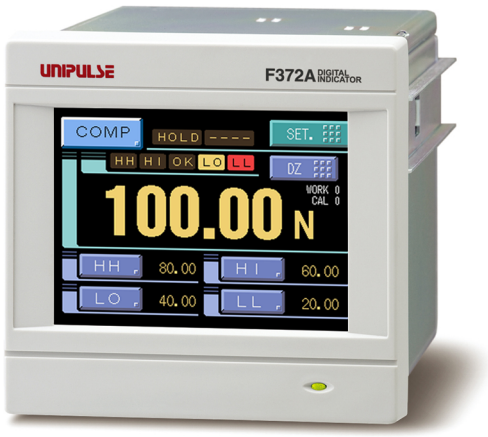


F372A

DIGITAL INDICATOR

OPERATION MANUAL

18OCT2012REV.3.09

UNIPULSE

Introduction

Thank you very much for purchasing our Digital Indicator F372A.

For good performance, and proper and safe use of the F372A, be sure to read this operation manual and properly understand the contents of it before use. Also, carefully keep this operation manual so that it can be referred to at any time.

Cautions and Requests for Use

● Do not disassemble the main body for modifications or repair.

● Be sure to use crimp contacts for connection to terminal blocks, and do not to connect bare wires as they are.

● Be sure to ground the protective ground terminal.
- The main F.G. is indicated by ⏚, it must be grounded with the protected earth.

● Be sure to disconnect the power cable when performing the following.
- Attachment / detachment of connectors of options.
- Wiring / connection of cables to terminal blocks.
- Connection of the ground line.

● For load cell(s), external input / output, and option, use shielded cables.

● Carefully check wiring, etc. before applying power.

● Take an interval of more than 5 seconds when repeating ON/OFF.

● Use F372A with correct supply voltage.

● Take adequate shielding measures when using at the following locations.
- Near a power line.
- Where a strong electric field or magnetic field is formed.
- Where static electricity, relay noise or the like is generated.

● Do not install in the following environments.
- The places where is exposed to direct sunlight.
- The places where is the temperature and/or humidity exceeds the range in the specifications.
- The places where is containing corrosive gas or flammable gas.
- The places where is with large quantities of dust, salt or iron powder.
- The places where is the product may be splashed with water, oil or chemicals.
- The places where is the main body is directly affected by vibration or shock.

● Set the correct Excitation Voltage for the sensor. (2.5V is set when F372A is dispatched from us.)

Safety Precautions

● Indications for safe use and their meanings

In this manual, precautions for using the F372A Digital Indicator safely are indicated as follows. Be sure to follow the precautions given here because they are important descriptions relating to safety.
Indications and their meanings are as follows:

⚠WARNING	Misuse may cause the risk of death or serious injury to persons.

⚠ CAUTION	Misuse may cause the risk of injury to persons or damage to property.

● Explanation of pictographs

The △ means a caution (or warning).
A specific description is written in the △.
The illustration on the left-hand side shows "Caution: May explode".

The △ means a caution (or warning).
A specific description is written in the △.
The illustration on the left-hand side shows a general caution.

● About the built-in lithium battery

⚠ WARNING Misuse may cause the risk of death or serious injury to persons.

Never disassemble, deform under pressure or throw the battery into fire.The battery may explode, catch fire or leak.

- Battery
  - Model: CR2477-1HF made by Matsushita Battery Industrial Co., Ltd.
  - Nominal voltage: 3V
  - Nominal electric capacity: 1000mAh
  - Battery life: approx 5-7 years

● **About the signal I/O terminal block**

⚠ CAUTION Misuse may cause the risk of injury to persons or damage to property.

For connection to the signal I/O terminal block, wire correctly after checking the signal names and terminal block numbers.
Also, turn off the power of the main body before connection / wiring to the signal I/O terminal block.

RoHS-Compliant Product

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

What is RoHS?

It is an abbreviation for Restriction on Hazardous Substances, which is implemented by the European Union (EU). The Directive restricts the use of six specific substances in electric and electronic equipment handled within EU borders. The six substances are lead, mercury, cadmium, hexavalent chromium, PBB (polybrominated biphenyls), and PBDE (polybrominated diphenyl ethers).

Conformity with EC Directives

The F372A Digital Indicator is a CE-marked EC-Directive-conforming product
(by the Council of the European Union).

- EMC Directives EN61326-1

(EN55011, EN61000-4-2, EN61000-4-3, EN61000-4-4
EN61000-4-5, EN61000-4-6, EN61000-4-8)

Point

EMC Directive EN61000-4-5 (Lightning Surge Immunity) is met by the F372A body in combination with a lightning surge protector.

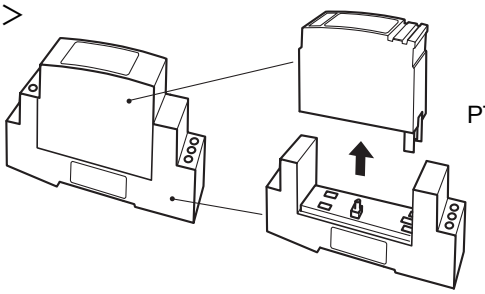
When installing, attention should be given to the following.

1. Since the F372A is defined as open type (built-in equipment), be sure to use it as installed and fixed to a panel, etc.
2. Use shielded cables (for load cell(s), external input / output, and option).
3. When using the DeviceNet or CC-Link option, also pay attention to the precautions related to conformity with EMC Directives provided by your PLC manufacturer.

◆Connection of a lightning surge protector

EMC Directive EN61000-4-5 (Lightning Surge Immunity) is met by the F372A body in combination with a lightning surge protector.
For conformity with EMC Directives, attach a lightning surge protector to the power supply line.

＜Shape＞

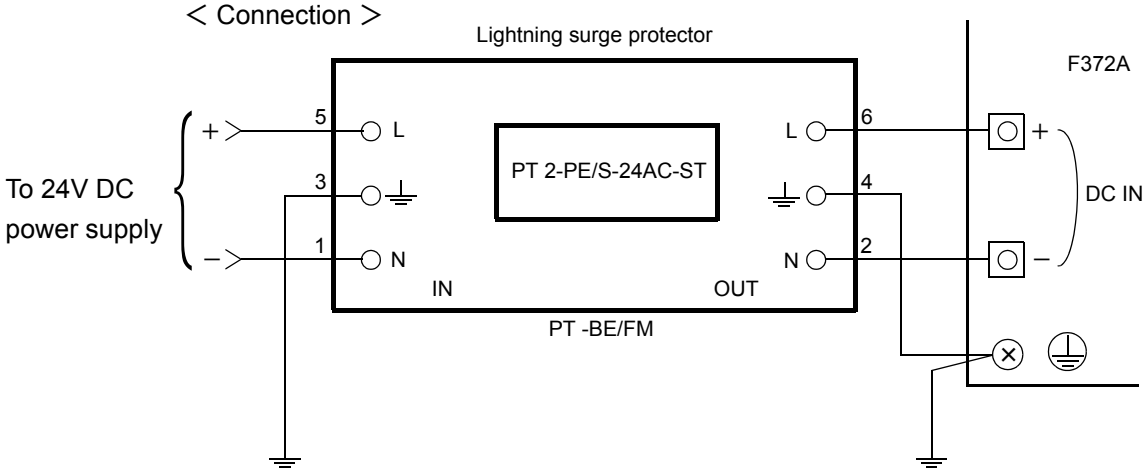


PT 2-PE/S-24AC-ST

PT-BE/FM
(DIN rail mount type)

＊ PT-BE/FM and PT 2-PE/S-24AC-ST are registered trademarks of PHOENIX CONTACT.

＜Connection＞



CAUTION

Be sure to ground ⏚ of the lightning surge protector.

Without grounding, it will not function as a lightning surge protector.

Point

No lightning surge protector is included as standard (optionally available).

Purchase it from PHOENIX CONTACT or us.
We sell lightning surge protectors (PT 2-PE/S-24AC-ST) and lightning surge protector terminal blocks (PT-BE/FM) as a set.
Specify "TSU03."

This operation manual consists of a standard volume and expansion volume.

CONTENTS

＜Standard＞

＜Expansion＞

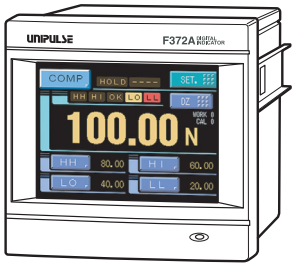
STANDARD

M E M O

1 OUTLINE

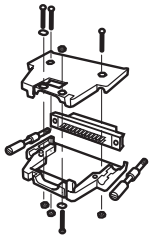
1-1. Contents of the Package

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



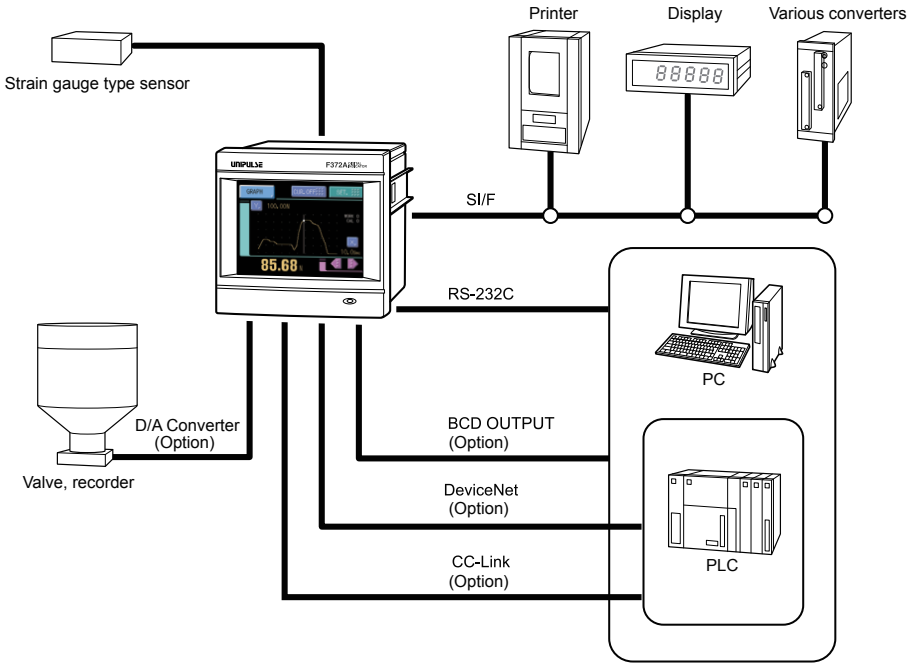
F372A body ･･･1

F372A operation manual ･･･1



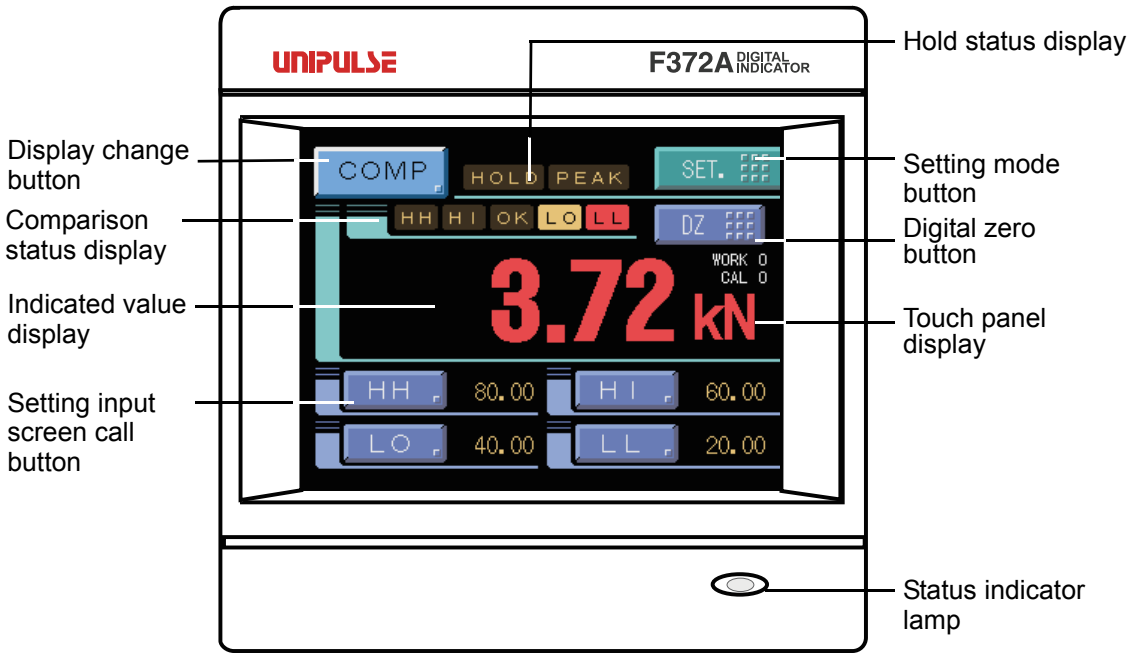
External input / output connector ･･･1set
[Connector: FCN-361J024-AU
Cover : FCN-360C024-B]

1-2. About Connectable Devices



1-3. Appearance Description

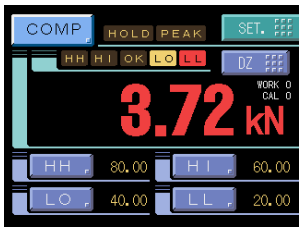
■Front panel



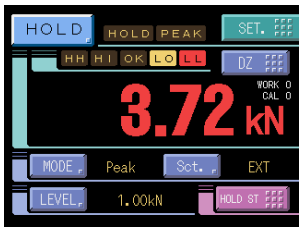
Touch panel display

This is the touch panel display for displaying an indicated value and graph set value and for setting various setting items of the V100. During measurement, a comparison display, hold display and graph display can be selected according to the function in use.

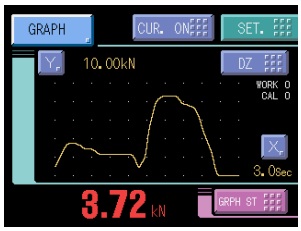
Comparison display



Hold display



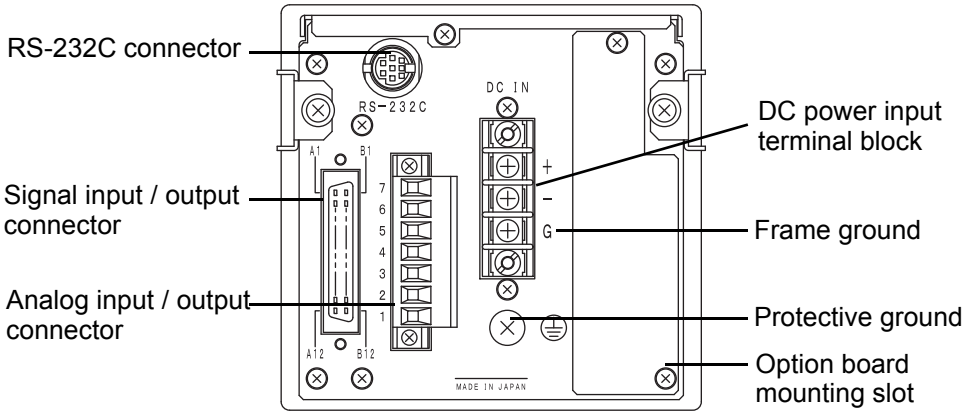
Graph display



Status indicator lamp

Lamp indication	Status
Green lighting	Steady state
Orange lighting	Writing into internal NOVRAM. Do not turn off the power of the V100.
Yellow blink	The voltage of the lithium battery for internal memory backup has dropped. The battery needs to be replaced. Ask us for replacement of the battery.

■Rear panel



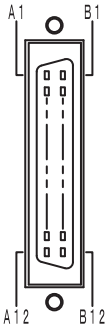
Analog input / output connector

7	− MONITOR
6	＋ MONITOR
5	SHIELD
4	＋ SIG
3	− EXC
2	− SIG
1	＋ EXC

Adaptable plug (ETB42-07P) (manufactured by OSADA or equivalent)
(Connector optional type: CN80)

Signal input / output connector

A1	＊	COM1	B1	＊	COM2
A2	out	HH	B2	in	WORK0
A3	out	HI	B3	in	WORK1
A4	out	OK	B4	in	WORK2
A5	out	LO	B5	in	WORK3(LOCK)
A6	out	LL	B6	in	T/H
A7	＊	COM1	B7	in	COM2
A8	out	HOLD END(H/E)	B8	in	SECTION
A9	out	RUN	B9	in	D/Z
A10	out	EVENT	B10	in	GRAPH TRIG
A11	out	SI/F	B11	in	CAL0
A12	out	SI/F	B12	in	CAL1



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

＋ EXC － EXC ＋ SIG － SIG SHIELD	The terminal for connecting to a strain-gage sensor.

See the section on "Load cell connection" page 20 for connection.

＋ MONITOR － MONITOR	The voltage output terminal for sensor input monitor. → page63 "Voltage Output"

See the section on "Voltage output connection" page 23 for connection.

COM1	The terminal common to output signals.
OK HI LO HH LL	Outputs the OK signal. Outputs the HI signal. Outputs the LO signal. Outputs the HH signal. Outputs the LL signal. → page40 "Comparison Functions"
RUN	Outputs the RUN signal. → page64 "RUN Output"
HOLD END (H/E)	Outputs the hold end signal. → page44 "Hold Functions"
EVENT	Outputs the event signal when graph plotting ends.

See the section on "External I/O connection" page 21 for connection.

COM2	The terminal common to input signals.
WORK0 WORK1 WORK2 WORK3(LOCK)	Selects the work No. for the multi-hold function. → page55 "Multi-hold Function" WORK3 is also usable as a LOCK terminal. → page63 "Screen Lock / Key Lock (B5 terminal function selection)"
T/H SECTION	The input for controlling the hold signal. → page44 "Hold Functions"
D/Z	The input for digital zero (making the indicated value zero). → page36 "Digital Zero"
GRAPH TRIG	The input for controlling the drawing of graphic display. → page59 "Graph plotting"
CAL0 CAL1	Selects the CAL No. for calibration value selection function. → page31 "Calibration value selection by external signal input"

See the section on "External I/O connection" page 21 for connection.

SI/F	The 2-wire serial interface for coupling a UNIPULSE printer, external display, etc.

See the section on "SI/F connection" page 20 for connection.

DC power input terminal block

Connect the DC power cord. The power supply voltage is 24V DC (±15%).
Adaptable crimp terminal [TMEV1.25-3S]

Frame ground (functional ground)

F.G. terminal. (There is continuity between the casing and F.G. terminal.)

Protective ground

Protective ground terminal. Be sure to ground the protective ground terminal to prevent electric shocks and injury by static electricity. (There is continuity between the casing and protective ground terminal.)

Optional slot

Any one of the following optional boards can be mounted.

- BCD data output
- D/A converter (voltage or current output)
- CC-Link interface
 (CC-Link is an abbreviation for "Control & Communication Link".)
- DeviceNet interface

RS-232C connector

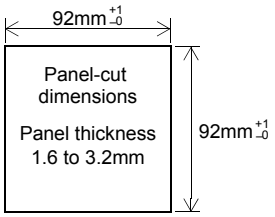
RS-232C connector to transmit / receive measurement data and status information, etc.
The adaptable plug is HOSIDEN-manufactured TCP8080-015267 or equivalent.
Optionally available RS-232C cable (cross) [CA81-232X] is connectable.

2 INSTALLATION & CONNECTION

2-1. Installation

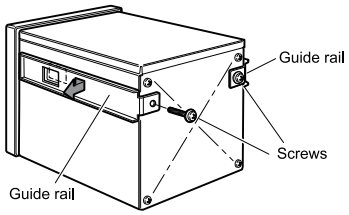
To install the F372A into a control panel, use the following procedure.

1. Make a hole in the panel according to the panel-cut dimensions.

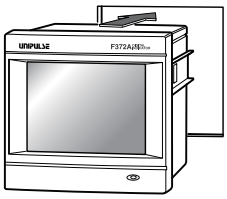


2. Remove the screws (two), and remove the guide rails from both sides.

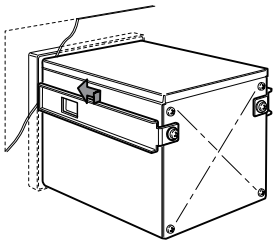
* Do not use other screws than those installed to the F372A body.



3. Fit in the F372A from the front of the panel.



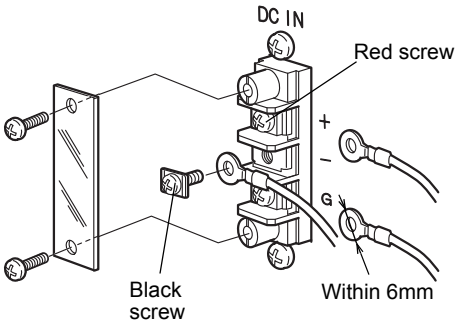
4. Install from the rear the guide rails having been removed from both sides in Step 2, and fix them with the screws (two).



2-2. Connection

■Power input connection

Connect the positive (+) side of the power source to the red screw side of the terminal block on the back of the F372A, and its negative (-) side to the black screw side. The input voltage is 24V DC(±15%).

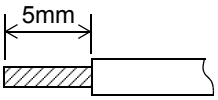


CAUTION

Be aware that the voltage drops depending on the wire thickness and length. Also, never input an AC power source. Doing so will cause a failure.

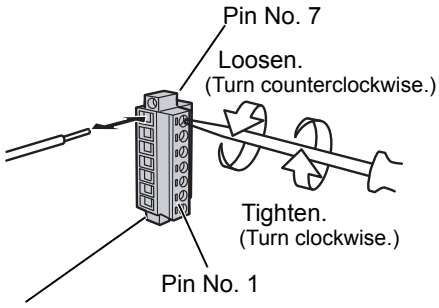
■Analog input / output terminals connection

How to connect



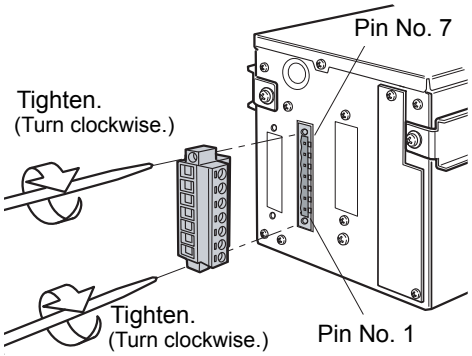
1. Strip 5mm of the covering of the wire to be connected.The size of connectable wires is from 0.21 to 3.31mm^2 (AWG12 to 24).
2. Twist the tip to such an extent that it will not spread out.
3. Loosen the screw with a screwdriver to open the connection hole.

   A Phillips screwdriver 3 to 3.5mm #1 in shaft diameter is recommended.
   (Precision screwdriver, etc.)
4. Insert the wire into the connection hole so as not to let the tip spread out.
5. Tighten the screw with the screwdriver.
   0.5Nm of tightening torque is recommended.



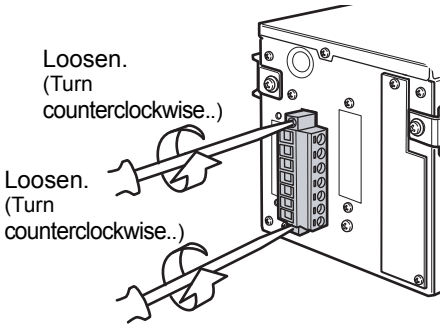
Adaptable plug ETB42-07P (attachment)
We sell it as CN80 (optional).

6. Lightly pull the wire to make sure that it is securely clamped.
7. Insert the wire-connected plug into the F372A body, and tighten the screws (two).



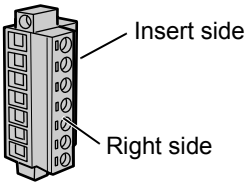
How to remove the terminal block

1. Loosen the screws (two) with a screwdriver.
2. Remove the terminal block by giving it a strong pull.



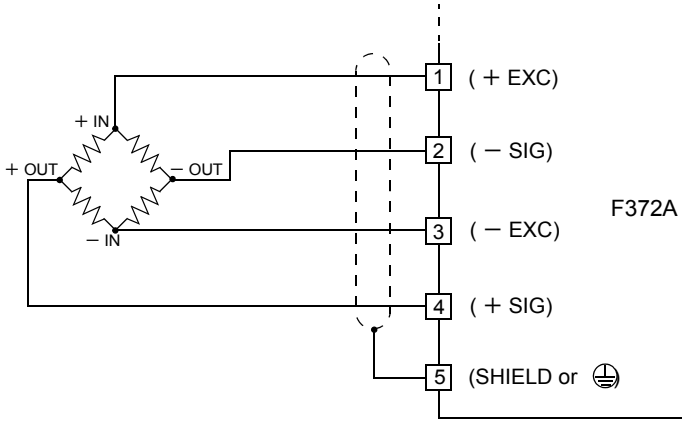
Attention

When installing the terminal block to the F372A body, check its orientation. (See the illustration at the right.)



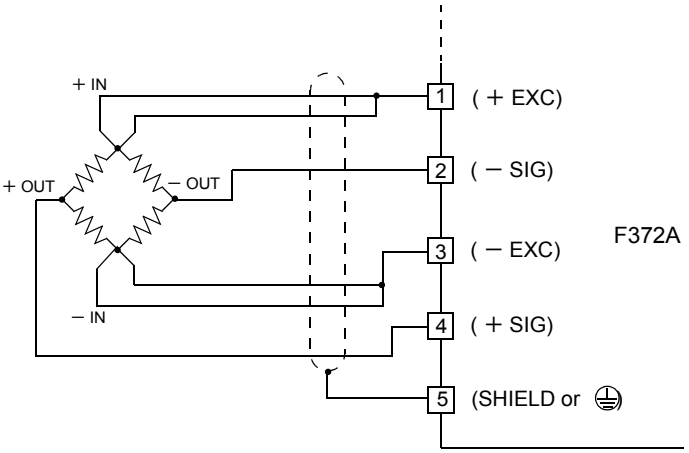
■Load cell connection

- 4-wire sensor



- 6-wire sensor

Short-circuit +EXC with +S and -EXC with -S for connecting a 6-wire strain-gage sensor.



■SI/F connection

The 2-wire serial interface has connective ability for coupling a UNIPULSE printer, external display, etc.

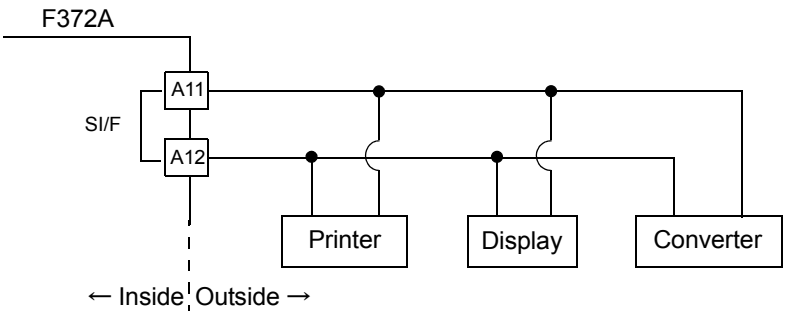
Connect from A11 and A12 of the external input/output connector.

The interface is nonpolarized and up to three external instruments may be connected.

A two-core parallel cable or a cabtyre cable (Wire with covering thickened for construction) may be used for connection.

When a two-core parallel cable or a cabtyre cable is used, the transmitting distance is approximately 30m. When a two-core shielded twisted pair cable is used, the transmitting distance is approximately 300m.

Do not parallel it with AC lines and high-voltage lines. It may cause of malfunction.



■External I/O connection

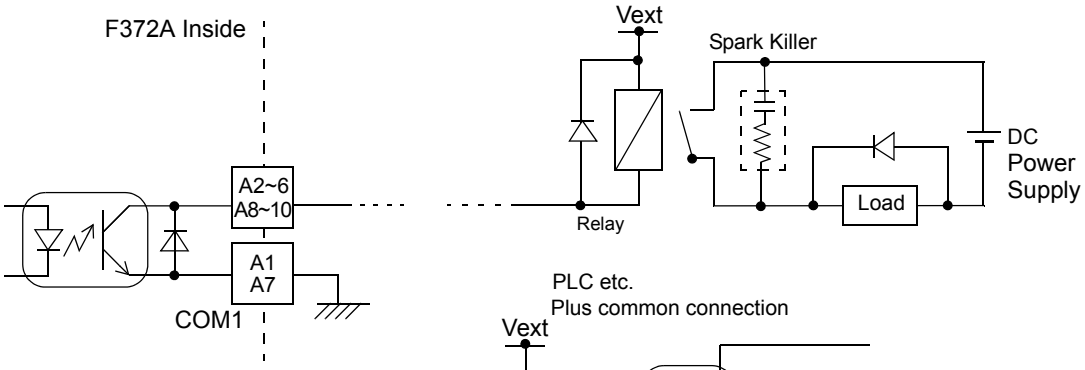
CAUTION

The Source type (ISC) for external output signal can be selected at the time of the purchase, as an option. The method to connect external input/output signal is also different when source type is installed. Refer to "6-3.External I/O (Source type (ISC) option)" on page 77. for details of source type (ISC).

How to connect external output (Sink type)

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

- Equivalent circuit



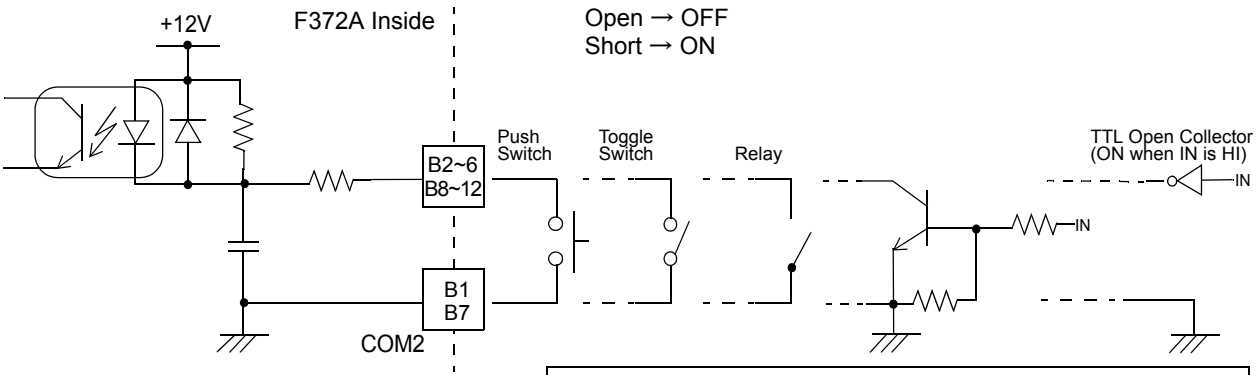
Supply an external power source for a relay drive power source (Vext).

● Output Transistor Status

Output Data	Tr
OFF	OFF
ON	ON

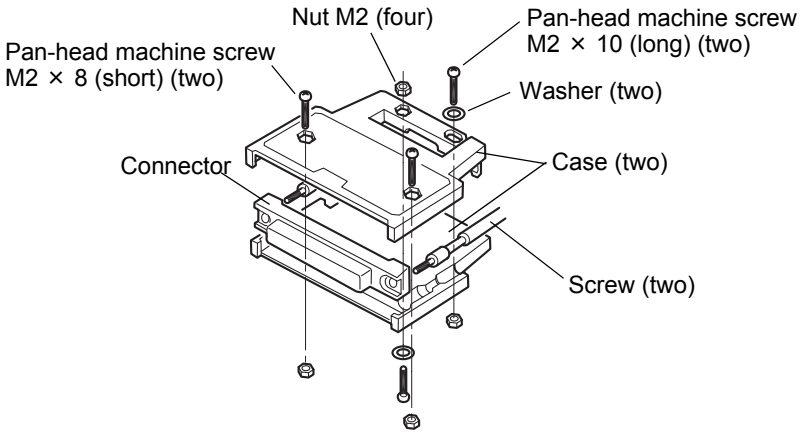
How to connect external input (minus common connection of no-voltage contact input type)

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



- The external element is required to withstand Ic=10mA.
- Leakage from the external element is required to be 100 μA or below.

How to assemble the connector

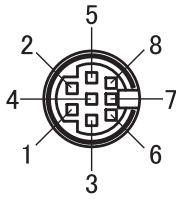


1. Set the connector and screws (two) into the grooves of the case (one side).
2. Cover with the other case, and fit the cases.
3. Tighten the M2 × 8 pan-head machine screws (two). Tighten the M2 × 10 pan-head machine screws (two). Be aware that washers should be set to the M2 × 10 pan-head machine screws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

■RS-232C interface connection

This connector connects the RS-232C.

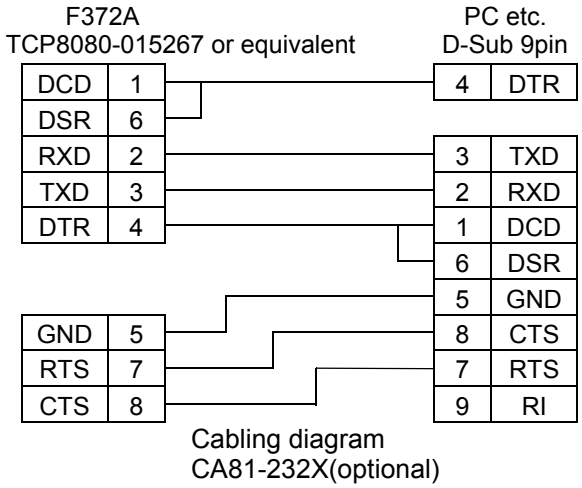
Pin No.	Signal name
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
Case	F.G



Example of cabling

The following shows an example of connection between DTE-DTE terminals. This will require modification depending on the equipment to be connected. For details, see the operation manual of the equipment to be connected.

Adaptable plug (TCP8080-015267) (manufactured by HOSIDEN or equivalent)
(Connector optional type: CN60)



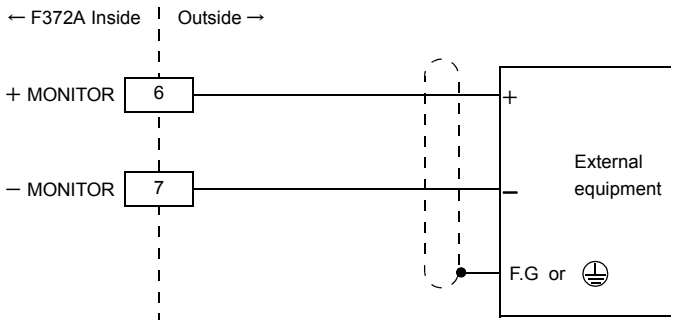
Cabling diagram
CA81-232X(optional)

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

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

■Voltage output connection

The monitor output terminal is an interface to extract analog voltage proportional to sensor signal inputs.

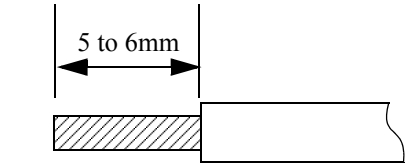


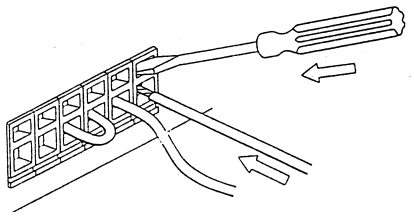
- Since the ±MONITOR terminals are not insulated from the internal circuit, use two-core shielded twisted pair wires for connection with external equipment, and carry out with as short a wiring as possible.
- Do not short-circuit. Doing so will cause a failure.
- Do not apply voltage from the outside. Doing so will cause breakage.

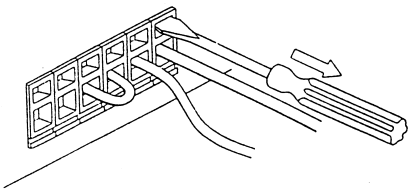
■Connecting to cage clamp terminal block

The output terminal D/A option is using the cage clamp system terminal stand. Please connect in the following procedure.

1. Strip the casing 5 - 6mm on the cable to be connected.
2. Twist the bare wire to fit the terminal hole.
3. Insert the supplied screwdriver into the upper hole and lift upward.
4. Insert the twisted wires into the lower hole.
5. Make sure cable is clamped securely and does not come out with a slight tug.







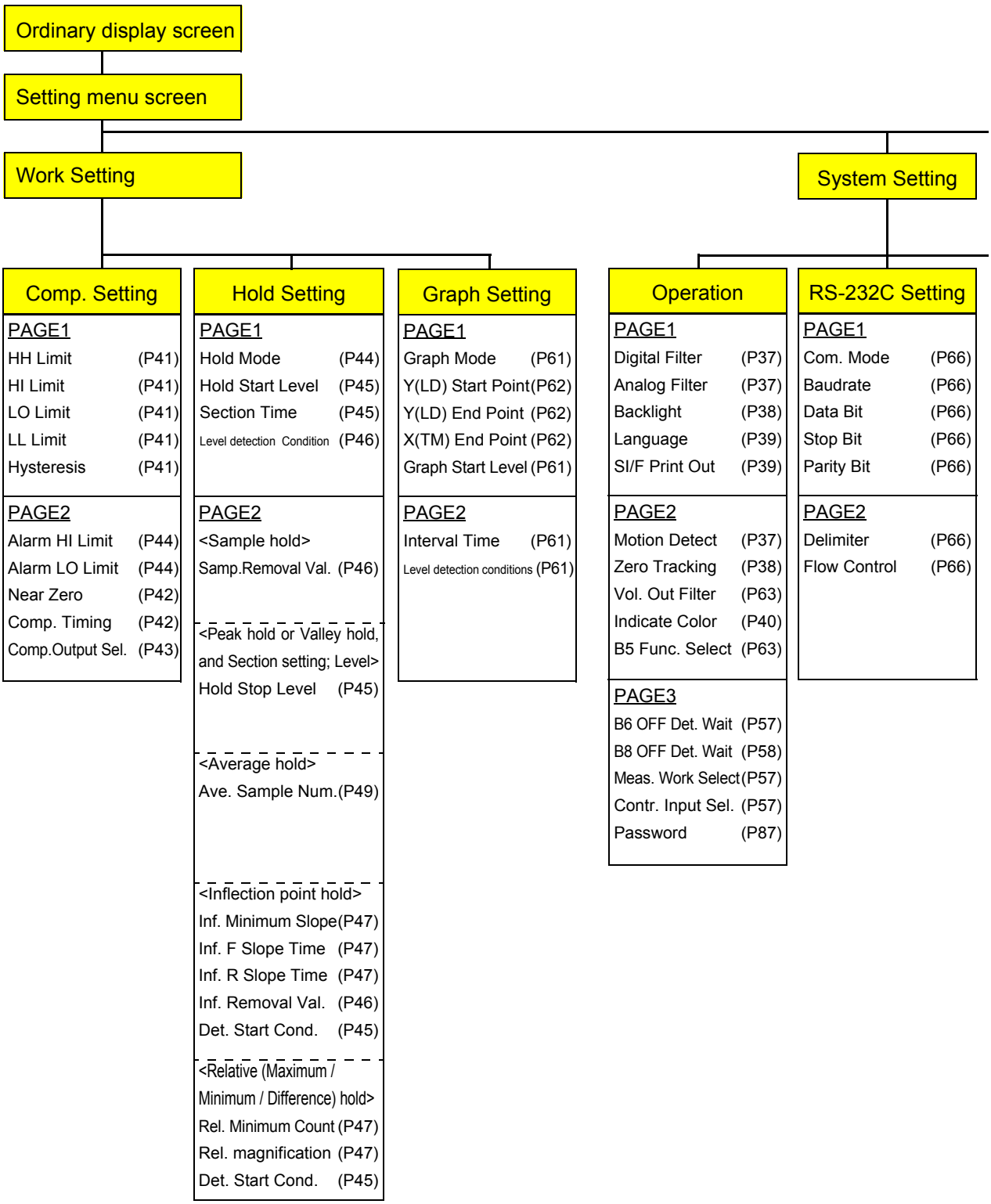
CAUTION

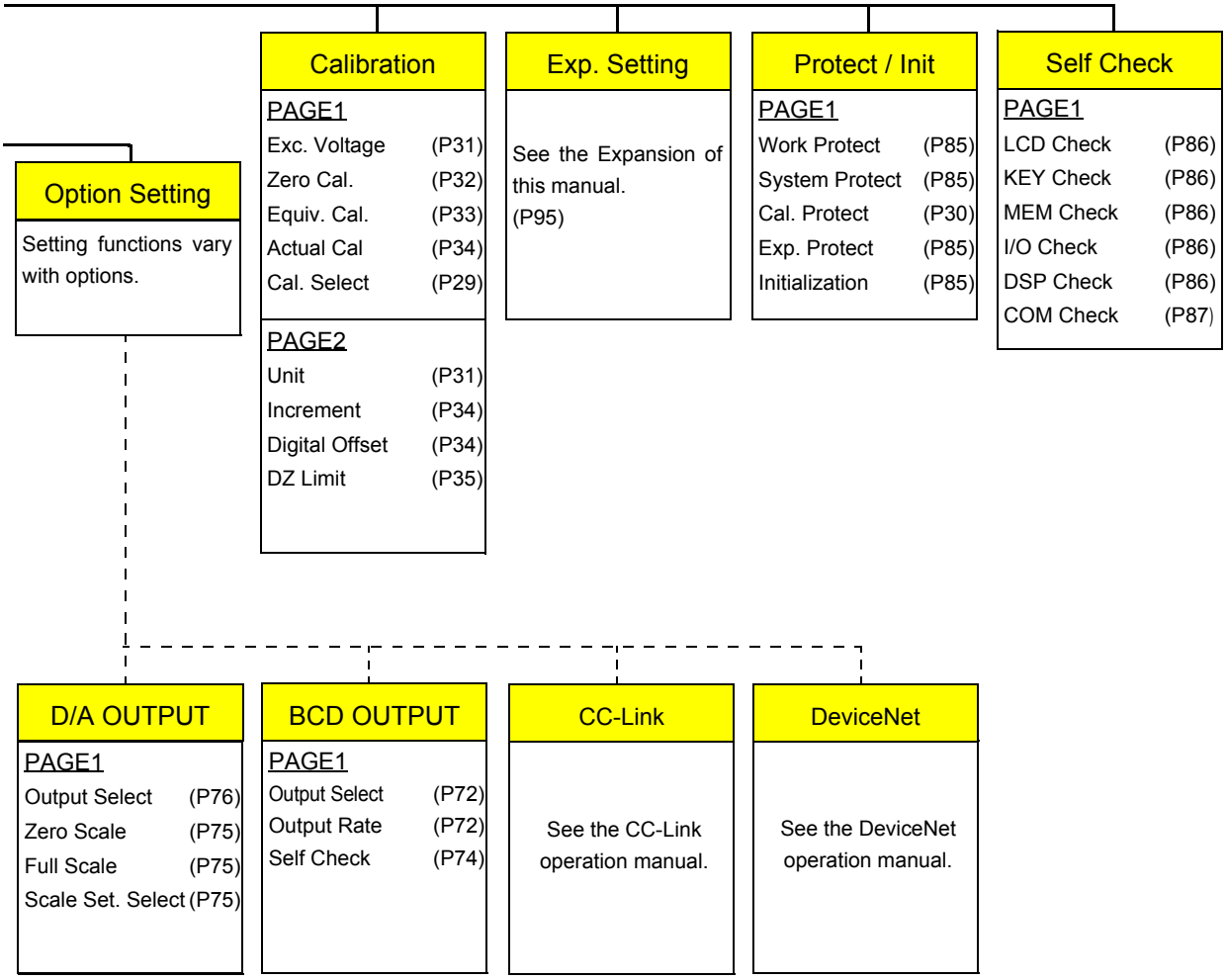
- Cable can be from 24 to 14AWG (0.2 to 2.5mm^2)
- It is not necessary to solder the cable wires or to fix a solderless terminal.
- If several cables to be inserted to the same hole, twist those cable wires together and insert.
- If you connect a cable (load cell(s), SI/F, external input and output), please turn off and be sure to perform the power supply of a main part.

