



# F650-CK

WEIGHING INDICATOR

## OPERATION MANUAL

01AUG2020REV.1.07

**UNIPULSE**

## Introduction

Thank you for purchasing the F650-CK weighing indicator.



Be sure to read this operation manual before use in order to take full advantage of the superb quality of the F650-CK and to use it properly and safely. Use this product with accurate understanding of the contents.

Keep this operation manual in a safe place to be used for further reference.

## Safety precautions

### Be sure to read for safety.

Make sure that installation, maintenance, and inspection of the F650-CK are performed by personnel with electrical knowledge.

In this manual, precautions for safe use of the F650-CK are described separately as  **Warning** and  **Caution** in the following text. The precautions described in this text are important contents regarding safety. Use this product with accurate understanding of the contents.



### Warning

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



### Caution

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



## Warning

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

### Design warning

- Prepare a safety circuit outside the F650-CK so that the entire system functions safely if the F650-CK fails or malfunctions.
- Be sure to contact our sales representative before use if the F650-CK will be used in the following situations:
  - If the product is used in an environment not described in the operation manual;
  - If the product is used in a way that causes substantial effects on medical devices, transportation equipment, entertainment devices, safety devices, etc.

### Installation warning

- Do not disassemble, repair or alter the F650-CK. Fire or electric shock may occur.
- Do not install the product in the following environments:
  - Locations with corrosive gases or combustible gases;
  - Locations over which water, oil, or chemicals splash.

### Wiring warning

- Do not connect commercial power supply directly to a signal I/O terminal.
- Be sure to perform class D grounding when installing the main unit.
- The AC cable included is for use in Japan and the rating is AC125V, 7A. Prepare a separate AC cable if the product is used at a voltage higher than the rating or is used overseas.
- Be sure to check that the power is off before the following actions:
  - Removal and installation of optional connectors and so forth;
  - Wiring and connection of cables to the terminal blocks;
  - Connection to the earth cable.
- Be sure to check signal names and pin assignment numbers and to wire cables properly before connecting to a signal I/O terminal.
- Be sure to use crimp contacts for connection to the terminal blocks, and do not to connect bare wires as they are.
- Make sure to attach the terminal block cover included after wiring power supply. Electric shock may occur.
- Be sure to check wiring and so on carefully before turning power on.



## Warning

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

### Startup/maintenance warning

- Use power supply voltage and load within the specified range and rating.
- Do not damage power cords. Fire or electric shock may occur.
- Do not touch a signal I/O terminal while the power is on. This may cause electric shock and malfunction.
- Electric shock may occur inside when the cover of the main unit is opened. Internal capacitors are charged even if power supply is cut off. Contact us for inspection and repair of internal parts.
- Turn power off and unplug power cable immediately if smoke, abnormal smell, or abnormal noise is detected.
- As for the batteries used in F650-CK, do not at any time dismantle the batteries, change the batteries shape by subjecting it to pressure or throw the batteries into fires as these may cause the batteries to explode, catch fire or leak.

Type:	CR2477/HFK (old type: CR2477-1HF) made by Panasonic
Voltage:	3V
Capacity:	1000mAh



## Caution

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

### Installation precautions

- The F650-CK must be incorporated into the control panel and so forth.
- Do not install into the following environments:
  - Locations where temperature or humidity exceeds specifications;
  - Locations subjected to drastic temperature fluctuations or icing and condensing;
  - Outdoors or locations above 2,000m;
  - Locations exposed to direct sunlight;
  - Locations subject to dust accumulation;
  - Locations with poor ventilation;
  - Locations with a lot of salt and metal powder;
  - Locations where the main unit is subject to direct vibration and shock.
- Perform adequate shielding if the product is used in the following locations:
  - Near power lines;
  - Locations subject to strong electric field and magnetic field;
  - Locations subject to noise such as static electricity and relays.
- Install as far away as possible from equipment generating high frequency, high voltage, large current, surge, etc. Perform wiring of cables separately from these power lines. Do not perform parallel wiring and identical wiring.
- Do not use the product if damaged.



## Caution

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

### Wiring precautions

- Tighten signal I/O terminal screws to the torque specified.  
Loose tightening may cause short-circuiting, fire, or malfunction.  
Tightening torque: 0.5N•m
- Use shielded cables for cables (sensors, external I/O, RS-232C, options).
- The temporary overvoltage applied to the power should not exceed 1500V.

### Startup/maintenance precautions

- Be sure to have a time interval of five seconds or longer between turning power on and off.
- Use after warming up for 30 minutes or longer following the startup of power supply.
- Protective performance of the F650-CK may be lost if it is not used as specified.
- Care
  - Unplug the power supply during maintenance.
  - Do not wipe with a wet cloth, benzine, thinner, alcohol, etc. Doing so may cause discoloration or deformation of the F650-CK.  
When dirty, clean using a cloth soaked in diluted neutral detergent followed by a soft, dry cloth.

### Transportation precautions

- Although the F650-CK package is designed to absorb shock sufficiently during shipping, re-use of the same packaging materials may damage the product when shock is encountered.  
When sending this product to us for repair and so on, package it using sufficient shock-absorbing materials.

### Disposal precautions

- Dispose of as industrial waste.
- Remove the lithium batteries used in the F650-CK and make sure to dispose them according to classification of waste collection.

## Product compliant to RoHS2 Directive

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

### RoHS2 Directive

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

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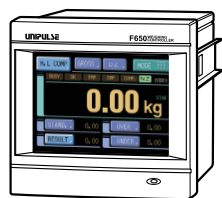
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# 1. Outline

## 1-1. Contents of the package

The packaging box contains the following.

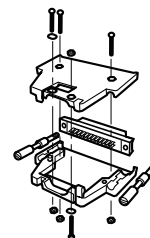
Be sure to check them before use.



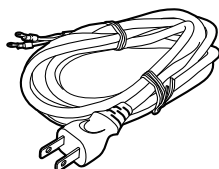
F650-CK body .....1



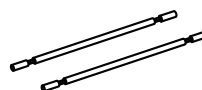
Operation manual .....1



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

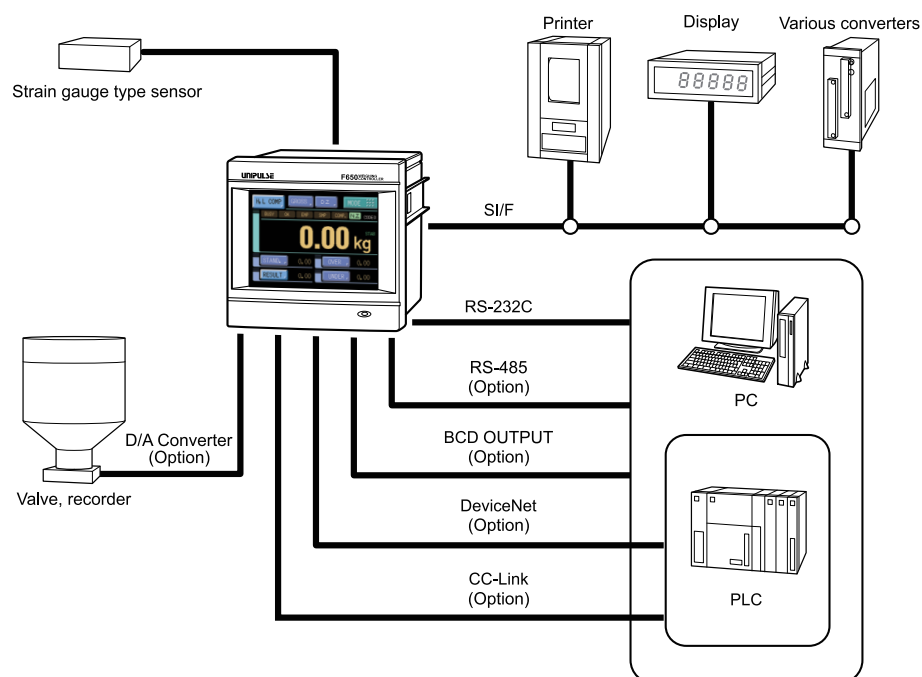


AC power cable .....1



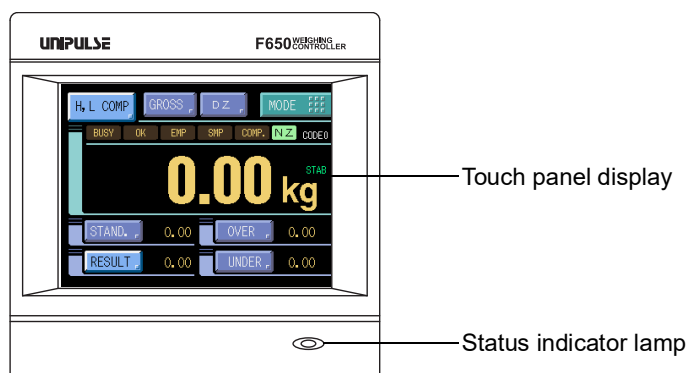
Jumper wire .....2

## 1-2. About connectable devices



## 1-3. Appearance description

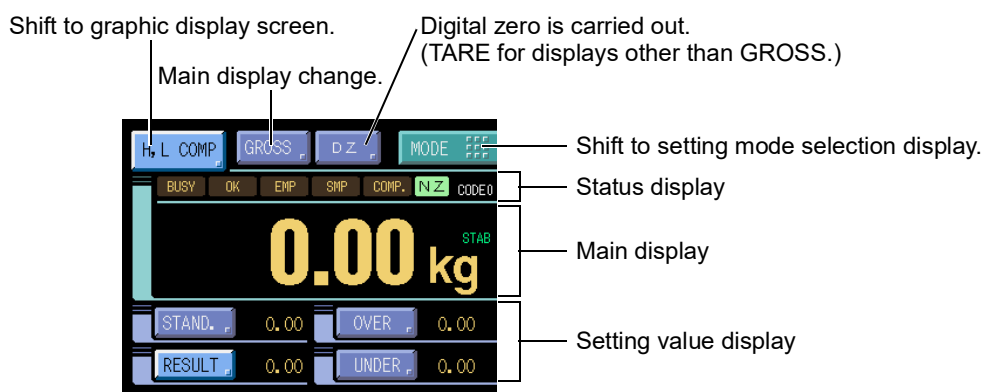
### 1-3-1. Front panel



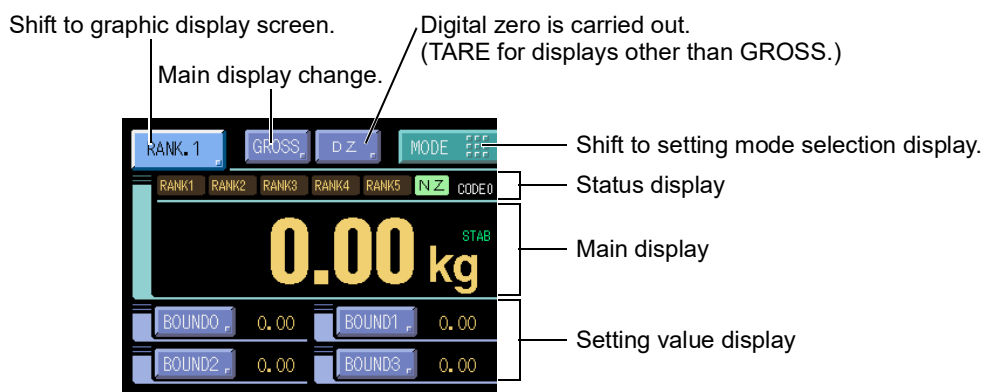
#### ■ Touch panel display

This is the touch panel display for displaying an indicated value and graph setting value and for setting various setting items of the F650-CK. During measurement, a comparison display, graph display and total display can be selected according to the function in use.

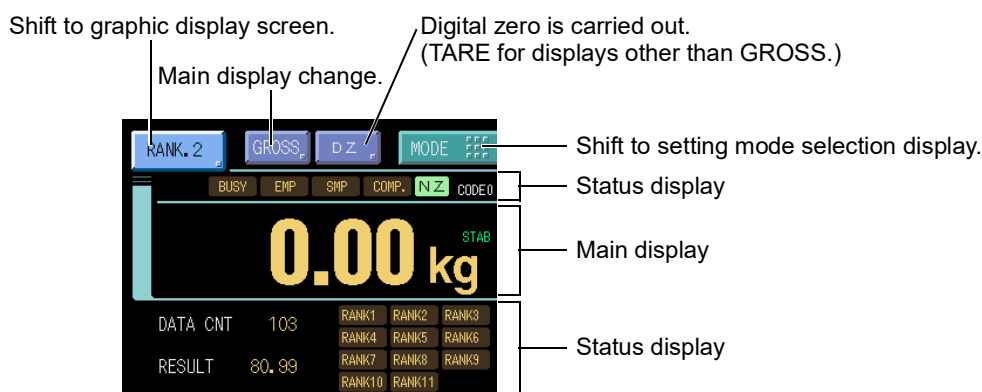
#### [Comparison display (COMP mode)]



#### [Comparison display (RANK.1 mode)]



## [Comparison display (RANK.2 mode)]



### □ Main display

Weight value	Displays GROSS, NET, ERROR, or RESULT.
STAB	Lights when the weight value is stable.
HOLD	Lights when the weight value is held.
ZT	Lights when the zero tracking function is working.
ZALM	Lights when a zero alarm is given.
Unit	Displays the unit set in unit display.

### □ Status display

BUSY	Lights while the internal ratio of the filter is being calculated. Trigger for weighing start is disabled at this time.
GO	Displays the judgment state of result as follows: Over (blue), Go (yellow), Under (red).
RANK1 to 11	Displays the judgment state of result.
EMP	Lights during ineffective sampling in weighing.
SMP	Lights during counting in weighing.
COMP.	Lights while the complete signal is output.
NZ	Lights when the weight is the near zero setting value or less.
CODE	Displays the currently weighing code No..
RESULT	Displays the result of weighing.
DATA CNT	Displays the weighing data count.

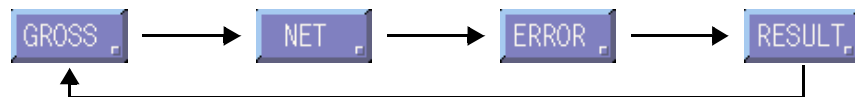
### □ Setting value display

STAND.	Set the standard value. The screen is switched to the standard setting screen by pressing the button.
OVER	Displays the over setting value. The screen is switched to the over setting screen by pressing the button.
UNDER	Displays the under setting value. The screen is switched to the under setting screen by pressing the button.

- BOUND 0 to 3** Set the each boundary setting value.  
The screen is switched to the boundary setting screen by pressing the button.
- RESULT** Displays the weighing result.  
The screen is switched to the result list screen by pressing the button.

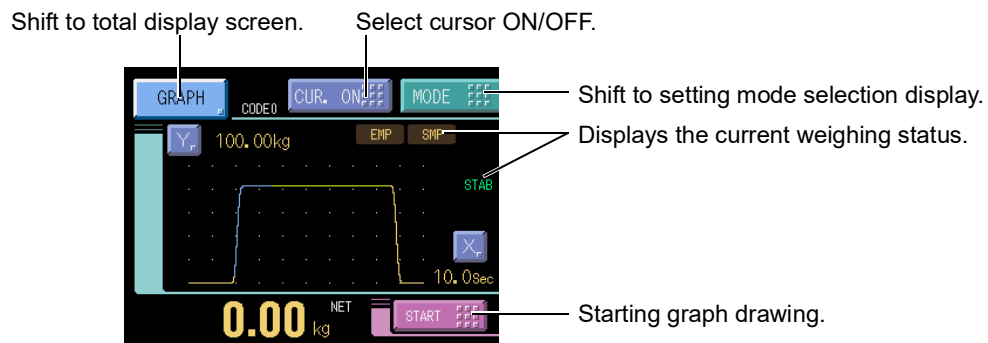
### □ Main display change

Each time the button is pressed, the weight value on the main display is switched.  
(GROSS, NET, ERROR, RESULT)

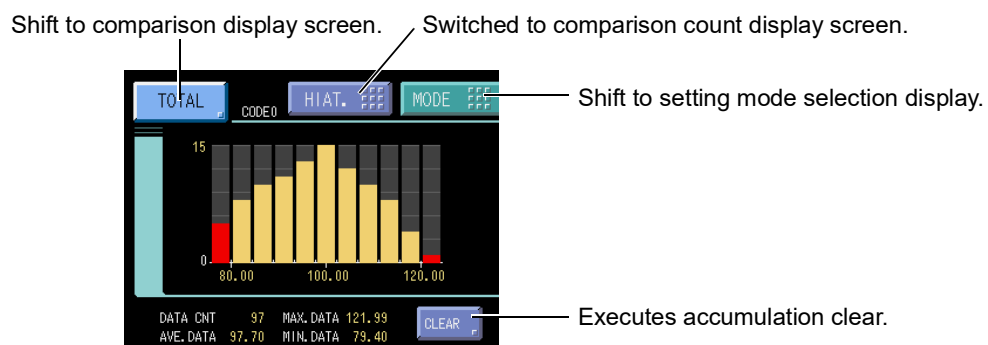


- \* RESULT and ERROR will be updated after weighing is complete.  
In addition, the weighing error shall be 0 when the mode is RANK.

### [Graph display]



### [Total display]



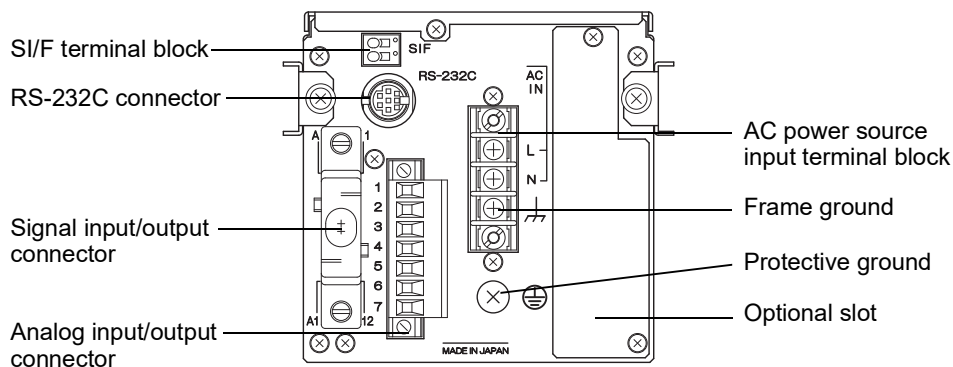
### ■ Status indicator lamp

Lamp indication	Status
Green lighting	Steady state
Red lighting	Writing into internal NOV.RAM. Do not turn off the power of the F650-CK.
Yellow blink	Voltage drop of the internal memory backup battery. Battery replacement is needed.

## ■ Prohibition of key operation

Setting of individual key operation ON/OFF is done by "SYSTEM". Please refer to "12. System" on page 50 for details.

### 1-3-2. Rear panel



## ■ AC power source input terminal block

Connect with AC power source cable supplied.

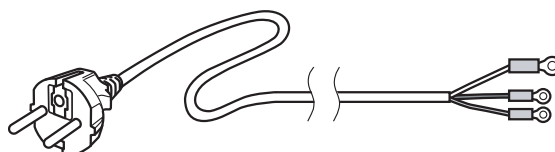
AC voltage is 100V to 240V(+10%, -15%) AC frequency is 50Hz/60Hz.



### About the power cable

- The power cable attached to this product as standard equipment can be used in the AC100V power supply in Japan. (Official ratings voltage AC125V)  
Please use the power cable authorized in the country when you use this product outside Japan.
- Our company sells following resistance pressure cable AC250V (European standard product) separately.  
Please purchase it from us when you need after confirming its plug shape/voltage.

