



# FC400-CCL-FA

## OPERATION MANUAL

04FEB2025REV.1.06E

**UNIPULSE**

# Operation overview for FC400



## Basic operation procedures

Please read "Setting/operation" on page **5**.

## Calibration

Please read "Calibration procedures" on page **6**.

## Measurement to fit the purpose

Please read "Setting and Operation Related to Comparison " on page **12**.

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# 1 Before getting started

Be sure to read for safety.

Make sure that installation, maintenance, and inspection of the FC400 are performed by personnel with electrical knowledge. In this manual, precautions for safe use of the FC400 are described separately as and in the following text. The precautions described in this text are important content regarding safety. Use this product having understood the content accurately.

## WARNING

Events that may cause death or severe injury to persons in cases of misuse.

### Design warning

- Prepare a safety circuit outside the FC400 so that the entire system functions safely.
- Be sure to contact our sales representative before use if the FC400 will be used in the following situations:
  - If the product is used in an environment not described in the operation manual;
  - If the product is used in a way that may have a substantial effect on human life and/or property, such as in medical devices, transportation equipment, entertainment devices, safety devices, etc..

### Mounting precautions

- Do not disassemble, repair or alter the FC400.
- 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 signal I/O terminal.
- Be sure to perform class D grounding when installing the product.
- Be sure to check that the power is off before the following actions:
  - Wiring and connection of cables to a terminal block;
  - Connection to functional grounding terminals.
- Be sure to check signal names and pin assignment numbers before connecting to the signal I/O terminal in order to wire cables properly.
- No connection is necessary for unused terminals.
- Be sure to check the wiring and so on carefully before turning the power on.

### Startup/maintenance warning

- Use power supply voltage and load within the specified range and rating.
- Do not touch the terminal while power is on. This may cause electric shock and malfunction.
- Do not open the main unit cover. Contact us for inspection and/or repair of internal parts.
- Turn power off immediately if smoke, abnormal smell, or abnormal noise is detected.

## CAUTION

Events that may cause injury to persons or material damage in cases of misuse.

### Mounting precautions

- The FC400 must be incorporated into the control panel and so forth.
- 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 condensation;
  - Outdoors or locations above 2,000m;
  - Locations exposed to direct sunlight;
  - Locations subject to dust accumulation;
  - Locations with poor ventilation;
  - Locations with a lot of salt and metal powder;
  - Locations where the main unit is subject to direct vibration and/or shock.
- Perform adequate shielding if the product is used in the following locations:
  - Near power lines;
  - Locations subject to strong electric and/or 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. Moreover, 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.

### Wiring precautions

- Use shielded cables for cables (load cell, external I/O).
- Be sure to ground the frame ground terminal.
- Tighten terminal screws to the specified torque.  
Tightening torque: 0.31 to 0.37 N·m

### Startup/maintenance precautions

- Be sure to allow an interval of five seconds or longer between turning power ON and OFF.
- Use after warming up for 30 minutes or longer following the startup of power supply.
- Protective performance of the FC400 may be lost if it is not used as specified.
- Cleaning
  - Unplug the power supply when cleaning.
  - Please use a dry cloth. When dirty, clean using a well squeezed cloth soaked in diluted neutral detergent. Afterwards wipe with a soft, dry cloth. Do not wipe with benzine, thinner, alcohol, etc. This may lead to discoloration and/or warping of the FC400.

### Transportation precautions

- When sending the FC400 to us for repair and so on, pack it with sufficiently shock-absorbing materials.

### Disposal precautions

- Handle this product as industrial waste when disposing.

## 1-1. Product supporting RoHS2 Directive

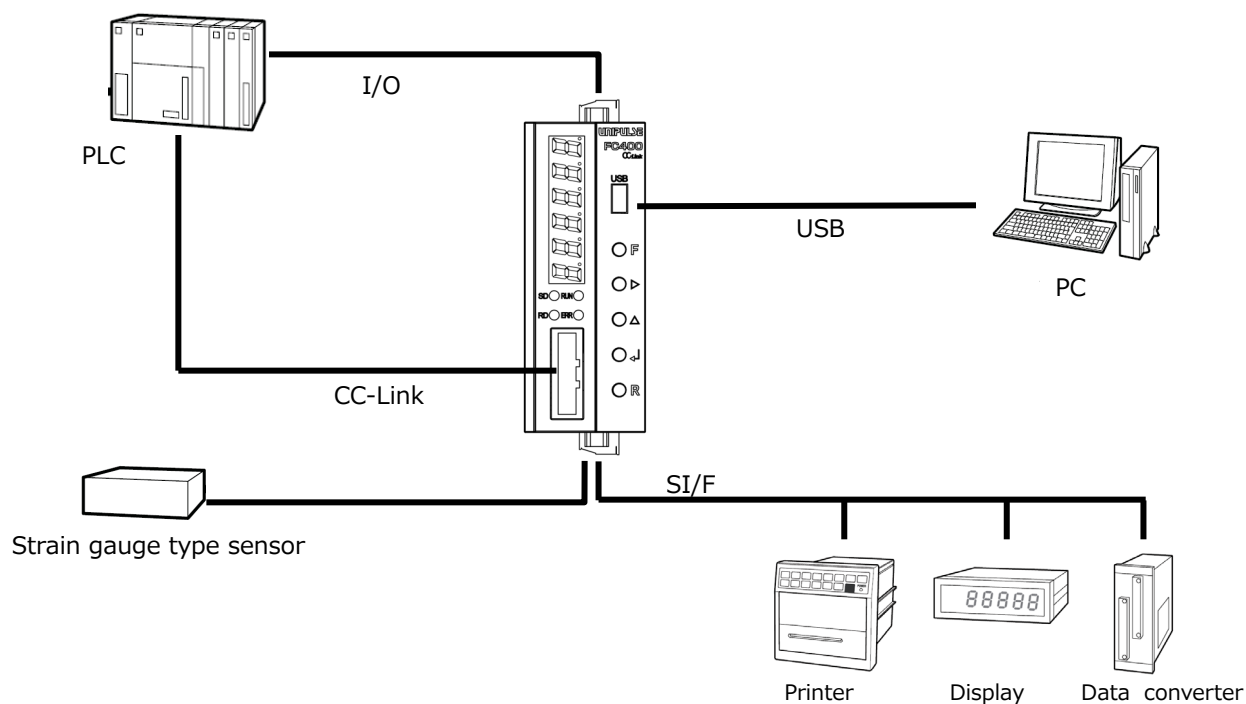
The parts and accessories used in this device (including the operation manual, package box and so on) correspond to the RoHS2 Directive which regulates the use of toxic substances that may have adverse effects on the environment as well as the human body.

## 1-2. Package contents

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

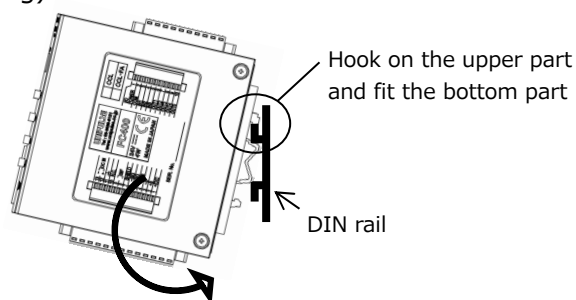
- |  |     |            |
|--|-----|------------|
| - FC400 main unit                                    | --- | One unit   |
| - Terminal block (10 pin) [Model: CN87]              | --- | One piece  |
| - Terminal block (13 pin) [Model: CN85]              | --- | One piece  |
| - CC-Link connector [Model: CN74]                    | --- | One piece  |
| - Small screwdriver for connection of terminal block | --- | One piece  |
| - Jumper wire  | --- | Two pieces |
| - FC400 quick reference                              | --- | Two copies |

## 1-3. Connection with other devices

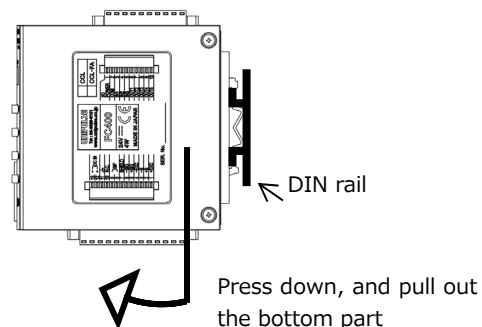


## 1-4. Attaching/detaching the DIN rail

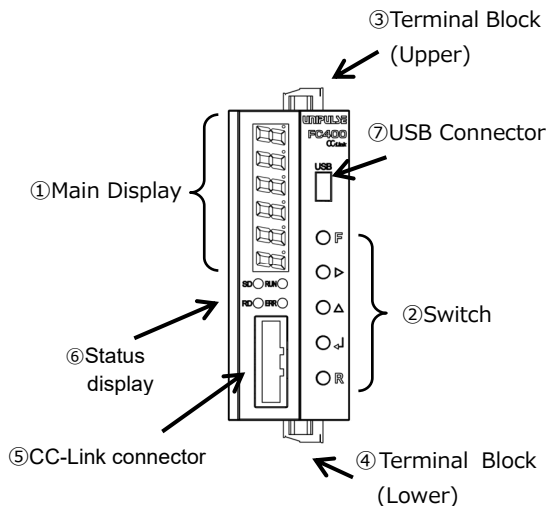
(Attaching)



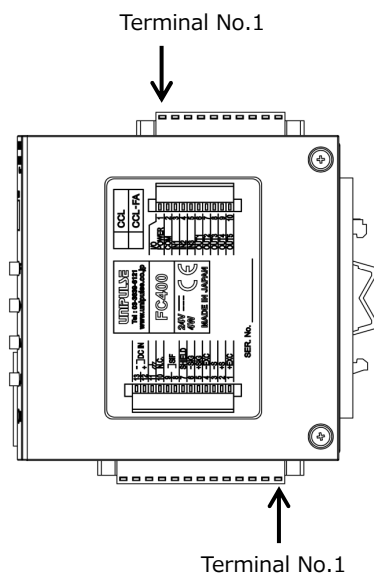
(Detaching)



## 1-5. Front panel / Terminal block



Name	Details	
① Main Display	1) Indicated value display	Display indicated value
	2) Over scale / error display	Over scale and other errors are displayed
	3) Setting value display	Each setting value is displayed
② Switch	F FNC	Go into setting mode
	▶ HOLD	Hold operation/Setting operation
	△ ZERO	Digital Zero/Setting operation
	↺ ENT(P/B)	Peak⇔bottom switching/setting operation
	R RESET	CC-Link reset
③ Terminal Block (Upper)	Connects with external I/O.	
④ Terminal Block (Lower)	Connects with the power supply/sensors/SI/F.	
⑤ CC-Link connector	Connects with a CC-Link cable.	
⑥ Status display	Displays the CC-Link communication status.	
⑦ USB Connector	Connects with a USB cable.	



### Terminal Block(Upper)

Uses	Terminal No.	Terminal Name	Details
Power supply for I/O signals	1	I/O POWER	Connects with the DC24V power supply for I/O
	2	COM	Common terminal of I/O signals.
Input terminal	3	IN1	Terminals for input signals. (Functions selected through settings.)
	4	IN2	
	5	IN3	
Output terminal	6	OUT1	Terminals for output signals. (Functions selected through settings.)
	7	OUT2	
	8	OUT3	
	9	OUT4	
	10	OUT5	

### Terminal Block(Lower)

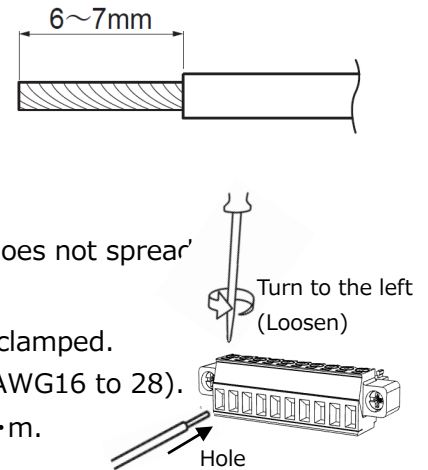
Uses	Terminal No.	Terminal Name	Details
Load input	1	+EXC	Terminals for connecting strain gauge type sensors. ※In the case of Four-line type, please connect +s with +EXC and -S with -EXC respectively by using the jumper wire of accessories.
	2	+S	
	3	-S	
	4	-EXC	
	5	+SIG	
	6	-SIG	
	7	SHIELD	
SI/F	8	SI/F	Terminals for connecting with the 2-wire serial interface.(No polarity)
	9	SI/F	
	10	N.C.	No connection.
Power supply input	11		Connects with the FC400 power supply (DC24V).
	12	DC IN+	
	13	DC IN-	

## 1-6. Connection to the terminal blocks

1. Peel off 6 to 7 mm of coating of the electric wire to be connected, and twist the tip enough so it does not spread.
2. Loosen the screw with a screwdriver and open the hole. A flathead screwdriver with a shaft diameter of 2.0mm is recommended. (Precision screwdrivers etc.)
3. Insert the electric wire into the hole, making sure that the tip does not spread.
4. Tighten the screw with a screwdriver.
5. Pull the electric wire slightly to check that it has been securely clamped.

\* Electric wires between 0.08 to 1.31mm<sup>2</sup> can be connected (AWG16 to 28).

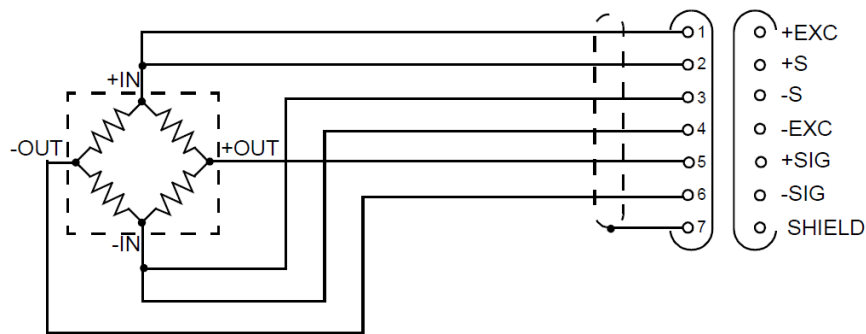
The recommended tightening torque value is 0.31 to 0.37 N·m.



## 1-7. Strain gauge type sensor connection

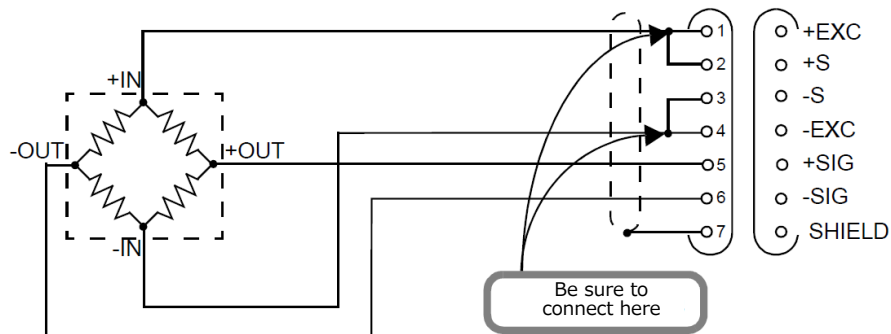
### ■ Six-line type connection

The load input terminal block for this device is of six-line type. Be sure to use a six-core shielded wire for connection with the Strain gauge type sensor and perform separate wiring for lines with a lot of noise (wiring for electrical power equipment, digital equipment etc.) and AC lines.



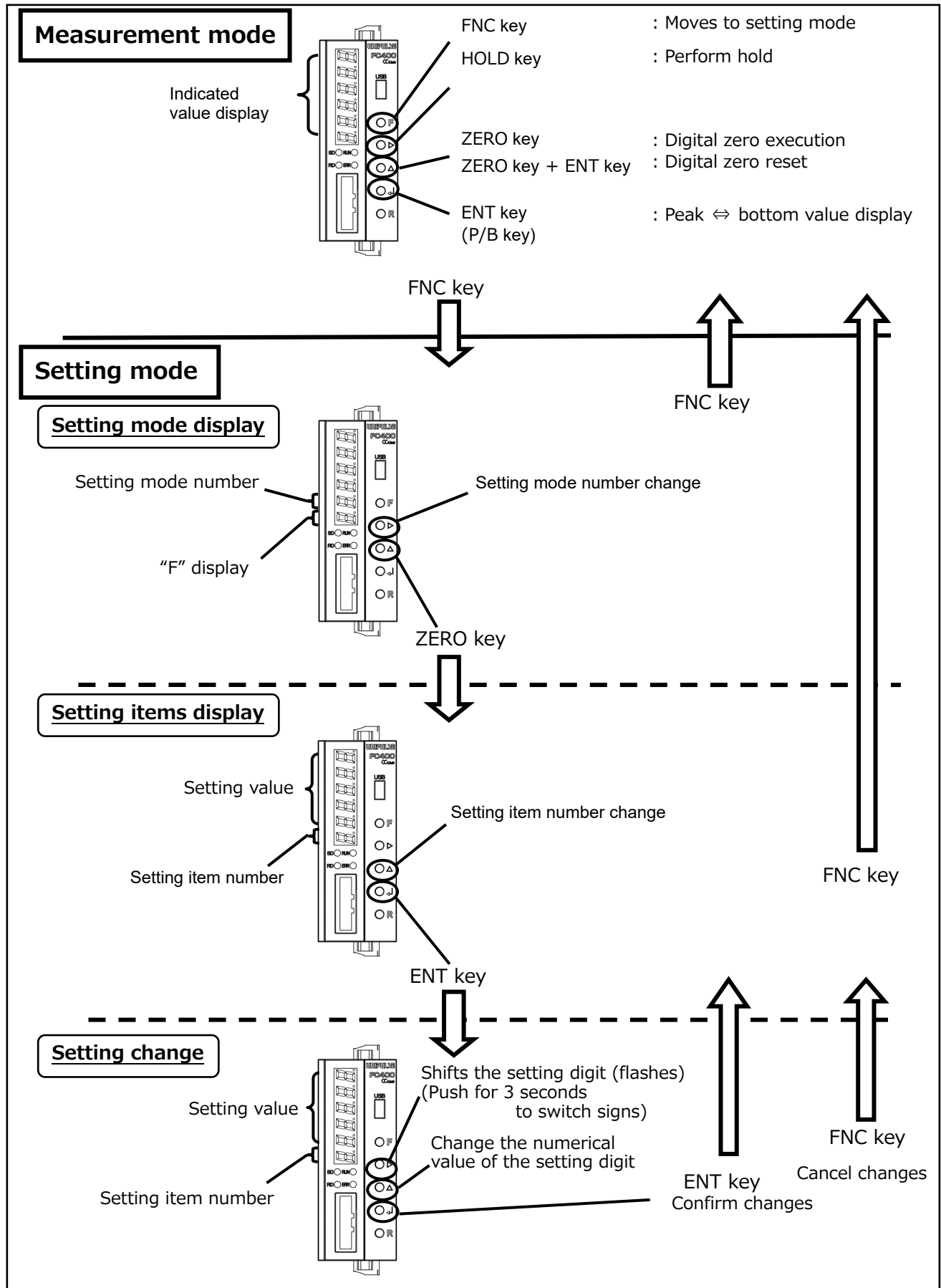
### ■ Four-line type connection

As outlined below, connect 1 with 2, and 3 with 4 respectively at the terminal block.



