TM201
TORQUE MONITOR

## OPERATION MANUAL

01JUL2018REV.3.01

UNIPULSE

Introduction

Thank you for purchasing the TM201 torque monitor.

TM201 is a dedicated USB interface for the UNIPULSE UTMⅡ series. This product can be used with devices which utilize UTMⅡ.

Be sure to read this operation manual before use in order to take full advantage of the superb quality of the TM201 and to use it properly and safely. Use this product with accurate understanding of the contents. Keep this operation manual in a safe place to be used for further reference.

PC TM201

UTMⅡ
rotating torque meter
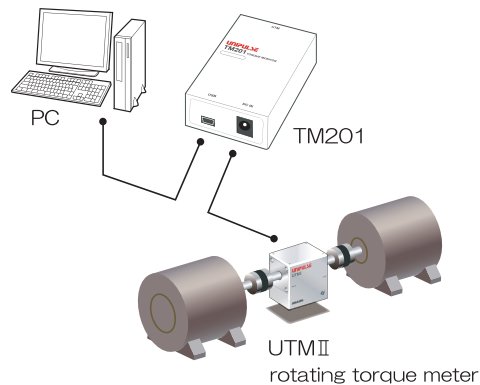
Safety precautions

Be sure to read for safety.

Make sure that installation, maintenance, and inspection of the TM201 are performed by personnel with electrical knowledge.

In this manual, precautions for safe use of the TM201 are described separately as ⚠ Warning and ⚠ Caution in the following text. The precautions described in this text are important contents regarding safety. Use this product with accurate understanding of the contents.

⚠ Warning

Events that may cause death or severe injury to personnel in case of misuse.

⚠ Caution

Events that may cause injury to personnel or material damage in case of misuse.

⚠️ **Warning** **Events that may cause death or severe injury to personnel in case of misuse.**

Design warning

● Prepare a safety circuit outside the TM201 so that the entire system functions safely if the TM201 fails or malfunctions.

● Be sure to contact our sales representative before use if the TM201 will be used in the following situations:
- In an environment not described in the operation manual;
- In a way that causes substantial effects on medical devices, transportation equipment, entertainment devices, safety devices, etc.

Installation warning

● Do not disassemble, repair or alter the TM201. Fire or electric shock may occur.

● Do not install the product in the following environments:
- Locations with corrosive gases or combustible gases;
- Locations over which water, oil, or chemicals splash.

Wiring warning

● Do not connect commercial power supply directly to the main unit.
(Be sure to use the dedicated AC adapter included.)

● Do not connect AC adapters other than the dedicated adapter included for the TM201 to the power input connector.

● Be sure to check wiring and so on carefully before turning the power on.

Startup/maintenance warning

● Use power supply voltage within the rated range.

● Do not damage the power cords. Fire or electric shock may occur.

● Electric shock may occur inside the main unit when the cover is opened.
Internal capacitors are charged even when power supply is cut off.
Contact us for inspection and repair of internal parts.

● In case of smoke, abnormal smell or abnormal noise, unplug the adapter from the outlet and the USB cable from the PC immediately.

⚠ **Caution** — Events that may cause injury to personnel or material damage in case of misuse.

Installation precautions

● Do not install the product in the following environments:
- Locations where temperature or humidity exceeds specifications;
- Locations subject to drastic temperature fluctuations or icing and condensing;
- Outdoors or locations above 2,000m;
- Locations exposed to direct sunlight;
- Locations subject to dust accumulation;
- Locations with poor ventilation;
- Locations with excessive salt and metal powder;
- Locations where the main unit is subject to direct vibration and shock.

● Perform adequate shielding if the product is used in the following locations:
- Near power lines;
- Locations subject to strong electric field and magnetic field;
- Locations subject to noise such as static electricity and relays.

● Install the product as far away as possible from equipment generating high frequency, high voltage, large current, surge, etc. Perform wiring of cables separately from these power lines. Do not perform parallel wiring and identical wiring.

● Do not use the product if it is damaged.

Startup/maintenance precautions

● Be sure to have a time interval of five seconds or longer between turning the power on and off or between the USB cable plugging in and unplugging.

● Use only after warming up for 30 minutes or longer following the start of power supply.

● Protective performance of the TM201 may be lost if it is not used as specified.

● Cleaning
- During cleaning, unplug the adapter from the outlet and the USB cable from the PC.
- Do not wipe with a wet cloth, benzine, thinner, alcohol, etc. Doing so may cause discoloration or deformation of the TM201. When dirty, clean the product with a cloth soaked in diluted neutral detergent and squeezed and then wipe with a soft, dry cloth.

Transportation precautions

● Although the TM201 is considered to be sufficiently shock absorbing during delivery, reusing the same packaging materials may damage the product when a shock is encountered. When sending this product to us for repair and so on, pack it with sufficiently shock-absorbing materials.

Disposal precautions

● Dispose of as industrial waste.

Product supporting RoHS Directive

The parts and accessories used in this product (including the operation manual, package box and so on) support RoHS Directive, which regulates the use of toxic substances that may have adverse effects on the environment and the human body.

RoHS Directive

RoHS stands for Restriction on Hazardous Substances. This is an EU regulation regarding toxic substances. This directive prohibits the use of six specific substances in electrical/electronic equipment sold in the EU region. The six substances include lead, mercury, cadmium, hexavalentchromium, PBB (polybrominated biphenyl) and PBDE (polybrominated diphenyl ether).

Contents

M E M O

1 Outline

1-1. Main features of the TM201

● This is a simple torque monitor to check and fetch the data of the rotation torque meter in the UTMⅡ series easily.

● In addition to torque, rotation speed and power can also be displayed on the PC.

● Up to 1000 files of waveform data from 0.1 to 1000 seconds can be fetched in CSV format on the PC.

● While fetching the waveform data, a level trigger function is available, which prompts fetching when a level change occurs in torque, rotation speed or power.

● Waveform data is displayed in graphs which are easy to check. Furthermore, the maximum, minimum and average values can also be displayed.

1-2. Package contents and accessories

The following items are included in the package box.
Be sure to check the contents before use.

TM201 main unit・・・One unit   TM201 setup guide・・・One copy   Dedicated AC adapter
for the TM201 (1.8m)・・・One piece
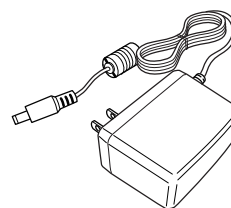
Cable for UTMⅡ connection (2m) ・・・One piece   miniB-PC
(with connector)   USB cable (1.8m)・・・One piece
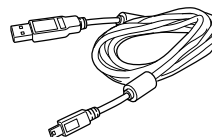
1-3. Dedicated PC application and operation manual (this manual)

A USB driver and the dedicated PC application are required to use the TM201. Download and install them from respective websites.

* Refer to P.6 "3-2.PC preparation" for details.

This manual can be downloaded from the UNIPULSE website or can be viewed in the help of the dedicated PC application.

When the dedicated PC application is updated, this operation manual may also be updated. Download the latest version of the operation manual or view the help of the dedicated PC application.

To download the manual, user registration (free) is required.

* https://www.unipulse.tokyo/en/product/tm201-2/

From ■ Download at the bottom of this page, the operation manual and software can be downloaded.

Download		
Product catalogue(PDF)		GC2017(131 KB)
Operation manual(PDF)		TM201_Guide Rev.3.01(576 KB)
		TM201_Manual Rev.3.01(2 MB) — Operation manual
		USB_setting Rev.1.00(368 KB)
External dimention	DXF (ZIP)	
	PDF	
Support tools		
Software		Software for USB interfaces for TM201 — Dedicated PC application

1-4. Connection with other devices

UTMⅡseris

USB

PC
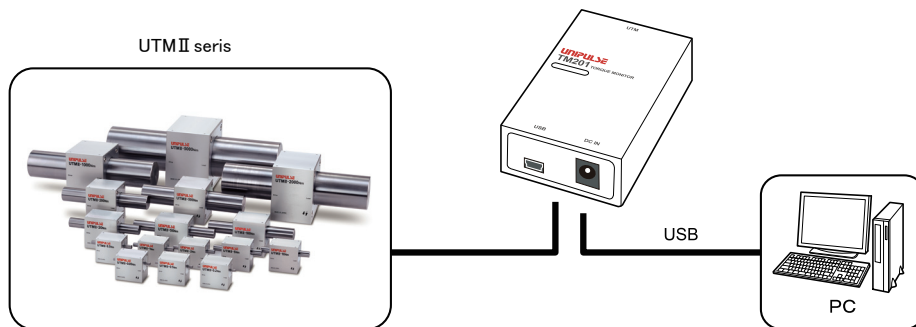
1-5. Part names and functions

UTM

UNIPULSE
TM201 TORQUE MONITOR

STATUS (green) lamp
ALM (red) lamp

USB   DC IN

UTMⅡ connection connector

Power input connector

USB connector
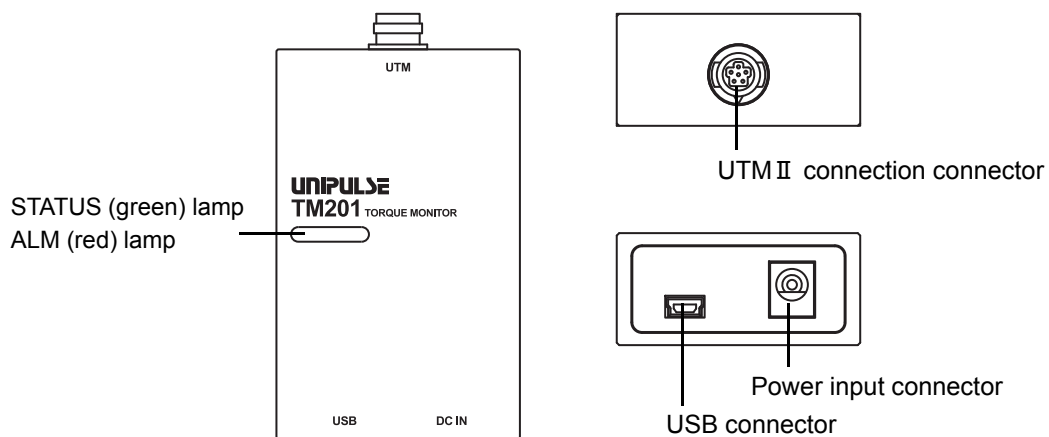
STATUS lamp (green)

UTMⅡ operation status is indicated.

Stop:	Slow flashes
Detect torque or rotation:	Fast flashes
Detect torque and rotation:	Lights on

* The status with torque indicates a condition where input of approx. ±0.1V or more is detected.

ALM lamp (red)

USB communication and power supply status from the AC adapter are indicated.

Normal:	Lights off
When the PC application is not communicating:	Lights on
When the AC adapter is not connected:	Slow flashes
Overload:	Fast flashes

* The overload indicates a condition where input of approx. ±6V or more is detected.

Power input connector

The dedicated AC adapter included for the TM201 is connected.
Input power is AC100 to 240V (-15%, +10%), free power supply. Frequency is 50/60Hz.

* Refer to P.4 "Connection of power input connector" for connection.

UTMⅡ connection connector

UTMⅡ is connected with the dedicated cable.

* Refer to P.4 "Connection of UTMⅡ" for connection.

USB connector

This part is connected to the PC with the USB cable included.

* Refer to P.5 "Connection of the USB cable" for connection.

1-6. Procedures for the first-time use

Set up the product following the procedures below.

1. Connect the AC adapter and UTMⅡ. Refer to P.4 "2-1.Connection procedure".

2. Install the USB driver and the dedicated PC application.
Refer to P.6 "3-2.PC preparation".
After installing this USB driver, connect the TM201 and PC with the USB cable.

Hereinafter, use the dedicated PC application to operate the TM201.

3. Set the sensor type. Refer to P.20 "3-6.Calibration tab" and perform calibration.

Once set, the torque and rotation speed can be checked in the waveform tab of the PC application.
Hereafter, set up the actual load calibration, filter and so on as required.

2   Connection

The following precautions are related to connection.

The precautions described in this text are important contents regarding safety.

Connect this product with accurate understanding of the contents.

⚠ Warning
● Do not connect commercial power supply directly to the main unit.
● Be sure to check the wiring and so on carefully before turning the power on.
● Be sure to use the dedicated AC adapter included for the TM201.