CA325AC3P-CEE7/7-B2 : CEE7/7 Plug cable (2m)



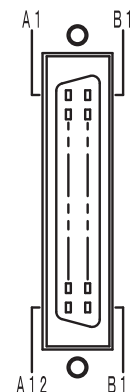
## ■ Analog input/output connector

Pin No.	Signal (6-wire)	Signal (4-wire)
1	+SIG	+SIG
2	-SIG	-SIG
3	+EXC	+EXC (Connect 3 to 4)
4	+S	
5	-EXC	-EXC (Connect 5 to 6)
6	-S	
7	SHIELD	SHIELD

Adaptable plug : ETB42-07P

### ■ Signal input/output connector (when specifying sink type)

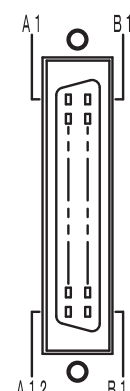
A1	*	COM	B1	*	COM
A2	OUT	OVER/RANK1/RANK2 <sup>0</sup>	B2	IN	CODE0
A3	OUT	GO/RANK2/RANK2 <sup>1</sup>	B3	IN	CODE1
A4	OUT	UNDER/RANK3/RANK2 <sup>2</sup>	B4	IN	CODE2/KEY LOCK
A5	OUT	Undefined/RANK4/RANK2 <sup>3</sup>	B5	IN	Graph drawing
A6	OUT	Undefined/RANK5/STROBE	B6	IN	D/Z ON
A7	OUT	State output sel. 0	B7	IN	TARE ON
A8	OUT	State output sel. 1	B8	IN	TARE OFF
A9	OUT	State output sel. 2	B9	IN	Accumulation clear
A10	OUT	State output sel. 3	B10	IN	Measurement start
A11	OUT	State output sel. 4	B11	IN	Measurement reset
A12	*	None	B12	*	None



Plug : FCN-365P024-AU (Adaptable jack : FCN-361J024-AU)

### ■ Signal input/output connector (when specifying source type)

A1	*	+24V	B1	*	+24V
A2	OUT	OVER/RANK1/RANK2 <sup>0</sup>	B2	IN	CODE0
A3	OUT	GO/RANK2/RANK2 <sup>1</sup>	B3	IN	CODE1
A4	OUT	UNDER/RANK3/RANK2 <sup>2</sup>	B4	IN	CODE2/KEY LOCK
A5	OUT	Undefined/RANK4/RANK2 <sup>3</sup>	B5	IN	Graph drawing
A6	OUT	Undefined/RANK5/STROBE	B6	IN	D/Z ON
A7	OUT	State output sel. 0	B7	IN	TARE ON
A8	OUT	State output sel. 1	B8	IN	TARE OFF
A9	OUT	State output sel. 2	B9	IN	Accumulation clear
A10	OUT	State output sel. 3	B10	IN	Measurement start
A11	OUT	State output sel. 4	B11	IN	Measurement reset
A12	*	0V	B12	*	0V



Plug : FCN-365P024-AU (Adaptable jack : FCN-361J024-AU)

### ■ SI/F terminal block

This is a 2-wire serial interface (SI/F) terminal block for connecting a UNIPULSE-manufactured printer, external display, and data converter, etc.

### ■ Frame ground

Please ground the frame ground terminal to prevent failures due to static electricity.

(The frame and the frame ground terminal are conducted.)

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

## ■ Protective ground

Be sure to ground the protective ground terminal to prevent electric shocks.

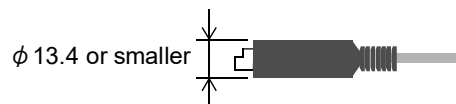
## ■ RS-232C connector

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.

(\*) Note, however, that the external diameter of connector must be smaller than  $\phi 13.4$ .



## ■ Option slot

Any one of the following optional boards can be mounted.

- BCD data output
- D/A converter (voltage or current output)
- CC-Link interface
- DeviceNet interface
- RS-485 interface

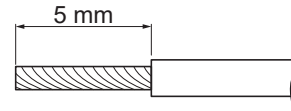


## 2. Connection

### 2-1. 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<sup>2</sup> (AWG12 to 24).

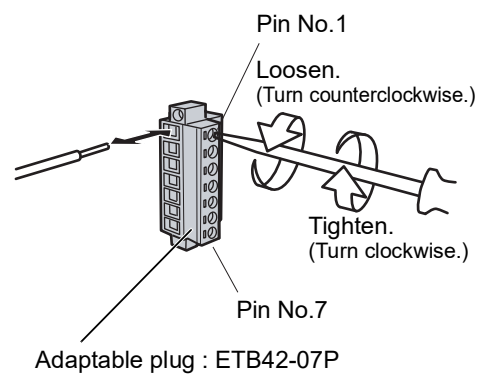


2. Twist the tip to such an extent that it will not spread out.

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.)

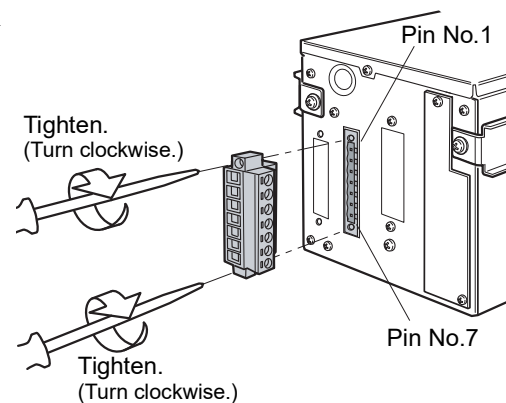
4. Insert the wire into the connection hole so as not to let the tip spread out.



5. Tighten the screw with the screwdriver.  
The recommended tightening torque value is 0.5Nm.

6. Lightly pull the wire to make sure that it is securely clamped.

7. Insert the wire-connected plug into the F650-CK body, and tighten the screws (two).

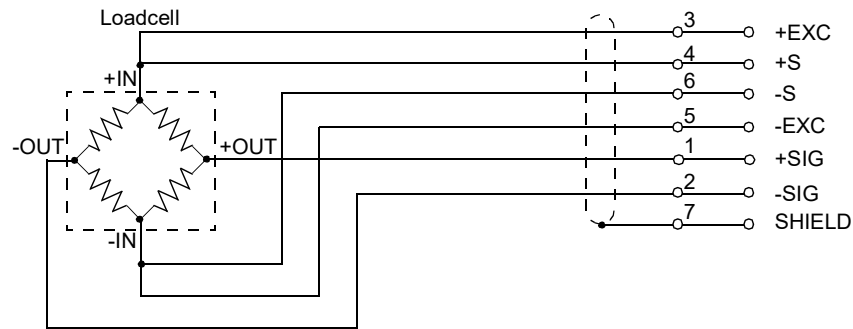


## 2-2. Loadcell connection

The voltage application of this equipment is 5V, and the maximum current is 90mA, to which up to six 350Ω loadcells can be connected in parallel.

### ■ 6-wire connection

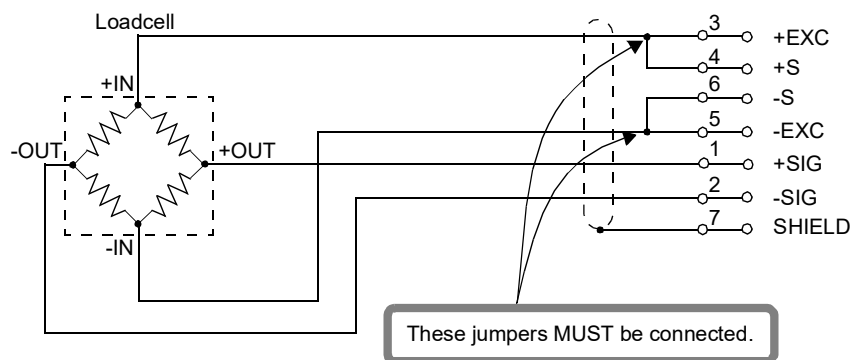
The loadcell input of the F650-CK is a 6-wire (remote sense) connection. 6-wire shielded loadcell cable should be used and kept separate from AC or other noise generating wire.



Remote sense lines are used to detect and correct variations in excitation voltage over long cable runs.

### ■ 4-wire connection

Connect 3 and 4, and 5 and 6 as shown below. Be sure to connect 4 and 6 on the terminal block with the accessory jumper lines because if the four-wire type is used when 4 and 6 are open, apparent normal operation is performed, but large errors are made in actuality.

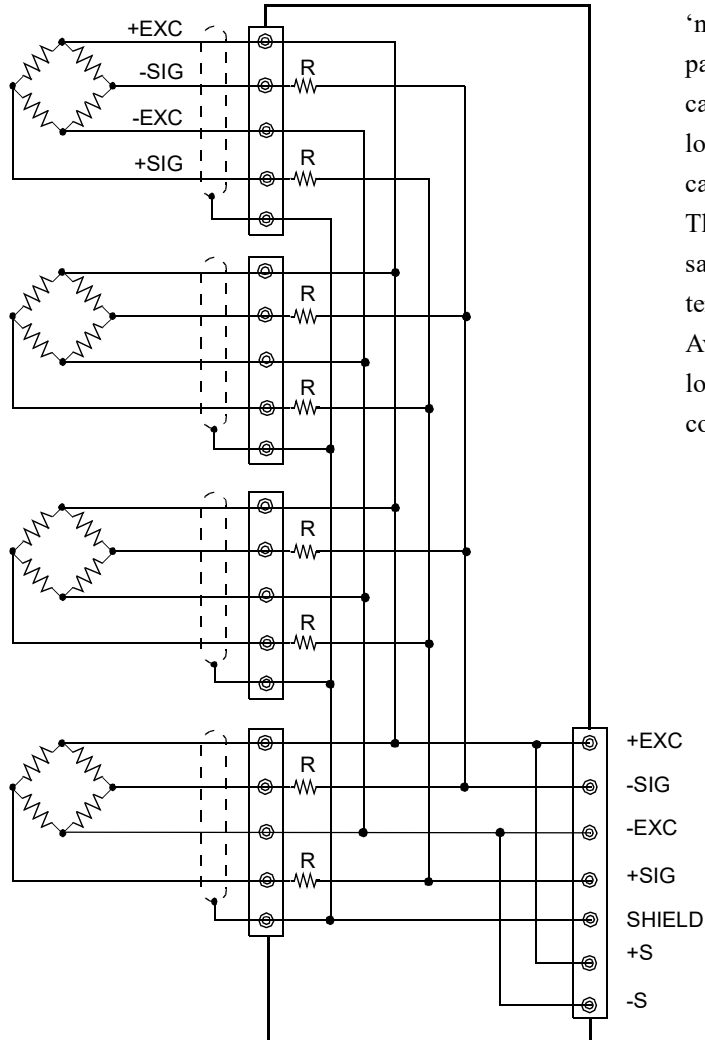


#### Notice

The loadcell excitation voltage of the F650-CK is 5V. Heating or breakage may occur unless the loadcells maximum excitation voltage is 5V or more.

## 2-3. Connecting loadcells in parallel

Some industrial applications require several loadcells connected in parallel (e.g., tank or flow scales). A summing junction box should be used to facilitate connection and corner correction.



'n' (number) loadcells connected in parallel are considered one unit whose capacity is  $n \times$  rated capacity of loadcells (loadcells must have the same capacity, bridge resistance, and mV/V). The averaging resistor (R) must be in same relative ratios with a low temperature coefficient. Averaging resistors are not needed if loadcells were designed for parallel connection.



### Notice

When connecting several loadcells in parallel, loadcell capacity should be higher than expected load to compensate for mechanical shock or eccentric loading.

## 2-4. Cable colors of sensors

Cable colors of sensors may differ from one manufacturer to another (it may even differ from one model to another for some products). Refer to the sensor manual (or data sheet) and check signal names and colors in order to connect the cables correctly.

## 2-5. Power source input terminal connection

Connect an AC input cord. The input power source is free in the range of 100 to 240V AC (-15%, +10%). The frequency is 50/60Hz.

Make connections to the terminal block with a solderless terminal within 6mm in diameter as shown in the illustration so as not to let the tip of the cable spread out.

### How to connect


1. Make sure that no power is applied.
2. Remove the screws (two), and remove the terminal block cover.
3. Remove the two screws(M3) at the terminal block.
4. Align the solderless terminals with the screw holes, and then tighten the screws.


L : Black

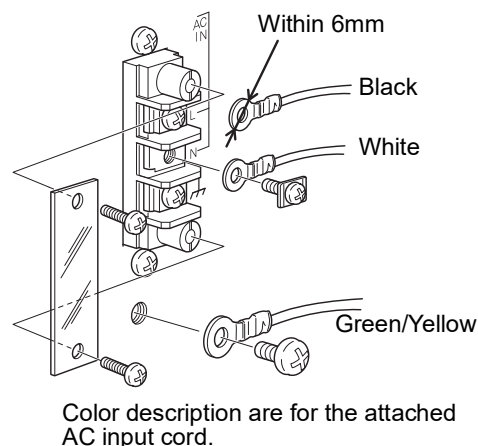
N : White

5. Install the terminal block cover, and fix it with the screws (two).

6. Remove the screws(M4) of the protective ground, align the crimp contacts with the screw holes, and then tighten the screws.

 : Green/ Yellow

\* The protective ground is internally connected with  frame ground.



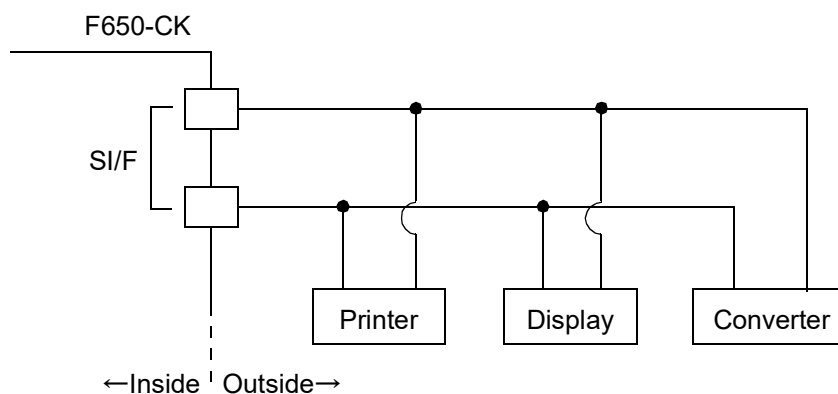
## 2-6. SI/F connection

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

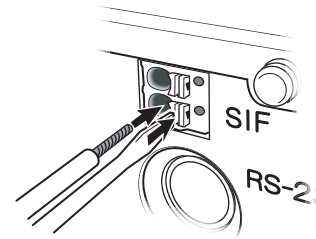
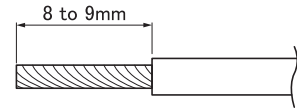
When a two-core parallel cable or a cabtyre cable is used, the transmitting distance is approximately 30m. When a two-core shielded twisted pair cable is used, the transmitting distance is approximately 300m.

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



### How to connect

1. Strip 8 to 9mm of the covering of the wire to be connected.  
Twist the tip to such an extent that it will not spread out.
2. Push the right button firmly with a screwdriver.
3. Insert the electric wire into the left hole without tearing the tip apart.
4. Pull out the screwdriver and release the button.
5. Lightly pull the wire to make sure that it is securely clamped.

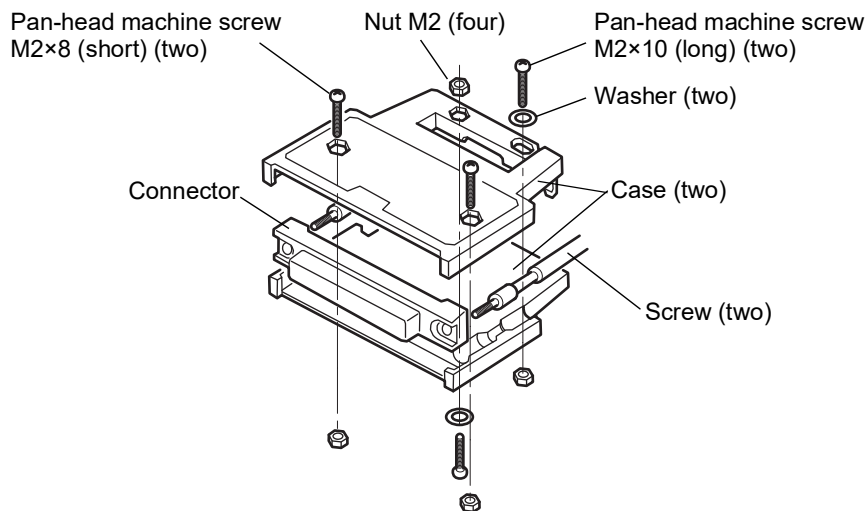


#### Notice

- Cable can be from 24 to 16AWG (0.2 to 1.5mm<sup>2</sup>).
- 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.

## 2-7. External I/O connection

### 2-7-1. How to assemble the connector



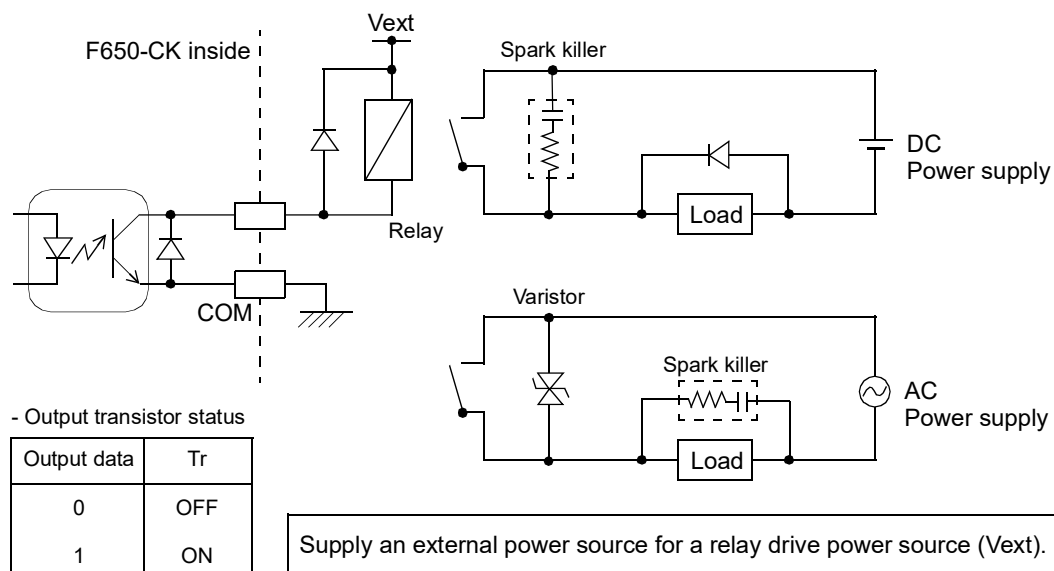
- 1) Set the connector and screws (two) into the grooves of the case (one side).
- 2) Cover with the other case, and fit the cases.
- 3) Tighten the M2 × 8 pan-head machine screws (two).  
Tighten the M2 × 10 pan-head machine screws (two).  
Be aware that washers should be set to the M2 × 10 pan-head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

### 2-7-2. External output connection (when specifying sink type)

The external output circuit is operated through an open collector.

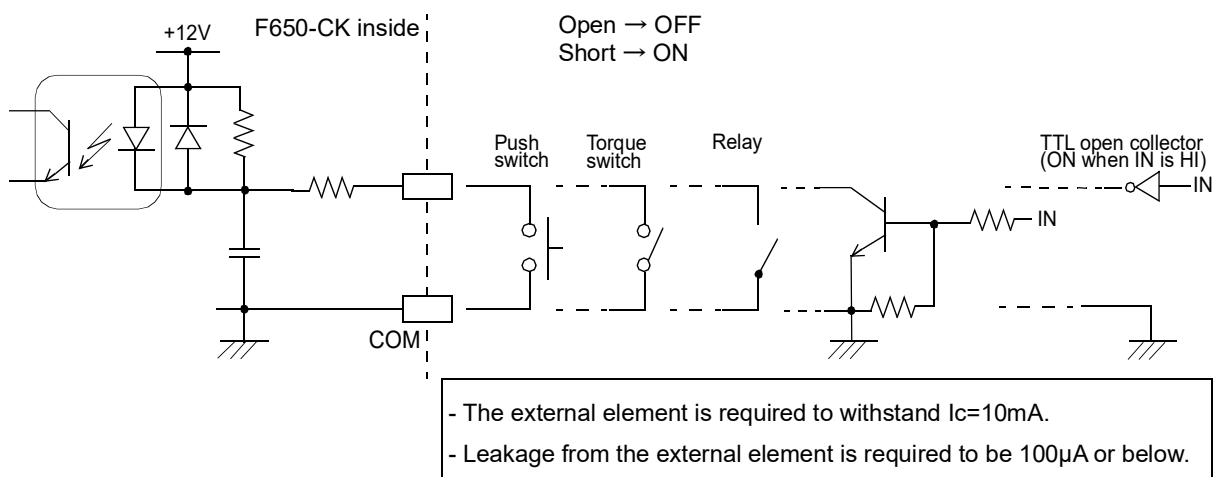
The open collector output capacity is 50mA and the withstand voltage is up to 30V.

