TOHNICHI COMPACT DISPLAY

MODEL CD5

INSTRUCTION MANUAL

Before using this product, please read this instruction manual carefully for your

safety use. If you have any questions, contact your nearest distributor or TOHNICHI.

Your Torque Partner

TOHNICHI

For your safety

To the user

Read these operating instructions carefully before use. For any questions, contact a Tohnichi authorized distributor or Tohnichi office. Keep these instructions for future use.

> Safety symbol
> This symbol indicates attention is required for your safety.
> When this symbol appears in these instructions, pay particular attention for your safety concerns. Take preventative measures according to the written message for appropriate operation and management.
>
> ⚠

Signal Words

A signal word accompanies the safety symbol, which indicates the level of cautions on safety of people and the appropriate use of the equipment.
Signal words are classified into 3 levels: "danger", "warning" and "cautions" by the degree of risk.

> 「⚠Danger」　　 : Imminent danger which may cause serious damage.
> 「⚠Warnings」 : Potential danger which may cause serious damage.
> 「⚠Cautions」 : Potential danger which may hinder ordinary operation but
> 　　　　　　　　　　 may not lead to serious damage.

⚠ Warnings

① Stop using the product immediately when you find something not normal in the product such as smoke or strange smell. It may cause an electric shock or a fire. Turn off the power immediately and pull out the AC adapter and contact your nearest Tohnichi distributor or TOHNICHI.

② Do not disassemble or modify the product.
It may degrade the safety level or shorten product life.

③ If water or some foreign particles comes inside the product, stop using.
It may cause an electric shock or fire.

④ Do not plug in and out with a wet hand.
It may cause an electric shock.

⑤ Do not use the voltage other than listed voltage (AC100V – 240V ±10%).
Using other voltage may cause an electric shock or a fire.

⑥ Do not use a damaged AC adapter.
It may cause an electric shock or fire.
When handling the power cord, pay attention to the following.
Do not modify or damage the cable.
Do not pull it, put a heavy object, or pinch it.
Do not force to bend or twist it.
Do not use other electric power cords than those designated.
Do not use the cable for other electric products.

⑦ Handle AC adpter with care.
A wrong use of the product may cause a fire.
Do not plug in when dust or foreign particles are on the adapter.
Plug in fully to the root and firmly.

⑧ When pulling out the AC adapter, make sure to hold the AC adapter to not damage the cable, which may cause a fire.

⑨ Do not place it on a tilted plate or place with a vibration to prevent possible falling of the product.

⑩ Do not place it where combustible liquid or gas exists.
It may cause an electric shock or a fire.

⑪ Use only the designated product and accessories to prevent possible injuries.

⚠ Cautions

① Avoid place with high humidity, or dust, or place subject to direct sun light and where temperate fluctuate widely.

② Plug out the AC adapter and clean it periodically.

③ When not using the product in a long period, make sure to plug out the cable.

④ When moving the product to other places, make sure to turn off the power and plug out all the related cables beforehand. Do not apply physical damage or vibration to the product. It may cause a fire, electric shock or product malfunction.

⑤ Check for damaged part.
Check all the conditions and proper operation of the product before use.
For damaged part, contact your nearest distributor or TOHNICHI for repair.

Note

① Use the voltage AC100V– 240V range only.
Use the enclosed AC adapter.

② Do not use the product in conditions not specified in this manual.

③ Do not disassemble or modify the product.

④ Check the product and settings before use.

⑤ Keep from water and oil to avoid malfunction.

⑥ Do not drop the product. It may break.

⑦ Connect the product to the torque sensor in proper way.

⑧ Conduct periodic checkup.

⑨ Check zero on the display before measuring.

If strange smell or fire occurs, stop using the product immediately and place it in a safe place. Contact Tohnichi immediately to seek advice.

■ Contents

1. Outline

CD5 compact display is a digital display to show values measured by the strain gauge sensor.

2. Features

① Judgement function
Upper and lower limit of the measured value can be set in advance.
If the measured result is within the OK range, it shows in blue display, and when it is out of the range (upper or lower), it informs in red display.

② Enhanced visibility
The black mask LCD is applied in the display to improve visibility.

③ Data memory
Measured data can be saved up to 1000pc.

④ Data transfer to external device
CD5 is equipped with RS232C (compliant) connector, which allows the data transfer to external devices such as PC, sequencer, and the dedicated printer.

⑤ International voltage range
AC100V–240V±10% power voltage covers use in almost any place of the world.

⑥ CE marking
With CE marking attached, it can be used in EU legitimately.

3. Components

① Body (Display unit) ·························· 1pc
② AC adapter (BA-6) ···························· 1pc
③ Power converting adapter (Type C)·············· 1pc
④ Instruction manual ····················· 1pc

4. Name of each part

4-1 Display and operating board
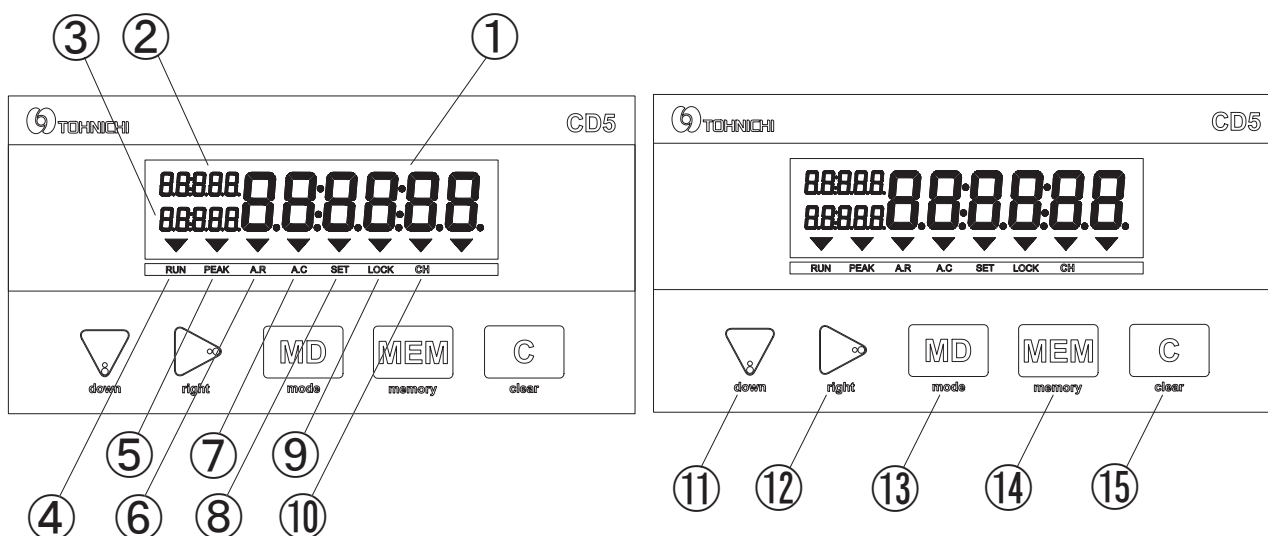
① Torque display: Displays the measured torque value.

② Counter/Upper value display: Shows the memory counter or the upper limit value.

③ Lower value display: Displays the lower value.

⑤ RUN mode (RUN): When in RUN mode, ▼ appears above here.

⑥ PEAK mode (PEAK): When in PEAK mode, ▼ appears above here.

⑦ Auto judgement (A.C): When auto judgement is selected, ▼ appears above here.

⑧ Setting process (SET): During the setting or calibration process, it shows ▼ appears above here.

⑨ Setting lock (LOCK): When the lock switch on the back panel is turned on, ▼ appears above here.

⑩ Setting change (CH): When CH.SW signal is input (CH2 selected), ▼ appears above here.

⑪ Counter backward key (down key)
Push this key to see the previous data. Keep it pushed to fast-forward.

⑫ Counter forward key (right key)
Push this key to see the next data. Keep it pushed to fast-forward.

⑬ Memory key (MEM key)
Save the measured data and proceeds to the next counter.

⑭ Mode key (MD key)
Keep pushing this key for 2 seconds in RUN mode, and it changes to the setting mode. Pushing this key in PEAK mode shows sample quantity, max/minimum/average values respectively.

⑮ Clear key (C key)
It clears the measured data in PEAK mode.
Auto zero adjustment will be effected in RUN mode.

4-2 Power and input/output
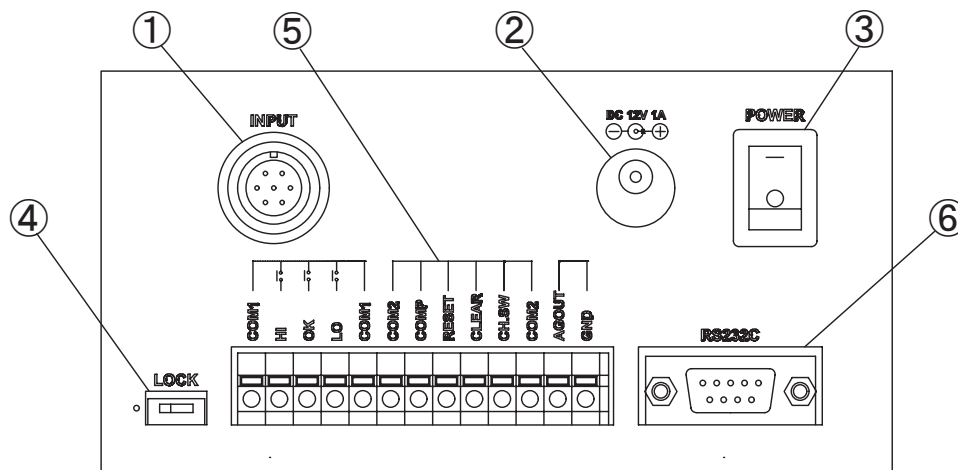
① INPUT: Connector for sensor cable.

② Power jack (12V, 1A): Connect the enclosed AC adapter (BA-6) to this terminal.

③ Power switch: Turn power ON/OFF.

④ Lock switch: It prevents accidental change of the setting by the lock function.
When it is ON, ▼ appears on LOCK in the display.

⑤ External terminals: Use these terminals to connect to external devices.
Signal output terminal: Output no voltage output signal between COM1 and each terminal.

　COM1: Common terminal (HI, OK. LO) for output signal.

　　HI: Outputs HI signal

　　OK: Outputs OK signal

　　LO: Outputs LO signal
●Signal input terminal: Shunt (short-circuit) each terminal to COM2.
※ Do not apply voltage. Input signal must be 0.1 sec or longer.

　　COM2: Common terminal for input signal (RESET, CLEAR, COMP, CH.SW).

　　RESET: It saves the measured data in PEAK mode, and send the counter to the
　　　　　　next. When connected to external device such as PC, the measured data
　　　　　　will be transferred to the device in both PEAK and RUN mode.

　　CLEAR: Clears the displayed value.
　　　　　　Auto zero function will be effected in RUN mode.

　　COMP: Jusgement will be given to the measured value.
　　　　　　It displays in blue when the judgement is OK, and red when the judgement
　　　　　　is NG (LO/HI).

　　CH.SW: Changes the setting.
　　　　　　When CH.SW and COM2 are shunted, ▼ appears at CH of the display.
　　　　　　※When changing the channels, all the measured data will be deleted.
●Analog output terminal
　AGOUT: Amplifies the sensor input, and output as voltage output (0 to ±11V)
　GND: GND terminal to analog output.
　※Analog output voltage is not calibrated (not adjusted in accurate ratio
　　against torque value). Check the output voltage by applying static torque
　　load using the calibration device, etc

⑥ RS232C: Use this terminal to connect to the printer or PC (D-SUB9 pin male).

4-3Display

● PEAK mode

Memory conter value 000

RUN mode (▼)
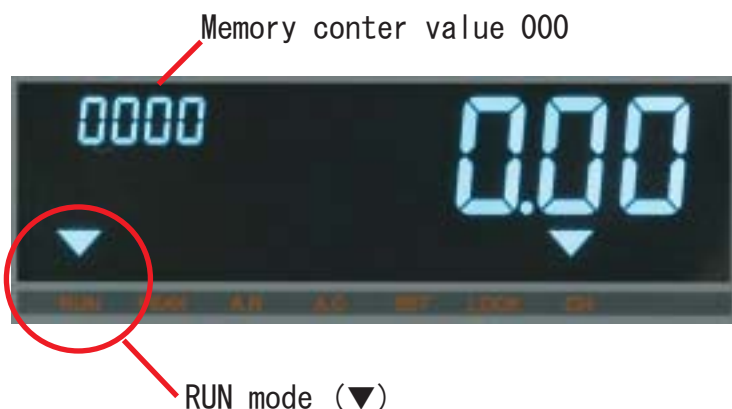
● PEAK mode
When upper/lower limit values are not set, upper left corner of
the display shows the memory counter and the measuring channel.

Memory counter value 0001-1000

Peak mode (▼)

● Judgement in process
When the judgement result is OK, it displays in blue, and when
it is NG (LO/HI) is shows in red.

upper limit value   measured value

lower limit value

5. Explanation of each mode

① Measuring mode
● RUN mode
   Set the memory counter to 0000 to set it to RUN mode. In RUN mode, the displayed
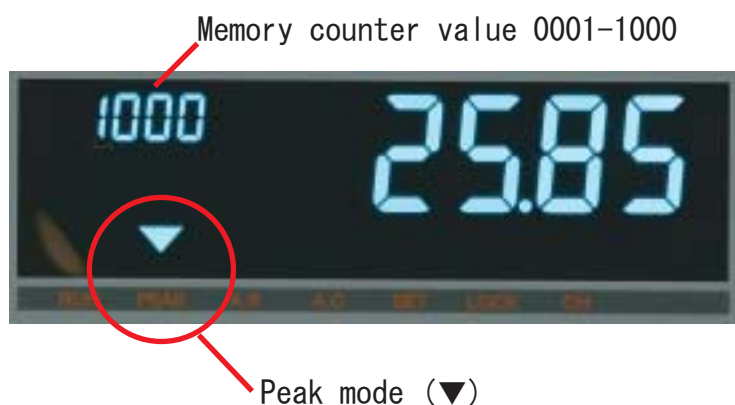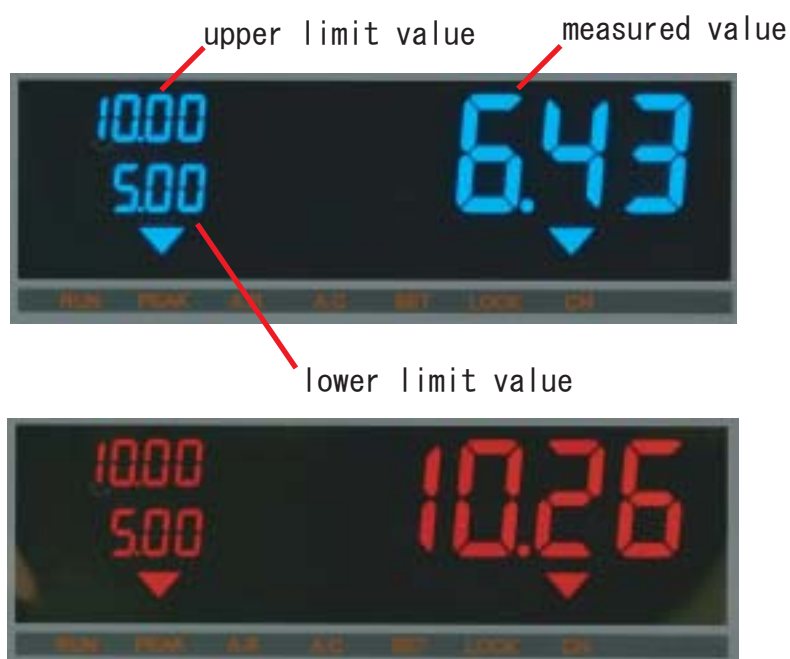   torque value increases as torque is applied, and returns to zero as it is released.
   (Counter clockwise load will be shown in negative figures.)