2-1. Connection procedure

■Connection of power input connector

The dedicated AC adapter for the TM201 is connected to
the power input connector of the main unit.
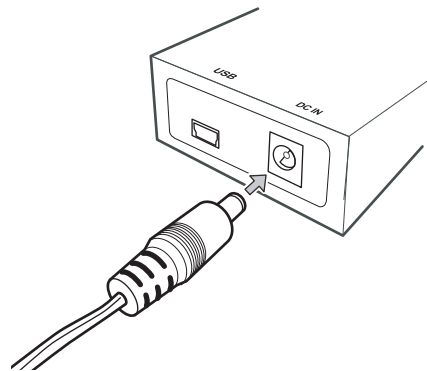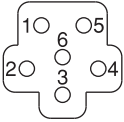
■Connection of UTMⅡ

The connection with UTMⅡ can be easily performed with the dedicated cable included. Both ends
of the connector have the same shape, and the cable is connected straight. Since the cable has no
directionality, either side of the connector may be connected to UTMⅡ and TM201.

Connect UTMⅡ while paying attention to the direction of the arrow on the connector.
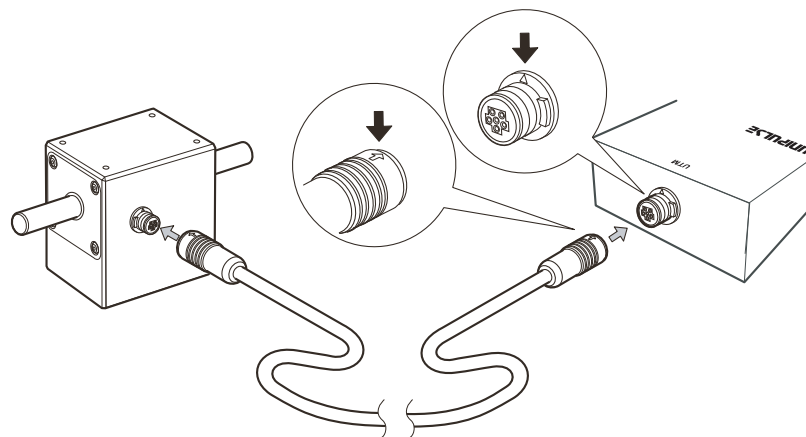
● Pin assignment

Pin-out	Pin number	Wire color	Signal name
	1	Red	PWR＋ (+24V)
	2	Black	PWR－ (0V)
	3	Green	SIG IN (±5V DC)
	4	White	SIG GND
	5	Yellow	PULSE IN＋
	6	Brown	PULSE IN－
	Shield	Braided wire	* The shield is not connected to the UTMⅡ case.

* The wire colors correspond with the color of cable included with UTMⅡ.
* Compatible connector: HR30-6P-6P (manufactured by HIROSE ELECTRIC CO., LTD.)
   (Model without optional connector: CN90)

Connection of the USB cable

The USB cable included enables easy connection to the PC.

Do not connect the USB cable if TM201 is being connected with the PC for the first time. Refer to P.6 "3-2.PC preparation" for connection procedures.

Once the USB cable is connected, the TM201 turns on due to power supply from the USB cable, and ALM (red) lamp or STATUS (green) lamp operates.
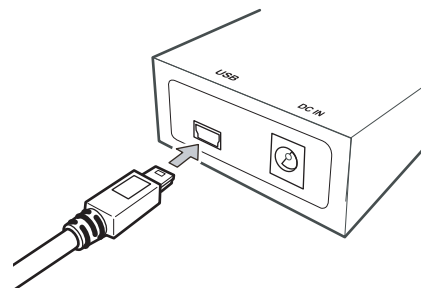
Connection to the outlet

After connecting to UTMⅡ, the AC adapter is connected to the outlet.
Input power is AC100 to 240V (-15%, +10%), free power supply. Frequency is 50/60Hz.

3   Setting Procedures

3-1.   USB interface

This USB interface allows the TM201 to be used in the dedicated PC application, such as retrieving the torque, rotation speed and power of UTMⅡ, writing setting values into the TM201 and so on.

■Communication specifications

Communication standard   USB Ver.2.0 compliant, full speed (12Mbps)
Connector   mini-B TYPE

3-2.   PC preparation

Please make sure to install USB drive and PC application prior to connecting TM201 to the PC for the first time.

■PC operating environment

OS	Windows7	CPU	Core i3 2GHz or above
Display	800×600 pixel or above	Memory	2GB or above
USB port	One or more free ports	Hard disk	15GB free space or more
USB driver	Virtual COM Port (VCP) Drivers (developed by FTDI Limited)		

■USB driver installation

Online network to perform automatic installation of driver.

Please go online network.

The driver automatically downloaded and installed via the network when TM201 connected to PC with the USB cable.

In case of failing driver installation or not starting of PC application software, you delete the USB driver and reconnect to PC. Please try again.

If it doesn't automatically perform installation, see the homepage of FTDI.

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

■USB connection

Following the installation procedures, connect the USB cable included to the PC.
The USB connector of the TM201 is mini-B TYPE.

■Check of virtual COM port

After installing this USB driver, connect the TM201 with the USB cable.

Next, check the virtual COM port number to which the TM201 is connected from the Device Manager of the PC.

Device Manager can be opened by double-clicking

the Device Manager in "Control Panel" from the Start menu.

Chapter 3

Setting Procedures
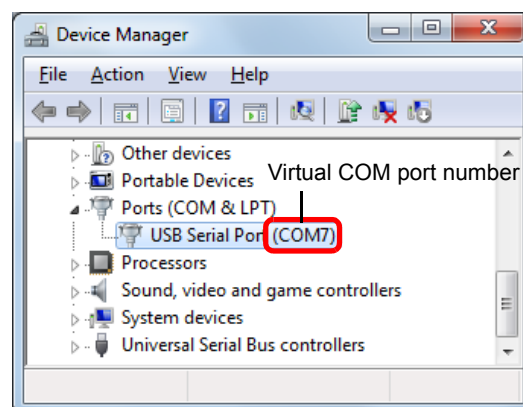
Key points

If the COM port number of the TM201 cannot be determined due to multiple USB Serial Ports and so on, unplug the USB cable once and confirm that one COM port is removed from the list of ports (COM and LPT). When the USB cable is reconnected to the previous connector, the number of COM ports displayed in the list increases. This number represents the COM port number of the TM201.

■Installation of the dedicated PC application

Download and install the dedicated PC application from the UNIPULSE website. To download the application, user registration (free) is required.

* https://www.unipulse.tokyo/en/product/tm201-2/

Download		
Product catalogue(PDF)	GC2017(131 KB)	
Operation manual(PDF)	TM201_Guide Rev.3.01(576 KB) TM201_Manual Rev.3.01(2 MB) USB_setting Rev.1.00(368 KB)	Operation manual
External dimention	DXF (ZIP)	
	PDF	
Support tools		
Software	Software for USB interfaces for TM201	Dedicated PC application

Download the compressed file to the PC from the download page

▼

Extract the compressed file on the PC and start up the installer

▼

Follow the procedure and complete the installation

■Turn-on of power supply

When connected to the PC with the USB cable, the power of the TM201 turns on.

■Startup of PC application

Double-click the shortcut of the TM201 on the desktop or click "UNIPULSE"→"TM201"→TM201 from the Start menu.

TM201

Shortcut

■Specification of COM port

Select the virtual COM port checked in the Device Manager of the PC on the start screen, click the "OK" button, and the PC application starts up.
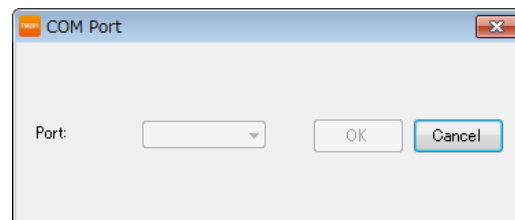
Once the PC application starts up,
the ALM lamp of the TM201 lights off.

If the lamp is a slow flash, check that power is supplied from the AC adapter, and if the lamp lights on, check that the virtual COM port of the TM201 has been properly selected in the PC application.

* If the number of enabled COM ports is one, the PC application starts up without displaying this selection screen.

Chapter 3

Setting Procedures

3-3. Menu

■File

From the file menu, saving and opening the waveform data and printing the screen can be performed.
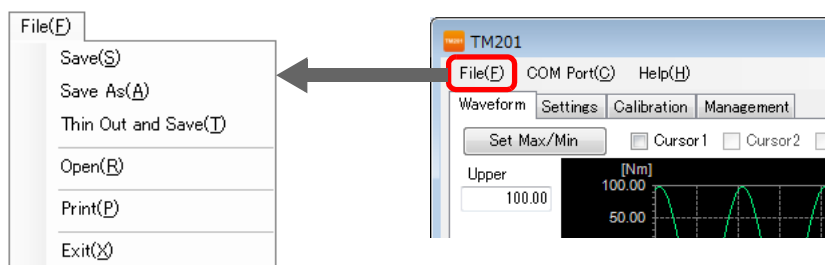
Save(S)

The setting of waveform display scale is overwritten on the file of the waveform data currently shown.

Save as(A)

The waveform data currently shown is saved with a new file name.

Thin out and save(T)

The acquired waveform data is thinned out and saved as a new file.
The original waveform file is not modified.
When this menu is selected, the screen on the right is displayed.

When x is specified in the range of 2 to 300 and "OK" is clicked, a file name can be input.
Once the file name is input, the file whose number of data is 1/x is created and saved.
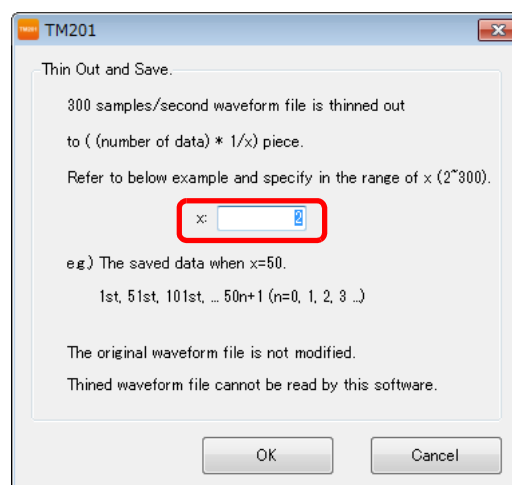
e.g.) The number of data and data number of the file to be saved (n = 0, 1, 2, 3 ...)

Original file
  300 samples/second   first, second, third, ... nth

When x = 2,
  150 samples/second   first, third, fifth, ... 2n+1th

When x = 50,
  6 samples/second   first, 51st, 101st, ... 50n+1th

When x = 300,
  1 sample/second   first, 301st, 601st, ... 300n+1th

Waveforms of the file thinned out and saved cannot be displayed with the PC application.

Open(R)

The saved waveform data is opened and its waveforms are displayed.

Print(P)

Screen hard copy is printed.

Exit(X)

This application software exits.

■COM port

Use this port when changing to the virtual COM port number of other TM201 or re-connecting it.
Refer to P.8 "Specification of COM port" for details.

■Help

Help and the PC application version information are displayed.
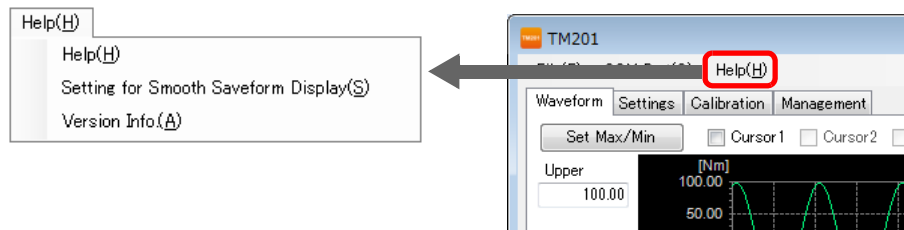
Help(H)

The operation manual (this manual) is displayed.

Setting for smooth waveform display(S)

Setting procedures are shown for displaying the waveforms smoothly that appear as in frame-by-frame advance.
Refer to the attached "USB Serial Port Setting Guide" for details.