3 SETTING PROCEDURE

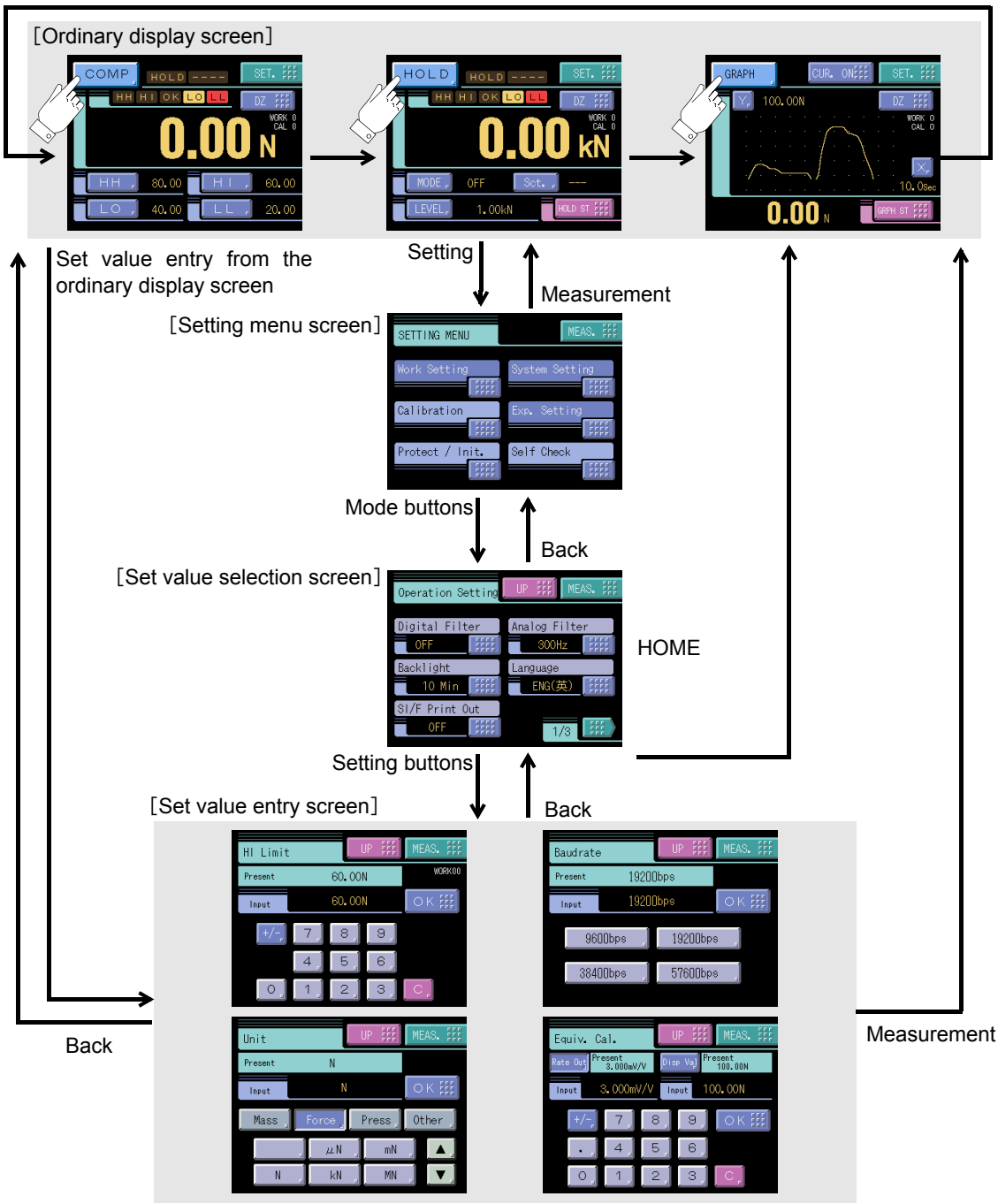
3-1. Screens And Operations

■Setting modes tree




Option Setting
Setting functions vary with options.
Calibration
PAGE1
Exc. Voltage (P31)
Zero Cal. (P32)
Equiv. Cal. (P33)
Actual Cal (P34)
Cal. Select (P29)
PAGE2
Unit (P31)
Increment (P34)
Digital Offset (P34)
DZ Limit (P35)
Exp. Setting
See the Expansion of this manual. (P95)
Protect / Init
PAGE1
Work Protect (P85)
System Protect (P85)
Cal. Protect (P30)
Exp. Protect (P85)
Initialization (P85)
Self Check
PAGE1
LCD Check (P86)
KEY Check (P86)
MEM Check (P86)
I/O Check (P86)
DSP Check (P86)
COM Check (P87)
D/A OUTPUT
PAGE1
Output Select (P76)
Zero Scale (P75)
Full Scale (P75)
Scale Set. Select (P75)
BCD OUTPUT
PAGE1
Output Select (P72)
Output Rate (P72)
Self Check (P74)
CC-Link
See the CC-Link operation manual.
DeviceNet
See the DeviceNet operation manual.

■F372A screen configuration



■About a setting call

In this manual, a setting function call is described as follows.

Example) Digital filter

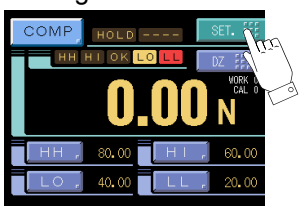
SET. → System setting → Operation → Page 1

↑ Setting menu　↑ Item classification　↑ Page

This call can be made by the following procedure.

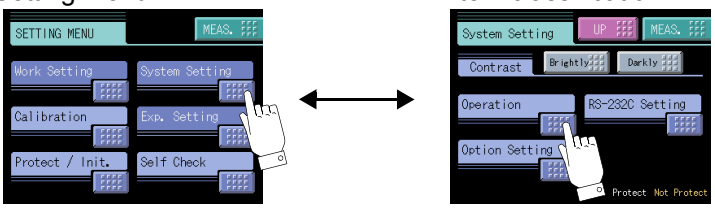
1. Press the [SET.] button on the ordinary display screen.

Setting call



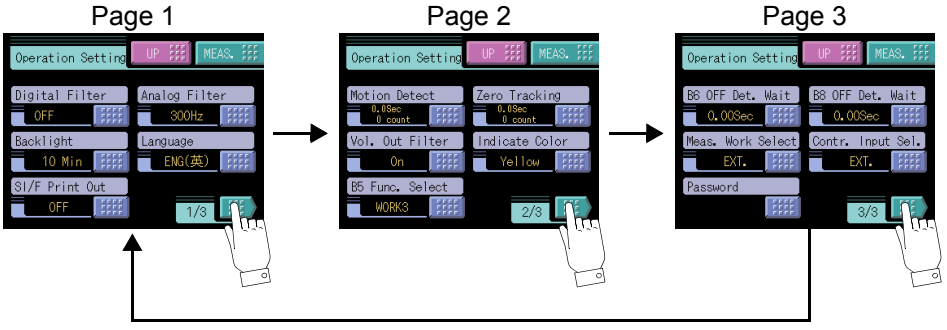
2. The setting menu screen appears. Select the item.

Setting menu　　Item classification



3. The setting function setting screen appears. Select the function.

Page 1　　Page 2　　Page 3



4 CALIBRATION

About calibration

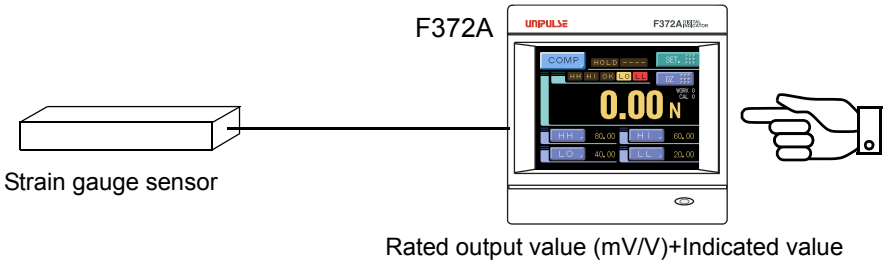
Calibration is performed for matching the F372A to a strain-gage sensor. The following two types of calibration are available for the F372A.

● Equivalent input calibration

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

For example, the gain is automatically determined by entering:

2.001mV/V (rated output) - 100.0kg (capacity)

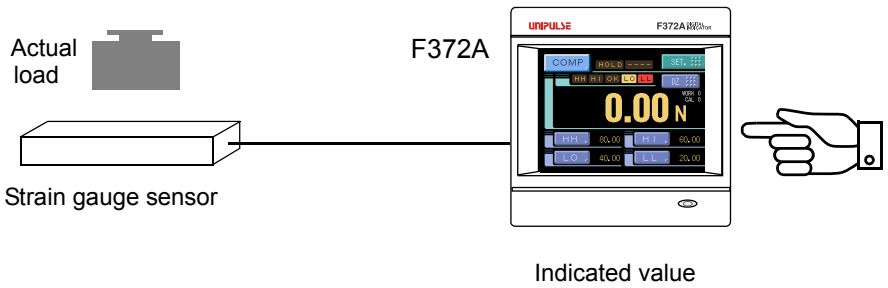


Point

A data sheet is attached to a strain-gage sensor at the time of purchase. Enter the rated capacity value and the rated output value described on the data sheet into the F372A.

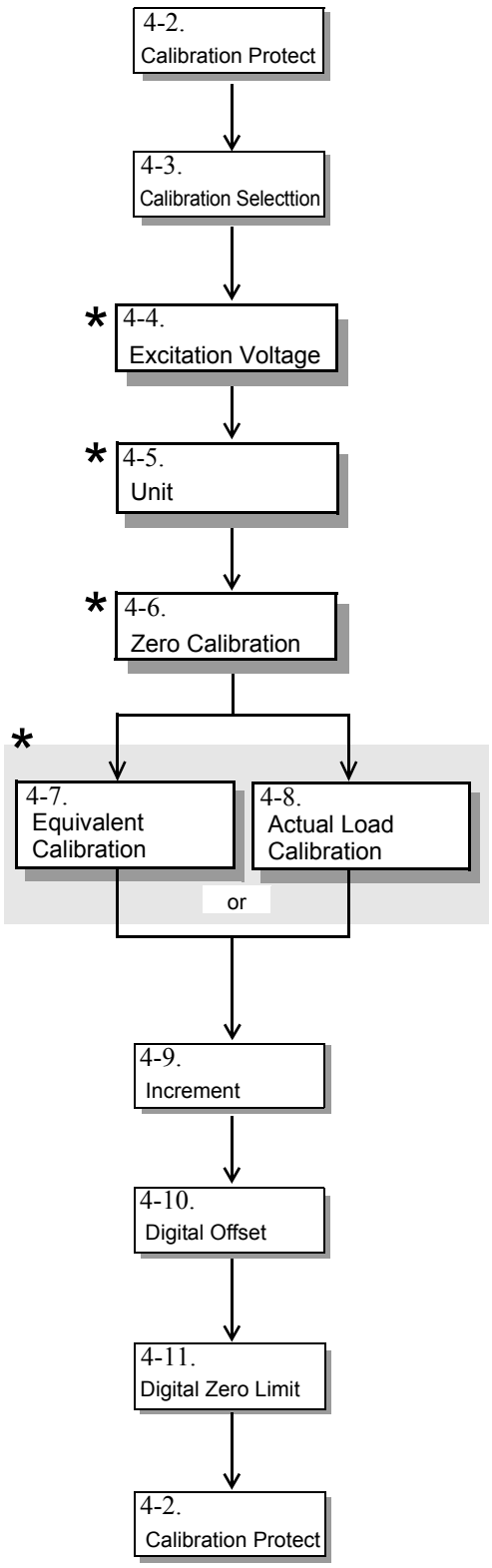
● Actual load calibration

Apply an actual load to the strain-gage sensor and enter the actual load value by the keys for calibration. Calibration is accurately performed with reductions in errors.



4-1. Calibration Procedures

Follow the steps below to perform equivalent input calibration and actual load calibration.



Release the calibration protection.

Set the calibration value No.
(Set "0" for use with only one selection.)(This step may be omitted if there is no change.)

Set the excitation voltage according to the sensor used.

Set the unit of the values displayed.

Set the zero point of the strain-gage sensor in no-load condition (with the sensor unloaded).

Equivalent Input Calibration
Enter the rated output value and reading of the strain-gage sensor.
At this time, also input the decimal point.
Actual Load Calibration
Enter the span (gain) point of the strain-gage sensor with a load applied to the sensor.
At this time, also input the decimal point.

Enter the minimum value of digital increments.
(This step may be omitted if there is no change.)

The calibrated value can be offset in advance.
(When not using, set "0".)
(This step may be omitted if there is no change.)

Set the load limit to allow digital zero.(This step may be omitted if there is no change.)

Turn on the calibration protection for preventing misoperation.

*···It is indispensable.

4-2. Calibration Protect

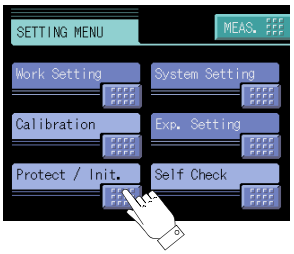
Calibration-related set values can be protected so that they will not be changed by misoperation. When Cal. Protect is ON, no change can be made while the alarm sounds.

ON : Protected
OFF : Unprotected

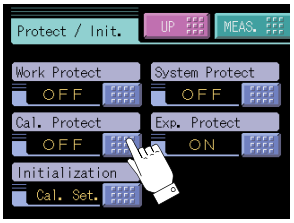
How to set

SET. → Protect / Init. → Page 1

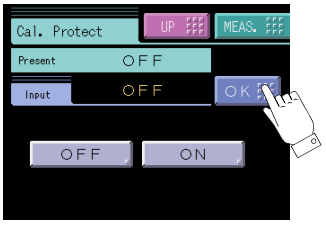
1. Press the [SET.] button. (refer to page 32)
2. Press the [Protect / Init.] button.



3. Press the [Cal. Protect] button.



4. Select the ON/OFF and determine with the [OK] button.

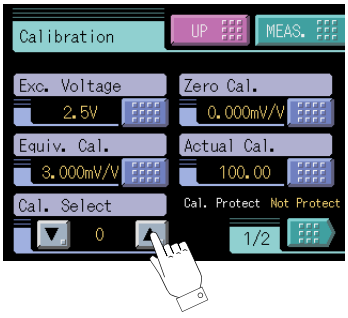


4-3. Calibration Value Selection

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

By storing up to four calibration values in the memory, the desired calibration value can be called to switch the indicated value. Setting values that can be switched are as follows:

Calibration Mode Setting
Excitation Voltage
Zero Calibration
Actual Load Calibration
Equivalent Input Calibration
Increment
Unit
Digital Offset
DZ Limit



■Calibration value selection by touch panel

Select "0" - "3" by pressing the ▼ ▲ button on the CALIBRATION screen.
When not using, set "0".

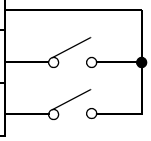
■Calibration value selection by external signal input

With this function, four types of calibration values can be selected with external selector signals CAL0 and CAL1 (when the calibration value selection setting is external). Set EXT 0 by pressing the ▼ ▲ button on the CALIBRATION screen. According to the input conditions of external signal inputs CAL0 and CAL1, the display changes as EXT 0 to EXT 3. Normally, when there is no input to CAL0 and CAL1 (the terminals are open), calibration value 0 is selected. When each terminal is in the following condition, each calibration value is selected.

CAL1	CAL0	Calibration value
Open	Open	Calibration value 0
Open	Short-circuit	Calibration value 1
Short-circuit	Open	Calibration value 2
Short-circuit	Short-circuit	Calibration value 3

I/O connector

B1 or B7	COM2
B11	CAL0
B12	CAL1



CAUTION

It takes one second at maximum for the changed calibration value to become effective. During this time, the calibration value is indefinable. Also, the indicated value is accordingly indefinable.

4-4. Excitation Voltage

Select the bridge voltage supplied to the strain gauge sensor.
The bridge voltage can be selected from 2.5V and 10V.
After this setting, be sure to perform calibration.

How to set

SET. → Calibration → Page 1

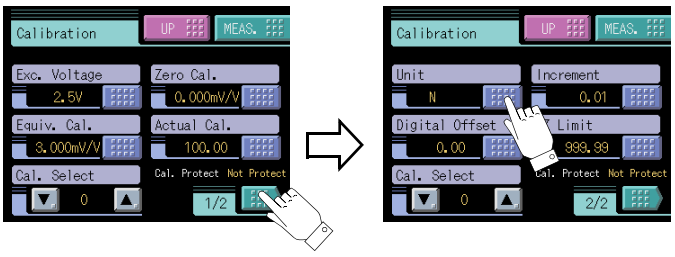
4-5. Unit

Set the unit of the values displayed. For settable units, see the "Unit Setting List"on page 87.

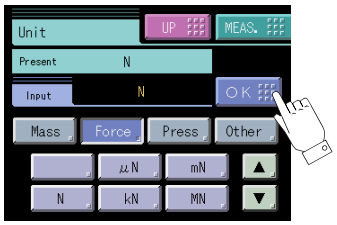
How to set

SET. → Calibration → Page 2

1. Press the [SET.] button. (refer to page 32)
2. Press the [Calibration] button. (refer to page 32)
3. Select page 2, and press the [Unit] button.



4. First select the category, and then select the unit and determine with the [OK] button.



Select by scrolling with the button.

* Even if the unit is changed, the display value (calibration value) will not change.

4-6. Zero Calibration

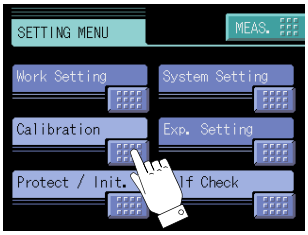
Set the zero point in no-load condition.

How to set

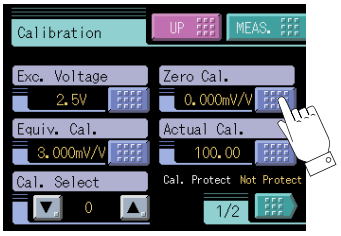
SET. → Calibration → Page 1

1. Press the [SET.] button.

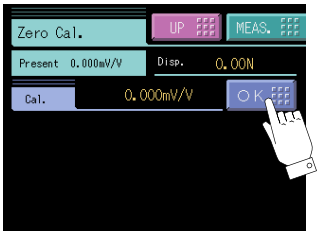
2. Press the [Calibration] button.



3. Press the [Zero Cal.] button.



4. Press [OK] button after confirming no-load was applied to the sensor.



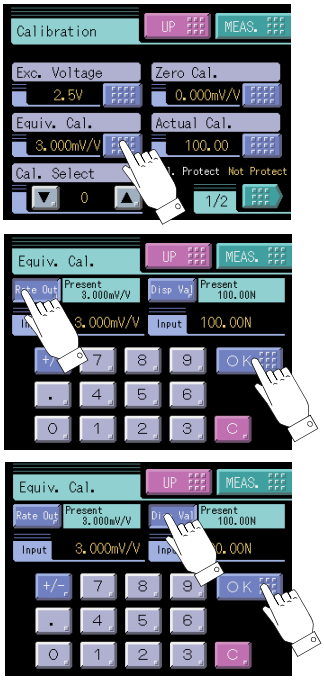
4-7. Equivalent Input Calibration

Set the rated output value and reading of the sensor.

Rated output value: −3.000～3.000mV/V（0 is excluded.）
Display value: −99999～99999（0 is excluded.）

How to set

1. Press the [SET.] button.
(refer to page 32)
2. Press the [Calibration] button.
(refer to page 32)
3. Press the [Equiv.Cal.] button.
4. After pressing the [Rate Out] button, enter the rated output of the sensor with the numerical keys.
5. After pressing the [Disp Val] button, enter the display value with the numerical keys. Also, set the decimal place here. Press the [OK] button to perform calibration. To eliminate a decimal point, register by inputting a numerical value and then pressing the decimal point key at the end.



■Registration method at decimal place

Example)

The indicated value is made "200.0" by Equivalent Input Calibration.

It is a specification to which the decimal point is input with the numerical keys.
Please input it in the image that operates the calculator.

Press [2] → [0] → [0] → [.] → [0]

The display of the decimal point of the input value moves.

Please put it again from the start pushing [C] when you correct it.

Point

- The decimal point ten keys are registered pushing at the end after the numerical value is input when the decimal point is lost.
- All set values concerning the load synchronize with the decimal place of the indicated value (capacity).

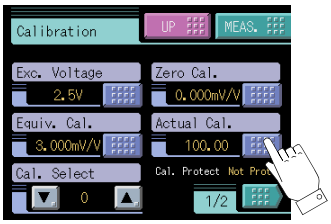
4-8. Actual Load Calibration

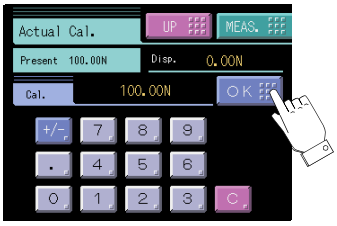
Set the actual load value under an actual load.
Setting range: －99999～99999（0 is excluded.）

How to set

SET. → Calibration → Page 1

1. Press the [SET.] button. (refer to page 32)
2. Press the [Calibration] button. (refer to page 32)
3. Press the [Actual Cal.] button.
4. Apply an actual load to the sensor, enter the actual load value by the numerical keys and determine with the [OK] button. Also, set the decimal place here. To eliminate a decimal point, register by inputting a numerical value and then pressing the decimal point key at the end.。





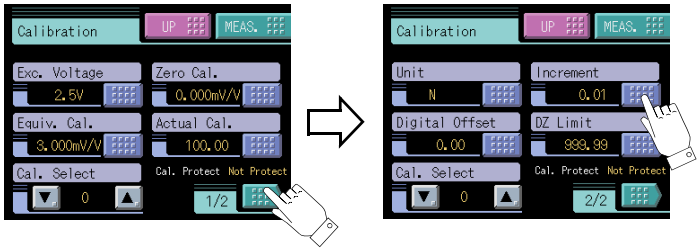
4-9. Increment (This step may be omitted if there is no change.)

Set the increment of the indicated value.
1 、2 、5 、10 、20 、50 、100（The display changes by the decimal place.）

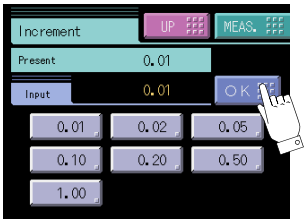
How to set

SET. → Calibration → Page 2

1. Press the [SET.] button. (refer to page 32)
2. Press the [Calibration] button. (refer to page 32)
3. Select page 2, and press the [Increment] button.



4. Select the increment and determine with the [OK] button.



4-10. Digital Offset (This step may be omitted if there is no change.)

By using the digital offset function, the value obtained by subtracting the set value from the indicated value is displayed. This function is convenient when zero cannot be obtained with no load for some reason or for offsetting. When not using, set "0".

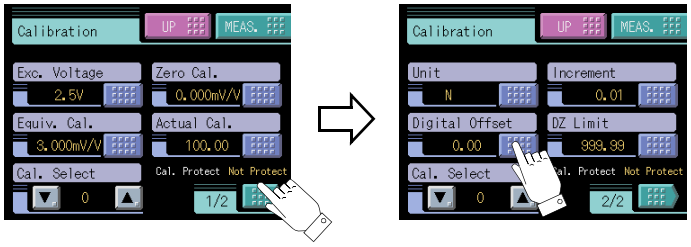
(Displayed value)=(Actual indicated value)-(Offset value)

↳ Setting range: − 99999 - 99999

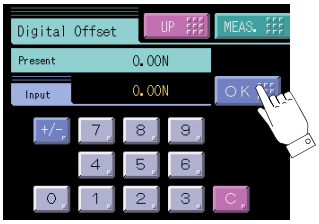
How to set

SET. → Calibration → Page 2

1. Press the [SET.] button. (refer to page 32)
2. Press the [Calibration] button. (refer to page 32)
3. Select page 2, and press the [Digital Offset] button.



4. Enter the digital offset value by the numerical keys and determine with the [OK] button.



4-11. Digital Zero Limit (This step may be omitted if there is no change.)

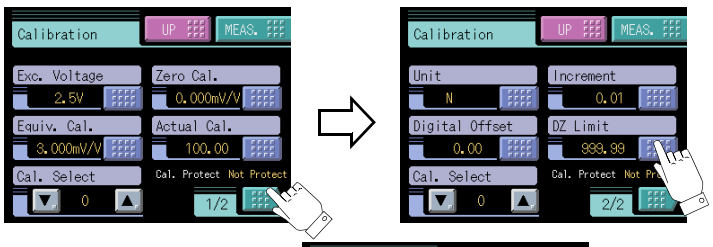
This is a load limit to allow digital zero.
When digital zero is executed, if the difference from the zero calibration point is larger than the setting value, an error will result, and the indicated value will not be zeroed.

Setting range: 0 - 99999

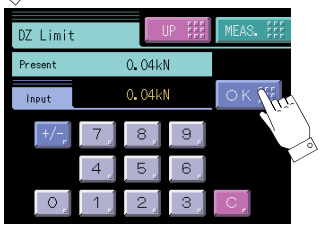
How to set

SET. → Calibration → Page 2

1. Press the [SET.] button. (refer to page 32)
2. Press the [Calibration] button. (refer to page 32)
3. Select page 2, and press the [DZ Limit] button.



4. Enter the digital zero limit value by the numerical keys and determine with the [OK] button.



5 SETTING OF FUNCTIONS

5-1. Digital Zero

The indicated values is forcedly zeroed.

Digital zero by means of Keys

1) Press the [DZ] button.in the ordinary display screen (COMP・HOLD・GRAPH)

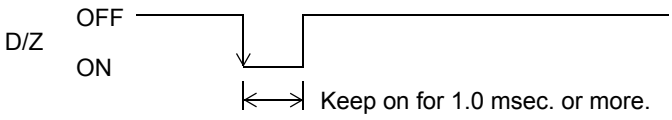
2) Press the [YES] button to perform the digital zero. Press the [NO] button to go back to the previous screen without executing digital zero.
Press the [RESET] button to reset the digital zero.

NO

YES

Digital zero by means of External I/O signal (D/Z input)

The digital zero may be performed by short circuiting the D/Z to the COM2 on the rear panel signal I/O terminal block.



CAUTION

- When digital zero is performed, if the difference from the zero calibration point exceeds the digital zero limit, the digital zero limit error will result. Also, only the digital zero limit is subtracted.
- If the digital offset is set, even if digital zero is executed, zero will not result. (Indicated value = -Setting value of digital offset)
- When digital zero reset is performed, the condition previous to correction by digital zero is restored.
- Digital zero is reseted in case of power failure. Please set digital zero again.

5-2. Digital Filter

The digital filter is a function for reducing drifts of the indicated value by means of a moving average of data converted from analog to digital. With an increase in the number of filterings, the indicated value becomes more stable, but the response to inputs becomes slower.

Number of settings: OFF, 2 - 999

How to set

SET. → System Setting → Operation → Page 1

5-3. Analog Filter

A low-pass filter is provided for filtering input signals from the strain-gage sensor and canceling noise components.
The cut-off frequency can be selected in a range between 30Hz and 1000Hz. With an increase in the cut-off frequency, the response becomes faster, but noise components may be indicated.

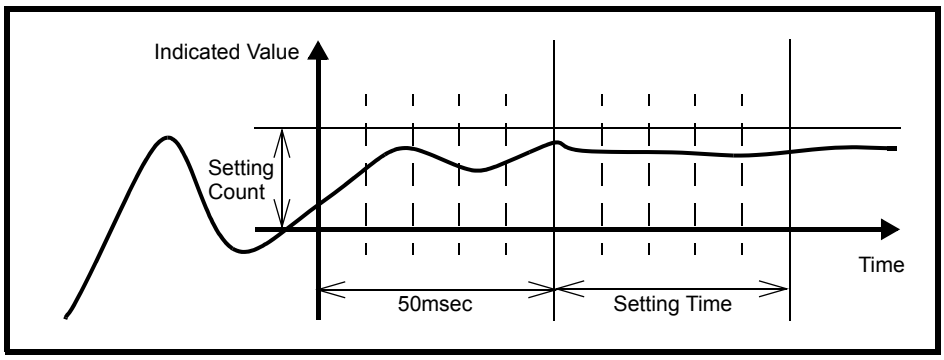
Cut-off frequency: 30Hz, 100Hz, 300Hz, 1000Hz

How to set

SET. → System Setting → Operation → Page 1

5-4. Motion Detect (MD)

Enter the parameters to detect stable.
If the difference between the current indicated value and the 50-msec-previously indicated value is less than the set count and the duration of the condition is more than the set time, the indicated value is regarded to be stable.



Setting range:

MD (Time): 0.0 - 9.9 sec.
MD (Count): 0 - 99 count

How to set

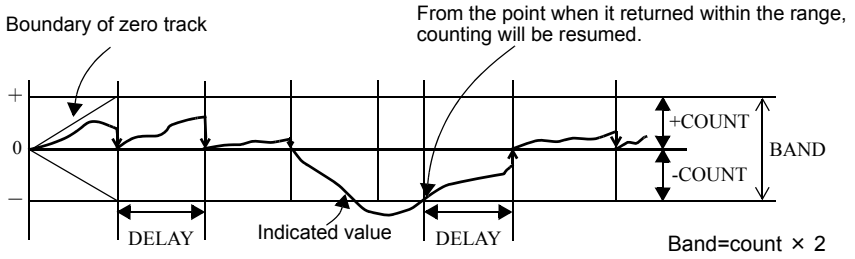
SET. → System Setting → Operation → Page 2

When the time is 0.0 sec. and the width is 00 markings, stable is not detected. Stability detection by Motion Detect is closely related to the SI/F print (stable value) function and comparison timing. For details, see "5-8.SI/F Print Out"on page 39 and " ■ Comparison timing"on page 42.

5-5. Zero Tracking (ZT)

Gradual changes in the zero point due to drifts etc., are automatically tracked for correction.

- When displacement of the zero point is within the set count of tracking and it continues more than the set time, it is automatically made zero by Zero Tracking function.
- The time (tracking delay) is set in the range of 0.1 - 9.9 sec., and the band (tracking band) is set in the range of 01 to 99.
  If the time is set at 0.0 sec. and the band at 00, the zero tracking function does not work.



Setting range:

ZT (Time): 0.0 - 9.9 sec. ZT (Count): 0 - 99 count

CAUTION

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

How to set

SET. → System Setting → Operation → Page 2

5-6. Backlight

This function changes the brightness of the backlight when touch screen has not been used for certain period of time.

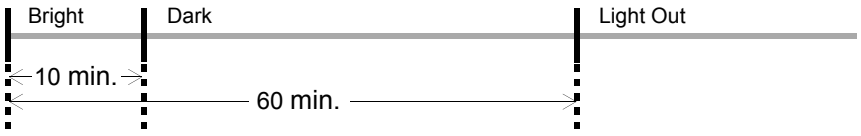
The ON time (lighting time of the backlight) and the Low time (bright→dark switching time of the backlight) are set up.

When you use it in the state which a display is always in sight, set the ON time to 0 minutes.

When you want the backlight always bright, set 0 minutes for both the ON time and the Low time.

The backlight is turned bright by touching the panel when the backlight is turned off or it is dark.

Ex.) Set 60 minutes to ON time, 10 minutes to Low time.）



Setting range: 00 - 99 minutes (with both time)

How to set

SET. → System Setting → Operation → Page 1

5-7. Display Language Selection

The display language of the F372A is selectable between Japanese and English.

Setting range: JPN(日): Japanese, ENG(英): English

How to set

SET. → System Setting → Operation → Page 1

5-8. SI/F Print Out

- OFF

Real time values and hold values are output in the GROSS area and NET area, respectively.

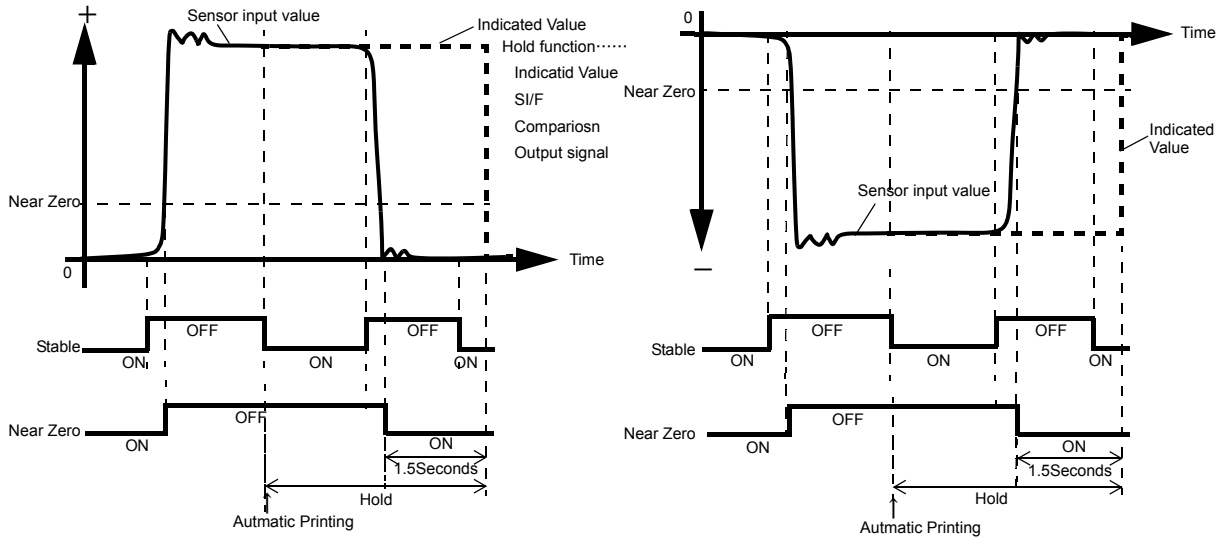
- MD

By this function, the indicated value is automatically printed to the UNIPULSE printer coupled with the F372A through the SI/F when the indicated value is stable. (Set the stable parameters by the Motion Detect.)

When Near Zero is OFF, Indicated value is held until Near Zero turns ON after stable turned ON. (Hold will be released when 1.5 sec. is passed after Near Zero is ON.) The output format is the same as in the setting of "OFF".

SI/F print out (setting to MD) is not performed under the following conditions.
- Motion Detect Time: 0.0 sec., Count: 0.0 of divisions is set.

Also, the indicated value is not held under the following conditions.
- Hold Mode When any items except Tracking is selected.



- HOLD

At hold-off time, the held value is automatically printed to the UNIPULSE printer coupled with the F372A through the SI/F. At hold-off time, hold values and real time values are output in the GROSS area and NET area, respectively. Others are the same as in the setting of "OFF".

Setting range: OFF, MD, HOLD

How to set

SET. → System Setting → Operation → Page 1

5-9. Indicate Color

The indicated value display color can be changed. By setting Comp.(Comparison Result), the indicated value display color changes following the comparison status.

OK	green
HI, LO	yellow
HH, LL	red

Setting range: Yellow, Green, Blue, Comp.

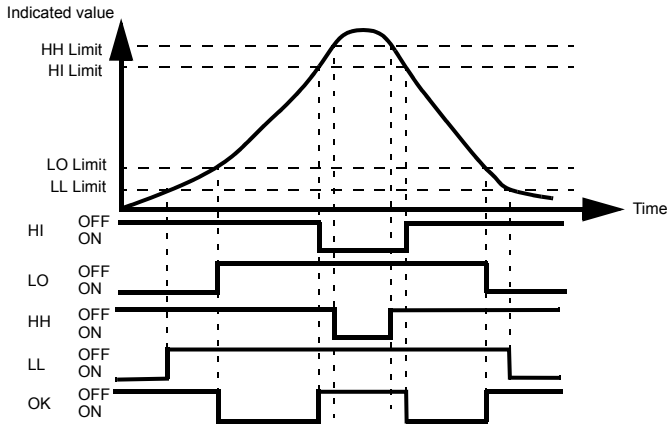
How to set

SET. → System Setting → Operation → Page 2

5-10. Comparison Functions

By the comparison function, the HI limit and LO limit values are set, and when the indicated value exceeds the HI limit, the HI output is turned on, and when the indicated value falls below the LO limit, the LO output is turned on. Also, HH limit and LL limit values may be set outside the HI-LO limit comparison. When the indicated value exceeds the HH limit, the HH output is turned on, and when the indicated value falls below the LL limit, the LL output is turned on. When the HI, HH, LO and LL outputs are all off, the OK output is turned on.

〈**HI/LO output conditions**〉	HI:	Indicated value＞HI limit value
	LO:	Indicated value ＜LO limit value
〈**HH/LL output conditions**〉	HH:	Indicated value＞HH limit value
	LL:	Indicated value＜LL limit value
〈**OK output conditions**〉	OK:	All conditions of HH, HI, LO and LL are off.



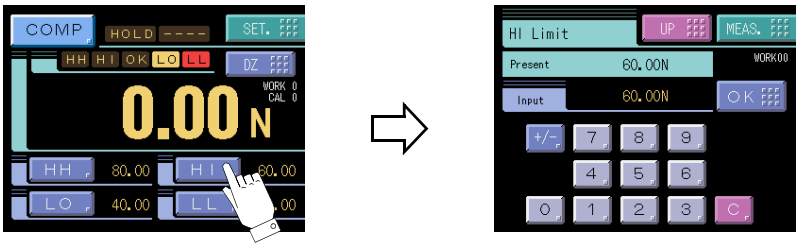
■HI limit / LO limit / HH limit / LL limit

How to set

SET. → Work Setting → Comp. Setting → Page 1

Simple setting call

Press any of the [HH], [HI], [LO] and [LL] buttons at the bottom of the indicated value display screen to go direct to the entry screen.



■Hysteresis

The hysteresis value may be determined so as to allow a margin for timing the turning off of the HI-LO limit comparison. Normally, it is turned on when the indicated value exceeds the HI limit and is turned off when the indicated value falls below it. However, by setting the hysteresis, it is turned off when the indicated value falls below the HI limit further lowered by the hysteresis value.
This function is effective to prevent chattering in such a case where signals fluctuate (vibrate) subtly.

〈Comparison conditions〉

- HI limit
  ON condition: indicated value＞HI limit value
  OFF condition: indicated value≦(HI limit value-hysteresis value)
- LO limit
  ON condition: indicated value＜LO limit value
  OFF condition: indicated value≧(LO limit value+hysteresis value)
- HH limit
  ON condition: indicated value＞HH limit value
  OFF condition: indicated value≦(HH limit value-hysteresis value)
- LL limit
  ON condition: indicated value＜LL limit value
  OFF condition: indicated value≧(LL limit value+hysteresis value)

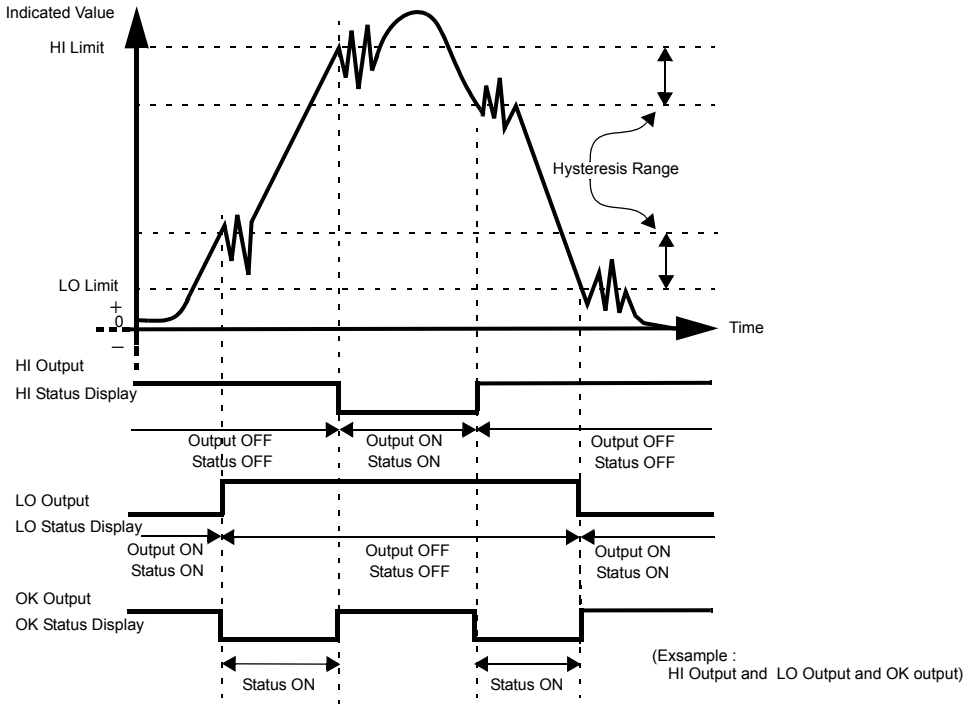
Setting range: 0 - 9999

How to set

SET. → Work Setting → Comp. Setting → Page 1

Hysteresis setting value is common to all HI limit value.

- Hysteresis operation



■Near zero

By this function, it is detected that the indicated value is near zero.

Near-zero ON: | indicated value | ≦ near zero set value

Near-zero OFF: | indicated value | > near zero set value

Setting range: 00000 - 99999

Near-zero ON/OFF is closely related to the SI/F Print Out (stable) and Comparison timing.
For details, see the sections "SI/F Print Out" on page 39 and "Comparison timing" on page 42.

How to set

SET. → Work Setting → Comp. Setting → Page 2

■Comparison timing

Set the operating condition of HI-LO limit comparison. Select the condition from the following.

ALL: HI-LO limit comparison is performed continuously.

MD: HI-LO limit comparison is performed when the indicated value is stable.
Set the stable parameters by the stable operation.

NZ: HI-LO limit comparison is performed when the indicated value is not near zero.
Set the near zero parameters by the near zero operation.

MD+NZ: HI-LO limit comparison is performed when the indicated value is stable and not near zero.

HOLD: HI-LO limit comparison is performed when the indicated value is held.

How to set

SET. → Work Setting → Comp. Setting → Page 2

■Comparison output selection

The number of HI-LO limits can be changed.

Correspondence between comparison screens and external I/O output terminals.

Mode	HI limit operation	LO limit operation
H4 / L0	HI-1 to HI-4	None
H3 / L1	HI-1 to HI-3	LO
H2 / L2	HH, HI	LO, LL
H1 / L3	HI	LO-1 to LO-3
H0 / L4	None	LO-1 to LO-4

	A2	A3	A4	A5	A6
H4 / L0	HI-4	HI-3	OK	HI-2	HI-1
H3 / L1	HI-3	HI-2	OK	HI-1	LO
H2 / L2	HH	HI	OK	LO	LL
H1 / L3	HI	LO-1	OK	LO-2	LO-3
H0 / L4	LO-1	LO-2	OK	LO-3	LO-4

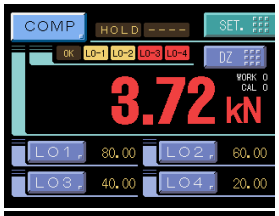
The HI limit output is turned on when the indicated value becomes larger than the set value.
The LO limit output is turned on when the indicated value becomes smaller than the set value.

How to set

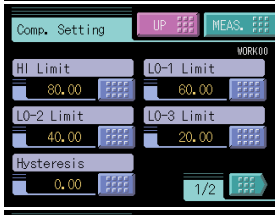
SET. → Work Setting → Comp. Setting → Page 2

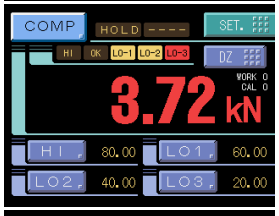
[Setting] [Comparison]

[HI-0, LO-4]



[HI-1, LO-3]

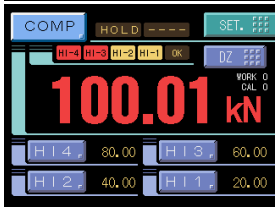




[HI-2, LO-2]

[HI-3, LO-1]

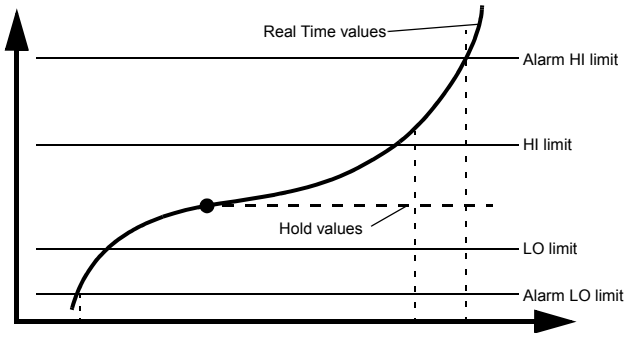
[HI-4, LO-0]



■Alarm HI and LO limits

The alarm HI and LO limits are always compared with sensor input values. By this function, whether the indicated value becomes abnormal during hold can be monitored.
If the indicated value exceeds the alarm HI limit or falls below the alarm LO limit, an OVERLOAD error will result, and the RUN output turns OFF. (Refer to "Error Display List" on page 84)

Alarm HI limit: −99999 - 99999 (invalid at 99999 (initial value))
Alarm LO limit: −99999 - 99999 (invalid at -99999 (initial value))



How to set

SET. → Work Setting → Comp. Setting → Page 2

- Since both the alarm HI limit and LO limit are set to be invalid as initial values, reset them for use.
- Since the alarm HI limit and LO limit are independent, use of only one of them is also possible.

5-11. Hold Functions

By the hold function, a specific point in a waveform is taken out for HI-LO limit comparison.
The operation of each hold will be described in detail.

■Hold setting --- Common ---

Hold mode

The F372A includes 10 hold modes as shown in the table below.
In the peak, valley, peak-to-peak and average modes, section setting is required. Select all section, external signal, external signal+time, level+time, level.
When not using any hold function, be sure to set the hold mode to OFF.
(In the OFF state, hold operation is not performed but input values are always displayed.)

Hold mode	Hold section
OFF	—
Sample	None
Peak Valley P-P Average	Required
Rel. Max Rel. Min Rel. Dif Inf. Pnt	None

*There is a section setup.
- All
- EXT
- EXT+TM
- LVL+TM
- LVL*

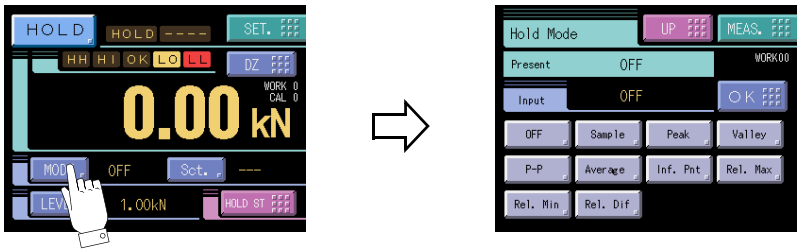
* Selectable only for Peak or Valley.

How to set

SET. → Work Setting → Hold Setting → Page 1

Simple setting call

Press the [MODE] button at the bottom of the indicated value display screen to go direct to the hold mode entry screen.



Section time

If you set the hold section setting in the hold function setting to external signal+time or level+time, set the time.

Setting range: 0.001 - 9.999 sec.

How to set

SET. → Work Setting → Hold Setting → Page 1

Hold start level

Set the start level in the case where the Section setting is Level + Time or Level for Peak, Valley, P-P, or Average hold or where the Detection Start Condition is External + Level for Relative Maximum, Relative Minimum, Relative Difference, or Inflection Point hold.

Setting range: −99999 - 99999

How to set

SET. → Work Setting → Hold Setting → Page 1

To perform hold operation simply by the external section signal (SECTION) without using the hold start level in the Relative Maximum / Relative Minimum / Relative Difference / Inflection Point hold mode, change External + Level to External Only in the Detection Start Condition setting.

Hold stop level

Set the hold stop level in the case where the Section setting is Level for Peak or Valley hold.

Setting range: −99999 - 99999

How to set

SET. → Work Setting → Hold Setting → Page 2

Detection start condition

Setting range: Ext+Level, Ext Only

How to set

SET. → Work Setting → Hold Setting → Page 1

Level detection conditions

(hold section setting; Level + Time or Level, or detection start condition; External + Level)

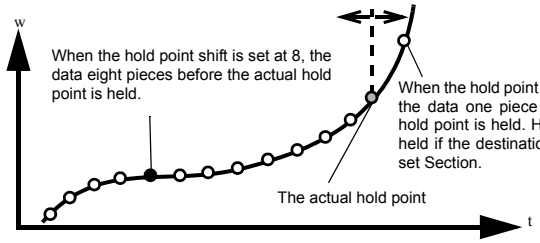
Setting range: Passed, Passed HI, Passed LO

- Passed:	Detection starts when the indicated value passes Hold start level.
- Passed HI:	Detection starts when the indicated value passes Hold start level in the direction from smaller toward larger values.
- Passed LO:	Detection starts when the indicated value passes Hold start level in the direction from larger toward smaller values.