● PEAK mode
   Set the memory counter to 0001 - 1000 to set it to PEAK mode. In PEAK mode, the
   displayed torque value increases as torque is applied, and maintains the maximum
   value (peak value) as torque is released. If you apply torque in counter clockwise
   direction, torque value is displayed in negative figures and maintains the peak
   value in the same way.

② Memory mode
● 1000 data mode (default setting)
   It can save up to 1000pc of data in the memory.
   Judgement result is also output through RS232C.

● 99 data mode
   It can save up to 99pc of data in the memory.
   In this mode, RS232C output format is compliant with that of CD42 (previous version).

6. Functions and operation

① Auto zero adjustment
In either RUN mode or PEAK mode (RUN display), do either of the following to effect auto zero function.
- Press C key
- Input CLEAR signal
- Input CLEAR command through RS232C
- Turn on the power

Range of auto zero
Auto zero adjustment works only when the following conditions are met. When the displayed value is out of range, it shows Err9.

PEAK mode: lower than 5% of the max measured value
 (lower than 50% when calibrated by actual weight using torque wrench sensor).

RUN mode: Sensor input is lower than ±1 mV/V
When turning the power on: Sensor input is lower than ±1 mV/V

Err9 display: Sensor input is lower than ±1 mV/V

●How to remove Err9
 Set the connected sensor at no load condition and press C key.
＊If Err9 disappears by the above operation, CD5 is working properly.
 If Err9 remains on the display, it needs to be repaired. Contact TOHNICHI or its authorized distributor.

② Judgement function
Set OK range (upper/lower limit value) and it judges whether the measured torque is within the set range. The display turns blue when the judgement result is OK, and red when it is out of the range (LO = too low, HI = too high). At the same time, no voltage contact signal will be output from the terminal LO, OK, HI respectively.

Judgement result
 LO: Measured value < lower limit value
 OK: Lower limit value ≦ Measured value ≦Upper limit value
 HI: Upper limit value < Measured value

Judgement in PEAK mode
When upper/lower limit are set, do either of the following to give judgement.
 −Input COMP signal
 −Input command from RS232C
 −When auto judgement is effected

Judgement in RUN mode
When upper/lower range is set, input COMP signal to give judgement.

③ Auto judgement function
When judgement function is on in PEAK mode, judgement will be automatically given if the peak is not renewed within the set time (0.1 to 5.0 sec selectable). If you set it to 0.0 second, auto judgement function will be cancelled.

④ Saving measured data
   Measured data can be saved up to 1000pc in PEAK mode when either of the following
   is commanded.

   - Press MEM key
   - Input RESET signal
   - Send command from RS232C
   - When auto memory function is in effect

   * After the memory is full (1000pc), the counter will be returned to 0001 and the
     old data will be overwritten by the new one.

⑤ Auto memory/ Reset function
   Auto memory/Reset function saves the measured data automatically after the set timing
   (selectable from 0.1 - 5.0 seconds) and proceeds to the next counter. If auto
   judgement function is in effect at the same time, Auto memory/Reset will be
   effected only when the judgement is OK. If you do not want to use Auto memory/Reset
   function, set it to 0.0 second.

⑥ Statistical processing
   Sample quantity (n): Shows the number of measured data in the selected range.
   Max value (HI): Shows the max value of the selected range of data.
   Minimum value (LO): Shows the minimum value of the selected range of data.
   Average value (Av): Shows the average value of the selected range of data.

⑦ Deleting measured data

   · Delete one piece of data
     Use down/right key to select the data to delete and push C key.

   · Delete selected range of data
     Use down/right key to select the last memory counter of the selected range and
     press MD key. The display shows "Stt". Then, use down/right key to select the
     first memory counter of the selected range and press MD key. While the display
     shows either "n", "HI", "Lo", or "Av", press MD key and C key at the same time.
     The selected range of data is now deleted.

   · Delete all the saved data
     First, turn the power off. Press C key as you turn the power, then all the saved
     data will be deleted (calibration value and settings remains intact).
   * Before deleting the data, make sure to check if the data is no longer needed.

⑧ Over torque alarm
   When the measured torque exceeds 110% of the max capacity, the display starts to
   blink and the buzzer goes off for warning. Also, when input value exceeds the
   sensor's rated voltage (capacity), the bar icon on the display shows blinks for
   alarming. See the following table

Sensor rated value	bar icon display
below 1.3mV/V	above 1.7mV/V
1.3mV/V to 3.0mV/V	above 3.15mV/V

⑨ Switching calibration settings
   2 kinds of calibration values can be registered and they can be switched around
   depending on the situation. This function is useful either when you use 2 different
   torque sensors to connect to CD5 or when you want to register 2 settings in one
   torque sensor.
   Shant (Short-circuit) CH.SW and COM2 to switch to 2CH and ▼ appears at CH of the
   display.
   * Switching the channel will delete all the previous data.
   * Auto zero adjustment will be effected when switching the channels. Make sure no
     load is applied when switching.

7. Connection

7-1 Connecting with torque sensor
Connect CD5 with the torque sensor using "INPUT" jack on the backside of CD5. Use TOHNICHI standard connector only. If you have to use an extension cable, make sure to use 4-core shielded cable and follow the instructions blow.
＊Recommended connector: PRC03-12A10-7M10.5 (TAJIMI ELECTRONICS CO.,LTD)
 If the displayed torque value is not stable, attach a clamp filter on the connecting cable.

CD5

To torque sensor

clamp filter
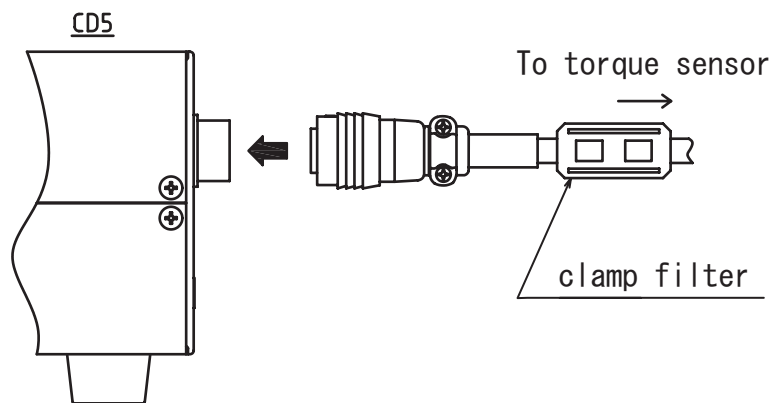
Connection of CD5 and torque sensor

(A) +EXC
(B) -SIG
(C) -EXC
(D) +SIG
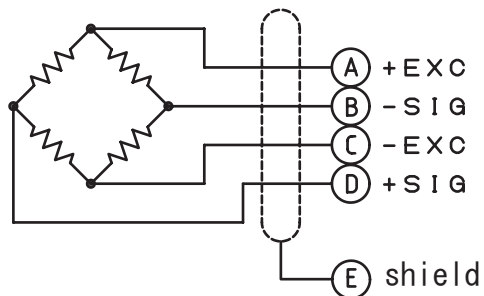
(E) shield

Wiring diagrams of 4-core shielded cable

7-2 Connecting to terminals
Terminals on the backside of CD5 are aligned as the following illustration.
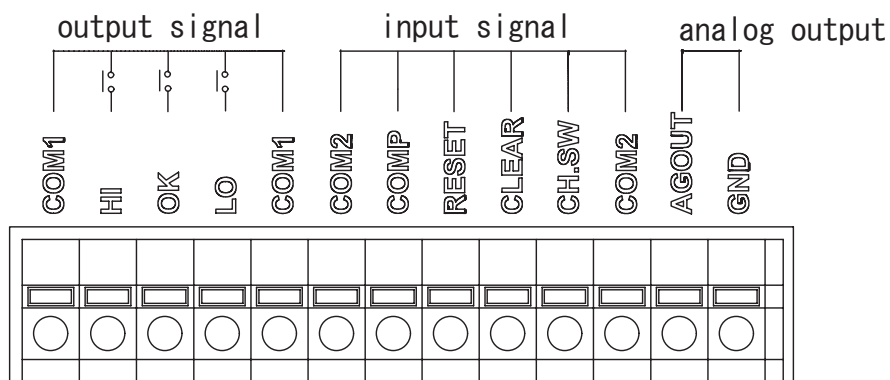
● How to connect to terminals
CD5 applies user-friendly clamp style connecting so it is simple and easy.

① Skin off 11 - 12mm tip of cable and twist it a little to put together.

② Push in 凸part with a screwdriver and insert the tip of the cable into the hole.

③ Release the screwdriver and put it back.

④ Pull the cable gently and check it is clamped securely.
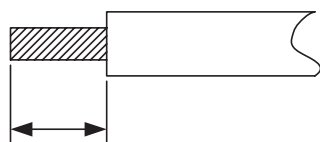
11～12mm

Applicable wires are
  Single wire：φ0.4～1.2mm(AWG26-16)
  twisted wire：0.2～1.25m㎡(AWG24-16)
 A wire in the cable φ0.18以上
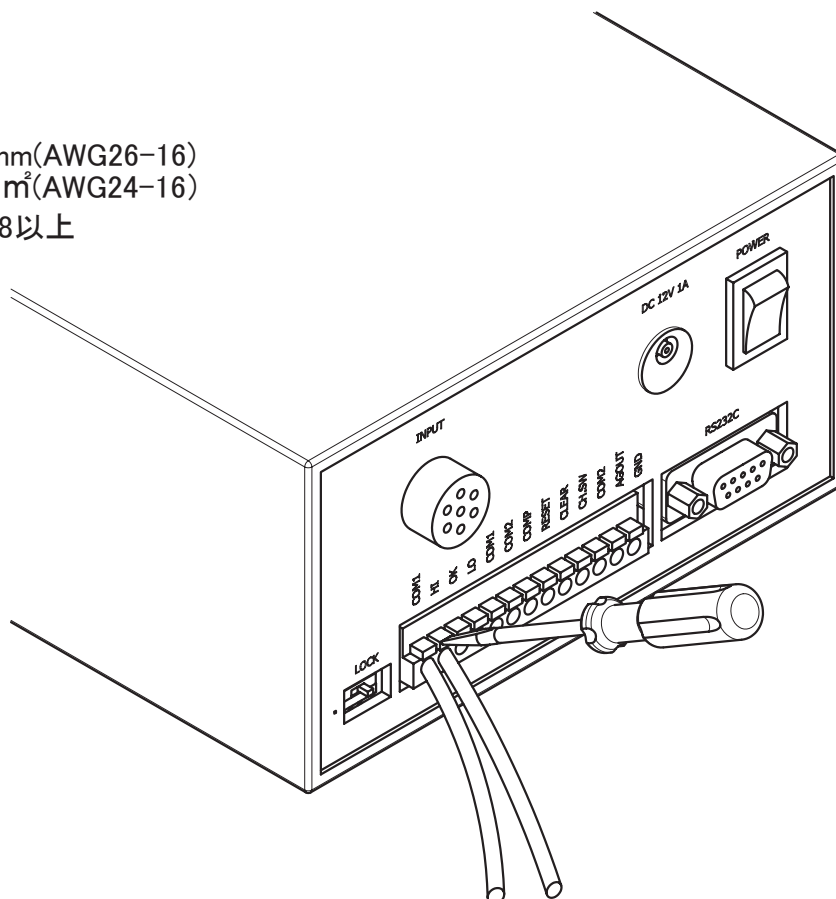
● Connecting to output signal terminal
  Output circuit is relay contact output. COM1 is the common use of the output
  signal terminal.

CD5 output signal internal equivalent circuit

＊ Notice on output wire arrangement
Load on the contact output must be within the rated current..
(Relay output: DC30V1A, AC125V, 0.5A). This capacity is based on the resistance load.
In some cases, between rated current and rush current may exist a large gap.
Following table shows the typical relations between rated current and rush current.
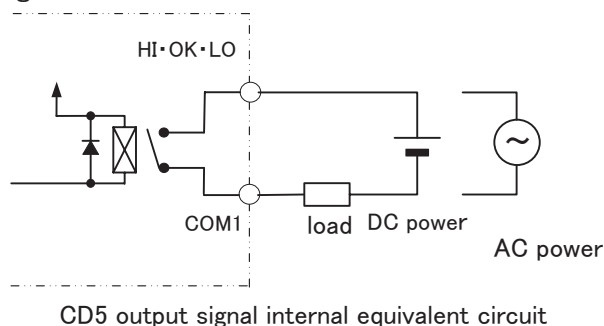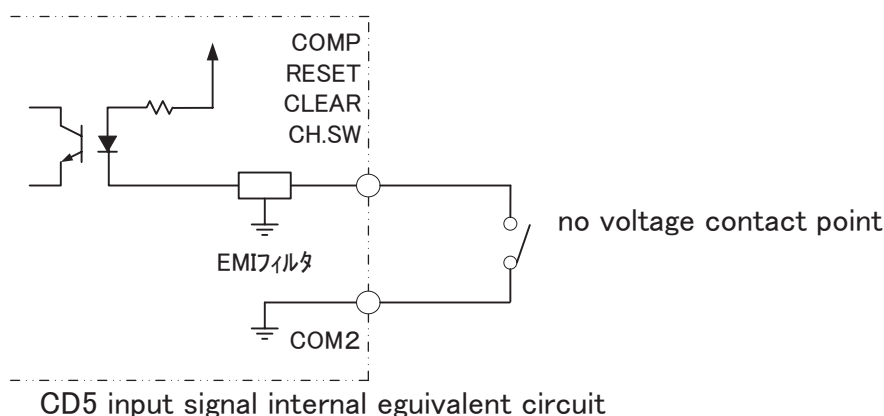
| load type	rush current	load type	rush current
resistance load	about same of rated current	mercury lamp load	about 3 times of rated current
solenoid load	10-20 times of rated current	naturium load	1-3 times of rated current
motor load	5-10 times of rated current	condenser load	20-40 times of rated current
incandescent light bulb load	10-15 times of rated current	trance load	5-15 times of rated current

When switching on/off induced load, it may generate inverse voltage, which may damage
contact point and shorten its life. Refer to below examples and take measures to
protect contact point.

	circuit sample	application AC	application DC	features/others	how to choose elements
CR method	relay contact r c inducing load	※ △	○	When load is by the timer, leaked current through cr may cause error. ＊ When using AC voltage, load impedance must be lower than that of cr.	c, r should be roughtly ranged as below: c: contact current 1A ⇒0.5-1(μF) r: contact voltage 1V ⇒0.5 -1 (Ω) c is effective in controlling electricity release when on/off of contact point. R controls current for the next time. Check in your own experiment. c should use 200 - 300V voltage resistance. For AC circuit, use AC condenser.
CR method	relay contact r c inducing load	○	○	When load is relay or sorenoid, recovery time may delay. When power sourse voltage is 24 or 48V, it is recommended to connect between the loads. When 100V - 200V, connect between contact point.	
diode method	relay contact diode inducing load	×	○	The energy accumulated in the coil will be released to the coil in the form of current by the parallel diode, and consumed as Joule heat by the resistance of indusive load. This method takes more recovery time than cr method.	Voltage resistance of the diode should be 10 times or more than the circuit voltage and the current for the right direction should be more than the loaded current .If the circuit voltage is not so big, resistance voltage should be 2 - 3 times that of the source voltage.