#### - Equivalent circuit



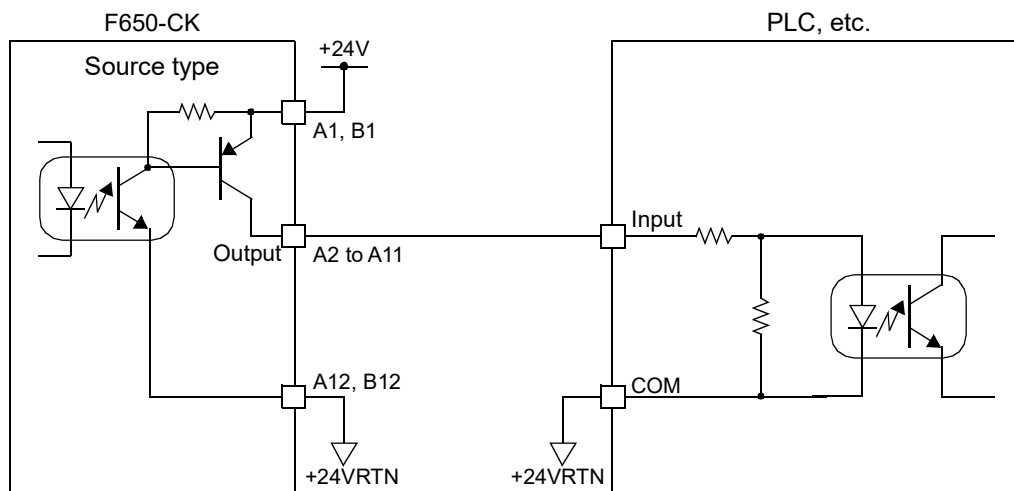
### 2-7-3. External input connection (when specifying sink type)

A signal is inputted to the signal input circuit by short-circuiting or opening the input terminal and the COM 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).



### 2-7-4. External output connection (when specifying source type)

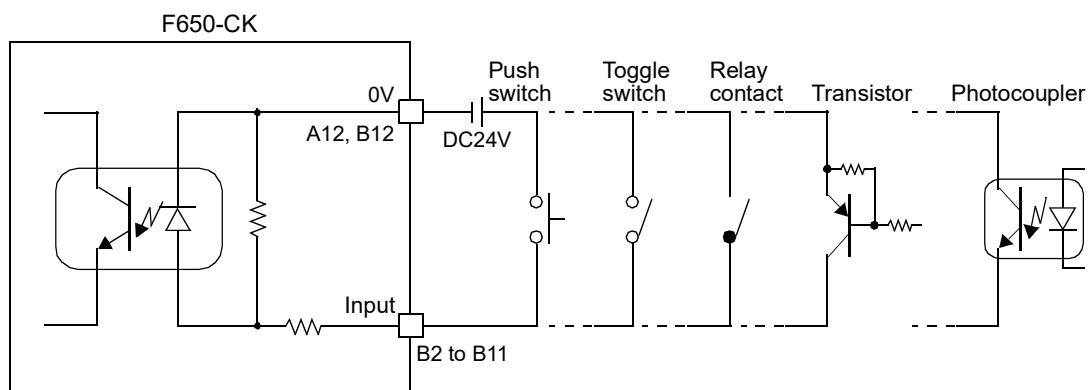
The signal output circuit is photocoupler isolated output (current source type).



### 2-7-5. External input connection (when specifying source type)

Switch, relay, transistor and photocoupler, etc. can be connected.

To connect the transistor and photocoupler, etc., connect unit of source type.

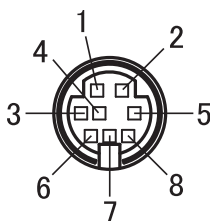


### 2-7-6. RS-232C interface connection

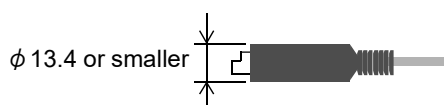
This connector connects the RS-232C.

The adaptable plug is HOSIDEN-manufactured TCP8080-015267 or equivalent (\*).

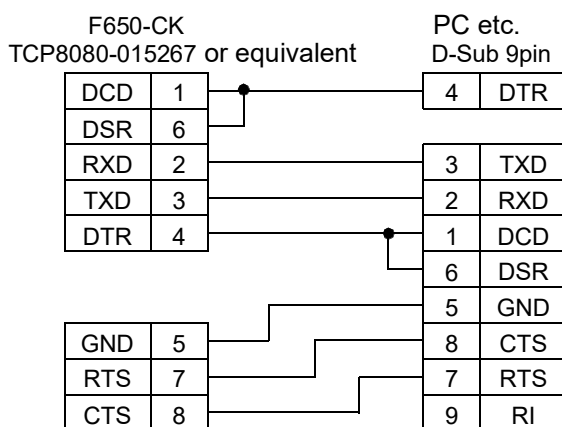
Pin No.	Signal name
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
Case	F.G.



(\*) Note, however, that the external diameter of connector must be smaller than  $\phi 13.4$ .



**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.



Cabling diagram  
CA81-232X (optional)

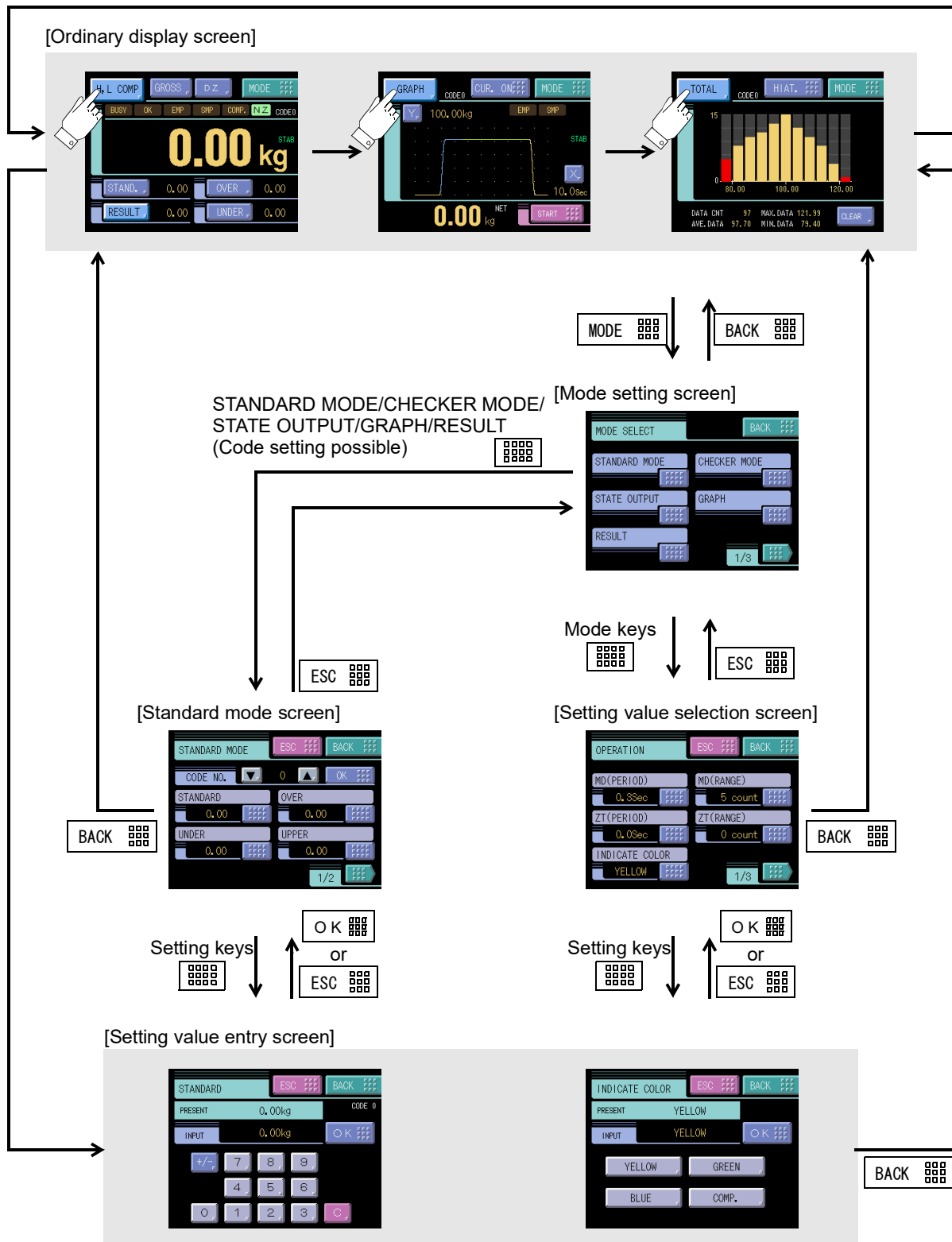
\* This connection diagram shows cabling applicable to the case where your PC is DTE (data terminal equipment). For connection with DCE (data circuit-terminating equipment), such as a modem, use straight type cabling.

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



## 3. Setting Mode Configuration

### 3-1. F650-CK screen configuration




## 3-2. About a setting call

Example) Calibration protection

This call can be made by the following procedure.

### Operation

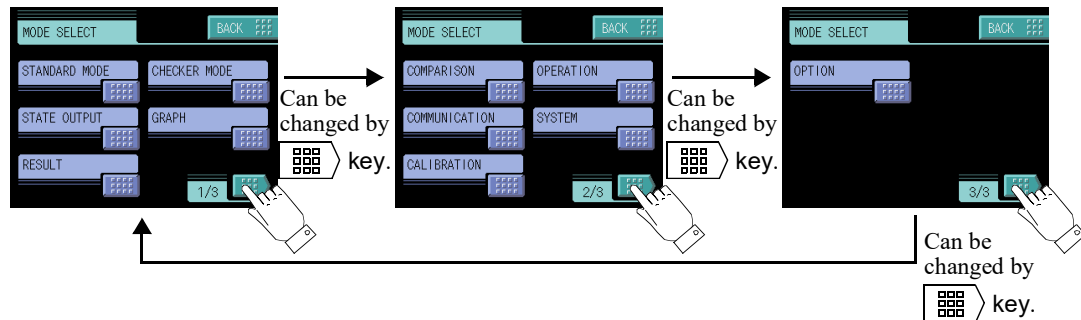
1) Press the **MODE**  key on the ordinary display screen.

Setting call



2) The mode setting screen appears. Select the mode. (Select the system on page 2.)

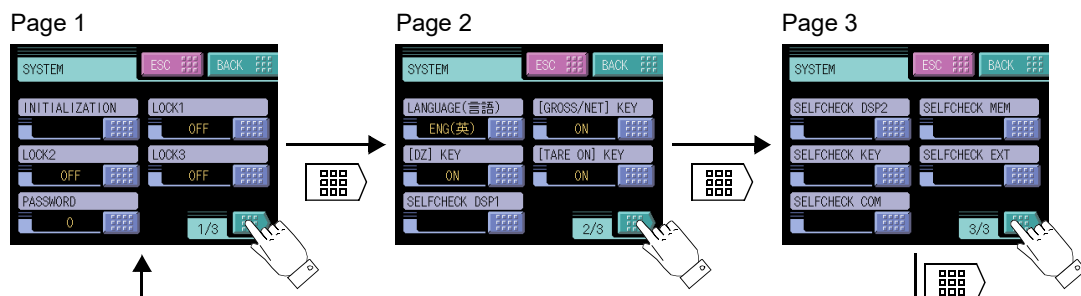
System



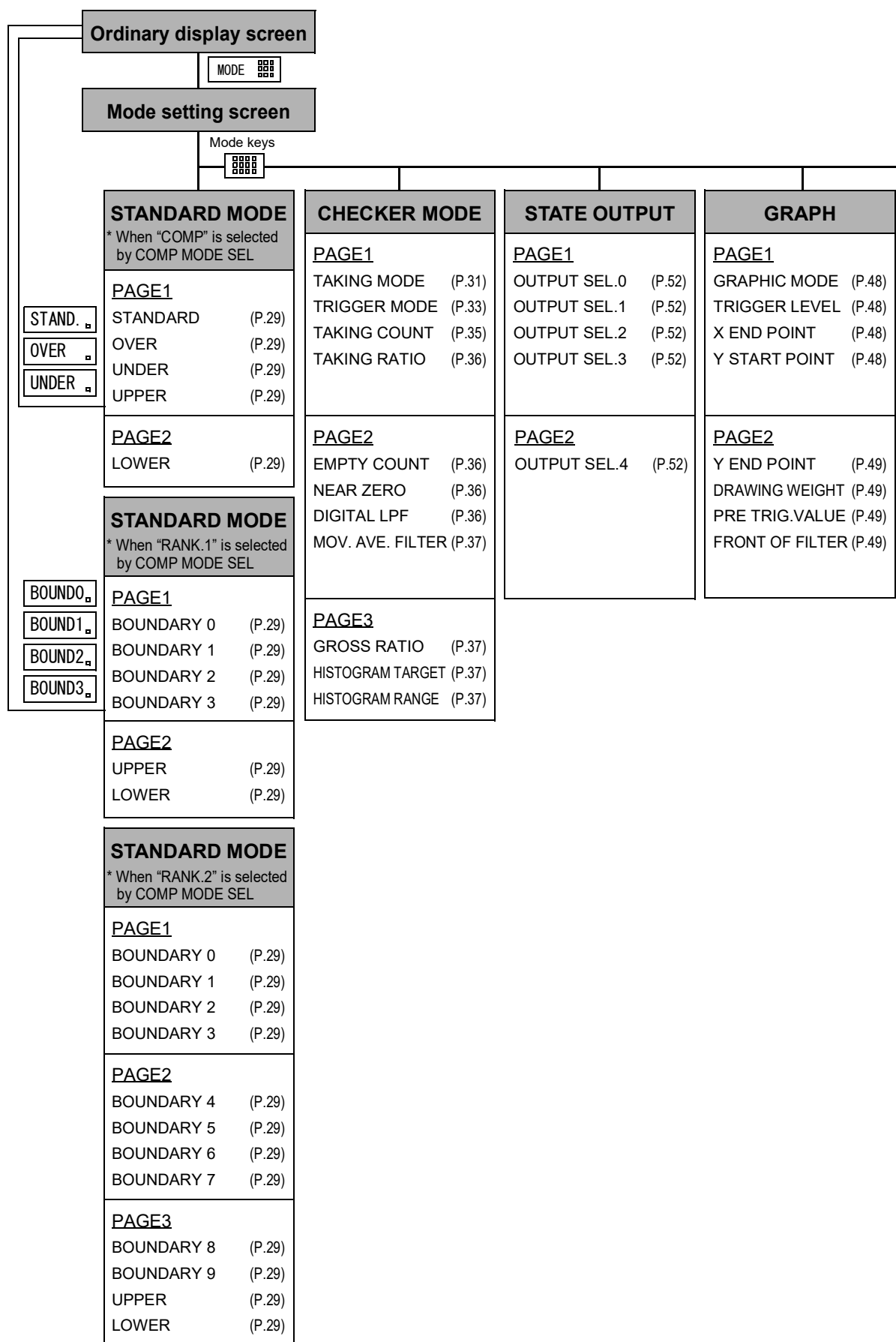
Modes are as follows:

- |                 |                 |                |
|-----------------|-----------------|----------------|
| - STANDARD MODE | - CHECKER MODE  | - STATE OUTPUT |
| - GRAPH         | - RESULT        | - COMPARISON   |
| - OPERATION     | - COMMUNICATION | - SYSTEM       |
| - CALIBRATION   | - OPTION        |                |

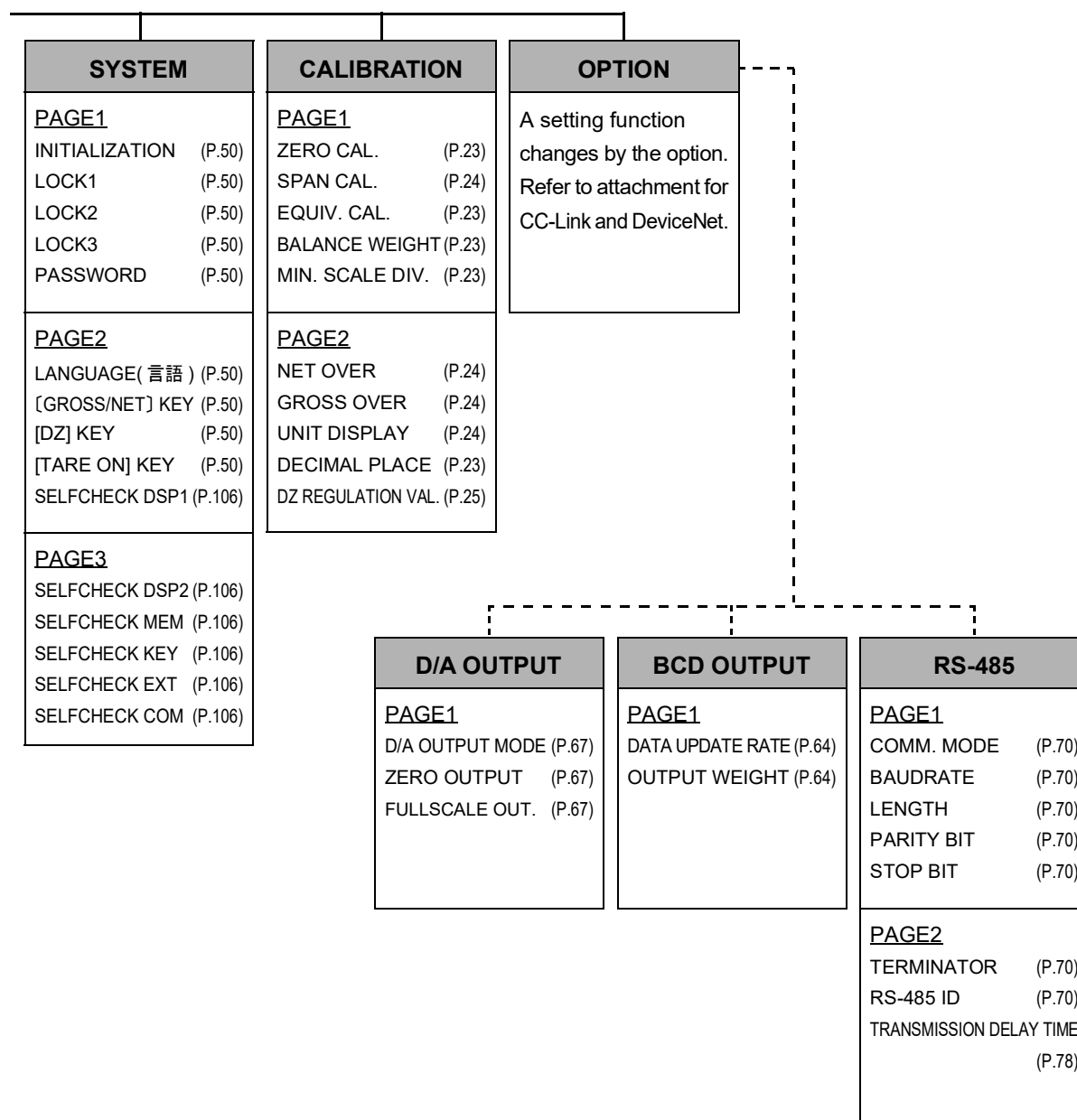
3) The setting function setting screen appears. Select the function. (Select LOCK2 on page 1.)