## 2 Settings/operations

Refer to the following and change the setting items for the required setting modes. (Refer to the "List of Setting Items" at the end of this document for setting mode configurations.)





## 3 Calibration procedures

### 3-1. Calibration

"Calibration" means matching the FC400 with the strain gauge type sensor. There are two methods of calibration, the "actual load calibration" and "equivalent input calibration".

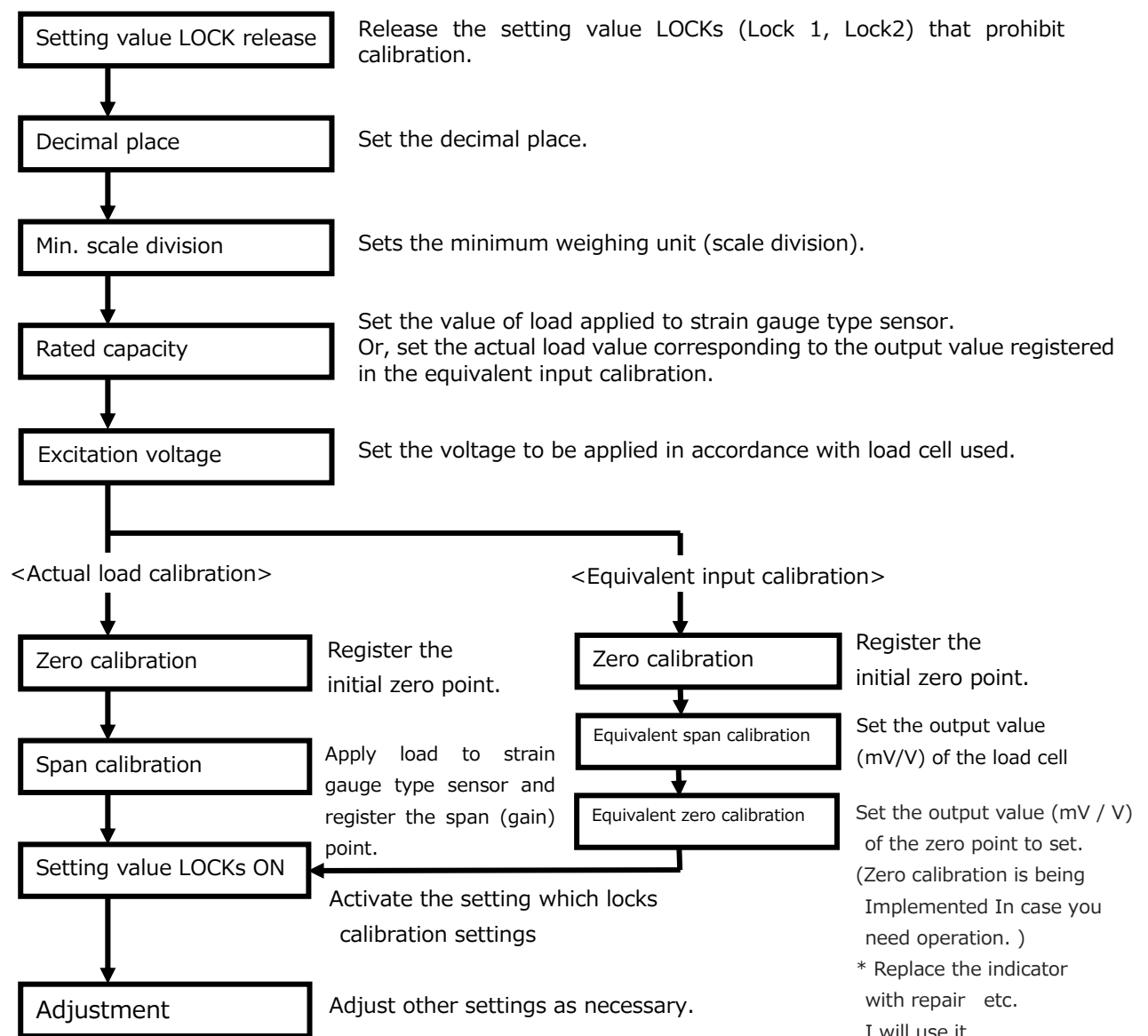
<Actual load calibration> ...

A method of calibration involving applying actual load or pressure to the sensor

< Equivalent input calibration > ...

A method of calibration involving directly inputting electrical signals equivalent to the electrical signal changes generated when actual load or pressure is applied to the sensor.

### 3-2. Calibration procedures



### 3-3. Settings/operations related to calibration

#### ■ Setting value LOCK

LOCKS can be enabled to prevent calibration and setting values from being changed due to operational errors.

[Setting value LOCK]	(Setting item 3-1)
<div><div></div><div></div><div></div><div></div></div>	
	0: Lock1 OFF, Lock2 OFF 1: Lock1 ON, Lock2 OFF 2: Lock1 OFF, Lock2 ON 3: Lock1 ON, Lock2 ON

#### ■ Decimal place

Set the common decimal place for displays, setting items etc. related to load.

[Decimal place]	(Setting item 5-4)
<div><div></div><div></div><div></div><div></div></div>	
	0:None 1:0.0 2:0.00 3:0.000 4:0.0000

#### ■ Min. scale division

Set the minimum weighing unit (scale interval).  
The input range is from 1 to 50.

[Min. scale division]	(Setting item 5-2)
<div><div></div><div></div><div></div></div>	(Input range: 1 to 50)

#### ■ Rated capacity

Set the load applied to strain gauge type sensor during span calibration.  
The input range is from 1 to 99999.

[Rated capacity]	(Setting item 5-1)
<div><div></div><div></div><div></div><div></div><div></div></div>	(Input range: 1 to 99999)

#### ■ Excitation voltage selection

Set the voltage value applied to strain gauge type sensor.

[Excitation voltage selection]	(Setting item 5-5)
<div><div></div></div>	(0 : 5V, 1 : 2.5V)

\* Please check the specifications of the strain gauge type sensor that you would like to use before changing the settings.

#### ■ Zero calibration


Register the default zero point.

- (1) Select setting item 9-1
- (2) Make sure that unwanted load does not apply to the strain gauge type sensor.
- (3) Press the ENT key to start zero calibration
- (4) "CAL-ZE" is displayed while calibration is in progress
- (5) Returns to indicated value display, and zero calibration is complete

[Zero calibration]	(Setting item 9-1)
<div><div></div><div></div><div></div><div></div><div>0</div></div>	No setting value input ("0" is displayed)

### ■ Span calibration <Actual load calibration>


Apply load to strain gauge type sensor and register the span (gain) point.

[Span calibration] (Setting item 9-2)  
 (Input range: 1 to 99999)

- (1) Select setting item 9-2
- (2) Enter the actual load value.
- (3) Hit ENT key to start the Actual load calibration.
- (4) "CAL-SP" is displayed while calibration is in progress
- (5) Returns to indicated value display, and span calibration is complete

### ■ Equivalent input span calibration <equivalent input calibration>

Perform calibration by inputting output of the sensor.


[Equivalent input span calibration] (Setting item 9-4)  
 (Input range: 0.0100 to 3.8000)

- (1) Select setting item 9-4
- (2) Input the output value of the sensor
- (3) Execute equivalent input calibration by confirming the input value
- (4) Returns to indicated value display, and equivalent input calibration is complete

### ■ Equivalent input zero calibration <Equivalent input calibration>

Input the sensor output value and register the default zero point.

\* Used when replacing indicators for repair and so on.

[Equivalent input zero calibration] (Setting item 9-3)  
 (Input range: -3.0000 to 3.0000)


## 4 Settings/operations related to the fluctuation and stability of values

Here, the functions that have been built in for ease of use when actually weighing etc. after completing calibration are described.

Select the most appropriate value in accordance with the type of weighing and the setting environment.


### ■ Display update rate

Set the rate at which the indicated value is updated per second.  
Reduce the display update rate if the indicated value flickers.

[Display update rate]	(Setting item 5-4)
	
	0: Once/sec
	1: 3 times/sec
	2: 6 times/sec
	3: 13 times/sec
	4: 25 times/sec

### ■ Sampling rate

This function changes a rate of referring to the sampled data.


[Sampling rate]	(Setting item 2-3)
	
	1: 2400 times/sec

### ■ Auto adjustment filter

This function recognizes fluctuation in the indicated value due to noise and vibration, and automatically sets the digital low-pass filter and moving average filter.

"CAL-FL" and indicated value are displayed alternately during adjustment.


Adjustment is complete once "CAL-FL" is no longer displayed.

[Auto adjustment filter]	(Setting item 4-3)
	
	0: Cancel
	1: Execute

### ■ Digital low-pass filter


This low-pass filter is used to screen the A/D converted data and cancel unnecessary noise content.

The cut-off frequency is set like the low-pass filter of an analog circuit.

[Digital low-pass filter]	(Setting item 4-4)
	
	(Input range: 0.1 to 600.0)
Cut-off frequency	0.1 ⇔ 600.0
Response speed	Slow ⇔ Fast

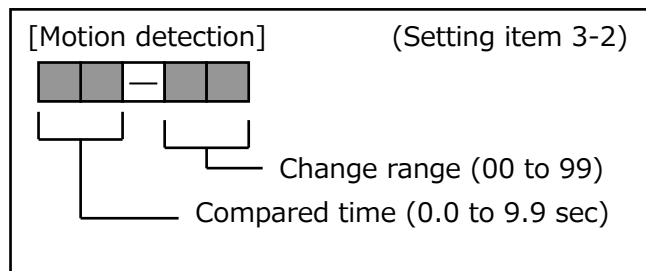
### ■ Moving average filter

This function takes the moving averages of the A/D converted data and reduces fluctuation in the indicated values.

[Moving average filter]	(Setting item 4-2)
	
	(Input range: 1:OFF, 2 to 999)
Average rate	1 ⇔ 999
Response speed	Fast ⇔ Slow
Stability of indicated value	Unstable ⇔ Stable

## ■ Motion detection

Set the parameters to detect indicated value stability. If the indicated value change range is lower than the set range and this condition continues longer than the set time, indicated value is considered to be stable and the stable signal turns ON.



## ■ Zero tracking (Period)

## ■ Zero tracking (Range)

This function sets the indicated value to 0 (zero) automatically when the condition that the travel of the zero point is within the set tracking range continues for the set period of time or longer. The tracking range is set in increments of 1/4 of the indicated indicated value.

(E.g.: Setting value 0004 → Equivalent to 1 count on the display)

When the period is set to 0.0 sec and the range is set to 00, zero tracking does not work.

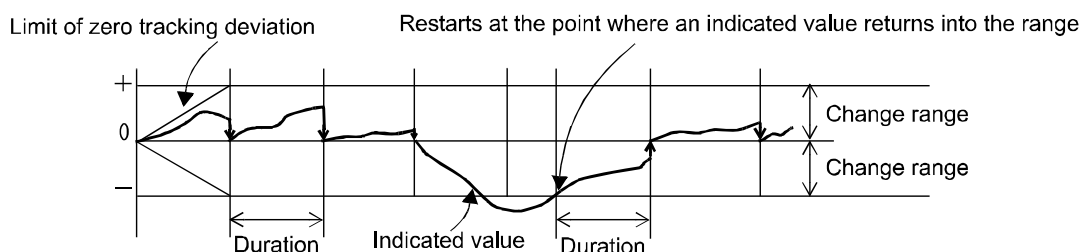
[Zero tracking (Period)] (Setting item 3-3)

(Input range: 0.0 to 9.9)

[Zero tracking (Range)] (Setting item 3-4)

(Input range: 0000 to 9999)

- Operation image



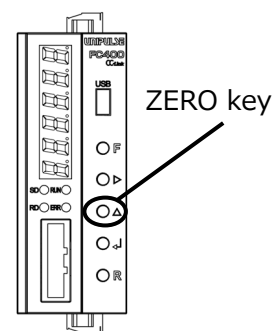
## ■ Digital zero (Designated key)

The indicated value is forcibly reset to zero when the ZERO key is pressed and digital zero is executed.

- If digital zero is executed with an indicated value exceeding the DZ regulation value, the DZ regulation value will be subtracted from the indicated value, and "ZE-AL" and display value displayed alternately.

Perform the following measures if this occurs.

- Change the setting value of DZ regulation value, and perform digital zero operation again.  
(However, as this procedure is only meant as a temporary measure, perform zero calibration as soon as possible)
- Remove weighing residue attached to the tank and so forth.
- Check that there is no mechanical contact around the sensor.



## ■ DZ regulation value

Set the zero point correction (deviation from zero calibration point) range using digital zero or zero tracking.

[DZ regulation value] (Setting item 5-3)

(Input range: 00000 to 99999)

### ■ Peak ⇔ bottom value display (dedicated key)

If hold mode is set to "3:Peak & bottom", display of peak & bottom value can be switched alternately by pressing the ENT key (PEAK/BOTTOM key).

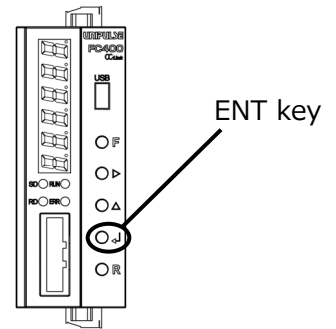
Switch to peak value display :

Peak value is displayed after indication of "P.HOLD".

Switch to bottom value display :

Bottom value is displayed after indication of "B.HOLD".

For hold mode other than "3: Peak & bottom", alternate switching is not possible.



### ■ Digital offset

This is a function to subtract a setting value from an indicated value. The value obtained by subtracting a setting value from an indicated value is displayed when digital offset is set.

This function is convenient when zero cannot be obtained with no load for some reason or when offset is implemented.

[Digital offset]

(Setting item 0-5)



(Input range: -99999 to 99999)

### ■ 6 digit display

Set the number of 7-segment display digits.

\* If it is set to 6 digit display, Min. scale division setting of setting item 5-2 will not be reflected.

Also, this setting will not be reflected to the comparison and the hold.

[6 digit display]

(Setting item 5-4)




0: 5 digit display  
1: 6 digit display

## 5 Setting and Operation Related to Comparison

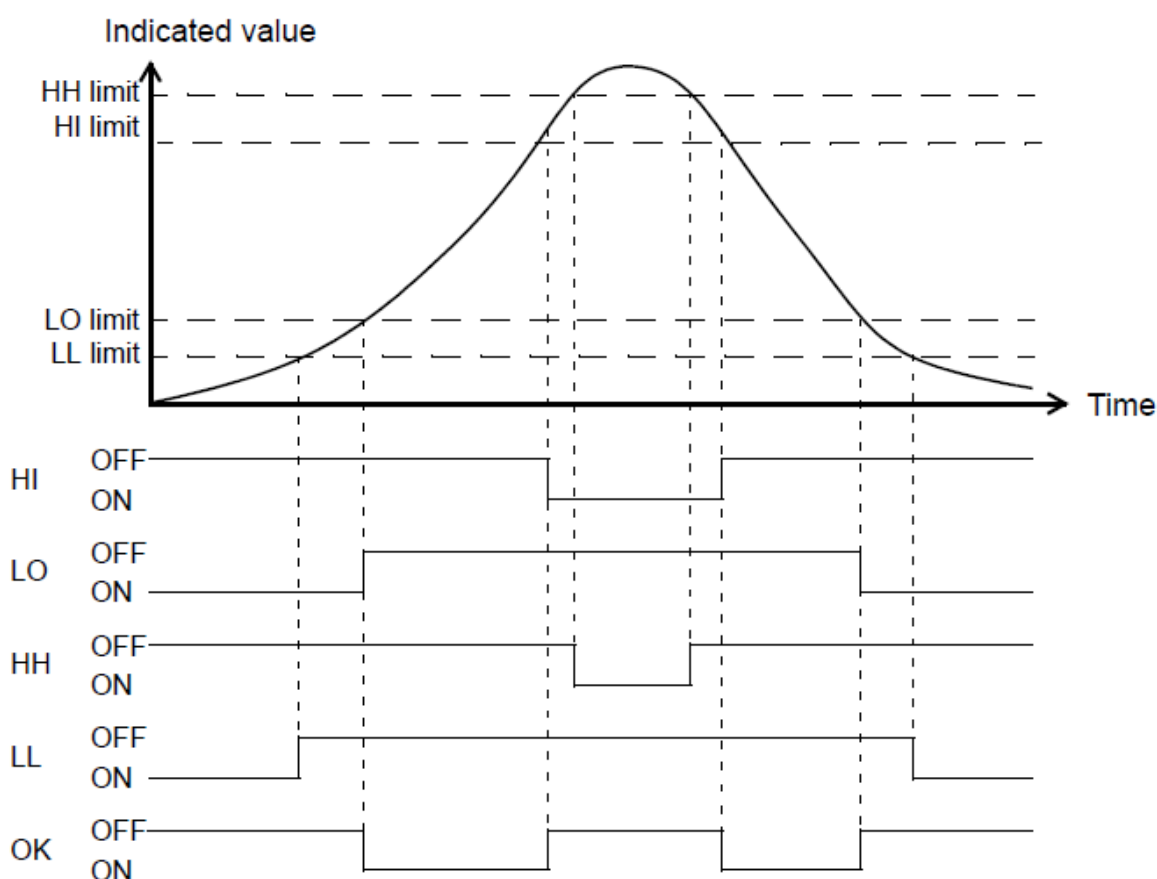
### ■ HI limit, LO limit, HH limit, LL limit

This function sets the HI limit and LO limit, turns the HI output ON when an indicated value exceeds the HI limit value, and turns LO output ON when an indicated value falls below the LO limit value. HH limit and

LL limit can also be set outside of these HI/LO limit comparisons. HH output is turned ON when an indicated value exceeds the HH limit value, and LL output is turned ON when the indicated value falls below the LL limit value. When HI, HH output, LO, and LL output are all OFF, OK output is turned ON.