Version info.(A)

The PC application version information is displayed.
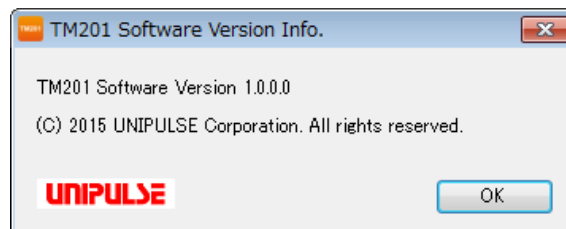
Version info

3-4. Waveform tab

Various indicated values such as torque, rotation speed and power as well as waveform data are acquired and displayed.
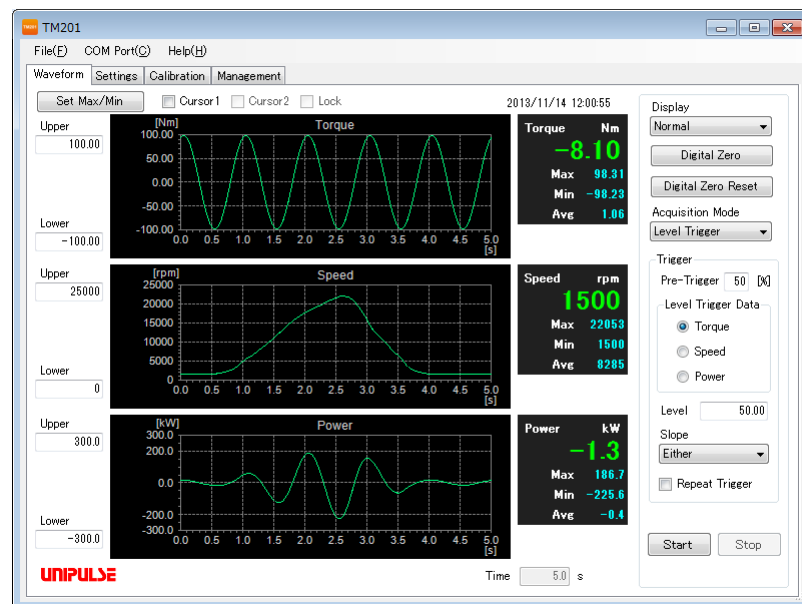
■Waveform tab
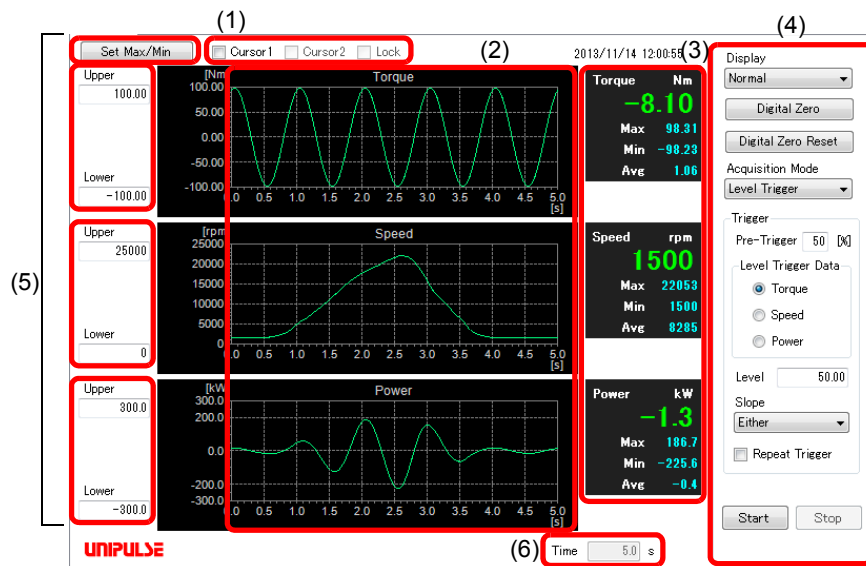
(1) Cursor display switch
Cursor display can be selected after waveform data is acquired or when historical data is shown.

(2) Waveform
Torque, rotation speed and power waveform are displayed from the upper section respectively.

(3) Indicated values
Current indicated values of the torque, rotation speed and power as well as the maximum, minimum and average values of the waveform data are displayed from the upper section respectively.

(4) Setting conditions for waveform acquisition
Settings related to the waveform display and data acquisition can be performed.
Refer to P.12 "Setting conditions for waveform acquisition" for details.

(5) Upper/Lower value

Upper value and lower value of the waveform display scale are specified.

<Setting value>   -1000000 to 1000000

(Digits after the decimal point differ depending on each decimal place of the calibration tab.)

Once the "Set Max/Min" button is clicked, the maximum and minimum values of each indicated value in (3) are set as upper value and lower value respectively and a graph is displayed in the whole frame.

Set Max/Min

(6) Acquisition time of waveform data

The length (time) of one waveform datum to be acquired is set.

<Setting value>   0.1 to 1000 [second]

■Setting conditions for waveform acquisition

(1) Display mode

Waveform display method is specified.

<Setting value>

Normal: Waveforms currently acquired are displayed.

History: Waveforms previously saved are displayed.

Normal

Waveforms can be acquired with the "Start" button. A maximum of 1000 waveforms are automatically saved.

History

When "History" is selected in display mode, the waveforms previously saved are displayed.

Upon selecting, the latest waveform is displayed.

The file name currently being displayed is shown in the upper section of the waveform.

While history is shown, the "Start" and "Stop" buttons switch to the "Prev." and "Next" buttons and a slider is shown above those buttons.

(1)
Display
Normal

Digital Zero

Digital Zero Reset

(2)
Acquisition Mode
Level Trigger

(3)
Trigger
Pre-Trigger   50   [%]

(4)
Level Trigger Data
○ Torque
○ Speed
○ Power

(5)   Level   50.00

(6)
Slope
Either

(7)   ☐ Repeat Trigger

(8)   Start   Stop

527
1 —○— 1000
Prev.   Next
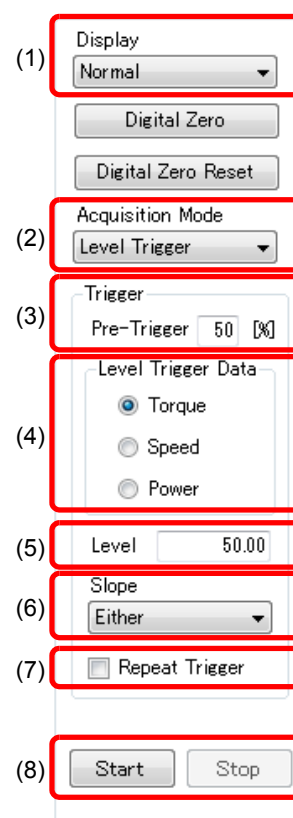
The left end of the slider represents the oldest file while the right end represents the latest file. When the slider is moved, the waveform currently being displayed switches accordingly. The file switches to the previous file when the "Prev." button is clicked and to the next new file when the "Next" button is clicked.

If the recording time of the waveform data to be displayed is more than a few minutes, it may take a few tens of seconds to display depending on the PC environment.

At this point, the ALM (red) lamp may lights on; however, this is not a failure. Once file reading is complete, the ALM (red) lamp lights off and is re-connected.

(2) Waveform acquisition mode

Waveform acquisition method is specified.

<Setting value>   Single/repeat/level trigger

Single: Once the "Start" button is clicked, waveform data acquisition starts, and waveform data is acquired until the acquisition time is reached.

Repeat: Once the "Start" button is clicked, waveform data acquisition starts, and waveform data is acquired until the acquisition time is reached. Thereafter, waveform data acquisition resumes and is repeated until the "Stop" button is clicked. Since the file is saved after the waveform data is acquired and before the next acquisition is started, data is not recorded during this time.

Level trigger: When the waveform data specified at the level trigger data in (4) for trigger, intersects the direction of level values in (5) specified at the slope in (6), waveform data acquisition starts and the acquisition continues until the acquisition time is reached.

(3) Pre-trigger

This is enabled when the level trigger is selected in waveform acquisition mode. Waveform data acquisition time before the trigger point is set in %.

<Setting value>   0 to 99 [%]

(4) Level trigger data

This is enabled when the level trigger is selected in waveform acquisition mode. Waveform data applicable to the trigger is specified.

<Setting value>   Torque (Torque)/rotation speed (Speed)/power (Power)

(5) Level

This is enabled when the level trigger is selected in waveform acquisition mode. Trigger level is set.

<Setting value>   -99999 to 99999

The setting value unit and decimal places are linked with the selection in the level trigger data.

(6) Slope

This is enabled when the level trigger is selected in waveform acquisition mode. The intersecting direction the trigger level is specified.

<Setting value>   Either/positive/negative

(7) Repeat trigger

This is enabled when the level trigger is selected in waveform acquisition mode. When repeat trigger is checked, the mode turns to state of standby for the trigger condition again after waveform acquisition. When the check is removed, waveform acquisition is performed once and is complete.

(8) "Start", "Stop" buttons
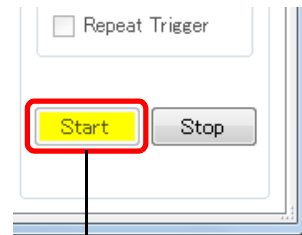
"Start" button

The "Start" button is enabled when the display mode is "Normal". The button cannot be clicked during waveform acquisition or in state of standby for the trigger condition. If waveform acquisition mode is "Single" or "Repeat", waveform data is acquired from the TM201 and waveforms are successively displayed when the "Start" button on the bottom right of the screen is clicked. If waveform acquisition mode is "Level Trigger", it turns to state of standby for the trigger condition. Once trigger condition is satisfied, waveform display starts.

"Start" button color

If waveform acquisition mode is "Level trigger", the start button color changes. The "Start" button remains yellow while waveform data for the pre-trigger time is being received after the "Start" button is clicked.

Yellow (pre-trigger in progress)

Waveform data for the pre-trigger time is received and the "Start" button turns green once it turns to state of standby for the trigger condition. However, when the pre-trigger is 0%, the button turns green immediately.

Green (state of standby for the trigger condition)

When the trigger conditions are satisfied, waveform data acquisition starts and the button turns red.
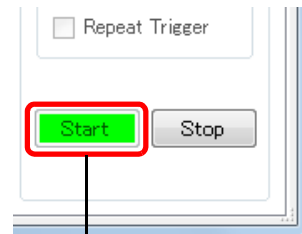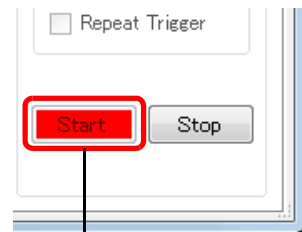
Red (data acquisition in progress)

When data acquisition is complete, the button turns to gray, and in Repeat Trigger setting, it turns to yellow as in pre-trigger.

After data acquisition, waveform (CSV) files are automatically saved. A maximum of 1000 files can be saved while old files can be automatically deleted. Refer to P.19 "Automatic deletion of waveform (CSV) files" of the setting tab.

"Stop" button

This button is enabled when the display mode is "Normal" and during waveform acquisition or during state of standby for the trigger condition. When the "Stop" button is clicked while waveform acquisition is in progress, the acquisition stops. When the "Stop" button is clicked during state of standby for the trigger condition, the wait state is canceled.

During state of standby for the trigger condition or waveform acquisition, operations and settings other than the "Stop" button cannot be performed. In order to perform graph setting and to switch to other tabs, the "Stop" button needs to be clicked.

When the "Stop" button is clicked during waveform acquisition, the values after this point in time are saved as "0" in waveform (CSV) file.

■Digital zero

Digital zero or digital zero reset is performed against torque.

Refer to P.38 "5-2.Digital zero" for details.

■Cursor

Cursor can be displayed after waveform data is acquired or when history waveform is shown.

(1) Cursor display selection

    When cursor 1 is checked, the first cursor is displayed and cursor 2 can be checked.

    When cursor 2 is checked, the second cursor is displayed and lock can be checked.

    When lock is checked, the range between the two cursors is locked.

    The two cursors can be moved with the range fixed.

(2) Cursor position

    The current position of the cursor is displayed as time.

    t1 represents time of cursor 1.

    Δt represents time interval between cursor 1 and cursor 2, and with which, cycles and so on can be checked.

    1/Δt is a reciprocal of Δt, and with which, frequencies and so on can be checked.

(3) Data value

    Each data value at the positions of cursor 1 and cursor 2 as well as the difference (Δ) are displayed.

Cursor movement

Cursors can be moved by a mouse or using <Tab>, <Home>, <End>, <←>, or <→> keys.
The cursors of torque, rotation speed and power move all together.

- <Home> key   The cursor is moved to the left end of the waveform being displayed.
- <End> key   The cursor is moved to the right end of the waveform being displayed.
- <Tab> key   The cursor is moved as much as 1/5th of the time range of the waveform
                              being displayed.
- <←>, <→>   The cursor can be moved to right and left with precision.

During zoom, the cursor can be used only in the range being displayed.

The cursor is disabled in the following cases:
- When waveforms are displayed after starting up the application;
- After switching from history mode to normal mode;
- While acquiring waveforms in normal mode;
- Time from file reading in history mode to displaying waveforms;
- When no reading files exist in history mode.