### 3-3. Setting modes tree



RESULT	COMPARISON	OPERATION	COMMUNICATION
<u>PAGE1</u> AVE.WEIGHT (P.38) MAX.WEIGHT (P.38) MIN.WEIGHT (P.38) CNT.OF DATA (P.38)	<u>PAGE1</u> COMP MODE SEL. (P.26) STAND. CMP SEL. (P.26) COMPLETE OUT T. (P.26) NEAR ZERO COMP. (P.26) HI/LO COMP. SEL. (P.26)	<u>PAGE1</u> MD (PERIOD) (P.41) MD (RANGE) (P.41) ZT (PERIOD) (P.41) ZT (RANGE) (P.41) INDICATE COLOR (P.43)	<u>PAGE1</u> COMM. MODE (P.53) BAUDRATE (P.53) LENGTH (P.53) PARITY BIT (P.53) STOP BIT (P.53)
<u>PAGE2</u> GEN.STAN.DEV. (P.40) SMP.STAN.DEV. (P.40) MAX. - MIN. (P.40) LATEST DATA (P.40)	<u>PAGE2</u> PRESET TARE WGT.1 (P.27) PRESET TARE WGT.2 (P.27) HOLD SELECT (P.27)	<u>PAGE2</u> BACKLIGHT LOW TM (P.44) BACKLIGHT ON TM (P.44) AUTO ACCUMULAT.(P.44) OUTPUT MODE (P.45) OUTPUT COMP. MODE(P.45)	<u>PAGE2</u> TERMINATOR (P.54) FLOW CONTROL (P.54) SI/F OUT1 SELECT (P.44) SI/F OUT2 SELECT (P.44)
		<u>PAGE3</u> WGT CODE INPUT (P.28) ZT MODE (P.41) AUTO ZERO AVE. (P.41) B4 FUCN. SELECT (P.45) TAKING SPEED (P.45)	

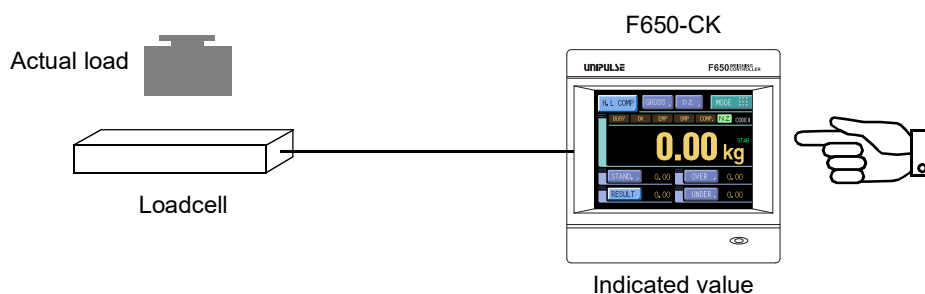


## 4. Calibration

Calibration is performed for matching the F650-CK to a loadcell. The following two types of calibration are available for the F650-CK.

### ◇ Actual load calibration

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



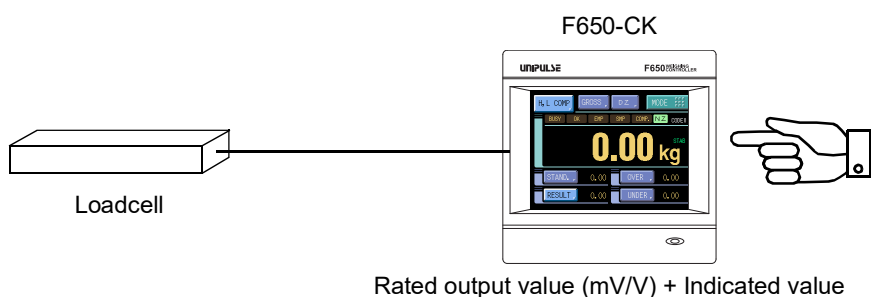
### ◇ Equivalent input calibration

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:

$$\text{In case of the load} \quad \frac{2.001 \text{ mV/V} - 100.0 \text{ kg}}{\text{Rated output} \quad \text{Capacity}}$$

as indicated for a load.



A data sheet is attached to a loadcell at the time of purchase.

The data sheet provides data including:

Capacity

Load (in kg, t, etc.)

Rated output

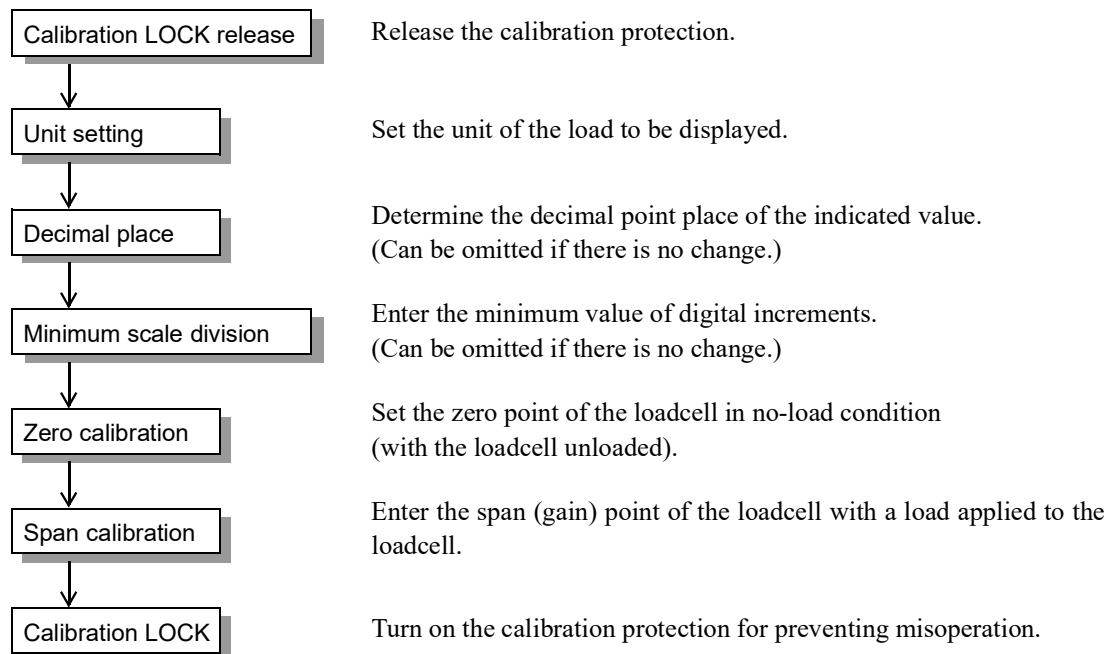
voltage (in mV/V)

non-linearity, hysteresis, input resistance, output resistance and zero balance.

Enter the capacity and the rated output value required for equivalent input calibration into the F650-CK.

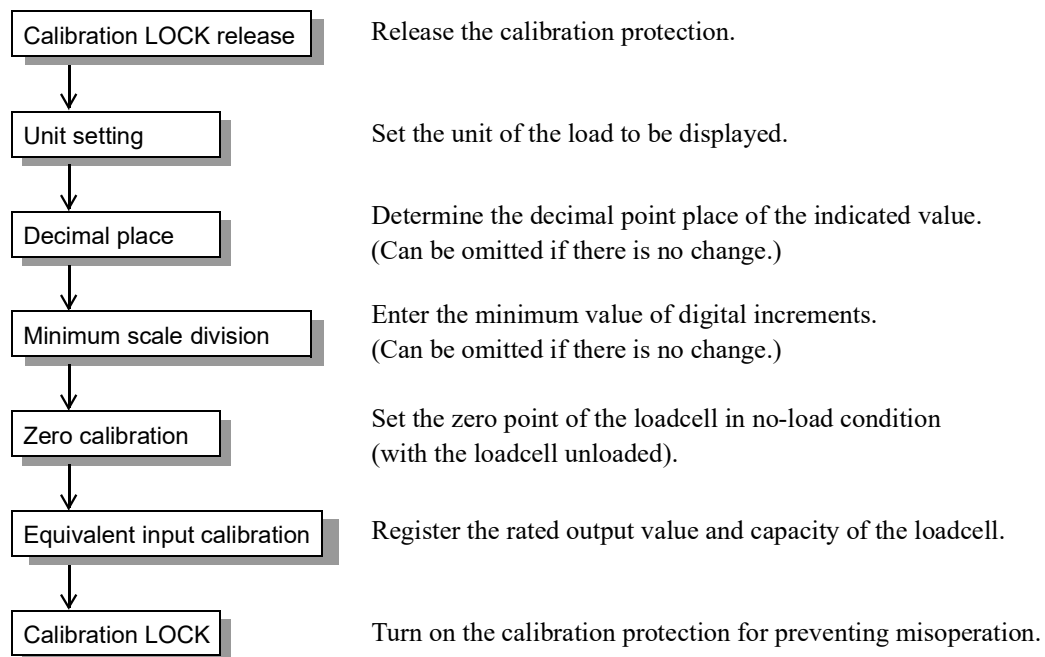
## 4-1. Span calibration procedure

Follow the steps below to perform span calibration.



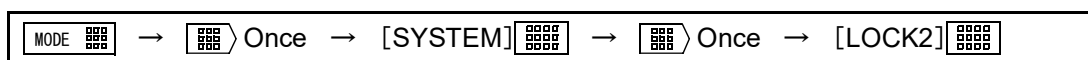
## 4-2. Equivalent input calibration procedure

Follow the steps below to perform equivalent input calibration.



## 4-3. Calibration setting

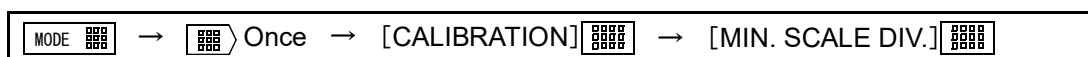
### 4-3-1. Calibration LOCK



Setting values relating to calibration are locked so as not to be changed by misoperation.  
Cancel the lock before performing calibration.

Alternatives: [OFF] [ON]

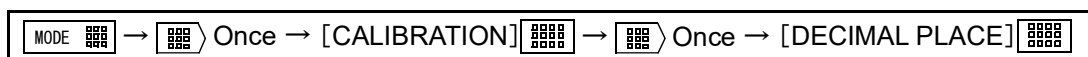
### 4-3-2. Minimum scale division



Set the minimum scale division of the indicated value.

Setting range: 001 to 100

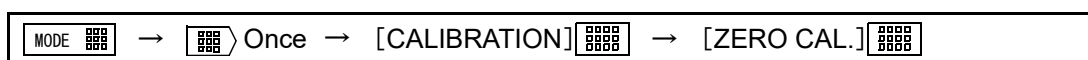
### 4-3-3. Decimal place



Set the decimal point place of the indicated value. Selection can be made from the following.

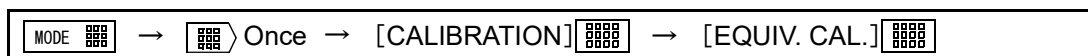
Alternatives: [NONE] [0.0] [0.00] [0.000]

### 4-3-4. Zero calibration



Set the zero point in no-load condition.

### 4-3-5. Equivalent input calibration



Set the rated output value and reading of the sensor.

Rated output value: 0.0001 to 3.1250 (mV/V)

Rated value: 00001 to 99999

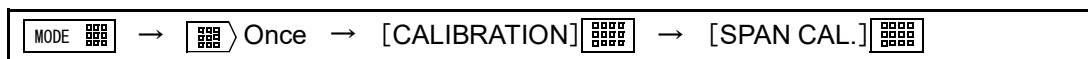


About the [BALANCE WEIGHT] setting

For performing calibration, weight value input can be omitted by setting a weight value to [BALANCE WEIGHT] beforehand. [BALANCE WEIGHT] is ganged with the weight value inputs of [SPAN CAL.] and [EQUIV. CAL.].



### 4-3-6. Span calibration



Set the actual load value under an actual load.

Setting range: 00001 to 99999 (The decimal place is selectable.)

### 4-4. Net over/ gross over



When the net weight value or gross weight value exceeds a fixed regulation, an alarm is given by this function.

NET OVER: 00000 to 99999

GROSS OVER: 00000 to 99999

The alarm is given when the following conditions are met.

	Conditional expression	Display
NET OVER	Net weight > "NET OVER" setting value	NET OVER
GROSS OVER	Gross weight > "GROSS OVER" setting value	GROSS OVER

### 4-5. Unit setting

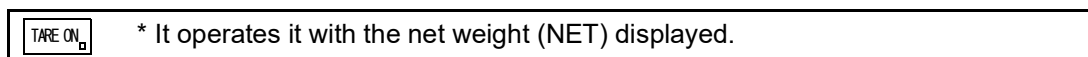


Set the unit of the load to be displayed.

The display value (calibration value) is not affected by changing the unit.

Alternatives: [NONE] [kg] [t] [g] [N] [lb]

### 4-6. Tare subtraction



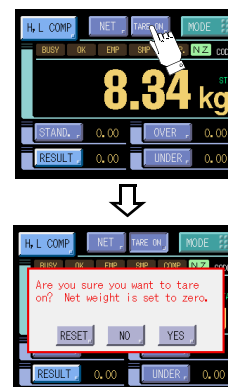
The net weight is zeroed by this function. The gross weight value is not changed by this operation.

Alternatives: [RESET] [NO] [YES]

**YES** : Perform the tare subtraction.

**NO** : Go back to the previous screen without executing tare subtraction.

**RESET** : Reset the tare subtraction.



## 4-7. Digital zero

**DZ** \* It operates it with the gross weight (GROSS) displayed.

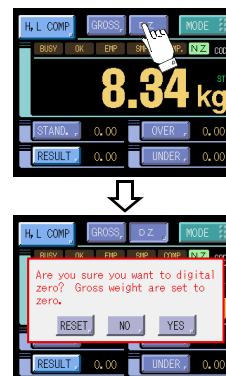
The gross weight value is zeroed by this function.

Alternatives: [RESET] [NO] [YES]

**YES** : Perform the digital zero.

**NO** : Go back to the previous screen without executing digital zero.

**RESET** : Reset the digital zero.



### 4-7-1. DZ regulation value

**MODE** → **Once** → **[CALIBRATION]** → **Once** → **[DZ REGULATION VAL]**

By setting the DZ regulation value, the alarm "ZALM" is displayed when operation is performed with any gross weight value exceeding the range.

Setting range: 0000 to 9999

The displayed "ZALM" can be invalidated by the following method.

DZ reset ..... Press the **RESET** key to reset the digital zero.

DZ re-execution ..... Perform digital zero again within the regulation value range.

(Refer to "4-7. Digital zero" on page 25.)

## 5. Comparison Setting

### ■ Comparison mode selection

Select the comparison mode.

Alternatives: [COMP] [RANK.1] [RANK.2]

### □ Explanation of each alternative

H, L comparison ([COMP])

Compare the result and the setting value, and judge comp.

Rank division comparison ([RANK.1] [RANK.2])

Compare the result and the setting value, and judge RANK.

### ■ Standard comparison selection

Select a weight value to implement H, L comparison or rank division.

Alternatives: [GROSS] [NET]

### ■ Complete output time

The length (time) of the completion signal to be output when weighing is completed can also be set.

Setting range: 0.00 to 9.99 (sec.)

### ■ Near zero comparison selection

Select a weight value to compare in near zero comparison.

Alternatives: [GROSS] [NET]

Near zero comp.	Conditions of near zero
GROSS	ON when gross $\leq$ near zero setting
NET	ON when net $\leq$ near zero setting

### ■ HI/LO limit comparison selection

Select a weight value to compare in HI/LO comparison.

Alternatives: [GROSS] [NET]

HI/LO limit comp.	Conditions of upper/lower
GROSS	ON when gross $>$ upper setting
	ON when gross $<$ lower setting
NET	ON when net $>$ upper setting
	ON when net $<$ lower setting

## ■ Tare setting selection/ preset tare value

By turning [preset tare wgt.1] ON, the net changes according to the following expression:

$$\text{Net} = \text{Gross} - \text{Preset tare value}$$

(However, if tare subtraction is input, the net weight becomes 0.)

PRESET TARE WGT.1: [OFF] [ON]

PRESET TARE WGT.2: 00000 to 99999

## ■ Hold selection

Select whether or not to hold the indicated values when weighing is completed.

However, the values are held only when the taking mode is [sample] or [stability].

Alternatives: [OFF] [ON] [CONDITIONAL]



Hold select	Conditions of hold
OFF	Indicated values are not held when weighing is completed.
ON	Indicated values are held while complete output is ON.
CONDITIONAL	Indicated values are held while complete output is ON. However, hold is released when near zero is ON or next weighing starts.

## 6. Code Setting

Weight checks can be made by assigning code No. to each setting values, such as standard mode, checker mode, state output and graph, and specifying setting values to each code No.

Up to 8 code No. can be stored.

### ■ Setting code No. selection

Press the / key on the each code setting screen, and specify the code No. you want to set.

Alternatives: [0 to 7] [ALL]

When each item is set with the code No. specified as “all,” the same setting value enters into all of code 0 to 7 on the set item. This function is convenient when there is any item you want to set all code in common.

### ■ Weighing code input

The F650-CK has a code (weighing code) for weighing and a code (setting code) for setting. Implement weighing code input externally (control connector) or internally (touch panel keys). Set external input and key input by weighing code input of operation.

Alternatives: [KEY INPUT] [EXT INPUT]



#### Notice


Do not change weighing code during weighing nor switch regularly to a code not weighed.


For weighing, use setting values corresponding to weighing codes being selected.

If the product is used as mentioned above, it may not operate normally.

### ■ Key input of weighing code

When weighing code input is "key input", weighing code may be input with touch panel keys.

Press the  key on the setting screen for each code.

However, input is disabled, if external input or communication (when option is equipped) are prioritized or even if the  key is pressed when [all] is selected. (An alarm will sound.)

## 7. Standard Mode

### ■ For H, L comparison (when “COMP” is selected by comp mode sel.)

Setting item	Input range
STANDARD	00000 to 99999
OVER	0000 to 9999
UNDER	0000 to 9999
UPPER	00000 to 99999
LOWER	00000 to 99999

When the result > standard + over setting value, the status display “HI” lights, and the signal output [OVER] turns ON.

When the standard - under setting value  $\leq$  result  $\leq$  standard + over setting value, the status display “GO” lights, and the signal output [GO] turns ON.

When the result < standard - under setting value, the status display “LO” lights, and the signal output [UNDER] turns ON.

When the weight value > upper, the signal output [UPPER] turns ON.

When the weight value < lower, the signal output [LOWER] turns ON.

\* The OVER/GO/UNDER signal turns ON only while the complete signal is output.

### ■ For rank division (when “RANK.1” or “RANK.2” is selected by comp mode sel.)

Setting item	Input range	
BOUNDARY 0	00000 to 99999	* Common
BOUNDARY 1	00000 to 99999	* Common
BOUNDARY 2	00000 to 99999	* Common
BOUNDARY 3	00000 to 99999	* Common
BOUNDARY 4	00000 to 99999	* Only when RANK.2 is selected.
BOUNDARY 5	00000 to 99999	* Only when RANK.2 is selected.
BOUNDARY 6	00000 to 99999	* Only when RANK.2 is selected.
BOUNDARY 7	00000 to 99999	* Only when RANK.2 is selected.
BOUNDARY 8	00000 to 99999	* Only when RANK.2 is selected.
BOUNDARY 9	00000 to 99999	* Only when RANK.2 is selected.
UPPER	00000 to 99999	* Common
LOWER	00000 to 99999	* Common

Compare result and setting values of boundary 0 to 9, and depending on judgment result, status is displayed and signal output is set to ON .


\* When result > threshold (boundary 0 to 9), the RANK turns to the next.

When the weight value > upper, the signal output [UPPER] turns ON.

When the weight value < lower, the signal output [LOWER] turns ON.

\* Judgment signal by rank division turns ON only while the complete signal is output.

**Example 1) Comparison mode:****When RANK.1 is selected (when all boundary 0 to 3 are used)**

Boundary 0: 9900		Threshold(1): 9800
Boundary 1: 10100		Threshold(2): 9900
Boundary 2: 9800		Threshold(3): 10000
Boundary 3: 10000		Threshold(4): 10100

\* Setting needs not to be boundary 0 < boundary 1 < boundary 2 < boundary 3.


Threshold(4)	<b>RANK5</b>	
Threshold(3)	<b>RANK4</b>	10100
Threshold(2)	<b>RANK3</b>	10000
Threshold(1)	<b>RANK2</b>	9900
	<b>RANK1</b>	9800

Compare the result and threshold to make a judgment.

If the result is "9950", it falls in between thresholds(2) and (3); therefore, judgment result is "RANK3".

Also, boundary 0 to 9 can be set when RANK.2 is selected, and RANK1 to 11 is judged.


**Example 2) Comparison mode:****When RANK.1 is selected (when setting value = 0 is included)**

Boundary 0: 9900		Threshold(1): 9900
Boundary 1: 10100		Threshold(2): 10100
Boundary 2: 0		Threshold(3): none
Boundary 3: 0		Threshold(4): none

\* If the setting value of boundary is 0, judgment is disabled.

Threshold(2)	<b>RANK3</b>	
	<b>RANK2</b>	10100
Threshold(1)	<b>RANK1</b>	9900


Also, judgment is as follows if all the setting values = 0.