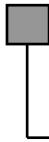
[HI limit]	(Setting item 0-1)
[LO limit]	(Setting item 0-2)
[HH limit]	(Setting item 0-6)
[LL limit]	(Setting item 0-7)
	(Input range: -99999 to 99999)

### ● Output operations




### ■ HI/LO limit comparison mode

This function specifies the comparison timing.

[HI/LO limit comparison mode]	(Setting item 1-2)
	<ul style="list-style-type: none"> <li>0: ALL</li> <li>1: MD</li> <li>2: NZ</li> <li>3: MD+NZ</li> <li>4: Hold</li> </ul>

## ■ Hysteresis

This function provides off timing range of HI/LO limit comparison. This function is effective for chattering prevention when signals fluctuate (vibrate) subtly.

[Hysteresis]	(Setting item 0-4)
	(Input range: 0000 to 9999)

<Comparison conditions>

### - HI limit

ON condition: Indicated value > HI limit setting value

OFF condition: Indicated value  $\leq$  (HI limit setting value - Hysteresis setting value)

### - LO limit

ON condition: Indicated value < LO limit setting value

OFF condition: Indicated value  $\geq$  (LO limit setting value + Hysteresis setting value)

### - HH limit

ON condition: Indicated value > HH limit setting value

OFF condition: Indicated value  $\leq$  (HH limit setting value - Hysteresis setting value)


### - LL limit

ON condition: Indicated value < LL limit setting value

OFF condition: Indicated value  $\geq$  (LL limit setting value + Hysteresis setting value)

## ■ Alarm HI limit, Alarm LO limit

A sensor input value is always compared with the alarm HI limit and alarm LO limit. If the value exceeds alarm HI limit or falls below alarm LO limit, an OVERLOAD error will occur and the OVERLOAD output turns ON.

[Alarm HI limit]	(Setting item 2-1)
[Alarm LO limit]	(Setting item 2-2)
	(Input range: -99999 to 99999)

However, in the case when hold mode is set to "3:Peak & bottom", hold value comparison will be:

Peak value > Alarm HI limit

Bottom value < Alarm LO limit

## ■ Near zero

This function detects that an indicated value is a value near zero.

[Near zero]	(Setting item 0-3)
	(Input range: 00000 to 99999)

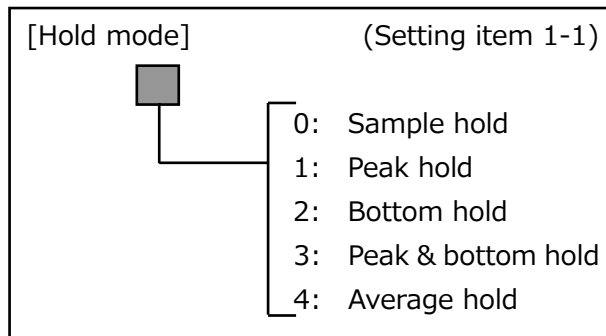


## 6 Settings and Operations Related to Hold

### 6-1. Setting of hold

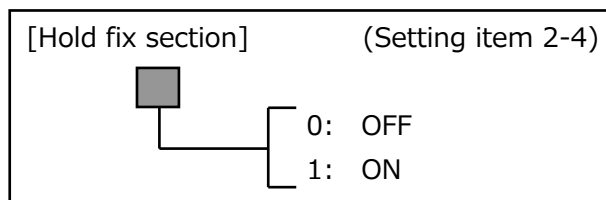
#### ■ Hold mode

FC400 has a peak hold function that maintains and displays a peak value (maximum value) of input signals, a bottom hold function that maintains and displays a bottom value (minimum value) of input signals and a sample hold function that maintains and displays an arbitrary point. When hold fix section is set as 1: ON, detection section and fix section can be distinguished.



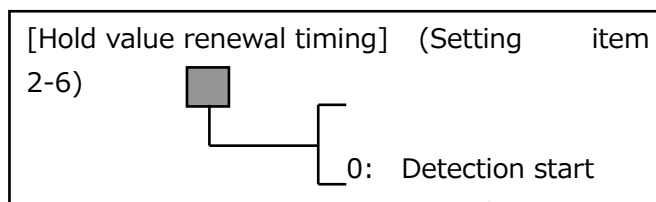
#### ■ Hold fix section

Whether or not a fix section is inserted into hold motion can be selected.



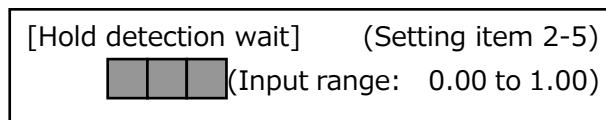
#### ■ Hold value renewal timing

Renewal timing of hold value display can be changed. Normally, it is 0: detection start, but if only hold values are to be displayed or indicated values are to be held at high-speed measurement, 1: detection stop is set.



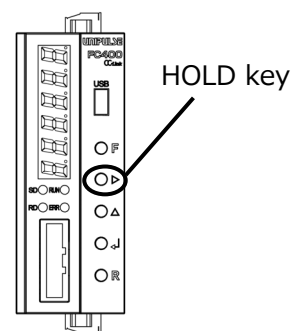
#### ■ Hold detection wait

Detection wait of hold input is set. Changes of hold input will not be recognized within the time set as detection wait after capturing the changes.



#### ■ Hold control (dedicated key)

This key is used for hold function operation. Operations change depending on setting values of hold fix section.



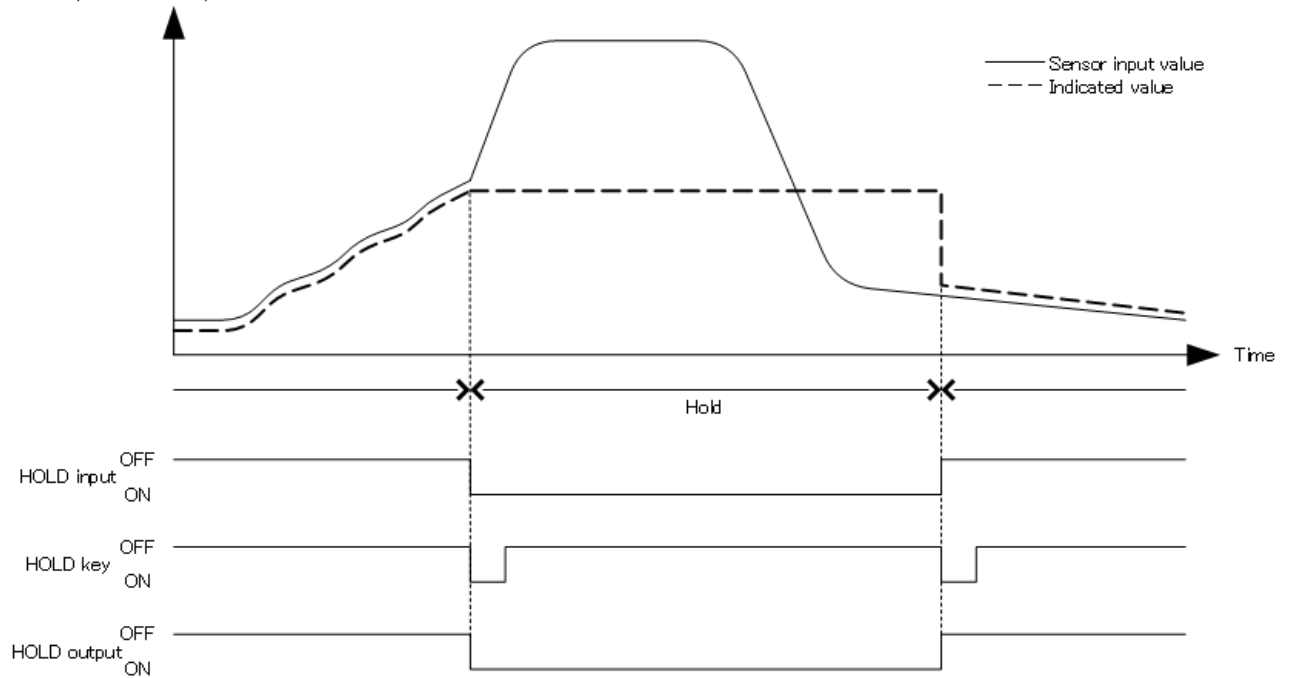
#### Key point

- When hold is turned ON with external signals, turn it OFF with external signals.
- When hold is turned ON with key inputs, turn it OFF with key inputs.