■Waveform zoom-in

Waveform display can be zoomed in.
The zoom menu appears when the right button of the mouse is clicked on the graph while
waveform is displayed.
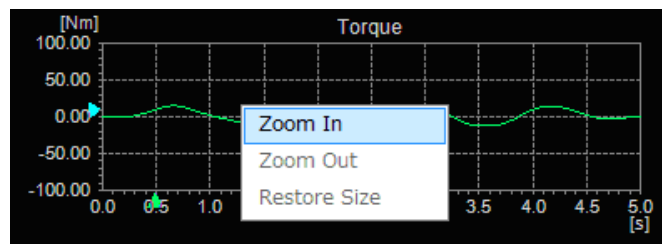
When "Zoom In" is selected from the menu that appears, the mouse pointer is displayed which
specifies the zoom-in area. Move the mouse to the starting point of the quadrangle of the zoom-in
display area, click the mouse, and specify the end point with the mouse.

Starting point

Zoom-in display area
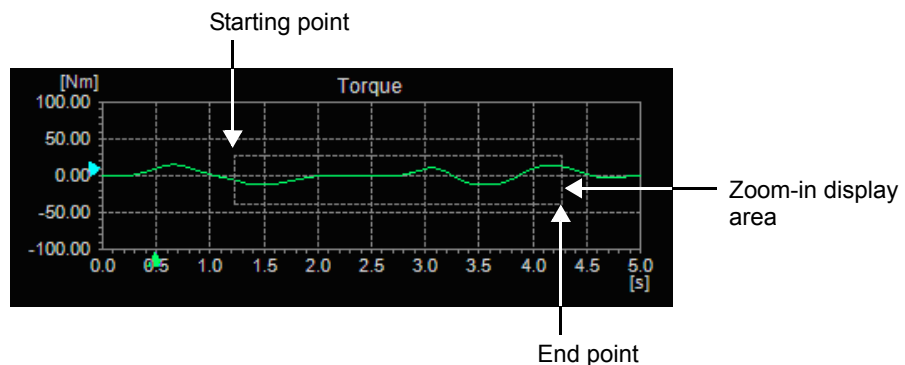
End point

The selected area is zoomed in and displayed after specifying the end point. Zoom-in display can be performed five times consecutively.
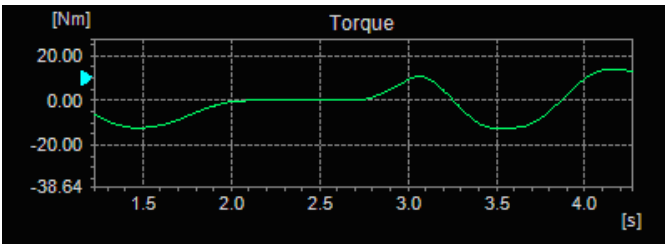
The graph can be scrolled in zoom-in display. Scrolling can be performed by dragging on the graph with the mouse.

To stop zoom-in display, select "Zoom Out"or "Restore Size" from the zoom menu.
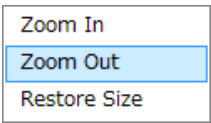
Restore the previous
zoom-in display condition
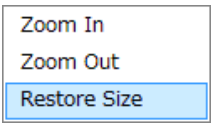
Stop zoom-in display

■Setting for smooth waveform display

In waveform tab, waveforms currently acquired may be displayed as in frame-by-frame advance. To smoothen the display, settings of the virtual COM port needs to be changed.

Refer to "USB Serial Port Setting Guide" or "Settings for Smooth Waveform Display" in the help menu of the PC application for setting procedure.

3-5. Setting tab

Setting related to the indicated values of the TM201 is performed.
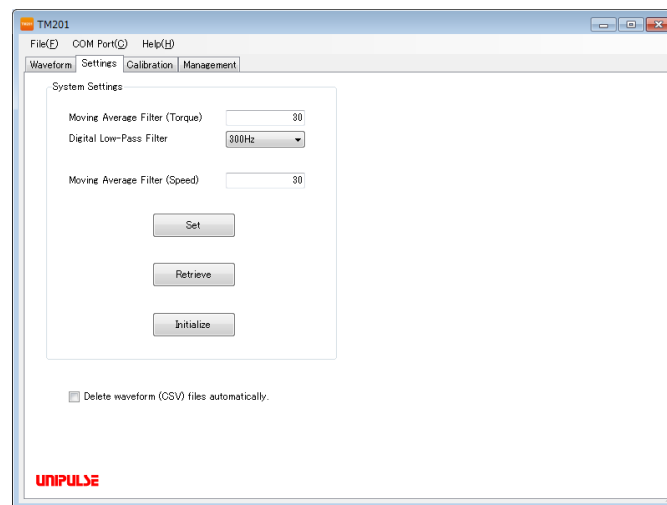
■System settings

Refer to P.38 "5.Function Description Related to Indicated Values" for description related to these values.

"Retrieve" button

System setting values are received from the TM201 all at once.

(Normally, these values are received at the startup of this application.)
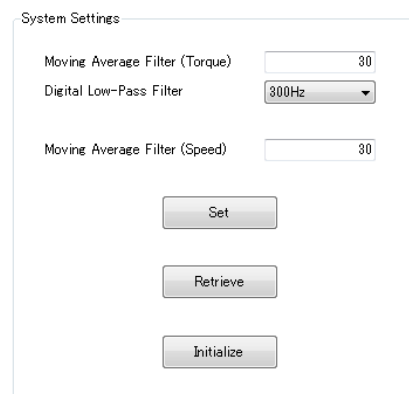
"Set" button

System setting values are written to the TM201 all at once.

When this button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".
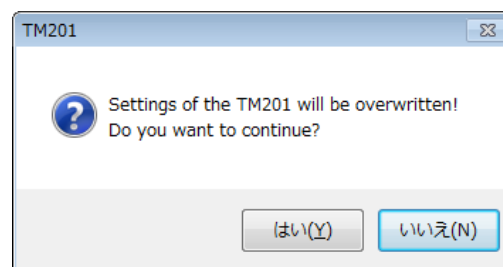
■Initialization of the system settings

"Initialize" button

System setting values inside the TM201 are initialized.

When this button is clicked, a confirmation dialog is displayed. With this operation, settings on the PC and inside the TM201 are initialized and cannot be restored; therefore, click the "Yes (Y)" button only when it is absolutely necessary to initialize.

When the system setting protection is ON, initialization cannot be performed.

Refer to P.44 "7-1.List of setting values" for default values.
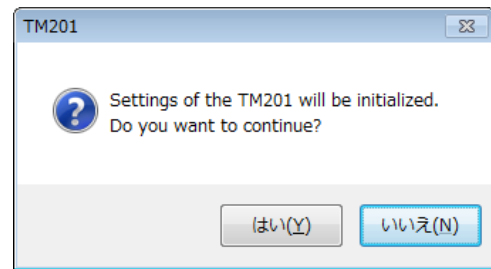
■Automatic deletion of waveform (CSV) files

When this item is checked, files are deleted from the oldest if the number of files exceeds 1000 after waveform data acquisition.

Remove this check to prevent automatic deletion.

Check

When the check is removed and the number of files exceeds 1000 after waveform data acquisition, the following confirmation dialog appears.
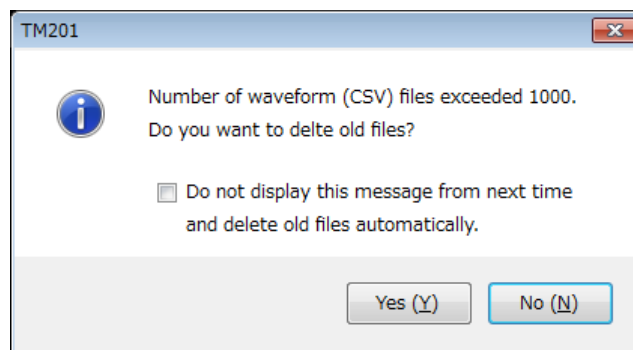
When the "Yes (Y)" button is clicked, old files over 1000 are deleted.

When the "No (N)" button is clicked, files are not deleted.

If "Do not display this message again ... and delete old files automatically." is checked and "Yes (Y)" is clicked, old files over 1000 are deleted and "Delete waveform (CSV) files automatically. " is checked. Files will be deleted automatically when waveform data files are saved next time.

History files are saved in "My Documents\UNIPULSE\TM201" directory.

Chapter
3

Setting Procedures

3-6. Calibration tab

Setting of sensor type and setting and calibration related to the TM201 calibration values are performed.
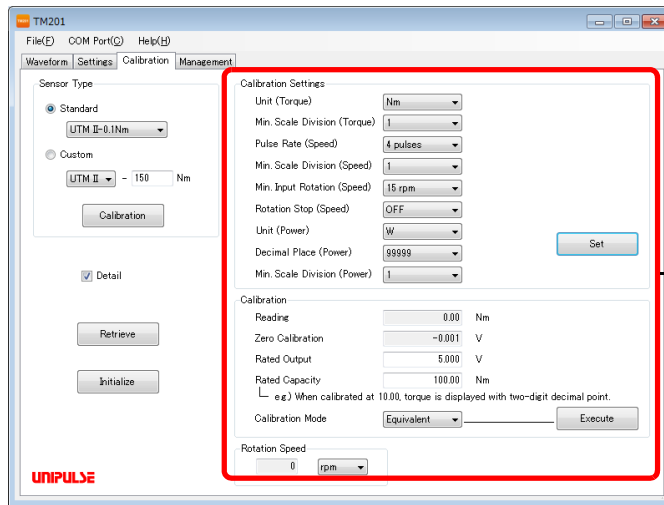
Detail items
(Calibration setting,
calibration, rotation speed)

■Detail

When this item is checked, detail items related to calibration (calibration setting, calibration, rotation speed) are displayed. If this check is removed, this item is not displayed (default).

Check

■Sensor type

Select the type of UTMⅡ connected and start calibration.
Refer to P.26 "4-2.Sensor type setting and calibration" for details.
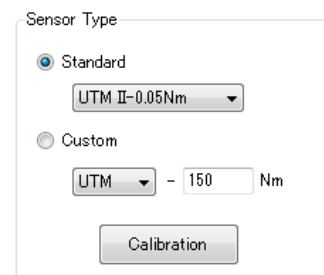
■Retrieve calibration settings
"Retrieve" button

Calibration setting values are received from the TM201 all at once.
(Normally, these values are received at the time of this application startup.)

■Initialization of calibration settings
"Initialize" button

Calibration setting values inside the TM201 are initialized.
When this button is clicked, a confirmation dialog is displayed. With this operation, settings on the PC and inside theTM201 are initialized and cannot be restored; therefore, click the "Yes (Y)" button only when it is absolutely necessary to initialize.
When the calibration setting protection is ON, initialization cannot be performed.
Refer to P.44 "7-1.List of setting values" for default values.
Calibration itself is not performed.

■Calibration settings

Setting related to calibration is performed.

Refer to P.29 "4-3.Procedures of equivalent input calibration and actual load calibration (torque)" for description related to these values.

"Set" button

Calibration setting values are written to the TM201 all at once.

When this button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".

■Calibration

Torque calibration is performed.

Refer to P.29 "4-3.Procedures of equivalent input calibration and actual load calibration (torque)" for the description.

■Rotation speed

Unit of rotation speed is specified.

This setting is used only in displaying this application and is not applied to the TM201.

  <Setting value> rpm, min-1

3-7. Management tab

Setting of comment to be recorded in history files, switching of setting protection, and self-check are performed.
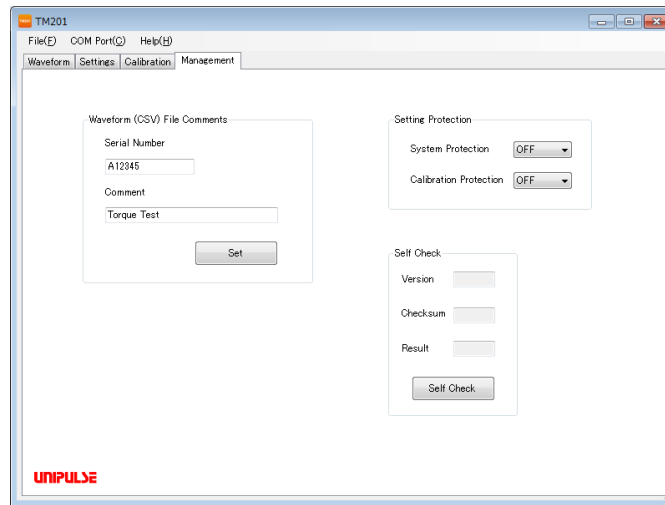
■Waveform (CSV) file comments

Display and setting of the serial number and comment set in the TM201 are performed.