Boundary 0: 0		Threshold(1): none
Boundary 1: 0		Threshold(2): none
Boundary 2: 0		Threshold(3): none
Boundary 3: 0		Threshold(4): none

\* Judgment result is RANK1 only.

<b>RANK1</b>
--------------

**Example 3) Comparison mode:****When RANK.1 is selected (when all setting values are the same)**

Boundary 0: 10000		Threshold(1): 10000
Boundary 1: 10000		Threshold(2): none
Boundary 2: 10000		Threshold(3): none
Boundary 3: 10000		Threshold(4): none

Threshold(1)	<b>RANK2</b>	
	<b>RANK1</b>	10000

## 8. Checker Mode

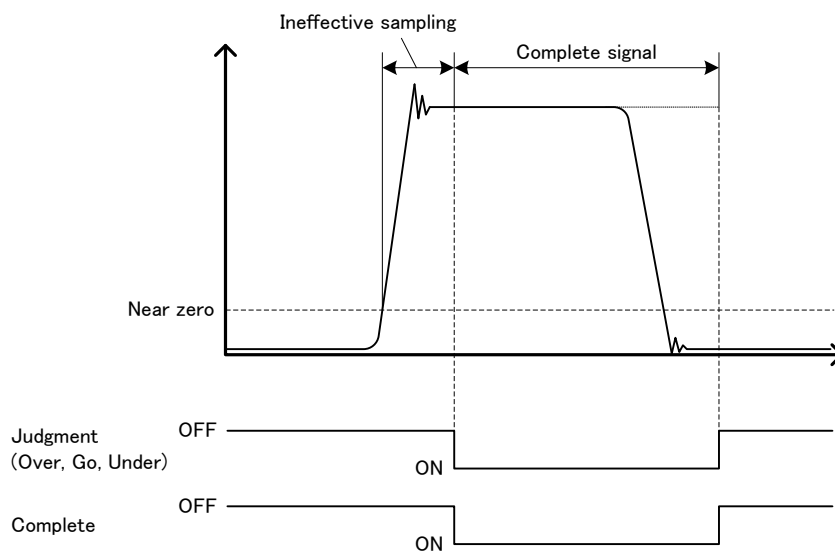
### ■ Taking mode

Select measurement procedure.

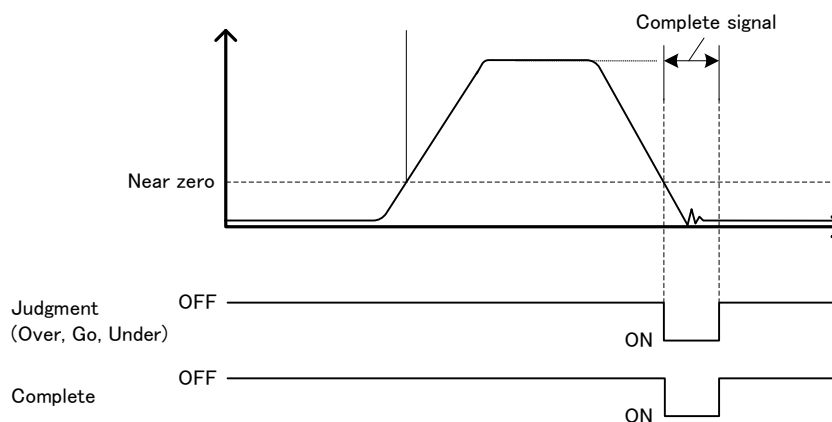
Alternatives: [SAMPLE] [PEAK] [ARITHMETIC] [REMOVAL] [STABILITY]

### □ Explanation of each alternative

**[SAMPLE]** This alternative is ongoing comparison mode except near zero.  
Weighing value is the value when the complete signal turns ON.  
Indicated values may be held by setting when the complete signal is ON.  
(Refer to page.27)  
The setting of taking count is disabled.



**[PEAK]** This alternative is ongoing comparison mode of peak value except near zero.  
Weighing value is the one of the peak value.  
The setting of taking count is disabled.





[ARITHMETIC] The average is calculated by using all the sample data.

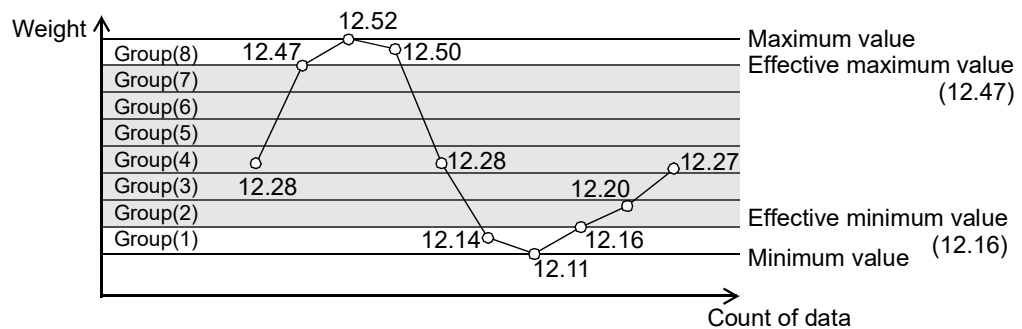
[REMOVAL] Out of sample data, splitting the difference between the maximum value and minimum value of the eight. The average is calculated by using data with the removal of the data of the maximum group (8) larger than effective maximum value and the minimum group (1) smaller than effective minimum value. In this case, the effective maximum value and effective minimum value in the sample data does not remove.

\* The effective maximum value is median value of group (7) and group (8). (Median value is truncated at the less than effective display digits.) The effective minimum value is median value of group (1) and group (2). (Median value is truncated at the less than effective display digits.)

Example 1) When data is dispersed

Arithmetic = 12.29

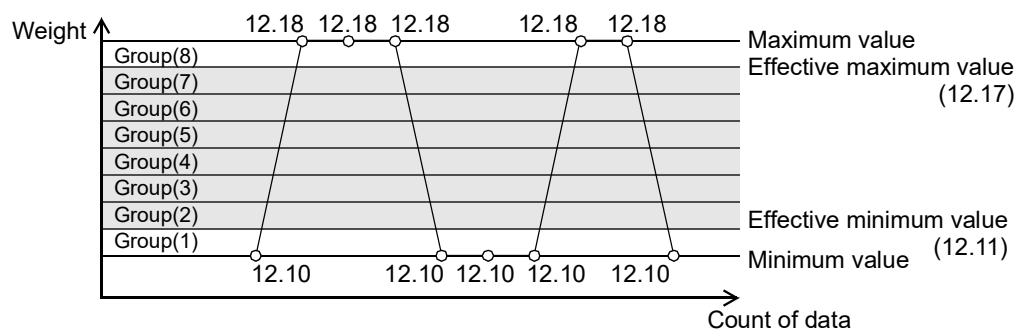
Removal = 12.28 (The average is calculated by using six samples with the removal of the data of group (8) and group (1).)



Example 2) When the data is biased up or down

Arithmetic = 12.14

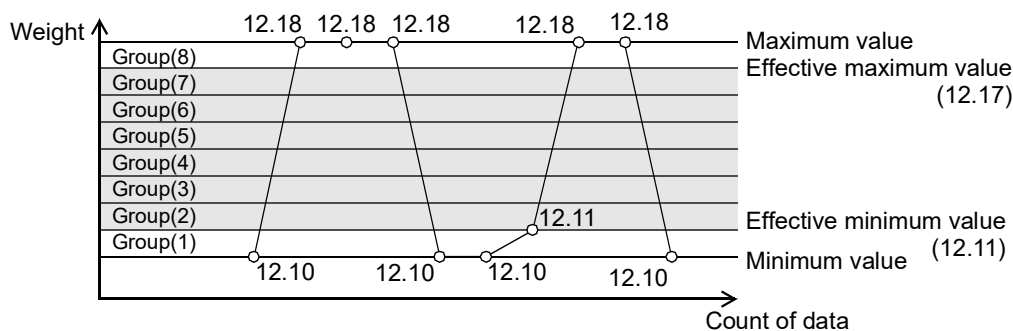
Removal = 12.14 (If the data of group (8) and group (1) are removed, there is no data; therefore the average of all the data is taken.)



**Example 3) When few data available to removal**

Arithmetic = 12.14

Removal = 12.11 (If the data of group (8) and group (1) are removed, only piece of data remains, and the average is calculated by using the one piece of data.)



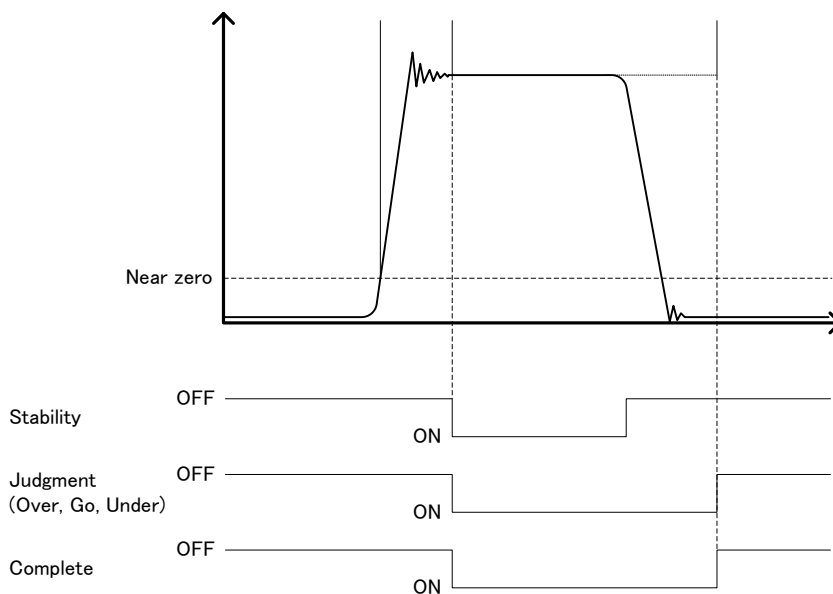
[STABILITY] This alternative is ongoing comparison mode except near zero.

Weighing value is the value when the stable signal turns ON.

Indicated values may be held by setting when the complete signal is ON.

(Refer to page.27)

The setting of taking count is disabled.



## ■ Trigger mode

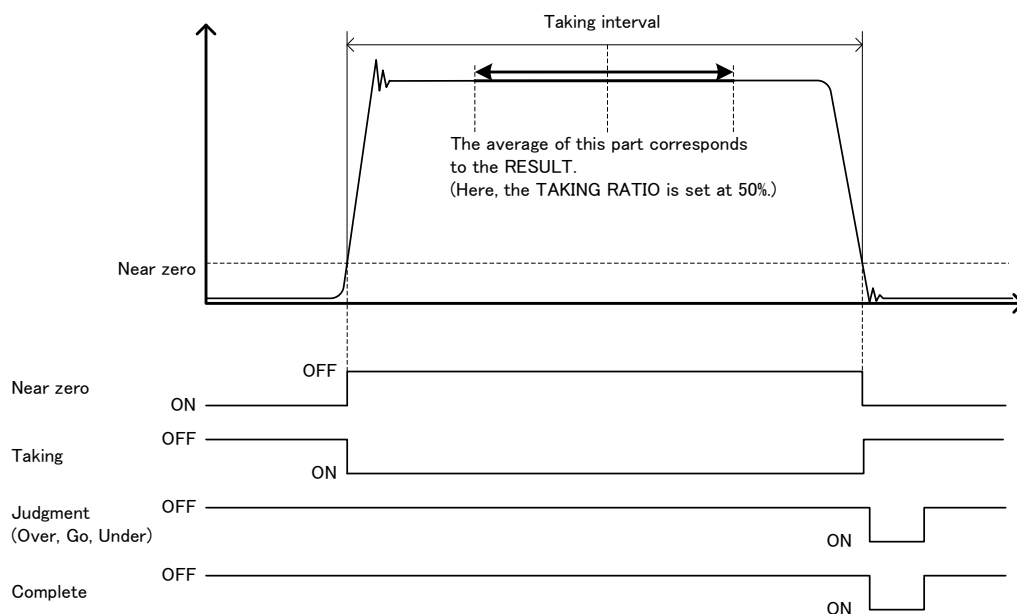
Select the trigger mode to start sampling.

Alternatives: [LEVEL] [EXTERNAL]

## □ Explanation of each alternative

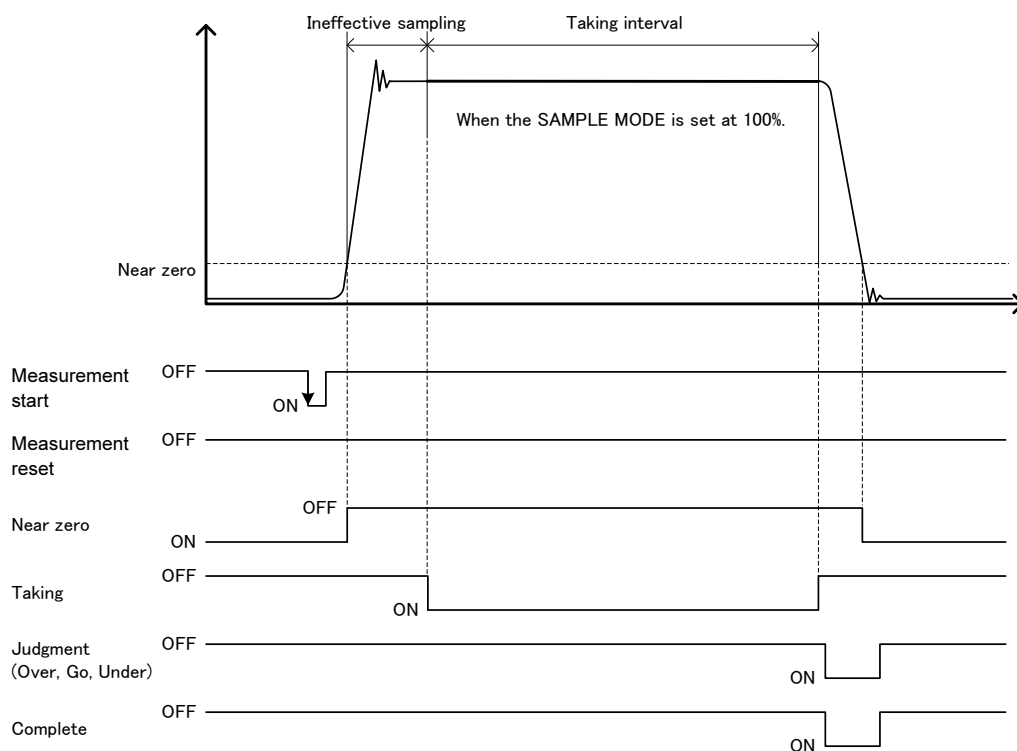
**[LEVEL]** Weighing starts when weight exceeds the near zero setting value and ends when weight falls below the near zero setting value or the data for effective sampling is taken. Weighing value is the average of data in the interval set at the taking ratio. Not dependent on weighing time, weighing may be implemented when weight value fluctuates around the near zero setting value.

This does not require external signals, which makes the system simple.



**[EXTERNAL]** After start signals are input from the external, weighing starts when weight exceeds the near zero setting value. Weighing ends when weight falls below the near zero setting value or the data for effective sampling is taken.

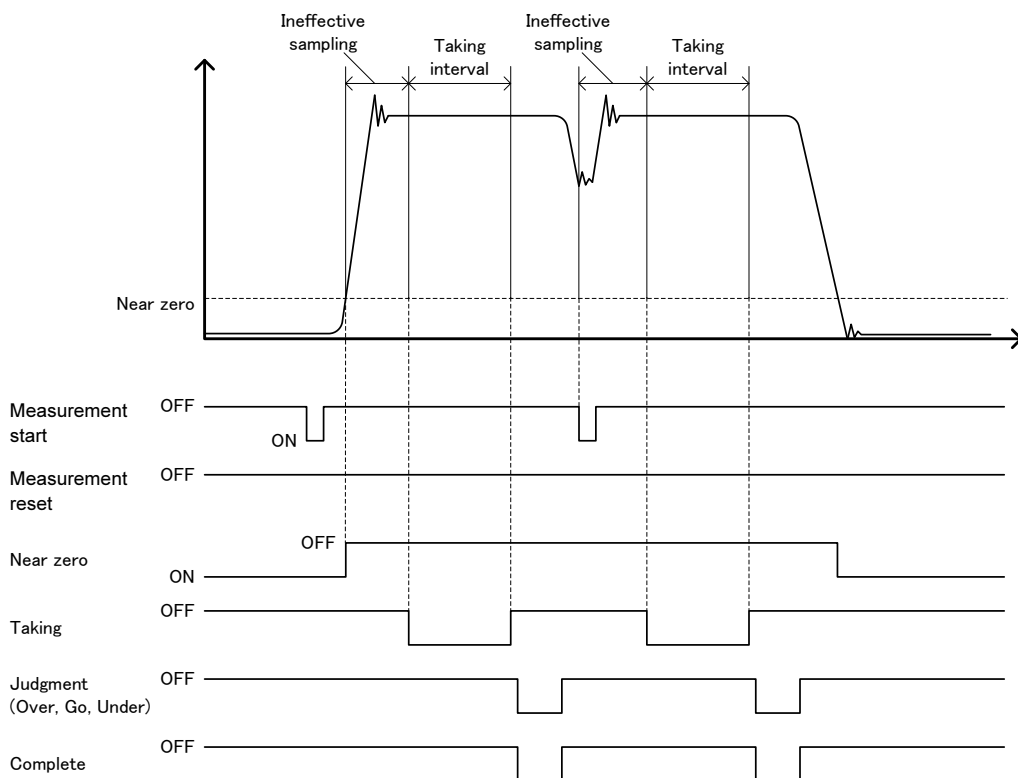
Weighing value is the average of data in the interval set at the raking ratio.



### In case of two cartons

If weighing tact is fast, there may be a case where weighing does not reach near zero and the next work comes in. In such case, weighing starts only with start signal input from the external even if weight does not fall below near zero setting value.

However, if falling below near zero setting value, weight must exceed external signal + near zero setting value for the start of next weighing as usual.



#### Notice

Weighing ends at the moment when measurement start signals are received during weighing, and the next weighing starts.

However, during ineffective sampling, the result is processed as 0.

### ■ Taking count

This is the interval during which the weight value is actually acquired after the measurement start and the passage of the ineffective sampling interval.

When the weight value is acquired by the effective sampling, weighing is completed.

(Weighing is also completed when the weight value becomes the near zero setting value or less.)

Setting range: 0001 to 5000

## ■ Taking ratio

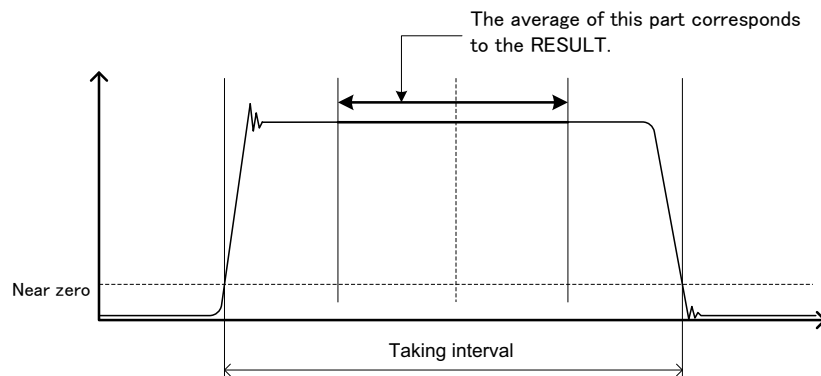
Set the sampling width to calculate the average of the take-in interval.

Alternatives: [100%] [50%] [25%] [12.5%] [5%] [2.5%]

### □ Explanation of each alternative

- [100%] The average is calculated by using all the sample data.
- [50%] The average is calculated by using the data 25% before and after the center of the sample data (50% in total).
- [25%] The average is calculated by using the data 12.5% before and after the center of the sample data (25% in total).
- [12.5%] The average is calculated by using the data 6.25% before and after the center of the sample data (12.5% in total).
- [5%] The average is calculated by using the data 2.5% before and after the center of the sample data (5% in total).
- [2.5%] The average is calculated by using the data 1.25% before and after the center of the sample data (2.5% in total).

### □ Example at 50%



## ■ Empty count

This is the interval between the measurement start and actual data acquisition.