Hold point shift

In the "sample hold" and "inflection point hold", the sampling data is held as it is shifted back or forth by the numerical value set under Sample Removal Value / Inflection Removal Value.

Setting range: −999 - 999



CAUTION
- This does not work for other holds.

How to set

SET. → Work Setting → Hold Setting → Page 2

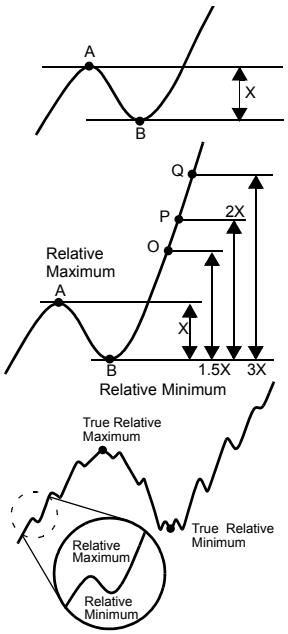
■Hold setting --- Relative (Maximum / Minimum / Difference) ---

If you select the relative maximum and relative minimum hold in the hold function setting, set the relative maximum and relative minimum value detection parameters "relative minimum count" and "relative magnification".

Set referring to the principle of operation only when the value cannot be held successfully with the factory settings or when further adjustments are required.

Detection of relative values

The logic of detecting the relative values is given below.



First, when difference X between point A and point B is larger than the minimum count, point A is judged to be the relative maximum value and point B is judged to be the relative minimum value.

After that, when the load exceeds difference X multiplied by the relative magnification (1/4 to 4), A, B, and the difference between A and B are held in relative maximum hold, relative minimum hold, and relative difference hold, respectively, at O, P, Q, etc.

If the minimum count is too small, when the waveform includes noise as shown on the left-hand side, the noise is regarded as the relative maximum value or relative minimum value and a correct value may not be held. In such a case, set the minimum count somewhat large.

Relative minimum count

Setting range: 0001 - 99999

How to set

SET. → Work Setting → Hold Setting → Page 1

Relative magnification

Setting range: ×0.25, ×0.50, ×0.75, ×1.00, ×1.25, ×1.50, ×2.00, ×3.00, ×4.00

How to set

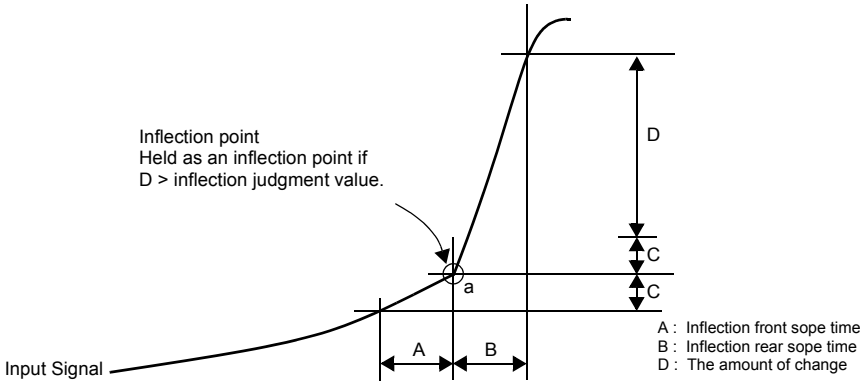
SET. → Work Setting → Hold Setting → Page 1

■Hold setting --- Inflection point ---

If you select the inflection point hold in the hold function setting, set the inflection point detection parameters "inflection minimum slope", "inflection front sope time" and "inflection rear sope time". Set referring to the principle of operation only when the value cannot be held successfully with the factory settings or when further adjustments are required.

Detection of the inflection point

The logic of detecting the inflection point is given below.
Assuming that the remainder obtained by subtracting the amount of change C of the indicated value over A from the amount of change of the indicated value over B is D, when the amount of change D exceeds the inflection minimum slope, point a is held as an inflection point.
If there are two or more inflection points in the hold section, the point having a larger change is held.
The inflection point is normally detected by A=B, but it may easily be detected with A<B where the slope is gradual.



Inflection minimum slope

Setting range: 00001 - 99999

How to set

SET. → Work Setting → Hold Setting → Page 2

Inflection front slope time and Inflection rear slope time

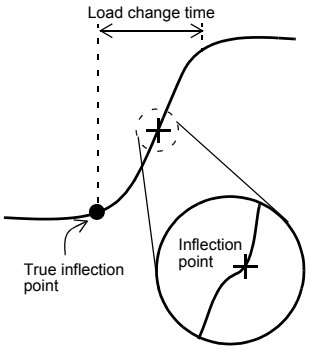
Setting range: 0≦Inflection front (rear) slope time≦990
Inflection front slope time＋Inflection rear slope time≦1000

How to set

SET. → Work Setting → Hold Setting → Page 2

Inflection front (rear) slope time setting is the number of samplings. Since the F372A's sampling speed is 2000 times/sec., one sampling is 0.5msec.
Therefore, setting of the interval at 100 means setting of 50msec.

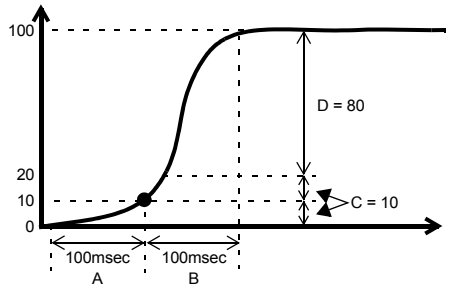
Caution regarding inflection point hold



If the detection Inflection front sope time and Inflection rear sope time are set too short, fine load changes may be detected as shown in the illustration on the left-hand side, so that a correct value cannot be held.
In this case, set the detection inflection rear sope time large enough to bring it as close to the load change time as possible, and also set the inflection minimum slope large according to the amount of change at that time, so that the inflection point is held at a correct position.

Example of inflection point hold setting

● Example of ideal waveform setting

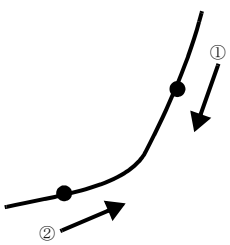


① Set the load change time (between the inflection point and when the change stops) to inflection rear sope time. In the example, it is set to 200 since it is 100 msec.

② Set the same value as inflection rear sope time to inflection front sope time.

③ Set load D obtained by subtracting load C changing with inflection front sope time from the load changing with inflection rear sope time to the inflection minimum slope.
In the example, set load change D=80 obtained by subtracting load C=10 changing with A from load 90 changing with B to the inflection minimum slope.
However, since an inflection point is not judged until load change D exceeds the inflection minimum slope, actually set the inflection minimum slope a slightly smaller than D.

● If the inflection point cannot be located successfully



① When holding above the inflection point and moving downward

1) It is considered that the inflection minimum slope is small with respect to load change D. Set the inflection minimum slope larger.

2) If lowering is insufficient in 1), increase inflection front sope time.

② When holding below the inflection point and moving upward inflection rear sope time is too long and the inflection minimum slope is too large.Shorten inflection rear sope time and decrease the inflection minimum slope.

■Hold setting --- Average value ---

Average sample number

In average hold, the average in each sampling can be detected for up to 5 seconds. Then, if the average sample number is set at 2 or more, the representative value of the sampling values by the set number (average by the number) is adopted as the sampling data used for average calculation.
The maximum average value detection time with the setting "1" is 5 sec., but the average value detection time can be extended by this setting.

Maximum average value detection time＝Average sample number×5 ［sec.］

where the number of updates of the average value will decrease.

Number of updates of the average value＝2000 ／ Average sample number ［times/sec.］

Setting range: 1 - 999 times

How to set

SET. → Work Setting → Hold Setting → Page 2

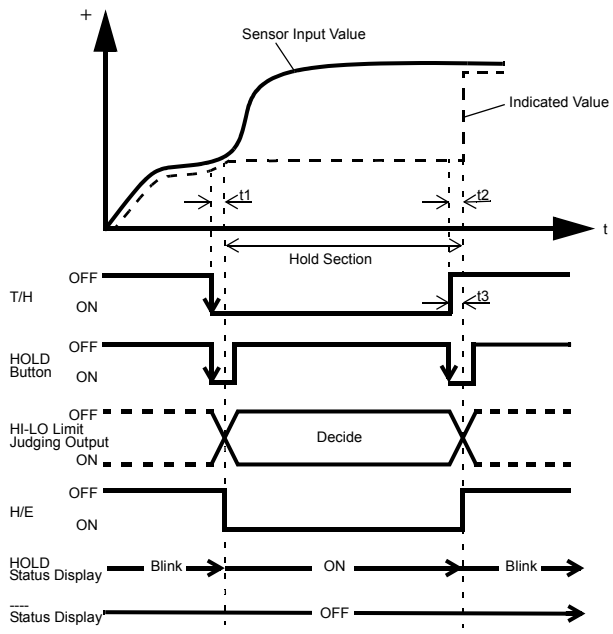
About the maximum average value detection time

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

■Hold operation

Sample hold

When the T/H signal is inputted, a desired point is held, and the H/E output is turned on.
Hold of the value continues as long as the T/H signal is on.



t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value is held
1.0ms (max.)

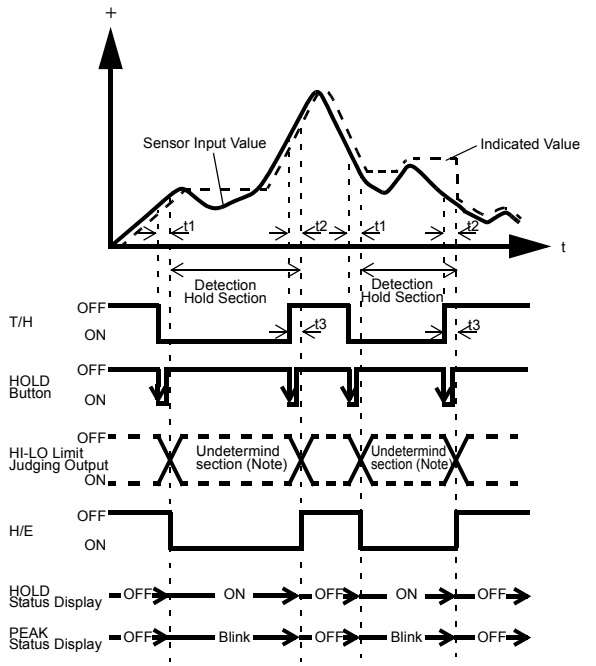
t2: A delay time between the instant when the T/H signal is released and the instant
when the indicated value returns to tracking
1.0ms (max.)

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

Peak hold

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

(Example) All section peak hold



t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value is held
1.0ms (max.)

t2: A delay time between the instant when the T/H signal is released and the instant when the indicated value returns to tracking
1.0ms (max.)

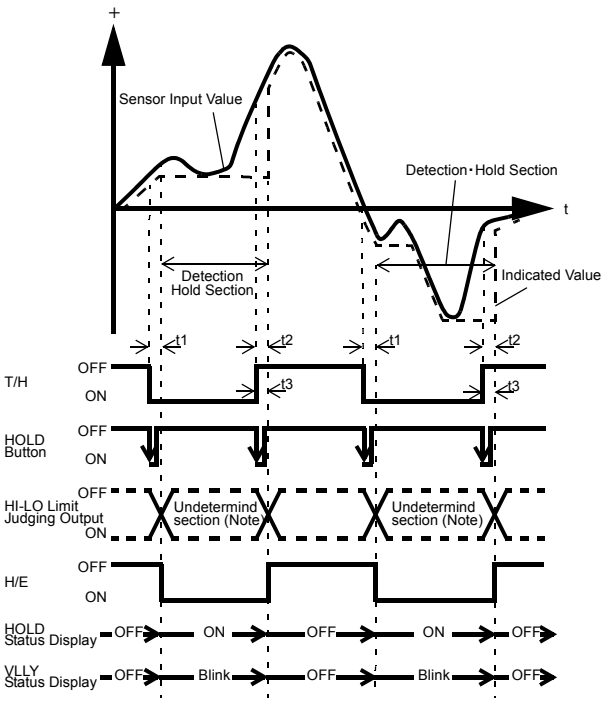
t3: A minimum reset signal width required for releasing the hold
1.0ms (min.)

Note: During the undetermined section, the judging output varies with fluctuations in the input waveform. However, the H/E output remains on during the undetermined section. Read the judging result when the indicated value becomes stable (immediately before the T/H signal rises).

Valley hold

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

(Example) All section valley hold



t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value is held
1.0ms (max.)

t2: A delay time between the instant when the T/H signal is released and the instant when the indicated value returns to tracking
1.0ms (max.)

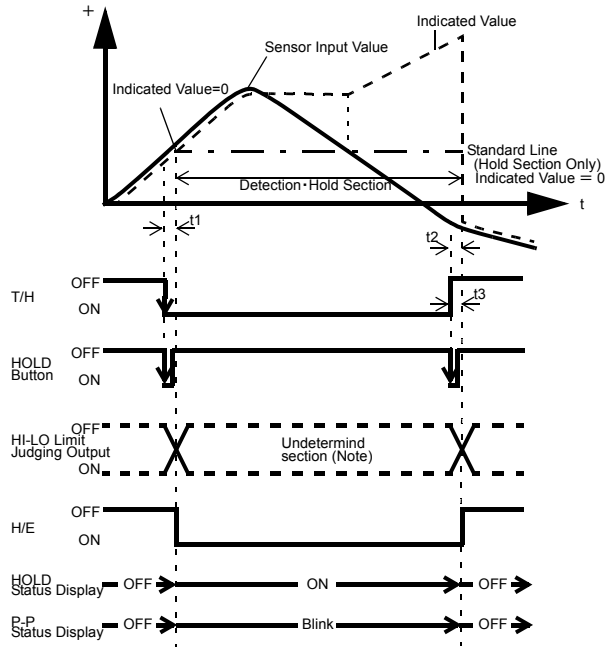
t3: A minimum reset signal width required for releasing the hold
1.0ms (min.)

Note: During the undetermined section, the judging output varies with fluctuations in the input waveform. However, the H/E output remains on during the undetermined section. Read the judging result when the indicated value becomes stable (immediately before the T/H signal rises).

Peak-to-Peak (P-P) hold

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

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



t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value is held
1.0ms (max.)

t2: A delay time between the instant when the T/H signal is released and the instant when the indicated value returns to tracking
1.0ms (max.)

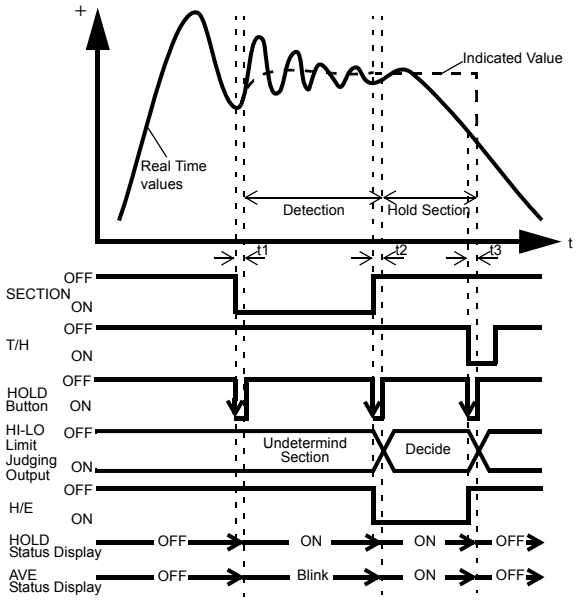
t3: A minimum reset signal width required for releasing the hold
1.0ms (min.)

Note: During the undetermined section, the judging output varies with fluctuations in the input waveform. However, the H/E output remains on during the undetermined section. Read the judging result when the indicated value becomes stable (immediately before the T/H signal rises).

Average hold

The average value of the sampling values over the specified section is calculated and updated to perform comparison operation. The section is specified by the setting of “all section”, “external signal”, “external signal+time”, or “level+time”.

(Example) Externally specified section average value hold



t1: A delay time between the instant when the SECTION signal is inputted and the instant when detection is performed.
1.0ms (max.)

t2: A delay time between the instant when the SECTION signal is released and the instant when the value to be held is determined
1.0mS (MAX.)

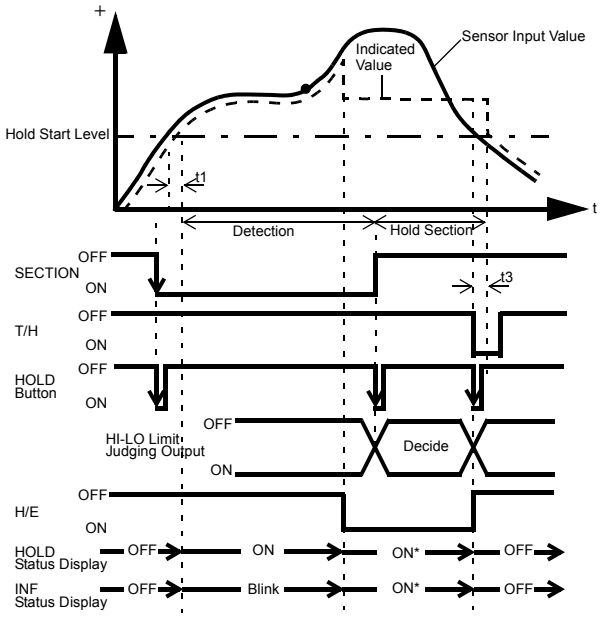
t3: A minimum reset signal width required for releasing the hold
1.0ms (min.)

The detection section is limited by the maximum average value detection time set according to the “Average sample number”.
For details, see the section on "Average sample number"on page 49.

Inflection point hold

Detection starts when the SECTION signal is inputted and also the Level detection conditions is met in comparison of the Hold Start Level and indicated value. Detection is performed as long as the SECTION signal is ON.The Hold is released by turning on the T/H signal as a reset signal.
The H/E output signal is on between the instant when the hold starts and the instant when the T/H signal is turned on. The next detection is started when the SECTION signal is turned on again even if the T/H signal is not turned on.
If you want to perform detection simply by the SECTION signal without using the Hold Start Level, set the Detection Start Condition to "External Only".

(Example) Inflection point hold



*When it was not possible to hold correctly, both HOLD and INF status display are blinked.

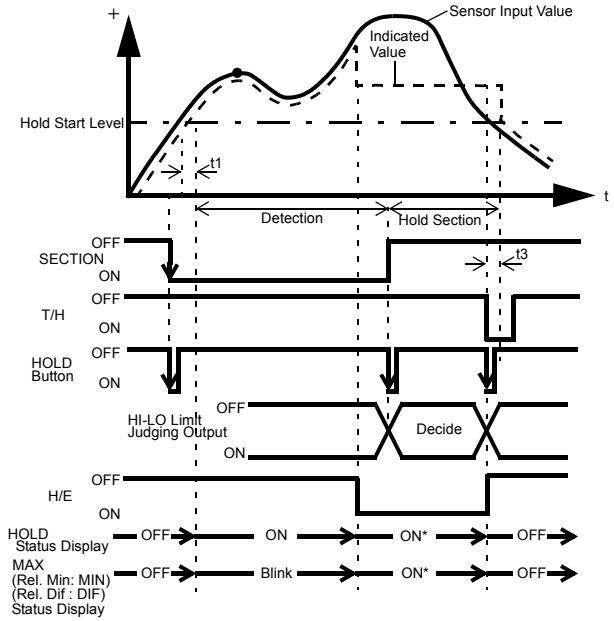
t1: A delay time between the instant when the indicated value meets the Hold Start Level under the Level detection conditions and the instant when detection starts.

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

Relative maximum, Relative minimum, Relative difference hold

The way of starting detection is the same as Inflection Point hold.

(Example) Relative maximum hold



*When it was not possible to hold correctly, both HOLD and MAX(MIN,DIF) status display are blinked.

t1: A delay time between the instant when the indicated value exceeds the Hold Start Level and the instant when hold is detected.

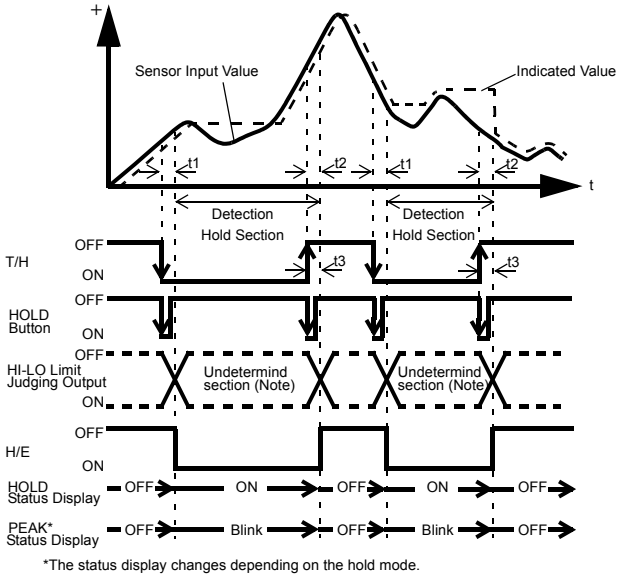
t3: A minimum reset signal width required for releasing the hold
1.0ms (min.)

■How to specify the hold detection section(Peak, Valley, P-P, Average)

All section

By this method, the hold detection section is externally specified by the T/H signal.
Detection starts with the T/H signal ON to perform each hold operation.
According to the ON/OFF state of the T/H signal, detection and tracking are repeated. There is no fixed hold section.

(Example) All section peak hold



*The status display changes depending on the hold mode.

t1: A delay time between the instant when the T/H signal is inputted and the instant when the indicated value is held
1.0ms (max.)

t2: A delay time between the instant when the T/H signal is released and the instant when the indicated value returns to tracking
1.0ms (max.)

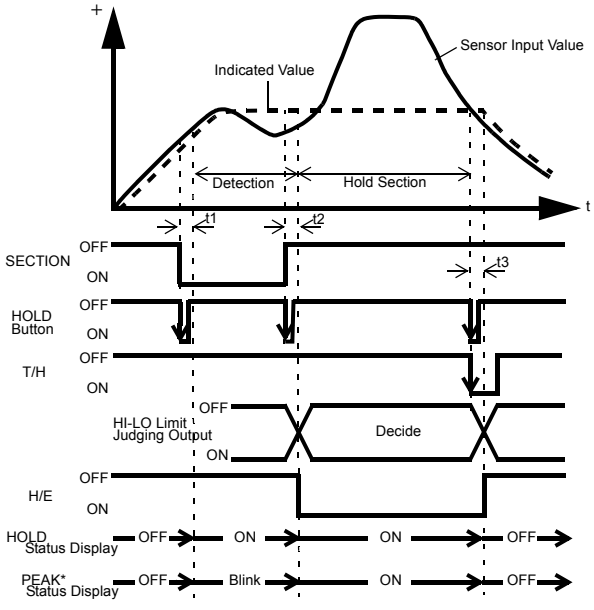
t3: A minimum reset signal width required for releasing the hold
1.0ms (min.)

Note: During the undetermined section, the judging output varies with fluctuations in the input waveform. However, the H/E output remains on during the undetermined section. Read the judging result when the indicated value becomes stable (immediately before the T/H signal rises).

External signal

By this method, the hold detection section is externally specified by the SECTION signal to maintain the hold value until the reset signal is turned on.The hold is released by turning on the T/H signal as a reset signal. The next detection is started when the SECTION signal is turned on again even if the T/H signal is not turned on.
The H/E output signal is on between the instant when the SECTION signal is turned off and the instant when the T/H signal is turned on.

(Example) Externally specified section peak hold



*The status display changes depending on the hold mode.

t1: A delay time between the instant when the SECTION signal is inputted and the instant when the value to be held is detected
1.0ms (max.)

t2: A delay time between the instant when the SECTION signal is released and the instant when the value to be held is determined
1.08ms (max.)

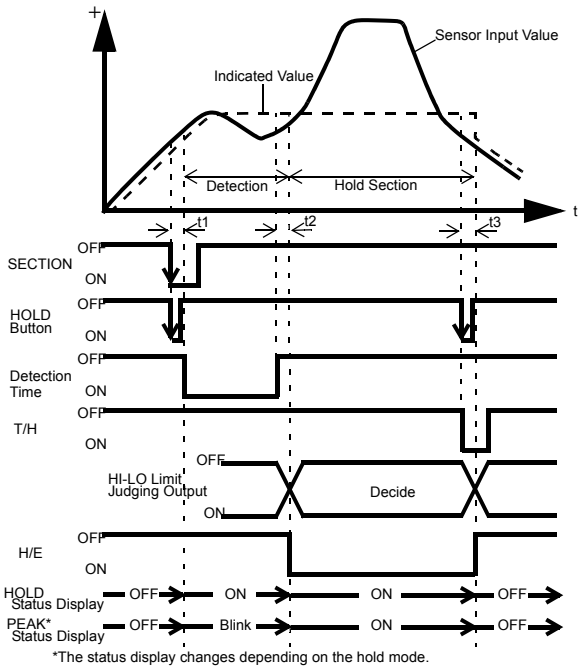
t3: A minimum reset signal width required for releasing the hold
1.0ms (min.)

External signal + time

Hold is detected during the predetermined time (hold section time) from the point in time when the SECTION signal is turned on. The hold is released by turning on the T/H signal as a reset signal. The next detection is started when the SECTION signal is turned on again even if the T/H signal is not turned on.

The H/E output signal is on between the instant when the SECTION signal is turned off and the instant when the T/H signal is turned on.

(Example) External + Time specified section peak hold



t1: A delay time between the instant when the SECTION signal is inputted and the instant when the value to be held is detected
1.0ms (max.)

t2: A delay time between the instant when the hold section time is expired and the instant when the value to be held is determined
1.0ms (max.)

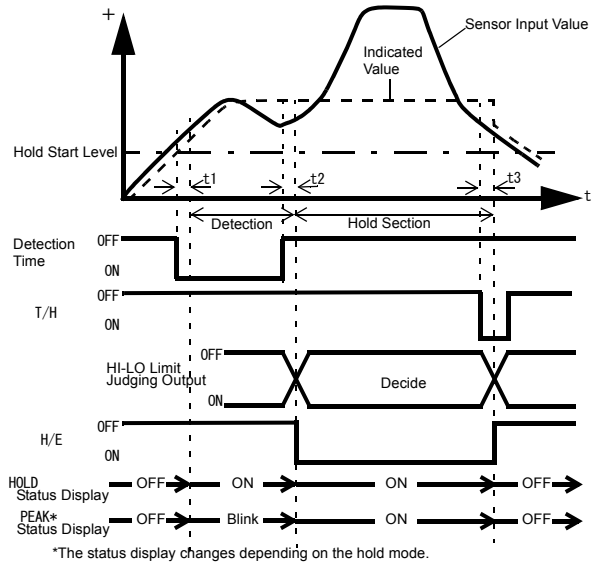
t3: A minimum reset signal width required for releasing the hold
1.0ms (min.)

Level + time

Hold is detected during the predetermined time (hold section time) from the point in time when the indicated value crosses the hold start level. The hold is released by turning on the T/H signal as a reset signal.

The H/E output signal is on between the instant when the hold section time ends and the instant when the T/H signal is turned on.

(Example) Level + Time specified section peak hold



t1: A delay time between the instant when the indicated value exceeds the hold start level and the instant when the value to be held is detected
0.5ms (max.)

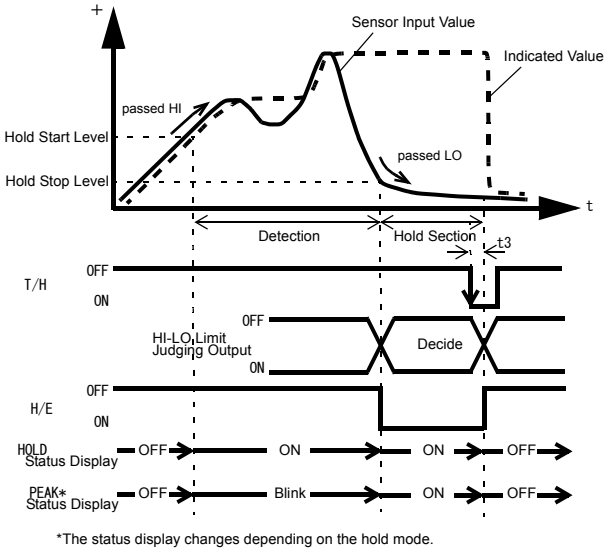
t2: A delay time between the instant when the hold section time is expired and the instant when the value to be held is determined
1.0ms (max.)

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

Level (only Peak and Valley)

By this method, the hold detection section is from the point in time when the indicated value crosses the Hold Start Level until it crosses the Hold Stop Level. The hold is released by turning on the T/H signal as a reset signal. The H/E output signal is on between the instant when the hold section time ends and the instant when the T/H signal is turned on.
However, there are limitations that the Hold Start Level should be passed HI and the Hold Stop level be passed LO in peak hold, while the Hold Start Level should be passed LO and the Hold Stop level be passed HI in valley hold.

(Example) Level specified section peak hold



*The status display changes depending on the hold mode.

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

5-12. Multi-hold Function

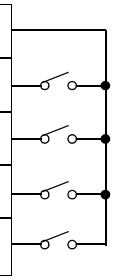
By this function, up to 16 types of hold, graph and comparison set values can be stored and selected with external switching signals of WORK0 - WORK3.
Normally, if there is no entry for WORK0 - WORK3, the set value of WORK00 is selected, but when WORK0 - WORK3 are in the following conditions, the set value of each Measurement work is selected.

WORK3	WORK2	WORK1	WORK0	Measurement work
0	0	0	0	WORK00
0	0	0	1	WORK01
0	0	1	0	WORK02
0	0	1	1	WORK03
0	1	0	0	WORK04
0	1	0	1	WORK05
0	1	1	0	WORK06
0	1	1	1	WORK07
1	0	0	0	WORK08
1	0	0	1	WORK09
1	0	1	0	WORK10
1	0	1	1	WORK11
1	1	0	0	WORK12
1	1	0	1	WORK13
1	1	1	0	WORK14
1	1	1	1	WORK15

(0: open, 1: short)

I/O terminal block

B1 or B7	COM2
B2	WORK0
B3	WORK1
B4	WORK2
B5	WORK3*



CAUTION

It takes 15msec at the maximum for the changed work No. to become effective. During this section, which work is measured is undefined.

Also, when the work is switched, the hold and graph functions are reset under the after-switching work conditions irrespective of the previous operation.

* If Measurement Work Selection is not set to External Input, measurement work cannot be specified by external input.
Also, if the B5 Function Selection setting is not WORK3, the B5 pin does not function as WORK3.

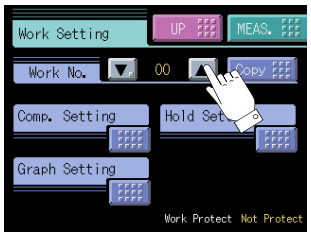
■About changing of the setting work

When changing the hold or comparison set value of each work, set the Work No. with the Work change key on the mode selection screen, and change the set value.

How to set

1) Select the setting Work on the Work setting screen.

2) Then, enter each set value in a likewise manner.



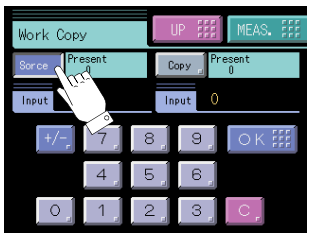
For making the settings of all Works equal, set the Work No. to “All”.
The value set with “All” is set for all WORK00 - WORK15.

CAUTION

The setting work change key is not for specifying the measurement work.
Designate Measurement Work(s) with external selector signals WORK0 - WORK3.

■Work copy

Work can be copied. Press Copy on the Work Setting screen. Set Source(0-15) and Copy(0-15).
Data to be copied are all set values of Comparison setting, Hold setting, and Graph setting.



5-13. Measurement Work Selection

Select the method for specifying the measurement work.

COM.: Measurement work specification by external input becomes ineffective, and only measurement work specification by communication (RS-232C, CC-Link (option) or DeviceNet (option)) becomes effective.

EXT.: Measurement work specification by communication (RS-232C, CC-Link (option) or DeviceNet (option)) becomes ineffective, and only measurement work specification by external input becomes effective.

How to set

SET. → System Setting → Operation → Page 3

5-14. Control Input Selection

Select the method for specifying the control (SECTION signal, T/H signal, or GRAPH TRIG signal) input.

COM.: Control by external input becomes ineffective, and only control by communication (RS-232C, CC-Link (option) or DeviceNet (option)) becomes effective.

EXT.: Control by communication (RS-232C, CC-Link (option) or DeviceNet (option)) becomes ineffective, and only control by external input becomes effective.

How to set

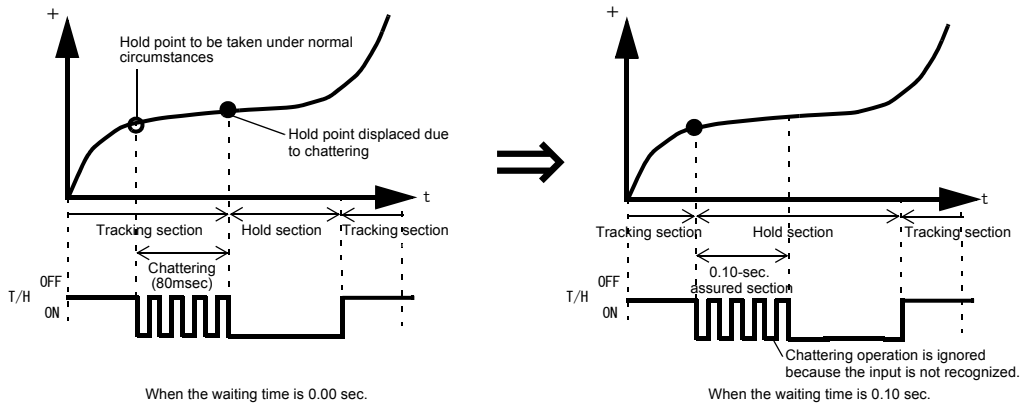
SET. → System Setting → Operation → Page 3

5-15. B6 OFF Detection Wait

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

Setting range: 0.00 - 1.00 sec.

Example) Sample hold



How to set

SET. → System Setting → Operation → Page 3

5-16.B8 OFF Detection Wait

This is convenient in hold controlled by the SECTION signal.
Operationally, detection/hold section is assured as in the case of B6 OFF Detection Wait.
The timer functions so as to also ignore chattering when the OFF edge is detected.

Setting range: 0.00 - 1.00 sec.

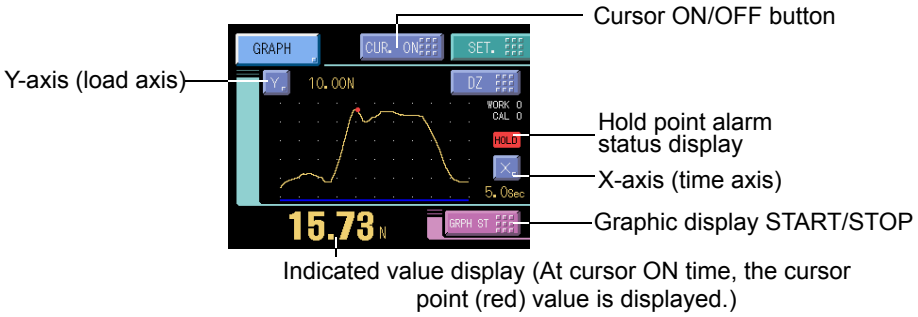
How to set

SET. → System Setting → Operation → Page 3

5-17.Waveform Display

■Graphic display screen

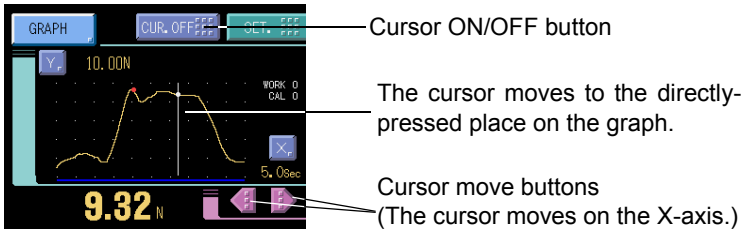
Graph is updated while operating on the ordinary display screen (a comparison, a hold, graph).



CAUTION

When the cursor display is on and when the setting screen is open, the graph is not upgraded.

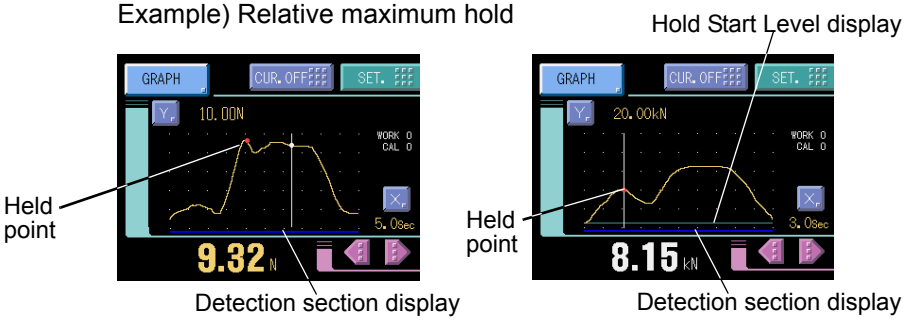
■Cursor display screen



Hold point plotting

By using the hold function and the graph plotting function together, the held point (red) can be plotted.

Example) Relative maximum hold



CAUTION

If the hold value is simply renewed without renewing the graph, the value will differ from the hold point on the graph. In such a case, the hold point alarm status is displayed.

Detection section display

By plotting a graph at the same time as the hold function, a cobalt line indicating the detection section is displayed at the bottom of the X-axis.

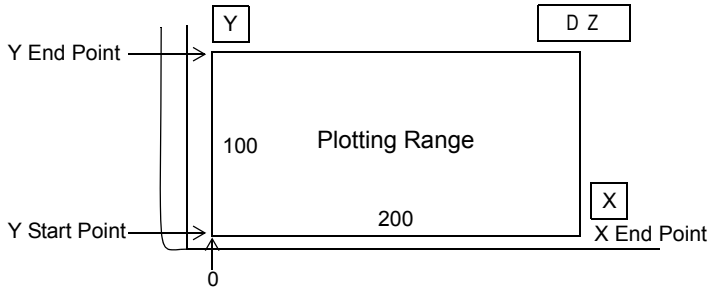
Hold Start Level display

If the Hold Start Level is used in the hold function, a light blue line is displayed. Also, a dotted line appears when the Hold Start Level is outside the graph area.

X-axis and Y-axis on the graph plotting screen

X-axis The X-axis is a time setting axis. One graph screen is plotted between the start signal input point and the X start point.
There are 200 plotting points, and typical values for the predetermined time divided by this number of plotting points are plotted.

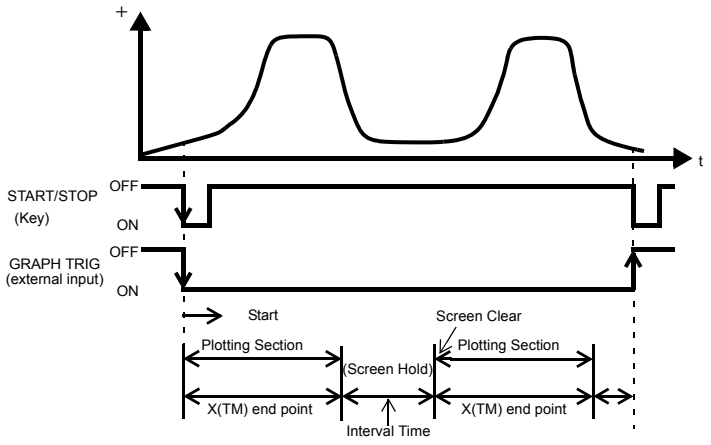
Y-axis The Y-axis is a load setting value. A graph is plotted between the Y start point and the Y end point. (There are 100 plotting points.)



■Graph plotting

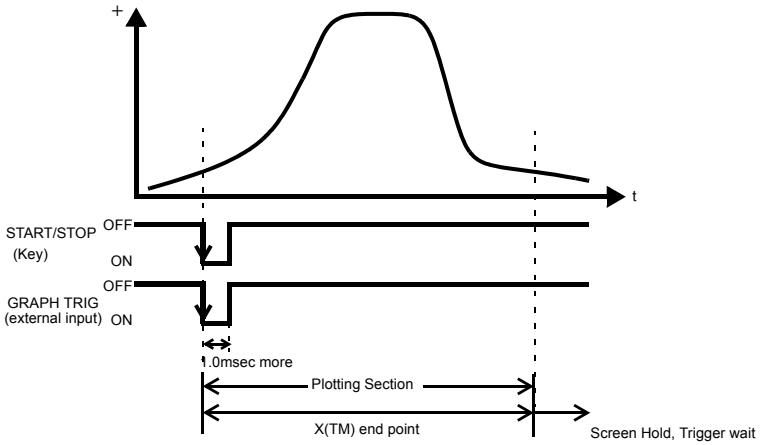
Continued

Graph plotting starts with the GRAPH Start/Stop key input or the GRAPH TRIG external input ON. When it ends on one screen, the screen is cleared after expiration of the interval time and graph plotting restarts on the next screen. Plotting ends with the GRAPH Start/Stop key input or the GRAPH TRIG external input OFF.



External

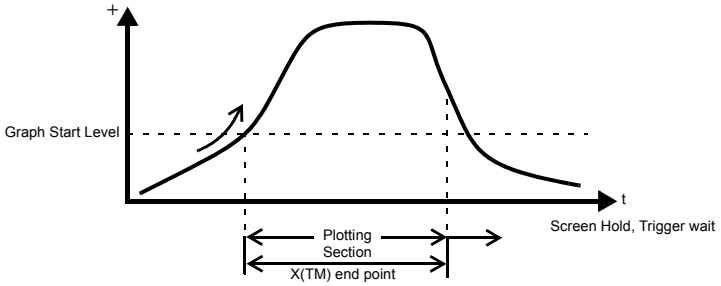
Graph plotting starts with the GRAPH Start/Stop key input or the GRAPH TRIG external input ON.
Plotting ends on one screen at the predetermined time of the X end point.



Level

Plotting starts when the Level detection conditions is met in comparison of the Graph Start Level set value and indicated value. Plotting ends on one screen at the predetermined time of the X end point.

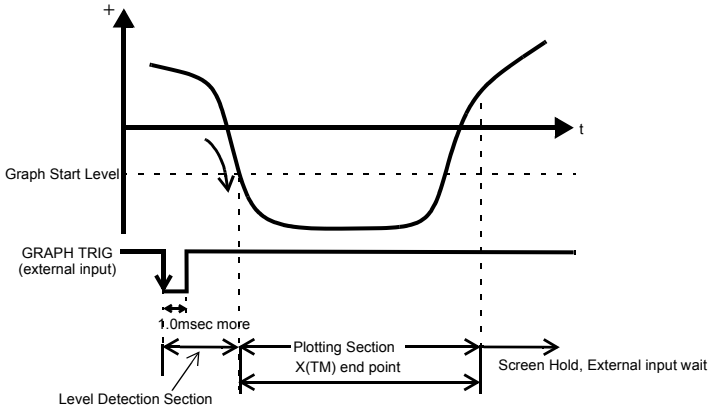
Example) Graph Start Level→Passed HI



External+level

Plotting starts when the Level detection conditions is met in comparison of the Graph Start Level and indicated value after GRAPH TRIG external input ON.
Plotting ends on one screen at the predetermined time of the X end point.

Example) Graph Start Level→Passed LO



■Graph mode

Set the graph plotting mode.

Setting range: Continued, Ext, Level, Ext+Level

How to set

SET. → Work Setting → Graph Setting → Page 1

■Interval time

If you select "Continued" in the graph function setting, set the graph plotting operation interrupting time from clearing the screen until moving to the next graph plotting operation. During this time, the graph screen is held.

Setting range: 00.0 - 99.9 sec.

How to set

SET. → Work Setting → Graph Setting → Page 2

■Graph start level

If you select [level] or [external + level] in the graph function setting, set the graph plotting start level.

Setting range:－99999 - 99999

How to set

SET. → Work Setting → Graph Setting → Page 1

■Level detection conditions

If you select [level] or [external + level] in the graph function setting, set the graph plotting start level comparison conditions.

Setting range: Passed, Passed HI, Passed LO, Beyond, Below

How to set

SET. → Work Setting → Graph Setting → Page 2

- Passed
  Graph plotting starts when the indicated value crosses the level set value.
- Passed HI
  Graph plotting starts when the indicated value crosses the level set value upward.
- Passed LO
  Graph plotting starts when the indicated value crosses the level set value downward.
- Beyond
  Graph plotting starts when the indicated value is larger than the level set value.
- Below
  Graph plotting starts when the indicated value is smaller than the level set value.

■X(Time) end point

Set the time to display by one screen.

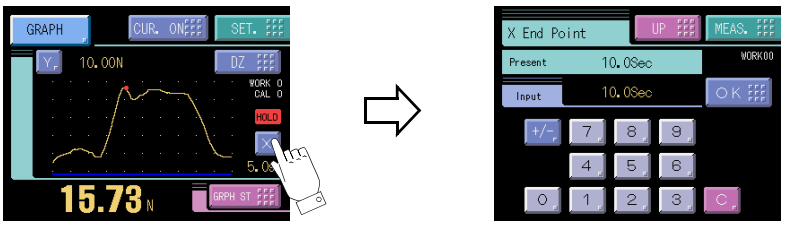
Setting range: 00.1 - 99.9 sec.

How to set

SET. → Work Setting → Graph Setting → Page 1

Simple setting call

Press the [X] button on the graph display to go direct to the X end point entry screen.