These items are recorded as a comment in the waveform data file.

These settings are arbitrary.

If the comment is rewritten, click the "Set" button and apply it to the TM201.

<Number of characters allowed>

Serial number   15 byte
Comment   30 byte

> **Key points**
>
> , (comma), ; (semicolon), ' (single quote), and " (double quote) cannot be used.
> If these are input and the setting button is pressed, these are rewritten with_ (underscore).

■Setting protection

The lock to prevent rewriting can be set to each category of the setting values.

Since this setting change is sent to the TM201 immediately, there are no buttons like "Set".

<Setting value>

OFF   Setting values are rewritable.

ON   Setting values are not rewritable.

Key points

Refer to P.44 "7-1.List of setting values" for setting items prohibited to be rewritten in the setting protection.

■Self check

"Self Check" button

Self-check is a function to check the memory of the TM201 main unit automatically and to detect errors.

It is also a function that performs checksum of software, operation check of NOVRAM and RAM, and check of lamp lighting. This function does not diagnose the analog circuit.

When the "Self Check" button is clicked, operation of the TM201 is checked, and the software version of the TM201, checksum and results are displayed.

During self-check, the STATUS (green) lamp and ALM (red) lamp all light off → light on (green) → light on (red) → all light on. Once the self-check is complete, the display returns to normal.

If the check is complete normally, "PASS" is displayed in the result.

If an error is detected in the TM201, "NGXX" is displayed in the result. (XX represents a 2-digit number.)

⚠ Caution

● If "NGXX" is displayed, it may be a sign of failure. (XX represents a 2-digit number.) Contact one of our sales representatives.

Chapter **3**

Setting Procedures

3-8. Exiting procedure

■PC application exiting

Click "File" → "Exit" from the menu, a confirmation dialog appears, and click "OK".
If the ALM (red) lamp of the TM201 main unit lights off and then lights on, it shows that the PC application has exited.
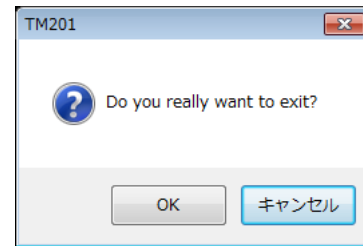
■Cable removal

1. Remove the AC adapter from the outlet.

2. Confirm that the PC application has exited, and remove the USB cable from the PC and the TM201.

3. Remove the cable and AC adapter connected to UTMⅡ.
(There is no need to use the "Remove Hardware Safely" feature to disconnect the USB cable of the TM201 from the PC.)

4 Calibration

4-1. Calibration

"Calibration" is the operation of matching the TM201 with UTMⅡ.
This operation is performed on the "Calibration" tab of the PC application.
The following two kinds of calibration methods are available for the TM201.

The calibration in the sensor type setting is the equivalent input calibration; normally, only this is used.
Refer to P.29 "4-3.Procedures of equivalent input calibration and actual load calibration (torque)" when performing the actual load calibration.
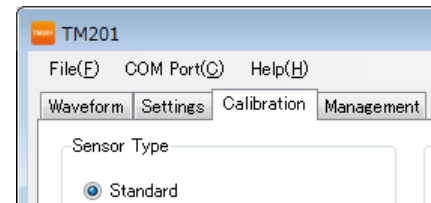
■Equivalent input calibration

In this calibration method, only the rated output value (V) and the rated capacity value (one to be displayed) of UTMⅡ are input. This method does not involve actual load. Calibration can be easily performed even when actual load cannot be applied.

For example, the gain is automatically determined by entering the following values:

In case of UTMⅡ-0.1Nm:	5.000V－0.100Nm
In case of UTMⅡ-2Nm:	5.000V－2.000Nm
In case of UTMⅡ-50Nm:	5.000V－50.00Nm
In case of UTMⅡ-100Nm:	5.000V－100.00Nm

■Actual load calibration

In this calibration method, the known torque load is applied onto UTMⅡ and the torque is input. Accurate calibration with minimal error can be performed.

* Only actual load calibration or equivalent input calibration can be performed.
 If actual load cannot be applied, make sure to perform the equivalent input calibration only.

4-2. Sensor type setting and calibration

■Standard

Select the type of UTMⅡ connected.

Chapter 4
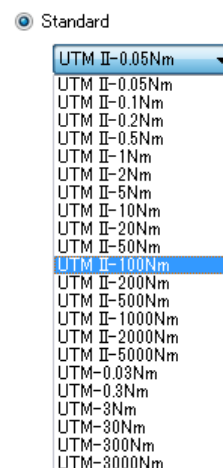
Calibration

■Custom

Select UTMⅡ/UTM and input the rated capacity.
The rated capacity unit is Nm.

If using UTMⅡ not in the standard list, select custom.
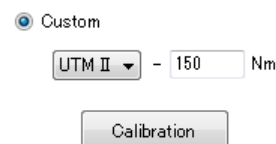
■Calibration

By setting the sensor type or clicking the "Calibration" button, the following dialog is displayed. Click "OK" to start calibration.

Once the calibration starts, display conditions of torque, rotation speed and power can be selected in order.
Selection screens are displayed in the following order. Select the appropriate condition respectively and click "OK".
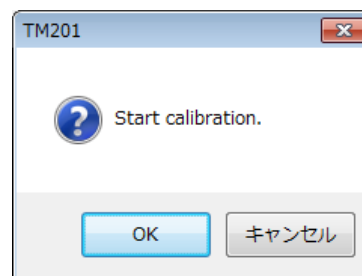
Click "Return" to go back to the previous selection screen and "Cancel" to stop the calibration. Setting cannot be changed once canceled.

🔍 Key points

When the calibration setting protection is ON, calibration cannot be performed. Follow (1) and (7) of P.29 "4-3.Procedures of equivalent input calibration and actual load calibration (torque)" to change the setting.

(1) Unit (torque)
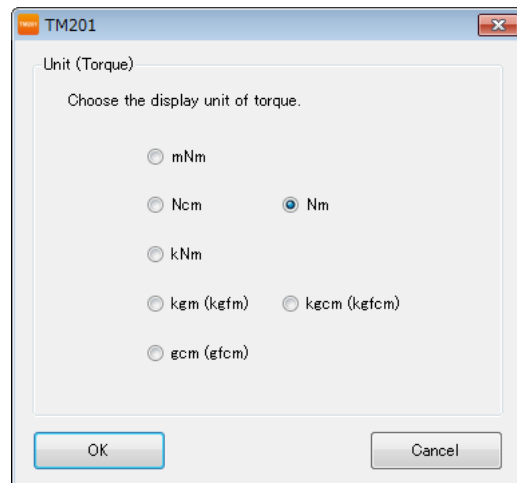
(2) Decimal place (torque)
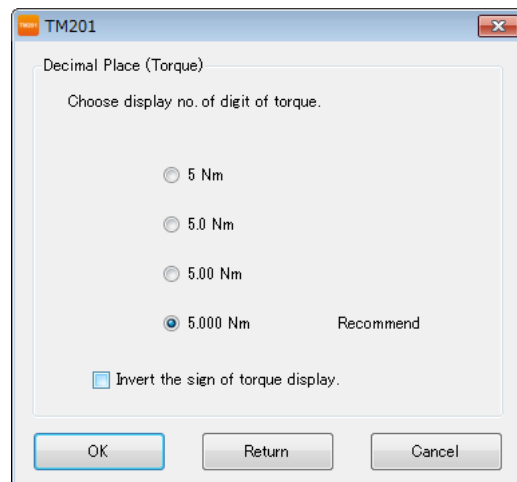
Check

* Check "Invert the sign of torque display." to invert plus or minus of the torque display.

(3) Unit (rotation speed)

(4) Unit (power)

TM201
Unit (Power)
Choose the display unit of power.

- ○ mW
- ● W
- ○ kW
- ○ PS
- ○ HP

OK　Return　Cancel

(5) Decimal place (power)

TM201
Decimal Place (Power)
Choose the display no. of digit of maximum power.

- ○ 99999 W
- ○ 9999.9 W
- ● 999.99 W
- ○ 99.999 W

OK　Return　Cancel
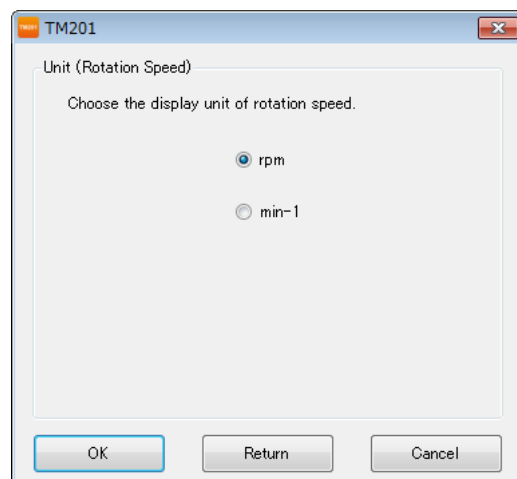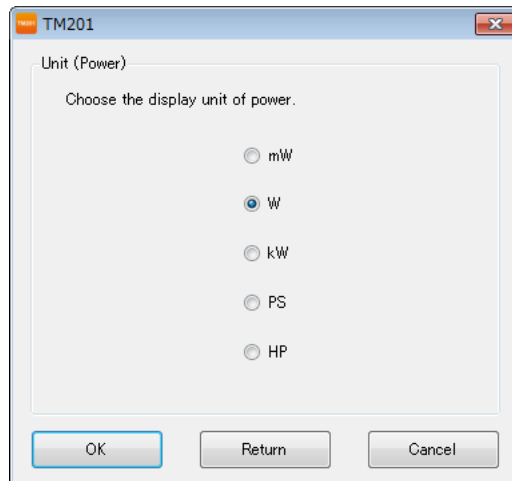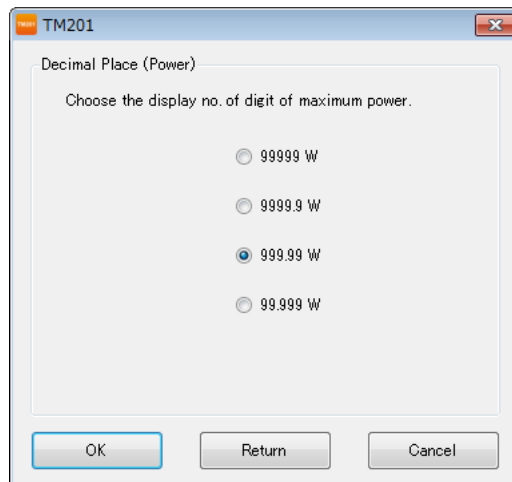
(6) Equivalent input calibration/zero calibration

TM201
Calibration is performed. Please set torque to unloaded condition.

OK　キャンセル
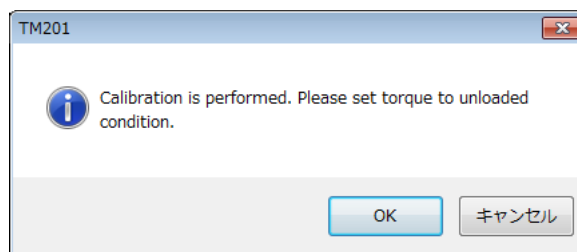
Based on the above conditions, equivalent input calibration and zero calibration are automatically performed. Set the torque to the unloaded condition and click "OK".

Key points

Min. scale division of torque, rotation speed and power is set to 1.
Furthermore, pulse rate is automatically set taking the sensor type into account.
Refer to P.29 "4-3.Procedures of equivalent input calibration and actual load calibration (torque)" and P.34 "4-4.Display setting of rotation speed/power" for these setting values.

4-3. Procedures of equivalent input calibration and actual load calibration (torque)

Equivalent input calibration and actual load calibration are performed in the following procedures, and check "Detail" to display detail items.

(1) Calibration setting protection	Calibration setting protection that prevents calibration is turned OFF ("Management" tab).
★ (2) Unit (torque)	The unit is set according to UTMⅡ used.
(3) Min. scale division (torque)	Minimum value of the digital change desired is set. (Optional if there is no change.)
★ (4) Calibration setting PC → TM201	Calibration setting is written to the TM201.
★ (5) Zero calibration	UTMⅡ is set to unloaded condition (where no torque load is being applied to UTMⅡ) and the zero point is registered.
★ (6) a. Equivalent input calibration / (6) b. Actual load calibration　or	**Equivalent input calibration** Rated output value and rated capacity value of UTMⅡ are registered. **Actual load calibration** The known torque load is applied to UTMⅡ and the torque is registered.
(7) Calibration setting protection	Calibration setting protection is turned ON to avoid operational errors ("Management" tab).