Setting range: 0000 to 5000

## ■ Near zero

Set the comparison weight value to make near zero

Setting range: 00000 to 99999

## ■ Digital low pass filter

This filter screens the A/D converted data and cancels unnecessary noise.

Like the analog circuit low pass filter, set the cut-off frequency.

Select the most appropriate value in accordance with kinds of measurements and setting environments.

Setting range: 2.0 to 10.0 (Hz)

**Notice**

When setting value of digital low pass filter is changed, the status display "BUSY" lights on.

When the "BUSY" lights on, it indicates that the internal ratio of filter is being calculated.

At this point, do not implement weighing since the trigger for starting weighing is ignored. Processing time differs depending on the value switched.

\* It takes a maximum of approx. 3.5 seconds (when switching 10.0Hz→2.0Hz).

### ■ Moving average filter

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

A higher frequency will make a more stable display in slower response. A lower frequency will have quicker response but unstable display.

Set the most appropriate value in accordance with the kinds of measurements.

Setting range: 1 to 999 (times)

### ■ Gross ratio

If a certain error should occur in weighing, make an adjustment with ratio multiplication.

Normally, set the ratio to "1.000" (no adjustment).

Setting range: 0.001 to 9.999

### ■ Histogram target/ histogram range

Set the target and range to display histogram.

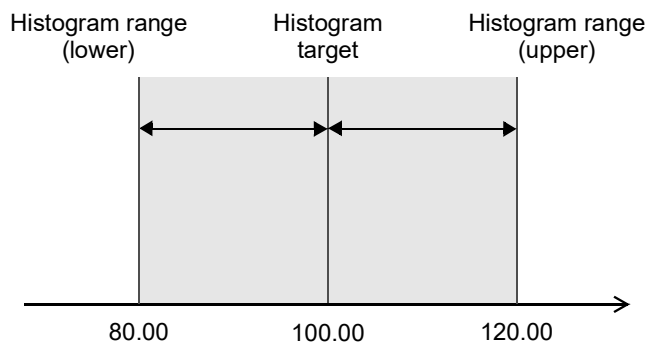
Divide the range limits (upper to lower) by nine and calculate the ranks for histogram.

HISTOGRAM TARGET: 00005 to 99994

HISTOGRAM RANGE: 0005 to 9999

\* Setting values may be limited depending on input values.

Setting example) Set 100.00 for the histogram target and 20.00 for the histogram range.



## 9.Total Function

### 9-1. Total display

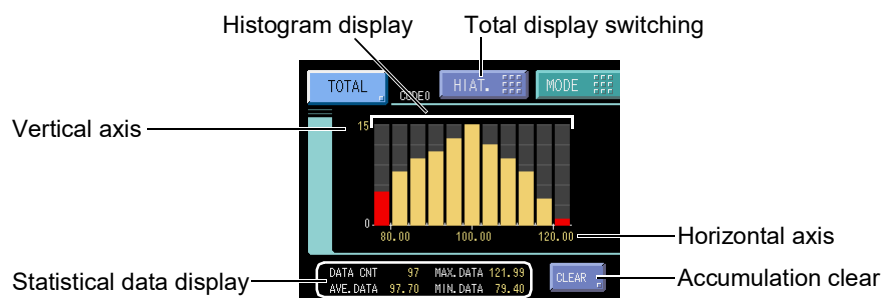
Press the button on the upper left of the screen to switch the ordinary display screen.

\* When the button is pressed in the [TOTAL] display, display is transferred to [H, L COMP].



#### ■ Histogram display/ comparison count display

##### [Histogram display]



##### □ Histogram display

The result of each code (recent 500 data) is displayed in data sections of nine. Two out-of-range data is displayed. Also, histogram is relatively displayed against the maximum number of rank data. (Refer to page.27)

##### □ Total display switching

Histogram display is switched to comparison count display.

##### □ Vertical axis

The maximum number of rank data is indicated.

##### □ Horizontal axis

Histogram upper, histogram lower and histogram target are indicated respectively.

##### □ Statistical data display

The result of display code is shown.

DATA CNT: The number of times of weighing is displayed.

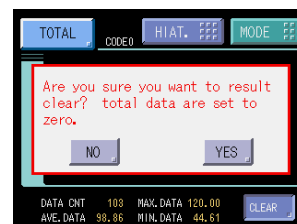
AVE.DATA: The average weight value of the result is displayed.

MAX.DATA: The maximum weight value of the result is displayed.

MIN.DATA: The minimum weight value of the result is displayed.

### □ Accumulation clear

Perform accumulation clear (weighing code).

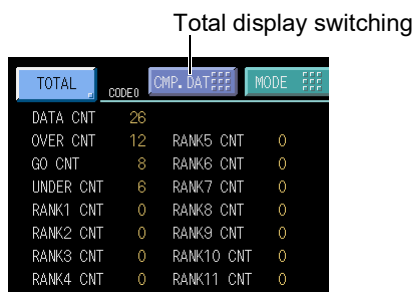


### [Comparison count display]

In this screen, the result is displayed by code.

The result is reset by accumulation clear (linked with weighing data clear).

\* Even if related setting items (comparison mode, over, under, standard, boundary 0 to 9) are changed, judgment result is not cleared.



### □ Total display switching

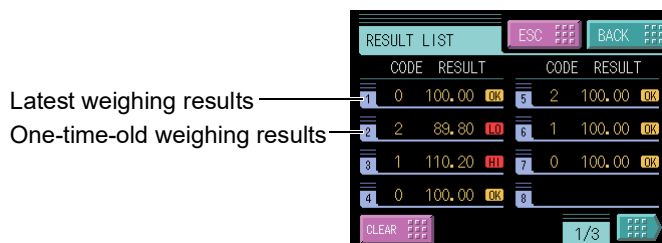
Comparison count display is switched to histogram display.

## 9-2. Result display screen

Latest eight weighing results (accumulated data) are displayed on the F650-CK at maximum.

The data accumulated by the auto accumulation command or the data accumulated by inputting the accumulation command is displayed.

For the data accumulated by the accumulation command, which is not judged, the judgment result is not displayed.



The data of the latest eight results of weighing are displayed. (Code No., weighing results, and judgment results are displayed.)

The display area is cleared by pressing [CLEAR] button. (This operation should be considered separately from the operation of accumulation clear.)



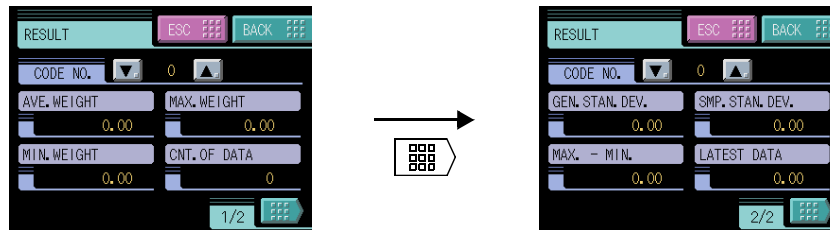
### 9-3. Result

The statistics data accumulated in F650-CK are displayed.

Weighing values can be accumulated up to 500 data by weighing with auto accumulation ON or by executing serial communication command.

The statistics data (8 sorts) for each code are also displayed.

Average weight, maximum weight, minimum weight, count of data, general standard deviation, sample standard deviation, maximum - minimum and latest data are displayed.



#### ● Calculation formula

$n$  = count = count of data

$\Sigma\chi$  = accumulation = grand total

$\bar{\chi}$  = average = accumulation/count =  $\Sigma\chi/n$

General standard deviation

$$\sigma_n = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}}$$

Use all the data of the finite population  
and find the standard deviation of the population.

Sample standard deviation

$$\sigma_{n-1} = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

Use the sample data among the population  
and the standard deviation of the population.

#### <Example>

Count (n)	Accumulation	Actual weighing value (latest)	Average	Max.	Min.	Max.- Min.	General S.D.	Sample S.D.
0	0.000	0.000	0.000	0.000	0.000	0.000	error	error
1	20.050	20.050	20.050	20.050	20.050	0.000	0.000	error
2	40.090	20.040	20.045	20.050	20.040	0.010	0.005	0.007
3	60.160	20.070	20.053	20.070	20.040	0.030	0.012	0.015
4	80.240	20.080	20.060	20.080	20.040	0.040	0.016	0.018
5	100.260	20.020	20.052	20.080	20.020	0.060	0.021	0.024
6	120.260	20.000	20.043	20.080	20.000	0.080	0.027	0.030
7	140.270	20.010	20.039	20.080	20.000	0.080	0.028	0.030
8	160.250	19.980	20.031	20.080	19.980	0.100	0.033	0.035
9	180.360	20.110	20.040	20.110	19.980	0.130	0.039	0.042
10	200.370	20.010	20.037	20.110	19.980	0.130	0.038	0.041

← Accumulation clear

## 10. Operation Setting

### ■ Motion detection period/ motion detection range

Set the parameter to detect stability.

When the width of change in weight value falls below the preset range  $\times$  minimum scale division, and the state continues for the preset time or more, the weight value is regarded as stable, and the stable status turns ON.

MD (PERIOD): 0.00 to 9.99 (sec.)

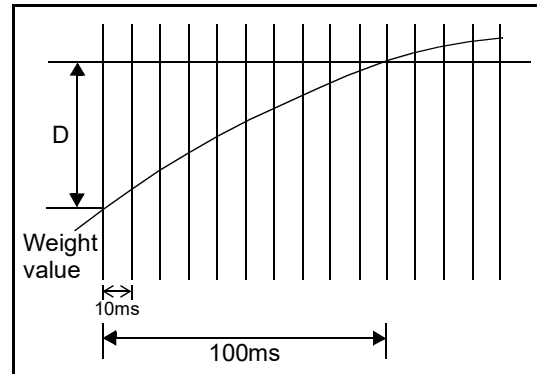
MD (RANGE): 00 to 99 (CNT)

“D” in the right picture and the range are compared at each time of A/D conversion, and when the preset range  $\times$  minimum scale division is exceeded, the stable status is turned OFF.

“STAB” is displayed at the upper part of the unit display section.

The output signal “STAB” turns ON at stable-time.

\* “D” is the difference between the present weight value and the prior weight value 100ms.



### ■ Zero tracking period/ zero tracking range/ zero tracking mode/ auto zero average

Slow changes in zero point due to drifting are automatically tracked and compensated by this function.

ZT (PERIOD): 0.00 to 9.99 (sec.)

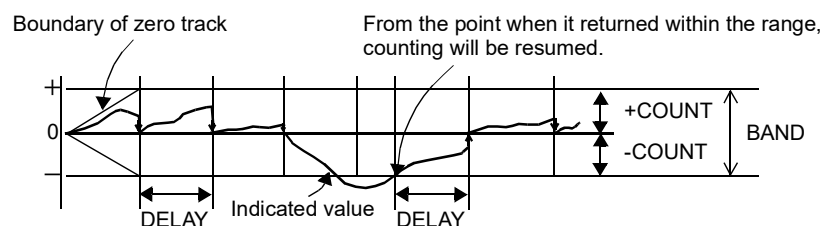
ZT (RANGE): 00 to 99 (CNT)

ZT MODE: [BAND MODE] [NZ MODE] [AVE. MODE]

AUTO ZERO AVE.: [10ms] [20ms] [50ms] [100ms]



- Zero tracking (band mode) automatically takes the zero point at the preset intervals when the amount of movement of the zero point is less than the preset range  $\times$  minimum scale division.
- The period (tracking delay) can be set in the range of 0.01 to 9.99 sec., and the range (tracking band) can be set in the range of 00 to 99. If the setting value is 02, two scale divisions will result. Also, if the period is set at 0.0 sec. and the range at 00, zero tracking (band mode) does not function.

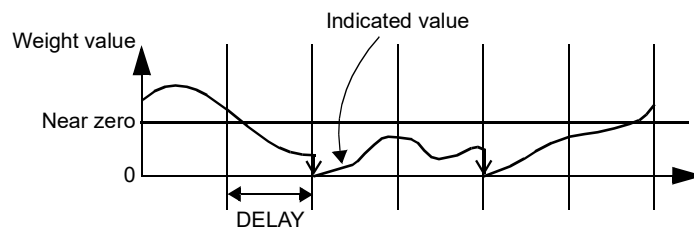


**Notice**

Since zero tracking (band mode) should function from the zero point of gross, it does not function if the indicated value has already exceeded the tracking band. Take the zero point again by digital zero or zero calibration.

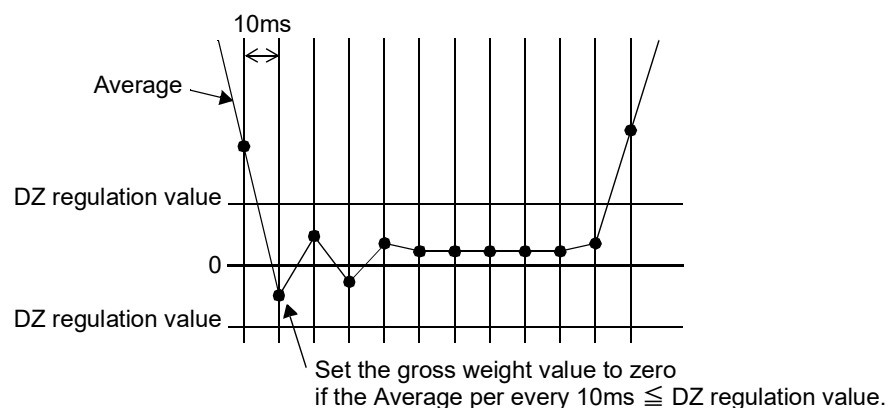


- Zero tracking (NZ mode) function makes comparisons with the previous weight at every set period; if the outcome turns out to be a decrease (previous weight or below), this function automatically implements zero tracking processing as long as the weight falls below near zero.
- Settings of the period (tracking delay) in the range of 0.01 to 9.99 seconds and the band (tracking band) are disabled. Also, if the period is set at 0.00 sec., zero tracking (NZ mode) does not function.



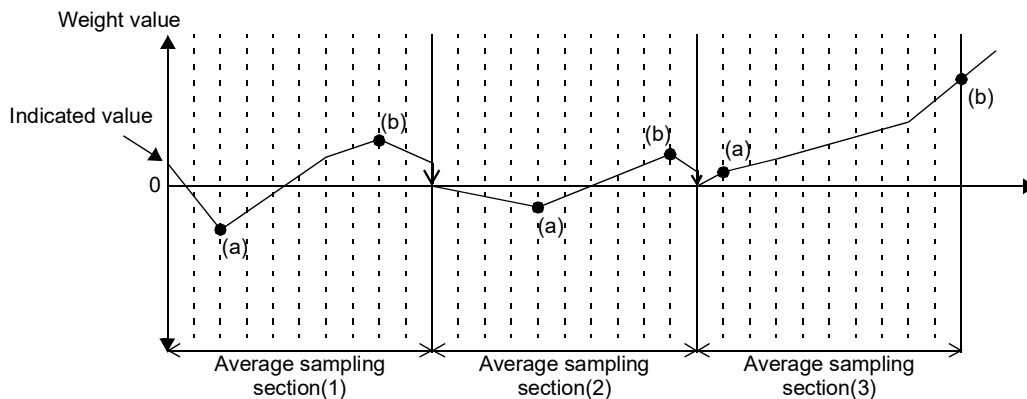
In ave. mode, when the calculated average of weight value at every set period of time (specified at auto zero ave.) is within the specified DZ regulation value, the gross weight value will automatically become 0 (zero).

The setting of ZT (PERIOD) and ZT (RANGE) is disabled.

**Example) When the auto zero ave. is 10ms**

**Notice**

MAX. - MIN. (R) from Maximum value (a) and Minimum value (b) per average sampling section is internally calculated. Auto zero is not performed if this (R) is greater than the previous value.



## ■ Indicate color

The indicated value display color can be changed.

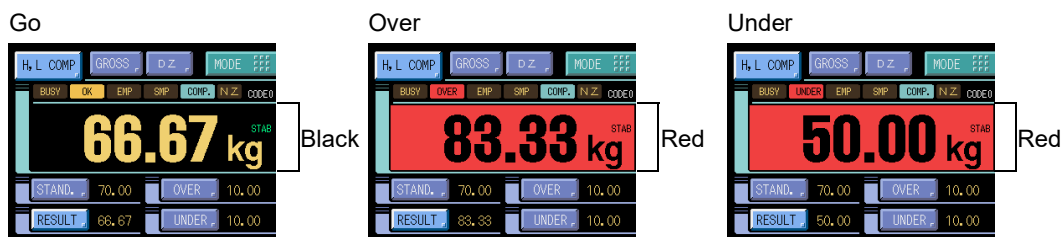
Alternatives: [Yellow] [Green] [Blue] [Comp.]

Operates as follows when the setting of indicate color is "COMP".

### [When the comparison mode is "COMP"]

Normally	Yellow
When the over	Red
When the under	Red

In addition, only weight display screen is linked with judgment result and the background colors of the area of the indicated value display will be changed.



### [When the comparison mode is "RANK.1" or "RANK.2"]

Normally	Blue
When the upper, the lower	Red

## ■ Backlight low time/ backlight on time

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

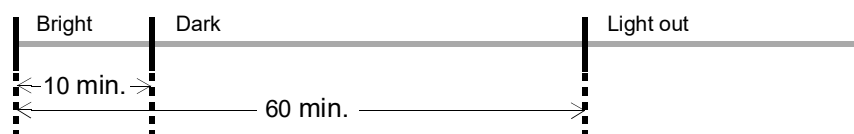
The ON time (lighting time of the backlight) and the Low time (bright → dark switching time of the backlight) are set up.

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 to 99 (min.) (with both time)

## ■ Auto accumulation

Select whether to automatically accumulate the result of the F650-CK (ON) or not (OFF).

When complete output signal turns ON, do auto accumulation to the active weighing code, value, times and statistical data. Also send out auto printer command via SI/F interfaces.

But if the weighing result exceeds 99999, F650-CK do not do accumulation.

Alternatives: [OFF] [ON]

## □ Auto print command

The F650-CK gives an automatic print command to any device connected by SI/F interface.

The automatic print command is sent when the complete output signal turns ON.

Also, when weighing result exceeds 99999, the automatic print command can not be sent out.

## ■ SI/F out1 select/ SI/F out2 select

In SI/F, data corresponding to GROSS data area and NET data area can be transmitted respectively.

The data selected in SI/F out1 select will be transmitted as GROSS data area in SI/F communication format, and the data selected in SI/F out2 select will be transmitted as NET data area.

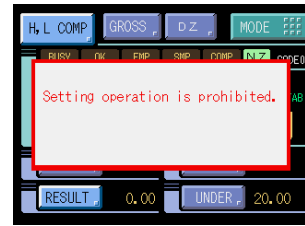
In cases of ERROR and RESULT, the data will be "0" as the internal memory will be cleared when power is supplied. In addition, the ERROR and RESULT are updated at the time of transmitting print command; therefore, the values are not updated when the timing for transmitting print command is absent.

Alternatives: [GROSS] [NET] [ERROR] [RESULT] [STANDARD]

## ■ B4 terminal function selection

Selection of the KEY LOCK terminal function from the CODE2 terminal function by the B4 function selection setting makes the following effective.

**KEY LOCK:** When the terminal is short-circuited, all key operations of a main screen are disabled.



When KEY LOCK terminal function is selected, measurement code that can be specified from the outside can be specified by CODE0 terminal, CODE1 terminal.  
It is limited to CODE No. 0 to 3.

## ■ Taking speed

The sampling rate in the ineffective and effective sampling intervals can be changed here. This feature is useful for long-time measurements (due to the length of measuring objects or belt speed) especially when the level trigger is used.

\* This setting parameter is configurable only when empty count and taking count features are activated.

Alternatives: [1000/s] [500/s]



Notice

Only the sampling speed in the sampling interval will be changed here.  
It does not affect the overall A/D conversion speed.

## ■ Output mode/ output comparison mode

The output mode is a function to control ON/OFF of signal output [output state], on the touch panel. ON/OFF of signal output [output state], can also be switched by communication command in addition to operations on the touch panel.

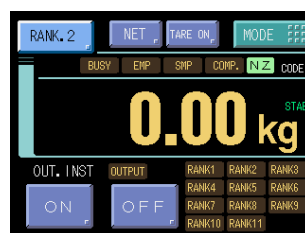
**OUTPUT MODE:** [OFF] [ON]  
**OUTPUT COMP. MODE:** [OFF] [ON]

If the output mode is "ON", comparison screen is as follows.