■Y(Load) start point and Y(Load) end point

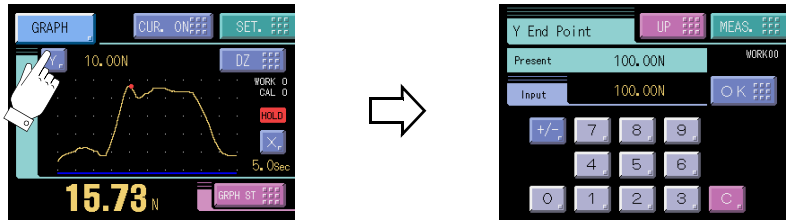
Setting range: −99999 - 99999 (where Y start point < Y end point)

How to set

SET. → Work Setting → Graph Setting → Page 1

Simple setting call

Press the [Y] button on the graph display to go direct to the Y end point entry screen.



CAUTION

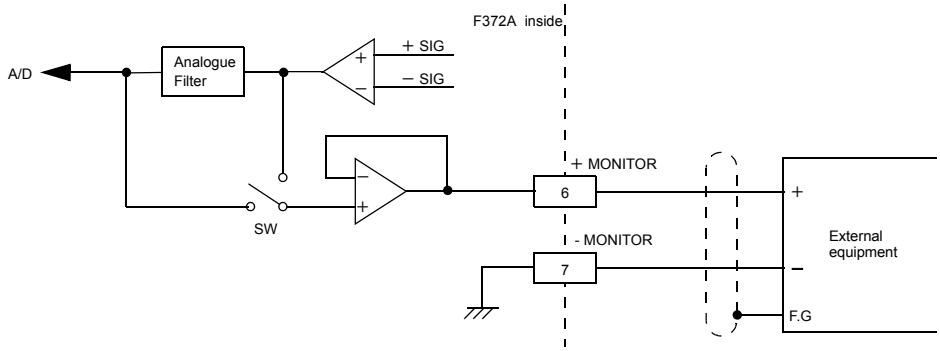
About the case to switch work and to draw

When beginning to draw, X (Time) end point and Graph mode, etc. are read. Therefore, please do not do the work switch while drawing when these settings are different in each work. Please do after drawing ends.

5-18. Voltage Output

This interface extracts analog voltage proportional to sensor input signals. This interface is convenient for observation and recording of waveforms with a recorder, etc., connected.
The output level is approx. 2V per 1mV/V of sensor input.

- Example of output equivalent circuit and external equipment connection



Output signals are not the indicated values themselves because they are extracted before sensor input signals are A/D-converted.
Therefore, output signals do not synchronize with the digitally processed indicated values, such as the digital zero and digital filter.
Output in synchronization with the indicated values requires an optional D/A converter.

Voltage output filter

Whether to extract the voltage output before or after the internal analog filter can be switched.

ON: Output after the analog filter
OFF: Output before the analog filter

How to set

SET. → System Setting → Operation → Page 2

5-19. Screen Lock / Key Lock (B5 terminal function selection)

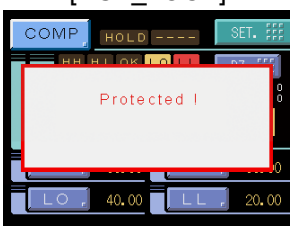
By the setting of "B5 Function Selection," switching can be done from the WORK3 terminal function to DSP_LOCK terminal function or KEY_LOCK terminal function.

WORK3: This can be used as the 4th work selection bit of external input.
WORK can be specified from 00 to 15.

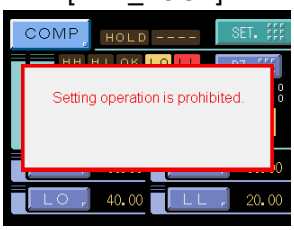
DSP_LOCK: When the terminal is short-circuited, key operations on the measurement screens (comparison, hold, and graph) are disabled. However, the measurement screen can be changed (hold to graph) and the cursor function is enabled.

KEY_LOCK: All key operations are disabled.

[DSP_LOCK]



[KEY_LOCK]



CAUTION

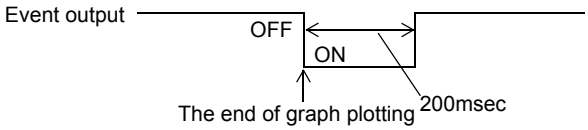
By the selection of each LOCK function, measurement work that can be specified externally is limited to WORK00 to WORK07.

How to set

SET. → System Setting → Operation → Page 2

5-20. Event Output at the End of Graph Plotting

Each time a graph is plotted on screen, a pulse signal is output (the pulse width is 200msec). The waveform can automatically be taken in through the RS-232C interface by connecting to the event input of the DS400.



*If the time to start the next graph plotting is less than 200msec, the pulse is forcedly turned OFF when the plotting starts.

5-21. RUN Output

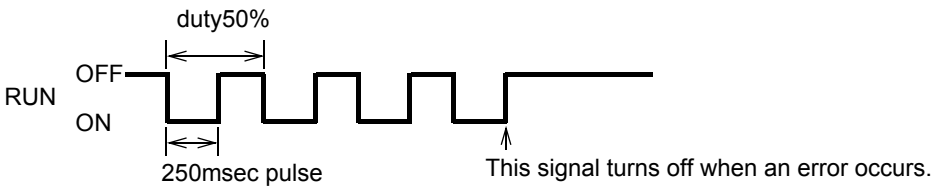
External output “RUN” stops when abnormal state of indicated value is detected.
The conditions of stopping the output caused by abnormal state are as follows.

- Sensor ±error
- ±Over (Overflow error)
- Overload (Overload error)
- Zero error (Zero calibration error)
- Span error (Span calibration error)
- Zero limit (Digital zero limit error)

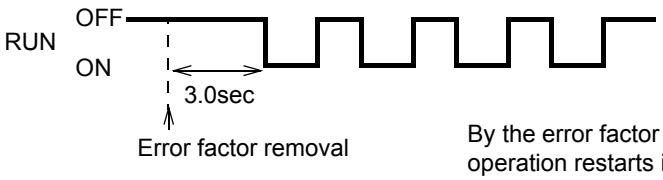
Refer to "Error Display List" on page 84 about the contents of errors.

RUN out specifications are as follows.

RUN output spec

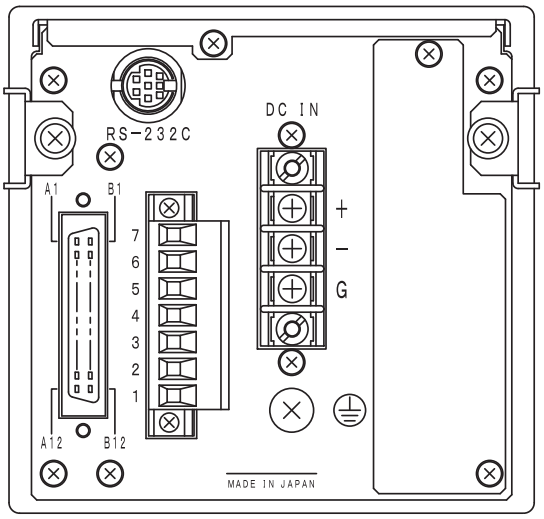


Normally, the signal repeating ON-OFF operation is output.



5-22.RS-232C Interface

The RS-232C is an interface to read the indicated value and status of the F372A and to write parameters into the F372A.
This interface is convenient to process controls, totals, records, etc., by connecting the F372A to a computer, process controller, sequencer or the like.



■Communication specifications

Specifications

Signal level:	Based on RS-232C	
Transmitting distance:	Approx.15m	
Transmitting method:	Asynchronous, Full duplex	
Transmitting speed:	9600, 19200, 38400, or 57600 bps Selectable	
Bit configuration:	Start bit	1
	Data bit	7 or 8 bit Selectable
	Stop bit	1 or 2 bit Selectable
	Parity	Parity none, odd or even Selectable
	Delimiter for sending	CR, CR+LF Selectable
Code:	ASCII	

Connector pin assignment

This connector connects the RS-232C.
(→"RS-232C interface connection" on page 22)

Cable

(→"RS-232C interface connection" on page 22)

Communication check

The communication can be checked. (→"⑥COM check" on page 87)

■RS-232C interface setting

Set the RS-232C communication conditions of the F372A.

Communication mode

Normal, Continue, Print

How to set

SET. → System Setting → RS-232C Setting → Page 1

Baudrate

9600, 19200, 38400, 57600bps

How to set

SET. → System Setting → RS-232C Setting → Page 1

Data bit

7bit, 8bit

How to set

SET. → System Setting → RS-232C Setting → Page 1

Stop bit

1bit, 2bit

How to set

SET. → System Setting → RS-232C Setting → Page 1

Parity bit

NONE, ODD, EVEN

How to set

SET. → System Setting → RS-232C Setting → Page 1

Delimiter

CR, CR＋LF

How to set

SET. → System Setting → RS-232C Setting → Page 2

Flow control

Off, RTS/CTS

How to set

SET. → System Setting → RS-232C Setting → Page 2

■Communication mode

1.Normal

Communications are carried out by commands from the host computer.
The indicated value, status and parameters can be read, and parameters can be written.

2.Continue

The indicated value and status are continuously transmitted.

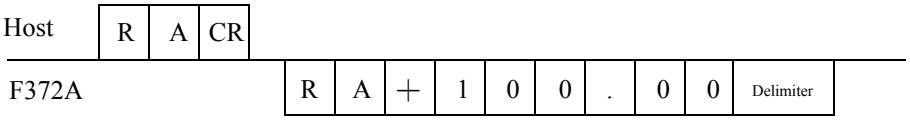
3.Print

The indicated value is transmitted upon printing (when a print command is output to the SI/F).

■Communication format

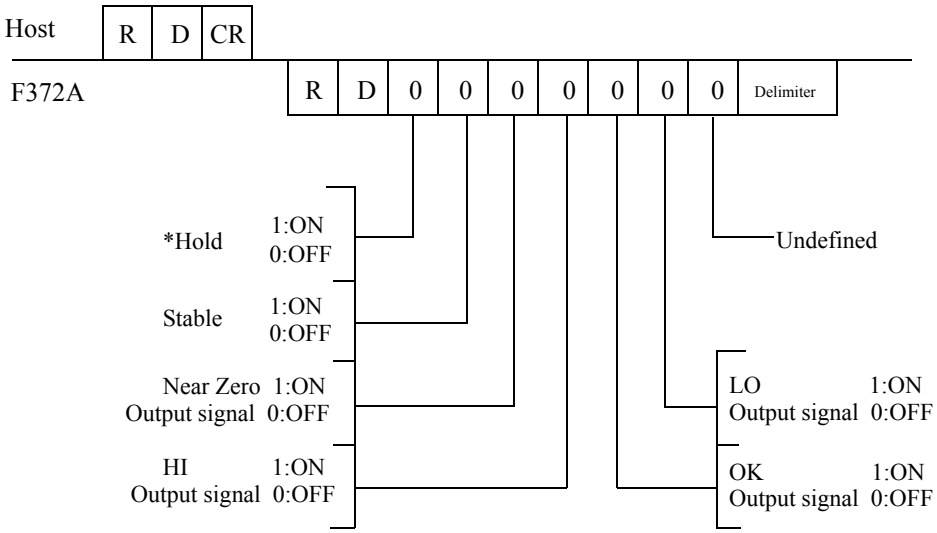
1.Normal

- Reading the indicated value (sign, 5-digit indicated value, decimal point)

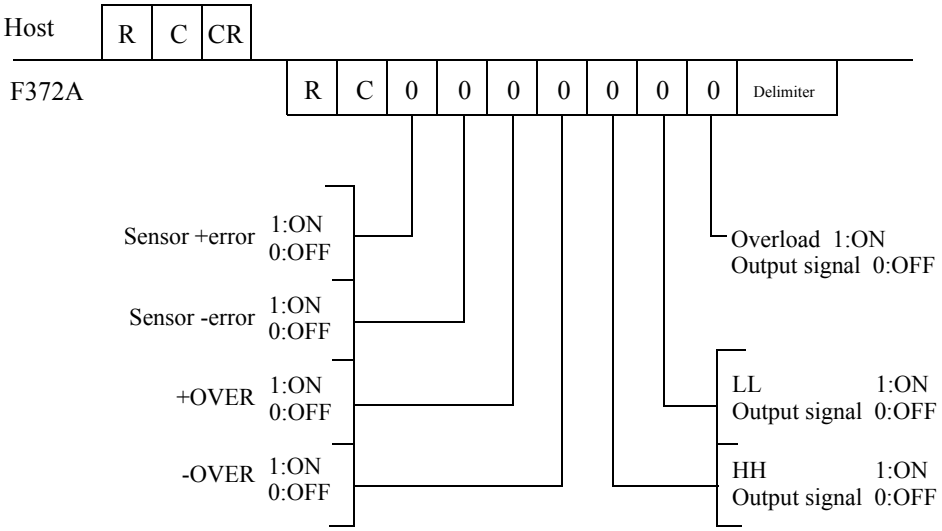


* If the indicated value has no decimal point, a decimal point follows the numerical value.

- Reading the status (7-digit)



*The hold bit is operated at the same timing as the H/E signal.



- Writing parameters

HH Limit	W	1	1	±						CR	(Work Setting Protect)
HI Limit	W	1	2	±						CR	(Work Setting Protect)
LO Limit	W	1	3	±						CR	(Work Setting Protect)
LL Limit	W	1	4	±						CR	(Work Setting Protect)
Hysteresis	W	1	5	0	0					CR	(Work Setting Protect)
Cal. Select	W	4	4	0	0	0	0	0	⑥	CR	(Calibration Protect)
Digital Offset	W	4	8	±						CR	(Calibration Protect)
Near Zero	W	1	6	0						CR	(Work Setting Protect)
Hold Mode	W	2	1	0	0	0	0	0	①	CR	(Work Setting Protect)
Hold Section	W	7	1	0	0	0	0	0	②	CR	(Work Setting Protect)
Section Time	W	2	2	0	0					CR	(Work Setting Protect)
Hold Start Level	W	2	3	±						CR	(Work Setting Protect)
Rel.Minimum Count	W	2	4	0						CR	(Work Setting Protect)
Rel.magnification	W	2	5	0	0	0	0	0	③	CR	(Work Setting Protect)
Inf.Minimum Slope	W	2	6	0						CR	(Work Setting Protect)
Inf.F Slope Time	W	2	7	0	0	0				CR	(Work Setting Protect)
Inf.R Slope Time	W	2	8	0	0	0				CR	(Work Setting Protect)
Graph Mode	W	3	1	0	0	0	0	0	④	CR	(Work Setting Protect)
Interval Time	W	3	2	0	0	0				CR	(Work Setting Protect)
Graph Start Level	W	3	3	±						CR	(Work Setting Protect)
Level detection conditions	W	3	4	0	0	0	0	0	⑤	CR	(Work Setting Protect)
Work No.	W	1	F	0	0	0	0			CR	

* When writing work setting values, specify the work by this setting in advance.

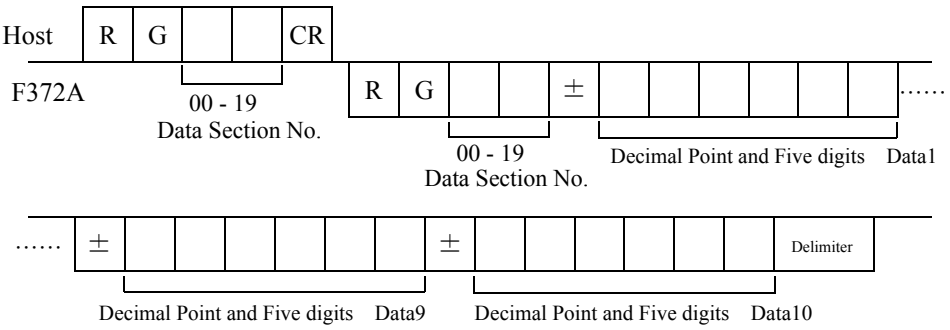
Samp.Removal Val.	W	2	9	0	0	±				CR	(Work Setting Protect)

Set value correspondence table

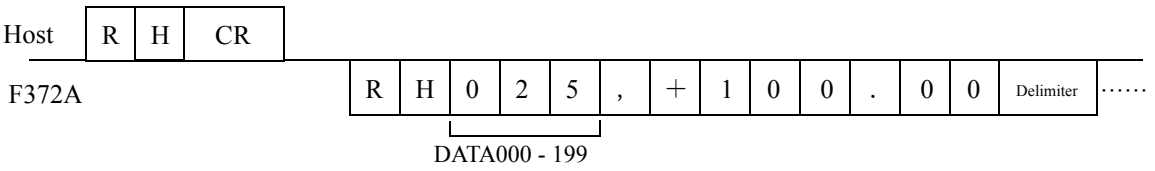
① Hold Mode	② Hold Section	③ Rel.magnification
0: OFF	0: All	0: × 0.25
1: Sample	1: EXT	1: × 0.50
2: Peak	2: EXT+TM	2: × 0.75
3: Valley	3: LVL+TM	3: × 1.00
4: P-P	4: LVL	4: × 1.25
5: Average		5: × 1.50
6: Inf. Pnt		6: × 2.00
7: Rel. Max		7: × 3.00
8: Rel. Min		8: × 4.00
9: Rel. Dif		

④ Graph Mode	⑤ Level detection conditions	⑥ Calibration Selection
0: Continued	0: Passed	0: Cal.0
1: Ext	1: Passed HI	1: Cal.1
2: Level	2: Passed LO	2: Cal.2
3: Ext+Level	3: Beyond	3: Cal.3
	4: Below	4: EXT.

- Reading waveform data

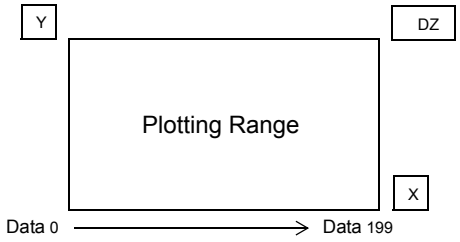


- Wave form hold point data read-out (data No, a mark, a decimal point,5 figures of directions value)



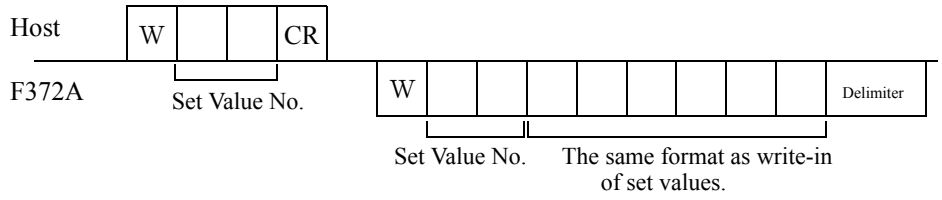
Data Section No.

One graph plotting screen includes 200 pieces of data. In reading waveform data, data can be read by being divided into 20 sections (by 10 pieces).



Section 00 Data 0 - Data 9
Section 01 Data10 - Data 19
≀
Section 19 Data190 - Data 199

- Reading parameters



- Commands (Host→F372A)

Digital Zero	C	G	CR
Digital Zero reset	C	H	CR
Print instruction	C	I	CR

(This will issue print a command onto SIF.)

2.Continue

The indicated value is continuously transmitted.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
G	S	,	∗1	,	∗2	,	∗3	,	∗4	,	∗5	,	±							Delimiter	

HEADER

Sign
＋ or －

Five digits of the indicated value and decimal point

3.Print

The indicated value is transmitted upon printing.

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
G	S	,	∗1	,	∗2	,	∗3	,	∗4	,	∗5	,	±							Delimiter	

HEADER

Sign
＋ or －

Five digits of the indicated value and decimal point

＊1
O ..... Sensor ±error, ±OVER
S..... Stable
M..... Not Stable
H ..... Hold
＊1 Priority H＞O＞ (S or M)

＊2
A ..... Zero Tracking OFF
T..... Zero Tracking ON

＊3
H ..... HI limit ON
L..... LO limit ON
G ..... HI limit and LO limit OFF
N ..... HI limit and LO limit ON
F..... Compare OFF
＊3 Priority N＞ (H or L) F＞ G

＊4
H ..... HH limit ON
L..... LL limit ON
G ..... HH limit and LL limit OFF
N ..... HH limit and LL limit ON
F..... Compare OFF
＊4 Priority N＞ (H or L) F＞ G

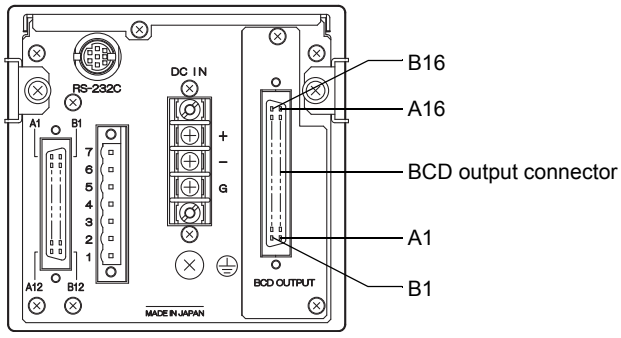
Even if the HI-LO limit output selection is changed to other than H2/L2, characters will not change.

＊5
N ..... Near Zero OFF
Z..... Near Zero ON

6 OPTION

6-1. BCD Data Output (Option)

The BCD data output is an interface to extract the indicated value of the F372A as BCD data. This interface is convenient to process controls, totals, records, etc., by connecting the F372A to a computer, process controller, sequencer or the like.
The I/O and internal circuits are electrically insulated by photocoupler.



■Connector pin assignment

32 pin

No.		Signal	No.		Signal
A1	*	COM	B1	*	COM
A2	OUT	1	B2	OUT	1000
A3	OUT	2	B3	OUT	2000
A4	OUT	4	B4	OUT	4000
A5	OUT	8	B5	OUT	8000
A6	OUT	10	B6	OUT	10000
A7	OUT	20	B7	OUT	20000
A8	OUT	40	B8	OUT	40000
A9	OUT	80	B9	OUT	80000
A10	OUT	100	B10	OUT	Minus (Polarity)
A11	OUT	200	B11	OUT	OVER
A12	OUT	400	B12	OUT	STAB
A13	OUT	800	B13	OUT	STROBE
A14	IN	BCD Data Hold	B14	IN	Logic Switching
A15	IN	Output Data Switching	B15	IN	
A16	—		B16	—	

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

■BCD output select

When "External" is set by the BCD Output Select setting, the output data is switched by A15. In the case of external selection, read after at least 2 cycles.
When COM and A15 are open: real time value, When they are short-circuited:hold value

Output data: Realtime, Hold, EXT.

How to set

SET. → System Setting → Option Setting (BCD OUT) → Page 1

■BCD output rate

Output rate: 10, 20, 50, 100, 200, 500, 1000, 2000〔Times/sec.〕

How to set

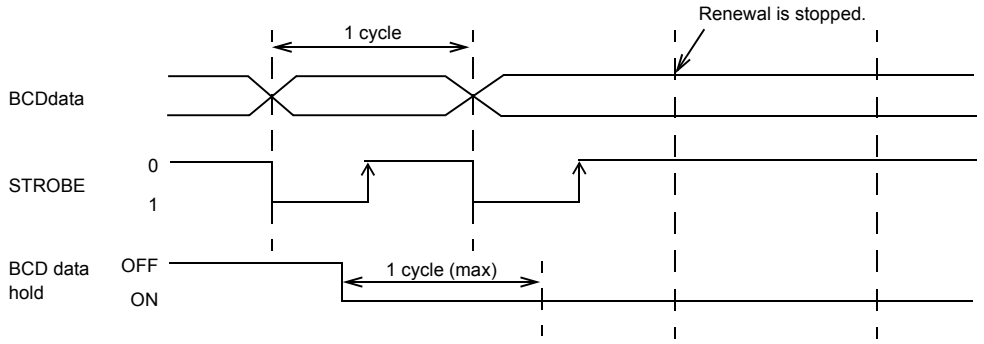
SET. → System Setting → Option Setting (BCD OUT) → Page 1

■Logic switching

Select the logic of output signals with pin B14.
Read at least 2 cycles after inputting the logic switching.
When COM and pin B14 are open: negative logic, When they are short-circuited: positive logic

■BCD data hold

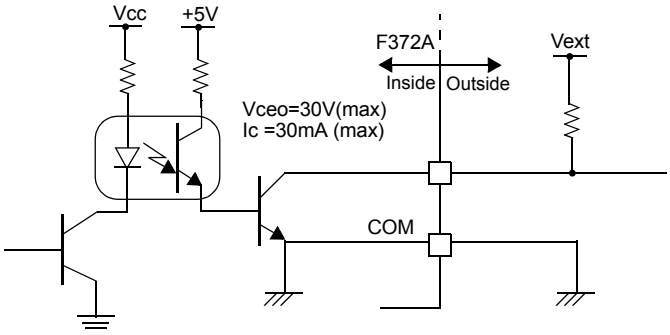
Renewal of the BCD data output signal is stopped. Also the STROBE output is turned OFF. Switching is done by A14. When COM and A14 are open: hold cancel, When they are short-circuited: hold on



Read at least 2 cycles after inputting the BCD data hold.
As long as the BCD Data Hold signal is inputted, data can be read reliably, but because the data is not renewed, it may be different from proper data.

■Equivalent circuit

-Output The signal output circuit is operated through a TTL open collector.



Internal transistor status

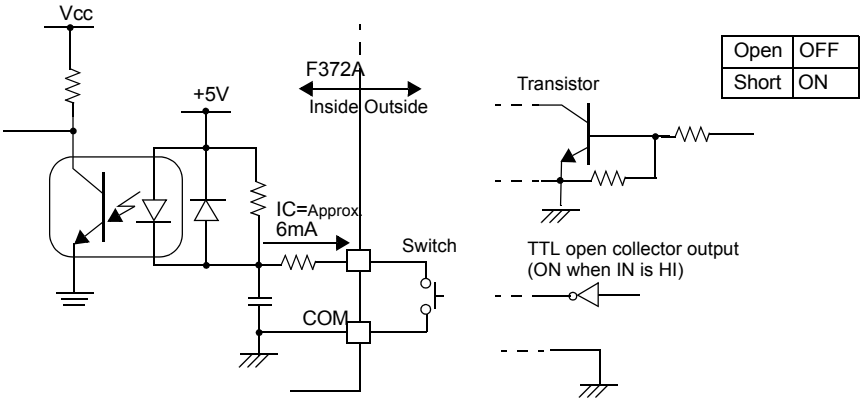
Output data	Negative	Positive
0	OFF	ON
1	ON	OFF

Output pin level

Output data	Negative	Positive
0	H	L
1	L	H

Through logic switching (B14)

-Input



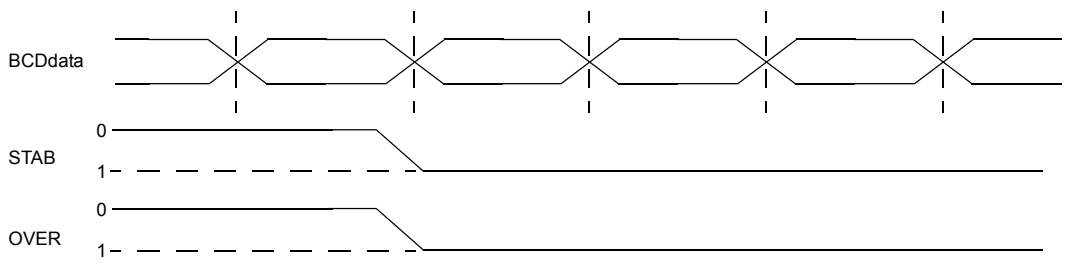
CAUTION

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

■Signal timing

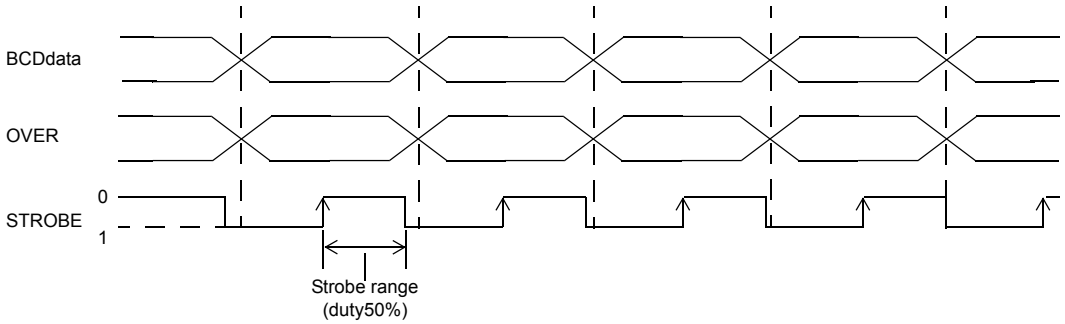
-STAB This signal turns on at the same time as BCD data when stability is detected by Motion Detect (MD). This signal is not output when the output data is a real time value.("Motion Detect (MD)"on page 37)

-OVER This signal is output at the time of a sensor error or ±OVER.



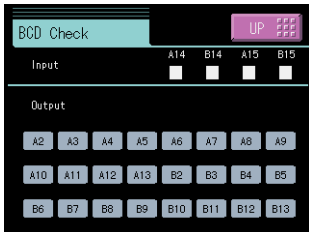
-STROBE Strobe pulses are output in synchronization with BCD data. Read data using the rising edges of the pulses. The BCD data output rate setting can be changed.

Example) Negative logic



■Self check

The BCD input / output status can be checked from bit to bit.
Each input turns green when its ON state is recognized.
Each output turns on when the corresponding button is pressed.

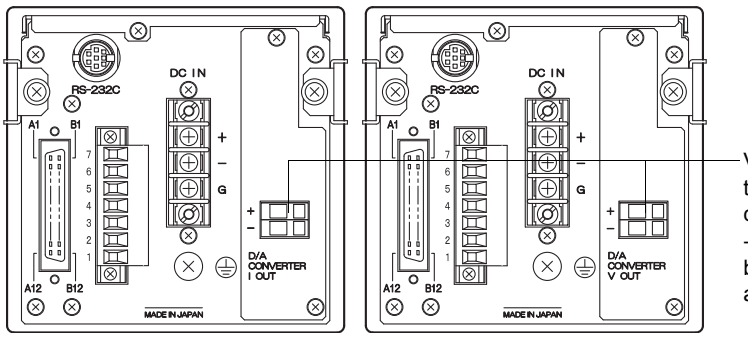


How to set

SET. → System Setting → Option Setting (BCD OUT) → Page 1

6-2. D/A Converter (Option)

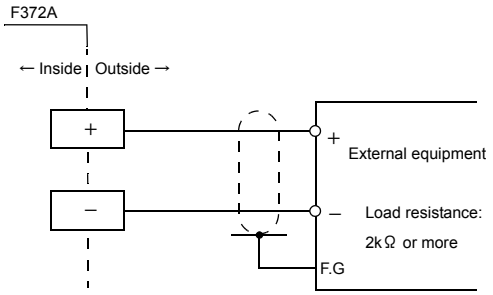
A D/A converter is provided for obtaining analog output synchronized with the indicated value of the F372A.
The analog output ranges are -10 - +10V output and 4 - 20mA constant-current output.
By using the D/A zero setting and D/A full scale setting functions, analog output can be obtained between zero (0V, 4mA) and full scale (10V, 20mA) with respect to the predetermined digital value.
The output circuit and the main unit circuit are isolated. The resolution is 1/10000 to -10 - +10V and 4 - 20mA, and the conversion rate is 2000 times/sec. The maximum voltage output range are about ±11V, the maximum current output range are about 2.4 - 21.6 mA.



Voltage / current output terminals: terminals to extract voltage or current signals.
-10 to +10V and 4 to 20mA can be obtained by the voltage output and current output, respectively.

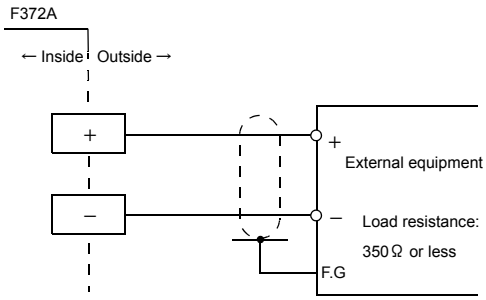
- Taking voltage output signals

Connect external equipment (2k Ω or more load resistance) to + and - of the F372A.



- Taking current output signals

Connect external equipment (350 Ω or less load resistance) to CUR and G of the F372A.



- Resolution

The D/A converter has a resolution of 1/10000 to -10 - +10V (4 - 20mA).

CAUTION

- The D/A converter is optional.
- Do not apply external voltage because it will break.
- Do not short-circuit the voltage output because a failure will occur. Also, connecting a capacitive load may cause oscillation.

■Scale setting value selection

Four types of zero scale and full scale settings can be stored.
Switch with the selector button (/) to conduct scale setting.
Scale of output of D/A converter changes accordingly when gain changes by the selection of calibration value.

How to set

SET. → System Setting → Option Setting (D/A OUTPUT) → Page 1

■Zero scale output value and full scale output value

Setting range: −99999 - 99999 (where zero set value < full scale set value)

- In the case of voltage output

Zero scale: Set the indicated value for the time of output of 0V.
Full scale: Set the indicated value for the time of output of 10V.

- In the case of current output

Zero scale: Set the indicated value for the time of output of 4mA.
Full scale: Set the indicated value for the time of output of 20mA.

How to set

SET. → System Setting → Option Setting (D/A OUTPUT) → Page 1

■D/A output select

Hold, Realtime, Zero scale, Full scale

Hold	: Output is produced in synchronization with the indicated value.
Realtime	: Output is produced in synchronization with the sensor input value.
Zero scale	: Output is fixed at zero output (0V or 4mA).
Full scale	: Output is fixed at full scale (10V or 20mA).

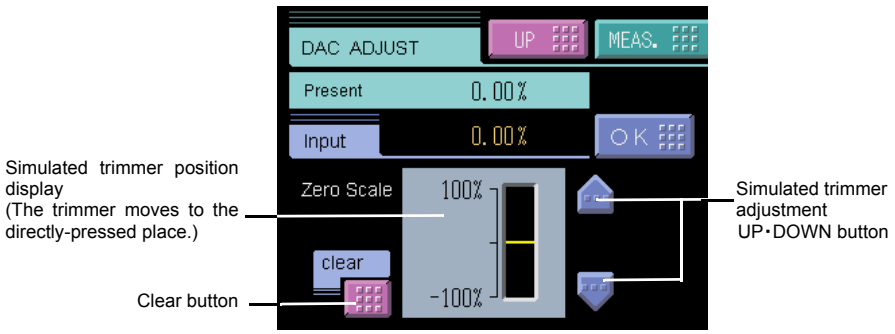
How to set

SET. → System Setting → Option Setting (D/A OUTPUT) → Page 1

How to output adjust

Select each fixed output in D/A output select, and press the OK button, and then use the simulated trimmer appearing on the adjustment screen to adjust the output.

While monitoring the output value, make fine adjustment of the output with the UP/DOWN button of the simulated trimmer, and determine by pressing the OK button, so that the trimmer position is entered.



* Pressing the simulated trimmer buttons continuously performs continuous operation.

* The trimmer adjusting ranges are as follows: voltage output; about ±2.0V, and current output; about ±1.6mA.

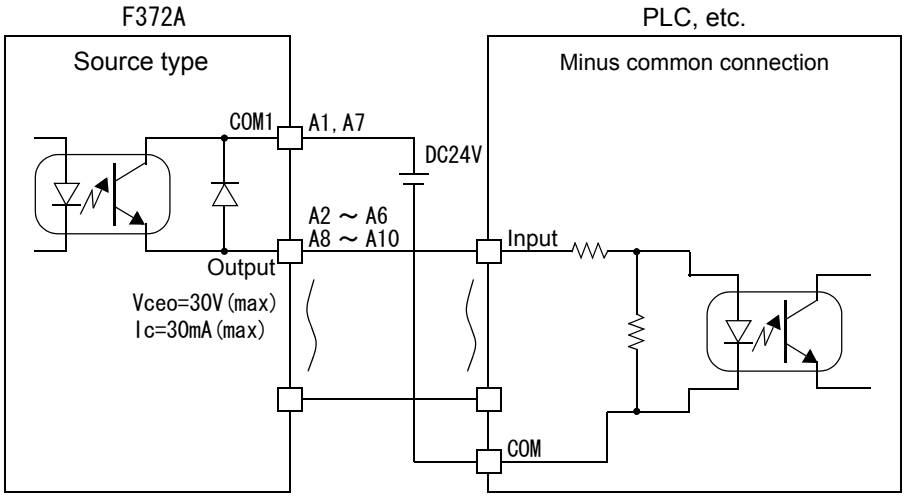
* The [Clear] button resets the Simulated trimmer position to the trimmer center point (0%).

6-3. External I/O (Source type (ISC) option)

The source type external input/output signal is an option which can be changed external input/output signal of F372A to source type. (The standard is sink type.)
The connection of external input/output signal is the minus common.

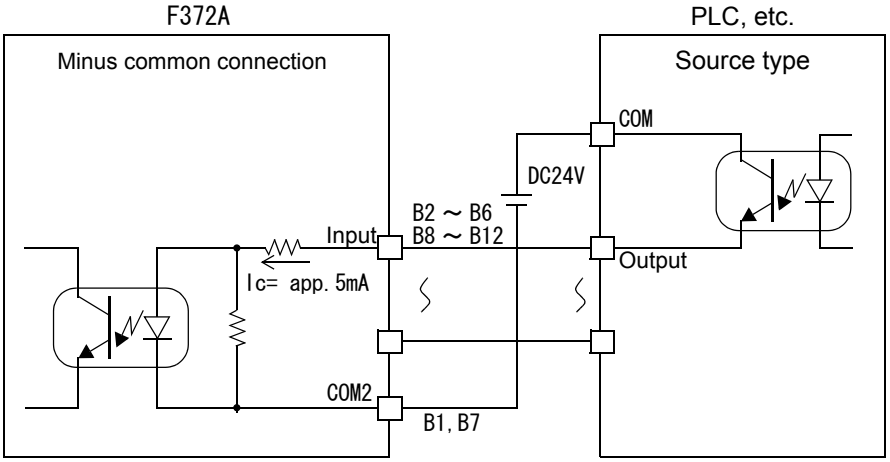
How to connect external output（Source type）

- Equivalent circuit



How to connect external input
(minus common connection of voltage input type)

- Equivalent circuit



CAUTION

- Connect elements that can pass Ic=5mA or more.
- The leak current of the elements connected should be 400 μA or less.
- External power supply (DC24V) is needed since F372A does not have the power supply

7 SPECIFICATIONS

7-1. Specifications

■Analog section

Sensor excitation	10V, 2.5V DC Output current: Within 120mA 4-wire (Up to four 350Ω load cells can be connected.)	
Signal input range	-3.0 - +3.0mV/V	
Zero and gain adjustment	Performed by digital computation	
Accuracy	Non-linearity:	Within 0.02%FS±1 digit (at a 3.0mV/V input)
	Zero drift:	Within 0.5μV/℃RTI
	Gain drift:	Within 0.01%/℃
A/D converter	Rate:	2000 times/sec.
	Rate:	24 bits (binary)
	Effective resolution:	Approx. 1/30000 to 3.0mV/V input
Analog filter	30Hz, 100Hz, 300Hz, 1000Hz	
Voltage output	Output level:	Approx. 2V per 1mV/V of input Load
	Load resistance:	2kΩ or more

■Digital section

Display
3.5 inch TFT color LCD module (display area: 71mm×53mm)
320×240 dots
Indicated value: ±99999 (5-digit)

Equivalent input calibration
Range: 0.5 - 3.0mV/V Error: Within ±0.1%FS

Hold functions
1) Sample hold
2) Peak hold
3) Valley hold
4) P-P hold
5) Average hold
6) Inf. Pnt hold
7) Rel. Max hold
8) Rel. Min hold
9) Rel. Dif hold

*Section setting (“all section”, “external signal”, “external signal+time”, or “level+time”) is available for 2) - 5).
*Section setting (“level”) is available for 2) - 3).

Comparison functions

	External output
HH limit	HH
LL limit	LL
	OK
HI limit	HI
LO limit	LO

Calibration value selection
Four calibration values can be stored in memory and switched.