★ ... Be sure to perform the setting.

(1) Release of calibration setting protection

Calibration setting protection is set to OFF.
Only this setting is performed in the "Management" tab.

　<Setting value>
　　OFF　　Setting values are rewritable.
　　ON　　Setting values are not rewritable.

Setting Protection

System Protection　OFF

Calibration Protection　OFF / OFF / ON

(2) Unit (torque) setting

The unit of torque for calibration is selected.

Unit (Torque)

<Setting value>
mNm, Ncm, Nm, kNm, kgm (kgfm),
kgcm (kgfcm), gcm (gfcm)
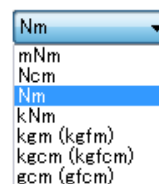
(3) Min. scale division (torque) setting (optional if there is no change.)

Min. scale division of the torque (scale interval, scale division) is selected.

Min. Scale Division (Torque)

<Setting value>
1, 2, 5, 10, 20, 50, 100
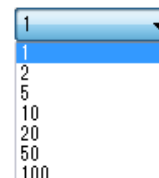
(4) Calibration setting is written to the TM201

The values selected in (1) to (3) are written to the TM201 in the following procedures.

■ Execution procedure

1. Click the "Set" button.

2. When the "Set" button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".
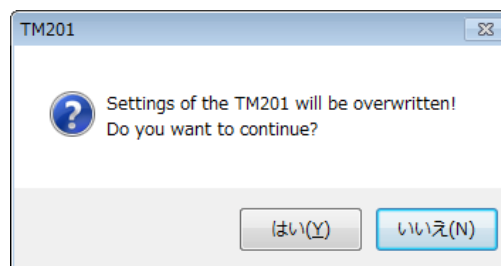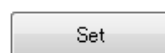
(5) Zero calibration

Zero point is registered while torque load is not applied to UTM II. Furthermore, if the initial torque remains in the jig and so on for the purpose of measurement, the zero point may be registered while the initial torque is being applied; however, the initial torque range needs to be subtracted from the signal input range.

■ Execution procedure

1. Select "Zero" for calibration mode.
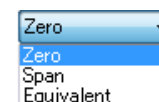
2. Click the "Execute" button.
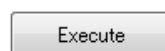
3. When the "Execute" button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".
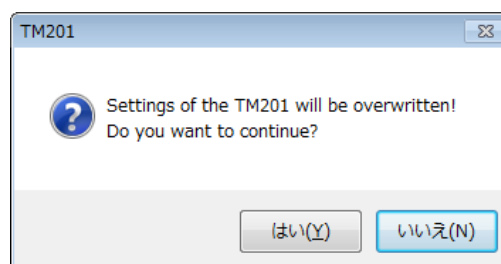
(6) a. Equivalent input calibration

Rated output and rated capacity of UTM II are registered.

<Setting value>

Rated output [V]:	-6.000 to 6.000 (excluding 0)
Display value (Rated capacity):	

In case of zero-digit decimal point:	-99999 to 99999 (excluding 0)
In case of one-digit decimal point:	-9999.9 to 9999.9 (excluding 0.0)
In case of two-digit decimal point:	-999.99 to 999.99 (excluding 0.00)
In case of three-digit decimal point:	-99.999 to 99.999 (excluding 0.000)

■ Execution procedure

1. Input the rated output and rated capacity.
(The rated capacity unit depends on the setting of (2).)
Refer to P.33 "Input procedure of rated capacity" for input procedure.

Rated Output   5.000 V
Rated Capacity   100.00 Nm

2. Select "Equivalent" for calibration mode.

Calibration Mode   Equivalent ▼
Zero
Span
Equivalent

3. Click the "Execute" button.

Execute

4. When the "Execute" button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".

TM201

Settings of the TM201 will be overwritten!
Do you want to continue?

はい(Y)   いいえ(N)

○ Key points

Set the display value (rated capacity) that has been converted according to the set torque unit and decimal place.
Refer to P.37 "4-6.Unit conversion table" for unit conversion table.

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4

Calibration

(6) b. Actual load calibration

The known torque is applied to UTMⅡ and the torque is registered.

<Setting value>

In case of zero-digit decimal point:	-99999 to 99999 (excluding 0)
In case of one-digit decimal point:	-9999.9 to 9999.9 (excluding 0.0)
In case of two-digit decimal point:	-999.99 to 999.99 (excluding 0.00)
In case of three-digit decimal point:	-99.999 to 99.999 (excluding 0.000)

When actual load calibration is performed, the input voltage from UTMⅡ at the time of execution is the rated output. The input voltage at which the actual load calibration was performed can be checked.

However, the voltage does not change when an error occurs.

Key points

Set the display value (rated capacity) that has been converted according to the torque unit and decimal place set.
Refer to P.37 "4-6.Unit conversion table" for unit conversion table.

■ Execution procedure

1. Input the rated capacity.
(The unit depends on the setting of (2).)
Refer to P.33 "Input procedure of rated capacity" for input procedure.

Rated Capacity   100.00   Nm

2. Select "Span" for calibration mode.

Calibration Mode   Span
Zero
Span
Equivalent

3. Click the "Execute" button.

Execute

4. When the "Execute" button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".

TM201

Settings of the TM201 will be overwritten!
Do you want to continue?

はい(Y)   いいえ(N)
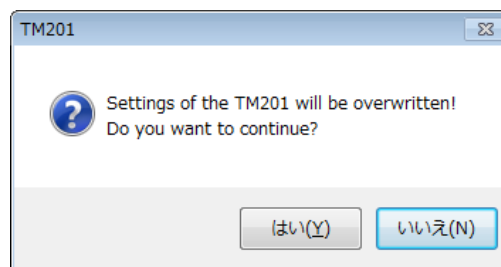
(7) Locking of calibration setting protection

Protection is turned ON to avoid operational errors.
Only this setting is performed in the "Management" tab.

Setting Protection

System Protection   OFF

Calibration Protection   ON
OFF
ON

<Setting value>

OFF	Setting values are rewritable.
ON	Setting values are not rewritable.

Chapter
4

Calibration

■ Input procedure of rated capacity

Decimal place and enabled number of digits of torque are determined according to the input value of the rated capacity.

The possible number of digits for setting is up to five in total and up to three after the decimal point.

e.g.) When UTMⅡ-10Nm is used

i) When rated capacity is 10Nm

Torque readings
-10, -9, ... 0, 1, ... 9, 10

ii) When rated capacity is 10.0Nm

Torque readings
-10.0, -9.9, ... 0.0, 0.1, ... 9.9, 10.0

iii) When rated capacity is 10.00Nm

Torque readings
-10.00, -9.99, ... 0.00, 0.01, ... 9.99, 10.00

iv) When rated capacity is 10.000Nm

Torque readings
-10.000, -9.999, ... 0.000, 0.001, ... 9.999, 10.000

v) When rated capacity is 10.0000Nm

Four-digit decimal point cannot be set.
The following error message appears when the calibration is performed, and the rated capacity is rewritten to the settable digits.

Warning

⚠ Number of digits of Rated Capacity exceeds the limit.
The value is rounded to the possible calibration digit.

OK
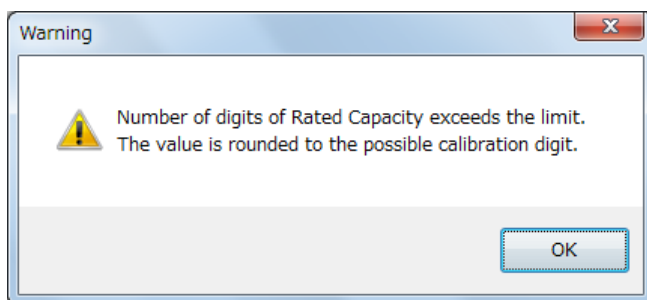
🔍 Key points

Negative value can be input to the rated capacity.
At this point, the sign of the torque readings can be inverted.

Rated Capacity　　[−10.00]　Nm

4-4. Display setting of rotation speed/power

Settings related to display of the rotation speed and power are performed.

(1) Pulse rate (rotation speed) setting

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

Pulse Rate (Speed)　　4 pulses
　　　　　　　　　　　　1 pulse
　　　　　　　　　　　　4 pulses

　　<Setting value>
　　　1 pulse, 4 pulses

(2) Min. scale division (rotation speed) setting

Select the min. scale division (display resolution, scale division) of the rotation speed.

Min. Scale Division (Speed)　1
　　　　　　　　　　　　　　1
　　　　　　　　　　　　　　2
　　　　　　　　　　　　　　5
　　　　　　　　　　　　　　10

　　<Setting value>
　　　1, 2, 5, 10

(3) Unit (power) setting

Select the unit of power.
The decimal place is not automatically changed.

Unit (Power)　　W
　　　　　　　　mW
　　　　　　　　W
　　　　　　　　kW
　　　　　　　　PS
　　　　　　　　HP

　　<Setting value>
　　　mW, W, kW, PS, HP

(4) Decimal place (power) setting

Select the decimal place of the power.
The unit is not automatically changed.

Decimal Place (Power)　99999
　　　　　　　　　　　　99999
　　　　　　　　　　　　9999.9
　　　　　　　　　　　　999.99
　　　　　　　　　　　　99.999

　　<Setting value>
　　　99999, 9999.9, 999.99, 99.999

(5) Min. scale division (power) setting

Select the min. scale division (display resolution, scale division) of the power.

Min. Scale Division (Power)　1
　　　　　　　　　　　　　　1
　　　　　　　　　　　　　　2
　　　　　　　　　　　　　　5
　　　　　　　　　　　　　　10

　　<Setting value>
　　　1, 2, 5, 10

Key points

The power is calculated according to the internal conversion based on the unit and decimal place setting. Therefore, do not change these settings without due consideration. Perform re-calibration to change these settings.
Refer to P.37 "4-6.Unit conversion table" for unit conversion table.

(6) Calibration setting is written to the TM201.

The values selected in (1) to (5) are written to the TM201.

■ Execution procedure

1. Click the "Set" button.

2. When the "Set" button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".
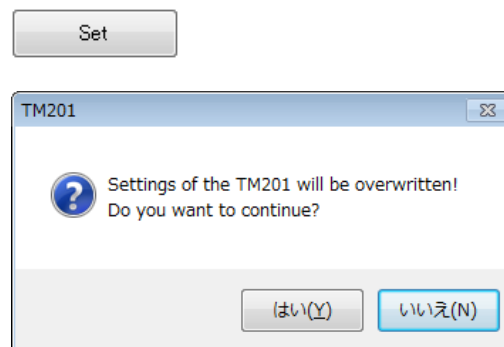
4-5. Rotation stop settings for rotation speed

■Minimum input rotation speed

Minimum input rotation speed that can be displayed is selectable.

≪Setting value≫

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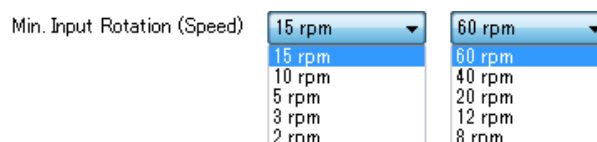
Example) When set at "2rpm"

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.
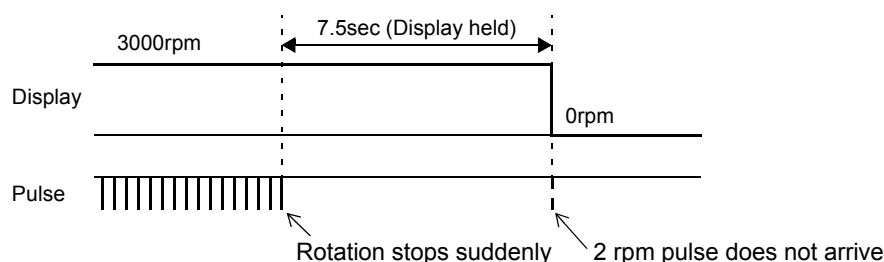
■Rotation stop mode

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≫

Rotation Stop (Speed)

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.