● Connecting external input signal
External input circuit input signals by shunting (short-circuit) respective input terminal and COM2.

CD5 input signal internal eguivalent circuit

COMP
RESET
CLEAR
CH.SW

no voltage contact point

EMIフィルタ

COM2

● Do not apply voltage to the input circuit. Doing so may damage the internal circuit.

AGOUT

GND

inside CD5

+

−

F.G.

external device
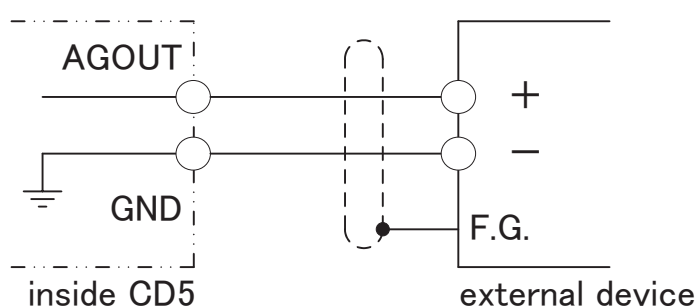
● Connecting analog output
This output terminal takes out the analog voltage in proportion to the sensor signal.
＊ Use shielded cables for wiring.
＊ Do not shunt (short-circuit) AGOUT and GND. Doing so may cause malfunction.
＊ Do not apply voltage from external source. It may cause breakdown.

7-3 Connecting to RS232C
Use the dedicated cable(no.383) to connect CD5 with PC. Refer to the following wiring diagram.

CD5 output signal internal equivalent circuit				PC (D-SUB9S female)		
PIN	signal	contents		PIN	signal	contents
1				1	DCD	carrier direct
2	RXD	receive data signal		2	RXD	receive data signal
3	TXD	send data signal		3	TXD	send data signal
4				4	DTR	no connection
5	GND	ground		5	GND	ground
6				6	DSR	no connection
7	RTS	send request signal		7	RTS	send request signal
8	CTS	send permit signal		8	CTS	send permit signal
9				9	NC	no connection
frame	shield			frame	shield	

＊ Serial cross cable (KR-ECL9-2, SANWA supply) is also applicable.

8. Calibration

8-1 Regarding calibration
Calibration refers to the adjusting procedure between CD5 and a torque sensor in accurate proportion. There are 3 kinds of calibration method as below.

● Equivalent input calibration
This calibration method can be processed just by inputting the rated output value(mV/V) and the maximum measuring value without using any actual weight. Rated value of the sensor ranges from ±0.5mV/V to ±3mV/V.

Example) Calibration of TCF100N can be processed by inputting the "rated output value 2mV/V" and "maximum measuring value 100N.m". Gain value will be automatically calculated.
* A label is attached on TOHNICHI torque sensor, on which the rated output value is listed. The maximum measuring value differs depending on the torque sensor.

● Calibration using actual weight
This calibration method applies actual stable weight and input its value by key operation. It can be applied when you cannot find the rated output value of the torque sensor, and more accurate calibration is possible. Actual loading range is ±1mV/V to ±3mV/V.
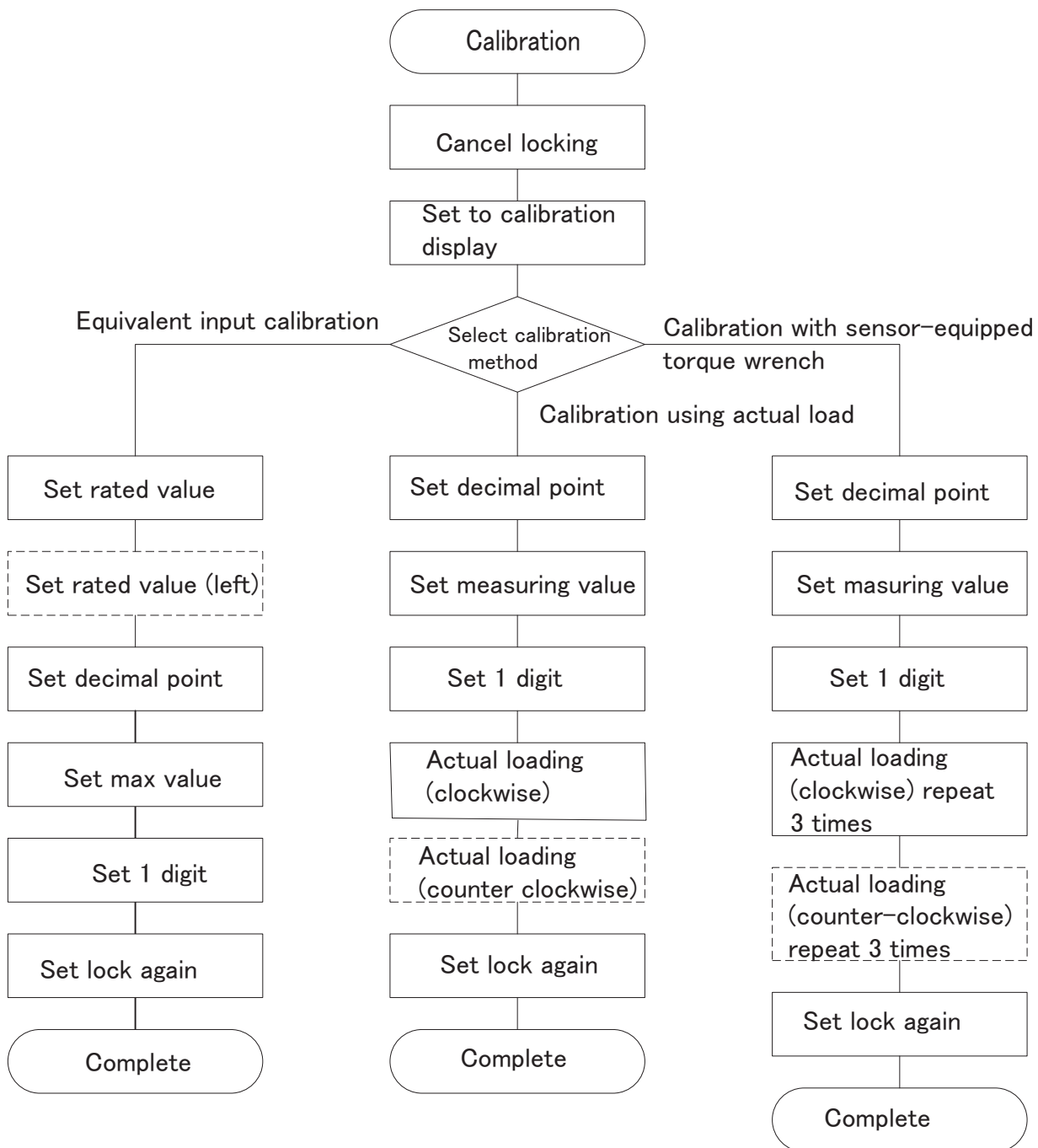
● Calibration using load applied by sensor-equipped torque wrench
This calibration method inputs the peak value applied by a sensor-equipped toque wrench. This method is used only when calibrating sensor-equipped torque wrenches. Maximum load range is 0.1mV/V to 3mV/V. Only clockwise operation applicable with 1/2000 resolution.

calibration method	equivalent input calibration		calibration with actual load	calibration with sensor-equipped torque wrench
sensor rated value range	+0.5 to +1.0mV/V、 −0.5 to −1.0mV/V	+1.0 to +3.0mV/V、 −1.0 to −3.0mV/V	+1.0 to +3.0mV/V、 −1.0 to −3.0mV/V	+0.1 to +3.0mV/V
max measuring value	10000	25000	25000	10000
max resolution	1/2000	1/5000	1/5000	1/2000
measuring direction	both direction/clockwise/counter clockwise		both direction/clockwise/ counter clockwise	clockwise
peak starting torque	over 5% of max measuring value		over 5% of max measuring value	over 50% of max measuring value
auto zero range	below 5 % of max measuring value		below 5% of max measuring value	below 50% of max masuring value, or below 1mV/V

* When purchasing a torque sensor and CD5 at the same timing, calibration will be processed at TOHNICHI before shipping.

8-2 Flow chart for calibration

```
                          ╭─────────────────╮
                          │   Calibration   │
                          ╰─────────────────╯
                                   │
                          ┌─────────────────┐
                          │  Cancel locking │
                          └─────────────────┘
                                   │
                          ┌─────────────────┐
                          │ Set to calibration
                          │ display         │
                          └─────────────────┘
                                   │
Equivalent input calibration   ◇ Select calibration ◇   Calibration with sensor-equipped
                               │    method          │    torque wrench
                               │                    │
                          Calibration using actual load
```

	Calibration using actual load	
Set rated value	Set decimal point	Set decimal point
Set rated value (left)	Set measuring value	Set masuring value
Set decimal point	Set 1 digit	Set 1 digit
Set max value	Actual loading (clockwise)	Actual loading (clockwise) repeat 3 times
Set 1 digit	Actual loading (counter clockwise)	Actual loading (counter-clockwise) repeat 3 times
Set lock again	Set lock again	Set lock again
Complete	Complete	Complete

8-3 How to proceed equivalent input calibration
　　This calibration method can be processed just by inputting the rated output
　　value(mV/V) and the maximum measuring value without using any actual weight.

⚠ **Notice**: When purchasing a torque sensor and CD5 at the same time,
　　　　　　　calibration will be processed at TOHNICHI before shipping.

Example)
In case of TCF100N "rated output value 2mV/V, maximum measuring value 100Nm.
Check the wiring connection between CD5 and the sensor.

① Set the memory counter to "0000".

```
0000            0.00
 ▼               ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

② Switch off the lock on the backside of CD5 (Setting cannot be changed without
　　unlocking).
　　When the lock is cancelled, ▼ above LOCK disappears.
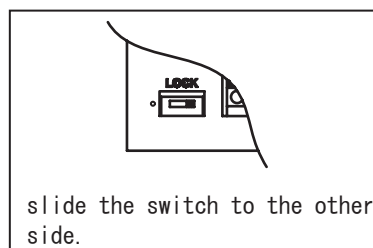
```
0000            0.00
 ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
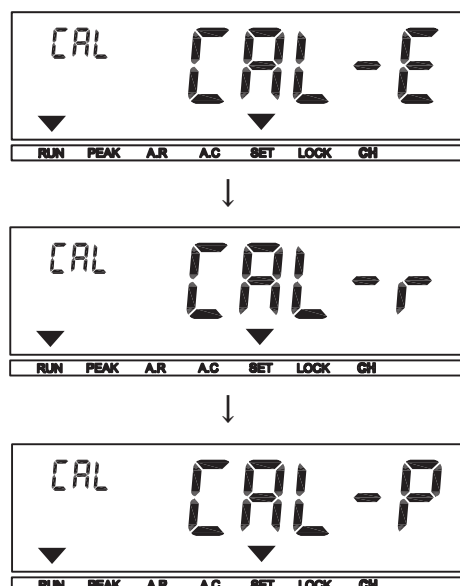
slide the switch to the other
side.

③ Set it to calibration display
　　Press C ⇒ MEM ⇒ MD key in this order.
　　After above key operation, "CAL-E" flashes on the display, which is the setting
　　mode (If already calibrated, the display may show either "CAL-E", "CAL-r", or
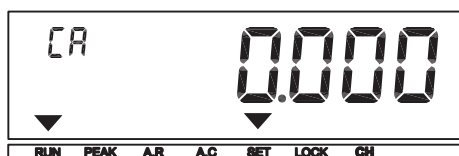　　"CAL-P".)

④ Select calibration method
　　Use down/right key to select "CAL-E"(=Equivalent input calibration) and press MEM
　　to confirm.

```
CAL         CAL-E
 ▼           ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

CAL-E: Equivalent input calibration
CAL-r: Calibration by actual weight
CAL-P: Calibration using sensor-equipped
　　　　　torque wrench

↓

```
CAL         CAL-r
 ▼           ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

↓

```
CAL         CAL-P
 ▼           ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

The display shows as below and "0." flashes.

```
 ┌─────────────────────────┐
 │  CA          0.000      │
 │  ▼           ▼          │
 │ RUN PEAK A.R A.C SET LOCK CH │
 └─────────────────────────┘
```

⑤ Setting sensor rated value (clockwise)
   Input sensor rated value.

```
 ┌─────────────────────────┐
 │  CA          0.000      │
 │  ▼           ▼          │
 │ RUN PEAK A.R A.C SET LOCK CH │
 └─────────────────────────┘
```

Example) Set the rate output value
         to 2.000mV/V.

1) Press down key twice and set it to 2.
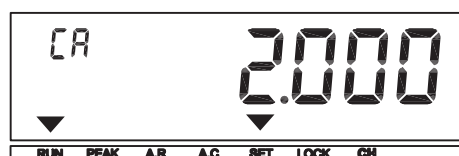
```
 ┌─────────────────────────┐
 │  CA          2.000      │
 │  ▼           ▼          │
 │ RUN PEAK A.R A.C SET LOCK CH │
 └─────────────────────────┘
```

2) Check the set value and press MEM
   to confirm.

As you press MEM key, it proceeds to the next setting(decimal point).

⑥ Selecting the decimal point

```
 ┌─────────────────────────┐
 │  dP          0.0000     │
 │  ▼           ▼          │
 │ RUN PEAK A.R A.C SET LOCK CH │
 └─────────────────────────┘
```
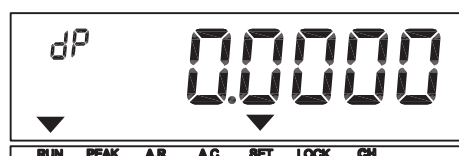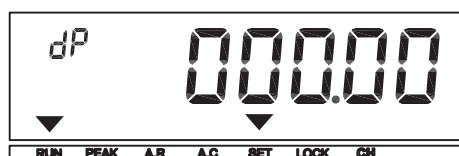
Example) Set the decimal point to "000.00"
1) Press right key twice.
   Use right key to move the decimal point position one by one.
   0.0000→00.000→000.00→0000.0→00000
   ↑_____|

```
 ┌─────────────────────────┐
 │  dP          000.00     │
 │  ▼           ▼          │
 │ RUN PEAK A.R A.C SET LOCK CH │
 └─────────────────────────┘
```
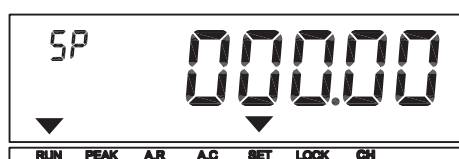
2) Check the set position and press MEM to
   confirm.

As you press MEM key, it proceeds to the next setting (Max value).
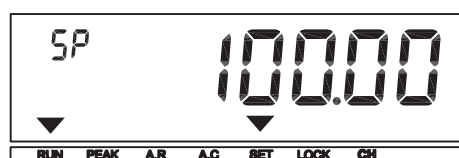
⑦ Setting the maximum measuring value
   Set the maximum value of the torque sensor.