■Standard interfaces

RS-232C communication interface

Start/stop system
Baud rate: 9600bps - 57600bps

SI/F (2-wire serial interface)

Start/stop system
Baud rate: 600bps

■Options interfaces

BCD data output	Open collector		
	Output rate		
	Can be selected from 10, 20, 50, 100, 200, 500, 1000 and 2000 times/sec.		
	Capacity	30V, 30mA	
D/A converter	Voltage output (DAV)	-10 - +10V	RL>2kΩ
	Current output (DAI)	4 - 20mA	RL<350Ω
	Zero output and full scale output can be digitally adjusted.		
	Zero adjusting range:	±10%FS	
	Gain adjusting range:	±10%FS	
	Zero drift:	Within 0.6mV/℃ (DAV) Within 0.5μA/℃ (DAI)	
	Gain drift:	Within 50ppm/℃	
	Non-linearity:	0.05%FS	
	Response:	Dependent on the A/D conversion speed (2000 times/sec.) of the main unit	

■External input and output

Output

HI-LO limit comparison output	- HH, HI, OK, LO, LL
Normal operation output	- RUN
Hold end output	- H/E
Graph plotting end output	- EVENT

Input

Work selection input	- WORK0, WORK1, WORK2, WORK3
Hold control input	- T/H, SECTION
Digital zero input	- DZ
Graph plotting control input	- GRAPH TRIG
Calibration Selection input	- CAL0, CAL1

■General

Power source	- DC spec	DC24V (±15%)
Power consumption	- DC spec	18W max
Rush current (Typ)	55A, 1msec (ordinary temperature, at cold-start time)	
Operating conditions	Operation temperature:	0℃ to +40℃
	Storage temperature:	-20℃ to ＋60℃
	Humidity:	85%RH or below (non-condensing)
Warmup time	20 minutes	

Dimensions	96.0W×96.0H×138.0D [mm] (excluding projected parts)
Panel cutout size	$92 \times 92 \begin{smallmatrix}+1\\-0\end{smallmatrix}$ mm（Board thickness：1.6～3.2㎜）
Weight	Approx. 1.0kg

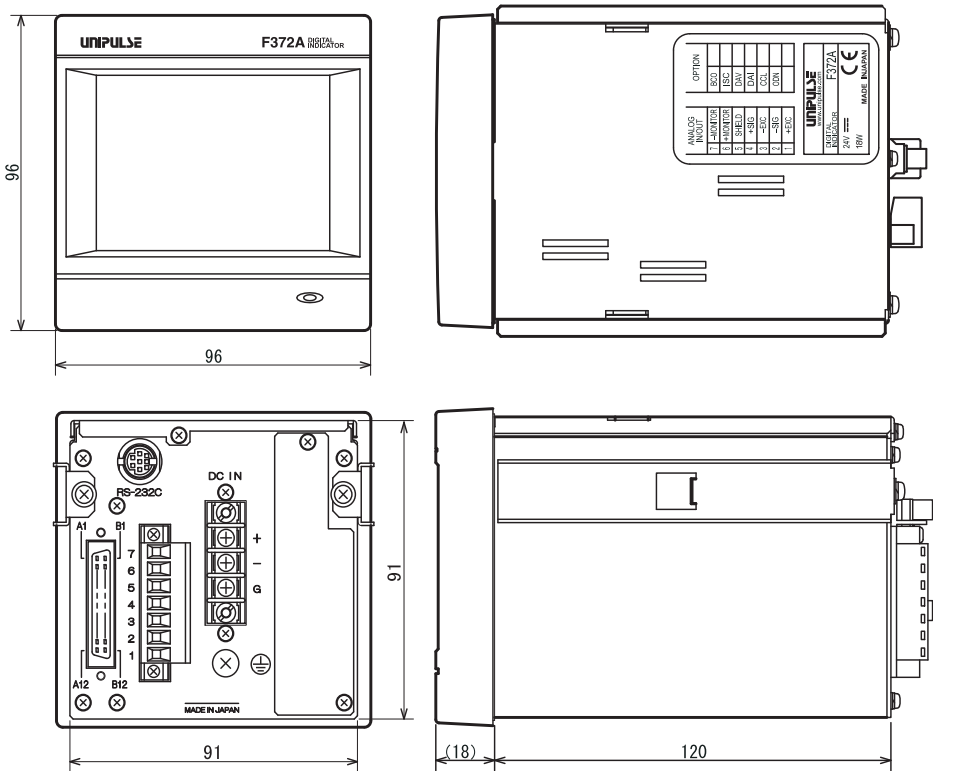
■Accessories

Operation manual 1
Control signal Input/Output connector 1
Connector for BCD output (with BCD option) 1
Mini screwdriver (with DAV/DAI option) 1
Connector for CC-Link (with CC-Link option) 1
Connector for DeviceNet (with DeviceNet option) 1

7-2. Dimensions

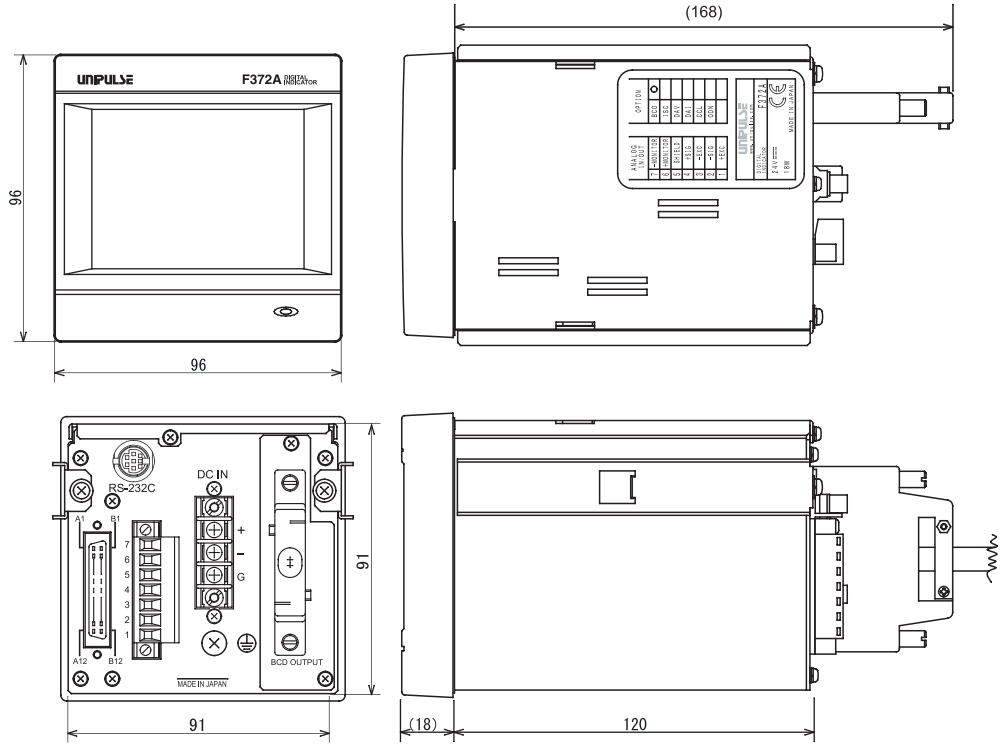
■Standard

［Unit:㎜］



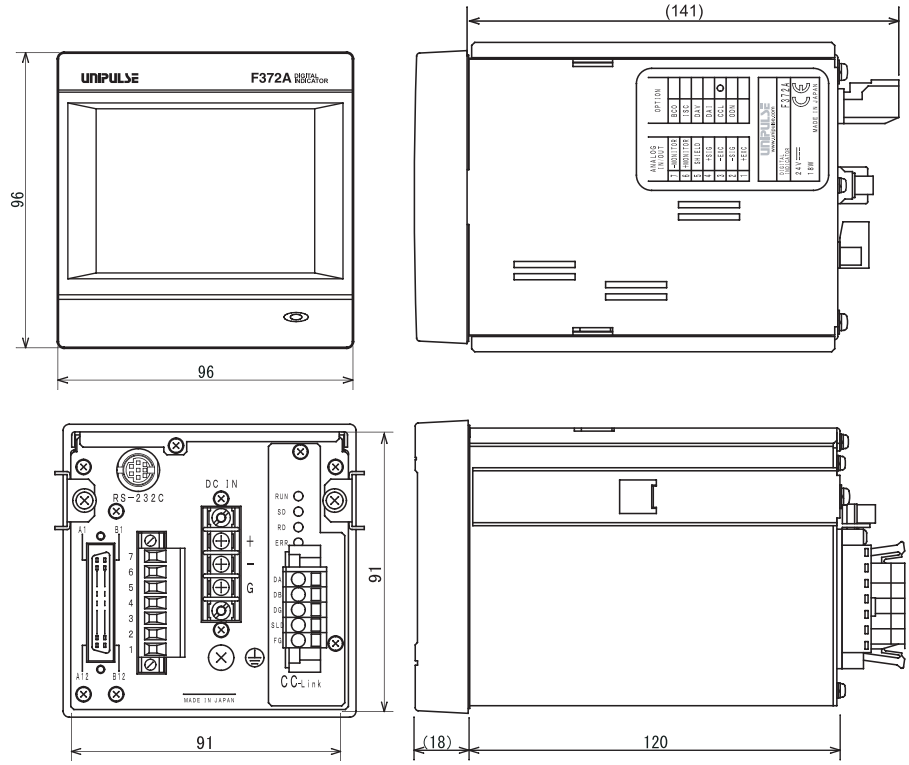
■Equipped with BCD parallel data output interface option

［Unit：mm］



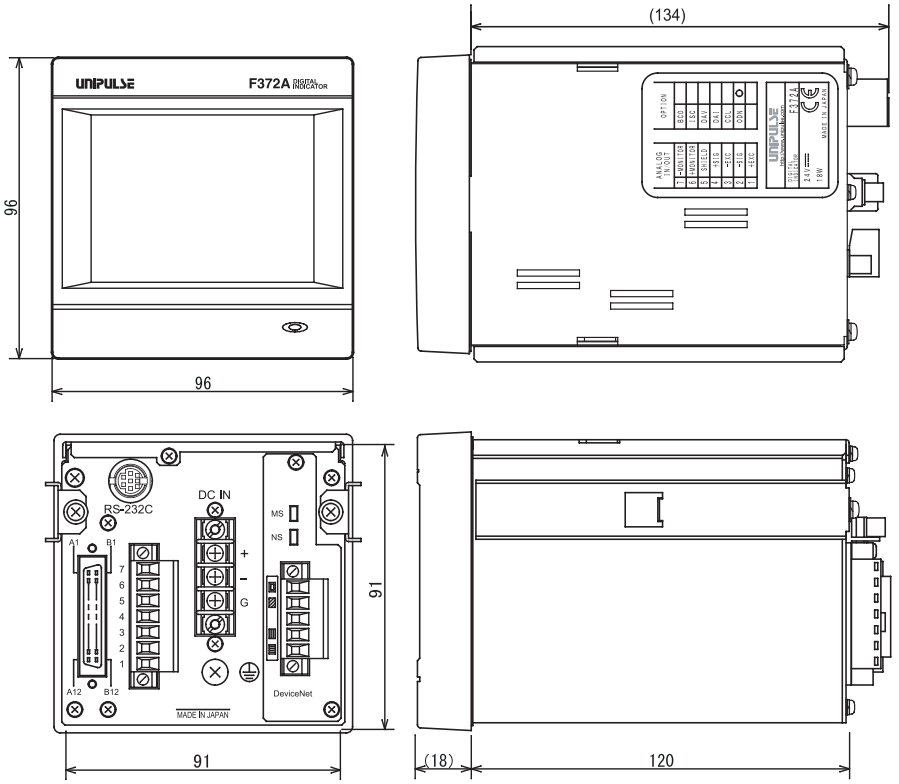
■Equipped with CC-Link interface option

［Unit：mm］

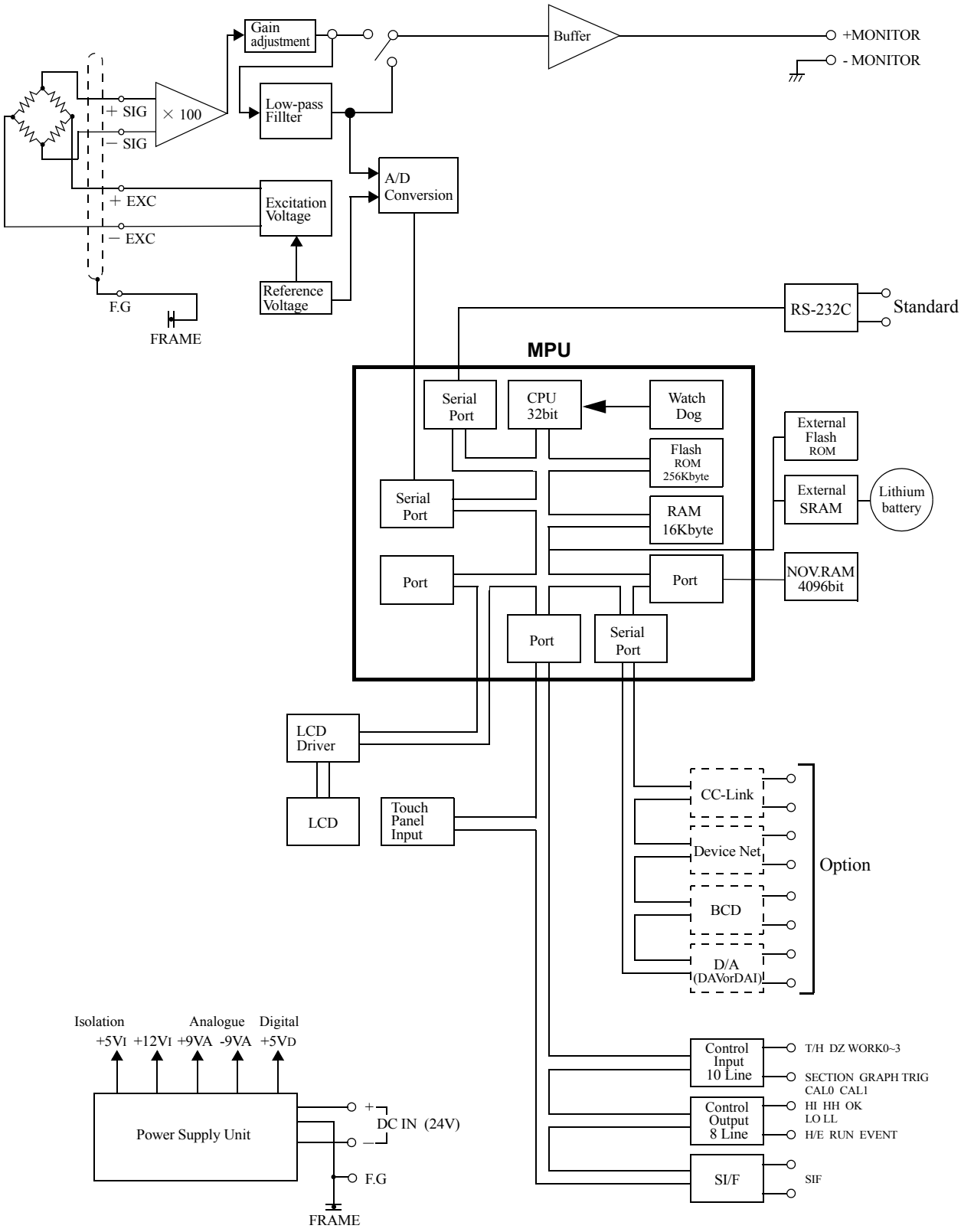


■Equipped with Device Net interface option

[Unit:mm]



7-3. F372A Block Diagram



8 SUPPLEMENTS

8-1. Error Display List

When either of the following errors occur, the RUN signal of an external output is turned off.

■Sensor +error or Sensor -error

This message indicates that the inputted electric signal exceeds the input voltage range of the element (ADC) which converts the inputted electric signal to a digital value whereby the signal cannot be converted to a correct digital value.
Sensor +error and Sensor -error indicate that the inputted electric signal exceeds the input range in the positive direction and negative direction, respectively.
This message may also be displayed when an excessive load is applied to the sensor or the input terminals are opened due to a break in the cable.

■+Over or -Over (Overflow error)

This message indicates that the value to be displayed except the decimal point and sign exceeds five digits. The message and a value of as much as five digits appear alternately.
+OVER and -OVER indicate that the value to be displayed exceeds five digits in the positive direction and negative direction, respectively.
This message is displayed in such a case wherein a load larger than expected is applied or calibration is performed below the measuring range. Check calibration and the measuring object.

■Overload (Overload error)

An Overload error results when the real time value (sensor input value) exceeds the alarm HI limit or drops below the alarm LO limit.
Check the sensor for excessive load.

■Zero error (Zero calibration error)

This message indicates that calibration cannot be performed because the inputted electric signal exceeds the input voltage range.
Check the cables for breaks or miswiring.

■Span error (Span calibration error)

The span calibration error occurs under the following conditions.

1) An actual load set value of zero is inputted.
2) An electric signal of -0.005 to 0.005mV/V is inputted.

In the case of 1), check the set value, and perform calibration again.

In the case of 2) , check that the actual load is properly applied and check the cables for miswiring.If the load is too light, the load needs to be increased.

Although the F372A will not break down immediately even if the above messages are displayed, Sensor +error or Sensor -error indicates that an excessive voltage may be applied to the input circuit of the F372A. It is therefore required to remove the cause immediately.
(Although the input is provided with a protection circuit, a long-time excessive voltage or an instantaneous but extremely high voltage may break the F372A.)

■Zero limit (Digital zero limit error)

A zero limit error results when the range of zero-point correction (deviation from the zero calibration registered point) by digital zero or zero tracking exceeds the Digital Zero Limit set value.
Reset the digital zero, or perform digital zero in an appropriate range.

8-2. Protect / Initialization

■Work setting protect

Set whether to protect the set values in Work Setting from changing.

Setting range: ON / OFF

How to set

SET. → Protect / Init. → Page 1

■System setting protect

Set whether to protect the set values in System Setting from changing.

Setting range: ON / OFF

How to set

SET. → Protect / Init. → Page 1

■Calibration protect

→See page30 "Calibration Protect".

How to set

SET. → Protect / Init. → Page 1

■Expansion protect

Set whether to protect the set values in Expansion Setting from changing

Setting range: ON / OFF

How to set

SET. → Protect / Init. → Page 1

■Initialization

All the set values of each setting item are initialized to their factory defaults.

Select the setting item you want to initialize.

Setting range: Work Set. / System Set. / Calibration Set./ Expansion Set.

* If the setting item on which you intend to execute initialization is protected, initialization cannot be executed.

How to set

SET. → Protect / Init. → Page 1

8-3. Self-Check

■Self-check

The self-check function includes a memory check to check the memory automatically for detecting problems, a visual check to check the display visually, a touch panel key input check and an external I/O check.

①LCD check

Check the display to see that it is free from color and display defects, etc. The screen changes from red, green, blue, horizontal stripes, to vertical stripes. Touching the screen restores the previous screen.

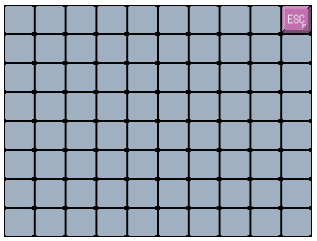
How to set

SET. → Self Check → LCD Check

②KEY check

Check the touch panel to see that it is free from unrecognized parts.

One touched square turns yellow. Pressing the ESC at the upper right of the screen restores the previous screen.

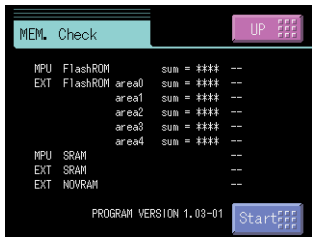


How to set

SET. → Self Check → KEY Check

③MEM check

Check the memory to see that it is free from defects. The result is displayed in a moment after the Start at the lower right of the screen is pressed. Or, check the version here.



How to set

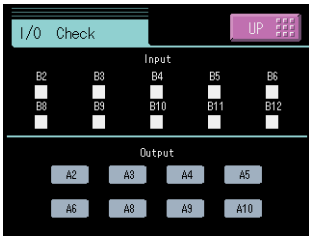
SET. → Self Check → MEM Check

④I/O check

Check the operations of the external input/output signals.

Each output turns on when the corresponding button is pressed.

Each input turns green when its ON state is recognized.



How to set

SET. → Self Check → I/O Check

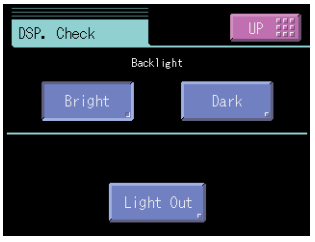
⑤DSP check

Check the backlight and status indicator lamp.

The backlight turns bright by pressing " Bright " button, and turns dark by pressing " Dark " button.

The backlight goes out when the "Light Out" button is pressed, and after that, it recovers when the screen is touched.

The status indicator lamp lights in green and orange alternately.



How to set

SET. → Self Check → DSP Check

⑥COM check

The data displayed under "Transmit data" is sent by pressing the Trns. button.
Under "Receive data", externally transmitted data is displayed.

How to set

SET. → Self Check → COM Check

Please transmit something information sentence from connected equipment side to the check on the reception. The data received to "Receive data" is displayed. Please confirm the cable or the setting of communication condition when it is not correctly displayed, when "Parity" or "Frame" lights in red.
Please press Trns. button to the check on the transmission. The data displayed in "Transmit data" is transmitted. It will be confirmed to receive it correctly on connected equipment side. Please confirm the cable or the setting of communication condition when it is not possible to confirm it.

■Password

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

8-4. Unit Setting List

* The numbers correspond to the values in the input range of RS-232C.
  Also, "0" means no unit.

Mass		Force		Pressure		Others			
1	μg	12	μN	25	μPa	42	kgm	60	kg/min
2	mg	13	mN	26	mPa	43	gcm	61	t/min
3	g	14	N	27	Pa	44	g/cm^3	62	kg/h
4	kg	15	kN	28	hPa	45	kg/m^3	63	kg/s
5	Mg	16	MN	29	kPa	46	t/m^3	64	t/h
6	t	17	μNm	30	MPa	47	g/l	65	m^3/s
7	lb	18	mNm	31	GPa	48	g/ml	66	m^3/min
8	dyne	19	Nm	32	N/m^2	49	mg/m	67	m^3/h
9	kdyne	20	kNm	33	μbar	50	kg/m	68	l/h
10	oz	21	MNm	34	mbar	51	kgm/s	69	l/min
11	TONNE	22	ftlb	35	bar	52	kgm^2/s	70	l/s
		23	inlb	36	mmHg	53	kgm^2	71	%
		24	inoz	37	inH_2O	54	mPas	72	km
				38	ftH_2O	55	Pas	73	m
				39	psia	56	m/s	74	cm
				40	psig	57	km/h	75	mm
				41	atom	58	m/s^2	76	μm
						59	t/s	77	rpm

8-5. Setting Item List

■Work setting　Comparison setting (WORK0 to WORK15)

Protect　○:Work Setting Protect, ◎:System Setting Protect, ●:Calibration Protect, レ:Expansion Protect
Memory　S:SRAM, N:NOVRAM

Page	No.	Item	Initial value	Setting range	Memory	Protect
1	1	HH Limit	8000	− 99999 to 99999	S	○
	2	HI Limit	6000	− 99999 to 99999	S	○
	3	LO Limit	4000	− 99999 to 99999	S	○
	4	LL Limit	2000	− 99999 to 99999	S	○
	5	Hysteresis	0	0 to 9999	S	○
2	6	Alarm HI Limit	99999	− 99999 to 99999	S	○
	7	Alarm LO Limit	− 99999	− 99999 to 99999	S	○
	8	Near Zero	100	0 to 99999	S	○
	9	Comparison Timing	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○
	10	Comparison Output Selection	2: H2/L2	*1	S	○

*1 0: H4/L0 1: H3/L1 2: H2/L2 3: H1/L3 4: H0/L4

■Work setting　Hold setting (WORK0 to WORK15)

Page	No.	Item	Initial value	Setting range	Memory	Protect
1	1	Hold Mode	OFF	*2 *3	S	○
	2	Hold Start Level	100	− 99999 to 99999	S	○
	3	Section Time	1.000 sec	0.001 to 9.999 sec	S	○
	4	Level detection conditions	0 :Passed	0: Passed 1: Passed HI 2: Passed LO	S	○
	5					

-Sample hold-

2	6	Sample Removal Value	0	− 999 to 999	S	○
	7					
	8					
	9					
	10					

-Peak hold or Valley hold, and Section setting; Level-

2	6	Hold Stop Level	100	− 99999 to 99999	S	○
	7					
	8					
	9					
	10					

-Average hold-

2	6	Average Sample Number	1	1 to 999	S	○
	7					
	8					
	9					
	10					

-Inflection Point hold-

2	6	Inflection Minimum Slope	30	1 to 99999	S	○
	7	Inflection Front Slope Time	200	10 to 990 (Front slope time + rear slope time < 1000)	S	○
	8	Inflection Rear Slope Time	200	10 to 990 (Front slope time + rear slope time < 1000)	S	○
	9	Inflection Removal Value	0	− 999 to 999	S	○
	10	Detection Start Condition	0: Ext+Level	0: Ext+Level 1: Ext Only	S	○

-Relative Maximum / Relative Minimum / Relative Difference hold-

2	6	Relative Minimum Count	10	1 to 99999	S	○
	7	Relative magnification	× 1.00	*4	S	○
	8	Detection Start Condition	0: Ext+Level	0: Ext+Level 1: Ext Only	S	○
	9					
	10					

*2

Hold
0:OFF
1:Sample
2:Peak
3:Valley
4:P-P
5:Average
6:Inflection Point
7:Relative Maximum
8:Relative Minimum
9:Relative Difference

*3

Hold Section
0:All
1:EXT
2:EXT+TM
3:LVL+TM
4:LVL *

* Selectable only for Peak or Valley.

*4

0:x0.25
1:x0.50
2:x0.75
3:x1.00
4:x1.25
5:x1.50
6:x2.00
7:x3.00
8:x4.00

■Work setting Graph setting (WORK0 to WORK15)

Protect ○:Work Setting Protect, ◎:System Setting Protect, ●:Calibration Protect, レ:Expansion Protect
Memory S:SRAM, N:NOVRAM

Page	No.	Item	Initial value	Setting range	Memory	Protect
1	1	Graph Mode	0: Continued	0: Continued 1: Ext 2: Level 3: Ext+Level	S	○
	2	Y(LD) Start Point	0	− 99999 to 99999	S	○
	3	Y(LD) End Point	10000	− 99999 to 99999	S	○
	4	X(TM) End Point	10.0 sec	0.1 to 99.9 sec	S	○
	5	Graph Start Level	100	− 99999 to 99999	S	○
2	6	Interval Time	1.00 sec	0.0 to 99.9 sec	S	○
	7	Level detection conditions	1: Passed HI	0: Passed 1: Passed HI 2: Passed LO 3: Beyond 4: Below	S	○
	8					
	9					
	10					
3	11					
	12					
	13					
	14					
	15					

■Calibration (CAL0 to CAL3)

Protect ○:Work Setting Protect, ◎:System Setting Protect, ●:Calibration Protect, レ:Expansion Protect
Memory S:SRAM, N:NOVRAM

Page	No.	Item	Initial value	Setting range	Memory	Protect
1	1	Excitation Voltage	0: 2.5V	0: 2.5V 1: 10V	N	●
	2	Zero Calibration	0	− 3.000mV / V to 3.000mV / V	N	●
	3	Equivalent Input Calibration	3.000mV/V	− 3.000mV / V to 3.000mV / V (0 is excluded.)	N	●
	4	Actual Load Calibration	10000	− 99999 to 99999*1 (0 is excluded.)	N	●
	5	Calibration Selecttion	0: Cal 0	0: Cal 0 1: Cal 1 2: Cal 2 3: Cal 3 4: EXT 0	N	●
2	6	Unit	kN	*2	N	●
	7	Increment	0: 1	0: 1 1: 2 2: 5 3: 10 4: 20 5: 50 6: 100	N	●
	8	Digital Offset	0	− 99999 to 99999	N	●
	9	Digital Zero Limit	99999	0 to 99999	N	●
	10					
3	11					
	12					
	13					
	14					
	15					

*1 Calibration is bipolar. *2 See page87 "Unit Setting List".

■System setting

Operation Setting

Page	No.	Item	Initial value	Setting range	Memory	Protect
1	1	Digital Filter	OFF	0: OFF, 2 to 999 Times	N	◎
	2	Analog Filter	2: 300Hz	0: 30 1: 100 2: 300 3: 1000 [Hz]	N	◎
	3	Backlight	ON time : 10 Min	0 to 99 Min (Always ON time when "0".)	N	◎
			Bright→Dark : 0 Min	0 to 99 Min（Always Bright when "0"）*		
	4	Language	0: JPN(日）	0: JPN(日） 1:ENG(英)	N	◎
	5	SI/F Print Out	OFF	0: OFF 1: MD 2: HOLD	N	◎
2	6	Motion Detect	0.0 sec / 0count	0.0 to 9.9 sec / 0 to 99 count	N	◎
	7	Zero Tracking	0.0 sec / 0count	0.0 to 9.9 sec / 0 to 99 count	N	◎
	8	Vol. Out Filter	1: ON	0: OFF 1: ON	N	◎
	9	Indicate Color	Yellow	0: Yellow 1: Green 2: Blue 3: Comparison	N	◎
	10	B5 Func. Select	0: WORK 3	0: WORK 3 1: DSP_LOCK 2: KEY_LOCK	N	◎
3	11	B6 OFF Det. Wait	0.00 sec	0.00 to 1.00 sec	N	◎
	12	B8 OFF Det. Wait	0.00 sec	0.00 to 1.00 sec	N	◎
	13	Measurement work selection	1: EXT.	0: COM. 1: EXT.	N	◎
	14	Control input selection	1: EXT.	0: COM. 1: EXT.	N	◎
	15	Password				

RS-232C Setting

1	1	Communication Mode	0: Normal	0: Normal 1: Continue 2: Print	N	◎
	2	Baudrate	1: 19200bps	0: 9600 1: 19200 2: 38400 3: 57600 [bps]	N	◎
	3	Data Bit	1: 8bit	0: 7bit 1: 8bit	N	◎
	4	Stop Bit	0: 1bit	0: 1bit 1: 2bit	N	◎
	5	Parity Bit	1: EVEN	0: NONE 1: EVEN 2: ODD	N	◎
2	6	Delimiter	0: CR	0: CR 1: CR+LF	N	◎
	7	Flow Control	0: OFF	0: OFF 1: RTS/CTS	N	◎
	8					
	9					
	10					

3	11					
	12					
	13					
	14					
	15					

Option setting BCD output

1	1	BCD Output Select	1: Hold	0: Realtime 1: Hold 2: EXT.	N	◎
	2	BCD Output Rate	3: 100 /s	0: 10 1: 20 2: 50 3: 100 4: 200 5: 500 6: 1000 7: 2000 [/s]	N	◎
	3					
	4					
	5					

Option setting D/A output

1	1	Output Select	1: Hold	0: Real Time 1: Hold 2: Zero Scale 4: Full Scale	N	◎
	2					
	3	Zero Scale	0	− 99999 to 99999	N	◎
	4	Full Scale	10000	− 99999 to 99999	N	◎
	5	Scale Set. Select	0	0 to 3	N	◎

Option setting CC-Link

1	1	Station No.	2: 4 Station	0: 1Station 1: 2 Station 2: 4 Station	N	◎
	2	Baudrate	4: 10M	0: 156k 1: 625k 2: 2.5M 3: 5M 4: 10M	N	◎
	3	ID	1	1 to 64 Station / 1 to 63 Station / 1 to 61 Station	N	◎
	4					
	5					

Option setting DeviceNet

1	1	Possession Node	0: 2 Node	0: 2 Node 1: 4 Node	N	◎
	2	Node Address	0	0 to 63	N	◎
	3	Major Revision	1	1, 2	N	◎
	4					
	5					

■Protect / Initialization

Protect ○:Work Setting Protect, ◎:System Setting Protect, ●:Calibration Protect, レ:Expansion Protect
Memory S:SRAM, N:NOVRAM

Page	No.	Item	Initial value	Setting range	Memory	Protect
1	1	Work Protect	0: OFF	0: OFF 1: ON	N	
	2	System Protect	0: OFF	0: OFF 1: ON	N	
	3	Calibration Protect	0: OFF	0: OFF 1: ON	N	
	4	Expansion Protect	1: ON	0: OFF 1: ON	N	
	5	Initialization	0: Work Set.	0: Work Set. 1: Sys. Set. 2: Cal. Set. 3: Exp. Set.		

■Self check

Page	No.	Item	Initial value	Setting range	Memory	Protect
1	1	LCD Check				
	2	KEY Check				
	3	MEM Check				
	4	I/O Check				
	5	DSP Check				
	6	COM Check				

※ Shaded parts indicate newly-added setting items to F370/F371.
Shaded* parts indicate newly-added setting items to F372.

M E M O

EXPANSION

M E M O

Expansion Function

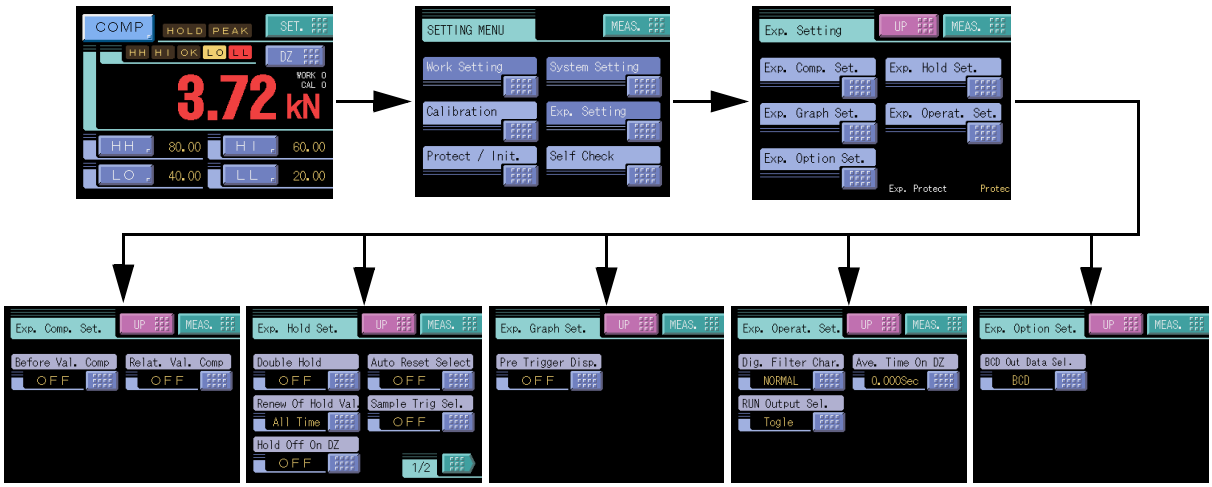
The F372A is designed so as to be able to perform more operations than the F370/F371 by selecting the following functions from the Expansion menu.

Expansion Comparison Setting	● Before Value Comparison (P116) ● Relative Value Comparison (P120)
Expansion Hold Setting	● Double Hold (P97) ● Auto Reset Select (P112) ● Renewal Of Hold Value (P114) ● Sample Trigger Selection (P110) ● Hold Off On Digital Zero (P113) ● Hold End Timing (P115)
Expansion Graph Setting	● Pre Trigger Display (P126)
Expansion Operation Setting	● Digital Filter Character (P127) ● Average Time On Digital Zero (P127) ● RUN Output Selection (P128)
Expansion Option Setting	● BCD Output Data Selection (P129)

Data of measurement values newly obtained by selecting and operating the expansion functions can also be taken out externally through standard and option interfaces.

Standard interfaces	● SI/F (P130) ● RS-232C (P130)
Option interfaces	● BCD OUTPUT (P137) ● DAC OUTPUT (P138) ● CC-Link (P138) ● DeviceNet (P138)

Expansion Setting menu



M E M O

1 EXP. HOLD FUNCTIONS

1-1. Double Hold

Specifically combined two types of hold functions are performed simultaneously in one Hold Section.

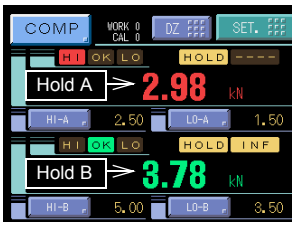
You can select hold modes from 26 modes in the following table.

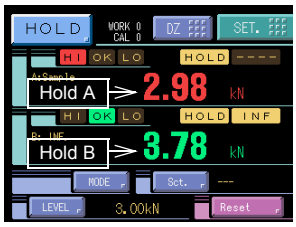
	Hold A	Hold B	SECTION
0	OFF	None	None
1	Sample	None	None
2	Peak	None	Section select 1
3	Valley	None	Section select 1
4	P-P	None	Section select 2
5	Average	None	Section select 2
6	Inflection Point	None	None
7	Relative Maximum	None	None
8	Relative Minimum	None	None
9	Relative Difference	None	None
10	Sample	Peak	Section select 2
11	Sample	Valley	Section select 2
12	Sample	P-P	Section select 2
13	Sample	Average	Section select 2
14	Sample	Inflection Point	None
15	Sample	Relative Maximum	None
16	Sample	Relative Minimum	None
17	Sample	Relative Difference	None
18	Peak	Valley	Section select 2
19	Peak	P-P	Section select 2
20	Valley	P-P	Section select 2
21	Average	Peak	Section select 2
22	Average	Valley	Section select 2
23	Average	P-P	Section select 2
24	Relative Maximum	Relative Minimum	None
25	Relative Maximum	Relative Difference	None
26	Relative Minimum	Relative Difference	None

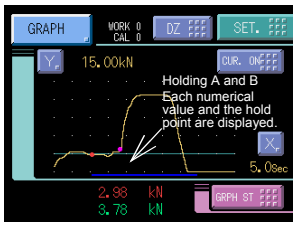
Section select 1	Section select 2
All	All
EXT	EXT
EXT+TM	EXT+TM
LVL+TM	LVL+TM
LVL	

■Screens appearing when double hold is selected

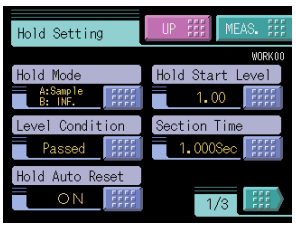
Double-Hold-specific measurement screens appear.

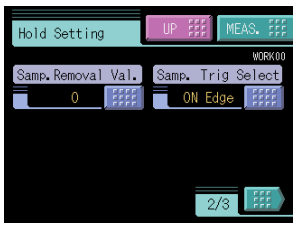






A Hold Setting menu corresponding to the selected hold mode is displayed.
(Example A: Sample B: Inflection Point)





Also, the Comparison Setting menu is dedicated.

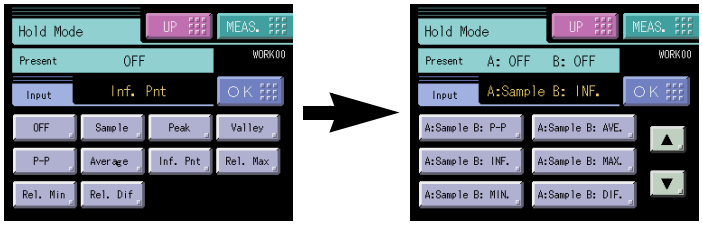
■Double hold setting

ON / OFF Initial value: OFF

How to set

SET. → Exp. Setting → Exp. Hold Set. → Page 1

When this setting is ON, you can set Hold A and Hold B in Hold Setting.

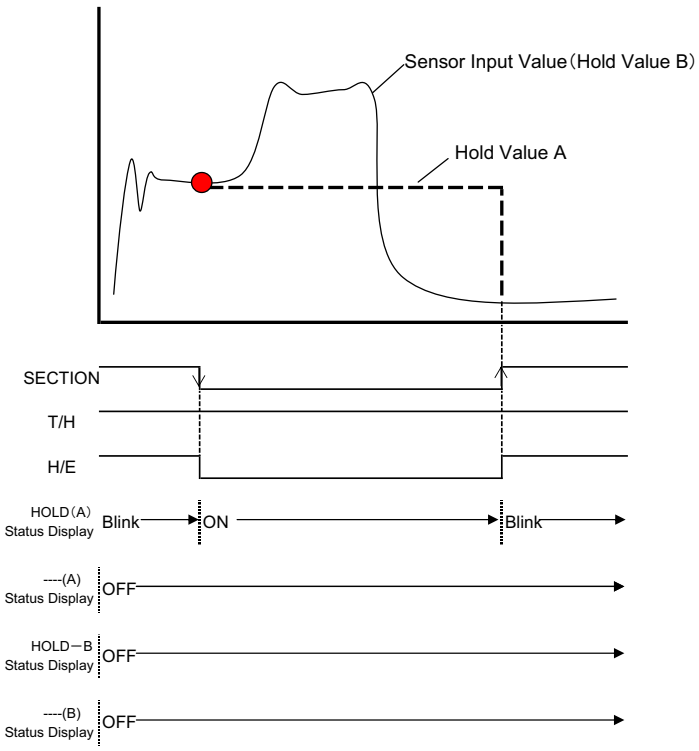


■Hold operations

For the operations of the HOLD buttons and HI/LO Limit judgment outputs, see the F372 Operation Manual (Standard).

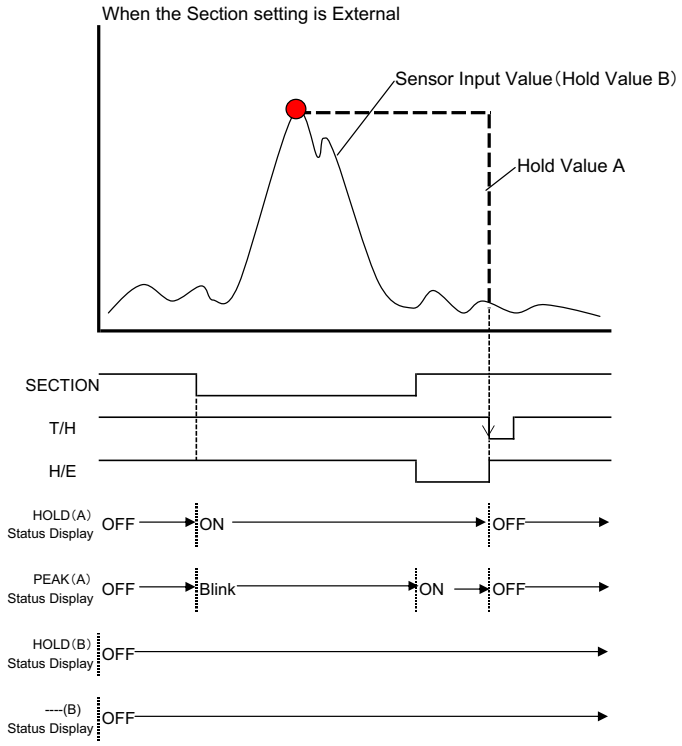
1. A: Sample hold B: None

An arbitrary point is held when the SECTION signal is ON.



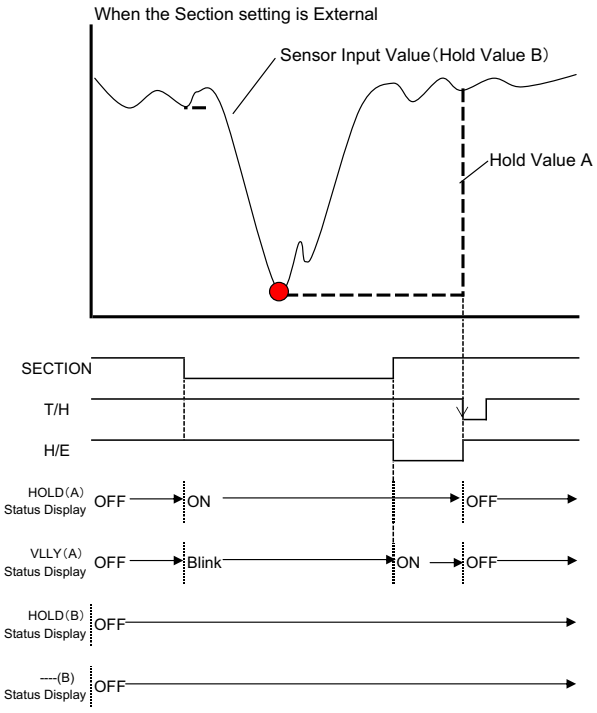
2. A: Peak hold B: None

The maximum value in the section specified is held.



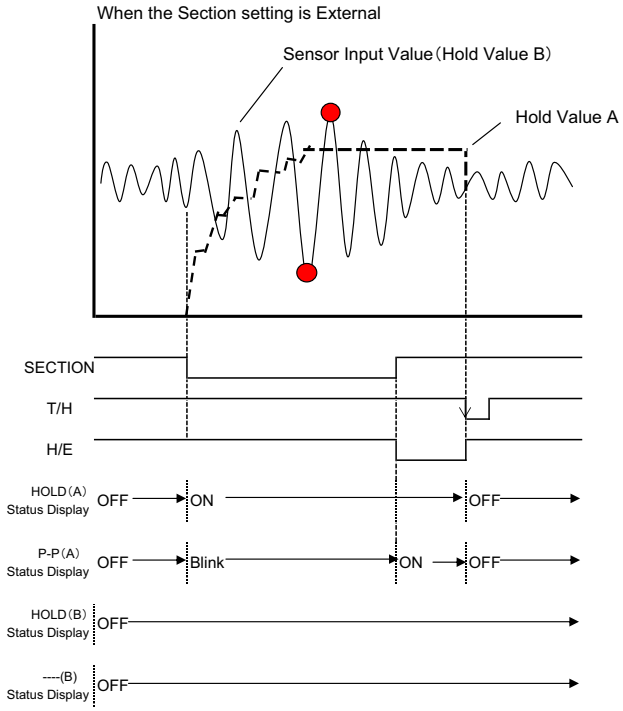
3. A: Valley hold B: None

The minimum value in the section specified is held.



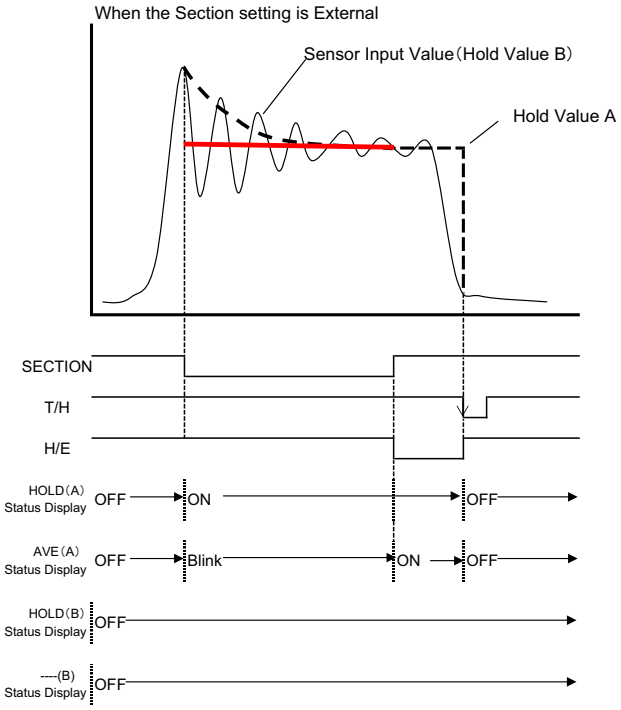
4. A: P-P hold B: None

The difference between the maximum value and minimum value in the section specified is held.



5. A: Average hold B: None

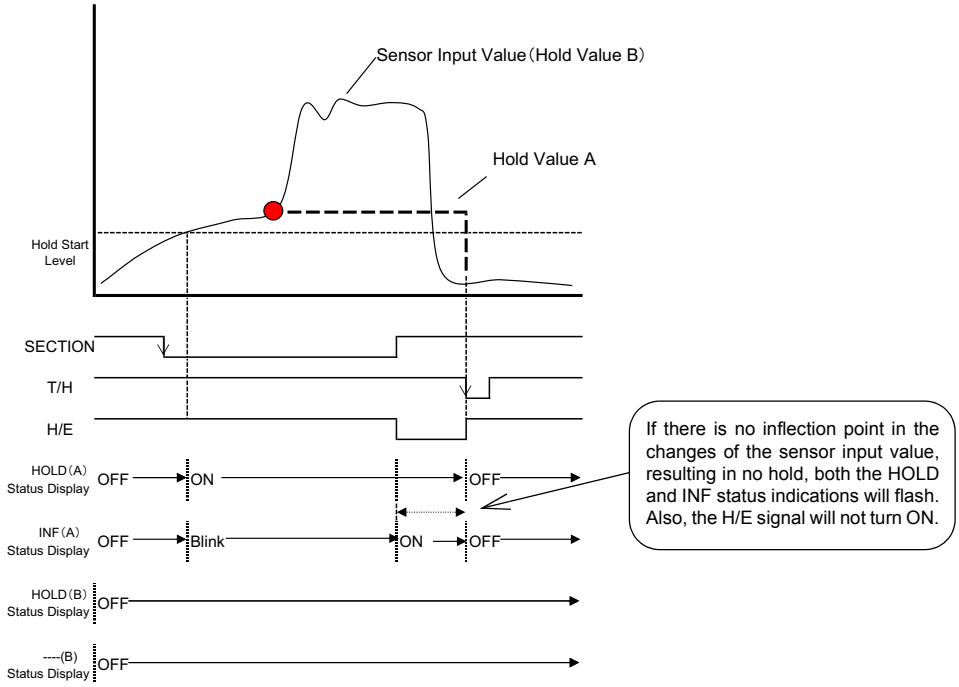
The average of the section specified is held.



6. A: Inflection point hold B: None

When the Hold Start Level is detected after turning-ON of the SECTION signal, Inflection Point hold detection starts.

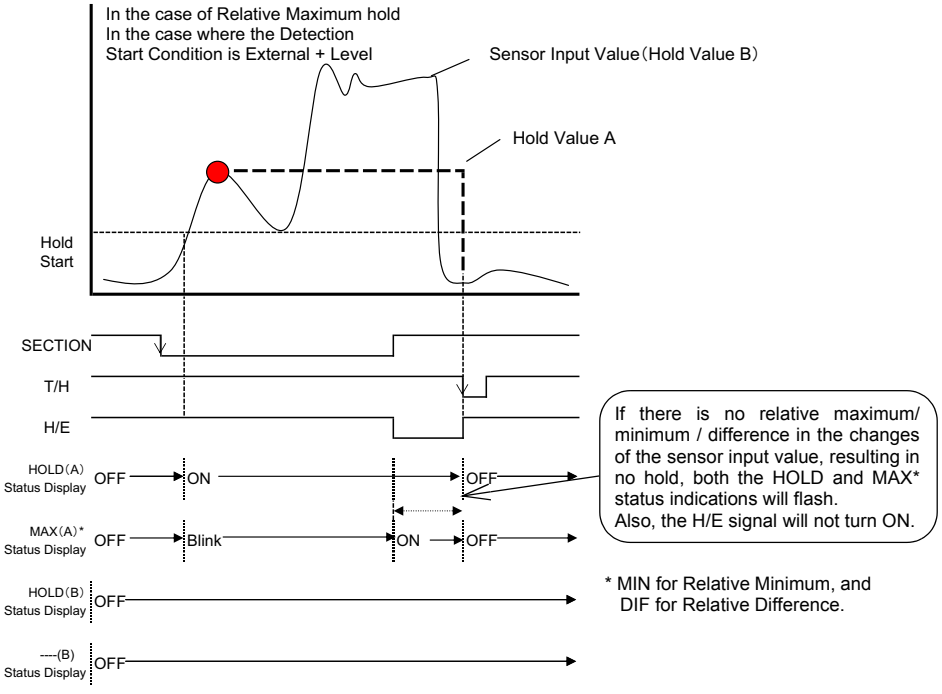
For the Hold Start Level, Detection Start Condition can be selected.Also, the value is maintained until the T/H signal turns ON with the hold Detection Start Condition External Only.



7. A: Relative (Maximum / Minimum / Difference) hold B: None

When the Hold Start Level is detected after turning-ON of the SECTION signal, Relative Maximum / Minimum / Difference hold detection starts.