2 times, 4 times, 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"
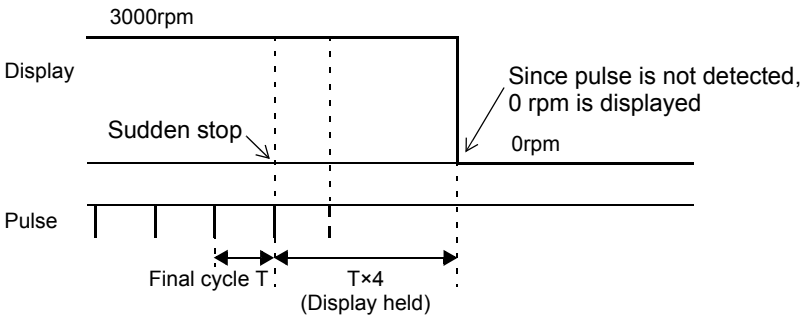
Example) When decelerated suddenly with the setting of "4 times"
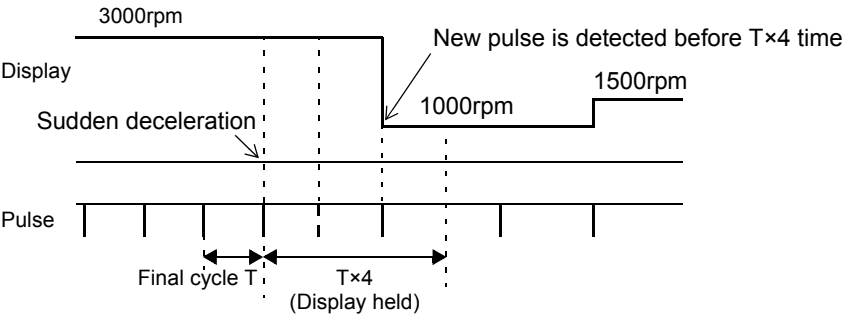
4-6. Unit conversion table

Refer to the tables when calibrating the torque and power and when setting the unit.

■Unit conversion table of torque

	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

■Unit conversion table of power

	mW	W	kW	PS	HP
mW	1	10^{-3}	10^{-6}	1.3596×10^{-6}	1.341×10^{-6}
W	10^{3}	1	10^{-3}	1.3596×10^{-3}	1.341×10^{-3}
kW	10^{6}	10^{3}	1	1.3596	1.341
PS	7.355×10^{5}	7.355×10^{2}	0.7355	1	0.9863
HP	7.457×10^{5}	7.457×10^{2}	0.7457	1.01387	1

Chapter 4

Calibration

5   Function Description Related to Indicated Values

5-1.   Indicated values

Torque

Analog signals (±5V) from UTMⅡ are displayed as torque.

Rotation speed

Pulse signals from UTMⅡ are displayed as rotation speed.

Power

Power calculated from torque and rotation speed are displayed.

Power [W] = 2π X torque [Nm] X rotation speed [rpm] / 60

🔍 Key points

Based on these data, torque/power attributes of the rotation speed can be obtained.

5-2.   Digital zero

This is a function to set the torque readings to zero.
The digital zero reset function that releases digital zero is also included.

■ Execution procedure

1. Switch the PC application screen to the "Waveform" tab.

2. Click the "Digital Zero/Digital Zero Reset" button.
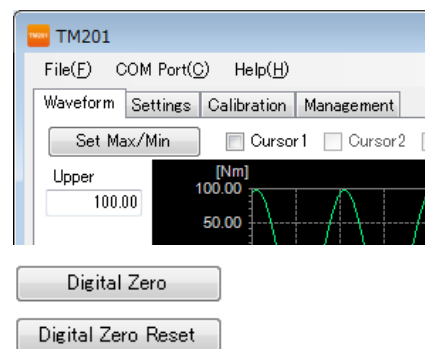
This button cannot be clicked in state of standby for the trigger condition or during waveform acquisition.

🔍 Key points

When digital zero reset is performed, the condition before digital zero correction is restored.

5-3. Moving average filter

This filter takes the moving averages of converted data and reduces fluctuation of indicated values. The fluctuation of indicated values can be reduced further by performing this function more number of times; however, response to input becomes slower. Torque and rotation speed can be individually set.

<Setting value>
OFF (0), 2 to 300 [times]
* One time represents one sampling of A/D convert.

■ Execution procedure

1. Switch the PC application screen to the "Settings" tab.

2. Input values in the moving average filter (torque)/moving average filter (rotation speed) respectively.

3. When writing setting values to the TM201, click the "Set" button.

4. When the "Set" button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".
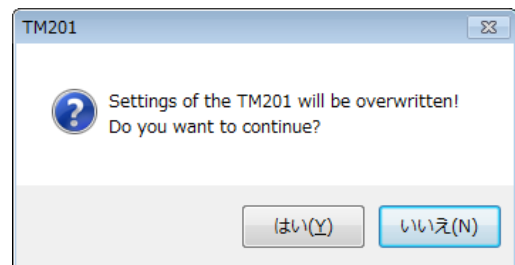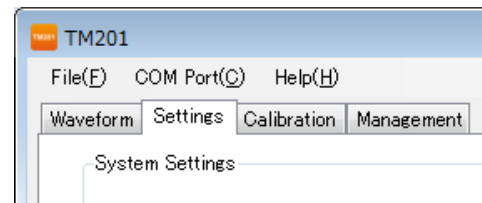
5-4. Digital low-pass filter

This function is a low-pass filter (allowing only signals below specific frequency to pass and attenuating signals above the frequency) that performs digital filter processing against the converted data and cancels unnecessary noise. The higher the cut-off frequency, the quicker the response, but noise may also be displayed. This filter can be set to torque.

<Setting value>
　　　3, 30, 300, Off [Hz]

■ Execution procedure

1. Switch the PC application screen to the "Settings" tab.

2. Select the cut-off frequency of the digital low-pass filter.

3. When writing setting values to the TM201, click the "Set" button.

4. When the "Set" button is clicked, a confirmation dialog to overwrite is displayed, and click "Yes (Y)".
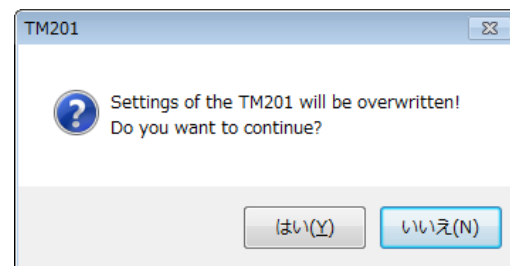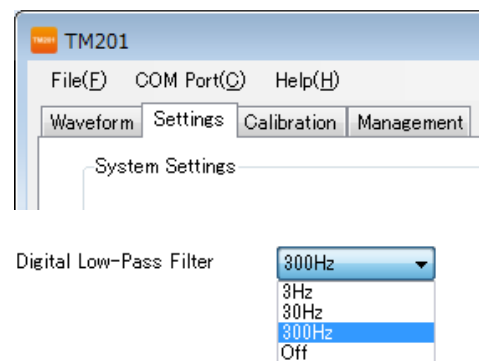
6   Specifications

6-1. Specifications

■UTMⅡ interface
DC-input for torque

Input resistance	1MΩ
Signal input range	±5V
Non-linearity	0.02%/F.S.±1digit
Zero drift	0.2mV/℃ RTI or less
Gain drift	0.01%/℃ or less
Analog filter	First-order low-pass filter (-6dB/oct)
	Fixed at 1k Hz
Sampling speed	300 times/second
A/D resolution	24 bit binary
	Approx. 1/30000 against 5V

Pulse input for rotation speed (open collector input)

Maximum input frequency	According to the output frequency of the UTMⅡ series
Minimum input frequency	15, 10, 5, 3, 2 rpm selectable * Pulse rate: 4 pulses
	60, 40, 20, 12, 8 rpm selectable * Pulse rate: 1 pulse
Minimum detected pulse range	50μs
Circuit configuration	No-voltage contact input (minus common)
	Open collector can be connected (Ic = approx. 10mA)

Drive power supply for UTMⅡ

Power supply voltage	DC24V * Up to one unit of UTMⅡ

■Display section

Status display	LED (red):	Power supply/alarm
	LED (green):	UTMⅡ in operation

■USB interface

Communication standard	USB Ver.2.0 compliant, full speed (12Mbps)
Virtual COM port	Used in the dedicated PC application
Connector	mini-B TYPE

■General performance

Power supply voltage	AC100 to 240V (-15%, +10%) [Free power supply 50/60Hz]
	* Using the AC adapter included
Power consumption	8W max (AC adapter)
Operating conditions	Temperature: Operating temperature 0 to +40℃
	Storage temperature -10 to +60℃
	Humidity: 80%RH or less (no condensation)
Dimensions	50(W)×23(H)×80(D) mm (not including protruding sections)
Weight	Approx. 120g

■Accessories

- Dedicated AC adapter for the TM201 (cable length 1.8m) 1
- Dedicated cable for UTMⅡ connection 2m..................................1
- miniB-PC USB connection cable 1.8m..1
- TM201 setup guide 1

Chapter 6

Specifications

6-2. Dimensions

[Unit: mm]

UTM

UNIPULSE
TM201 TORQUE MONITOR

USB   DC IN

80

(87.5)

50

23

6-3.   TM201 block diagram

SIG IN (±5V DC)

SIG GND

1/5

Low-pass filter

A/D convert 24 bit

Reference voltage

PULSE IN ＋

PULSE IN －

PWR ＋ (+24V)

PWR － (0V)

AC adapter (24V)

MPU

Watch dog

Pulse counter

Serial port

CPU 32 bit

RAM 12KB

Power supply detection

ROM 64KB

NOVRAM 2048 bit

Port

Serial port

Lamp (red/green)

MPU AMP and A/D +3.3V

USB

PC
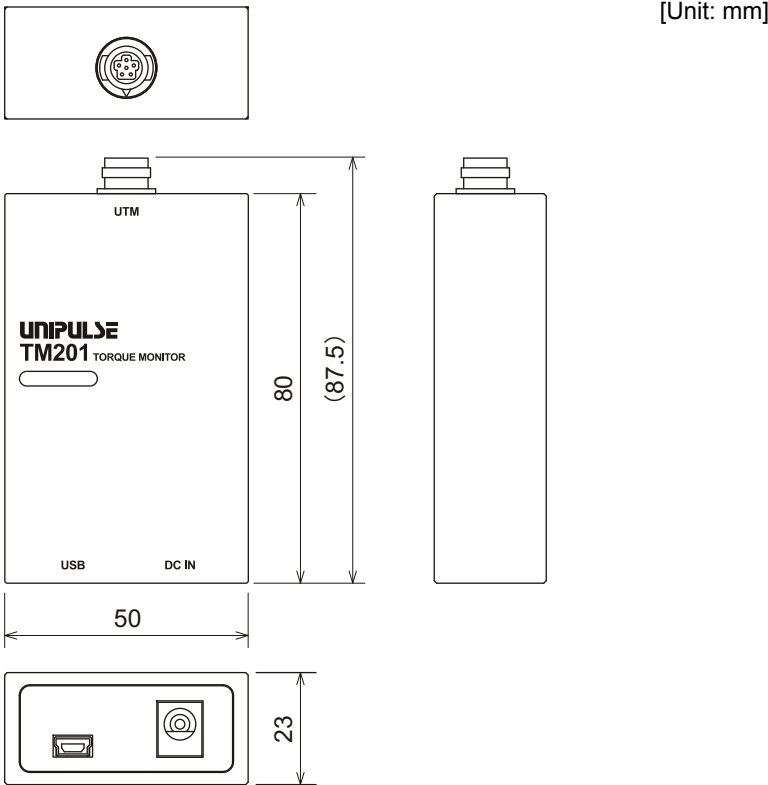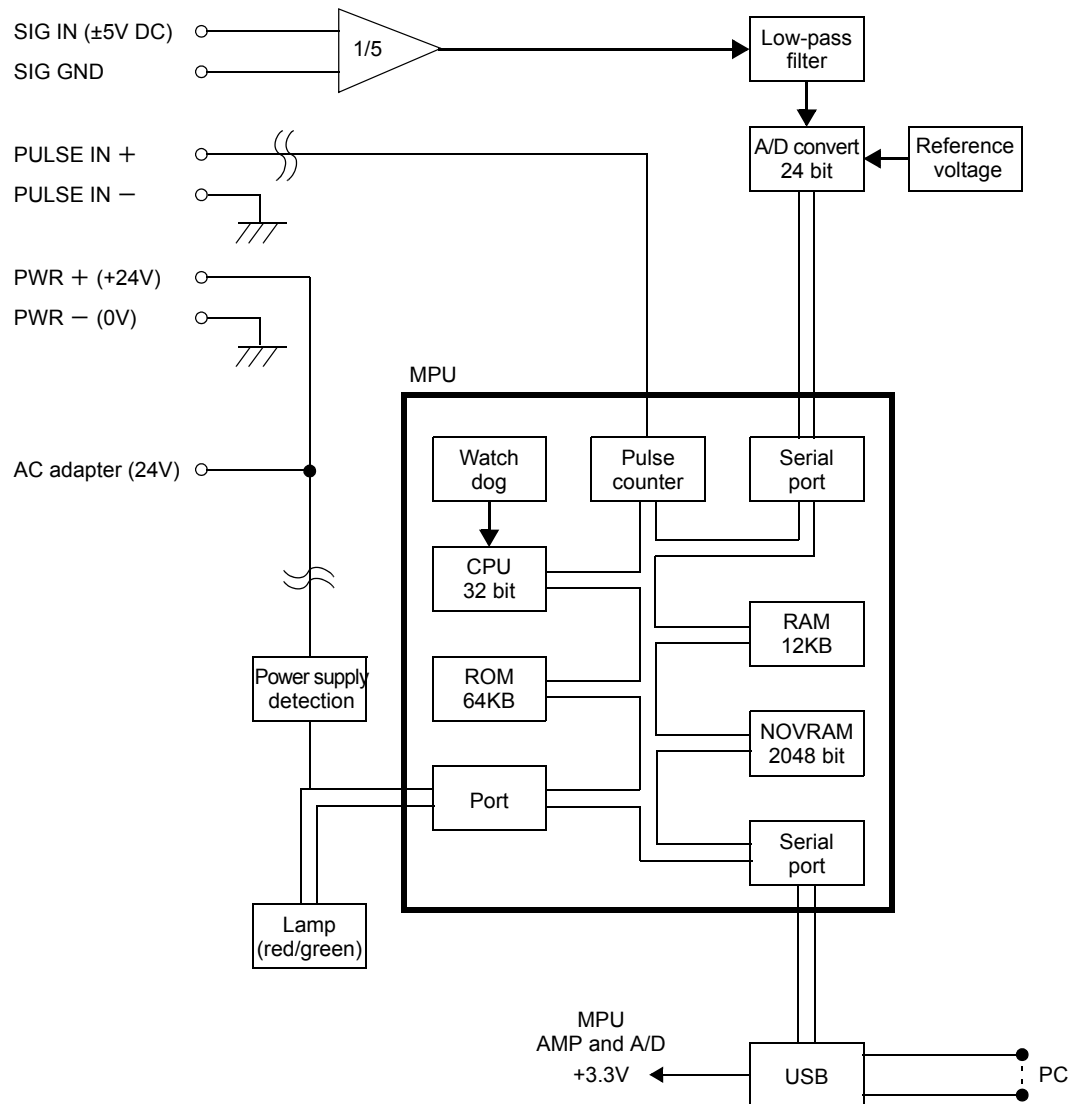
∗ ⑀: Indicates insulation by the photo-coupler.