## 6-2. Sample hold (maintaining arbitrary points)

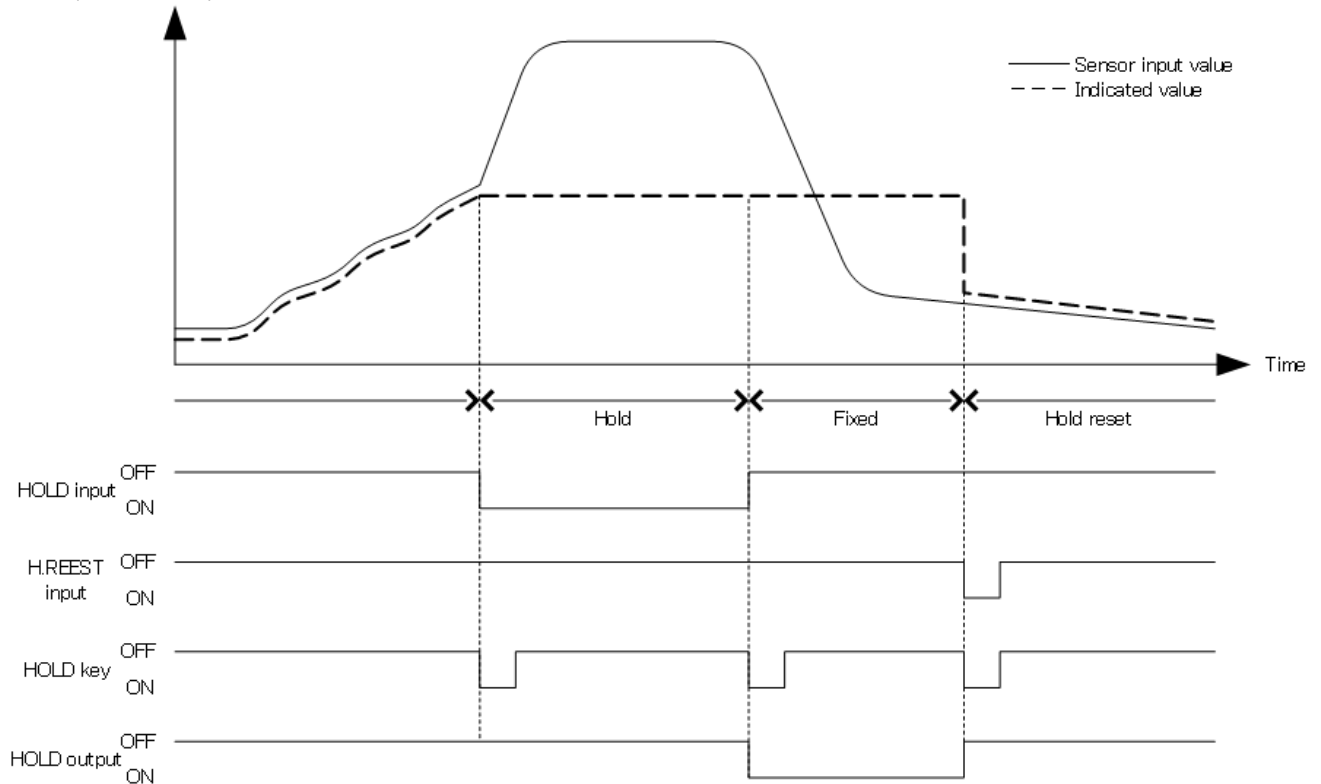
When hold fix section is 0: OFF

● Operation of sample hold



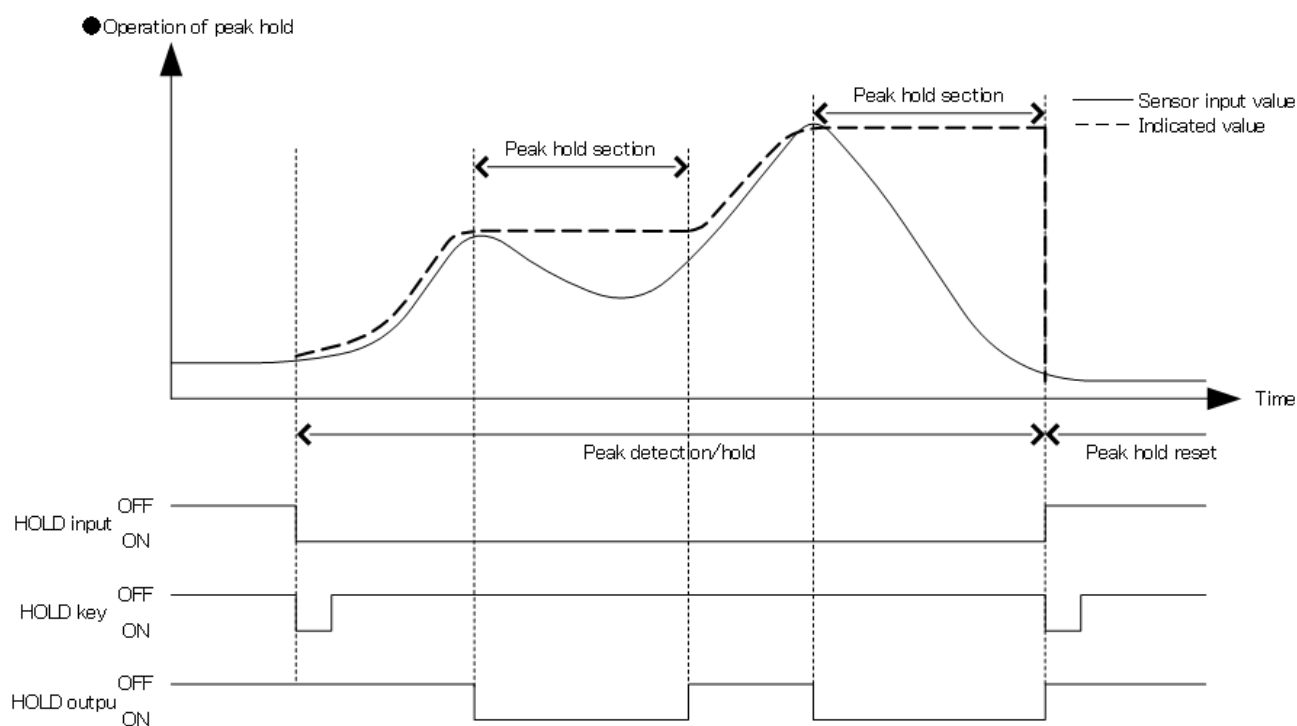
When hold fix section is 1: ON

● Operation of sample hold

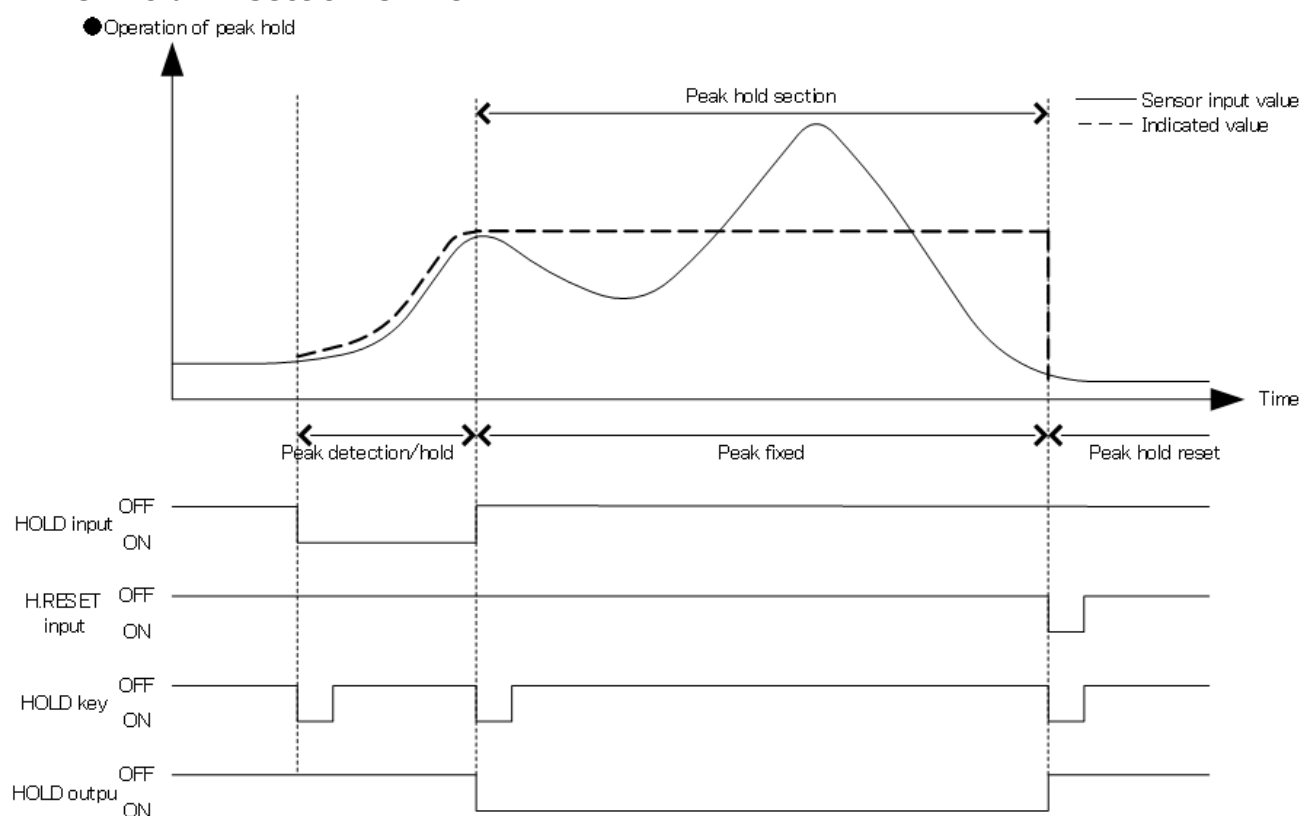


## 6-3. Peak hold (maintaining a maximum point)

When hold fix section is 0: OFF

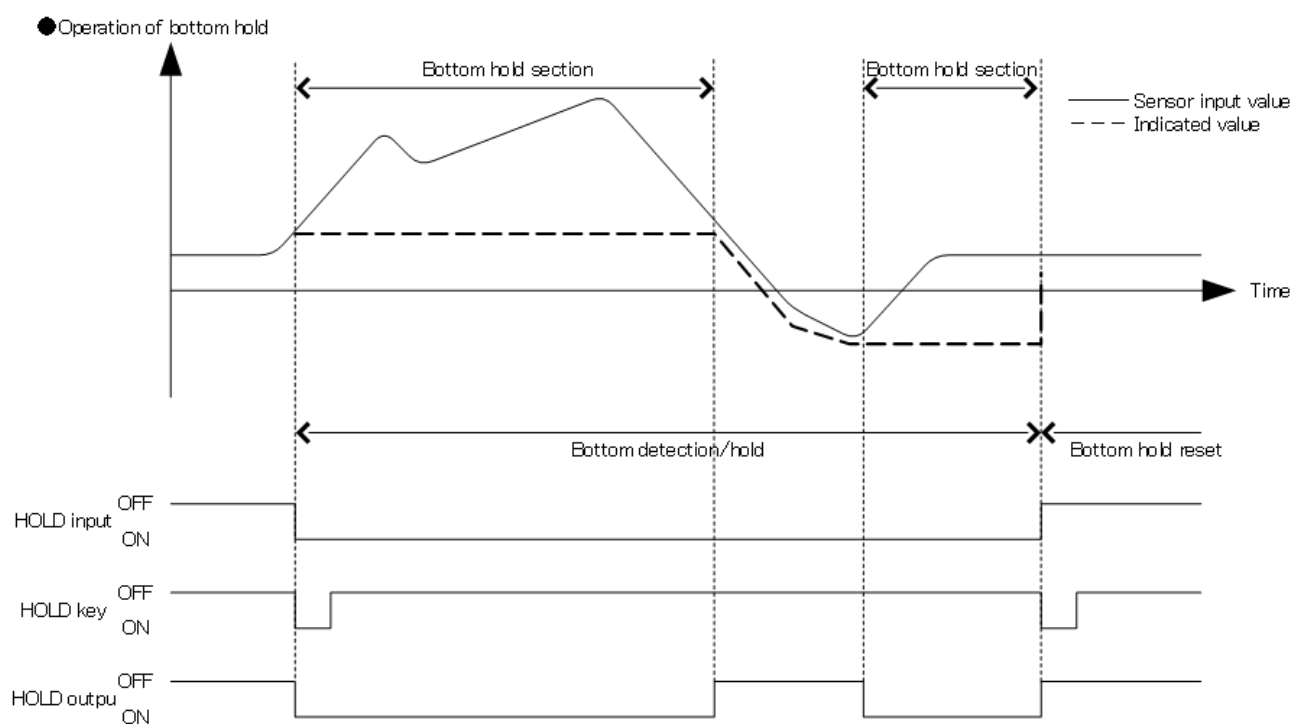


When hold fix section is 1: ON

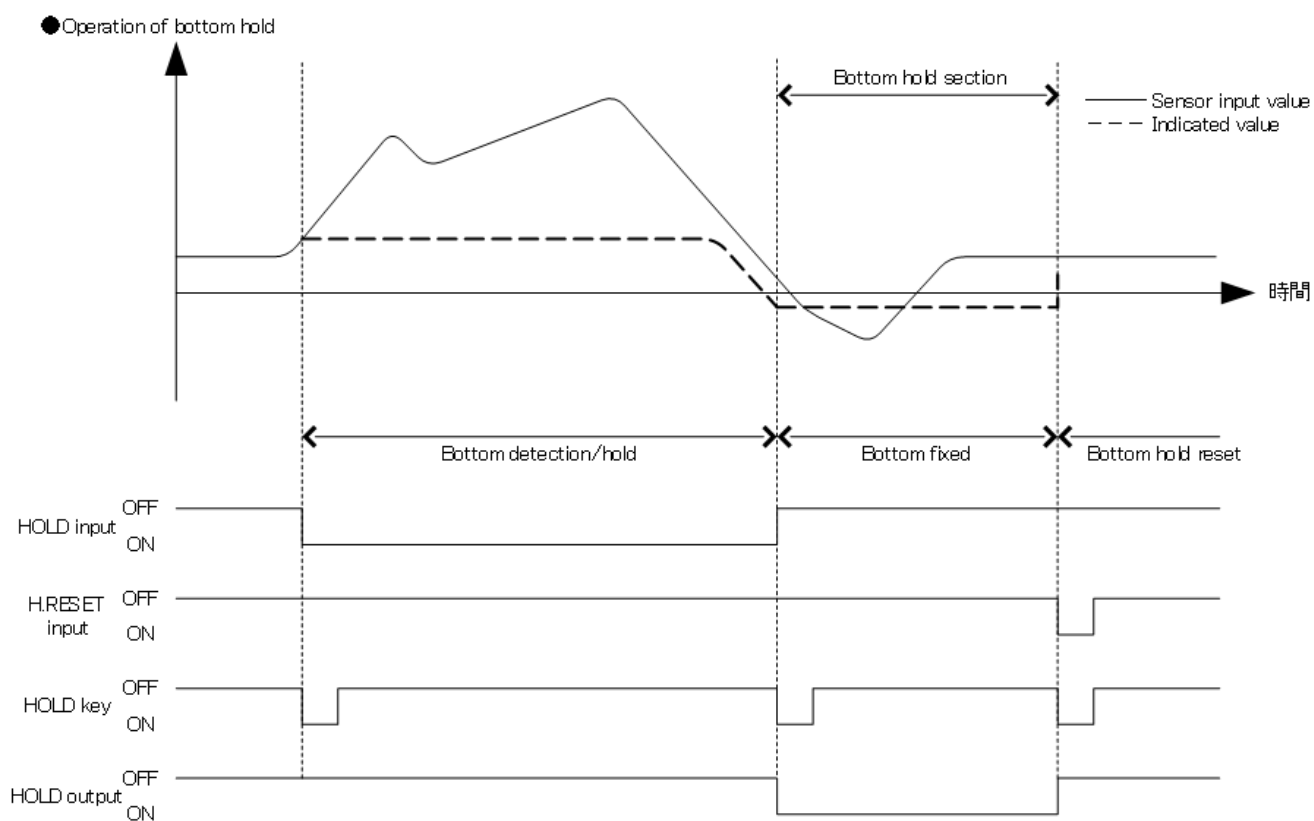


## 6-4. Bottom hold (maintaining a minimum point)

When hold fix section is 0: OFF

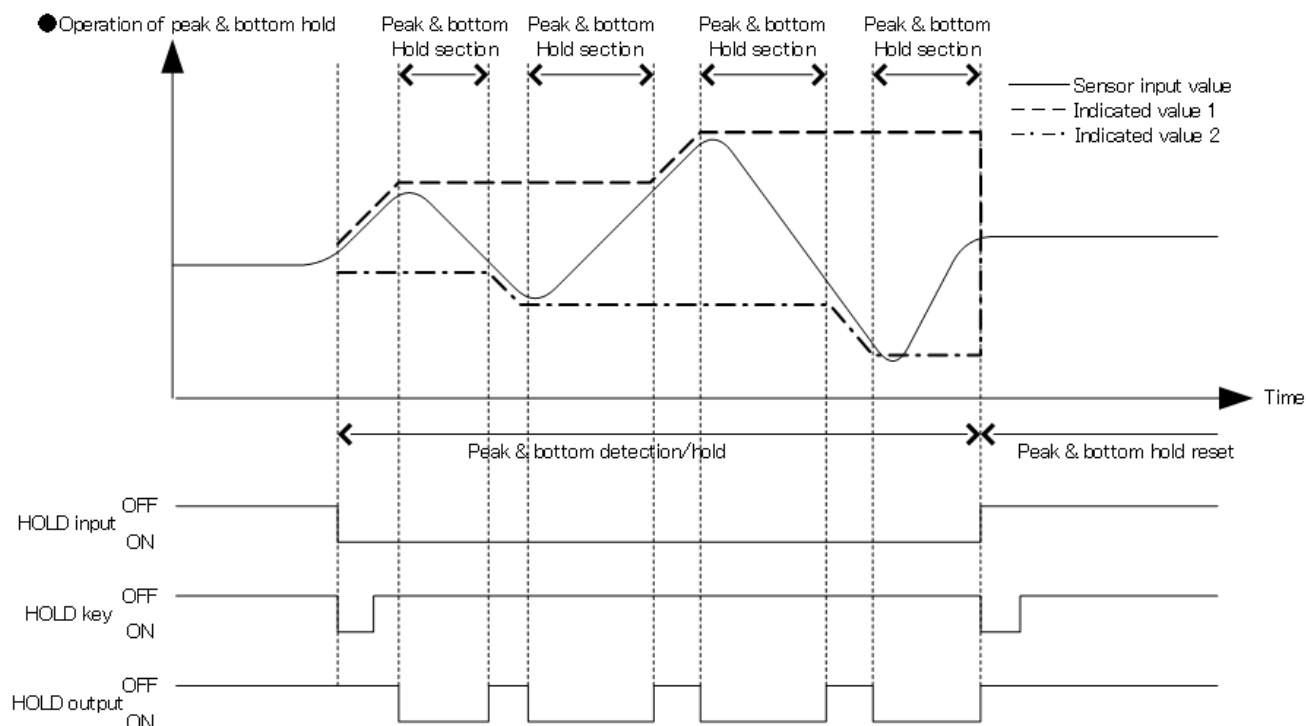


When hold fix section is 1: ON

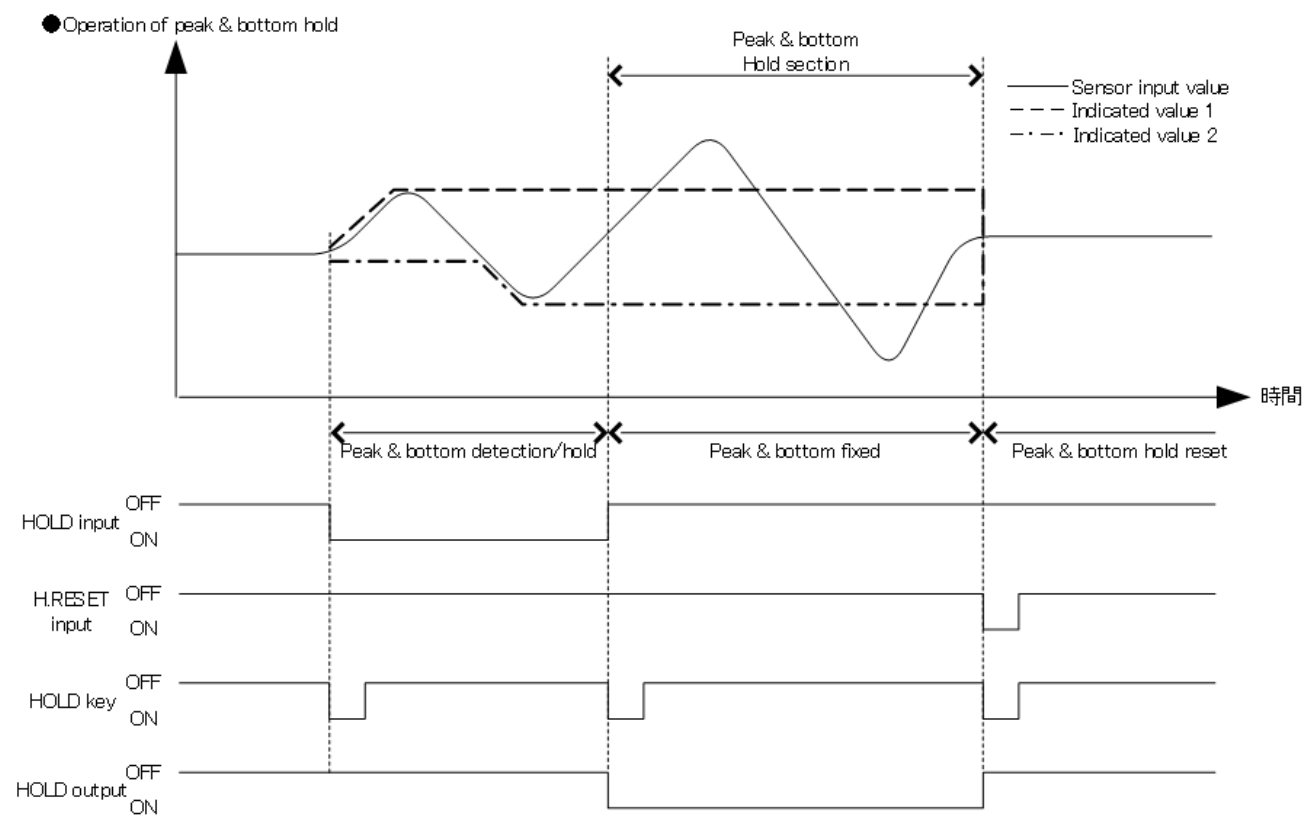


## 6-5. Peak & bottom hold (maintaining a maximum point and a minimum point)

When hold fix section is 0: OFF



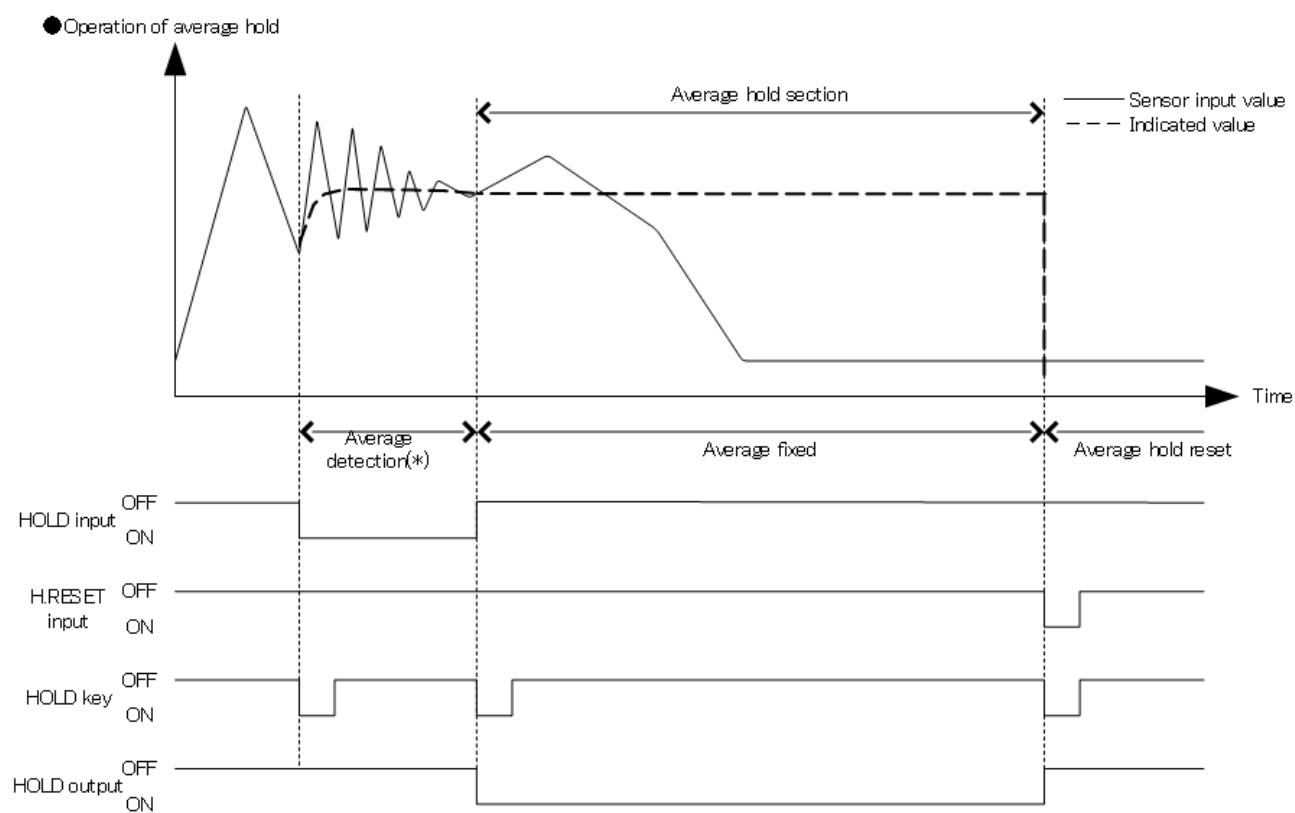
When hold fix section is 1: ON



## 6-6.Average hold (maintaining an average point)

Average hold only works if hold fix section is ON.