For the Hold Start Level, Detection Start Condition can be selected.Also, the value is maintained until the T/H signal turns ON with the hold Detection Start Condition External Only.

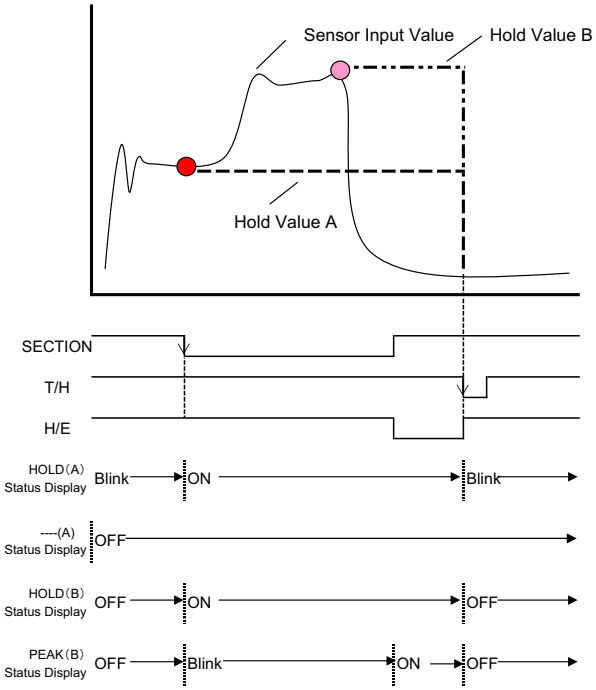


8. A: Sample hold B: Peak hold

An arbitrary point is held when the SECTION signal is ON.

The maximum value in the section specified is held.

The value is maintained until the T/H signal turns ON.

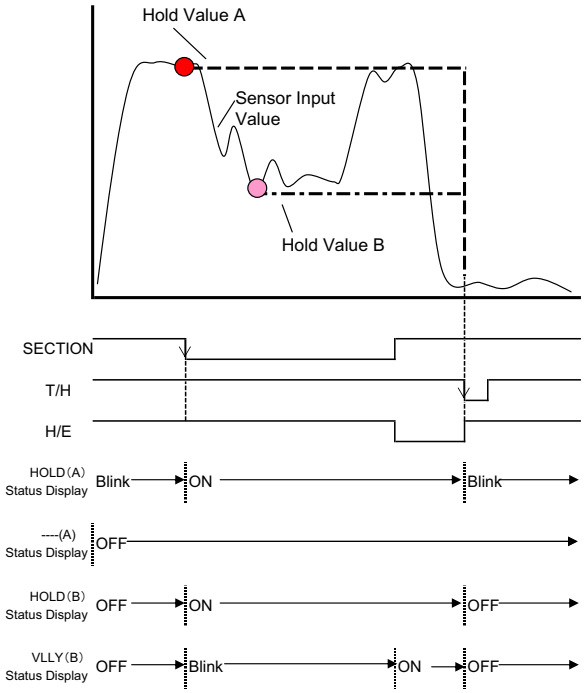


9. A: Sample hold B: Valley hold

An arbitrary point is held when the SECTION signal is ON.

The minimum value in the section specified is held.

The value is maintained until the T/H signal turns ON.

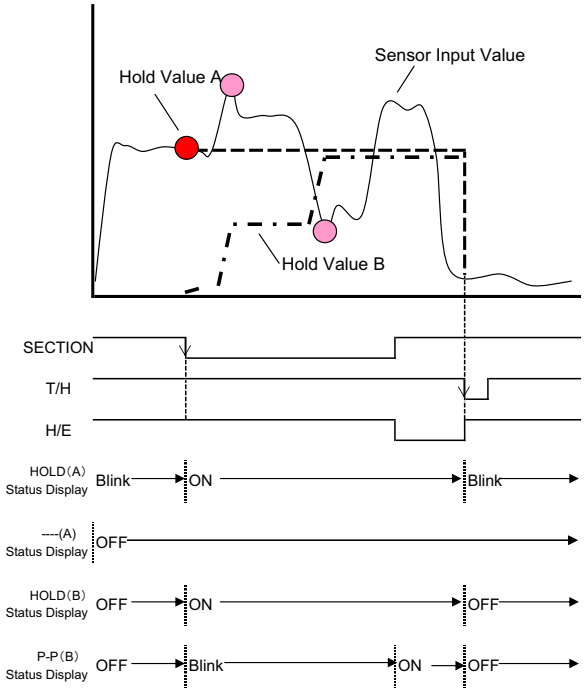


10. A: Sample hold B: P-P hold

An arbitrary point is held when the SECTION signal is ON.

The difference between the maximum value and minimum value in the section specified is held.

The value is maintained until the T/H signal turns ON.

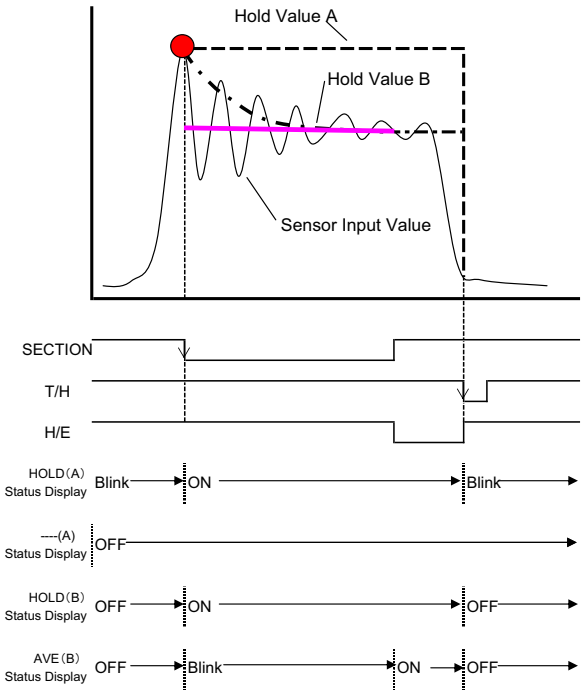


11. A: Sample hold B: Average hold

An arbitrary point is held when the SECTION signal is ON.

The averageof the section specified is held.

The value is maintained until the T/H signal turns ON.

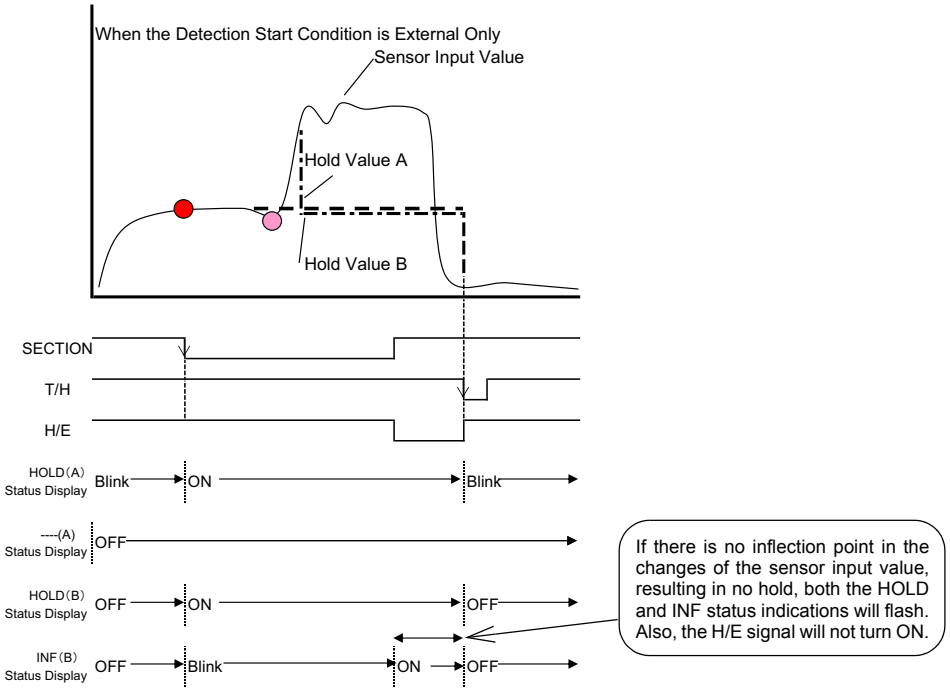


12. A: Sample hold B: Inflection point hold

An arbitrary point is held when the SECTION signal is ON. When the Hold Start Level is detected after turning-ON of the SECTION signal, Inflection Point hold detection starts.

For the Hold Start Level, Detection Start Condition can be selected. Also, operation can be performed without using the Hold Start Level with the hold Detection Start Condition External Only.

The value is maintained until the T/H signal turns ON.

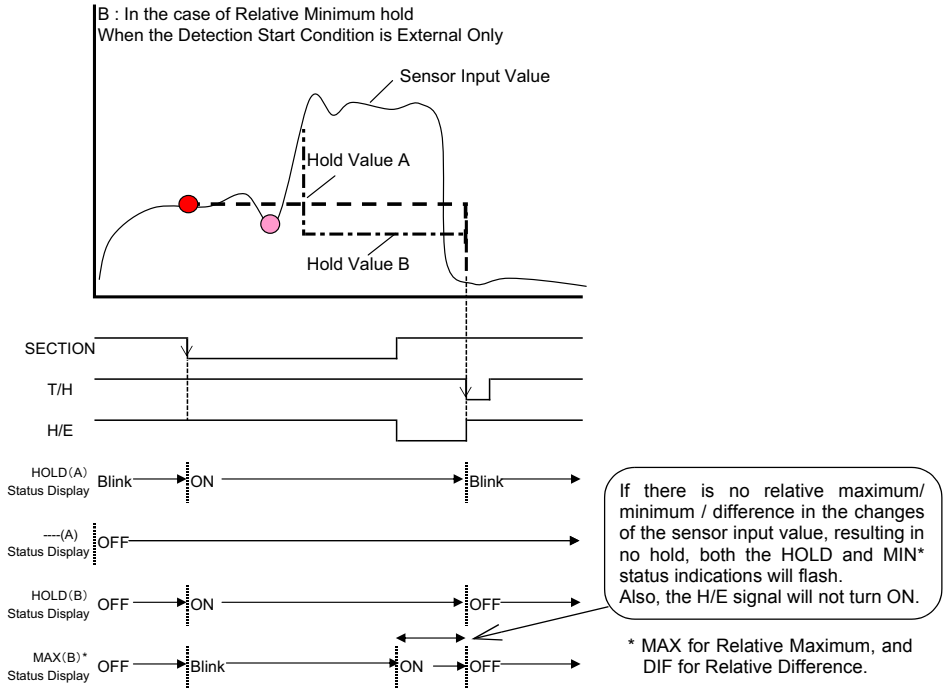


13. A: Sample hold B: Relative (Maximum / Minimum / Difference) hold

An arbitrary point is held when the SECTION signal is ON. When the Hold Start Level is detected after turning-ON of the SECTION signal, Relative Maximum / Minimum / Difference hold detection starts.

For the Hold Start Level, Detection Start Condition can be selected.

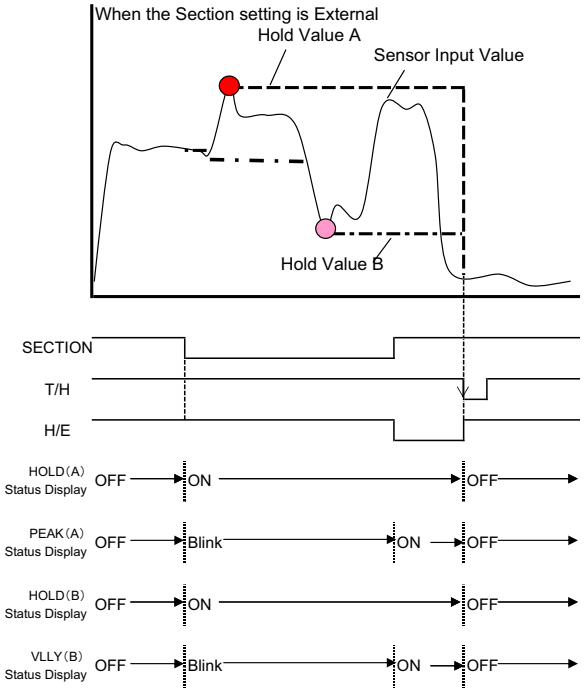
Also, the value is maintained until the T/H signal turns ON with the hold Detection Start Condition External Only. The value is maintained until the T/H signal turns ON.



14. A: Peak hold B: Valley hold

The maximum value and minimum value in the section specified by the SECTION signal are held.

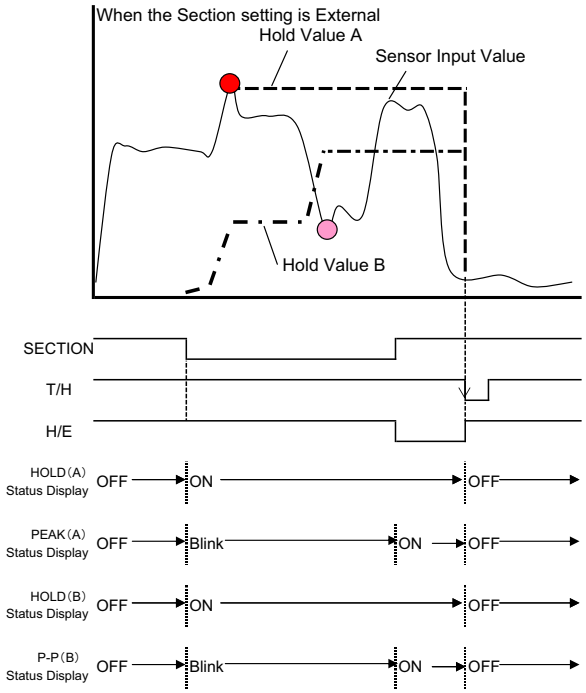
The value is maintained until the T/H signal turns ON.



15. A: Peak hold B: P-P hold

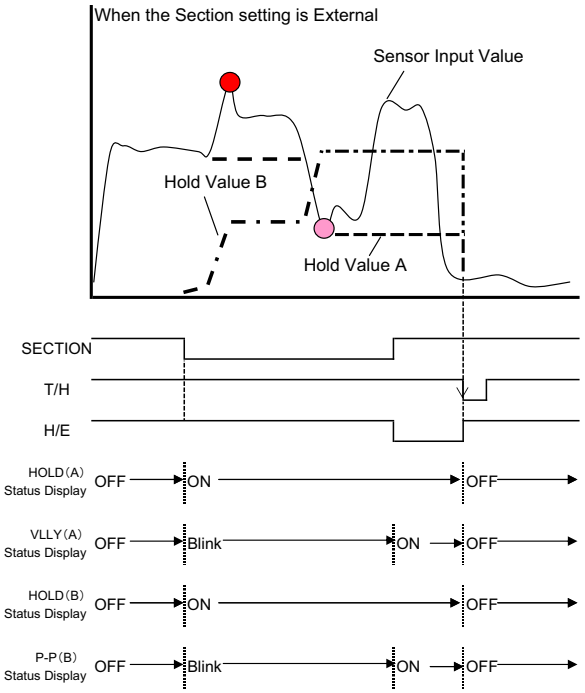
The maximum value and the difference between the maximum value and minimum value in the section specified by the SECTION signal are held.

The value is maintained until the T/H signal turns ON.



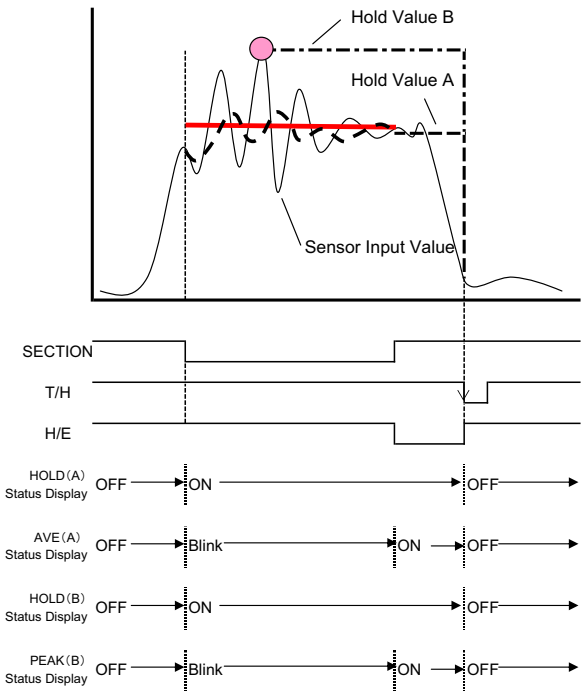
16. A: Valley hold B: P-P hold

The minimum value and the difference between the maximum value and minimum value in the section specified by the SECTION signal are held.
The value is maintained until the T/H signal turns ON.



17. A: Average hold B: Peak hold

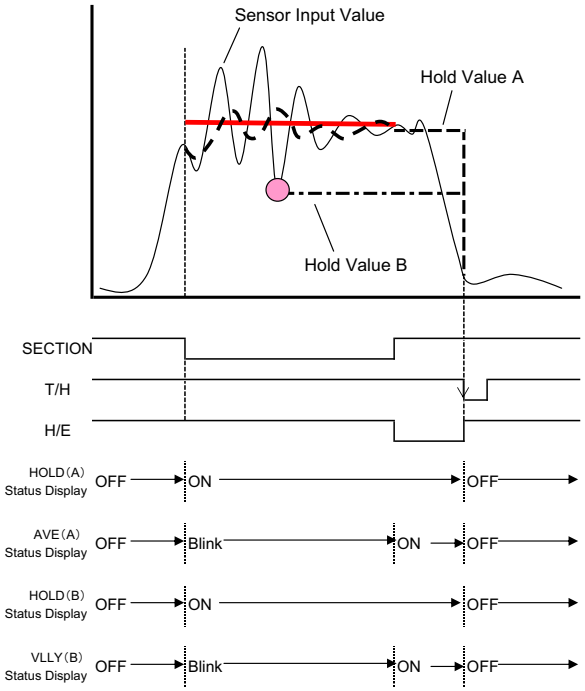
The average of and the maximum value in the section specified by the SECTION signal are held.
The value is maintained until the T/H signal turns ON.



18. A: Average hold B: Valley hold

The average of and the minimum value in the section specified by the SECTION signal are held.

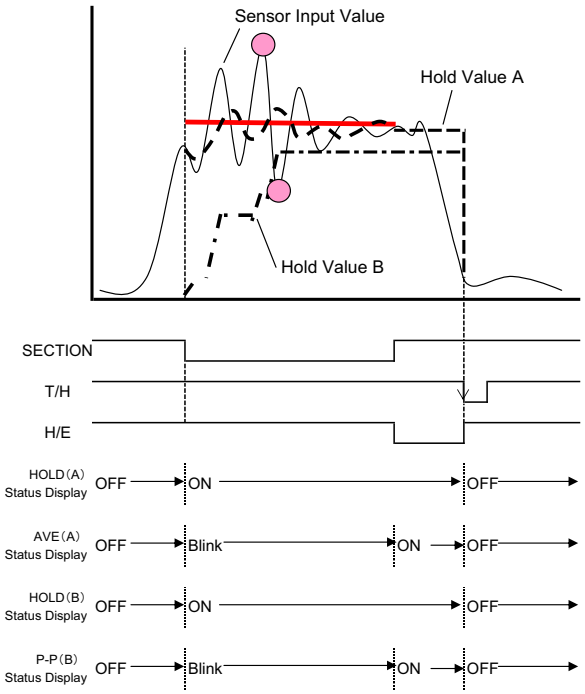
The value is maintained until the T/H signal turns ON.



19. A: Average hold B: P-P hold

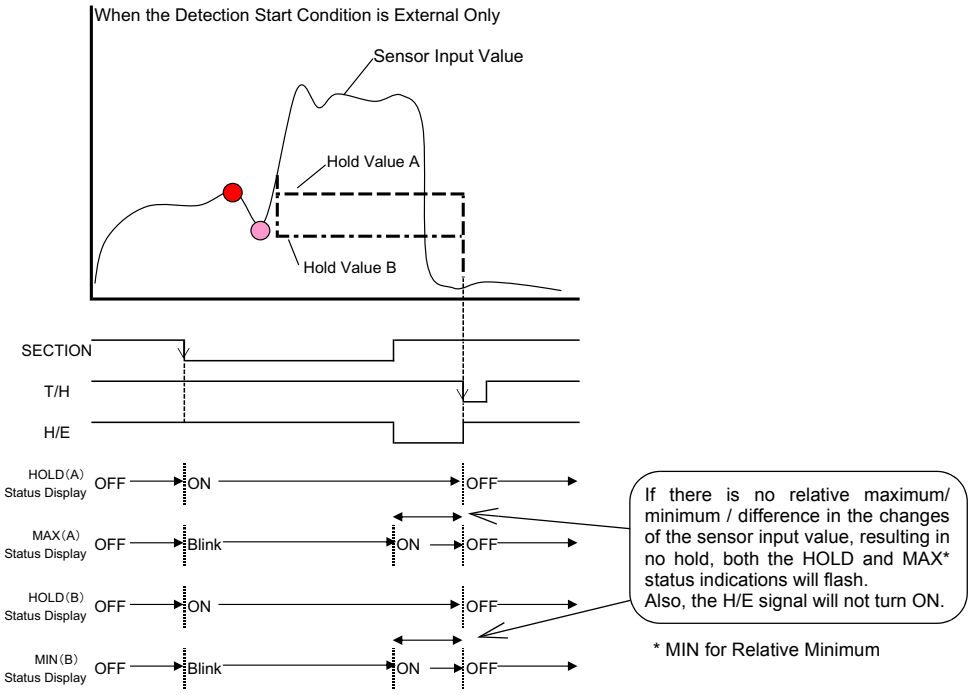
The average of and the difference between the maximum value and minimum value in the section specified by the SECTION signal are held.

The value is maintained until the T/H signal turns ON.



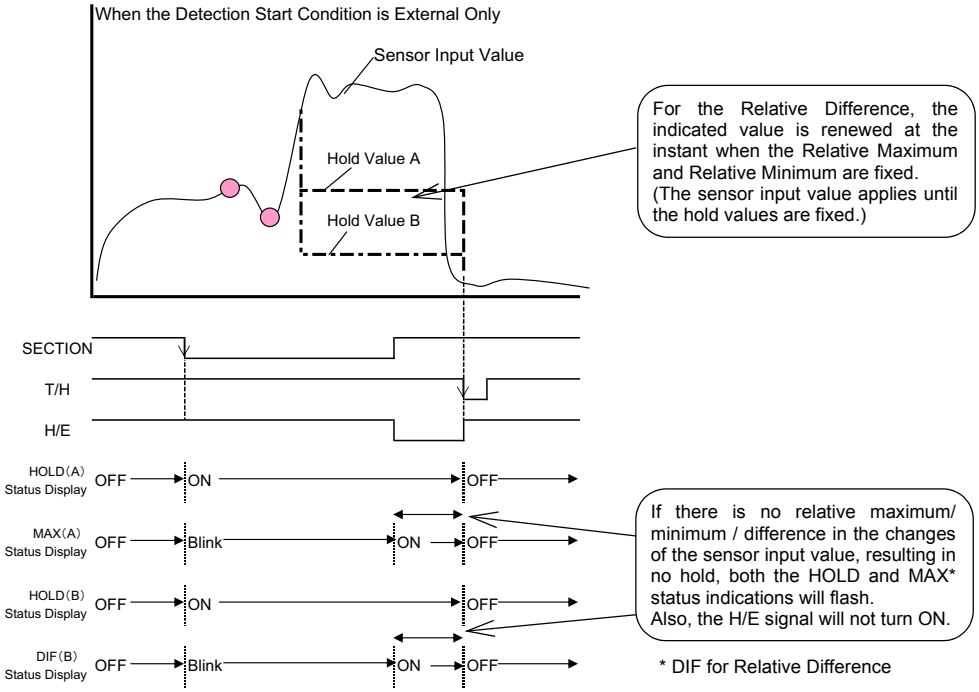
20. A: Relative maximum hold B: Relative minimum hold

When the Hold Start Level is detected after turning-ON of the SECTION signal, Relative Maximum / Minimum hold detection starts. For the Hold Start Level, Detection Start Condition can be selected.
Also, the value is maintained until the T/H signal turns ON with the hold Detection Start Condition External Only. The value is maintained until the T/H signal turns ON.



21. A: Relative maximum hold B: Relative difference hold

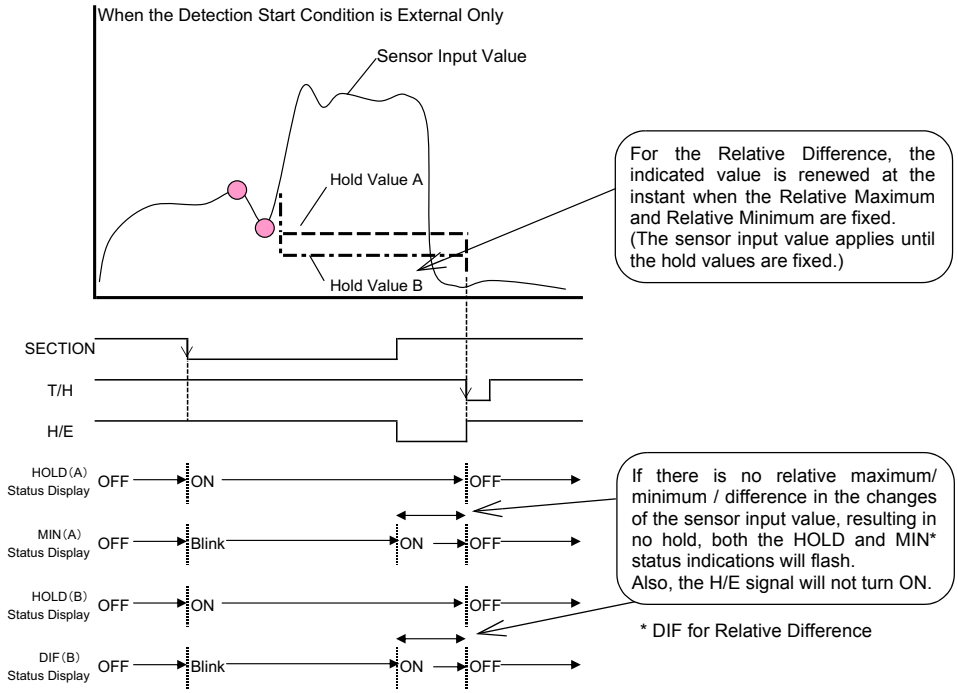
When the Hold Start Level is detected after turning-ON of the SECTION signal, Relative Maximum and Relative Difference (difference between the Relative Maximum and Relative Minimum) hold detection starts. For the Hold Start Level, Detection Start Condition can be selected.
Also, the value is maintained until the T/H signal turns ON with the hold Detection Start Condition External Only. The value is maintained until the T/H signal turns ON.



22. A: Relative minimum hold B: Relative difference hold

When the Hold Start Level is detected after turning-ON of the SECTION signal, Relative Minimum and Relative Difference (difference between the Relative Maximum and Relative Minimum) hold detection starts. For the Hold Start Level, Detection Start Condition can be selected.

Also, the value is maintained until the T/H signal turns ON with the hold Detection Start Condition External Only. The value is maintained until the T/H signal turns ON.



■HI/LO limit comparisons of double hold

You can set HI/LO-A and HI/LO-B for comparisons of Hold A and Hold B.

- HI limitA(B)	-99999 - 99999	Initial value: 6000(8000)
- LO limitA(B)	-99999 - 99999	Initial value: 4000(2000)

HI/LO Limit comparisons of Double Hold are made, and respective judgment results are output externally.

- Hold A HI (HI-A)
  - ON Condition: Hold A＞HI-A
  - OFF Condition: Hold A≦HI-A
- Hold A LO(LO-A)
  - ON Condition: Hold A＜LO-A
  - OFF Condition: Hold A≧LO-A
- HI-B
  - ON Condition: Hold B＞HI-B
  - OFF Condition: Hold B≦HI-B
- LO-B
  - ON Condition: Hold B＜LO-B
  - OFF Condition: Hold B≧LO-B
- OK
  - ON Condition: All of HI-A, HI-B, LO-A, and LO-B are OFF.
  - OFF Condition: Any of HI-A, LO-A, HI-B, and LO-B is ON.

* You can set the Comparison Timing condition for each of Hold A and Hold B.
* If the Comparison Timing condition is not met, the comparison result of the value targeted for the Comparison Timing turns OFF.

* OK is displayed each on the LCD screen as hold value A is OK, and hold value B is OK.

- External I/O pin assignments for Double Hold

A1	—	COM1	COM2	—	B1
A2	Out	HI-B	WORK0	IN	B2
A3	Out	HI-A	WORK1	IN	B3
A4	Out	OK	WORK2	IN	B4
A5	Out	LO-A	WORK3(LOCK)	IN	B5
A6	Out	LO-B	T/H	IN	B6
A7	—	COM1	COM2	—	B7
A8	Out	HOLD END(H/E)	SECTION	IN	B8
A9	Out	RUN	DIGITAL ZERO	IN	B9
A10	Out	EVENT	GRAPH TRIG	IN	B10
A11	Out	SIF	CAL0	IN	B11
A12	Out	SIF	CAL1	IN	B12

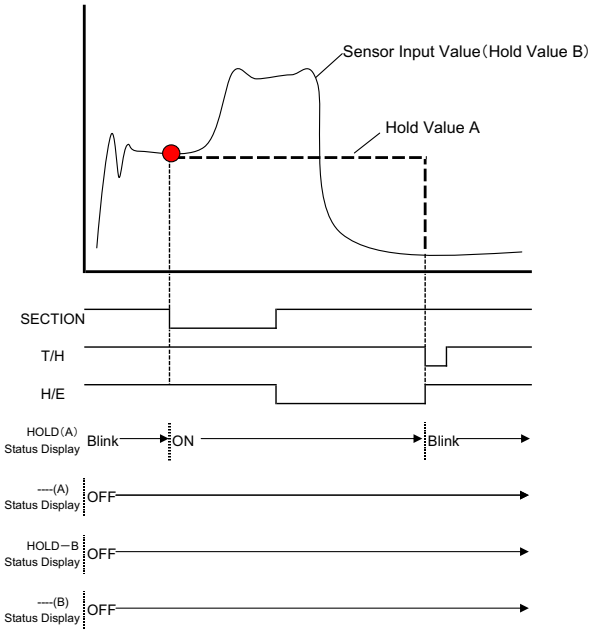
External I/O FCN-365P024-AU/FCN-360C024-B

1-2. Sample Hold Trigger Edge Selection

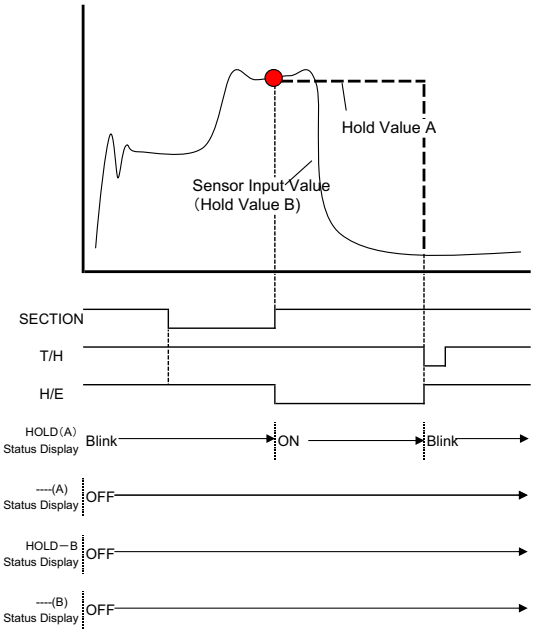
You can select the input timing of the SECTION signal to perform sample hold from ON edge and OFF edge.

However, OFF-edge operation can be performed only when a Hold Section exists.

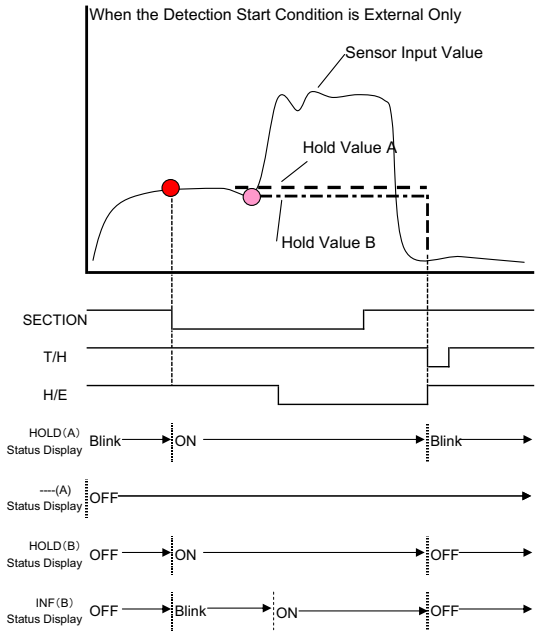
● In the case of ON-edge operation where the hold modes are
A: Sample hold
B: None



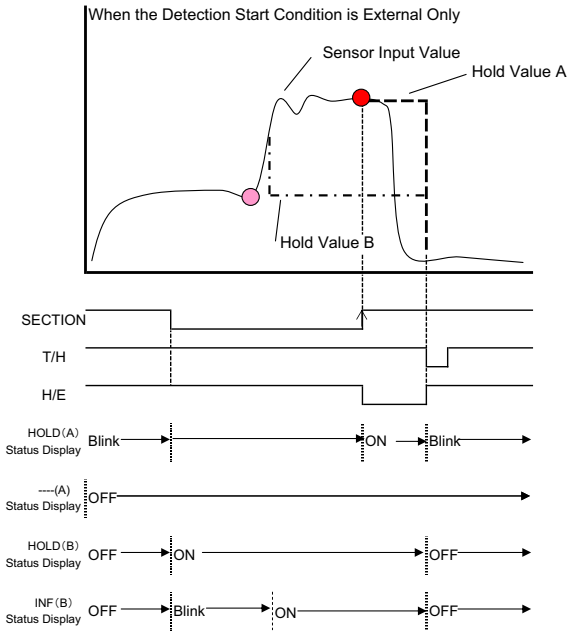
● In the case of OFF-edge operation where the hold modes are
A: Sample hold
B: None



● In the case of ON-edge operation where the hold modes are
A: Sample hold
B: Inflection Point



● In the case of OFF-edge operation where the hold modes are
A: Sample hold
B: Inflection Point



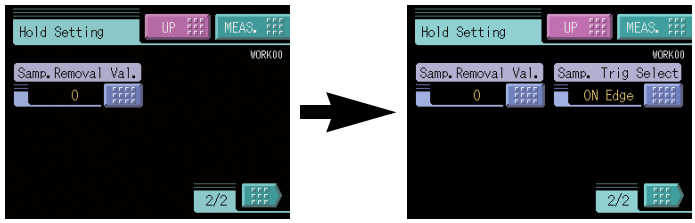
■Sample trigger selection setting

ON / OFF Initial value: OFF

How to set

SET. → Exp. Setting → Exp. Hold Set. → Page 1

When this setting is ON, the edge selection setting is displayed in the sample hold setting menu to allow operation selection.



■Sample trigger select

ON Edge / OFF Edge Initial value: ON Edge

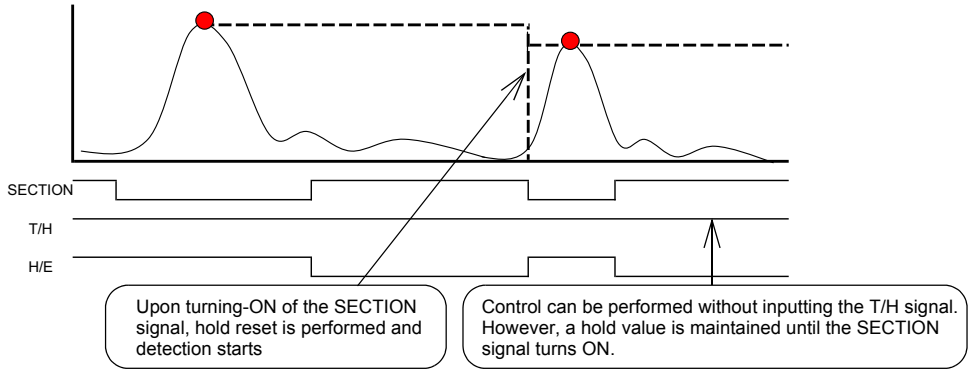
How to set

SET. → Work Setting → Hold Setting → Page 1

1-3. Auto Reset Selection at the Start of Hold Detection

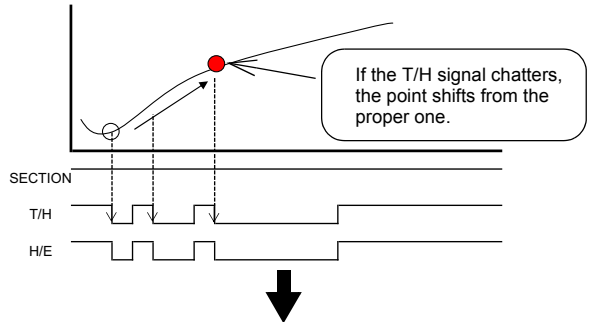
As standard, hold reset is automatically performed at the start of each Hold Section. This allows simple control as control can be performed by the SECTION signal alone without inputting the T/H signal.

When Hold Auto Reset is ON in Externally specified section Hold Peak hold

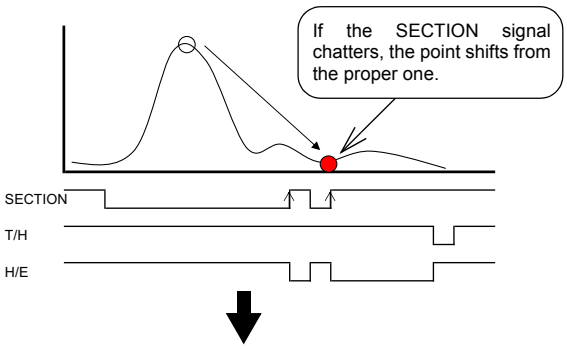


By resetting the hold at the start of each Hold Section, the next hold detection would also be performed when a hold value should be maintained in some cases, but as reset operation can be selected by setting, such a hold value can always be maintained until the T/H signal is inputted.

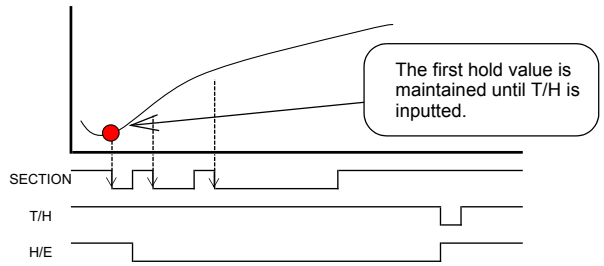
When Hold Auto Reset is ON in Sample hold (Double hold OFF)
(Controlled by the T/H alone)



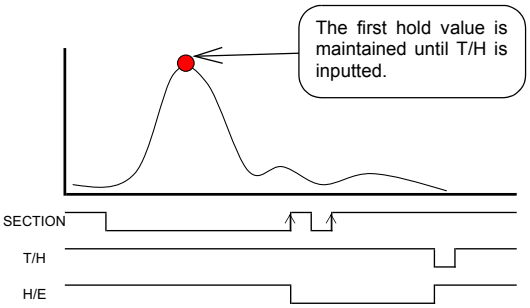
When Hold Auto Reset is ON in Externally specified section Hold Peak hold



When Hold Auto Reset is OFF in Sample hold (Double hold OFF)
(Controlled by the SECTION and T/H)



When Hold Auto Reset is OFF in Externally specified section Hold Peak hold



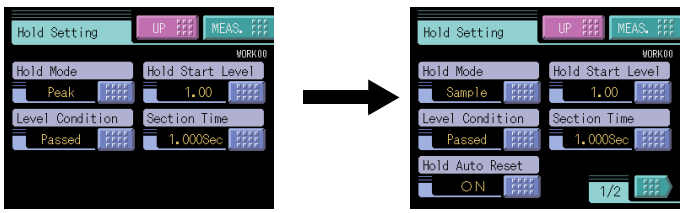
■Auto reset select setting

ON / OFF Initial value: OFF

How to set

SET. → Exp. Setting → Exp. Hold Set. → Page 1

When this setting is ON, the Auto Reset Select setting is displayed in the hold setting menu to allow operation selection.



■Hold auto reset

ON / OFF Initial value: ON

How to set

SET. → Work Setting → Hold Setting → Page 1

- OFF: After a hold is confirmed, the next detection is not started until the T/H signal is turned on even if the SECTION signal is turned on.
- ON: After a hold is confirmed, the next detection is started when the SECTION signal is turned on again even if the T/H signal is not turned on.

CAUTION

The sample hold with double hold OFF is controlled simply by the T/H signal when auto reset is ON, but controlled by the SECTION signal and T/H signal when auto reset is OFF.

1-4. Hold Off on Digital Zero

You can select whether to maintain or release the hold condition when Digital Zero is executed.

ON / OFF Initial value: OFF

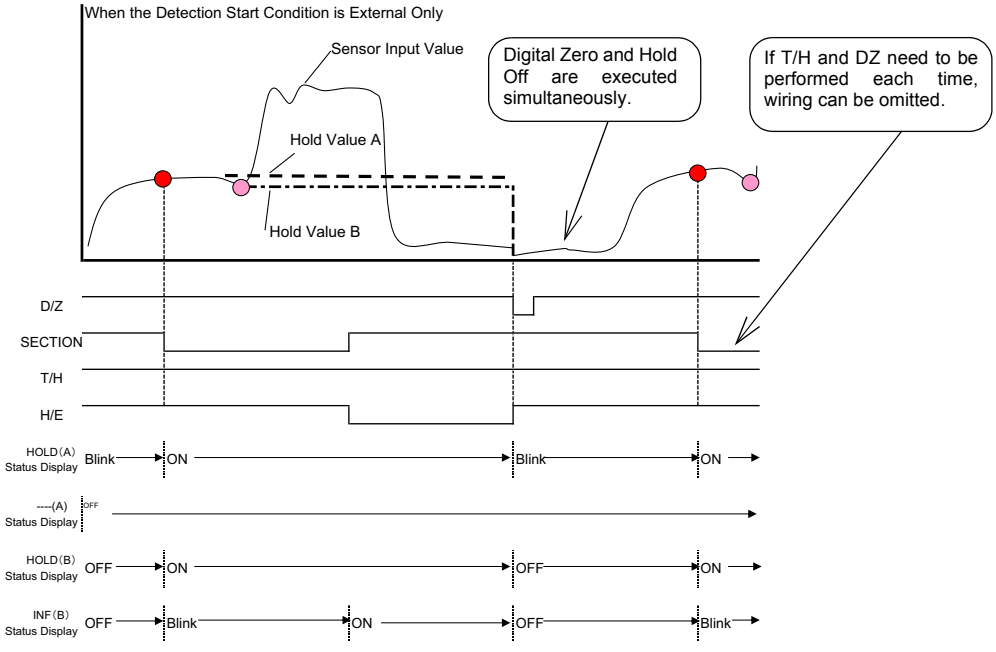
How to set

SET. → Exp. Setting → Exp. Hold Set. → Page 1

CAUTION

If ZT (Zero Tracking) is used with this setting ON, Hold Off is also performed when the Digital Zero is reset.

● In the case of Hold Off On Digital Zero where the hold modes are
A: Sample hold
B: Inflection Point hold



1-5. Renewal of Hold Value

You can change the operation of renewing the hold value display.

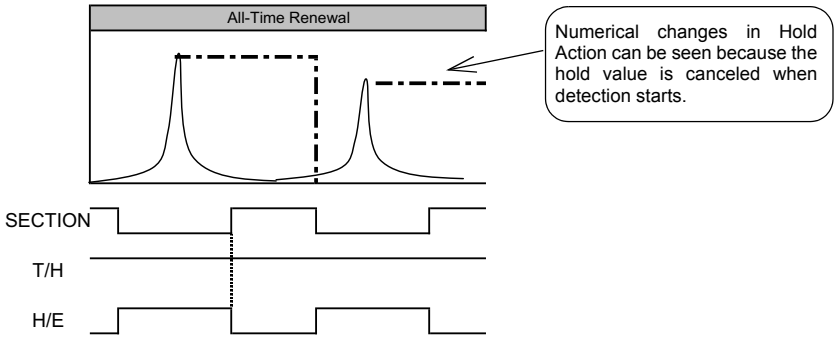
All Time / Hold Stop Initial value: All Time

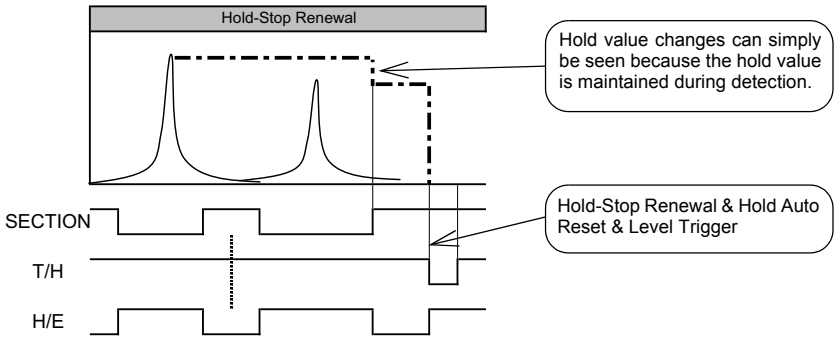
How to set

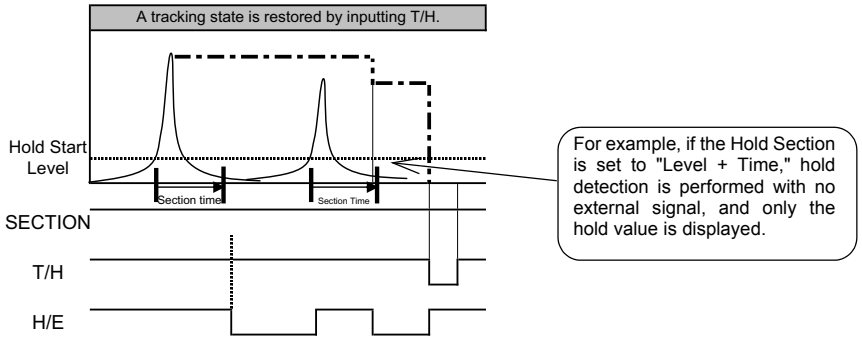
SET. → Exp. Setting → Exp. Hold Set. → Page 1

- All Time: When detection starts, the previous hold value is canceled and the indicated value is displayed by tracking. When the hold condition is met, the indicated value is held.
- Hold Stop: When detection starts, the previous hold value is maintained, and no tracking state is displayed. If the hold condition is met when the Hold Section ends, the hold value is renewed. This is, however, effective only when Hold Auto Reset is ON.