7 Appendices

7-1. List of setting values

* Default value   Factory default value

* Protection   ◎: System setting protection

                    ●: Calibration setting protection

* NOVRAM   ◎: Saving on NOVRAM

* Reference   Reference page number for each item description

■ System setting (settings tab)

Item number	Setting value name	Setting value range	Default value	Protection	NOV RAM	Reference
1	Moving average filter (torque)	0 (OFF), 2 to 300 [times]	30	◎	◎	P39
2	Digital low-pass filter	3, 30, 300, Off [Hz]	300	◎	◎	P40
3	Moving average filter (rotation speed)	0 (OFF), 2 to 300 [times]	30	◎	◎	P39

■ Calibration setting (calibration tab)

Item number	Setting value name	Setting value range	Default value	Protection	NOV RAM	Reference
1	Calibration function selection1 Unit (torque)	mNm, Ncm, Nm, kNm, kgm (kgfm), kgcm (kgfcm), gcm (gfcm)	Nm	●	◎	P30
2	Calibration function selection1 Min. scale division (torque)	1, 2, 5, 10, 20, 50, 100	1	●	◎	P30
3	Calibration function selection2 Pulse rate (rotation speed)	1 pulse, 4 pulses	4 pulses	●	◎	P34
4	Calibration function selection2 Min. scale division (rotation speed)	1, 2, 5, 10	1	●	◎	P34
5	Rotation stop settings Minimum input rotation speed	Pulse rate: 4 pulses 15rpm, 10rpm, 5rpm, 3rpm, 2rpm Pulse rate: 1 pulse 60rpm, 40rpm, 20rpm, 12rpm, 8rpm	15rpm	●	◎	P35
6	Rotation stop settings Rotation stop mode	OFF, 2 times, 4 times, 8 times	OFF	●	◎	P36
7	Calibration function selection2 Unit (power)	mW, W, kW, PS, HP	W	●	◎	P34
8	Calibration function selection2 Decimal place (power)	99999, 9999.9, 999.99, 99.999	99999	●	◎	P34
9	Calibration function selection2 Min. scale division (power)	1, 2, 5, 10	1	●	◎	P34

■ Protection

Item number	Setting value name	Setting value range	Default value	Protection	NOV RAM	Reference
1	System setting protection	OFF, ON	OFF		◎	P23
2	Calibration setting protection	OFF, ON	OFF		◎	P23

■ Calibration setting

Item number	Setting value name	Setting value range	Default value	Protection	NOV RAM	Reference
1	Zero calibration	-5.000 to 5.000 [V]	0.000	●	◎	P30
2	Rated output	-6.000 to 6.000 [V] (excluding 0)	5.000	●	◎	P31
3	Rated capacity	In case of zero-digit decimal point: -99999 to 99999 (excluding 0) In case of one-digit decimal point: -9999.9 to 9999.9 (excluding 0.0) In case of two-digit decimal point: -999.99 to 999.99 (excluding 0.00) In case of three-digit decimal point: -99.999 to 99.999 (excluding 0.000)	100.00	●	◎	P32

Chapter 7

Appendices

7-2. Waveform data file format

Waveform data files are saved in My Documents\UNIPULSE\TM201directory as CSV format text files. The format is as follows.

Rows 1 to 11 are headers under which measurement conditions are recorded.

Row 1: String for file identification, file format version

Rows 2 and 3: Sensor type, serial number, comment

Rows 4 and 5: Measurement start date, measurement start time, torque unit, rotation speed unit, power unit, decimal place of torque, decimal place of rotation speed, decimal place of power

Rows 6 and 7: Measurement interval, number of samples

Rows 8 and 9: Waveform acquisition mode, waveform acquisition setup time, waveform acquisition result time, lower value and upper value of torque waveform, lower value and upper value of rotation speed waveform, lower value and upper value of power waveform, pre-trigger value, level value, slope, level trigger data

Row 10: Empty

Row 11: Measurement data header

From row 12, measurement data is entered. The data of measurement point number, torque, rotation speed and power is recorded.

File example (Bold represents fixed value and italic represents actual measurement value and setting value.)

row	1	2	3	4	5	6	7	8	9	10	11	12	13
1	**TM201 Waveform File**	1											
2	**Sensor type**	**Serial number**	**Comment**										
3	*UTMII-5K*	*123456*	*Sensor comment*										
4	**Date**	**Time**	**Unit(Torque)**	**Unit(Speed)**	**Unit(Power)**	**Decimal Place(Torque)**	**Decimal Place(Speed)**	**Decimal Place(Power)**					
5	*2013/9/26*	*16:38:23.854*	*Nm*	*rpm*	*W*	*2*	*0*	*0*					
6	**Interval time**		**Number of samples**										
7	**Fixed**	*1/300*	*36001*										
8	**Waveform mode**	**Setup time**	**Result time**	**Torque lower**	**Torque upper**	**Speed lower**	**Speed upper**	**Power lower**	**Power upper**	**Pre-trigger**	**Level**	**Slope**	**Level Trigger Data**
9	*Level trigger*	*120*	*120*	*-100*	*100*	*0*	*100*	*-10000*	*10000*	*50*	*2000*	*Negative*	*Speed*
10													
11	**No**	**Time**	**Torque**	**Speed**	**Power**								
12	*1*	*16:38:23.854*	*1.22*	*1.22*	*122*								
13	*2*	*16:38:23.857*	*1.21*	*1.21*	*121*								
14	*3*	*16:38:23.861*	*1.2*	*1.20*	*120*								

7-3. Troubleshooting

Item	Question	Answer/countermeasure
UTMⅡ	Are correct indicated values displayed just by connecting UTMⅡ?	Match the UTMⅡ output and TM201 by sensor type setting and calibration. Indicated values proportional to the UTMⅡ output are displayed.
Wiring/ connection	The power cannot be turned on. Lamp does not light on or flash.	Is the USB connector connected to the PC? Is the power of the PC on? Check if connected with the USB of the PC in operation.
	ALM (red) lamp flashes slowly.	Are the power cord and AC adapter properly connected? Connect the power cord and AC adapter properly.
		Is the dedicated AC adapter used? Use the dedicated AC adapter.
		Is the power supply in use within the range of the specifications? Use the power supply that is within the range of the specifications.
		Are the breaker, switch and so forth turned on? Check if the power comes to the outlet by connecting other electric products and so on.
	ALM (red) lamp lights on.	Does the PC application start up, and is the correct COM port number selected? Is the USB cable properly connected to the PC? Refer to the PC application help, open the Device Manager of the PC and check the virtual COM port number and selected number to which the TM201 is connected.
		If the recording time of the waveform data to be shown in the waveform tab is more than a few minutes, it may take a few tens of seconds to display depending on the PC environment. At this point, the ALM (red) lamp may light on; however, this is not a failure. Once file reading is complete, the ALM (red) lamp lights off and is re-connected.
	Indicated value is abnormal.	Is UTMⅡ properly connected? Connect UTMⅡ properly.
		Is UTMⅡ damaged? Connect proper UTMⅡ.
		Is mechanistic load being applied onto UTMⅡ? Do not apply any load.
		Does the STATUS (green) flash in accordance with the torque and rotation of UTMⅡ? When torque and rotation are detected, the pattern of flashing changes. Check connection with UTMⅡ as well as calibration.
		Does ALM (red) lamp flashes fast? Power cannot be supplied to UTMⅡ. Connect the AC adapter so that power can be supplied.

Chapter 7

Appendices

Item	Question	Answer/countermeasure
Setting/ operation	How to reduce digits of numerical values?	Change the decimal place (torque) in calibration when setting the sensor type, reduce the number of digits of rated capacity, and perform equivalent input calibration or actual load calibration.
	Low order digit of indicated values fluctuates.	Is calibration of approx. 30000 or more performed at 5V?
		Since resolution is approx. 30000 per 5V, if calibration is performed more than 30000, scale division becomes rough, and indicated value fluctuates and is not stable. Ignore the low order digit if using the product as is, or reset the min. scale division.
USB	The PC application display is abnormal. Displaying stops. "Setting error", "XXX acquisition error", "communication error" or "communication time out error" are sometimes displayed.	Is the USB cable wired in parallel with the AC line?
		Re-wire the USB cable so that it is not in parallel with the AC line.
		Does the ALM (red) lamp light on? Is the correct COM port number selected for the PC application? Is the USB cable properly connected to the PC?
		Refer to the PC application help, open the Device Manager of the PC and check the virtual COM port number and selected number to which the TM201 is connected.
	The virtual COM port number does not appear in the Device Manager of the PC even if the TM201 is connected.	Is the USB driver properly installed?
		Remove the USB cable of the TM201 once, and reinstall the USB driver.
	The USB driver cannot be installed.	Right-click the driver software as a user with administrator privileges or as an administrator, and select execute to install it. Check the website and guide of FTDI Limited.

7-4. Conformity with EC directives

The TM201 Torque Monitor is a CE-marked EC-Directive-conforming product (by the Council of the European Union).

- Low Voltage Directive;   EN62311:2008 (test distance: 10cm)
- EMC Directives;   EN61326-1
EN55011
EN61000-3-2
EN61000-3-3
EN61000-4-2
EN61000-4-3
EN61000-4-4
EN61000-4-5
EN61000-4-6
EN61000-4-8
EN61000-4-11

Key points

The AC adapter accompanying as standard does not comply with CE marking compliance.
In case the AC adapter which complies with CE marking compliance is required, please specify when you order.

⚠ Caution

● Use shielded cables (for USB and UTM).

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☐	Hiroshima Sales Office:	Hiroshima Dai-ichi Seimei OS Bldg. 1-2-21 Matoba-cho, Minami-ku, Hiroshima 732-0824