```
 ┌─────────────────────────┐
 │  SP          000.00     │
 │  ▼           ▼          │
 │ RUN PEAK A.R A.C SET LOCK CH │
 └─────────────────────────┘
```

Example) Set the max value to "100.00".
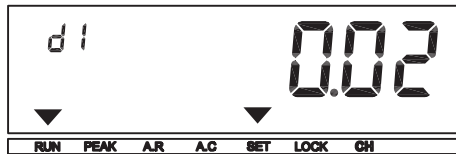1) Press down key 9 times.
   Use right key to select digits (selected digit flashes)
   and down key to select number
   (counting from 9, 8, 7 ⇒0).
2) Check the set value and press MEM to
   confirm.

```
 ┌─────────────────────────┐
 │  SP          100.00     │
 │  ▼           ▼          │
 │ RUN PEAK A.R A.C SET LOCK CH │
 └─────────────────────────┘
```

As you press MEM key, it proceeds to the next setting (smallest digit setting).

⑧ Setting the smallest digit (1 digit)

```
d1              0.02
▼       ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
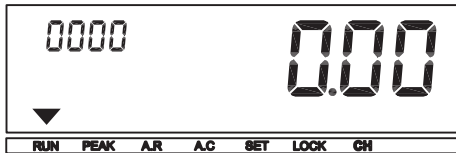
Displayed value is the smallest digit value. To chang the value, press down key.

* Refer below for resolution for CD5. Setting beyond below values is not applicable.
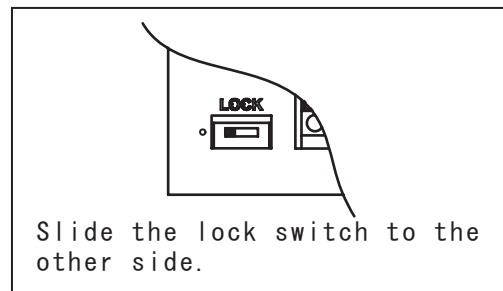Sensor rated value ±0.5 - 1.0mV/V Resolution 1/2000
Sensor rated value ±1.0 - 3mV/V   Resolution 1/5000

```
0000            0.00
▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

Check the set value and press MEM key to confirm.

Press MEM key, and it returns to the measuring condition on RUN mode. Setting is now complete. Switch the lock on to prevent accidental change of settings.

```
0000            0.00
▼               ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

```
         LOCK
        ▢▬▭   ▢
```

Slide the lock switch to the other side.

8-4 Calibration using actual weight
   This calibration method inputs the value loaded by the actual weight. More
   accurate calibration is possible. Refer to the following procedures.
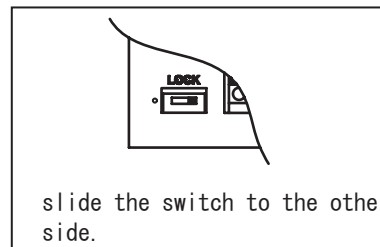

 Example) TCF100N, max measuring value: 100Nm
 * Check the wiring condition between CD5 and the sensor before proceeding.

  ① Set the memory counter to "0000".

```
 0000          0.00
  ▼             ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

  ② Switch off the lock on the backside of CD5 (Setting cannot be changed without
     unlocking). As you switch it off, ▼ above LOCK disappears.

```
 0000          0.00
  ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

slide the switch to the other
side.

  ③ Set it to calibration display
     Press C ⇒ MEM ⇒ MD key in this order.
     After above key operation, "CAL-E" flashes on the display,
     which is the setting mode (If already calibrated, the display may show either
     "CAL-E", "CAL-r", or "CAL-P".

  ④ Select calibration method
     Use down/right key to select "CAL-r"(=Calibration using actual weight) and
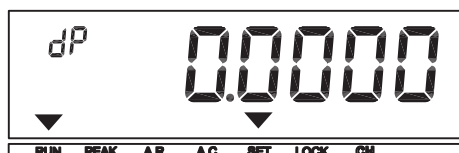   press MEM to confirm.
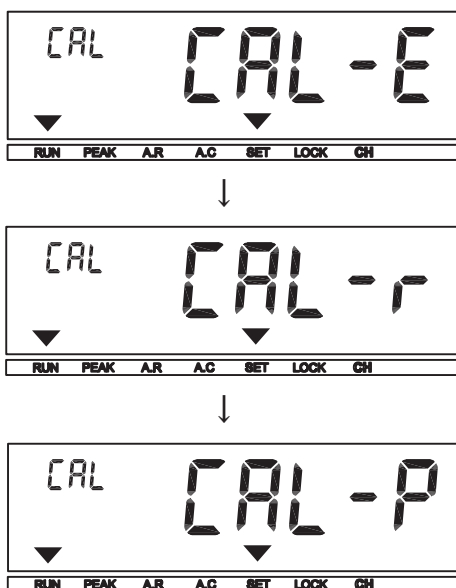
```
 CAL      CAL-E
  ▼         ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

CAL-E: Equivalent input calibration
CAL-r: Calibration by actual weight
CAL-P: Calibration using load applied by
       sensor-equipped torque wrench

↓

```
 CAL      CAL-r
  ▼         ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

↓

```
 CAL      CAL-P
  ▼         ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

The display shows as below and "0." starts to flash.

```
dP    0.0000
  ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```

⑤ Selecting the decimal point

```
dP    0.0000
  ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```
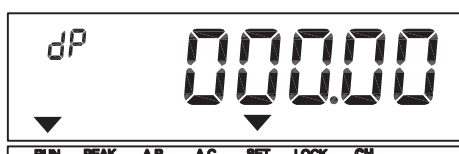
Example) Set the decimal point to
         "000.00".
 1) Press right key twice.
    Press right key to move the digit rightward.
    0.0000→00.000→000.00→0000.0→00000

```
dP    000.00
  ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```

 2) Check the position and press MEM key.

  Set the position of the decimal point and press MEM key to confirm. Zero on
  the biggest digit starts to flash as shown below.
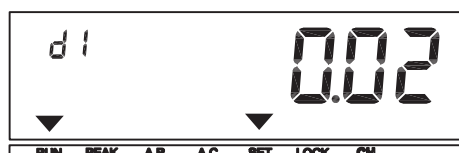
⑥ Setting the maximum measuring value

```
SP    000.00
  ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```
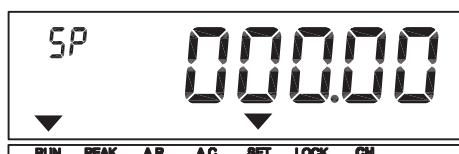
Example) Set max value to "100.00".
 1) Press down key 9 times.
     press down key to set the value
    (down count 9,8,→0)

```
SP    100.00
  ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```

 2) Check the set value and press
    MEM key.

⑦ Setting the smallest digit value (1 digit)

```
d1      0.02
  ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```
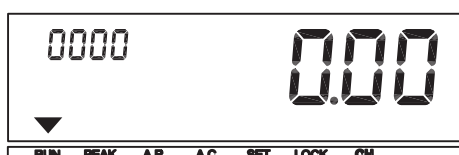
Displayed value is the smallest value.
To change, press down key.

＊ Refer below for resolution for CD5. Setting
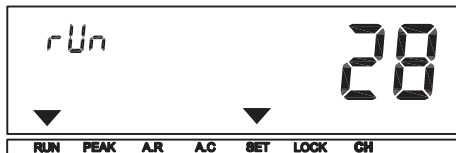 beyond below values is not applicable.
  Sensor rated value ±0.5 - 1.0mV/V Resolution 1/2000
  Sensor rated value ±1.0 - 3mV/V   Resolution 1/5000

```
0000    0.00
  ▼
RUN PEAK A.R A.C SET LOCK CH
```

Check the set value and press MEM to confirm.

After the above procedure, the display changes as below and an arbitrary number appears.

```
rUn            28
 ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```

⑧-1 Set the torque sensor to the calibration device and apply a training weight.
Apply the max measuring weight as training weight.

⑧-2 Remove the training weight and press C key.
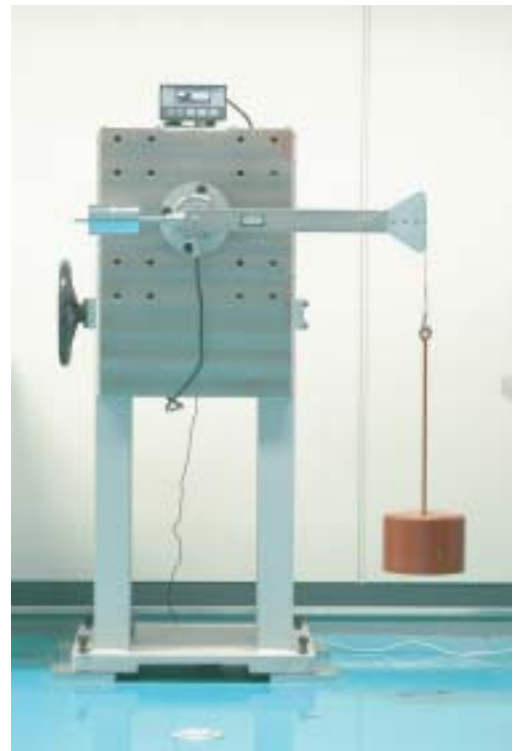Set the calibration lever and wire and press C key again.

```
rUn             0
 ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```
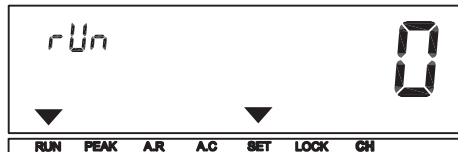
Check the display shows "0".

⑧-3 Apply the maximum measuring weight
again
(The display may show values irrelevant
to the loaded torque value).
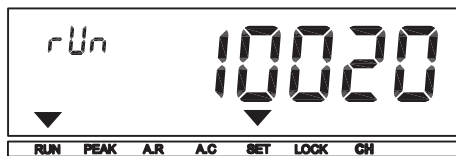
```
rUn         10020
 ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```
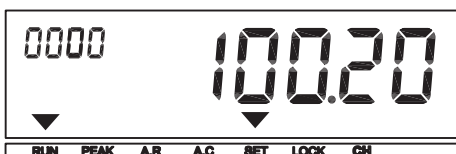(The above figurers are not torque value.)

For reference : calibration of torque sensor

⑧-4 Press MEM key to register the actual loading value.
The display returns to the measuring condition on RUN mode, and shows the
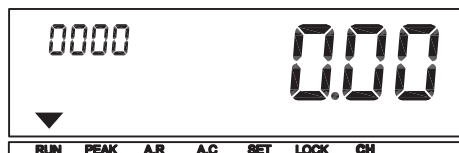maximum torque value. Check the displayed value matches your setting.

```
0000        100.20
 ▼        ▼
RUN PEAK A.R A.C SET LOCK CH
```

After the above procedure, the display returns to the measuring mode (RUN mode).

```
0000          100.20
▼              ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

⑧-5 Remove loading and check it returns to "0".
　　　After checking, remove the calibration equipment.

```
0000           0.00
▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

　　Now, calibration is complete. Put the lock switch back to prevent accidental
　　setting change.

```
0000           0.00
▼              ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

```
LOCK
 ▫ ▭
```

Slide the lock switch to the
other side.
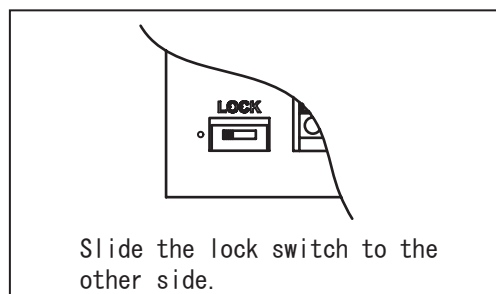
8-5 Calibration using load applied by sensor-equipped torque wrench
    Use this method for calibrating a sensor-equipped torque wrench.
    Set the torque wrench on the torque tester and apply torque for 3 times.
    Calibration is processed based on the average value of this 3-time measurement
   results. Highest resolution is 1/2000.

 Example) Calibrating CSPD140N3 "torque setting 100N.m"
* Check the correct wire connection between CD5 and the torque wrench before
  proceeding further.

① Set the memory counter value to "0000".

```
0000                 0.00
 ▼                    ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
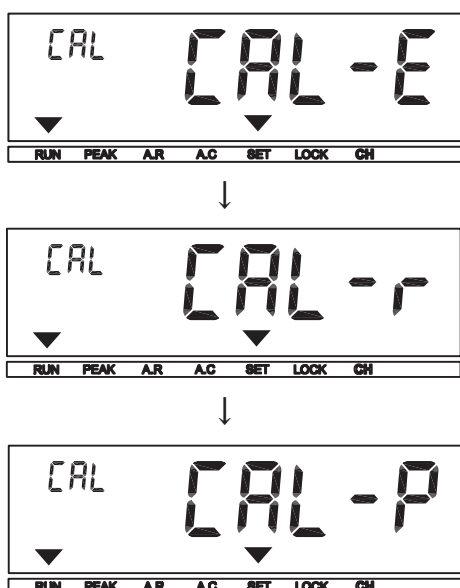
② Switch off the lock on the backside of CD5 (Setting cannot be changed without
   unlocking). As the lock is cancelled,
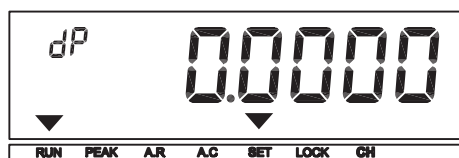   ▼ above LOCK on the display disappears.
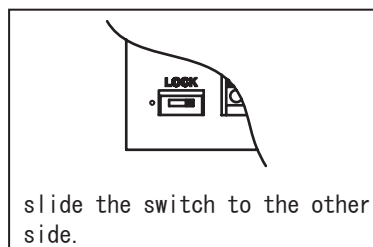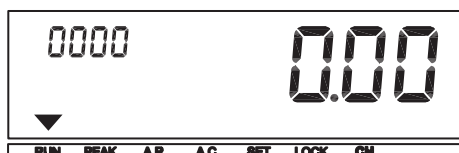
```
0000                 0.00
 ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

slide the switch to the other side.

③ Set it to calibration display
   Press C ⇒ MEM ⇒ MD key in this order.
   After above key operation, "CAL-E" flashes on the display, which is the setting
   mode (If already calibrated, the display may show either "CAL-E", "CAL-r", or
   "CAL-P".)

④ Select calibration method
   Use down/right key to select "CAL-E"(=Equivalent input calibration) and press
   MEM to confirm.

```
CAL     CAL-E
 ▼       ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
         ↓
```
CAL     CAL-r
 ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
         ↓
```
CAL     CAL-P
 ▼       ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
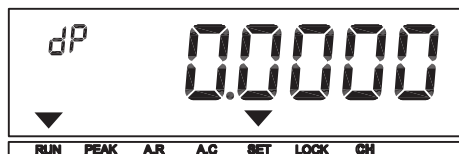
CAL-E: Equivalent input calibration
CAL-r: Calibration by actual weight
CAL-P: Calibration using sensor-equipped
       torque wrench

After the above key operation, "0." flashes on the display.

```
dP      0.0000
   ▼           ▼
RUN PEAK A.R A.C SET LOCK CH
```

⑤ Selecting the decimal point

```
dP      0.0000
   ▼           ▼
RUN PEAK A.R A.C SET LOCK CH
```
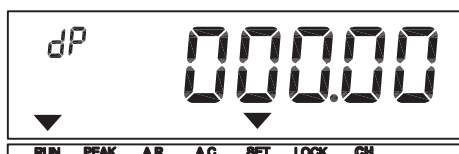
Set the decimal point to "000.00".
1) Press right key twice.
   As you press right key, the decimal point moves rightward.
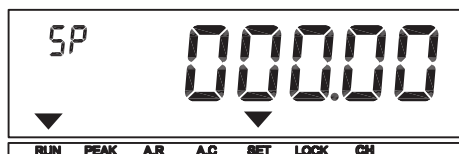   0.0000→00.000→000.00→0000.0→00000

```
dP      000.00
   ▼           ▼
RUN PEAK A.R A.C SET LOCK CH
```

2) Check the set value and press MEM key to confirm.