- In the case of Peak hold







1-6. Hold End Timing

The HOLD END (H/E) signal timing when Inflection Point, Relative Maximum, Relative Minimum or Relative Difference hold is used can be changed.

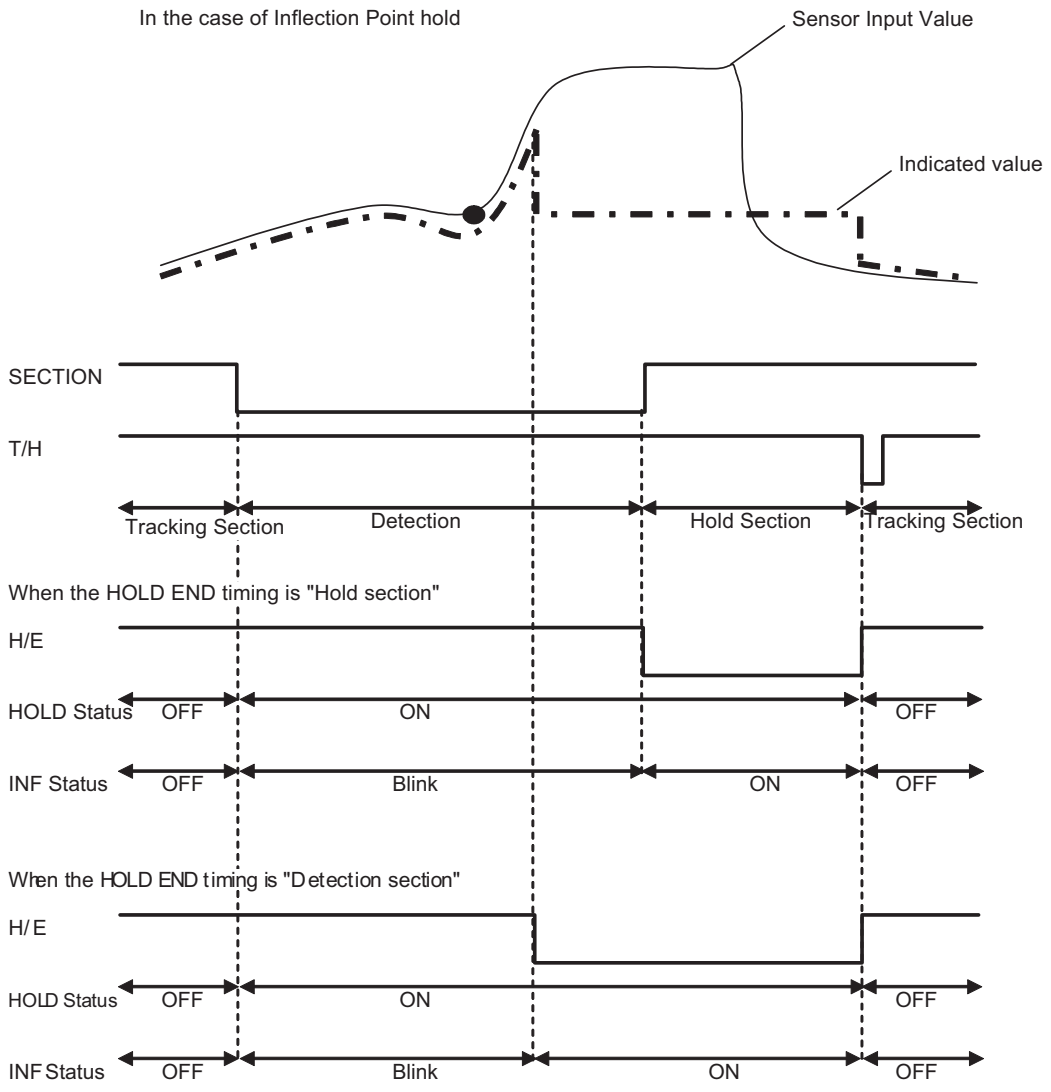
Hold Sct / Detect Sct Initial value: Detect Sct

How to set

SET. → Exp. Setting → Exp. Hold Set. → Page 2

- Hold Sct: HOLD END (H/E) is on according to timing in which the SECTION signal is off.
- Detect Sct: HOLD END (H/E) is on immediately after the detection of the hold point.

■Hold operations



2 EXP. COMPARISON FUNCTIONS

2-1. Before Value Comparison

■Before value comparison

ON / OFF Initial value: OFF

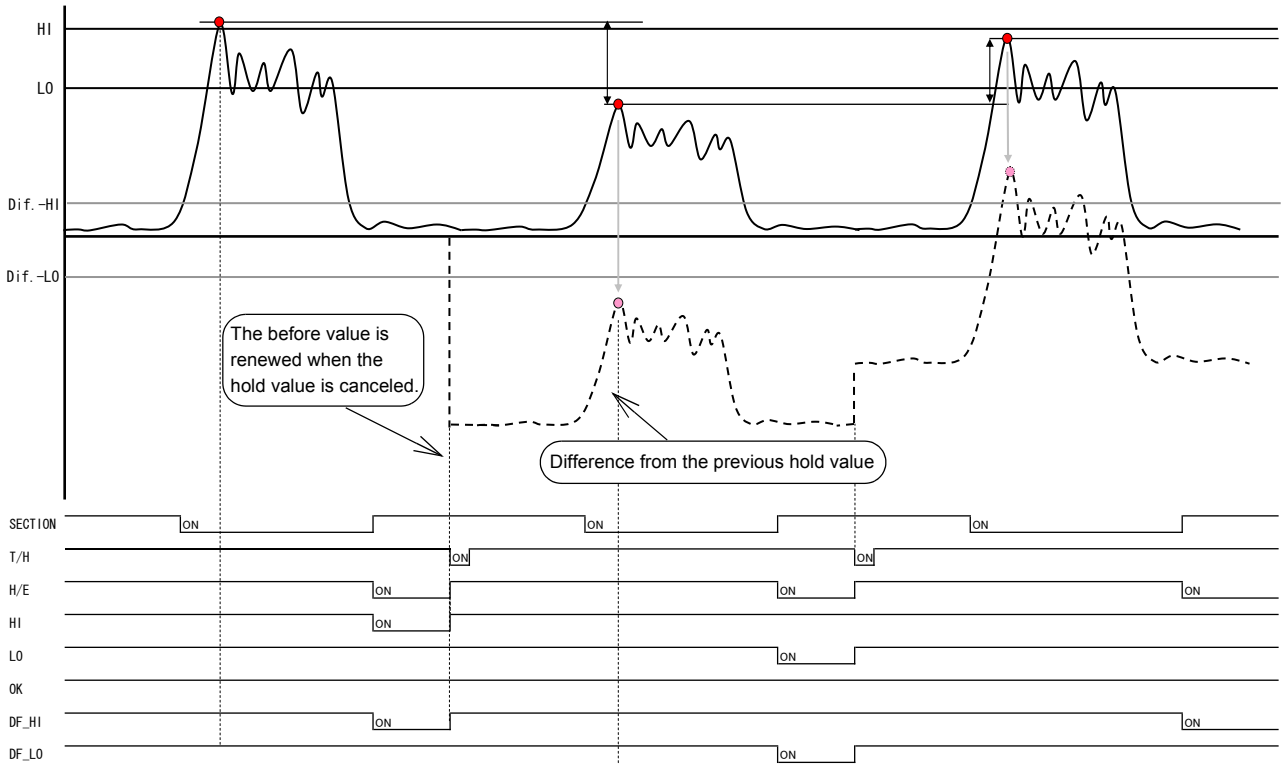
How to set

SET. → Exp. Setting → Exp. Comp. Set. → Page 1

In addition to the HI/LO Limit comparisons of hold values, the difference between the presently-measured hold value and the previously-measured hold value can be judged.

Difference value = Present hold value (indicated value) - Previous hold value

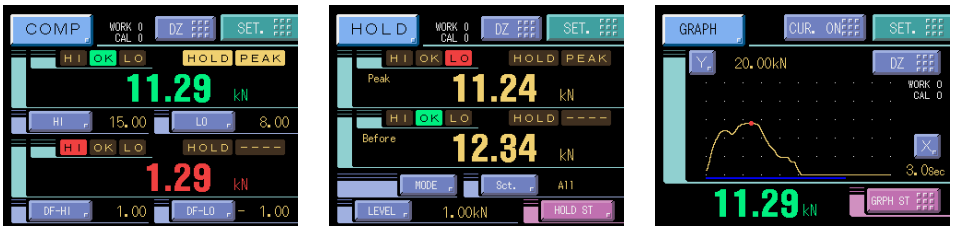
● In the case of Peak hold



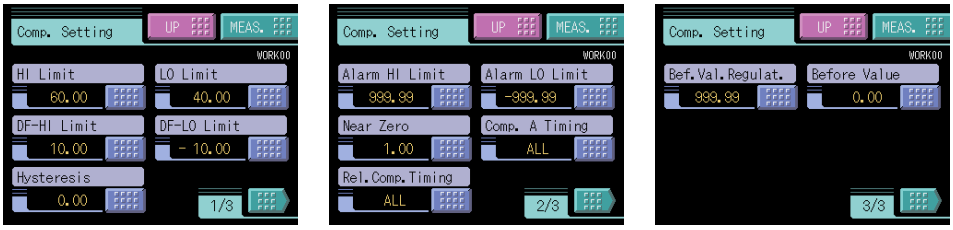
* The comparison output in the above timing chart applies to the case where the Comparison Timing setting in Comparison Setting is Hold.
* The before value is renewed when the hold value is canceled.

■Screens appearing when before value comparison is selected

Before-value-comparison-specific measurement screens appear.



Also, the Comparison Setting menu is dedicated.



■Before value renewal condition

The previous hold value used for Before Value Comparison is renewed under the following conditions:

1) When the hold is canceled (except when the Before Value Regulation is exceeded)

2) When the Before Value in the Comparison Setting menu is changed by inputting a value in a similar manner to set values.

   This is convenient for inputting a predetermined value at the first measurement, etc., and for changing the Before Value as desired.

3) When an input is made by special-purpose input commands through the communication interface (RS232C / CC-Link / DeviceNet)

■Difference-HI/LO limit comparisons

You can set Difference value-HI Limit and Difference value-LO Limit to compare the difference between the previous hold value and present hold value.

- Difference value-HI Limit -99999 - 99999 Initial value: 1000
- Difference value-LO Limit -99999 - 99999 Initial value: -1000

When Before Value Comparison is made, judgments are made under the following conditions, and respective results are output.

- HI Limit (HI)	ON condition:	Hold Value (indicated value) > HI Limit
	OFF condition:	Hold Value (indicated value) ≦ HI Limit
- LO Limit (LO)	ON condition:	Hold Value (indicated value) < LO Limit
	OFF condition:	Hold Value (indicated value) ≧ LO Limit
- Difference-HI Limit (DF-HI)	ON condition:	Difference value > Difference value-HI Limit
	OFF condition:	Difference value ≦ Difference value-HI Limit
- Difference-LO Limit (DF-LO)	ON condition:	Difference value < Difference value-LO Limit
	OFF condition:	Difference value ≧ Difference value-LO Limit
- OK	ON condition:	All of HI, LO, DF-HI, and DF-LO are OFF.
	OFF condition:	Any of HI, LO, DF-HI, and DF-LO is ON.

* The Hysteresis setting is not reflected in the Difference-HI/LO Limit comparison operation.
* If the Comparison Timing condition is not met, the comparison result of the value targeted for the Comparison Timing turns OFF.
* In Before Value Comparison, HH Limit/LL Limit comparisons become ineffective.
* OK is displayed each on the LCD screen as the hold value is OK, and the difference value is OK.

A1	–	COM1	COM2	–	B1
A2	OUT	DF-HI	WORK0	IN	B2
A3	OUT	HI	WORK1	IN	B3
A4	OUT	OK	WORK2	IN	B4
A5	OUT	LO	WORK3(LOCK)	IN	B5
A6	OUT	DF-LO	T/H	IN	B6
A7	–	COM1	COM2	–	B7
A8	OUT	HOLD END(H/E)	SECTION	IN	B8
A9	OUT	RUN	D/Z	IN	B9
A10	OUT	EVENT	GRAPH TRIG	IN	B10
A11	OUT	SIF	CAL0	IN	B11
A12	OUT	SIF	CAL1	IN	B12

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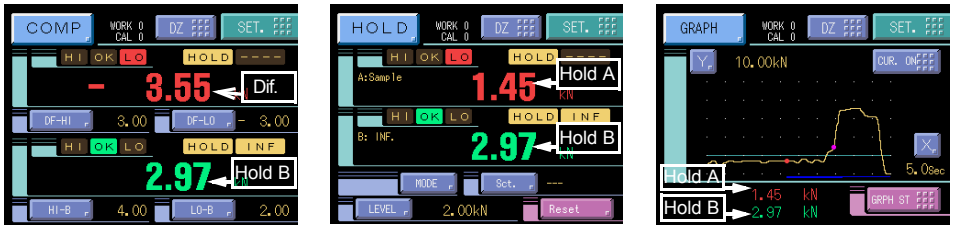
■Before value regulation

* For judging that the difference between the previous and present hold values is too large for comparison, set the Before Value Regulation. If the absolute value of the difference is larger than this regulation, the Before Value is not renewed. (Not the present hold value but the previous hold value is used for the next comparison.)

- Before Value Regulation 0 - 99999 Initial value: 99999

2-2. Before Value Comparison in Double Hold

Before-value-comparison-specific measurement screens in double hold appear.



Also, the Comparison Setting menu is dedicated.

■Comparison standard

In double hold, Before Value Comparison can be made only on either A or B by selecting either Hold A or Hold B as Comparison Standard.

- Comparison Standard Hold A / Hold B Initial value Hold A

Difference value when the Comparison Standard is Hold A(B) =
Present hold value A(B) - Previous hold value A(B)

■Double hold and difference-HI/LO limit comparisons

Double Hold HI/LO Limit and Difference-HI/LO Limit comparisons are made, and respective judgment results are output externally.

When the Comparison Standard is A:

The HI/LO Limit comparison result and Difference value-HI/LO Limit comparison result of hold value A are output together.

- Hold value A HI Limit (HI-A) & Difference value-HI Limit (DF-HI)
  ON condition:Hold value A > HI-A Limit, or Difference value > Difference value-HI Limit
  OFF condition: Hold value A ≦ HI-A Limit, and Difference value ≦ Difference value-HI Limit
- Hold value A LO Limit (LO-A) & Difference value-LO Limit (DF-LO)
  ON condition: Hold value A < LO-A Limit, or Difference value < Difference value-LO Limit
  OFF condition: Hold value A ≧ LO-A Limit, and Difference value≧ Difference value-LO Limit
- HI-B Limit (HI-B)
  ON condition: Hold value B > HI-B Limit
  OFF condition: Hold value B ≦ HI-B Limit
- LO-B Limit (LO-B)
  ON condition: Hold value B < LO-B Limit
  OFF condition: Hold value B ≧ LO-B Limit
- OK
  ON condition: All of HI-A, LO-A, HI-B, LO-B, DF-HI, and DF-LO are OFF.
  OFF condition: Any of HI-A, LO-A, HI-B, LO-B, DF-HI, and DF-LO is ON.

* The Hysteresis setting is not reflected in the Difference-HI/LO Limit comparison operation.
* If the Comparison Timing condition is not met, the comparison result of the value targeted for the Comparison Timing turns OFF.
* OK is displayed each on the LCD screen as hold value A, and the difference value are OK and hold value B is OK.

- External I/O pin assignments for Comparison Standard A

A1	—	COM1	COM2	—	B1
A2	OUT	HI-B	WORK0	IN	B2
A3	OUT	HI-A & DF-HI	WORK1	IN	B3
A4	OUT	OK	WORK2	IN	B4
A5	OUT	LO-A & DF-LO	WORK3(LOCK)	IN	B5
A6	OUT	LO-B	T/H	IN	B6
A7	—	COM1	COM2	—	B7
A8	OUT	HOLD END(H/E)	SECTION	IN	B8
A9	OUT	RUN	D/Z	IN	B9
A10	OUT	EVENT	GRAPH TRIG	IN	B10
A11	OUT	SIF	CAL0	IN	B11
A12	OUT	SIF	CAL1	IN	B12

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When the Comparison Standard is B:

The HI/LO Limit comparison result and Difference value-HI/LO Limit comparison result of hold value B are output together.

- HI-A Limit (HI-A)
  ON condition: Hold value A > HI-A Limit
  OFF condition: Hold value A ≦ HI-A Limit
- LO-A Limit (LO-A)
  ON condition: Hold value A < LO-A Limit
  OFF condition: Hold value A ≧ LO-A Limit

- Hold value B HI Limit (HI-B) & Difference value-HI Limit (DF-HI)
  ON condition: Hold value B > HI-B Limit, or Difference value > Difference value-HI Limit
  OFF condition: Hold value B ≦ HI-B Limit, and Difference value ≦ Difference value-HI Limit
- Hold value B LO Limit (LO-B) & Difference value-LO Limit (DF-LO)
  ON condition: Hold value B < LO-B Limit, or Difference value < Difference value-LO Limit
  OFF condition: Hold value B ≧ LO-B Limit, and Difference value ≧ Difference value-LO Limit
- OK
  ON condition: All of HI-A, LO-A, HI-B, LO-B, DF-HI, and DF-LO are OFF.
  OFF condition: Any of HI-A, LO-A, HI-B, LO-B, DF-HI, and DF-LO is ON.

* The Hysteresis setting is not reflected in the Difference-HI/LO Limit comparison operation.
* If the Comparison Timing condition is not met, the comparison result of the value targeted for the Comparison Timing turns OFF.
* OK is displayed each on the LCD screen as hold value A is OK, and hold B and the difference value are OK.

- External I/O pin assignments for Comparison Standard B

A1	—	COM1	COM2	—	B1
A2	OUT	HI-B & DF-HI	WORK0	IN	B2
A3	OUT	HI-A	WORK1	IN	B3
A4	OUT	OK	WORK2	IN	B4
A5	OUT	LO-A	WORK3(LOCK)	IN	B5
A6	OUT	LO-B & DF-LO	T/H	IN	B6
A7	—	COM1	COM2	—	B7
A8	OUT	HOLD END(H/E)	SECTION	IN	B8
A9	OUT	RUN	D/Z	IN	B9
A10	OUT	EVENT	GRAPH TRIG	IN	B10
A11	OUT	SIF	CAL0	IN	B11
A12	OUT	SIF	CAL1	IN	B12

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2-3. Relative Value Comparison (in expansion double hold only)

ON / OFF Initial value: OFF

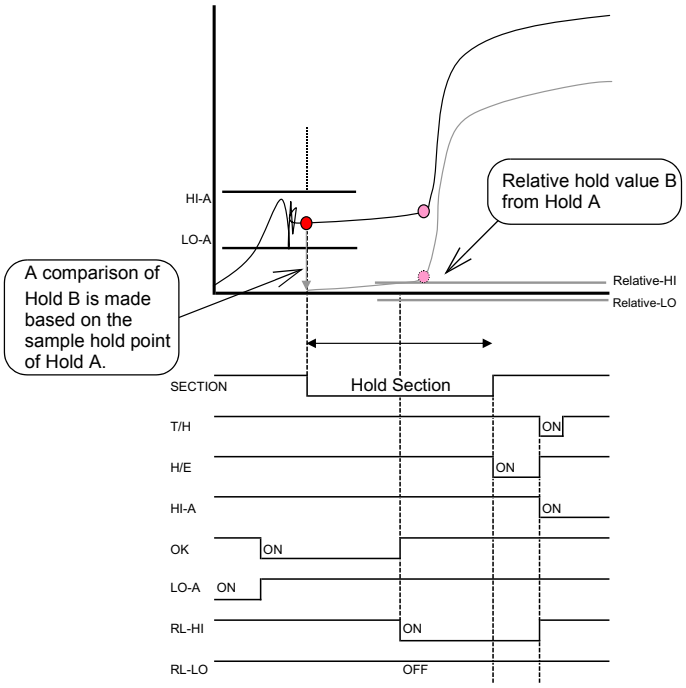
How to set

SET. → Exp. Setting → Exp. Comp. Set. → Page 1

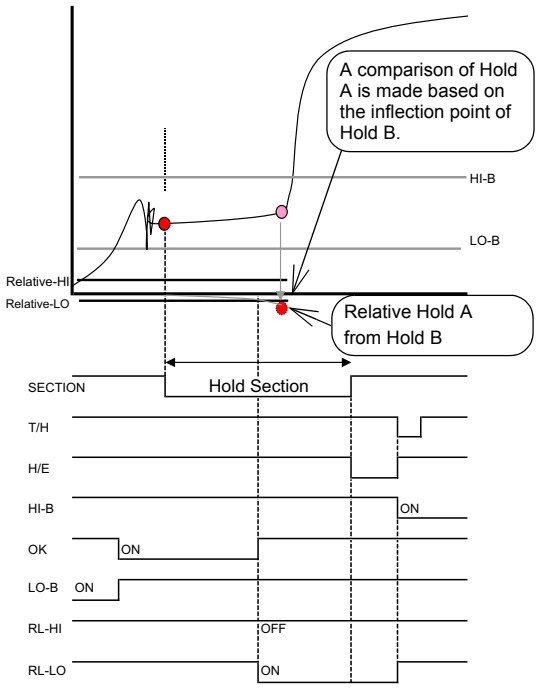
On two hold points (A and B) in Double hold, HI/LO Limit comparisons of the comparison standard hold value, and HI/LO Limit judgments of the difference (relative value) between the comparison standard hold value and the other hold value can be made.

● In the case of Comparison Standard A where
Hold A: Sample
Hold B: Inflection Point

* The comparison output in the timing chart shown on the right-hand side applies to the case where the Comparison Timing setting in Comparison Setting is All Time.

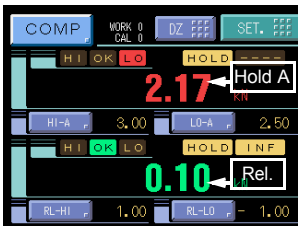


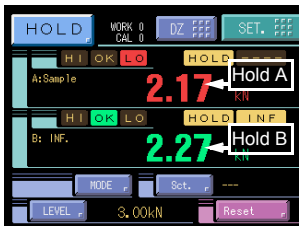
● In the case of Comparison Standard B where
Hold A: Sample
Hold B: Inflection Point

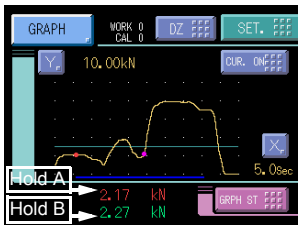


■Screens appearing when relative value comparison is selected

Relative-value-comparison-specific measurement screens appear.







Also, the Comparison Setting menu is dedicated.

■Relative-HI/LO limit comparison

You can set Relative-HI Limit and Relative-LO Limit to compare the difference between hold value A and hold value B.

- Relative-HI -99999 - 99999 Initial value: 1000
- Relative-LO -99999 - 99999 Initial value: -1000

■Comparison standard

Relative Value Comparison is made by selecting either of Hold A and Hold B detected by Double Hold as Comparison Standard.

- Comparison Standard Hold A / Hold B Initial value Hold A

Relative value when the Comparison Standard is Hold A(B) =
Hold value B(A) - Hold value A(B)

■Relative value HI/LO limit comparison

Double hold HI/LO Limit and Relative Value HI/LO Limit comparisons are made, and respective judgment results are output externally.

When the Comparison Standard is A:

The HI/LO Limit comparison result and Relative Value HI/LO Limit comparison result of hold value A are output together.

- HI-A Limit (HI-A)
  ON condition: Hold value A > HI-A Limit
  OFF condition: Hold value A ≦ HI-A Limit
- LO-A Limit (LO-A)
  ON condition: Hold value A < LO-A Limit
  OFF condition: Hold value A ≧ LO-A Limit
- Relative-HI Limit (RL-HI)
  ON condition: Relative Value (Hold value B - Hold value A) > Relative-HI Limit
  OFF condition: Relative Value (Hold value B - Hold value A) ≦ Relative-HI Limit
- Relative-LO Limit (RL-LO)
  ON condition: Relative Value (Hold value B - Hold value A) < Relative-LO Limit
  OFF condition: Relative Value (Hold value B - Hold value A) ≧ Relative-- LO Limit
- OK
  ON condition: All of HI-A, LO-A, RL-HI, and RL-LO are OFF.
  OFF condition: Any of HI-A, LO-A, RL-HI, and RL-LO is ON.

* The Hysteresis setting is not reflected in the Relative-HI/LO Limit comparison operation.
* If the Comparison Timing condition is not met, the comparison result of the value targeted for the Comparison Timing turns OFF.
* OK is displayed each on the LCD screen as hold value A is OK, and the relative value is OK.

- - External I/O pin assignments for Comparison Standard A

A1	—	COM1	COM2	—	B1
A2	OUT	RL-HI	WORK0	IN	B2
A3	OUT	HI-A	WORK1	IN	B3
A4	OUT	OK	WORK2	IN	B4
A5	OUT	LO-A	WORK3(LOCK)	IN	B5
A6	OUT	RL-LO	T/H	IN	B6
A7	—	COM1	COM2	—	B7
A8	OUT	HOLD END(H/E)	SECTION	IN	B8
A9	OUT	RUN	D/Z	IN	B9
A10	OUT	EVENT	GRAPH TRIG	IN	B10
A11	OUT	SIF	CAL0	IN	B11
A12	OUT	SIF	CAL1	IN	B12

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When the Comparison Standard is B:

The HI/LO Limit comparison result and Relative Value HI/LO Limit comparison result of hold value B are output together.

- Relative-HI Limit (RL-HI)
  ON condition: Relative Value (Hold value A - Hold value B) > Relative-HI Limit
  OFF condition: Relative Value (Hold value A - Hold value B) ≦ Relative-HI Limit
- Relative-LO Limit (RL-LO)
  ON condition: Relative Value (Hold value A - Hold value B) < Relative-LO Limit
  OFF condition: Relative Value (Hold value A - Hold value B) ≧ Relative-LO Limit
- HI-B Limit (HI-B)
  ON condition: Hold value B > HI-B Limit
  OFF condition: Hold value B ≦ HI-B Limit
- LO-B Limit (LO-B)
  ON condition: Hold value B < LO-B Limit
  OFF condition: Hold value B ≧LO-B Limit
- OK
  ON condition: All of HI-B, LO-B, RL-HI, and RL-LO are OFF.
  OFF condition: Any of HI-B, LO-B, RL-HI, and RL-LO is ON.

* The Hysteresis setting is not reflected in the Relative-HI/LO Limit comparison operation.
* If the Comparison Timing condition is not met, the comparison result of the value targeted for the Comparison Timing turns OFF.
* OK is displayed each on the LCD screen as the relative value is OK, and hold value B is OK.

- External I/O pin assignments afor Comparison Standard B

A1	—	COM1	COM2	—	B1
A2	OUT	HI-B	WORK0	IN	B2
A3	OUT	RL-HI	WORK1	IN	B3
A4	OUT	OK	WORK2	IN	B4
A5	OUT	RL-LO	WORK3(LOCK)	IN	B5
A6	OUT	LO-B	T/H	IN	B6
A7	—	COM1	COM2	—	B7
A8	OUT	HOLD END(H/E)	SECTION	IN	B8
A9	OUT	RUN	D/Z	IN	B9
A10	OUT	EVENT	GRAPH TRIG	IN	B10
A11	OUT	SIF	CAL0	IN	B11
A12	OUT	SIF	CAL1	IN	B12

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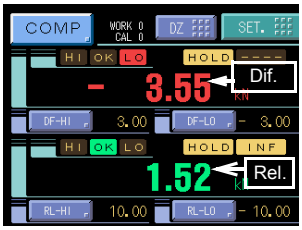
2-4. Before Value Comparison and Relative Value Comparison

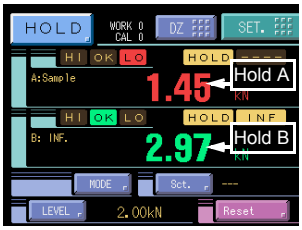
(in expansion Double Hold only)

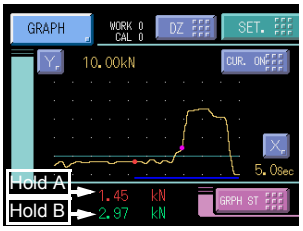
In Double Hold, Before Value Comparison and Relative Value Comparison can be made simultaneously.

■Screens appearing when before value comparison & relative value comparison are selected

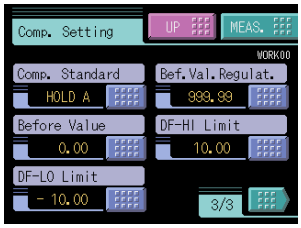
Before-value-comparison & Relative-Value-Comparison-specific measurement screens appear.







Also, the Comparison Setting menu is dedicated.



■Difference Value- and relative-HI/LO limit comparisons

HI/LO Limit, Difference value-HI/LO, and Relative-HI/LO Limit comparisons of Double Hold are made, and respective judgment results are output externally.

When the Comparison Standard is A:

The HI/LO Limit comparison result of the relative value, and the HI/LO Limit comparison result and Difference value-HI/LO Limit comparison result of hold value A are output together.

- Hold value A HI Limit (HI-A) & Difference value-HI Limit (DF-HI)
  ON condition: Hold value A > HI-A Limit, or Difference value > Difference value-HI Limit
  OFF condition: Hold value A ≦HI-A Limit, and Difference value ≦ Difference value-HI Limit
- Hold value A LO Limit (LO-A) & Difference value-LO Limit (DF-LO)
  ON condition: Hold value A < LO-A Limit, or Difference value < Difference value-LO Limit
  OFF condition: Hold value A ≧ LO-A Limit, and Difference value ≧ Difference value-LO Limit
- Relative-HI Limit (RL-HI)
  ON condition: Relative Value (Hold value B - Hold value A) > Relative-HI Limit
  OFF condition: Relative Value (Hold value B - Hold value A) ≦ Relative-HI Limit
- Relative-LO Limit (RL-LO)
  ON condition: Relative Value (Hold value B - Hold value A) < Relative-LO Limit
  OFF condition: Relative Value (Hold value B - Hold value A) ≧ Relative-LO Limit
- OK
  ON condition: All of HI-A, LO-A, DF-HI, DF-LO, RL-HI, and RL-LO are OFF.
  OFF condition: Any of HI-A, LO-A, DF-HI, DF-LO, RL-HI, and RL-LO is ON.

* The Hysteresis setting is not reflected in the Difference-HI/LO Limit and Relative-HI/LO Limit comparison operation.
* If the Comparison Timing condition is not met, the comparison result of the value targeted for the Comparison Timing turns OFF.
* OK is displayed each on the LCD screen as hold value A and the difference value are OK, and the relative value is OK

- External I/O pin assignments for Comparison Standard A

A1	—	COM1	COM2	—	B1
A2	OUT	RL-HI	WORK0	IN	B2
A3	OUT	HI-A & DF-HI	WORK1	IN	B3
A4	OUT	OK	WORK2	IN	B4
A5	OUT	LO-A & DF-LO	WORK3(LOCK)	IN	B5
A6	OUT	RL-LO	T/H	IN	B6
A7	—	COM1	COM2	—	B7
A8	OUT	HOLD END(H/E)	SECTION	IN	B8
A9	OUT	RUN	D/Z	IN	B9
A10	OUT	EVENT	GRAPH TRIG	IN	B10
A11	OUT	SIF	CAL0	IN	B11
A12	OUT	SIF	CAL1	IN	B12

External I/O FCN-365P024-AU/FCN-360C024-B

When the Comparison Standard is B:

The HI/LO Limit comparison result of the relative value, and the HI/LO Limit comparison result and Difference value-HI/LO Limit comparison result of hold value B are output together.

- Relative-HI Limit (RL-HI)
  ON condition: Relative Value (Hold value A - Hold value B) > Relative-HI Limit
  OFF condition: Relative Value (Hold value A - Hold value B) ≦ Relative-HI Limit
- Relative-LO Limit (RL-LO)
  ON condition: Relative Value (Hold value A - Hold value B) < Relative-LO Limit
  OFF condition: Relative Value (Hold value A - Hold value B) ≧ Relative-LO Limit
- Hold value B HI Limit (HI-B) & Difference value-HI Limit (DF-HI)
  ON condition: Hold value B > HI-B Limit, or Difference value > Difference value-HI Limit
  OFF condition: Hold value B ≦ HI-B Limit, and Difference value ≦ Difference value-HI Limit
- Hold value B LO Limit (LO-B) & Difference value-LO Limit (DF-LO)
  ON condition: Hold value B < LO-B Limit, or Difference value < Difference value-LO Limit
  OFF condition: Hold value B ≧ LO-B Limit, and Difference value ≧ Difference value-LO Limit
- OK ON condition: All of HI-B, LO-B, DF-HI, DF-LO, RL-HI, and RL-LO are OFF.
  OFF condition: Any of HI-B, LO-B, DF-HI, DF-LO, RL-HI, and RL-LO is ON.

* The Hysteresis setting is not reflected in the Difference-HI/LO Limit and Relative-HI/LO Limit comparison operations.
* If the Comparison Timing condition is not met, the comparison result of the value targeted for the Comparison Timing turns OFF.
* OK is displayed each on the LCD screen as the relative value is OK, and hold value B and the difference value are OK.

- External I/O pin assignments for Comparison Standard B

A1	—	COM1	COM2	—	B1
A2	OUT	HI-B & DF-HI	WORK0	IN	B2
A3	OUT	RL-HI	WORK1	IN	B3
A4	OUT	OK	WORK2	IN	B4
A5	OUT	RL-LO	WORK3(LOCK)	IN	B5
A6	OUT	LO-B & DF-LO	T/H	IN	B6
A7	—	COM1	COM2	—	B7
A8	OUT	HOLD END(H/E)	SECTION	IN	B8
A9	OUT	RUN	D/Z	IN	B9
A10	OUT	EVENT	GRAPH TRIG	IN	B10
A11	OUT	SIF	CAL0	IN	B11
A12	OUT	SIF	CAL1	IN	B12

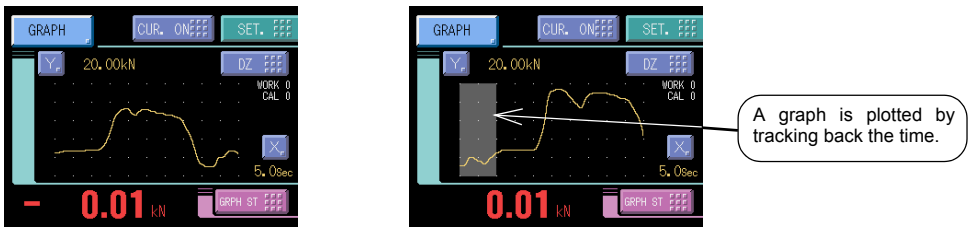
Extyernal I/O FCN-365P024-AU/FCN-360C024-B

3 EXP. GRAPH FUNCTION

3-1. Graph Pre Trigger Display Function

A graph is plotted by tracking back the time by the percentage set for Pre Trigger Display.

Absence of Pre Trigger Display　　Presence of Pre Trigger Display (20%)



* The Pre Trigger Value can be set in the range of 0 to 20%.
* Even if the Pre Trigger Value is set, the graph plotting time is fixed, in which plotting is performed from the head of the Pre Trigger Value: therefore, the time of plotting from its start becomes short by the Pre Trigger Value.
* The Pre Trigger Value can be set on each piece of work.
* No hold point is marked in the Pre Trigger Display area.

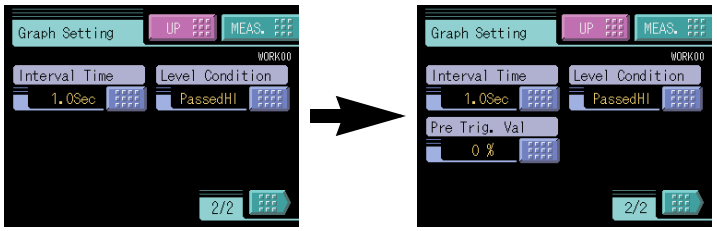
■Pre trigger display setting

ON / OFF　　Initial value: OFF

How to set

SET. → Exp. Setting → Exp. Graph Set. → Page 1

When this setting is ON, the Pre Trigger Value setting is displayed in the graph setting menu to allow adjustment of the amount of Pre Trigger Display.



■Pre trigger value

0 to 20%　　Initial value: 0

How to set

SET. → Work Setting → Graph Setting → Page 2

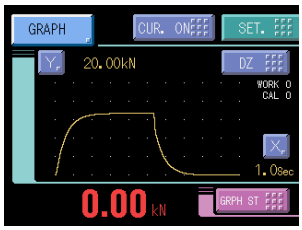
4 EXP. OPERATION FUNCTIONS

4-1. CR Characteristic (Primary) Digital Filter

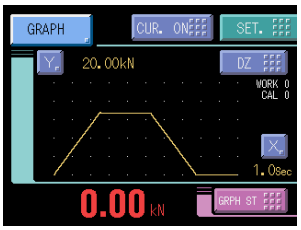
You can select CR characteristic digital filters in addition to the conventional digital filtering by the moving-average method alone.

Step response waveform

CR characteristic low pass filtering

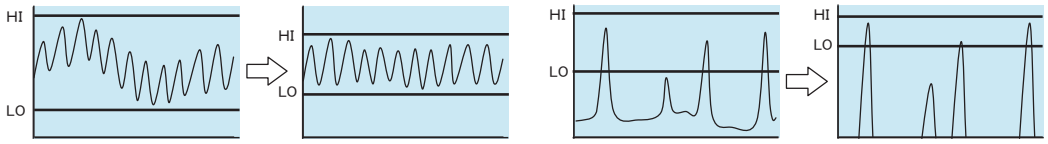


Moving-average type low pass filtering



- Primary CR filter characteristics are shown.
- Like an analog filter, you can set the cutoff frequency, where the degree of flexibility in cutoff frequency increases.
  The cutoff frequency can be set in the range of 1 to 990Hz.
  The cutoff frequency can be set in units of hertz in the range of 1 to 100Hz.
  The cutoff frequency can be set in units of 10 hertz in the range of 100 to 990Hz.
- Compared with an analog filter, the individual difference in characteristics is small.
- A high pass filter can also be selected.

When a high pass filter is used ...



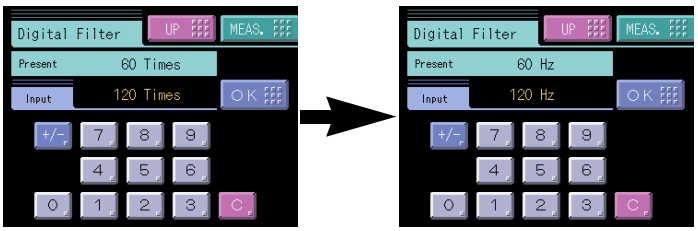
■Digital filter character

STANDARD / CR type LPF / CR type HPF Initial value: STANDARD

How to set

SET. → Exp. Setting → Exp. Operat. Set. → Page 1

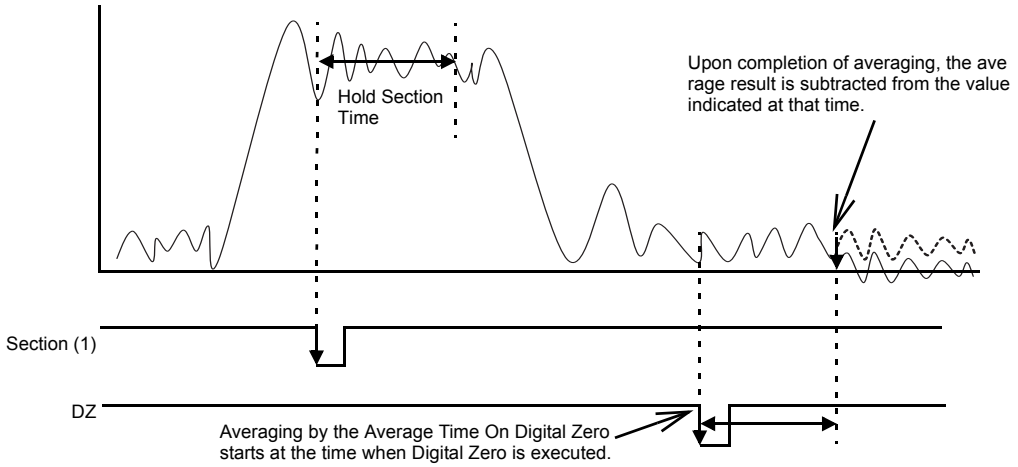
When this setting is CR type LPF or CR type HPF, the Digital Filter setting in the operation setting menu becomes the cutoff frequency setting.



4-2. Averaging on Digital Zero

When Digital Zero is executed, an average calculation is made by the time set for Average Time On Digital Zero, and upon completion of the calculation, the average value is subtracted from the value indicated at that time. (However, the maximum average time in Digital Zero is 5 sec. In the case of more than that, processing will be performed by 5 sec.)

Example) Time specified section average hold



■Average time on digital zero

0.000 to 5.000 sec Initial value: 0.000 sec

How to set

SET. → Exp. Setting → Exp. Operat. Set. → Page 1

Inputting 0.001 sec. or more makes the above operation effective.

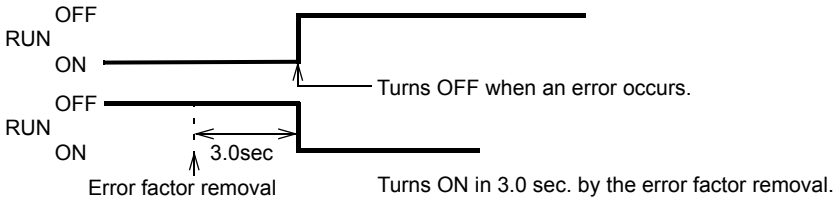
CAUTION

In the case of using ZT (Zero Tracking) with this function effective, averaging is also performed.

4-3. RUN Output Selection

You can select the output form of the external output signal RUN (A9).

- ON-OFF operation See "5-21.RUN Output" in the operation manual (Standard) of the F372
- ON fixed



- OFF fixed The ON-OFF relationship is the inverse of the ON-fixed case.

■RUN output selection

ON-OFF operation / ON fixed / OFF fixed Initial value ON-OFF operation

How to set

SET. → Exp. Setting → Exp. Operat. Set. → Page 1

CAUTION

Be aware that judgment is difficult if a hardware error occurs (if the level is fixed for some reason) when the output is fixed.

5 EXP. OPTION FUNCTION

5-1. BCD Output Data Selection

When the BCD option is mounted, you can select the output data form from BCD and binary.

BCD / Binary Initial value BCD

How to set

SET. → Exp. Setting → Exp. Option Set → Page 1

Connector pin assignments for binary output FCN-365P032-AU/FCN-360C032-B

No.		Signal	No.		Signal
A1	*	COM	B1	*	COM
A2	OUT	2^0	B2	OUT	2^{12}
A3	OUT	2^1	B3	OUT	2^{13}
A4	OUT	2^2	B4	OUT	2^{14}
A5	OUT	2^3	B5	OUT	2^{15}
A6	OUT	2^4	B6	OUT	2^{16}
A7	OUT	2^5	B7	OUT	
A8	OUT	2^6	B8	OUT	BCD Data Select 0 (Response)
A9	OUT	2^7	B9	OUT	BCD Data Select 1 (Response)
A10	OUT	2^8	B10	OUT	Minus (Polarity)
A11	OUT	2^9	B11	OUT	OVER
A12	OUT	2^{10}	B12	OUT	STAB
A13	OUT	2^{11}	B13	OUT	STROBE
A14	IN	BCD Data Hold	B14	IN	Logic Select
A15	IN	BCD Data Select 0	B15	IN	BCD Data Select 1
A16	–		B16	–	

Currently-selected data can be confirmed by B8 and B9.

For the BCD output data list, see "BCO Option" on page 137.

6 STANDARD INTERFACES

6-1. SI/F

Outputs are made to the two types of data output areas according to the expansion condition as shown in the table below.

Expansion	Output data		Comparison Standard
	GROSS area	NET area	
Standard	Real Time value	Hold value	—
Before Value Comparison	Hold value	Difference value	—
Double Hold	Hold value A	Hold value B	—
Double Hold & Before Value Comparison	Difference value	Hold value B	A
	Hold value A	Difference value	B
Double Hold & Relative Value Comparison	Hold value A	Relative value	A
	Relative value	Hold value B	B
Double Hold & Before Value & Relative Value Comparison	Difference value	Relative value	A
	Relative value	Difference value	B

6-2. RS-232C

Transmit / Receive mode

Special-purpose commands, such as hold value A/B, difference value, and relative value, are added to read commands.