[H, L COMP, RANK.1]

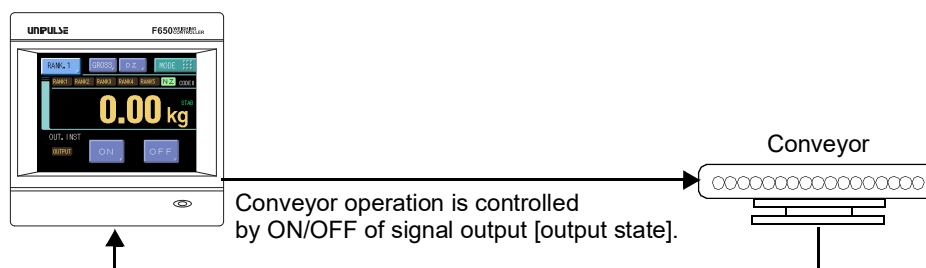


[RANK.2]



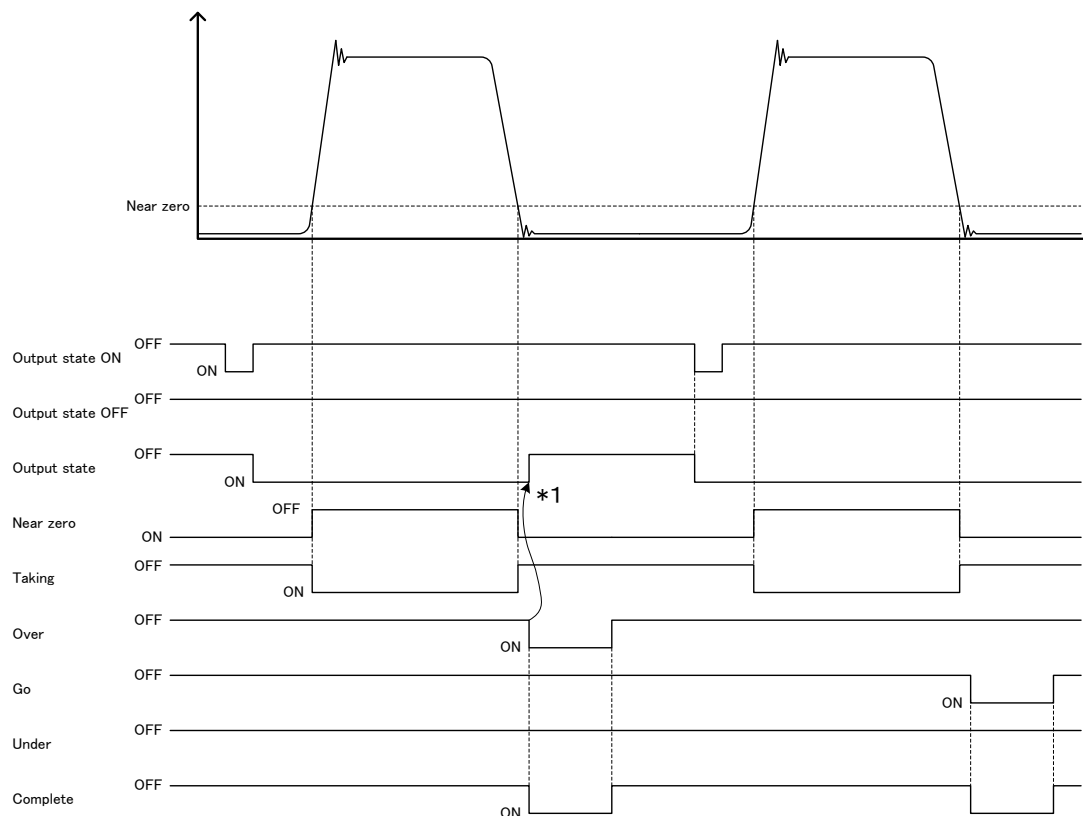
\* The above figure shows the case of H,L comp.

### Example) An indicator alone can be a checker.



Also, if output comparison mode is "ON", signal output [output state] is automatically turned OFF as long as the judgment result is other than go (over or under).

However, H, L comparison is not implemented in the case of rank division mode; therefore, this function is not affected.

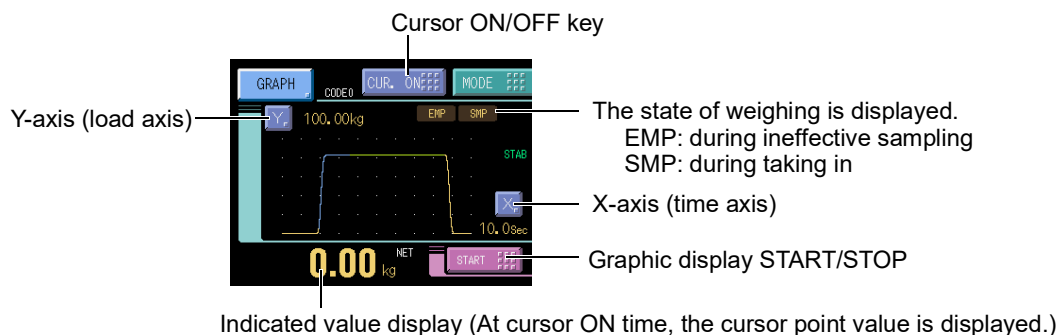


\*1 In case of ON or if the judgment result is other than go (over or under), output signal is turned OFF. Regardless of the setting, output is not affected if judgment result is go.

# 11. Graph Setting

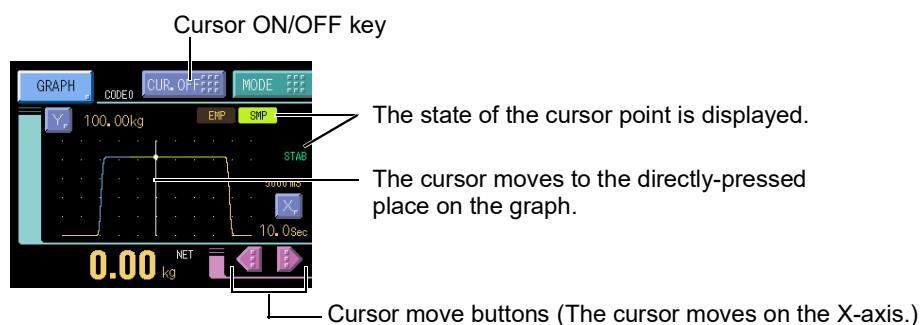
## □ Graphic display screen

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



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

## □ Cursor display screen



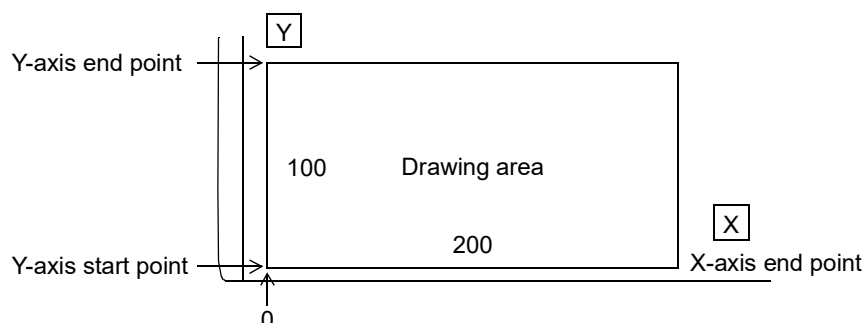
## □ X-axis

“X-axis” is time axis setting. One screen is drawn between the instant of inputting the start and the instant of the time set by the X-axis end point.

The number of drawing points is 200, and drawing is performed with the representative value at each of the set time divided by the number of drawing points.

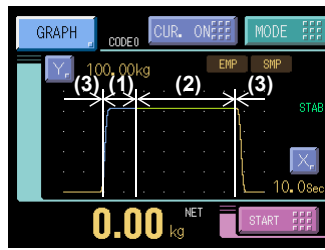
## □ Y-axis

“Y-axis” is load axis setting. Drawing is performed from the value set by the Y-axis start point to the value set by the Y-axis end point. (The number of drawing points is 100.)





## □ Explanation of graphic colors



- (1) Displayed in sky blue during ineffective sampling.
  - (2) Displayed in yellow during taking in.
  - (3) Others, subject to setting of [indicate color].
- \* (1) and (2) do not affect the setting of indicate color.

## ■ Graphic mode

Select the method of drawing.

Alternatives: [CONTINUITY] [LEVEL] [EXTERNAL] [OPERATING]

## □ Explanation of each alternative

- [CONTINUITY] Drawing is started by the **START** key, and drawing is repeated until the **STOP** key is input.
- [LEVEL] Drawing is started when the drawing weight exceeds the trigger level, or the **START** key is pressed, and only one screen is drawn.
- [EXTERNAL] Drawing is started when ON edge of signal input [graph drawing], or the **START** key is pressed, and only one screen is drawn.
- [OPERATING] Drawing is started when the drawing weight exceeds the near zero level, or the **START** key is pressed, and only one screen is drawn.

## ■ Trigger level

Set the graph drawing start level (trigger level) if [LEVEL] has been selected by graphic mode selection.

Setting range: 00000 to 99999

## ■ X-axis (time) end point

Set the time to display one screen. The setting range is from 0.2 sec. to 99.8 sec. (at intervals of 0.2 sec.)  
The X-axis (time) end point can also be set from the graph screen.

Setting range: 0.2 to 99.8 (sec.)

## ■ Y-axis (load) start point

Set the graph drawing start point.

Setting range:  $\pm 00000$  to  $\pm 99999$

## ■ Y-axis (load) end point

Set the graph drawing end point. The Y-axis (load) end point can also be set from the graph screen.

Note) The start point should be smaller than the end point.

Setting range:  $\pm 00000$  to  $\pm 99999$

## ■ Drawing weight selection

Select the weight for drawing.

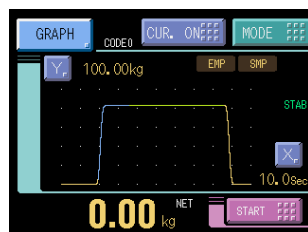
Alternatives: [GROSS] [NET]

## ■ Pre trigger value

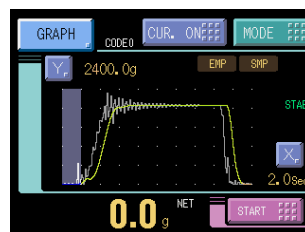
A graph is plotted by tracking back the time by the percentage set.

Setting range: 0 to 20 (%)

Absence of pre trigger display (0%)



Presence of ore trigger display (10%)

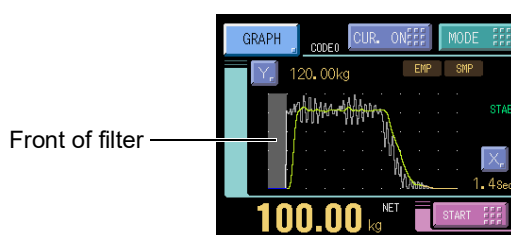


\* Even if the pre trigger value is set, the graph plotting time is fixed, in which plotting is performed from the head of the pre trigger value: therefore, the time of plotting from its start becomes short by the pre trigger value.

\* Pre-trigger section is displayed in blue.

## ■ Front of filter

When this setting is ON, gross weight before filtering can also be drawn.



\* Drawing of front of filter is displayed in gray.

\* Drawing of front of filter in the pre-trigger section is displayed in white.

## 12. System

### ■ Initialization

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

Select the setting item you want to initialize.

Alternatives: [CODE] [CAL.] [e.t.c.]

\* If LOCK1, LOCK2 or LOCK3 of setting item which you intend to initialize is ON, the initialization cannot be executed.

### ■ LOCK1/ LOCK2/ LOCK3

This function protects setting values and calibration from being changed by mistake.

LOCK1: [OFF] [ON]

LOCK2: [OFF] [ON]

LOCK3: [OFF] [ON]

\* Please refer to "22. Setting Item List" on page 111 for the setting that LOCK is done by LOCK1, LOCK2 and LOCK3.

### ■ Password

By inputting password, accumulation clear is enabled for execution.

Accumulation clear of weighing code: 2486

Accumulation clear of all code: 4268

### ■ Language ( 言語 )

The display language is selectable between japanese and english.

JPN ( 日 ): JAPANESE

ENG ( 英 ): ENGLISH

### ■ [GROSS/NET] key

Set OFF/ON of the key operation of the GROSS / NET key.

Alternatives: [OFF] [ON]

### ■ [DZ] key

Set OFF/ON of the key operation of the DZ key.

Alternatives: [OFF] [ON]

### ■ [TARE ON] key

Set OFF/ON of the key operation of the TARE ON key.

Alternatives: [OFF] [ON]

## 13. External Input/Output Signals

### ■ External input signals

#### (1) CODE0 to CODE2 <level input> (B2, B3, B4)

Input signals to specify codes for weighing externally.

CODE2	CODE1	CODE0	Selected CODE
Open	Open	Open	0
Open	Open	Shorted	1
Open	Shorted	Open	2
Open	Shorted	Shorted	3
Shorted	Open	Open	4
Shorted	Open	Shorted	5
Shorted	Shorted	Open	6
Shorted	Shorted	Shorted	7

\* If weighing code input is set as "key input", this input is disabled.

\* CODE2 is also usable as a Key LOCK terminal.

(Refer to " ■ B4 terminal function selection" on page 45.)

#### (2) Graph drawing <edge input> (B5)

The ON edge (OFF → ON) of the external input will start the graph drawing.

However, the drawing will be enabled only when the graphic mode is set to "external".

#### (3) D/Z (digital zero) <edge input> (B6)

The ON edge (OFF → ON) of the external input will zero the gross weight.

However, the range that can be zeroed is within the DZ regulation value. Out of this range, zero will not result, but "ZALM" will light.

#### (4) TARE ON (tare subtraction) <edge input> (B7)

The ON edge (OFF → ON) of the external input will result in immediate tare subtraction to zero the net weight.

#### (5) TARE OFF (tare subtraction reset) <edge input> (B8)

The ON edge (OFF → ON) of the external input will reset the above tare subtraction. However, the tare setting is not cancelled.

#### (6) Accumulation clear <edge input> (B9)

The ON edge (OFF → ON) of the external input will zero clear accumulation, the number of times, and totals.

\* For accumulation, eight sorts are recorded per code; currently selected code of accumulation will be cleared.

#### (7) Measurement start <edge input> (B10)

The measurement will be enabled when the trigger mode is set to "external".

This will not function if the setting is other than "external".

#### (8) Measurement reset <edge input> (B11)

The ON edge (OFF → ON) of the external input will stop the weight.

## ■ External output signal

- (1) OVER/RANK1/RANK2<sup>0</sup> (judgment output)(A2)
  - (2) GO/RANK2/RANK2<sup>1</sup> (judgment output)(A3)
  - (3) UNDER/RANK3/RANK2<sup>2</sup> (judgment output)(A4)
  - (4) Undefined/RANK4/RANK2<sup>3</sup> (judgment output)(A5)
  - (5) Undefined/RANK5/STROBE (judgment output)(A6)
- Changes depending on  
comparison mode.  
(Refer to page.26)

\* In case of RANK.2 mode, judgment output is indicated in 4bit BINARY (A2 to A5).  
For reading the data, use the rising edge of strobe pulse (A6). (ON → OFF)  
The strobe range is approx. 100ms.

- (6) to (10) OUT0 to OUT4 (state output sel.)(A7 to A11)  
Output signals can be freely allotted.

Alternatives:     [OUTPUT] [COMPLETE] [NZ] [TAKING] [ERROR]  
                      [UPPER] [LOWER] [STAB] [RUN]

### Output

This controls ON/OFF of signals on the touch panel during output mode.  
(\* Also possible by communication command)

### Complete

This processes average calculation after data sampling is completed. Then, complete signals turn ON.

### NZ (near zero)

This is near zero comparison output. (Refer to page.26.)

### Taking

This turns ON during data sampling. (\* Excluding ineffective sampling)

### Error

This turns ON when a weight error occurs.  
(\* Net over, gross over, LOAD, -LOAD, and ZALM are included.)

### Upper/ lower

This is comparison output of upper or lower. (Refer to page.26.)

### Stab

This turns ON when a stable. (Refer to page.41.)

### RUN

This turns ON when the indicator is operating normally.

## 14. RS-232C Interface

The RS-232C is an interface to read the indicated value and status of the F650-CK and to write setting value into the F650-CK.

This interface is convenient to process controls, totals, records, etc., by connecting the F650-CK to a computer, process controller, sequencer or the like.

### 14-1. Communication specifications

#### ■ Specifications

Signal level:	Based on RS-232C	
Transmitting distance:	Approx.15m	
Transmitting method:	Asynchronous, Full duplex	
Transmitting speed:	9600, 19200, 38400, 57600, 76800 or 115.2k bps selectable	
Bit configuration:	Start bit	1 bit
	Character length	7 or 8 bit selectable
	Stop bit	1 or 2 bit selectable
	Parity	None, odd or even selectable
	Terminator	CR or CR+LF selectable
Code:	ASCII	

### 14-2. RS-232C interface setting

Set the RS-232C communication conditions of the F650-CK.

#### ■ Communication mode

Alternatives: [HAND SH.] [CONTINUITY] [AT PRINT]

#### □ Explanation of each alternative

[HAND SH.] Communications are carried out according to the commands from the host computer.  
Reading of weight values, status and setting values, writing of setting values, and instructions of operations can be performed.

[CONTINUITY] The displayed weight value and status are transmitted continuously.

[AT PRINT] The result and status are transmitted at the print timing.  
For the print timing, refer to "Auto print command" on page 44.

#### ■ Baud rate

Alternatives: [9600bps] [19200bps] [38400bps] [57600bps] [76800bps] [115.2kbps]

#### ■ Character length

Alternatives: [7bit] [8bit]

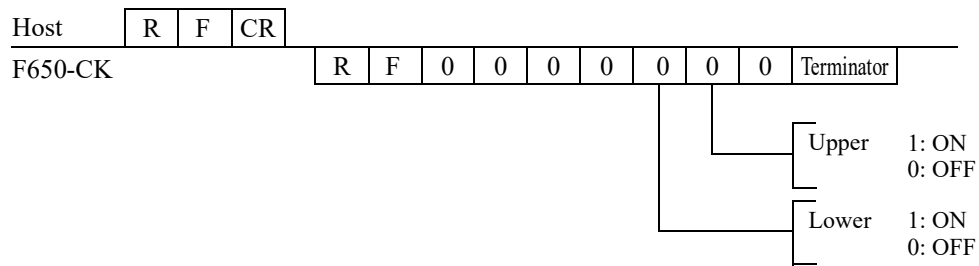
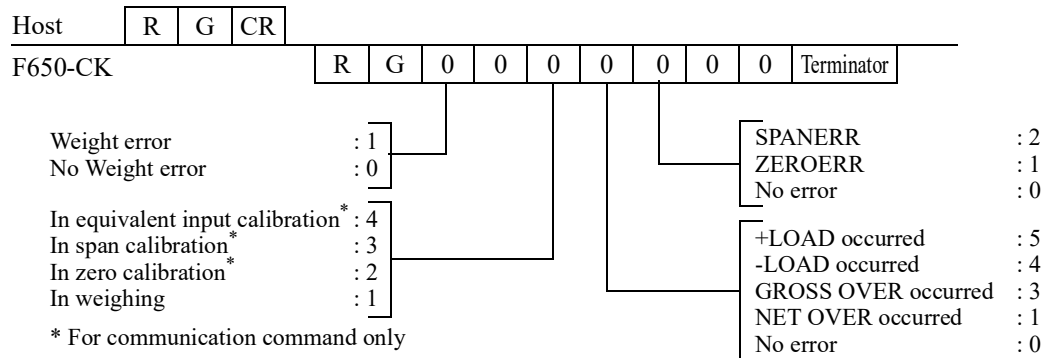
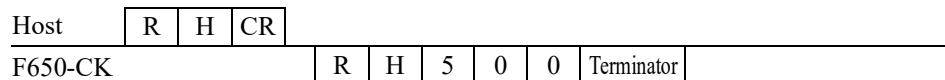
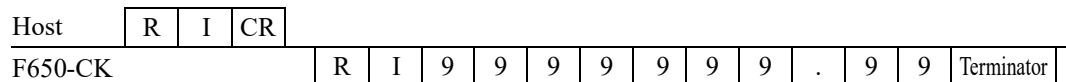
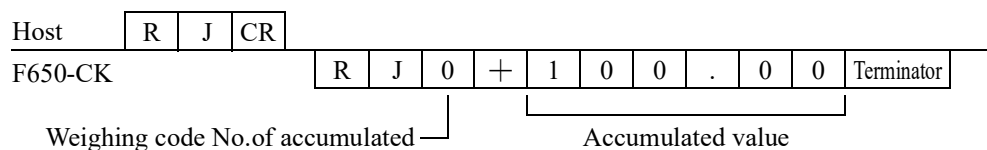
#### ■ Parity bit

Alternatives: [NONE] [ODD] [EVEN]

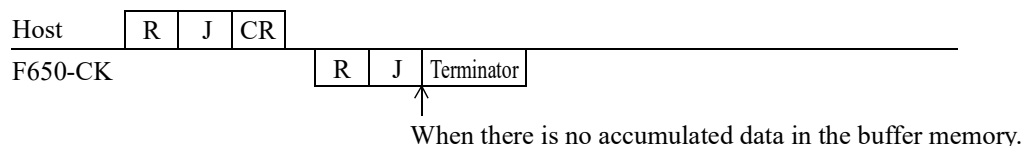
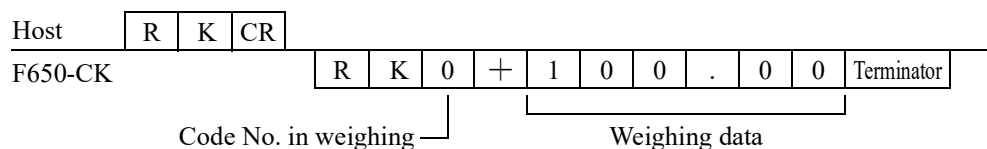
#### ■ Stop bit

Alternatives: [1bit] [2bit]



**- Read out the status (7-digits)****- Read out the status (7-digits)****- Read out the accumulation times (3-digits)****- Read out the accumulation value (9-digits, decimal point)****- Read out the accumulation data**

\* Up to 256 data entries are stored in the memory buffer. Oldest data will be cleared when buffer is read.