**When hold fix section is 1: ON**

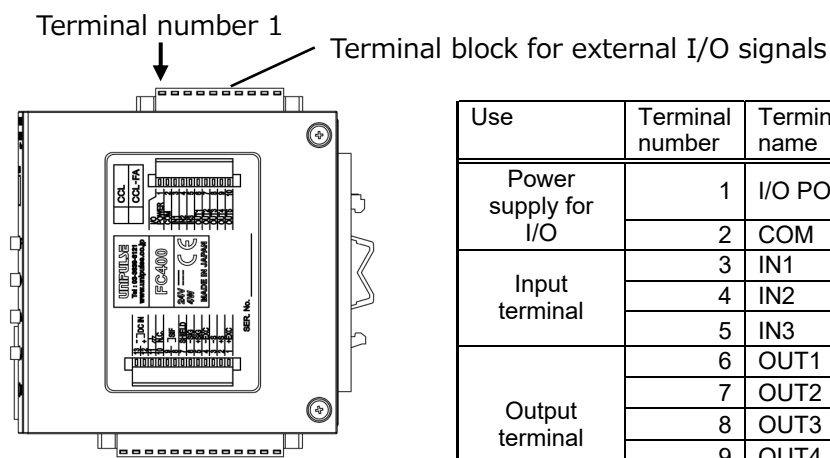


### Key points

\*Maximum detection section is 5 sec (fixed).  
Detection more than 5 sec can not be made.

## 7 External I/O signals

### 7-1. Terminal block pin assignment



Use	Terminal number	Terminal name	Description
Power supply for I/O	1	I/O POWER	Connects with the DC24V power supply for I/O.
	2	COM	A common terminal for I/O signals.
Input terminal	3	IN1	Terminals for input signals. (Functions selected through settings.)
	4	IN2	
	5	IN3	
Output terminal	6	OUT1	Terminals for output signals. (Functions selected through settings.)
	7	OUT2	
	8	OUT3	
	9	OUT4	
	10	OUT5	

- An external DC24V (power supply for the external I/O signal circuit) must be prepared separately.
- I/O circuits and internal circuits are electrically insulated by a photo-coupler.

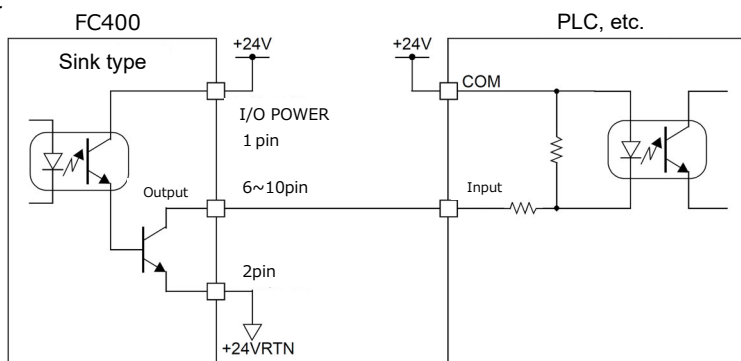
### 7-2. Connecting an external control device

Input terminals ... Switches, relays, transistors, photo-couplers etc. can be connected.

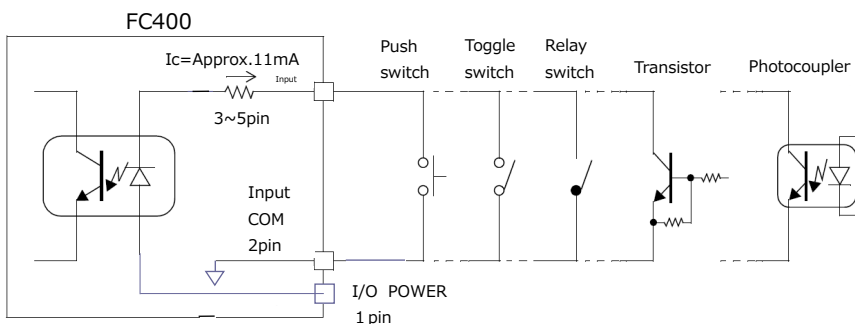
Connect a sink type unit for connecting transistors, photo-couplers etc.

Output terminals ... Open collector output for transistors.

- Output



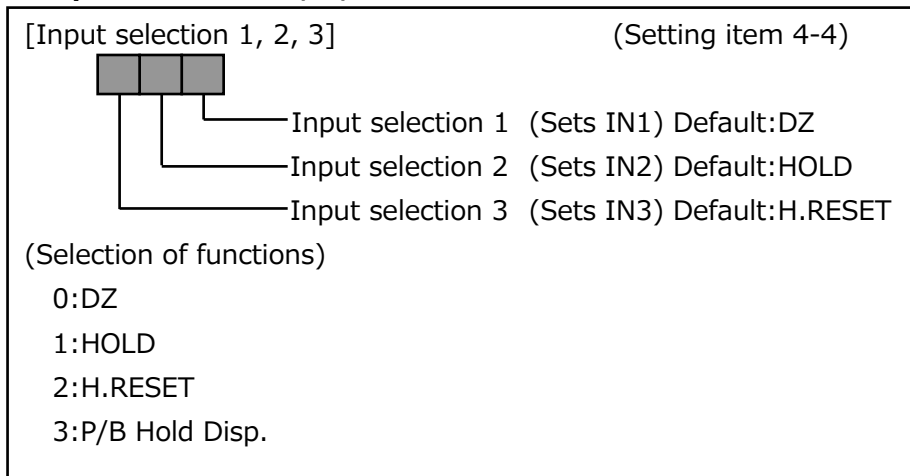
- Input



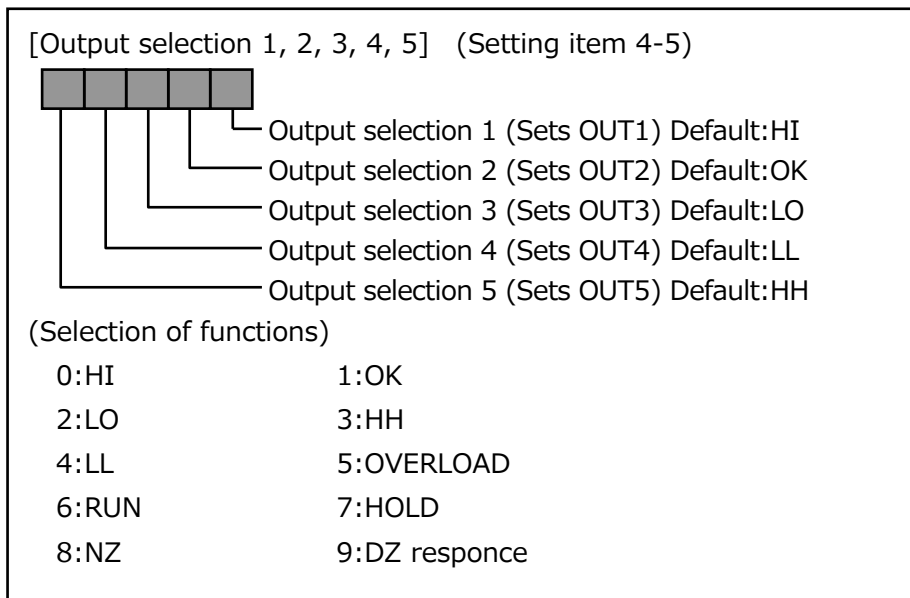
## 7-3. Selection of external I/O signal functions

Functions can be selected for each I/O terminal.

### ■ Input selection 1, 2, 3



### ■ Output selection 1, 2, 3, 4, 5





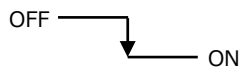
## 7-4. Description of external I/O signal functions

### (Input signals)

Function	Input method	Description
DZ	Edge input	Digital zero is implemented at ON edge.
HOLD	Edge input	Hold control is performed. If hold fix section is set to 0:OFF, holding value is detected and fixed at the ON edge, and holding value is released at the OFF edge.
H.RESET	Edge input	Hold is released at ON edge. If hold fix section is set to 0:OFF, HOLD signals is also hold release at the same time.
P/B Hold Disp.	Edge input	If hold mode is set to 3: Peak & Bottom, the indication value display becomes bottom hold value at the ON edge, and becomes peak hold value at the OFF edge.

#### <Edge input>

- ON edge (OFF → ON)



- OFF edge (ON → OFF)



\* Pulse range of 50 msec or more

### (Output signals)

Function	Description
HI	Output turns ON when HI limit < indicated value.
OK	Output turns ON when LO limit < indicated value < HI limit.
LO	Output turns ON when HI limit < indicated value.
HH	Output turns ON when HH limit < indicated value.
LL	Output turns ON when LL limit < indicated value.
HOLD	Use this function to obtain synchronization of hold and decision.
NZ	Output turns ON when indicated value $\leq$ near zero setting value.
OVERLOAD	This function outputs results of comparisons of Alarm HI limit and Alarm LO limit against indicated values.
DZ response	Use this function to check if digital zero is recognized.
RUN	The signal will switch between ON and OFF roughly once every 0.5 seconds.

## 8 2-wire serial interface[SI/F]

This is a dedicated serial interdice for connecting external devices such as printers and large display units made by UNIPULSE.

Use two-core parallel cables, cabtire cables (electric wires with thick coating for construction) and so on for wires.

When two-core parallel cables and cabtire cables are used, transmission distamce is approx. 30m.

When two-core shield twisted pair wires are used, transmission distance is approx. 300m.

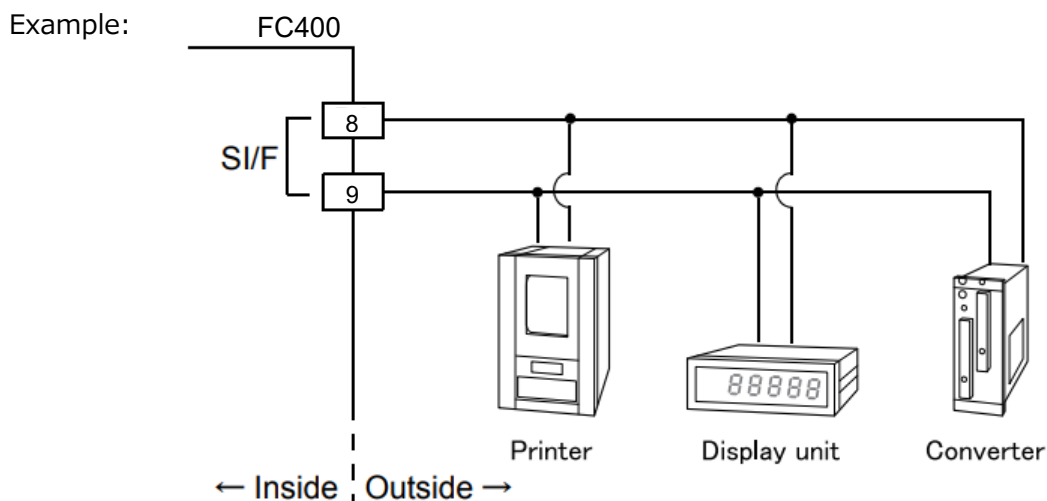
### 8-1. Specifications

Transmitting method	Asynchronous
Transmitting speed	600bps
Output number of times	Approx. 3 times/sec

### 8-2. Connection

Up to three external devices can be connected with no polarity.

However, do not parallel AC lines and high-pressure lines. This causes malfunction.



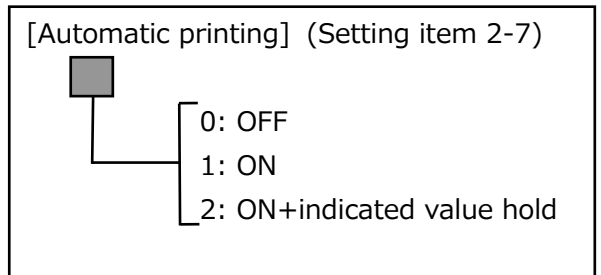
## 8-3. Automatic printing command

Automatic printing command corresponding to the printers and display units connected to SI/F of the FC400 can be output.

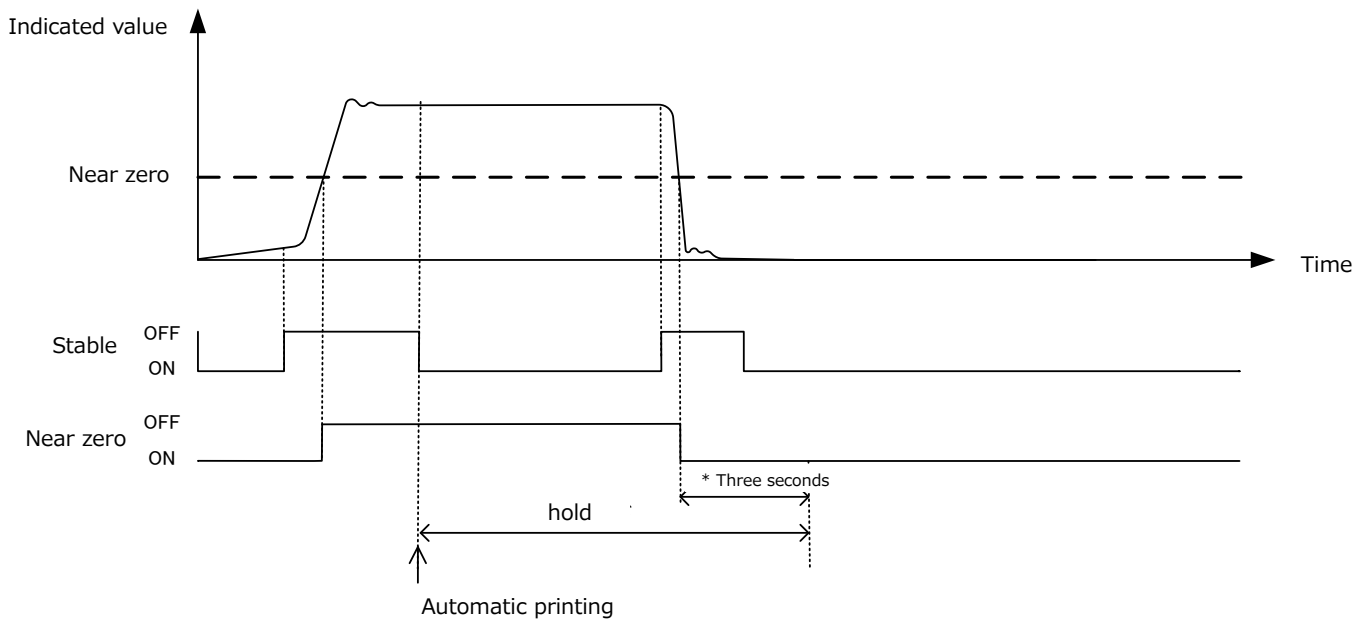
### ■ Automatic printing command

FC400 automatically outputs indicated values via SI/F as soon as STABLE Status turns ON. (STABLE Status works depending on Motion Detect Setting.)

In addition, the reading can be held for 3sec if required. (HOLD function)



### ● Indicated value hold function operations



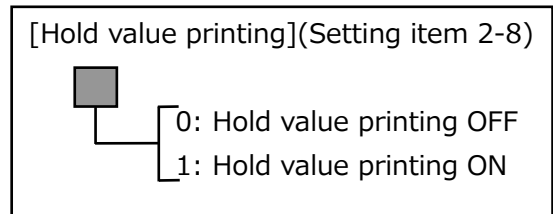
### ■ Hold value printing

FC400 automatically outputs the hold values via SI/F interface as soon as HOLD is released.

\*When "Hold Fix Section" is ON, the hold values are outputted as soon as hold value is fixed.

Also Automatic Printing does not work when "Hold value printing" is set to ON.

"Indicated value hold" by "Automatic Printing" does not work as well.