As you press MEM key, it proceeds to the next setting (max measuring value).

⑥ Setting the maximum measuring value

```
SP      000.00
   ▼           ▼
RUN PEAK A.R A.C SET LOCK CH
```

Example) Set the max measuring value to "100.00".
1) Press down key 9 times.
   Press down key to set the value (9, 8 ⇒0)

```
SP      100.00
   ▼           ▼
RUN PEAK A.R A.C SET LOCK CH
```

2) Set the value and presss MEM key to confirm.

As you press MEM key, it proceeds to the next setting (smallest digit).

⑦ Selecting the smallest digit (1 digit)

```
d1         0.05
   ▼           ▼
RUN PEAK A.R A.C SET LOCK CH
```
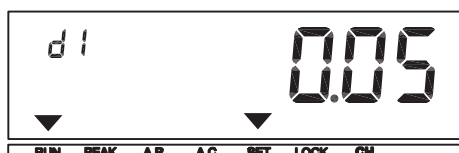
Displayed value is the minimum value. To change it, press down key.

* Refer below for resolution for CD5. Setting beyond below values is not applicable.
  Sensor rated value ±0.5 − 1.0mV/V Resolution 1/2000
 Sensor rated value ±1.0 − 3mV/V   Resolution 1/5000

Check the set value and press MEM to confirm.

After the above procedure, the display changes as below
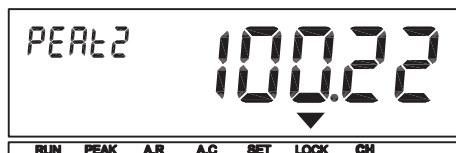(an arbitrary number appears).

```
PEAt1            10
  ▼       ▼
RUN PEAK A.R A.C SET LOCK CH
```
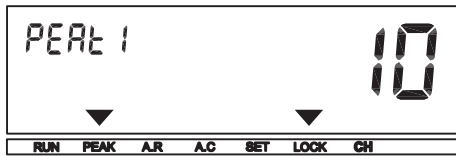
⑧ Zero adjustment and calibration with actual weight.
⑧-1 Set the sensor-equipped torque wrench to the torque wrench tester and
      apply a training weight (set torque).
⑧-2 Remove the torque wrench from the torque wrench tester and press C key
      for both torque wrench tester and CD5. Check the displayed value returns to 0.

```
PEAt1             0
  ▼
RUN PEAK A.R A.C SET LOCK CH
```
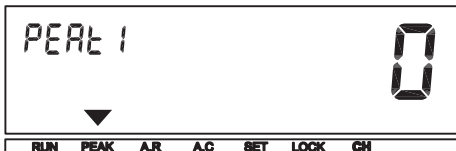
   Check the display shows "0".

⑧-3 Set the torque wrench on the tester again and operate the
      torque wrench
      and press MEM key. Repeat this process for 3 times.
      (The values shown on CD5 are irrelevant to the measured torque value).

```
PEAt1         100.20
  ▼
RUN PEAK A.R A.C SET LOCK CH
```

```
PEAt2         100.22
           ▼
RUN PEAK A.R A.C SET LOCK CH
```

```
PEAt3         100.24
  ▼
RUN PEAK A.R A.C SET LOCK CH
```

After the above procedure, the display returns to a measuring mode (RUN mode).
Remove the torque wrench from the torque wrench tester and check the display
shows "0".
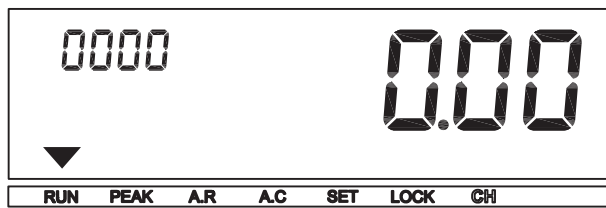
Calibration is now complete. To prevent accidental setting change, put the lock
switch back on.
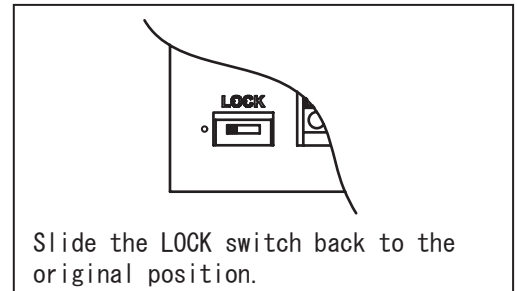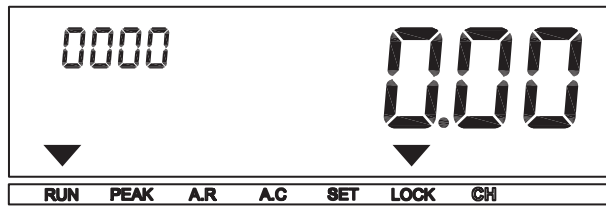
Slide the LOCK switch back to the
original position.

9. Various settings and operation

Settings and their procedures are explained bleow.

9-1 List of setting items

|	setting item	display	default	select
1	Upper limit value	HI	0	0 – max value
2	Lower limit value	Lo	0	0 – max value
3	Measuring direction	tUrn	botH	rIgHt/LEFt
4	Auto judgement timer	AC	0.0	0.1-5.0
5	Auto memory/Reset timer	Ar	0.0	0.1-5.0
6	Detect external input signal	EdgE	rISE	FALL
7	Communication output format	doUt	PC	Prn
8	Torque unit in printer output	Unit	Unit 1	Unit 2 ～ Unit 12
9	Baud rate	bPS	2400	4800/9600/19200
10	Data length	LngtH	7bit	8bit
11	Parity	PArtY	nonE	odd/EvEn
12	Flow control (RTD/CTS)	Flo	on	oFF
13	Memory mode	dCnt	1000	99
14	Calibration (clockwise/counterclockwise)	CAL	CAL1	CAL2
15	Reset setting (Default setting)	dFLt	dFLt-n	dFLt-Y

9-2 How to proceed settings
① Set the memory counter to "0000".

```
0000            0.00

▼               ▼
RUN  PEAK  A.R   A.C   SET  LOCK  CH
```
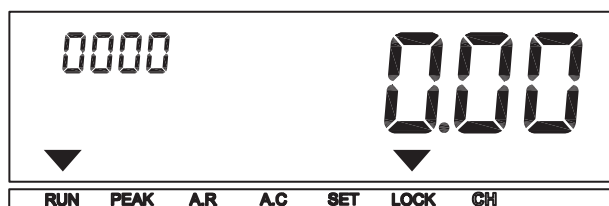
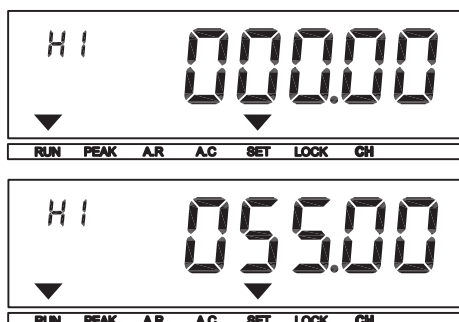② Turn the lock switch off to enable setting change (Lock switch is on the back side of CD5). Check ▼ above LOCK on the display disappears.

```
0000            0.00

▼
RUN  PEAK  A.R   A.C   SET  LOCK  CH
```

LOCK

Slide the LOCK switch to the other side.
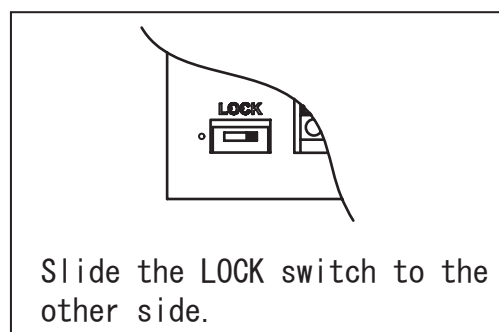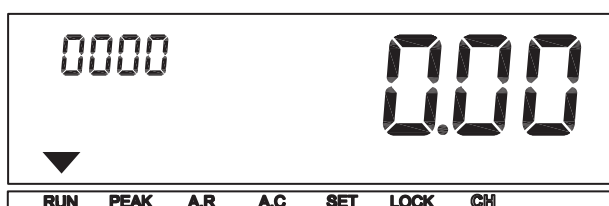
③ Keep pushing MD key for 2 seconds or more until the buzzer goes off, then release it.
The display changes as below to set the upper limit value.

```
 HI        000.00
▼          ▼
RUN PEAK A.R A.C SET LOCK CH
```
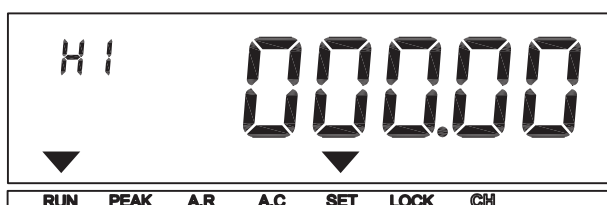
● Upper limit value setting (Default: 0)
　Setting the upper limit value for judgement.
　If you prefer no judgement, set it to "0"

```
 HI        000.00
▼          ▼
RUN PEAK A.R A.C SET LOCK CH
```
```
 HI        055.00
▼          ▼
RUN PEAK A.R A.C SET LOCK CH
```

Example) Setting to 55Nm
① Press right key 1 time (press right key to select digit).
② Press down key for 5 times (press down key to set the number).
③ Press right key 1 time.
④ Press down key for 5 times.
⑤ Check the value on the display and press MEM key to confirm.

　It proceeds to lower limit value setting.

● Lower limit value (Lo) setting
　Setting the lower limit value for judgement
　If you prefer no judgement, set it to "0".

```
 Lo        000.00
▼          ▼
RUN PEAK A.R A.C SET LOCK CH
```
```
 Lo        045.00
▼          ▼
RUN PEAK A.R A.C SET LOCK CH
```
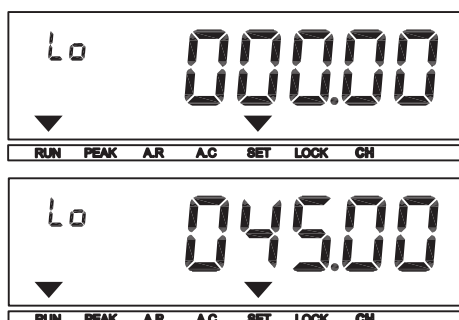
Example) Setting to 45Nm
① Press right key 1 time (press right key to select digit).
② Press down key for 6 times (press down key to set the number).
③ Press right key 1 time.
④ Press down key for 5 times.
⑤ Check the value on the display and press MEM key to confirm.

　It proceeds to measuring direction setting.

● Measuring direction setting (Default: both)

```
 tUrn      botH
▼          ▼
RUN PEAK A.R A.C SET LOCK CH
```
↓
```
 tUrn      rIgHt
▼          ▼
RUN PEAK A.R A.C SET LOCK CH
```
↓
```
 tUrn      LEFt
▼          ▼
RUN PEAK A.R A.C SET LOCK CH
```
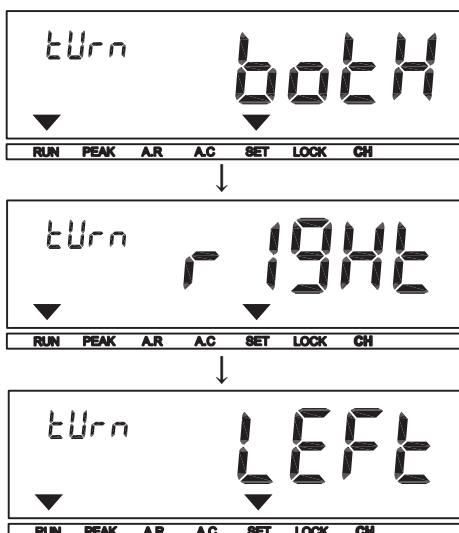
Use right/down key to select from below.
　BotH: Clockwise and counter clockwise
　rIgHt: Clockwise only
　LEFt: Counter clockwise only

　Press MEM key to confirm and proceeds to the next setting.

● Auto judgement timer (Default: 0.0)
  Setting timer for auto judgement.
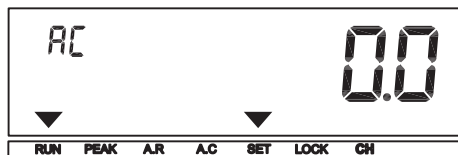 Auto judgement timer conducts judgement automatically after the set timing.

```
AC                 0.0
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

```
AC                 0.5
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

It proceeds to the next setting.

Example) Setting to 0.5 second
① Press right key for 5 times
  ＊ Timer is settable every 0.1 sec for
    0.1 ～ 0.5 sec range, and every 1.0
    sec for 1.0 - 5.0 sec range.
② check the set value on the display and
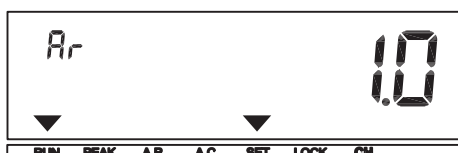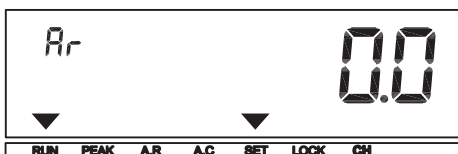 press MEM key to confirm.

● Auto memory/Reset timer setting (Default: 0.0)
  Setting Auto memory/Reset timer
  Auto memory/Reset timer saves the data automatically after the set timing and
  proceeds to the next counter.

  When upper/lower limit value is set, auto memory/reset timer works only when
  the judgement is OK. When using this function and auto judgement timer at the
  same time, Auto memory/Reset must be longer than Auto judgement timer.
  If you want to turn off this function, set it to "0.0".

```
Ar                 0.0
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

```
Ar                 1.0
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

It proceeds to the next setting.

Example) Setting to 1.0 sec.
① Press right key for 6 times.
 ＊ Timer is settable every 0.1 sec for
   0.1 - 0.5 sec range, and every 1.0 sec
   for 1.0 - 5.0 sec range.
② Check the displayed value and press MEM
  to confirm.

● Detecting external input signal (default: rISE)
  Selecting the detecting way of external terminal input signal(RESET, CLEAR, COMP)

  rISE: Detecting by upward move of input signal

```
EdGE        r ISE
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

① upward
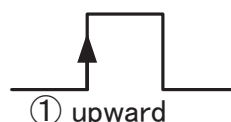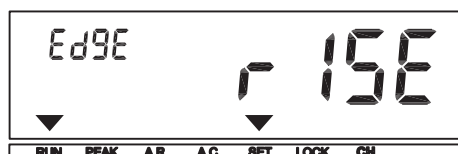
  FALL: Detecting by downward move of input signal

```
EdGE        FALL
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

② downward
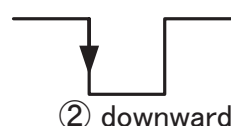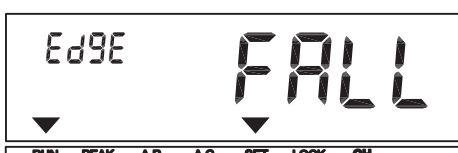
Press MEM key to proceed to the next setting.