- Indicated value / status read commands

Indicated value/status read

Function	Header		Protocol	Compatibility
	Main	Sub		
Hold A	R	A	Host: R A CR → F372A: R A + 1 2 3 . 4 5 Delimiter (Sign, decimal point, 5-digit indicated value)	○
Hold B	R	B	Host: R B CR → F372A: R B + 1 2 3 . 4 5 Delimiter (Sign, decimal point, 5-digit indicated value)	×
Status 1	R	C	Host: R C CR → F372A: R C 0 0 0 0 0 0 0 Delimiter; Sensor +Error 0:OFF 1:ON; Sensor −Error 0:OFF 1:ON; +OVER(A) 0:OFF 1:ON; −OVER(A) 0:OFF 1:ON; HH 0:OFF 1:ON; LL 0:OFF 1:ON; Overload 0:OFF 1:ON	○
Status 2	R	D	Host: R D CR → F372A: R D 0 0 0 0 0 0 0 Delimiter; Hold(A) 0:OFF 1:ON; Stable(A) 0:OFF 1:ON; Near Zero 0:OFF 1:ON; HI(A) 0:OFF 1:ON; OK(A) 0:OFF 1:ON; LO(A) 0:OFF 1:ON; Undefined	○

Indicated value/status read

Function	Header Main	Header Sub	Protocol	Compatibility
Status 3	R	E	Host → F372A: RE CR F372A → Host: RE 0 0 0 0 0 0 0 Delimiter Hold(B) 0:OFF 1:ON Stable(B) 0:OFF 1:ON Undefined HI(B) 0:OFF 1:ON OK(B) 0:OFF 1:ON LO(B) 0:OFF 1:ON Undefined	×
Difference value	R	F	Host → F372A: RF CR F372A → Host: RF + 1 2 3 . 4 5 Delimiter Sign, decimal point, 5-digit indicated value	×
Graph data	R	G	Host → F372A: RG ＊ ＊ CR F372A → Host: RG ＊ ＊ + 1 2 3 . 4 5 … … + 1 2 3 . 4 5 + 1 2 3 . 4 5 Delimiter Sign, decimal point, 5-digit indicated value ＊＊ : Section 00 – 19 ＊ 10 points of data can be read on one section.	○
Graph hold point data; Hold A, one point only	R	H	Host → F372A: RH CR F372A → Host: RH 0 0 0 、 + 1 2 3 . 4 5 Delimiter Graph data no. 000 – 199 Sign, decimal point, 5-digit indicated value	○
Graph hold point data; Hold A/B Hold A、B	R	P	Host → F372A: RP A CR A:Hold A B:Hold B F372A → Host: RP A ＊ ＊ ＊ , + 3 4 5 . 6 7 A:Hold A B:Hold B Sign, decimal point, 5-digit indicated val Information of the 1st point , ＊ ＊ ＊ , + 1 2 3 . 4 5 Delimiter Sign, decimal point, 5-digit indicated value Information of the 2nd point ＊＊＊ :Graph data no. 000 – 199 ＊ In P-P hold, for example, two points are displayed: therefore, information of those two points can be read. ＊ The above shows the case of Hold A. ＊ When there is no data, graph data and indicated value are expressed as "–" (hyphen).	×
Relative Value	R	I	Host → F372A: RI CR F372A → Host: RI + 1 2 3 . 4 5 Delimiter Sign, decimal point, 5-digit indicated value	×
Real time Value	R	J	Host → F372A: RJ CR F372A → Host: RJ + 1 2 3 . 4 5 Delimiter Sign, decimal point, 5-digit indicated value	×

● Set value read / write commands

To read/write set value(s) in Work Setting, first write the work no. of the set value(s).

Expansion; Work no. write for work setting				
Function	Header		Protocol	Compa-tibility
	Main	Sub		
Setting work no.	W	A	Host W A 0 0 0 1 0 0 0 0 1 2 Delimiter Work no. 00 – 16 Specify 16 for setting the same value to all work nos.	×

Expansion; Work no. read for work setting				
Function	Header		Protocol	Compa-tibility
	Main	Sub		
Setting work no.	W	A	Host W A 0 0 0 1 CR F372A W A 0 0 0 1 0 0 0 0 1 2 Delimiter Work no. 00 – 16	×

This work no. is specific to 232C.

If the power is turned on again, and in the case of entry into the COM Check screen in Self Check, "0" will result.

Expansion; Setting write				
Function	Header		Protocol	Compa-tibility
	Main	Sub		
Each set value	W	A	Host W A 1 2 3 4 + 1 2 3 4 5 CR Command / Sign, 5-digit set value * When the number of digits of the set value is smaller than 5, put "0" in the high-order digit(s). Example) In the case of 3 digits W A 1 2 3 4 + 0 0 1 2 3 CR * When the set value is a selection, put "0" in the sign digit. W A 1 2 3 4 0 0 0 0 0 1 CR	×

Expansion; Setting read				
Function	Header		Protocol	Compa-tibility
	Main	Sub		
Each set value	W	A	Host W A 1 2 3 4 CR Command F372A W A 1 2 3 4 + 1 2 3 4 5 Delimiter Sign, 5-digit indicated value	×

For the command no. of the WA command, use each 4-digit set value no.
(See the list of set values at the end of this manual.)

● Special function commands

Standard; Continuous transmission/transmission upon printing				
Function	Header		Protocol	Compatibility
	Main	Sub		
Digital Zero	C	G	Host C G CR	○
Digital Zero Reset	C	H	Host C H CR	○
SI/F Print Command	C	I	Host C I CR	○
Zero Calibration	C	Z	Host C Z CR	×
Span Calibration	C	S	Host C S CR	×
Measurement Work Select	C	W	Host C W 0 0 CR Measurement work no. 00～15 (Numerical values other than the above are ignored.)	×
Control	C	C	Host C C 0 0 0 CR GRAPH TRIG O:OFF 1:ON SECTION O:OFF 1:ON T/H O:OFF 1:ON	×
Screen Change	C	–	Host C 1 CR 1: Comparison screen 2: Hold screen 3: Graph screen	×

● Continuous transmission / transmission upon printing

Standard; Continuous transmission/transmission upon printing				
Function	Header		Protocol	Compatibility
	Main	Sub		
Indicated value and status	G	S	F372A G S , S1 , S2 , S3 , S4 , S5 , 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 + 1 2 3 . 4 5 Delimiter Sign, decimal point, 5-digit indicated value	○

S1	S2	S3	S4	S5
O:Sensor ±Error or ±Over	A:Zero Tracking OFF	H:HI ON	H:HH ON	N:Near Zero OFF
	T:Zero Tracking ON	L:LO ON	L:LL ON	Z:Near Zero ON
S:Stable		G:HI/LO OFF	G:HH/LL OFF	
M:not stable		N:HI/LO ON	N:HH/LL ON	
H:Hold		F:Comparison OFF	F:Comparison OFF	
H>O>(SorM)		N>(HorL)>F>G	N>(HorL)>F>G	

Expansion Before Value Comparison; Continuous transmission/transmission upon printing

Function	Header		Protocol	Compa-tibility
	Main	Sub		
Indicated value and status	G	S	F372A: G S , S1 S2 S3 S4 S5 S6 S7 , (0–10) + 1 2 3 . 4 5 , + 1 2 3 . 4 5 Delimiter (11–27) Present hold value / Difference value	×

S1	S2	S3	S4	S5
O:Sensor ±Error or ±Over S:Stable M:not stable H:Hold		H:HI ON L:LO ON G:HI/LO OFF N:HI/LO ON F:Comparison OFF	O:Dif. value ±Over H:Dif.-HI ON L:Dif.-LO ON G:Dif.-HI/LO OFF N:Dif.-HI/LO ON F:Comparison OFF	
H>O>(SorM)		N>(HorL)>F>G	O>N>(HorL)>F>G	

S6	S7
N:Near Zero OFF Z:Near Zero ON	A:Zero Tracking OFF T:Zero Tracking ON

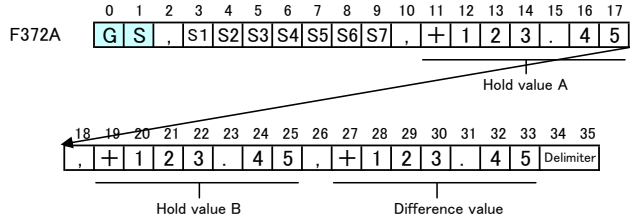
Expansion Double Hold; Continuous transmission/transmission upon printing

Function	Header		Protocol	Compa-tibility
	Main	Sub		
Indicated value and status	G	S	F372A: G S , S1 S2 S3 S4 S5 S6 S7 , (0–10) + 1 2 3 . 4 5 , + 1 2 3 . 4 5 Delimiter (11–27) Hold value A / Hold value B	×

S1	S2	S3	S4	S5
O:Sensor ±Error or ±Over A S:StableA M:not stableA H:Hold A	O:Sensor ±Error or ±Over B S:StableB M:not stableB H:Hold B	H:HI-A ON L:LO-A ON G:HI-A/LO-Aがｵﾌ N:HI-A/LO-A ON F:ComparisonA OFF	H:HI-B ON L:LO-B ON G:HI-B/LO-Bがｵﾌ N:HI-B/LO-B ON F:ComparisonA OFF	
H>O>(SorM)	H>O>(SorM)	N>(HorL)>F>G	N>(HorL)>F>G	

S6	S7
N:Near Zero OFF Z:Near Zero ON	A:Zero Tracking OFF T:Zero Tracking ON

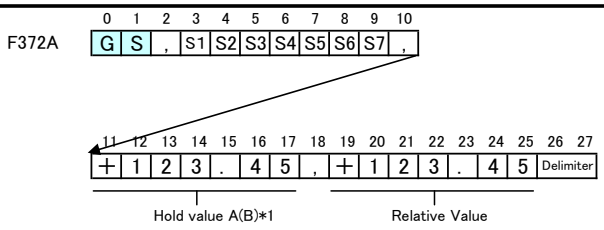
Expansion Double Hold & Before Value Comparison; Continuous transmission/transmission upon printing

Function	Header Main	Header Sub	Protocol	Compatibility
Indicated value and status	G	S		×

S1	S2	S3	S4	S5
O:Sensor ±Error or ±Over A S:StableA M:not stable A H:Hold A	O:Sensor ±Error or ±Over B S:StableB M:not stable B H:Hold B	H:HI-A ON L:LO-A ON G:HI-A/LO-A OFF N:HI-A/LO-A ON F:Comparison A OFF	H:HI-B ON L:LO-B ON G:HI-B/LO-B OFF N:HI-B/LO-B ON F:Comparison B OFF	O:Dif. value ±Over H:Dif.-HI ON L:Dif.-LO ON G:Dif.-HI/LO OFF N:Dif.-HI/LO ON F:Dif. Comparison OFF
H>O>(SorM)	H>O>(SorM)	N>(HorL)>F>G	N>(HorL)>F>G	O>N>(HorL)>F>G

S6	S7
N:Near Zero OFF Z:Near Zero ON	A:Zero Tracking OFF T:Zero Tracking ON

Expansion Double Hold & Relative Value Comparison; Continuous transmission/transmission upon printing

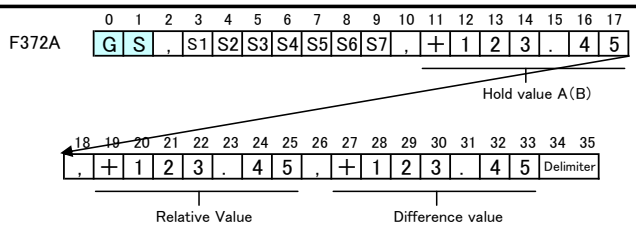
Function	Header Main	Header Sub	Protocol	Compatibility
Indicated value and status	G	S		×

S1	S2	S3	S4	S5
O:Sensor ±Error or ±Over A S:Stable A M:not stable A H:Hold A	O:Sensor ±Error or ±Over B S:Stable B M:not stable B H:Hold B	H:HI-A(B) ON L:LO-A(B) ON G:HI-A(B)/LO-A(B) OFF N:HI-A(B)/LO-A(B) ON F:Comparison A OFF	O:Relative value ±Over H:Relative-HI ON L:Relative-LO ON G:Relative-HI/LO OFF N:Relative-HI/LO ON F:Rel. Value Comparison OFF	
H>O>(SorM)	H>O>(SorM)	N>(HorL)>F>G	O>N>(HorL)>F>G	

S6	S7
N:Near Zero OFF Z:Near Zero ON	A:Zero Tracking OFF T:Zero Tracking ON

*1
Insert the value selected by Comparison Standard in Comparison Setting.

Expansion Double Hold & Before Value & Relative Value Comparison; Continuous transmission/transmission upon printing

Function	Header		Protocol	Compa-tibility
	Main	Sub		
Each set value	G	S		×

S1	S2	S3	S4	S5
O:Overload A	O:Overload B	H:HI-A(B) ON	H:Relative-HI ON	H:Dif.-HI ON
S:Stable A	S:Stable B	L:LO-A(B) ON	L:Relative-LO ON	L:Dif.-LO ON
M:not stable A	M:not stable B	G:HI-A(B)/LO-A(B) OFF	G:Relative-HI/LO OFF	G:Dif.-HI/LO OFF
H:Hold A	H:Hold B	N:HI-A(B)/LO-A(B) ON	N:Relative-HI/LO ON	N:Dif.-HI/LO ON
		F:Comparison A(B) OFF	F:Rel. Value Comparison OFF	F:Dif. Value Comparison OFF
H>O>(SorM)	H>O>(SorM)	N>(HorL)>F>G	N>(HorL)>F>G	N>(HorL)>F>G

S6	S7
N:Near Zero OFF	A:Zero Tracking OFF
Z:Near Zero ON	T:Zero Tracking ON

7 OPTION INTERFACES

7-1. BCO Option

You can set data to be output as fixed, or read data by setting external selection.

Connector pin assignments for BCD output FCN-365P032-AU/FCN-360C032-B

No.		Signal	No.		Signal
A1	*	COM	B1	*	COM
A2	OUT	1	B2	OUT	1000
A3	OUT	2	B3	OUT	2000
A4	OUT	4	B4	OUT	4000
A5	OUT	8	B5	OUT	8000
A6	OUT	10	B6	OUT	10000
A7	OUT	20	B7	OUT	20000
A8	OUT	40	B8	OUT	40000
A9	OUT	80	B9	OUT	80000
A10	OUT	100	B10	OUT	Minus (Polarity)
A11	OUT	200	B11	OUT	OVER
A12	OUT	400	B12	OUT	STAB
A13	OUT	800	B13	OUT	STROBE
A14	IN	BCD Data Hold	B14	IN	Logic Select
A15	IN	BCD Data Select 0	B15	IN	BCD Data Select 1
A16	—		B16	—	

■BCD output data list

BCD data select 1*1	BCD data select 0*1	Standard	Before Value	Double Hold
OFF	OFF	Real Time value	Real Time value	Real Time value
OFF	ON	Hold value	Hold value	Hold value
ON	OFF	Real Time value	Difference Value	Hold value
ON	ON	Real Time value	Real Time value	Real Time value

BCD data select 1*1	BCD data select 0*1	Double Hold & Before Value Comparison	Double Hold & Relative Value Comparison	Double Hold & Before Value Comparison & Relative Value Comparison
OFF	OFF	Real Time value	Real Time value	Real Time value
OFF	ON	Hold value A	Hold value (A/B)*2	Hold value (A/B)*2
ON	OFF	Hold value B	Relative value	Relative value
ON	ON	Difference Value	Real Time value	Difference Value

*1 BCD data select input condition when the BCD Output Select is External.

*2 Value selected by Comparison Standard in Comparison Setting of the measurement work no. specified by external input.

7-2. DAV/DAI Option

At standard time, you can select real time value or hold value.
At expansion Double Hold time, you can select real time value, hold value A, or hold value B.

* Before Value / Relative Value cannot be output.

7-3. CC-Link Option

You can read values corresponding to the expansion condition from remote register R⇒M (F372A →sequencer) when four stations are occupied.

* For details, see the CC-Link-specific operation manual.

7-4. DeviceNet Option

You can read from the data area added according to the expansion condition separately from the standard address area.

* For details, see the DeviceNet-specific operation manual.

8 SUPPLEMENTS

8-1. Setting Item List

■Work setting Comparison setting (WORK0 to WORK15)

Protect ○:Work setting protect, ◎:System setting protect, ●:Calibration protect, レ:Expansion protect
Memory S:SRAM, N:NOVRAM

Standard

Page	No.	Item	Initial value	Setting range	Memory	Protect	Command No.	COM. Read/ Write
1	1	HH Limit	8000	− 99999 to 99999	S	○	103	R/W
	2	HI Limit	6000	− 99999 to 99999	S	○	101	R/W
	3	LO Limit	4000	− 99999 to 99999	S	○	102	R/W
	4	LL Limit	2000	− 99999 to 99999	S	○	104	R/W
	5	Hysteresis	0	0 to 9999	S	○	105	R/W
2	6	Alarm HI Limit	99999	− 99999 to 99999	S	○	106	R/W
	7	Alarm LO Limit	− 99999	− 99999 to 99999	S	○	107	R/W
	8	Near Zero	100	0 to 99999	S	○	108	R/W
	9	Comparison Timing	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	109	R/W
	10	Comparison Output Selection	2: H2/L2	0: H4/L0 1: H3/L1 2: H2/L2 3: H1/L3 4: H0/L4	S	○	110	R/W

Expansion 1 -Before value comparison-

1	1	HI Limit	6000	− 99999 to 99999	S	○	101	R/W
	2	LO Limit	4000	− 99999 to 99999	S	○	102	R/W
	3	Difference-HI Limit	1000	− 99999 to 99999	S	○	111	R/W
	4	Difference-LO Limit	− 1000	− 99999 to 99999	S	○	112	R/W
	5	Hysteresis	0	− 9999 to 9999	S	○	105	R/W
2	6	Alarm HI Limit	99999	− 99999 to 99999	S	○	106	R/W
	7	Alarm LO Limit	− 99999	− 99999 to 99999	S	○	107	R/W
	8	Near Zero	100	0 to 99999	S	○	108	R/W
	9	Comparison Timing	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	109	R/W
	10							
3	11	Before Value Regulation	99999	0 to 99999	S	○	113	R/W
	12	Before Value	0	− 99999 to 99999	S	○	114	R/W
	13							
	14							
	15							

Expansion 2 -Double hold-

1	1	HI-A Limit	6000	− 99999 to 99999	S	○	101	R/W
	2	Lo-A Limit	4000	− 99999 to 99999	S	○	102	R/W
	3	HI-B Limit	8000	− 99999 to 99999	S	○	103	R/W
	4	Lo-B Limit	2000	− 99999 to 99999	S	○	104	R/W
	5	Hysteresis	0	− 9999 to 9999	S	○	105	R/W
2	6	Alarm HI Limit	99999	− 99999 to 99999	S	○	106	R/W
	7	Alarm LO Limit	− 99999	− 99999 to 99999	S	○	107	R/W
	8	Near Zero	100	0 to 99999	S	○	108	R/W
	9	Comparison Timing A	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	109	R/W
	10	Comparison Timing B	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	115	R/W

Expansion 3 -Double hold＆Before value comparison-

1	1	HI-A Limit	6000	－99999 to 99999	S	○	101	R/W
	2	Lo-A Limit	4000	－99999 to 99999	S	○	102	R/W
	3	HI-B Limit	8000	－99999 to 99999	S	○	103	R/W
	4	Lo-B Limit	2000	－99999 to 99999	S	○	104	R/W
	5	Hysteresis	0	－9999 to 9999	S	○	105	R/W
2	6	Alarm HI Limit	99999	－99999 to 99999	S	○	106	R/W
	7	Alarm LO Limit	－99999	－99999 to 99999	S	○	107	R/W
	8	Near Zero	100	0 to 99999	S	○	108	R/W
	9	Comparison Timing A	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	109	R/W
	10	Comparison Timing B	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	115	R/W
3	11	Comparison Standard	0:Hold A	0:Hold A 1:Hold B	S	○	116	R/W
	12	Before Value Regulation	99999	1 to 99999	S	○	113	R/W
	13	Before Value	0	－99999 to 99999	S	○	114	R/W
	14	Difference-HI Limit	1000	－99999 to 99999	S	○	111	R/W
	15	Difference-LO Limit	－1000	－99999 to 99999	S	○	112	R/W

Note) When double hold is on: object value of before value comparison is selected by "11: The comparison standard".

Expansion 4 -Double hold＆Relative value comparison-

1	1	HI-A Limit (HI-B Limit) *2	6000	－99999 to 99999	S	○	101/ 103	R/W
	2	Lo-A Limit (Lo-B Limit) *2	4000	－99999 to 99999	S	○	102/ 104	R/W
	3	Relative-HI Limit	1000	－99999 to 99999	S	○	117	R/W
	4	Relative-LO Limit	－1000	－99999 to 99999	S	○	118	R/W
	5	Hysteresis	0	－9999 to 9999	S	○	105	R/W
2	6	Alarm HI Limit	99999	－99999 to 99999	S	○	106	R/W
	7	Alarm LO Limit	－99999	－99999 to 99999	S	○	107	R/W
	8	Near Zero	100	0 to 99999	S	○	108	R/W
	9	Comparison Timing A (Comparison Timing B) *2	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	109/ 115	R/W
	10	Relative Comparison Timing	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	115/ 109	R/W
3	11	Comparison Standard	0:Hold A	0:Hold A 1:Hold B	S	○	116	R/W
	12							
	13							
	14							
	15							

Expansion 5 -Double hold＆Before value comparison＆Relative value comparison-

1	1	HI-A Limit (HI-B Limit) *2	6000	－99999 to 99999	S	○	101/ 103	R/W
	2	Lo-A Limit (Lo-B Limit) *2	4000	－99999 to 99999	S	○	102/ 104	R/W
	3	Relative-HI Limit	1000	－99999 to 99999	S	○	117	R/W
	4	Relative-LO Limit	－1000	－99999 to 99999	S	○	118	R/W
	5	Hysteresis	0	－9999 to 9999	S	○	105	R/W
2	6	Alarm HI Limit	99999	－99999 to 99999	S	○	106	R/W
	7	Alarm LO Limit	－99999	－99999 to 99999	S	○	107	R/W
	8	Near Zero	100	0 to 99999	S	○	108	R/W
	9	Comparison Timing A (Comparison Timing B) *2	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	109/ 115	R/W
	10	Relative Comparison Timing	0: ALL	0: ALL 1: MD 2: NZ 3: MD+NZ 4: HOLD	S	○	115/ 109	R/W
3	11	Comparison Standard	0:Hold A	0:Hold A 1:Hold B	S	○	116	R/W
	12	Before Value Regulation	99999	1 to 99999	S	○	113	R/W
	13	Before Value	0	－99999 to 99999	S	○	114	R/W
	14	Difference-HI Limit	1000	－99999 to 99999	S	○	111	R/W
	15	Difference-LO Limit	－1000	－99999 to 99999	S	○	112	R/W

*2) A and B counterchange according to the comparison standard setting.

■Work setting Hold setting (WORK0 to WORK15)

Protect ○:Work setting protect, ◎:System setting protect, ●:Calibration protect, レ:Expansion protect
Memory S:SRAM, N:NOVRAM

Standard

Page	No.	Item	Initial value	Setting range	Memory	Protect	Command No.	COM. Read/ Write
1	1	Hold Mode	OFF	*2 *3	S	○	201	R/W
	2	Hold Start Level	100	− 99999 to 99999	S	○	202	R/W
	3	Section Time	1.000 sec	0.001 to 9.999 sec	S	○	203	R/W
	4	Level Condition	0: Passed	0: Passed 1: Passed HI 2: Passed LO	S	○	204	R/W
	5							

Expansion 1 -Auto reset selection-

1	1	Hold Mode	OFF	*2 *3	S	○	201	R/W
	2	Hold Start Level	100	− 99999 to 99999	S	○	202	R/W
	3	Section Time	1.000 sec	0.001 to 9.999 sec	S	○	203	R/W
	4	Level Condition	0: Passed	0: Passed 1: Passed HI 2: Passed LO	S	○	204	R/W
	5	Hold Auto Reset	1: ON	0: OFF 1: ON	S	○	205	R/W

*2 When Double Hold is OFF

	Hold
0	OFF
1	Sample
2	Peak
3	Valley
4	P-P
5	Average
6	Inflection Point
7	Relative Maximum
8	Relative Minimum
9	Relative Difference

*2 When Double Hold is ON

	HoldA	HoldB
0	OFF	OFF
1	Sample	OFF
2	Peak	OFF
3	Valley	OFF
4	P-P	OFF
5	Average	OFF
6	Inflection Point	OFF
7	Relative Maximum	OFF
8	Relative Minimum	OFF
9	Relative Difference	OFF
10	Sample	Peak
11	Sample	Valley
12	Sample	P-P
13	Sample	Average
14	Sample	Inflection Point
15	Sample	Relative Maximum
16	Sample	Relative Minimum
17	Sample	Relative Difference
18	Peak	Valley
19	Peak	P-P
20	Valley	P-P
21	Average	Peak
22	Average	Valley
23	Average	P-P
24	Relative Maximum	Relative Minimum
25	Relative Maximum	Relative Difference
26	Relative Minimum	Relative Difference

*3

Hold Section	Command No.
0:All	216
1:EXT	
2:EXT+TM	
3:LVL+TM	
4:LVL *	

* Selectable only for Peak or Valley.

Standard -Sample hold-

2	6	Sample Removal Value	0	− 999 to 999	S	○	206	R/W
	7							
	8							
	9							
	10							

Expansion 2 -Sample trigger selection-

2	6	Sample Removal Value	0	− 999 to 999	S	○	206	R/W
	7	Sample Trigger Selection *1	0: ON Edge	0: ON Edge 1: OFF Edge	S	○	217	R/W
	8							
	9							
	10							

*1) When the hold mode is Sample and also Hold Auto Reset is ON, the OFF edge cannot be selected in terms of hold operation: therefore, the Sample Trigger Select setting is not displayed.

Standard -Peak hold / Valley hold (Section setting; Level)-

2	6	Hold Stop Level	100	− 99999 to 99999	S	○	207	R/W
	7							
	8							
	9							
	10							

Standard -Average hold-

2	6	Average Sample Number	1	1 to 999	S	○	208	R/W
	7							
	8							
	9							
	10							

Expansion 3−1 -Sample&Average hold-

2	6	Sample Removal Value	0	− 999 to 999	S	○	206	R/W
	7							
	8							
	9							
	10							
3	11	Average Sample Number	1	1 to 999	S	○	208	R/W
	12							
	13							
	14							
	15							

Expansion 3−2 -Sample (Trigger selection)&Average hold-

2	6	Sample Removal Value	0	− 999 to 999	S	○	206	R/W
	7	Sample Trigger Selection	0: ON Edge	0: ON Edge 1: OFF Edge	S	○	217	R/W
	8							
	9							
	10							
3	11	Average Sample Number	1	1 to 999	S	○	208	R/W
	12							
	13							
	14							
	15							

Standard -Inflection point hold-

2	6	Inflection Minimum Slope	30	1 to 99999	S	○	209	R/W
	7	Inflection Front Slope Time	200	10 to 990 (Front slope time + rear slope time < 1000)	S	○	210	R/W
	8	Inflection Rear Slope Time	200	10 to 990 (Front slope time + rear slope time < 1000)	S	○	211	R/W
	9	Inflection Removal Value	0	− 999 to 999	S	○	212	R/W
	10	Detection Start Condition	0: Ext+Level	0: Ext+Level 1: Ext Only	S	○	213	R/W

Expansion 4−1 -Sample&Inflection point hold-

2	6	Sample Removal Value	0	− 499 to 499	S	○	206	R/W
	7							
	8							
	9							
	10							
3	11	Inflection Minimum Slope	30	1 to 99999	S	○	209	R/W
	12	Inflection Front Slope Time	200	10 to 990 (Front slope time + rear slope time < 1000)	S	○	210	R/W
	13	Inflection Rear Slope Time	200	10 to 990 (Front slope time + rear slope time < 1000)	S	○	211	R/W
	14	Inflection Removal Value	0	− 499 to 499	S	○	212	R/W
	15	Detection Start Condition	0: Ext+Level	0: Ext+Level 1: Ext Only	S	○	213	R/W

Expansion 4−2 -Sample (Trigger selection)&Inflection point hold-

2	6	Sample Removal Value	0	− 499 to 499	S	○	206	R/W
	7	Sample Trigger Selec	0: ON Edge	0: ON Edge 1: OFF Edge	S	○	217	R/W
	8							
	9							
	10							
3	11	Inflection Minimum Slope	30	1 to 99999	S	○	209	R/W
	12	Inflection Front Slope Time	200	10 to 990 (Front slope time + rear slope time < 1000)	S	○	210	R/W
	13	Inflection Rear Slope Time	200	10 to 990 (Front slope time + rear slope time < 1000)	S	○	211	R/W
	14	Inflection Removal Value	0	− 499 to 499	S	○	212	R/W
	15	Detection Start Condition	0: Ext+Level	0: Ext+Level 1: Ext Only	S	○	213	R/W

Standard -Relative maximum / Relative minimum / Relative difference hold-

2	6	Relative Minimum Count	10	1 to 99999	S	○	214	R/W
	7	Relative magnification	3: × 1.00	*4	S	○	215	R/W
	8	Detection Start Condition	0:Ext+Level	0: Ext+Level 1: Ext Only	S	○	213	R/W
	9							
	10							

Expansion 5－1 -Sample＆Relative maximum / Relative minimum / Relative difference hold-

2	6	Sample Removal Value	0	－999 to 999	S	○	206	R/W
	7							
	8							
	9							
	10							
3	11	Relative Minimum Count	10	1 to 99999	S	○	214	R/W
	12	Relative magnification	3: × 1.00	*4	S	○	215	R/W
	13	Detection Start Condition	0: Ext+Level	0: Ext+Level 1: Ext Only	S	○	213	R/W
	14							
	15							

Expansion 5－2 -Sample (Trigger selection)＆Rel. max. / Rel. min. / Rel. dif. hold-

2	6	Sample Removal Value	0	－999 to 999	S	○	206	R/W
	7	Sample Trigger Selection	0: ON Edge	0: ON Edge 1: OFF Edge	S	○	217	R/W
	8							
	9							
	10							
3	11	Relative Minimum Count	10	1 to 99999	S	○	214	R/W
	12	Relative magnification	3: × 1.00	*4	S	○	215	R/W
	13	Detection Start Condition	0: Ext+Level	0: Ext+Level 1: Ext Only	S	○	213	R/W
	14							
	15							

*4

0	1	2	3	4	5	6	7	8
x0.25	x0.50	x0.75	x1.00	x1.25	x1.50	x2.00	x3.00	x4.00

■Work setting　Graph setting (WORK0 to WORK15)

Protect　○:Work setting protect, ◎:System setting protect, ●:Calibration protect, レ:Expansion protect
Memory　S:SRAM, N:NOVRAM

Standard

Page	No.	Item	Initial value	Setting range	Memory	Protect	Command No.	COM. Read/ Write
1	1	Graph Mode	0: Continued	0: Continued 1: Ext 2: Level 3: Ext+Level	S	○	301	R/W
	2	Y(LD) Start Point	0	− 99999 to 99999	S	○	302	R/W
	3	Y(LD) End Point	10000	− 99999 to 99999	S	○	303	R/W
	4	X(TM) End Point	10.0 sec	0.1 to 99.9 sec	S	○	304	R/W
	5	Graph Start Level	100	− 99999 to 99999	S	○	305	R/W
2	6	Interval Time	1.00 sec	0.0 to 99.9 sec	S	○	306	R/W
	7	Level Condition	1: Passed HI	0: Passed 1: Passed HI 2: Passed LO 3: Beyond 4: Below	S	○	307	R/W
	8							
	9							
	10							
3	11							
	12							
	13							
	14							
	15							

Expansion

1	1	Graph Mode	0: Continued	0: Continued 1: Ext 2: Level 3: Ext+Level	S	○	301	R/W
	2	Y(LD) Start Point	0	− 99999 to 99999	S	○	302	R/W
	3	Y(LD) End Point	10000	− 99999 to 99999	S	○	303	R/W
	4	X(TM) End Point	10.0 sec	0.1 to 99.9 sec	S	○	304	R/W
	5	Graph Start Level	100	− 99999 to 99999	S	○	305	R/W
2	6	Interval Time	1.00 sec	0.0 to 99.9 sec	S	○	306	R/W
	7	Level Condition	1: Passed HI	0: Passed 1: Passed HI 2: Passed LO 3: Beyond 4: Below	S	○	307	R/W
	8	Pre Trigger Value	0%	0 to 20%	S	○	308	R/W
	9							
	10							

■RS-232C special setting (Work setting)

	1	RS-232C setting work	0	0 to 16			1	R/W
	2							
	3							
	4							
	5							

■RS-232C special setting (Calibration setting)

	1	Decimal Place	0: None	0: None 1: 0.0 2: 0.00 3: 0.000 4: 0.0000	N	●	2010	R/W
	2							
	3							
	4							
	5							

■Calibration (CAL0 to CAL3)

Protect ○:Work setting protect, ◎:System setting protect, ●:Calibration protect, レ:Expansion protect
Memory S:SRAM, N:NOVRAM

Standard

Page	No.	Item	Initial value	Setting range	Memory	Protect	Command No.	COM. Read/ Write
1	1	Excitation Voltage	0:2.5V	0: 2.5V 1: 10V	N	●	2001	R/W
	2	Zero Calibration	0	− 3.000mV / V to 3.000mV / V	N	●	2002	R/W
	3	Equivalent Input Calibration	3.000mV/V	− 3.000mV / V to 3.000mV / V (0 is excluded.)	N	●	2003	R/W
	4	Actual Load Calibration	10000	− 99999 to 99999*1 (0 is excluded.)	N	●	2004	R/W
	5	Calibration Selecttion	0: Cal 0	0: Cal 0 1: Cal 1 2: Cal 2 3: Cal 3 4: EXT 0	N	●	2005	R/W
2	6	Unit	kN	*2	N	●	2006	R/W
	7	Increment	0:1	0: 1 1: 2 2: 5 3: 10 4: 20 5: 50 6: 100	N	●	2007	R/W
	8	Digital Offset	0	− 99999 to 99999	N	●	2008	R/W
	9	Digital Zero Limit	99999	0 to 99999	N	●	2009	R/W
	10							

*1 Calibration is bipolar.
*2 See “Unit Setting List”

The numbers correspond to the values in the input range of RS-232C.
Also, "0" means no unit.

Mass		Force		Pressure		Others			
1	μg	12	μN	25	μPa	42	kgm	60	kg/min
2	mg	13	mN	26	mPa	43	gcm	61	t/min
3	g	14	N	27	Pa	44	g/cm^3	62	kg/h
4	kg	15	kN	28	hPa	45	kg/m^3	63	kg/s
5	Mg	16	MN	29	kPa	46	t/m^3	64	t/h
6	t	17	μNm	30	MPa	47	g/l	65	m^3/s
7	lb	18	mNm	31	GPa	48	g/ml	66	m^3/min
8	dyne	19	Nm	32	N/m^2	49	mg/m	67	m^3/h
9	kdyne	20	kNm	33	μbar	50	kg/m	68	l/h
10	oz	21	MNm	34	mbar	51	kgm/s	69	l/min
11	TONNE	22	ftlb	35	bar	52	kgm^2/s	70	l/s
		23	inlb	36	mmHg	53	kgm^2	71	%
		24	inoz	37	inH_2O	54	mPas	72	km
				38	ftH_2O	55	Pas	73	m
				39	psia	56	m/s	74	cm
				40	psig	57	km/h	75	mm
				41	atom	58	m/s^2	76	μm
						59	t/s	77	rpm

■System setting

Protect ○:Work setting protect, ◎:System setting protect, ●:Calibration protect, レ:Expansion protect
Memory S:SRAM, N:NOVRAM

Operation setting Standard

Page	No.	Item	Initial value	Setting range	Memory	Protect	Command No.	COM. Read/ Write
1	1	Digital Filter	OFF	0: OFF, 2 to 999 Times	N	◎	501	R/W
	2	Analog Filter	2: 300Hz	0: 30 1: 100 2: 300 3: 1000 [Hz]	N	◎	502	R/W
	3	Backlight	ON Time: 10min Bright → Dark : 0 min	0 to 99 Min (Always ON when "0".) 0 to 99 Min (Always Bright when "0")*	N	◎	503 517	R/W
	4	Language	1:ENG(英)	0: JPN(日) 1:ENG(英)	N	◎	504	R/W
	5	SI/F Print Out	OFF	0: OFF 1: MD 2: HOLD	N	◎	505	R/W
2	6	Motion Detect	0.0 sec / 0count	0.0 to 9.9 sec / 0 to 99 count	N	◎	506/ 507	R/W
	7	Zero Tracking	0.0 sec / 0count	0.0 to 9.9 sec / 0 to 99 count	N	◎	508/ 509	R/W
	8	Vol. Out Filter	1: ON	0: OFF 1: ON	N	◎	510	R/W
	9	Indicate Color	Yellow	0: Yellow 1: Green 2: Blue 3: Comparison	N	◎	511	R/W
	10	B5 Function Selection	0: WORK 3	0: WORK 3 1: DSP_LOCK 2: KEY_LOCK	N	◎	512	R/W
3	11	B6 OFF Det. Wait	0.00 sec	0.00 to 1.00 sec	N	◎	513	R/W
	12	B8 OFF Det. Wait	0.00 sec	0.00 to 1.00 sec	N	◎	514	R/W
	13	Measurement Work Selection	1: EXT.	0: COM. 1: EXT.	N	◎	515	R/W
	14	Control Input Selection	1: EXT.	0: COM. 1: EXT.	N	◎	516	R/W
	15	Password						

Operation setting Expansion -Digital filter character CR HPF / LPF-

1	1	Digital Filter	1Hz	1 to 990Hz*	N	◎	501	R/W
	2	Analog Filter	2: 300Hz	0: 30 1: 100 2: 300 3: 1000 [Hz]	N	◎	502	R/W
	3	Backlight	ON Time: 10min Bright → Dark : 0 min	0 to 99 Min (Always ON time when "0".) 0 to 99 Min (Always Bright when "0")*	N	◎	503 517	R/W
	4	Language	1:ENG(英)	0: JPN(日) 1:ENG(英)	N	◎	504	R/W
	5	SI/F Print Out	OFF	0: OFF 1: MD 2: HOLD	N	◎	505	R/W
2	6	Motion Detect	0.0 sec / 0count	0.0 to 9.9 sec / 0 to 99 count	N	◎	506/ 507	R/W
	7	Zero Tracking	0.0 sec / 0count	0.0 to 9.9 sec / 0 to 99 count	N	◎	508/ 509	R/W
	8	Vol. Out Filter	1: ON	0: OFF 1: ON	N	◎	510	R/W
	9	Indicate Color	Yellow	0: Yellow 1: Green 2: Blue 3: Comparison	N	◎	511	R/W
	10	B5 Function Selection	0: WORK 3	0: WORK 3 1: DSP_LOCK 2: KEY_LOCK	N	◎	512	R/W
3	11	B6 OFF Det. Wait	0.00 sec	0.00 to 1.00 sec	N	◎	513	R/W
	12	B8 OFF Det. Wait	0.00 sec	0.00 to 1.00 sec	N	◎	514	R/W
	13	Measurement Work Selection	1: EXT.	0: COM. 1: EXT.	N	◎	515	R/W
	14	Control Input Selection	1: EXT.	0: COM. 1: EXT.	N	◎	516	R/W
	15	Password						

*) At 100Hz or less, setting can be made in units of hertz.
At 100Hz or more, setting can be made in units of 10 hertz.

RS-232C setting Standard

1	1	Communication Mode	0: Normal	0: Normal 1: Continue 2: Print	N	◎	601	R
	2	Baudrate	1: 19200bps	0: 9600 1: 19200 2: 38400 3: 57600 [bps]	N	◎	602	R
	3	Data Bit	1: 8bit	0: 7bit 1: 8bit	N	◎	603	R
	4	Stop Bit	0: 1bit	0: 1bit 1: 2bit	N	◎	604	R
	5	Parity Bit	1: EVEN	0: NONE 1: EVEN 2: ODD	N	◎	605	R
2	6	Delimiter	0: CR	0: CR 1: CR+LF	N	◎	606	R
	7	Flow Control	0: OFF	0: OFF 1: RTS/CTS	N	◎	607	R
	8							
	9							
	10							

Option setting BCD output Standard

1	1	Output Select	1: Hold	0: Realtime 1: Hold 2: EXT.	N	◎	701	R
	2	Output Rate	3: 100 /s	0: 10 1: 20 2: 50 3: 100 4: 200 5: 500 6: 1000 7: 2000 [/s]	N	◎	702	R
	3	Self Check						
	4							
	5							

Option setting BCD output Expansion 1 -Before value comparison-

1	1	Output Select	1: Hold	0: Realtime 1: Hold 2: Dif. 3: EXT.	N	◎	701	R
	2	Output Rate	3: 100 /s	0: 10 1: 20 2: 50 3: 100 4: 200 5: 500 6: 1000 7: 2000 [/s]	N	◎	702	R
	3	Self Check						
	4							
	5							

Option setting BCD output Expansion 2 -Double hold-

1	1	Output Select	1: HoldA	0: Realtime 1: HoldA 2: HoldB 3: EXT.	N	◎	701	R
	2	Output Rate	3: 100 /s	0: 10 1: 20 2: 50 3: 100 4: 200 5: 500 6: 1000 7: 2000 [/s]	N	◎	702	R
	3	Self Check						
	4							
	5							

Option setting BCD output Expansion 3 -Double hold & Before value comparison-

1	1	Output Select	1: HoldA	0: Realtime 1: HoldA 2: HoldB 3: Dif. 4: EXT.	N	◎	701	R
	2	Output Rate	3: 100 /s	0: 10 1: 20 2: 50 3: 100 4: 200 5: 500 6: 1000 7: 2000 [/s]	N	◎	702	R
	3	Self Check						
	4							
	5							

Option setting BCD output Expansion 4 -Double hold & Relative value comparison-

1	1	Output Select	1: Hold	0: Realtime 1: Hold 2: Rel 3: EXT.	N	◎	701	R
	2	Output Rate	3: 100 /s	0: 10 1: 20 2: 50 3: 100 4: 200 5: 500 6: 1000 7: 2000 [/s]	N	◎	702	R
	3	Self Check						
	4							
	5							

Option setting BCD output Expansion 5 -Double hold & Before value comparison & Relative value comparison-

1	1	Output Select	1: Hold	0: Realtime 1: Hold 2: Dif. 3: Rel 4: EXT.	N	◎	701	R
	2	Output Rate	3: 100 /s	0: 10 1: 20 2: 50 3: 100 4: 200 5: 500 6: 1000 7: 2000 [/s]	N	◎	702	R
	3	Self Check						
	4							
	5							

Option setting DAC output

1	1	Output Select	1: Hold	0: Real Time 1: Hold 2: Zero Scale 3: Full Scale *1	N	◎	801	R
	2							
	3	Zero Scale	0	− 99999 to 99999	N	◎	803	R
	4	Full Scale	10000	− 99999 to 99999	N	◎	804	R
	5	Scale Set. Select	0	0 to 3	N	◎	805	R

*1 When double hold is ON: real time value / hold value A / hold value B / zero scale / full scale.

Option setting CC-Link

1	1	Station No.	2: 4 Station	0:1 Station 1: 2 Station 2: 4 Station	N	◎	901	R
	2	Baudrate	4: 10M	0: 156k 1: 625k 2: 2.5M 3: 5M 4: 10M	N	◎	902	R
	3	ID	1	1 to 64 Station / 1 to 63 Station / 1 to 61 Station	N	◎	903	R
	4							
	5							

Option setting DeviceNet

1	1	Possession Node	0: 2 Node	0: 2 Node 1: 4 Node	N	◎	1001	R
	2	Node Address	0	0 to 63	N	◎	1002	R
	3	Major Revision	1	1, 2	N	◎	1003	R
	4							
	5							

Protect / Initialization

Page	No.	Item	Initial value	Setting range	Memory	Protect	Command No.	COM. Read/ Write
1	1	Work Protect	0: OFF	0: OFF 1: ON	N		4001	R
	2	System Protect	0: OFF	0: OFF 1: ON	N		4002	R
	3	Calibration Protect	0: OFF	0: OFF 1: ON	N		4003	R
	4	Expansion Protect	1: ON	0: OFF 1: ON	N		4004	R
	5	Initialization	0: Work Set.	0: Work Set. 1: Sys. Set. 2: Cal. Set. 3: Exp. Set.				

Self check

Page	No.	Item	Initial value	Setting range	Memory	Protect	Command No.	COM. Read/ Write
1	1	LCD Check						
	2	KEY Check						
	3	MEM Check						
	4	I/O Check						
	5	DSP Check						
	6	COM Check						

■Expansion setting

Protect ○:Work setting protect, ◎:System setting protect, ●:Calibration protect, レ:Expansion protect
Memory S:SRAM, N:NOVRAM

Expansion comparison setting

Page	No.	Item	Initial value	Setting range	Memory	Protect	Command No.	COM. Read/ Write
1	1	Before Value Comparison	0: OFF	0: OFF 1: ON	N	レ	3001	R
	2	Relative Value Comparison *1	0: OFF	0: OFF 1: ON	N	レ	3002	R
	3							
	4							
	5							

*1 The relative value comparison setting is effective only when double hold in expansion setting is ON.

Note) Indicated value display in relative value/before value comparison

		Relative Value		
		OFF	ON	
Before Value	OFF	Hold	Hold A Standard Hold A Hold B − Hold A	Hold B Standard Hold A − Hold B Hold B
	ON	Present Hold − Previous Hold	Hold A Standard Previous Hold A − Present Hold A Hold B − Hold A	Hold B Standard Hold A − Hold B Previous Hold B − Present Hold B

Expansion hold setting

1	1	Double Hold	0: OFF	0: OFF 1: ON	N	レ	3101	R
	2	Auto Reset Select	0: OFF	0: OFF 1: ON	N	レ	3102	R
	3	Renewal Of Hold Value	1: All Time	0: Detect End 1: All Time	N	レ	3103	R
	4	Sample Trigger Selection	0: OFF	0: OFF 1: ON	N	レ	3104	R
	5	Hold Off On Digital Zero	0: OFF	0: OFF 1: ON	N	レ	3105	R
2	6	Hold End Timing	1: Detect Sct	0: Hold Sct 1: Detect Sct	N	レ	3106	R

Expansion graph setting

1	1	Pre Trigger Display	0: OFF	0: OFF 1: ON	N	レ	3201	R
	2							
	3							
	4							
	5							

Expansion option setting

1	1	Digital Filter Character	0: NORMAL	0: NORMAL 1: CR LPF 2: CR HPF	N	レ	3301	R
	2	Average Time ON Digital Zero	0.000 sec	0.000 to 5.000 sec	N	レ	3302	R
	3	RUN Output Selection	0:Togle	0:Togle 1: ON Level 2: OFF Level	N	レ	3303	R
	4							
	5							

Expansion operation setting

1	1	BCD Output Data Selection	0: BCD	0 :BCD 1: BIN	N	レ	3401	R
	2							
	3							
	4							
	5							

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