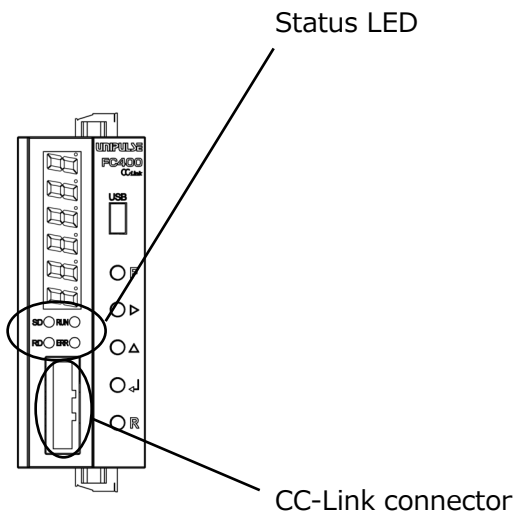


# 9 CC-Link interface

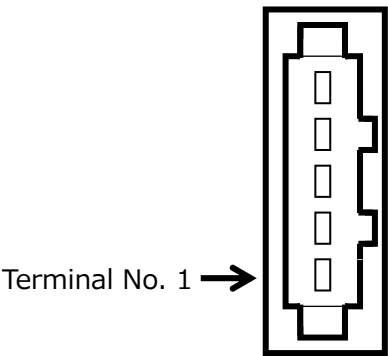
## 9-1. Introduction

If a CC-Link I/F is used, the FC400 can be controlled directly from a PLC, and the amount of wiring needed will be greatly reduced. Basic knowledge of PLCs and CC-Link I/F is required prior to reading. Refer to specialized materials regarding basic knowledge for the CC-Link I/F.

## 9-2.Names of components



LED name	Lights on	Lights off	Flashing
RUN	- Normal	- Resetting - Communication not possible	
SD	- Transmitting		-----
RD	- Receiving		
ERR	- Setting error - CRC error - Failure		-----



Terminal number	Terminal name	Cable color	Signal type
5	SLD	----	Shield
4	NC	----	Not connected
3	DG	Yellow	Signal wire ground
2	DB	White	Signal wire DB side
1	DA	Blue	Signal wire DA side

\* Compatible plug: CN74

<Optional accessories>

CN74: 1pc is included in standard package.

CN75: Y-shaped branch connector.

CN76: Termination connector.

<How to use optional accessories>

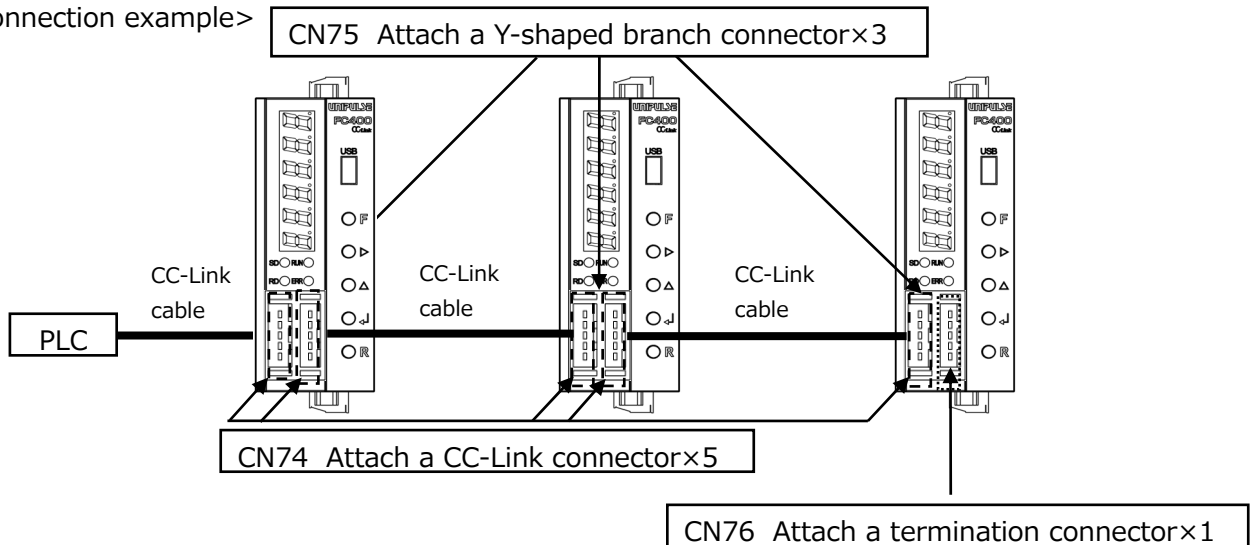
e.g.) To use 3 FC400 in a network

•CN74 2pcs + 3pcs(Included in FC400 packages) = 5pcs

•CN75 3pcs

•CN76 1pcs

<Connection example>



## 9-3. Settings

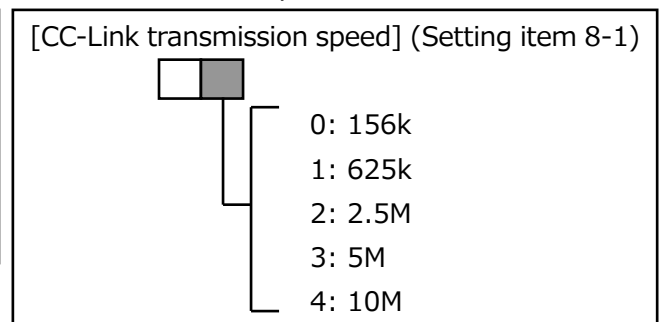
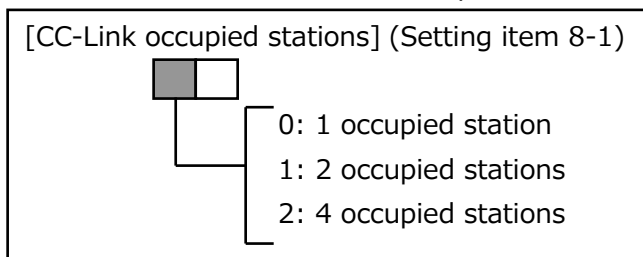
The FC400 is a remote device station which supports CC-Link Ver.1.10.

If using Mitsubishi general-purpose PLC MELSEC-Q series, please set the mode configuration and station type as following in the configuration of master station network parameters.

- Mode configuration: **Remote net Ver.1 mode** - Station type : **Remote device stations**

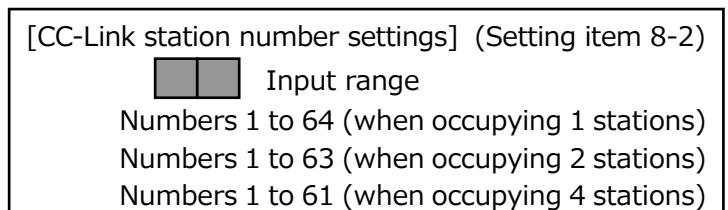
### ■ CC-Link occupied stations/speed settings

Set the number of CC-Link occupied stations and communication speed.



### ■ CC-Link station number settings

Set the slave station number.



## 9-4. PLC address

The number of occupied stations can be changed through the FC400 settings. Ensure that the addresses do not overlap when setting to occupy multiple stations. Within the master station, addresses allotted to remote stations change based on the station number.

Station number	Remote input	Remote output	Remote register	
			M → R	R → M
1	RX0000	RY0000	RWw0000	RWr0000
	00E0H	0160H	01E0H	02E0H
2	RX0020	RY0020	RWw0004	RWr0004
	00E2H	0162H	01E4H	02E4H
3	RX0040	RY0040	RWw0008	RWr0008
	00E4H	0164H	01E8H	02E8H

Consequently, the address for the FC400 data will change depending on the station number. The following address map shows the status for station number 1.

## 9-5. Address map (data region)

### ■ Remote register M→R (PLC → FC400)

Station	Buffer address	Device M → R	Details					
			When occupying 4 stations		When occupying 2 stations		When occupying 1 station	
			MSB	LSB	MSB	LSB	MSB	LSB
1	01E0H	RWw0000	HH limit		HI limit		Undefined	64bit
	01E1H	RWw0001		32bit		32bit		
	01E2H	RWw0002	HI limit		LO limit			
	01E3H	RWw0003		32bit		32bit		
2	01E4H	RWw0004	LO limit		General purpose data area		/	
	01E5H	RWw0005		16bit	32bit			
	01E6H	RWw0006	LL limit		Undefined	Command No. 8bit		
	01E7H	RWw0007		32bit	Undefined	16bit		
3	01E8H	RWw0008	Near zero		/			
	01E9H	RWw0009		32bit				
	01EAH	RWw000A	Undefined					
	01EBH	RWw000B		32bit				
4	01ECH	RWw000C	General purpose data area		/			
	01EDH	RWw000D		32bit				
	01EEH	RWw000E	Undefined	Command No. 8bit				
	01EFH	RWw000F	Undefined	16bit				

M: Master R: Remote

Within the bold line: Dedicated data area

## ■ Description on remote register M → R

### ◎ Dedicated data area

When registering each setting value using request flag 1, data is set in the respective area.

#### - HH limit (32bit binary) (-99999 to 99999) (4 stations)

Set the value for HH limit. If a value larger than 99999 is set, 99999 will be used as the set value.

If a value smaller than -99999 is set, -99999 will be used as the set value.

#### - HI limit (32bit binary) (-99999 to 99999) (4 stations, 2 stations)

Set the value for HI limit. If a value larger than 99999 is set, 99999 will be used as the set value.

If a value smaller than -99999 is set, -99999 will be used as the set value.

#### - LL limit (32bit binary) (-99999 to 99999) (4 stations)

Set the value for LL limit. If a value larger than 99999 is set, 99999 will be used as the set value.

If a value smaller than -99999 is set, -99999 will be used as the set value.

#### - LO limit (32bit binary) (-99999 to 99999) (4 stations, 2 stations)

Set the value for LO limit. If a value larger than 99999 is set, 99999 will be used as the set value.

If a value smaller than -99999 is set, -99999 will be used as the set value.

#### - Near zero (32bit binary) (0 to 99999) (4 stations)

Set the value for Near zero. If a value larger than 99999 is set, 99999 will be used as the set value.

### ◎ General purpose data area (signed 32bit binary) (-99999 to 99999) (4 stations, 2 stations)

Used when the command and data are set using request flag 2.

### ◎ Command No. (8bit binary) (0 to 255) (4 stations, 2 stations)

Set the command No. Note that response flag 2 will not turn on for invalid commands.

### ■ Remote register R → M (FC400 → PLC)

Station	Buffer address	Device R → M	Details					
			When occupying 4 stations		When occupying 2 stations		When occupying 1 station	
			MSB	LSB	MSB	LSB	MSB	LSB
1	02E0H	RWr0000	Real-time value  32bit		Indicated value (PEAK/BOTTOM)  32bit		Indicated value (PEAK/BOTTOM)  32bit	
	02E1H	RWr0001						
	02E2H	RWr0002	Hold value1  32bit		Undefined	Error code 8bit	Undefined	Error code 8bit
	02E3H	RWr0003			Undefined	Error assistance code 8bit	Undefined	Error assistance code 8bit
2	02E4H	RWr0004	Hold value2  32bit		General purpose data area  32bit		<div></div>	
	02E5H	RWr0005						
	02E6H	RWr0006	Undefined	Error code 8bit	Undefined	Command No. (response) 8bit		
	02E7H	RWr0007	Undefined	Error assistance code 8bit	Undefined  16bit			
3	02E8H	RWr0008	Undefined   64bit		<div></div>			
	02E9H	RWr0009						
	02EAH	RWr000A						
	02EBH	RWr000B						
4	02ECH	RWr000C	General purpose data area  32bit				<div></div>	
	02EDH	RWr000D						
	02EEH	RWr000E	Undefined	Command No. (response) 8bit				
	02EFH	RWr000F	Undefined  16bit					



## ■ Description of remote register R → M

- ◎ Real-time value\* (signed 32bit binary) (-99999 to 99999) (4 stations)  
Indicates Real-time value.  
Data is expressed in 6-digit numbers if "6-digit display" is selected at setting 5-4.
  - ◎ Hold value1\* (signed 32bit binary) (-99999 to 99999) (4 stations)  
Indicates peak value.
  - ◎ Hold value2\* (signed 32bit binary) (-99999 to 99999) (4 stations)  
Indicates bottom value.
  - ◎ Indicated value\* (PEAK/BOTTOM) (signed 32bit binary) (-99999 to 99999) (2 stations, 1 station)  
Indicates peak value or bottom value depending on the specified bit.  
When occupying 2 stations: Indicates peak value when RY0015 is OFF, and bottom value when ON.  
When occupying 1 station: Indicates peak value when RY0007 is OFF, and bottom value when ON.
- \* Regarding peak value, bottom value, and indicated value: Minus data is indicated in two's complement.
- ◎ Error code (8bit binary) (0 to 255) (4 stations, 2 stations, 1 station)  
Displays indicator error codes.
    - 0: No error
    - 1: Sensor error
    - 2: Calibration error
  - ◎ Error assistance code (8bit binary) (0 to 255) (4 stations, 2 stations, 1 station)  
Displays indicator error codes.  
The error status can be confirmed from the combination of the error codes and error assistance codes.

Error code	Error assistance code	Error content
0	0	No error
1	1	A/D converter misus over
	2	A/D converter input over
	3	Display over(OFL2)
	4	Display over(OFL1)
	5	Zero error
	6	OVERLOAD
2	2	Seq. error 2
	3	Seq. error 3
	6	Seq. error 6
	7	Seq. error 7
	8	Seq. error 8

- ◎ Command No. response (8bit binary) (0 to 255) (4 stations, 2 stations)  
When the command No. is set using request flag 2, the same data is set here.

## ■ List of commands

Indicates the command No. and the value to be set in the general purpose data area when a setting value is changed or a command is given using request flag 2. (Items in the bold boxes are read-only.)

Common to reading and writing setting values	Command No. (RWw000E)	General purpose data area (RW000C to 000D)	Common to reading and writing setting values	Command No. (RWw000E)	General purpose data area (RW000C to 000D)
HI limit	1	-99999 to 99999	CC-Link occupied stations/speed settings	81	00 to 24
LO limit	2	-99999 to 99999	CC-Link station number settings	82	01 to 64
Near zero	3	00000 to 99999	Span calibration	92	00001 to 99999
Hysteresis	4	0000 to 9999	Equivalent input zero calibration	93	-30000 to 30000
Digital offset	5	-99999 to 99999	Equivalent input span calibration	94	00100 to 38000
HH limit	6	-99999 to 99999	Input conversion value display	95	-39000 to 39000
LL limit	7	-99999 to 99999			
Hold mode	11	0 to 4			
HI/LO limit comparison mode	12	0 to 4			
Alarm HI limit	21	-99999 to 99999			
Alarm LO limit	22	-99999 to 99999			
Sampling rate	23	1			
Hold fix section	24	0 to 1			
Hold detection wait	25	000 to 100			
Hold value renewal timing	26	0 to 1			
Automatic printing command	27	0 to 1			
Hold value printing	28	0 to 1			
Key invalid/LOCK	31	0000 to 1113			
Motion detection (period - range)	32	00 to 99 - 00 to 99			
Zero tracking (period)	33	00 to 99			
Zero tracking (range)	34	0000 to 9999			
Extended function selection	35	00 to 11			
Digital Low-pass filter	41	01 to 6000			
Moving average filter	42	1 to 999			
Auto adjustment filter	43	0 to 1			
Input selection	44	000 to 333			
Output selection	45	00000 to 99999			
Rated capacity	51	00001 to 99999			
Min. scale division	52	01 to 50			
DZ regulation value	53	00000 to 99999			
Display selection	54	0000 to 1404			
Excitation voltage selection	55	0 to 1			

Commands	Command No. (RWw000E)	General purpose data area (RWw000C to 000D)
Displays peak value ON	0	10
Displays bottom value ON	0	11
Hold ON	0	12
Hold OFF	0	13
Hold reset	0	14
Digital zero	0	15
Digital zero reset	0	16
Printing command	0	17
Auto adjustment filter	0	18
Zero calibration (actual load calibration)	0	30
Span calibration (actual load calibration)	0	31
Zero calibration (equivalent input calibration)	0	32
Span calibration (equivalent input calibration)	0	33

## 9-6. Address map (relay region)

### ■ Remote output M → R (PLC → FC400)

Station	Buffer address	Remote output	Details		
			When occupying 4 stations	When occupying 2 stations	When occupying 1 station
1	0160H	RY0000	Request 1	Request 1	Hold ON
		RY0001			Hold reset
		RY0002	Request 2	Request 2	Digital zero
		RY0003	R/W	R/W	Digital zero reset
		RY0004			Peak/Bottom hold switch
		RY0005			Printing command
		RY0006			
		RY0007			
		RY0008			
		RY0009			
		RY000A			
		RY000B			Auto adjustment filter
		RY000C			zero calibration
		RY000D			span calibration
		RY000E			Equivalent input zero calibration
		RY000F			Equivalent input span calibration
	0161H	RY0010	Hold ON	Hold ON	
		RY0011	Hold reset	Hold reset	
		RY0012	Digital zero	Digital zero	
		RY0013	Digital zero reset	Digital zero reset	
		RY0014	Peak/Bottom hold switch	Peak/Bottom hold switch	
		RY0015	Printing command	Printing command	
		RY0016			
		RY0017			
		RY0018			
		RY0019			
		RY001A			
		RY001B	Auto adjustment filter	Auto adjustment filter	
		RY001C	zero calibration	zero calibration	
		RY001D	span calibration	span calibration	
		RY001E	Equivalent input zero calibration	Equivalent input zero calibration	
		RY001F	Equivalent input span calibration	Equivalent input span calibration	
2	0162H	:			
	0163H	:			
3	0164H	:			
	0165H	:			
4	0166H	:			
	0167H	:			

## ■ Remote output RY (PLC → FC400) signal

Signal name	Signal meaning
Request 1	Turns ON when writing settings using the dedicated data area. Turns OFF after confirming response 1 ON.
Request 2	Turns ON when writing/reading setting values, or giving a command using the general purpose data area.  Turns OFF after confirming response 2 ON.
R/W	Sets the writing/reading setting values using request 2. ON when reading (READ) and OFF when writing (WRITE). READ: Each setting value of the indicator is read. WRITE: Each setting value is written to the indicator and a command is given to the indicator.
Hold ON/OFF	Hold control is performed. If hold fix section is set to 0:OFF, holding value is detected and fixed at the ON edge, and holding value is released at the OFF edge.
Hold reset	Hold is released at ON edge.
Digital zero	Indicated value is reset to zero at ON edge.
Digital zero reset	Digital zero is released at ON edge.
Peak/Bottom hold switch	Bottom hold is selected at ON edge. Peak hold is selected at OFF edge. *For Remote register R → M (Indicated value (PEAK/BOTTOM))
Printing command	FC400 sends Printing command to connected device(s) in SI/F. (ON-edge triggered)
Auto adjustment filter	Auto adjustment filter is performed at the ON edge.
Zero calibration	Zero calibration is performed at the ON edge.
Span calibration	Span calibration is performed at the ON edge.
Equivalent input zero calibration	Equivalent input zero calibration is performed at the ON edge.
Equivalent input span calibration	Equivalent input span calibration is performed at the ON edge.