● Output format setting (Default: PC)
  Setting output format for RS232C.
  * To connect to sequencer, etc, select "PC".

        PC: Output to PC

        ```
        doUt          PC
        ▼         ▼
        RUN  PEAK  A.R  A.C  SET  LOCK  CH
        ```

① Use right/down key to select PC or Prn.
② Check the setting and press MEM to confirm.
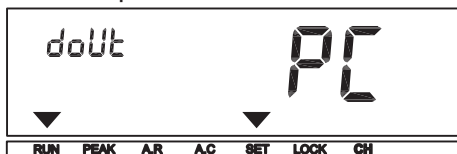
        Prn: Output to Printer

        ```
        doUt          Prn
        ▼         ▼
        RUN  PEAK  A.R  A.C  SET  LOCK  CH
        ```
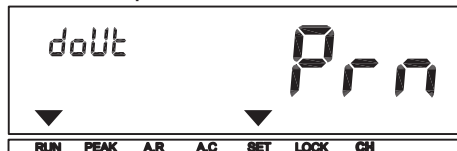
  It proceeds to the next setting.

● Baud rate setting (Default: 2400bps)
  Setting baud rate for RS232C

  * To connect to the dedicated printer (EPP16M2) select 2400bps.

  * To connect to PC or sequencer, select the baud rate in line with their settings.

        2400bps
        ```
        bPS          2400
        ▼         ▼
        RUN  PEAK  A.R  A.C  SET  LOCK  CH
        ```
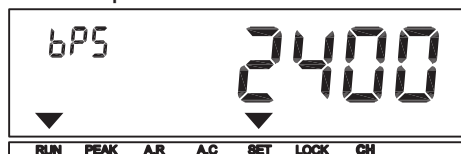
① Use right/down key to select.
② Press MEM key to confirm.

                ↓
        4800bps
        ```
        bPS          4800
        ▼         ▼
        RUN  PEAK  A.R  A.C  SET  LOCK  CH
        ```

                ↓
        9600bps
        ```
        bPS          9600
        ▼         ▼
        RUN  PEAK  A.R  A.C  SET  LOCK  CH
        ```

                ↓
        19200bps
        ```
        bPS          19200
        ▼         ▼
        RUN  PEAK  A.R  A.C  SET  LOCK  CH
        ```
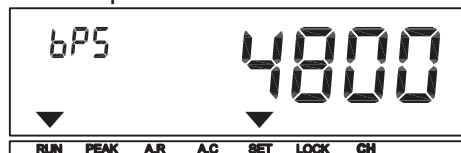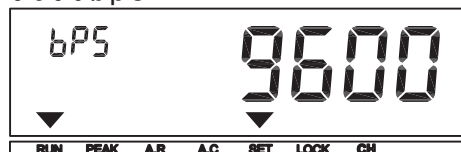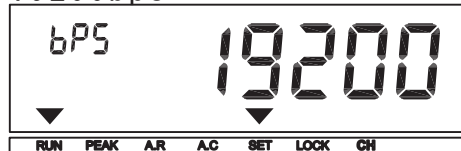
  It proceeds to the next setting.

● Communication setting (Default: 7 bit)
   Setting the data length for RS232C.
   * Select 7 bit when connecting to the dedicated printer EPP16M2.
   * When connecting to PC or sequencer, select the data length in line with their
     settings.

   Data length: 7bit

   | Ln9tH   7b It |

   ▼   ▼
   RUN PEAK A.R A.C SET LOCK CH
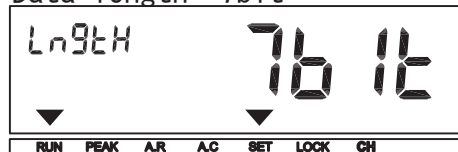
   ① Use right /down key to select.
   ② Press MEM key to confirm.

   Data length: 8bit

   | Ln9tH   8b It |

   ▼   ▼
   RUN PEAK A.R A.C SET LOCK CH

   It proceeds to the next setting.

● Parity setting (Default: nonE)
   Setting parity for RS232C communications.
   * When connecting to the dedicated printer (EPP16M2), select nonE.

   Parity: none

   | PArtY   nonE |

   ▼   ▼
   RUN PEAK A.R A.C SET LOCK CH
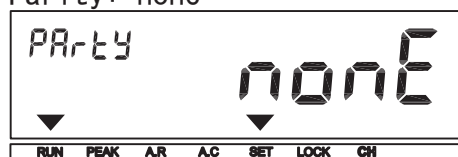
   ① Use right/down key to select.
   ② Press MEM to confirm.

   Parity: odd

   | PArtY   odd |

   ▼   ▼
   RUN PEAK A.R A.C SET LOCK CH

   Parity: even

   | PArtY   EuEn |

   ▼   ▼
   RUN PEAK A.R A.C SET LOCK CH
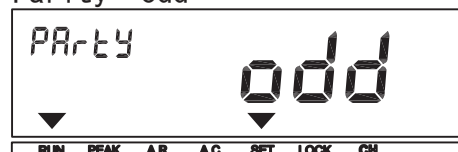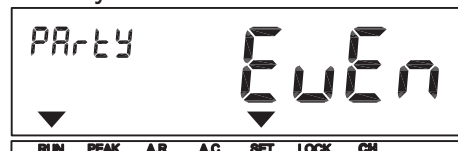
   It proceeds to the next setting.

● Flow control setting (Default: on)
　Choosing whether or not to enable RTS/CTS flow control (on: enable flow control,
　off: disable flow control).
　＊ When sending a command to CD5 from external device, make sure to set it ON.
　＊ When outputting data to the dedicated printer (EPP16M2), set it ON.

Flow control "ON"

```
 FLo
            on
  ▼         ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
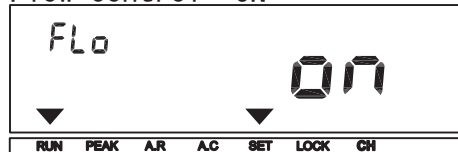
① Use right/down key to select ON or OFF.
② Check the display and press MEM key to
　confirm.

Flow control "OFF"

```
 FLo
            oFF
  ▼         ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
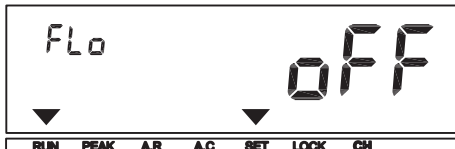
　　It proceeds to the next setting.

● Memory mode (Default: 1000)
　　Choosing the capacity of data memory
　　1000: 1000pc of data
　　99: 99pc of data (communication format compliant with previous version CD42).

1000: 1000pc of data

```
 dCnt
            1000
  ▼         ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
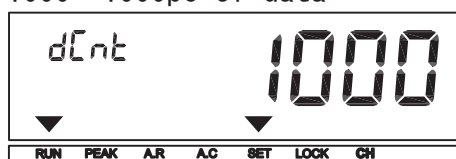
① Use right/down key to select.
② Check the display and press MEM key to
　confirm.

99: 99pc of data

```
 dCnt
             99
  ▼         ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
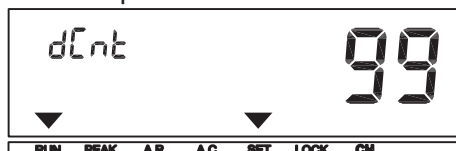
As you press MEM key, the display changes as below.

```
      dCnt
              CLr-y
       ▼       ▼
      RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

＊ If you agree to delete all the previous
　 data, press MEM key.
　 It proceeds to the next setting
　 (Clockwise/Counter clockwise calibration).

＊If you do not want to delete the
　existing data, press C key to
　cancel memory mode change.
　 It returns to previous display.

```
 dCnt
            CLEAr
  ▼         ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

● Calibration (clockwise/counterclockwise) (Defalut: CAL1)
　Choosing whether to calibrate clockwise and counter clockwise direction at the
　same time, or separately. (CAL1: both at one time / CAL2: separately)

Calibrating Clockwise/Counter
clockwise at the same time

```
CAL        CAL 1
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
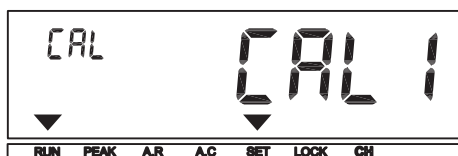
① Use right/down key to select.
② Check the display and press MEM to confirm.

Calibrating Clockwise/Counter clockwise separately

```
CAL        CAL2
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
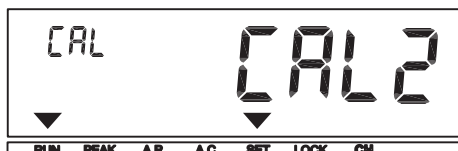
　As you press MEM key, it proceeds to the next setting.

● Reset setting (Default setting)
　Reset the setting to default
　Saved data will be deleted but the calibration settings value remain intact.

Do not reset settings

```
dFLt       dFLt-n
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

① Use right/down key to select.
② Check the display and press MEM to confirm.

Reset setting to the default conditions.

```
dFLt       dFLt-Y
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
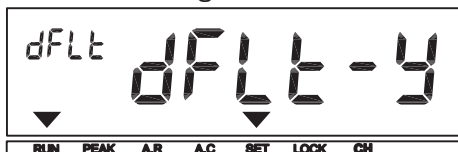
　As you press MEM key, it returns to a measuring display on RUN mode.

```
0000       0.00
▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
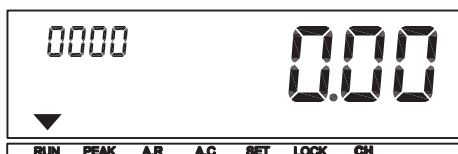
To prevent accidental change of settings, put the lock switch back.

```
0000       0.00
▼          ▼
RUN  PEAK  A.R  A.C  SET  LOCK  CH
```


Slide the LOCK switch back to the
original position.
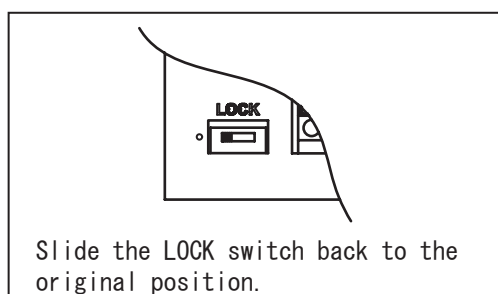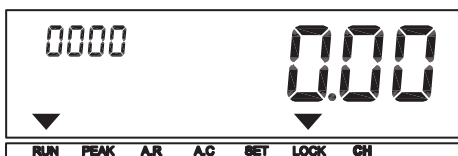
9-3 Check and change the current settings
   Follow the below operation to check the current settings or change them.

●Checking the current condition
   ① Set the memory counter to "0000".

```
 0000          0.00
   ▼            ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
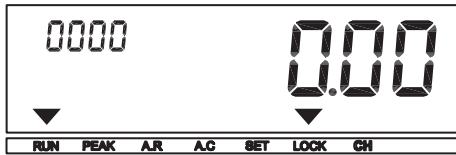
   ② Push MD key for 2 seconds or more till the buzzer goes off.
      The display shows the upper limit value (HI).

```
  HI          055.00
   ▼            ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

   ③ Press MD to check the current settings.
      As you press MD key, the display shows the current settings in the following
      order respectively.
      * ( ) shows the number of times to push MD key.

      Lower limit value (1)
          ↓
      Measuring direction (2)
          ↓
      Auto judgement timer (3)
          ↓
      Auto memory/Reset timer (4)
          ↓
      Detecting external input signal (5)
          ↓
      Communication output format (6)
          ↓
      Torque unit when printing (7)
          ↓
      Baud rate (8)
          ↓
      Data length (9)
          ↓
      Parity (10)
          ↓
      Flow control (11)
          ↓
      Memory mode (12)
          ↓
      Clockwise/counter clockwise calibration (13)
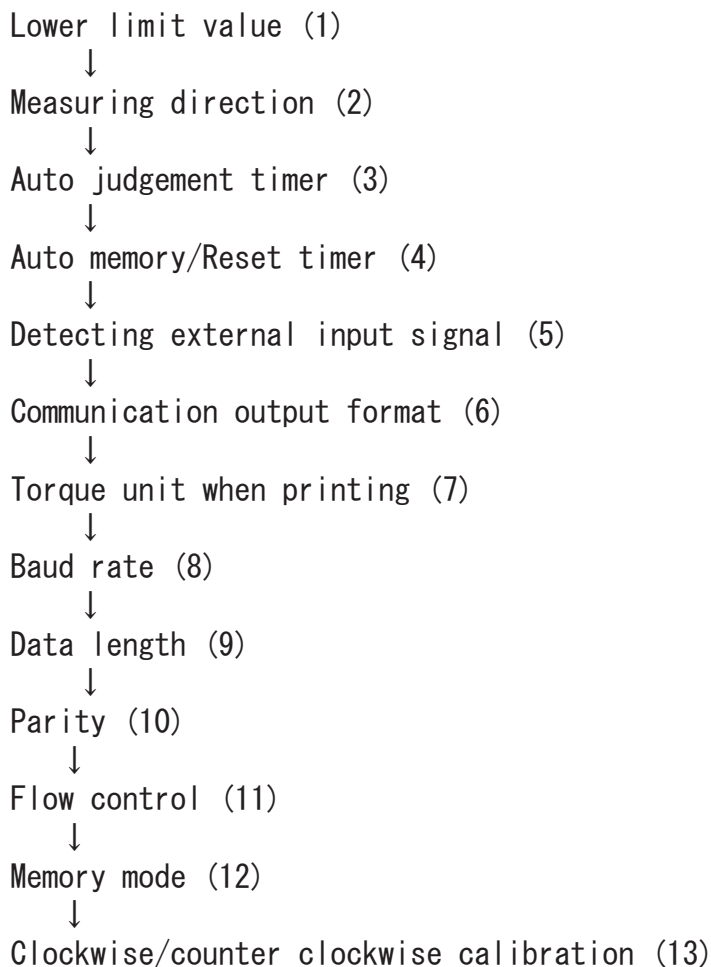
     * Press C key to cancel along the way.
       It goes to a measuring display in RUN mode.

●How to change the current settings
① Set the memory counter to "0000".

```
 0000          0.00
  ▼             ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

② Press MD key for 2 seconds or more until the buzzer goes off.
   It proceeds to upper limit value settings.

```
 HI           055.00
  ▼             ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
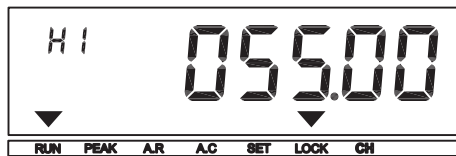
③ Press MD key several times until it shows the setting you would like to change.
   (Example) Changing Auto memory/Reset timer to 0.5 second
   ③-1 Press MD key 4 times as it shows Auto memory/Reset timer settings.

```
 Ar              1.0
  ▼             ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
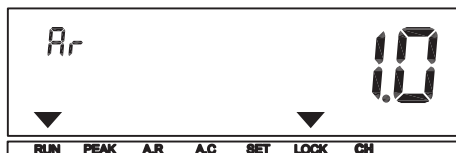
③-2 Unlock the LOCK switch.
   Turn the lock switch on the back side of CD5 to enable setting change.
   ▼ above LOCK on the display disappears.

```
 Ar              1.0
  ▼       ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

③-3 Use right/down key to set it to 0.5.