■ Remote input R → M (FC400 → PLC)

Station	Buffer address	Remote input	Details		
			When occupying 4 stations	When occupying 2 stations	When occupying 1 station
1	00E0H	RX0000	Response 1	Response 1	Hold
		RX0001			Stable
		RX0002	Response 2	Response 2	Near zero
		RX0003	R/W (response)	R/W (response)	Zero tracking
		RX0004			HH
		RX0005	CPU normal operation	CPU normal operation	HI
		RX0006			OK
		RX0007	Calibration processing state	Calibration processing state	LO
		RX0008	Hold	Hold	LL
		RX0009	Stable	Stable	Sensor error
		RX000A	Near zero	Near zero	OVERLOAD
		RX000B	Zero tracking	Zero tracking	Zero error
		RX000C	HH	HH	P/B
		RX000D	HI	HI	Decimal place 1
		RX000E	OK	OK	Decimal place 2
		RX000F	LO	LO	Decimal place 3
	00E1H	RX0010	LL	LL	LOCK1
		RX0011	Sensor error	Sensor error	LOCK2
		RX0012	OVERLOAD	OVERLOAD	
		RX0013	Zero error	Zero error	Calibration processing state
		RX0014	P/B	P/B	Calibration error No. 1 2 4 8
		RX0015	Decimal place 1	Decimal place 1	
		RX0016	Decimal place 2	Decimal place 2	
		RX0017	Decimal place 3	Decimal place 3	
		RX0018			
		RX0019			
		RX001A			Error status flag
		RX001B			Remote READY
		RX001C			
		RX001D			
		RX001E	LOCK1	LOCK1	
		RX001F	LOCK2	LOCK2	
2	00E2H	:			
	00E3H	RX0030	Calibration error No. 1 2 4 8	Calibration error No. 1 2 4 8	
		RX0031			
		RX0032			
		RX0033			
	:				
	RX003A		Error status flag		
	RX003B		Remote READY		
:					
3	00E4H	:			
	00E5H	:			

4	00E6H	:			
	00E7H	:			
		RX007A	Error status flag		
		RX007B	Remote READY		
		:			
		RX007F			

## ■ Remote input RX (FC400 → PLC) signal

Signal name	Signal meaning
Response 1	Turns ON when writing of the setting values by request 1 is complete. Turns OFF after confirming request 1 OFF.
Response 2	Turns ON when command given by request 2 is complete. Turns OFF after confirming request 2 OFF.
R/W (response)	Changes to the same status as the R/W signal when response 2 turns ON.
CPU normal operation	ON/OFF is repeated approximately every 0.5 second.
Calibration processing state	Turns ON during Equivalent calibration, Span calibration .
Sensor error	Turns ON when the indicator shows Over scale error.
OVERLOAD	Turns ON when the indicator shows OVERLOAD error.
Zero error	Turns ON when the indicator shows Digital zero error.
Decimal place 1 Decimal place 2 Decimal place 3	Indicates the decimal place. 0: #####, 1: #####.#, 2: ###.##, 3: ##.###, 4: #.####
Near zero	Turns ON when the indicator's NZ signal is ON.
Zero tracking	Turns ON when the Zero tracking is ON.
HH	Turns ON when the indicator's HH signal is ON.
HI	Turns ON when the indicator's HI signal is ON.
OK	Turns ON when the indicator's OK signal is ON.
LO	Turns ON when the indicator's LO signal is ON.
LL	Turns ON when the indicator's LL signal is ON.
P/B	Turns ON when Bottom value display is selected.
Hold	Turns ON when indicated value is being held.
Stable	Turns ON when the indicator is stable.
Complete	Turns ON when weighing is complete.
Being held	Turns ON when weight value is being held.
Error status flag	Turns ON when there is an error.
Remote READY	Turns ON when initialization is complete and the error status flag is OFF.

\* Be sure to confirm that remote READY is ON after the power is turned ON.  
Do not turn request 1 (RY0000) or request 2 (RY0002) ON while remote READY is OFF.  
Normal operation may not be possible when remote output or writing to remote register M→R is performed before it turns ON. If it turns OFF due to a power outage etc., perform an initialization process on the PLC side as well to allow access to FC400.



## 9-7. Setting procedures

### ■ When setting settings using the dedicated data area and request flag 1

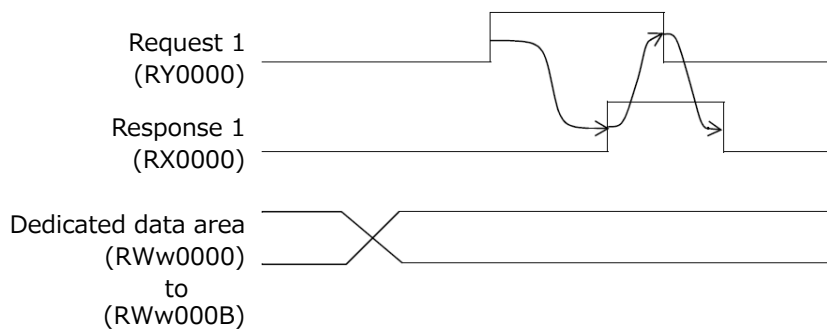
Request flag 1 is used when writing a setting value.

When requests 1 and 2, and responses 1 and 2 are all OFF, writing of the setting value is performed at ON edge of request 1.

The dedicated data area is from RWw0000 to RWw000B when occupying 4 stations, and from RWw0000 to RWw0003 when occupying 2 stations.

\* When turning ON the power, be sure to confirm that remote READY has turned ON before turning ON request 1.

Example) When occupying 4 stations



### ■ When making settings using the general purpose data area and request flag 2

Request flag 2 is used when writing/reading setting values and giving commands.

When requests 1 and 2, and responses 1 and 2 are all OFF, operations are executed at ON edge of request 2.

The general purpose data area is from RWw000C to RWw000D when occupying 4 stations, and from RWw0004 to RWw0005 when occupying 2 stations.

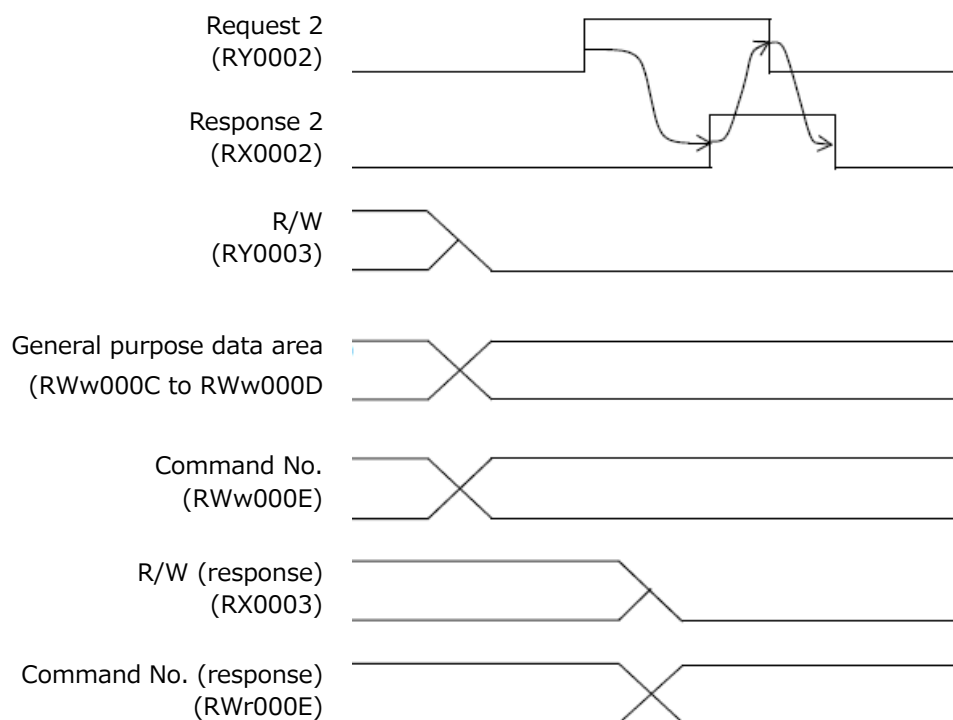
The command No. area is RWw000E when occupying 4 stations, and RWw0006 when occupying 2 stations.

Turn R/W ON when reading setting values.

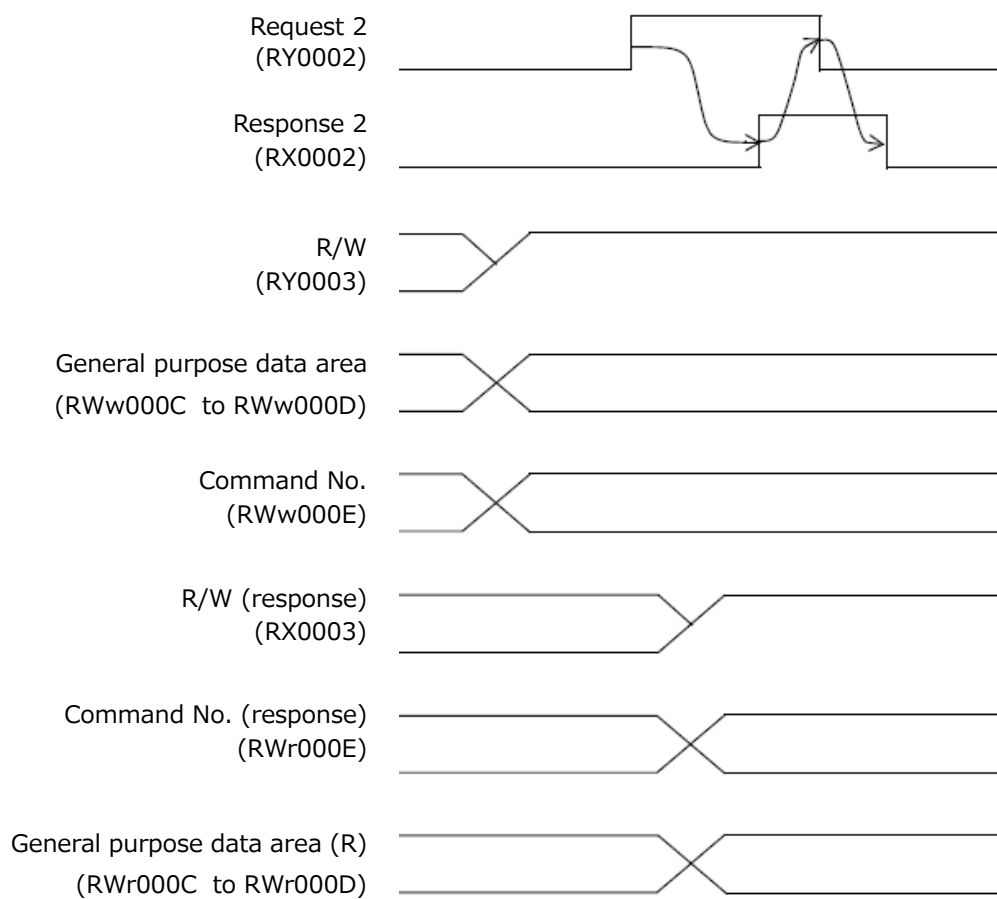
Turn R/W OFF when writing setting values or giving a command.

\* When turning ON the power, be sure to confirm that remote READY has turned ON before turning ON request 2.

Example) Writing a setting value or giving a command when occupying 4 stations



Example) Reading a setting value when occupying 4 stations



## 10 USB interface

The USB interface is used to read the indicated values of the FC400 and to write setting values into the FC400. Reading/writing setting values, recording, and graph display are possible using a dedicated PC application for the FC400.

### 10-1. USB interface

#### Communication specifications

Communication standard USB Ver.2.0 compliant, full speed (12Mbps)

Connector mini-B TYPE

### 10-2. PC preparation

For a PC that is being used for the first time, the USB driver and the dedicated PC application must be installed.

#### PC operating environment

OS	Windows 7/10 Home Premium/Professional/Ultimate 32/64bit Japanese edition, English edition, Chinese (Simplified) edition
Display	800 × 640 pixel or above
USB port	One free port (USB 2.0 or above)
USB driver	Virtual COM Port (VCP) Drivers (manufactured by FTDI Limited)
Memory	2GB or above
Hard disk	15GB free space or more

#### USB driver installation

A driver will be installed automatically when a USB is connected in a network environment.

Connect the PC to the network.

Automatic download/installation will start when the device is connected to the PC with the optional USB cable.

If automatic installation fails or the dedicated application does not start up, delete the drive and reconnect.

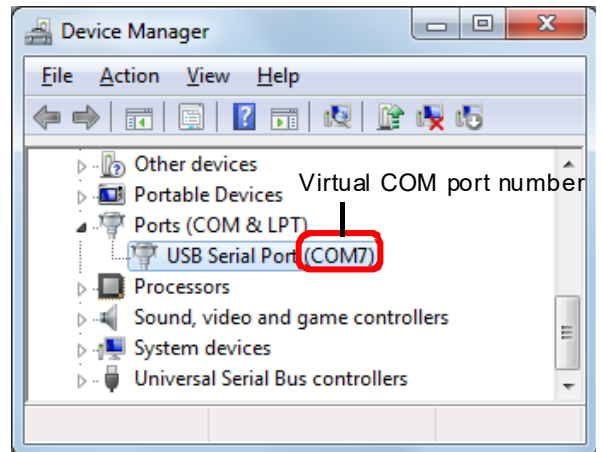
See the FTDI website if automatic installation does not work.

Guide (English) <http://www.ftdichip.com/Support/Documents/InstallGuides.htm>

Driver (English) <http://www.ftdichip.com/Drivers/VCP.htm>

## Virtual COM port check

Check the virtual COM port number to which the device is connected from the PC device manager or when installing the driver.



### Key point

If the COM port number of the FC400 cannot be identified due to multiple USB serial ports and so on, unplug the USB cable 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 will increase. This number represents the COM port number of the FC400.

## Installation of the dedicated PC application

The dedicated application is used for setting the device, and is useful for managing and analyzing data.

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

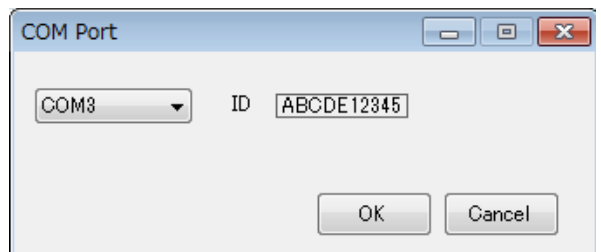
## PC application startup

Double-click the FC400 shortcut on the desktop or click "UNIPULSE" → "FC400" → FC400 from the start menu.

## Specifying the COM port

The COM port selection screen will appear when the PC application is activated for the first time after installation.

Once the COM port is selected and the "OK" button is clicked, it connects to the FC400 and the screen will appear.



## 11 Other functions

### ■ Operation when a zero error occurs

Select the display operation for when digital zero is performed in a state where the DZ regulation value has been exceeded.

[Operation when a zero error occurs]

(Setting item 3-5)



- 0: Execution (Indicated value - DZ regulation value)
- 1: Non-execution

### ■ Digital zero condition

Set the operating condition for digital zero.

[Digital zero condition]

(Setting item 3-5)



- 0: Accept regularly
- 1: Only at stable time

### ■ Key invalid

Makes key operations for digital zero, hold subtraction and peak/bottom value switch invalid/valid.

[Key invalid]

(Setting item 3-1)



- P/B switching key
  - ZERO key
  - HOLD key
- 0: Invalid
  - 1: Valid

### ■ Input conversion value display

Displays output values from the connected strain gauge type sensor in real time.

\* Used when replacing indicators for repair and so on, or for confirming initial load etc.

[Input conversion value display]

(Setting item 9-5)



(Display range: -3.9000 to 3.9000)

### ■ Setting value restoration

The current setting parameters including calibration value can be saved.

In case the setting parameters are accidentally changed, you can load the saved setting parameters by just inputting the password.

Save setting parameters : 5059

Restore setting parameters : 6059

\* Do not perform the Restoration if the setting parameters are not saved on FC400.