```
 Ar              0.5
  ▼       ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

③-4 Press MEM key to confirm.

```
 Ed9E          r 1SE
  ▼       ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```

③-5 Put the lock switch back on.

```
 Ed9E          r 1SE
  ▼       ▼
 RUN  PEAK  A.R  A.C  SET  LOCK  CH
```
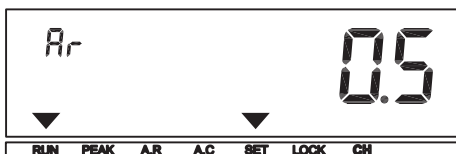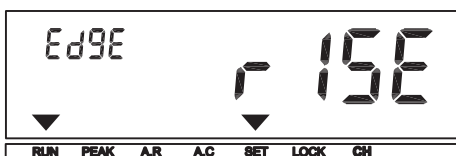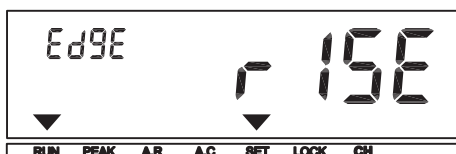
③-6 Press C key to return to a measuring display on RUN mode.

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10. Example use

Shown below is a typical use of CD5 connected to a sensor-equipped TOHNICHI product.

Example1) In case CD5 is connected to TCF100N to check tightening torque
         (When the tightening completion signal cannot be taken)

        Setting condition:
                Judgement: Upper limit value: 55Nm
        Lower limit value: 45Nm
    Auto judgement time: 1.0 sec
    Auto memory/Reset: 2.0 sec
                Connection: Connect the torque sensor to "INPUT" of CD5.
                Operation:
① As torque is applied, the peak value starts to increase.

② Auto judgement will be conducted if the peak value is not renewed within the set
   time frame.

   - In case of OK judgement
   OK signal will be output when the displayed torque
   value is within the set range (between upper and lower value).

   -In case of HI judgement
   HI signal will be output when the displayed value
   exceeds the upper limit value.

③ - in case of OK judgement
   After releasing torque and reaching the set time , auto memory/reset will be
   activated. It saves the data and proceed to the next memory counter and reset.

   - In case of HI (= when it exceeds the upper limit value)
   Measured data will be saved by pushing MEM key or inputting RESET
   signal. Measured data will be cleared by pushing C key or inputting CLEAR
   signal (When the judgement is HI, auto reset/memory will not work even
   after the set timing.)
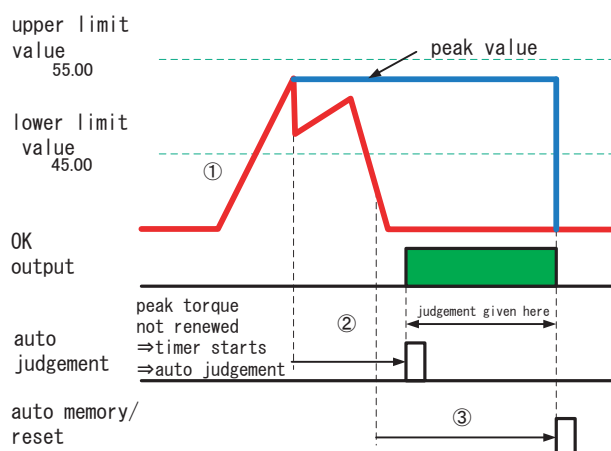
Case 1: Judgement OK

Case2: Judgement HI

Example 2) In case CD5 is connected to a sensor-equipped torque wrench CSPD100N3x15D
for torque management (When judgement is conducted by the completion
signal, and Auto memory/Reset is used).
●Setting condition:
Judgement: Upper limit value: 55Nm
Lower limit value: 45Nm
Auto judgement time: 0 sec
Auto memory/reset: 2.0 sec
External input signal setting: FALL

●Connection: Inputting tightening completion signal to COMP-COM2.

No polarity

●Operation
① After applying torque, the peak value increases.
 * Even if you release the torque by the ratchet movement, judgement will not
   be conducted until COMP signal (completion signal) is input.

② - in case of OK-
   After releasing the torque, Judgement will be given by COMP signal input.
   When it is within the set range (between upper and lower limit value), it
   outputs OK signal.

   -in case of HI-
   If the measured torque exceeds the upper limit value, HI signal will be output.

③ - in case of OK-
   After the set timing, auto memory/reset work to save the measured data and
   proceed to the next memory counter and reset.

   -in case of HI
   Measured data can be saved by pushing MEM key or sending RESET signal. The
   data can be deleted by pushing C key or sending CLEAR signal.
 * Auto memory/reset does not operate when the judgement is HI.

Case 1: Judgement OK

Case 2: Judgement HI

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Example 3) In case CD5 is connected to a sensor-equipped torque wrench CSPD100N3x15D
          for torque management. (When controlled by sequencer).

● Setting condition
  Judgement: Upper limit value: 55Nm
  Lower limit value: 45Nm
  Auto judgement: 0 second
  Auto memory/Reset: 0 second
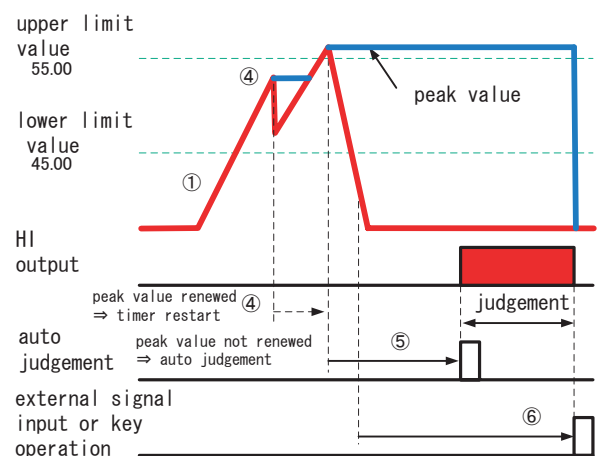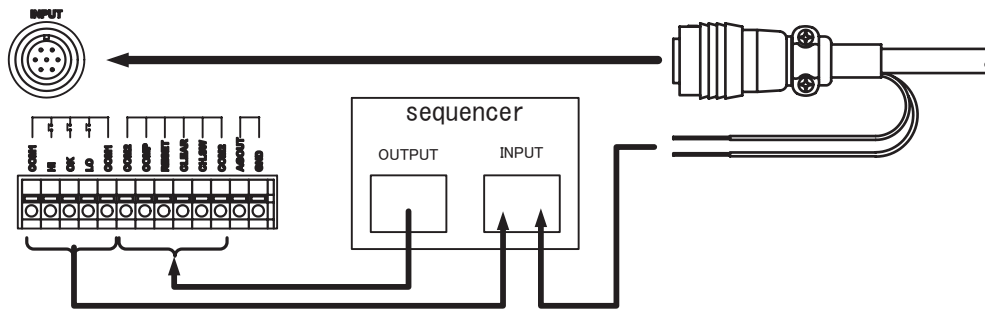 External input signal: rISE

●Connection: Connecting the torque sensor to "INPUT" on CD5. Terminals on CD5
             should be connected to the sequencer.

● Operation

① As torque is applied, the peak value increases.

② After the sequencer receives the completion signal, it sends COMP signal
   to CD5 after the set timing.

③ As CD5 receives COMP signal, it gives judgement.

④ - In case of OK judgement -
   When the measured value is within the set range, it output OK signal.

   - In case of HI judgement
   When the measured value exceeds the upper limit value, it output HI signal.

⑤ - In case of OK judgement -
   The measured data will be saved by sending RESET signal to CD5 and the
   memory counter will be sent forward and reset.
   - In case of HI judgement
   When the sequencer receives HI signal, it outputs CLEAR signal to CD5.
   As CD5 receives the CLEAR signal, the measured data will be cleared.
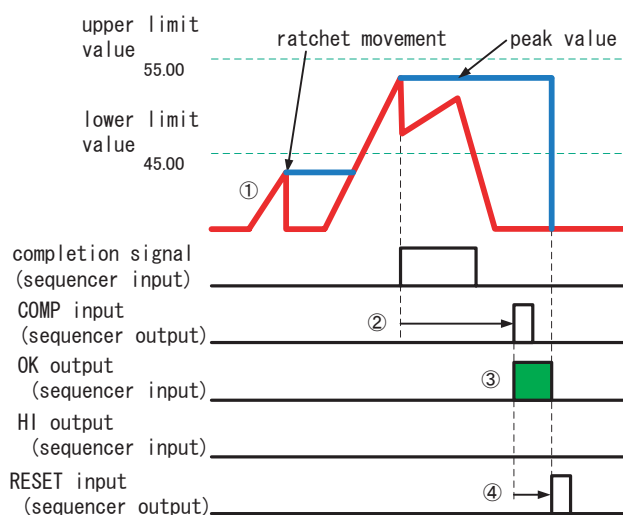
Case 1: Judgement OK
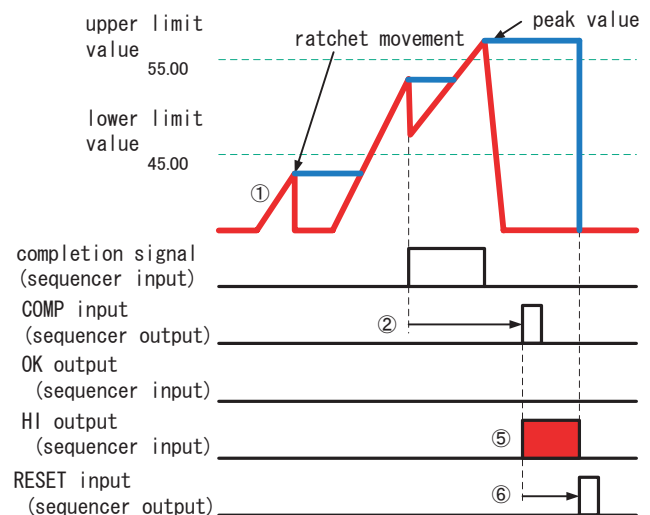
Case 2: Judgement HI

11. Interface to external device

11-1 Printing out
Connect CD5 and the dedicated printer (EPP16M2) with the printer cable (No.382).
Set the communication format to "Prn" and do other settings in line with the printer.

● EPP16M2 communication setting
 Data format : RS232C compliant
 Communication method: asynchronous
 Baud rate: 2400 bps
 Data length: 7 bit
 Stop bit: 1 bit
 Parity: none

● Progressive print out
 Printing can be commanded by either of the following
  - Press MEM key
  - Input RESET signal
  - By auto memory/reset function
  * In this printing, statistical result will not be printed.

● Continuous printing
 ① Use right/down key to set the memory counter to the last counter of the range
  you would like to print out.
  Then, press MD key.
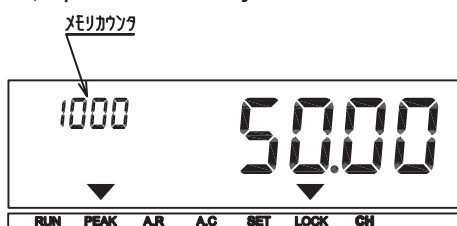
 ② Use right/down key to set the memory counter to the first counter of the range
  you would like to print out. Then, press MD key.
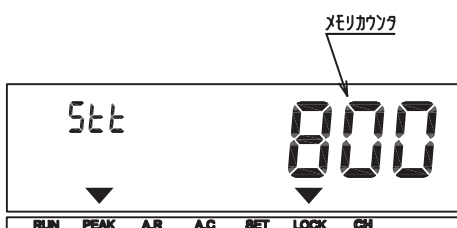
 ③ Press MEM key.
  Selected range of the measured data will be printed out (Measured data, Sample
  quantity = n, max value = HI, minimum value = LO, average value = x).

● Continuous printing sample
  In case of memory mode 1000

Judgement result

Memory counter value

Measuring channel

```
1 :  OK  CH1
123. 4  N・m          ← unit
2 :  LO  CH1
112. 8  N・m
        .
        .
        .
        .
7 :  ―― CH1
===. =  N・m
8 :  HI  CH1
132. 8  N・m
――――――――――
n＝7
HI :   132. 8  N・m
LO : ―112. 8  N・m
X :   125. 0  N・m
```

Torque value → (123. 4 N・m)

Sample quantity → n＝7
Max value → HI : 132. 8 N・m
Minimum value → LO : ―112. 8 N・m
Average value → X : 125. 0 N・m

In case of memory mode 99

Memory counter value

Torque value