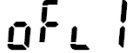
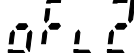
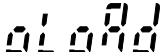
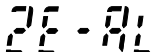
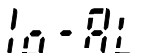
[password]

(Setting item 9-9)



## 12 Troubleshooting

### 12-1. Over scale display

Display	Error name	Error content/countermeasures
	A/D converter input over	Signals that exceed the FC400 signal input range are input. Confirm that the sensor output does not exceed the span calibration range and that the cable connecting the FC400 to the sensor is not disconnected. This may also appear if nothing is connected to the load input on the terminal block.
	A/D converter minus over	Signals lower than the signal input range of the FC400 are input. Confirm that the sensor output is not below the span calibration range and that the cable connecting the FC400 to the sensor is not disconnected. This may also appear if nothing is connected to the load input on the terminal block.
	Display over	The indicated value is exceeding -99999. In order to return to normal display from this over scale display, increase the input signal of sensor until the over scale display disappears.
	Display over	The indicated value is exceeding 99999. In order to return to normal display from this over scale display, decrease the input signal of sensor until the over scale display disappears.
	OVERLOAD error	Sensor input is exceeding alarm HI limit or dropping below alarm LO limit. In order to return to normal display from this over scale display, change input signal of sensor closer to 0 until the over scale display disappears, or edit the settings of alarm HI limit or alarm LO limit.
	Digital zero over	Digital zero is executed with an indicated value exceeding the DZ regulation value. Change the DZ regulation value, and restart the digital zero operation.
	External output error	External output is overloaded.(Over current) Please check if the wires are properly connected.

## 12-2. Calibration error display

Display	Error name	Error content/countermeasures
c Err2	Calibration error 2	Zero calibration or span calibration cannot be performed because the electronic signal input on the positive side exceeds the input voltage range. Check for cable disconnection and mis-wiring.
c Err3	Calibration error 3	Zero calibration or span calibration cannot be performed because the electronic signal input on the negative side exceeds the input voltage range. Check for cable disconnection and mis-wiring.
c Err6	Calibration error 6	Load cell output value has not reached the span adjustment range of the FC400. Confirm that the load is applied to the load cell correctly and that the load cell output is capable of reaching the span adjustment range, and then re-perform span calibration.
c Err7	Calibration error 7	The load cell output is on the minus (negative) side. Confirm that load is applied to the load cell in the correct direction and that the wiring for load cell +SIG and -SIG are not reversed, and then re-perform span calibration.
c Err8	Calibration error 8	Load cell output exceeds the span adjustment range of the FC400. Confirm that the load is applied to the load cell correctly and that the rated output value of the load cell is within the span adjustment range, and then re-perform span calibration.

# 13 List of setting values

## Setting mode 0

Setting item	Name	Initial value	Setting range	LOCK		Page
				1	2	
1	HI limit	000.00	-99999 to 99999	⊙		P12
2	LO limit	000.00	-99999 to 99999	⊙		P12
3	Near zero	000.00	00000 to 99999	⊙		P13
4	Hysteresis	00.00	0000 to 9999	⊙		P13
5	Digital offset	000.00	-99999 to 99999	⊙		P11
6	HH limit	999.99	-99999 to 99999	⊙		P12
7	LL limit	-999.99	-99999 to 99999	⊙		P12

## Setting mode 1

Setting item	Name	Initial value	Setting range	LOCK		Page
				1	2	
1	Hold mode	0	0 : Sample hold 1 : Peak hold 2 : Bottom hold 3 : Peak & bottom hold 4 : Average hold		⊙	P14
2	HI/LO limit comparison mode	0	0 : ALL 1 : MD 2 : NZ 3 : MD+NZ 4 : Hold		⊙	P12

## Setting mode 2

Setting item	Name	Initial value	Setting range	LOCK		Page
				1	2	
1	Alarm HI limit	999.99	-99999 to 99999	⊙		P13
2	Alarm LO limit	-999.99	-99999 to 99999	⊙		P13
3	Sampling rate	1	1 : 2400 times/sec		⊙	P9
4	Hold fix section	0	0 : OFF 1 : ON		⊙	P14
5	Hold detection wait	0.00	0.00~1.00 sec		⊙	P14
6	Hold value renewal timing	0	0 : Detection start 1 : Detection stop		⊙	P14
7	Automatic printing command	1	0 : OFF 1 : ON 2 : ON+Indicated value Hold		⊙	P24
8	Hold value printing	0	0 : Hold value printing OFF 1 : Hold value printing ON		⊙	P24



### Setting mode 3

Setting item	Name	Initial value	Setting range	LOCK		Page
				1	2	
1	Key invalid/LOCK	1 1 1 0				P7
	Setting value LOCK		0: Lock1 OFF, Lock2 OFF 1: Lock1 ON, Lock2 OFF 2: Lock1 OFF, Lock2 ON 3: Lock1 ON, Lock2 ON			
	PEAK/BOTTOM key		0: Invalid 1: Valid			P42
	ZERO key		0: Invalid 1: Valid			
	HOLD key		0: Invalid 1: Valid			
2	Motion detection (period - range)	1.5-05	0.0 to 9.9 – 00 to 99		⊙	P10
3	Zero tracking (period)	0.0	0.0 to 9.9		⊙	P10
4	Zero tracking (range)	0000	0000 to 9999		⊙	P10
5	Extended function selection	0 0			⊙	P42
	Operation when a zero error occurs		0: Execution (indicated value - dz regulation value) 1: Non-execution			
	Digital zero condition		0: Accept regularly 1: Only at stable time			P42

### Setting mode 4

Setting item	Name	Initial value	Setting range	LOCK		Page
				1	2	
1	Digital low-pass filter	100.0	0.1 to 600.0		⊙	P9
2	Moving average filter	030	1:OFF, 2 to 999		⊙	P9
3	Auto adjustment filter	0			⊙	P9
4	Input selection	2 1 0			⊙	P21
	Input selection 1 Input selection 2 Input selection 3		0: DZ 1: HOLD 2: H.RESET 3: P/B Hold Disp.			
5	Output selection	4 3 2 1 0			⊙	P21
	Output selection 1 Output selection 2 Output selection 3 Output selection 4 Output selection 5		0: HI 1: OK 2: LO 3: HH 4: LL 5: OVERLOAD 6: RUN 7: HOLD 8: NZ 9: DZ response			

## Setting mode 5

Setting item	Name	Initial value	Setting range	LOCK		Page
				1	2	
1	Rated capacity	100.00	00001 to 99999	⊙	⊙	P7
2	Min. scale division	0.01	01 to 50	⊙	⊙	P7
3	DZ regulation value	999.99	00000 to 99999		⊙	P10
4	Display selection	0204				
	Display update rate		0: Once/sec 1: 3 times/sec 2: 6 times/sec 3: 13 times/sec 4: 25 times/sec			P9
	Undefined		0: Fixed			
	Decimal place		0: None 1: 0.0 2: 0.00 3: 0.000 4: 0.0000	⊙	⊙	P7
	6 digit display		0: 5 digit display 1: 6 digit display			P11
5	Excitation voltage selection	1	0: 5V 1: 2.5V	⊙	⊙	P7

## Setting mode 8

Setting item	Name	Initial value	Setting range	LOCK		Page
				1	2	
1	CC-Link occupied stations/speed settings	24				
	Transmission speed		0: 156k 1: 625k 2: 2.5M 3: 5M 4: 10M		⊙	P26
	Occupied stations		0: 1 occupied station 1: 2 occupied stations 2: 4 occupied stations			P26
2	CC-Link station number settings	01	01 to 64		⊙	P26

## Setting mode 9

Setting item	Name	Initial value	Setting range	LOCK		Page
				1	2	
1	Zero calibration	0		⊙	⊙	P7
2	Span calibration	100.00	00001 to 99999	⊙	⊙	P8
3	Equivalent input zero calibration	0.0000	-3.0000 to 3.0000	⊙	⊙	P8
4	Equivalent input span calibration	3.0000	0.0100 to 3.8000	⊙	⊙	P8
5	Input conversion value display	---	-3.9000 to 3.9000			P42
7	Version display	***				
8	Checksum display	****				
9	Password	0000				

## 14 Specifications

### 14-1. Analog section

Load cell power supply	DC5V or 2.5V±5% Output current: 90 mA or 45mA, ratiometric type (Up to six 350Ω series load cells can be connected in parallel)
Signal input range	-3.9 to 3.9 mV/V
Zero adjustment range	Automatically adjusted by digital computation -3.0 to 3.0 mV/V
Span adjustment range	Automatically adjusted by digital computation 0.01 to 3.8 mV/V
Minimum input sensitivity	0.15μV/count
Accuracy	Non-linearity 0.01%FS or less Zero drift 0.0002%FS/°C Typ Gain drift 1 ppm/°C Typ
Filter	Low-pass filter 0.1 to 600.0 Hz Moving average filter 1:OFF, 2 to 999 times
A/D converter	Conversion rate 2400 times Conversion resolution 24bit (binary)
Minimum indicated resolution	1/10000

### 14-2. Display section

Display unit	Numbers are displayed by a 7-segment green LED with a character height of 8 mm (5 digit)
Display value	Max. 6 digits
Min. scale division	Can be set from 1 to 50
Decimal place	Selectable from 0, 0.0, 0.00, 0.000, and 0.0000 (zero blanking display based on decimal place)
Over scale display	A/D converter input over LOAD A/D converter input minus over -LOAD Display over OFL1 Display over OFL2 OVERLOAD OLOAD

### 14-3. Settings section

Setting procedure	Settings made using four tact switches Settings can also be made using an interface (CC-Link,USB)
Saving of setting values	Initial setting values saved in NOVRAM (non-volatile memory) Other settings saved in F-RAM (non-volatile memory)
Setting value protection	Protection possible through locking software

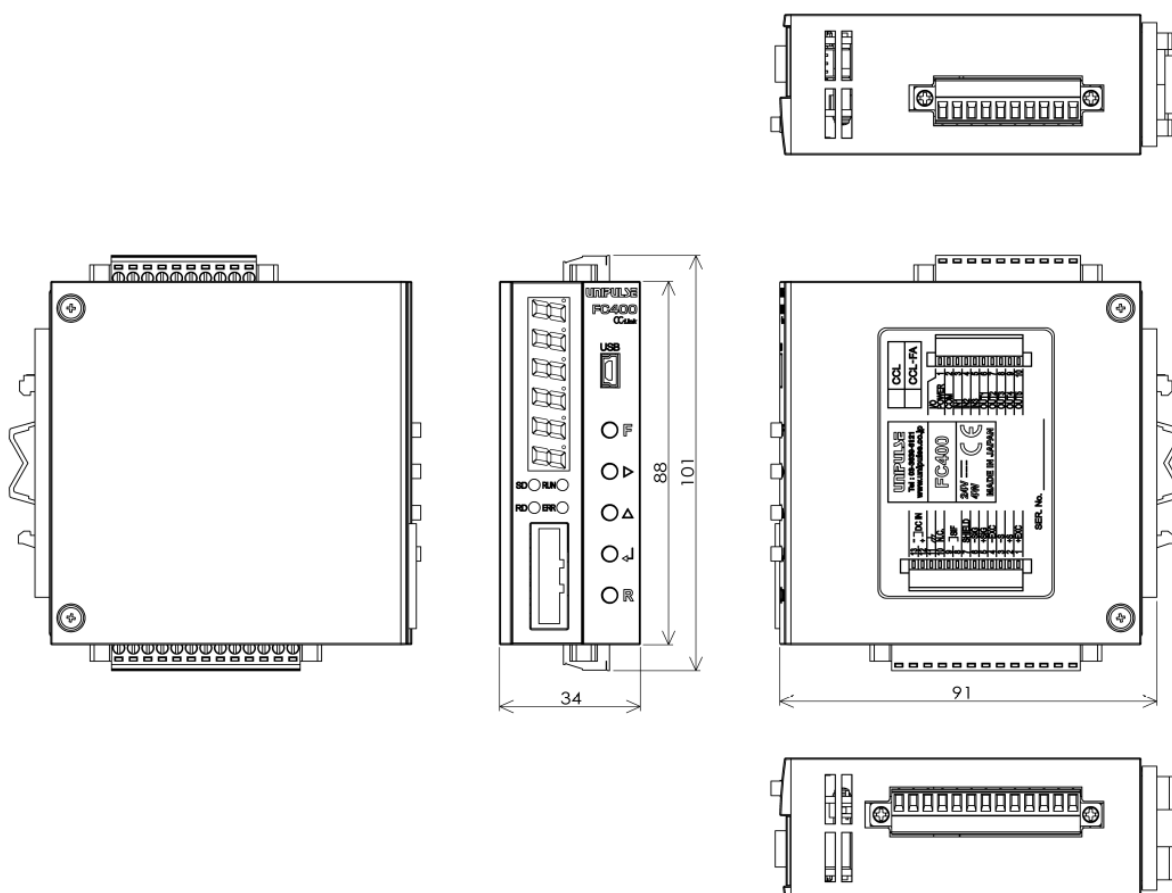
## 14-4. External signal input/output

Compatible plug	CN87 (10 pin), CN85 (13 pin)
Input signal (3 points)	Each control input can be selected through settings Contact (relays, switches etc.) or non-contact (transistors, photo-couplers etc.) Considered ON when short-circuited with COM terminal * Prepare a DC24V external power supply
Output signal (5 points)	Each control output can be selected through settings Open collector output for transistors ( $V_{ceo} = 30 \text{ V}$ , $I_c = 50 \text{ mA}$ )

## 14-5. General performance

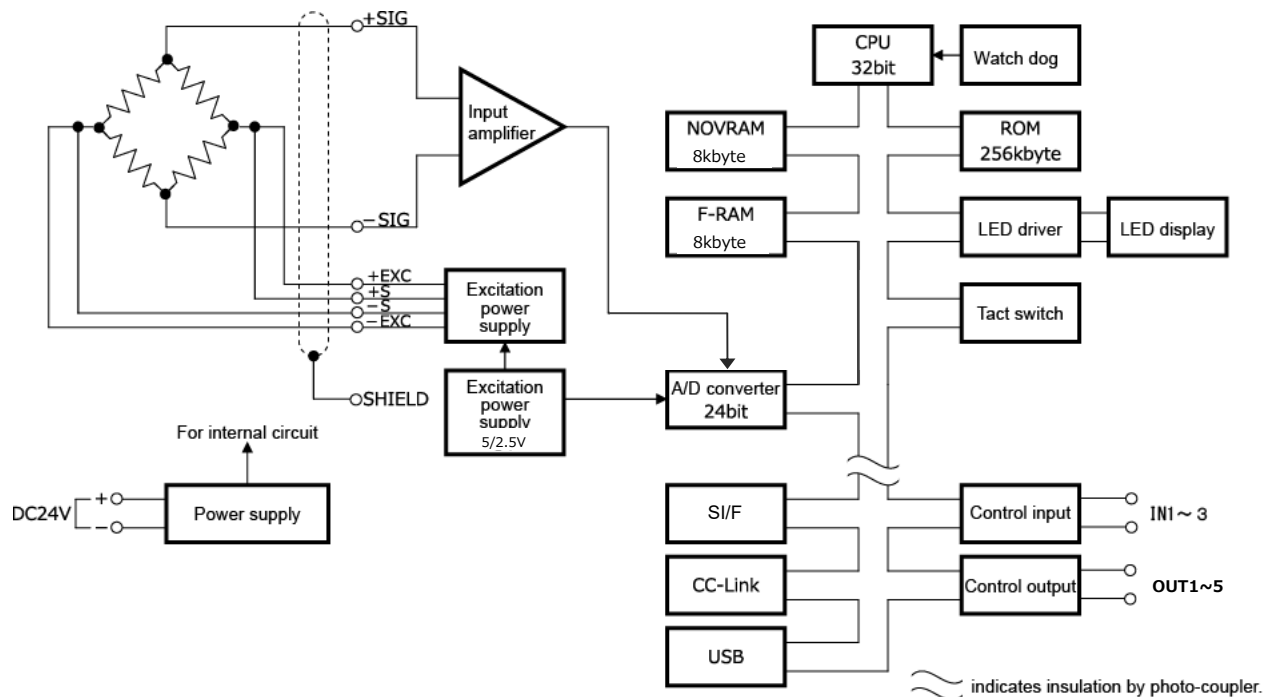
Power supply voltage	DC24V ( $\pm 15\%$ )
Power consumption	4W
Operating conditions	Temperatures      temperature range $-10$ to $50 \text{ }^{\circ}\text{C}$ Storage temperature range $-20$ to $85 \text{ }^{\circ}\text{C}$ Humidity $85\%\text{RH}$ or below (no condensation)
External dimensions	$34 \text{ (W)} \times 88 \text{ (H)} \times 91 \text{ (D)}$ (* not including protruding sections)
Weight	Approx. 210 g

## 14-6. External dimensions



Unit : mm

### 14-7. Block diagram




## 14-8. Compliance with EC directives

**\*The FC400 is CE-compliant. With using it, observe the following:**

The FC400 weighing indicator is compliant with EC Directives(based on Council of the European Union) and CE-marked.

-EMC Directive	EN61326-1:2013
	EN55011:2009, A1:2010 Group1, ClassA
	EN61000-4-2:2009
	EN61000-4-3:2006, A1:2008, A2:2010
	EN61000-4-4:2012
	EN61000-4-5:2006
	EN61000-4-6:2009
	EN61000-4-8:2010

The following precautions should be taken for installation.

1. Since FC400 is defined as an open type (built-in device), it should be used to install and fix to a panel, etc.
2. Use shielded cable for connections other than power supply (load cell, external input/output).
3. Be sure to ground the frame ground terminal (  ).

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<input type="checkbox"/> Osaka Sales Office:	Sumitomo Seimei Shin Osaka Kita Bldg. 4-1-14 Miyahara, Yodogawa-ku, Osaka 532-0003
<input type="checkbox"/> Hiroshima Sales Office:	Hiroshima Dai-ichi Seimei OS Bldg. 1-2-21 Matoba-cho, Minami-ku, Hiroshima 732-0824
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