```
1 :   123. 4  N・m      ← unit
2 : ―127. 6  N・m


        .
        .
        .
        .
7 :  ===. =  N・m
8 :  122. 8  N・m
――――――――――
n＝7
HI : ―127. 6  N・m
LO :   122. 8  N・m
X :   125. 0  N・m
```

Sample quantity → n＝7
Max value → HI : ―127. 6 N・m
Minimum value → LO : 122. 8 N・m
Average value → X : 125. 0 N・m

※ Even in memory mode 1000, judgement result will not be printed if judgement
  function is not activated.
  Maximum value, minimum value, average value are calculated based on the absolute
  value. The average value will be shown as a positive figure.
  "===" will be shown when CD5 display shows either "0" or "――――", which are
  excluded from computing factors and will not be printed.

11-2 PC communication
Connect CD5 and an external device by the communication cable (No.383). Set the communication format to "PC", and do other settings in line with the external device.

● Communication setting
　　　Data format: RS232C compliant
　　　Communication method: asynchronous
　　　Baud rate: 2400/4800/9600/19200 bps
　　　Data length: 7 bit/ 8 bit
　　　Stop bit: 1 bit
　　　Parity: none/even/odd

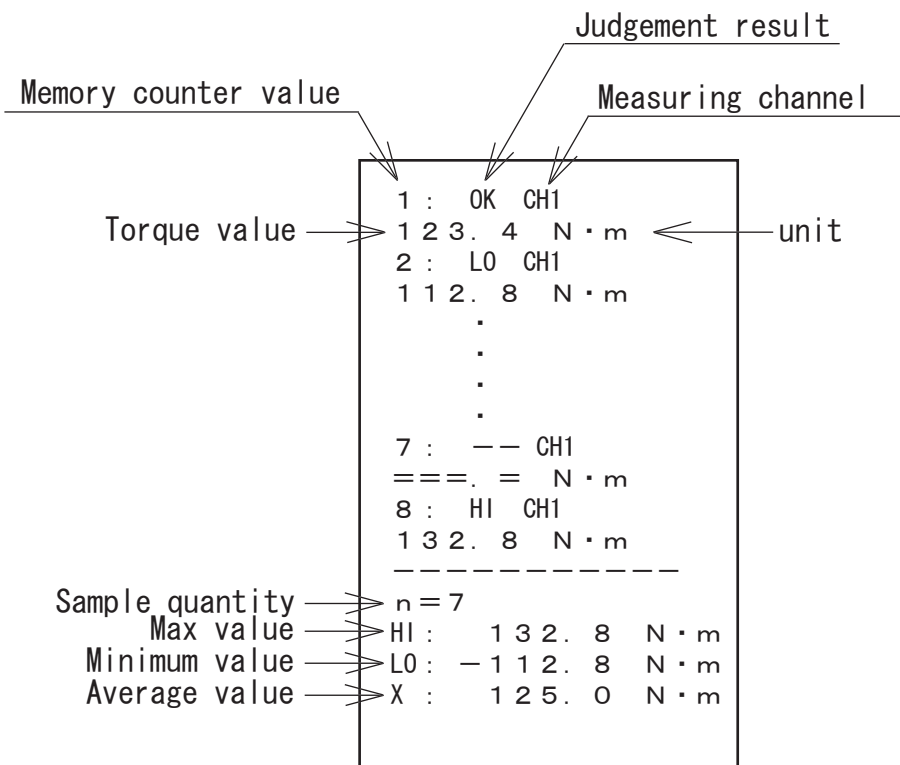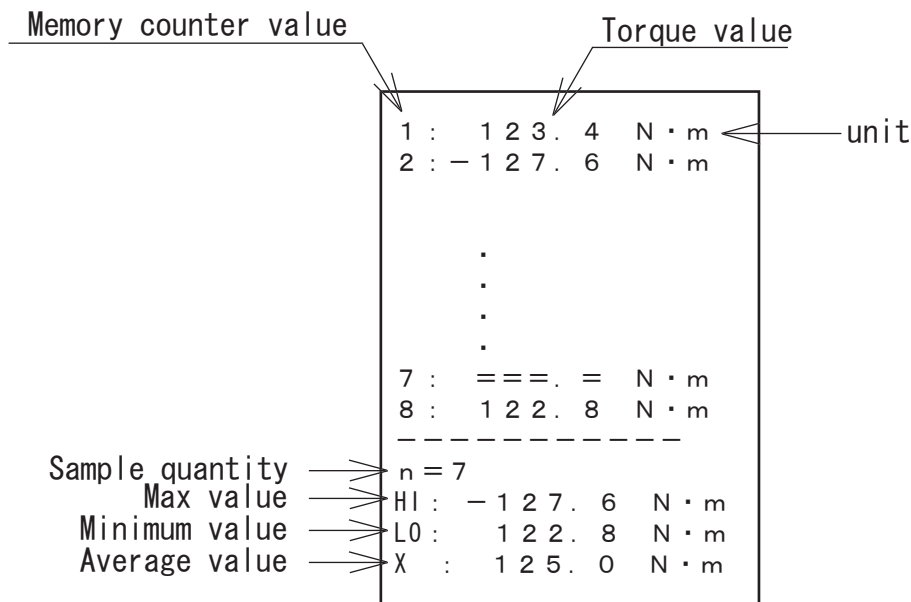① Progressive print out
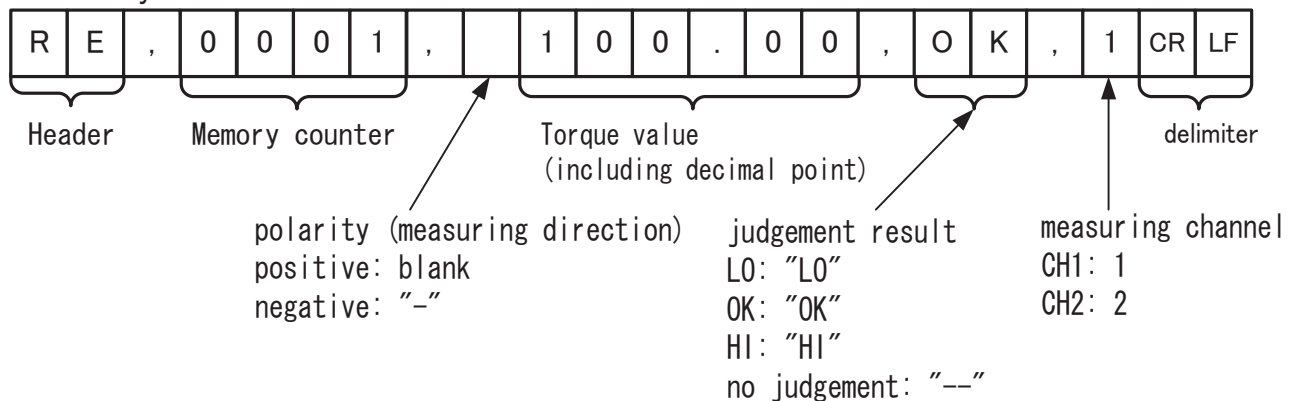　　Printing can be commanded by either of the following
　　- Press MEM key
　　- Input RESET signal
　　- By auto memory/reset function
　　- Send "M3CRLF" command from PC

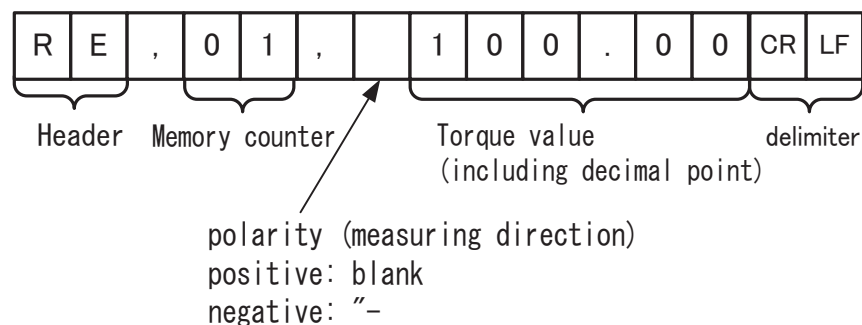② Printing selected range of data
　　Set the memory counter to the last counter of the range you would like to print out and press MD key. The display should show "Stt". Use right/down key to set it the first counter of the range and press MD. While the display shows "n", press MEM key, then printing starts.

● PC output format
In memory mode 1000

| R | E | , | 0 | 0 | 0 | 1 | , | | 1 | 0 | 0 | . | 0 | 0 | , | O | K | , | 1 | CR | LF |

Header　　Memory counter　　　　Torque value　　　　　　　　　　　　delimiter
　　　　　　　　　　　　　　　　(including decimal point)

polarity (measuring direction)　　judgement result　　measuring channel
positive: blank　　　　　　　　　　LO: "LO"　　　　　　CH1: 1
negative: "-"　　　　　　　　　　　OK: "OK"　　　　　　CH2: 2
　　　　　　　　　　　　　　　　　HI: "HI"
　　　　　　　　　　　　　　　　　no judgement: "--"

・In memory mode 99

| R | E | , | 0 | 1 | , | | 1 | 0 | 0 | . | 0 | 0 | CR | LF |

Header　Memory counter　　Torque value　　　delimiter
　　　　　　　　　　　　(including decimal point)

polarity (measuring direction)
positive: blank
negative: "-

When the value on CD5 display is "————", 0 will be output.

● PC input command

In measuring condition, input the following command from an external device.

| M | 0 | CR | LF | Displayed data will be output continuously every 100ms.

| M | 1 | CR | LF | 1 measured data will be output (Automatic data output will be cancelled).

| M | 2 | CR | LF | Automatic data output will be cancelled.

| M | 3 | CR | LF | Same as RESET signal input. In peak mode, measured data will be output, the data will be saved and the counter proceeeds to the next.

| M | 4 | CR | LF | Same as CLEAR signal input. When the peak value is displayed, the peak value will be cleared. In RUN mode, auto zero adjustment will be conducted.

| M | 5 | CR | LF | Same as COMP isgnal input in PEAK mode. It gives judgement for the displayed value.
Judgement continues until other key operation or input of RESET or CLEAR signal.

header　torque value (no decimal point)

| W | 0 | 0 | 5 | 5 | 0 | 0 | CR | LF | changes upper limit value

header　torque value (no decimal point)

| W | 1 | 0 | 4 | 5 | 0 | 0 | CR | LF | changes lower limit value

＊ Upper/lower limit value cannot be set in loaded condition.

＊ Upper/lower limit value to be transfereed should not include the figures below decimal point, which should be the same as CD5 display.

Example) When the decimal point on CD5 is set as "000.00", upper limit value 50N.m should be transferred as "W005000CRLF". If the decimal point is "0000.0", the upper value 50N.m should be "W000500CRLF".

● Response commpand

When receiving input command, following response cord will be returned.

| E | 0 | 0 | CR | LF | receive complete

| E | 1 | 0 | CR | LF | receive error

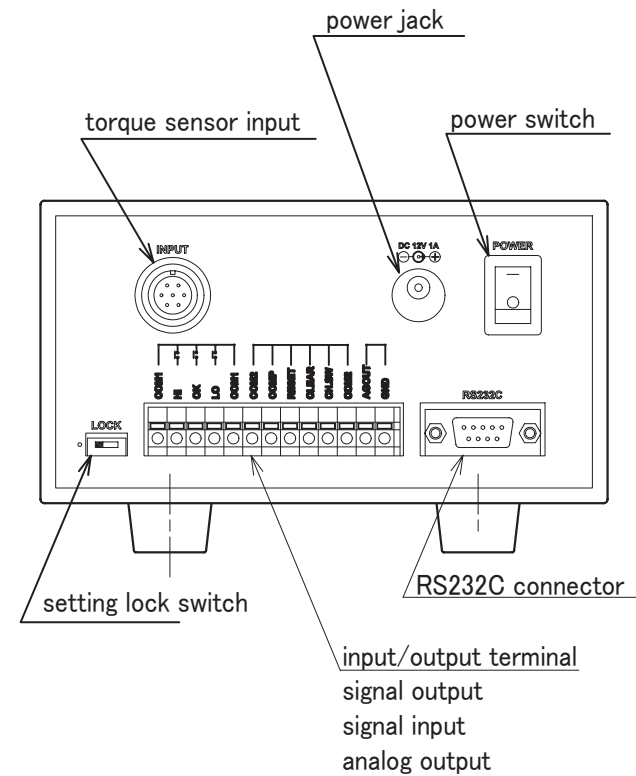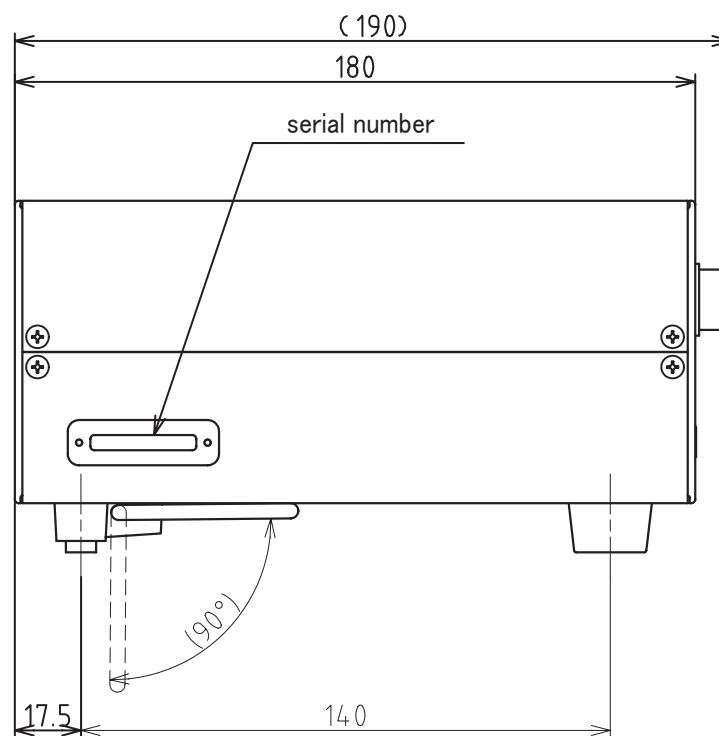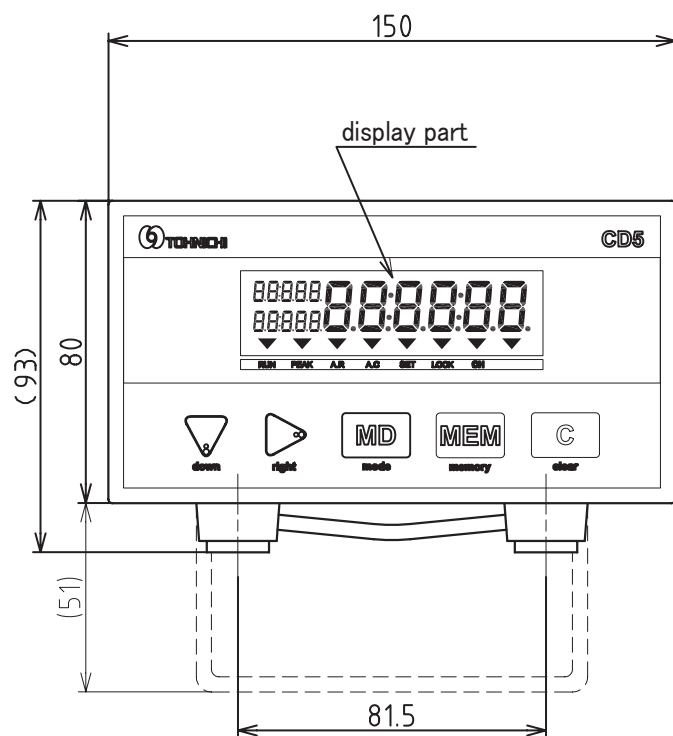| E | 0 | 9 | CR | LF | auto zero adjustment does not work (Err9)

12. Option

・ Dedicated printer: EPP16M2
・ Cable for printer： No.380
・ PC communication cable： No.383

13. Error message

Error message	Content	How to cope
Err1〜5	One of the keys are kept pushed	Turn the power off and turn it on again without touching any key. If the error disappears, you can use the product. If it stays on, switch error is suspected. Contact your nearest distributor or TOHNICHI for repair.
Err8	CPU/memory error	It needs to be repaired. Contact your nearest distributor or TOHNICHI to seek further advice.
Err9	out of allowable zero range (error on torque sensor or internal circuit.)	Check the torque sensor is securely connected. If it is not connected, connect it and press C key. If it is connected, press C key at no load condition. If the error message disappears, you can use the product. If it stays on, the sensor error or internal circuit malfunction is suspected. Contact your nearest distributor or TOHNICHI for repair.

14. Specifications

Analog part	
Voltage	DC 5V
Signal input range	−3.0mV/V ～ 3.0mV/V
Analog filter	150Hz
AD converter	16 bit successive converting style
Sampling speed	4000 times/sec
Accuracty	
Nonlinerity	±0.05% F.S
Zero point drift	±0.1μV/ ℃(TYP.)
Gain drift	±0.01%/ ℃(TYP.)
Display part	
Display	Negative type liquid crystal
Torque display	13mm 6 digit
Counter display	5.2mm 4 digit
▼ display	PEA K、RUN、A. R、A.C、SET、LOCK
Max torque display	25000
Gain calibration	
Calibration methods	Equivalent input calibration
	Calibration by actual weight
	Calibration using sensor−equipped torque wrench
External connection	
External input	RESET/CO MP/CLEAR /CHSW
External output	HI/OK/LO
Analog output	Max ±11V
Communication	RS232C compliant
Power	AC100−240V±10%
Operating environment	
Temperature	0～40℃
Humidity	Below 85% RH (no condensation)
Appearance	
Dimensions	150W X 190D X 94H
Weight	About 1.8 kg

150

display part

CD5

RUN PEAK A.R A.C SET LOCK CH

down right MD mode MEM memory C clear

(93) 80

-46-

(51)

81.5

(190)

180

serial number

(90°)

17.5 140

power jack

power switch

torque sensor input

INPUT

DC 12V 1A POWER

LOCK

RS232C

setting lock switch

RS232C connector

input/output terminal
signal output
signal input
analog output

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