**- Read out the weighing data**



**- Read out over count (3-digits)**

Host	R	L	CR						
F650-CK		R	L	5	0	0	Terminator		

**- Read out go count (3-digits)**

Host	R	M	CR						
F650-CK		R	M	5	0	0	Terminator		

**- Read out under count (3-digits)**

Host	R	N	CR						
F650-CK		R	N	5	0	0	Terminator		

**- Read out RANK1 count (3-digits)**

Host	R	O	CR						
F650-CK		R	O	5	0	0	Terminator		

**- Read out RANK2 count (3-digits)**

Host	R	P	CR						
F650-CK		R	P	5	0	0	Terminator		

**- Read out RANK3 count (3-digits)**

Host	R	Q	CR						
F650-CK		R	Q	5	0	0	Terminator		

**- Read out RANK4 count (3-digits)**

Host	R	R	CR						
F650-CK		R	R	5	0	0	Terminator		

**- Read out RANK5 count (3-digits)**

Host	R	S	CR						
F650-CK		R	S	5	0	0	Terminator		

**- Read out RANK6 count (3-digits)**

Host	R	T	CR						
F650-CK		R	T	5	0	0	Terminator		

**- Read out RANK7 count (3-digits)**

Host	R	U	CR						
F650-CK		R	U	5	0	0	Terminator		

**- Read out RANK8 count (3-digits)**

Host	R	V	CR						
F650-CK		R	V	5	0	0	Terminator		

**- Read out RANK9 count (3-digits)**

Host	R	W	CR							
F650-CK	R	W	5	0	0	Terminator				

**- Read out RANK10 count (3-digits)**

Host	R	X	CR							
F650-CK	R	X	5	0	0	Terminator				

**- Read out RANK11 count (3-digits)**

Host	R	Y	CR							
F650-CK	R	Y	5	0	0	Terminator				

**- Read out the setting value [ex. upper]**

Host	W	0	4	CR										
F650-CK	W	0	4	±	1	0	0	0	0	0	Terminator			

Command No.
Setting value No.
5-digits value (without a decimal point)

**- Write in the setting value [ex. upper]**

Host	W	0	4	±	1	0	0	0	0	CR			
F650-CK	W	0	4	±	1	0	0	0	0	CR			

Command No.
5-digits value (without a decimal point)

\* When you write in a setup which it is not with the sign, put "0" in the sign digit.

**- Read out the setting code**

Host	W	0	0	CR										
F650-CK	W	0	0	0	0	0	0	0	0	0	Terminator			

└─ Setting code 0 to 7

**- Write in the setting code**

Host	W	0	0	0	0	0	0	0	CR				
F650-CK	W	0	0	0	0	0	0	0	CR				

└─ Setting code 0 to 7



- Please refer to "22. Setting Item List" on page 111 for command No. of setting value read (write) and set digit.

- When the digit is less than five digits, it treats by "0".

Ex.) Read out the complete output time

Host	W	4	3	CR										
F650-CK	W	4	3	0	0	0	9	9	9	Terminator				

Command No.
Setting value

It sends it back by 0.

**- Command**

Zero calibration	C	A	CR	Span calibration	C	B	CR
Gross weight switch	C	C	CR	Net weight switch	C	D	CR
Tare subtraction	C	E	CR	Tare subtraction reset	C	F	CR
Digital zero	C	G	CR	Digital zero reset	C	H	CR
Accumulation command	C	I	CR	Accumulation clear	C	J	CR
Accumulation data all clear	C	K	CR	Equiv. calibration	C	L	CR
Output state ON	C	M	CR	Output state OFF	C	N	CR
Error switch	C	O	CR	Result switch	C	P	CR



How to use the CL command (equivalent input calibration execution)

- 1) Correct values should previously be set to “equivalent input calibration” and “balance weight”.

Therefore, check the rated output and rated capacity of the load cell as in the case of equivalent input calibration by the touch panel.

Ex.) It is assumed that the rated output and the rated capacity of the load cell are 2.0000mV/V and 100.00kg, respectively.

- 2) Set the rated input by using the command W83 (equivalent input calibration).

Ex.) For 100.00kg (assuming that the decimal place is positioned as 0.00), input as follows:

W	8	3	0	2	0	0	0	0	CR	LF
---	---	---	---	---	---	---	---	---	----	----

Input 2.0000mV/V as a value of 20000 with no decimal point.

- 3) Set the rated capacity by using the command W84 (balance weight).

Ex.) For 100.00kg (assuming that the decimal place is positioned as 0.00), input as follows:

W	8	4	0	1	0	0	0	0	CR	LF
---	---	---	---	---	---	---	---	---	----	----

Input 100.00kg as a value of 10000 with no decimal point.

- 4) Give the equivalent input calibration execution command (CL).

This allows slope calculation from the currently registered “balance weight” and “equivalent input calibration” value.

### 14-3-2. Continuity transmission/ transmission at print-time

The formats of continuity transmission and transmission at print-time are common.

Setting values cannot be read or written.



#### At continuity

The header becomes "GS" when gross is displayed, and weight data sends gross.

The header becomes "NT" when net weight is displayed, and weight data sends net weight.

#### At print

The header becomes "GS" when standard comparison selection is gross, and weight data sends result.

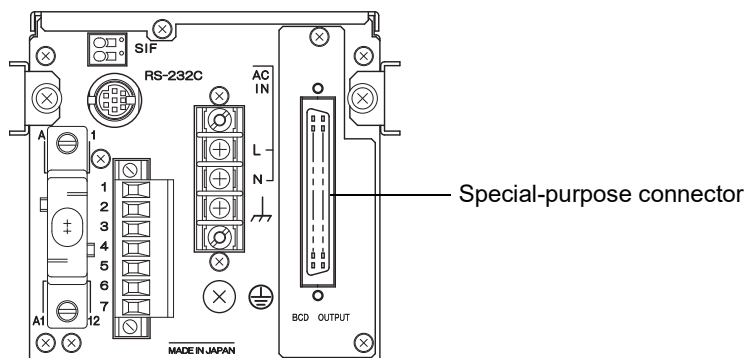
The header becomes "NT" when standard comparison selection is net, and weight data sends result.

- |   |   |
|---|---|
| <p>*1    H ..... In holding<br/>             O ..... Weight error<br/>             S ..... Stable<br/>             M ..... Unstable</p> <p>*2    T ..... Zero tracking ON<br/>             A ..... Zero tracking OFF</p> <p>*3    G ..... Upper and lower OFF<br/>             N ..... Upper and lower ON<br/>             H ..... Upper ON<br/>             L ..... Lower ON</p> <p>*4    For H, L comparison<br/>             G ..... Over and under OFF<br/>             V ..... Over ON<br/>             U ..... Under ON</p> | <p>For rank division<br/>             B ..... RANK11 ON<br/>             A ..... RANK10 ON<br/>             9 ..... RANK9 ON<br/>             8 ..... RANK8 ON<br/>             7 ..... RANK7 ON<br/>             6 ..... RANK6 ON<br/>             5 ..... RANK5 ON<br/>             4 ..... RANK4 ON<br/>             3 ..... RANK3 ON<br/>             2 ..... RANK2 ON<br/>             1 ..... RANK1 ON<br/>             G ..... RANK1 to 11 OFF</p> |
| <p>*5    N ..... Near zero OFF<br/>             Z ..... Near zero ON</p>  |   |

## 15. BCD Data Output (Option)

The BCD data output is an interface to extract the indicated value of the F650-CK as BCD data. This interface is convenient to process controls, totals, records, etc., by connecting the F650-CK to a computer, process controller, sequencer or the like.

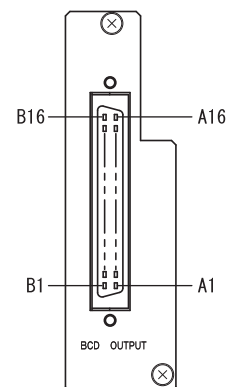
The I/O and internal circuits are electrically insulated by photocoupler.



### 15-1. Connector pin assignment (when specifying sink type)

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	P.C
A13	OUT	800	B13	OUT	STROBE
A14	IN	BCD data hold	B14	IN	Logic switching
A15	IN	NC	B15	IN	NC
A16	-		B16	-	



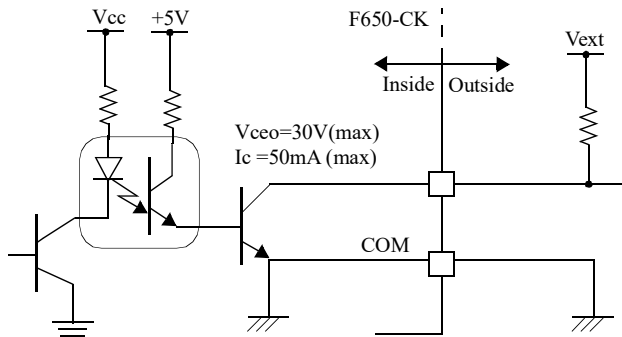
Compatible connector: FCN-361J032-AU (manufactured by FUJITSU COMPONENT or equivalent)

Connector cover: FCN-360C032-B (manufactured by FUJITSU COMPONENT or equivalent)

## 15-2. Equivalent circuit (when specifying sink type)

### - Output

The signal output circuit is operated through an open collector.



### - Internal transistor status

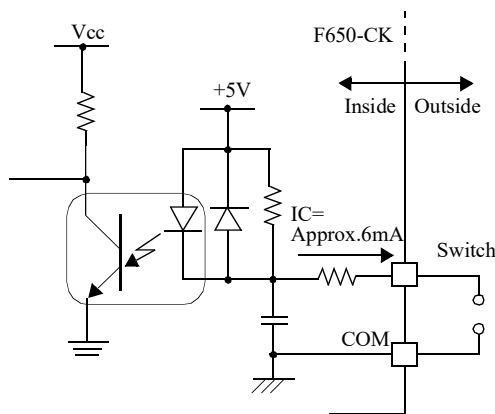
Output data	Negative	Positive
0	OFF	ON
1	ON	OFF

Through logic switching (B14)

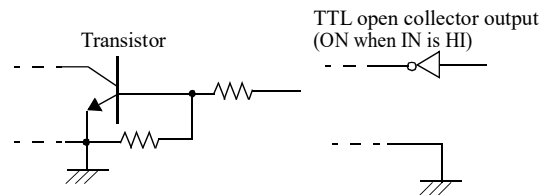
### - Output pin level

Output data	Negative	Positive
0	H	L
1	L	H

### - Input



Open	OFF
Short	ON



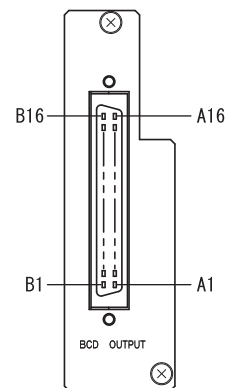
### Notice

- Do not apply external voltage to the signal input circuit.
- The external element is required to withstand  $I_c=10\text{mA}$ .
- Leakage from the external element is required to be  $30\mu\text{A}$  or below.

### 15-3. Connector pin assignment (when specifying source type)

32 pin

No.		Signal	No.		Signal
A1	*	+24V	B1	*	+24V
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	P.C
A13	OUT	800	B13	OUT	STROBE
A14	IN	BCD data hold	B14	IN	Logic switching
A15	IN	NC	B15	IN	NC
A16	-	0V	B16	-	0V

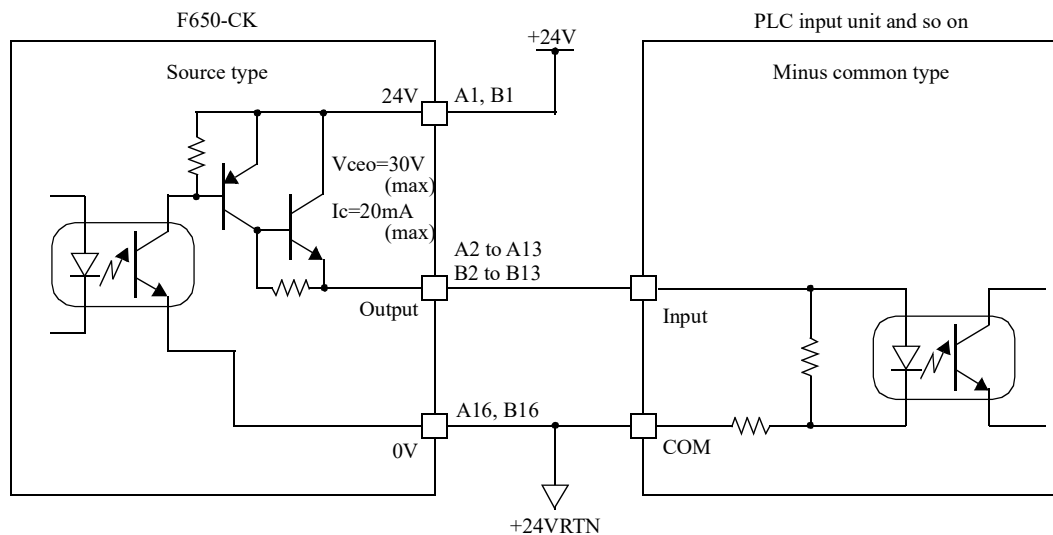


Compatible connector: FCN-361J032-AU (manufactured by FUJITSU COMPONENT or equivalent)

Connector cover: FCN-360C032-B (manufactured by FUJITSU COMPONENT or equivalent)

### 15-4. Equivalent circuit (when specifying source type)

- Output



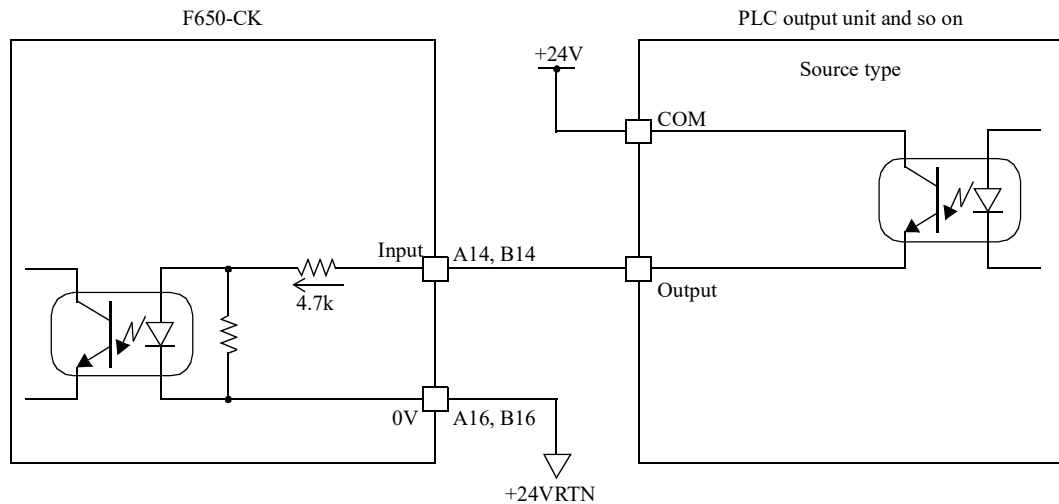
● Internal transistor condition

Output data	Positive	Negative
0	OFF	ON
1	ON	OFF

● Output pin level

Output data	Positive	Negative
0	L	H
1	H	L

In accordance with logic selection (B14pin)

**- Input**

9V or higher	ON
3V or less	OFF

**Notice**

- Do not apply external voltage to the signal input circuit.
- The external element is required to withstand  $I_c=10\text{mA}$ .
- Leakage from the external element is required to be  $30\mu\text{A}$  or below.

**15-5. Signal input****Logic switching (B14)**

The output signal logic is switched. (The strobe signal logic is also switched.)

If open, negative logic will result, and if shorted with COM, positive logic will result.

**BCD data hold (A14)**

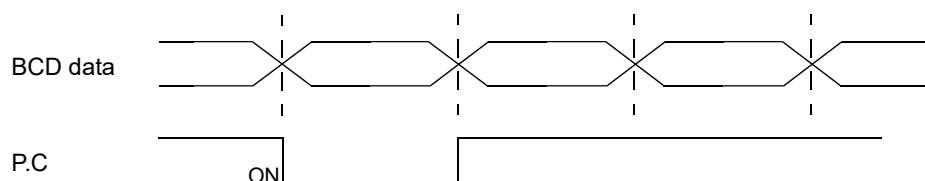
BCD data is held when shorted with COM.

No strobe pulse is output.

**15-6. Signal output timing****- P.C**

Note: P.C should also be acquired in synchronization with the strobe signal as in the case of the data signal. (Refer to page.64.)

The signal is output by ON edge of complete signal.





**- OVER**

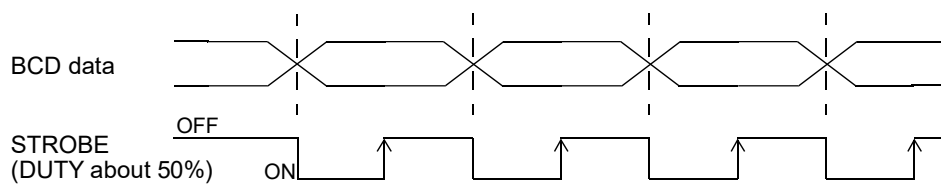
The signal is output with +ADC OVER (+LOAD) or -ADC OVER (-LOAD) overflow (NET OVER or GROSS OVER).

**- STROBE**

Strobe pulses are output in synchronization with BCD data. For reading the data, use the pulse rising edge(ON → OFF). The BCD data update rate can be changed by setting.

**Note:** The logic on the software varies depending on the equipment on the receiving side.

(0 → 1, 0 → 1)



If the update rate is changed, the strobe pulse width is also changed proportionally.

## 15-7. BCD data output setting

### ■ Data update rate

Alternatives: [1000 times] [500 times] [200 times] [100 times] [50 times]  
[20 times] [10 times] [5 times]

### ■ Output weight

Alternatives: [INDICATE] [GROSS] [NET] [RESULT]

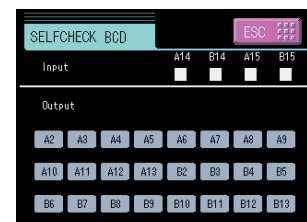
Select the weight value for BCD output. If “INDICATE” is selected, the weight indicated by the indicator is output.

## 15-8. 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.



## 16. D/A Converter (Option)

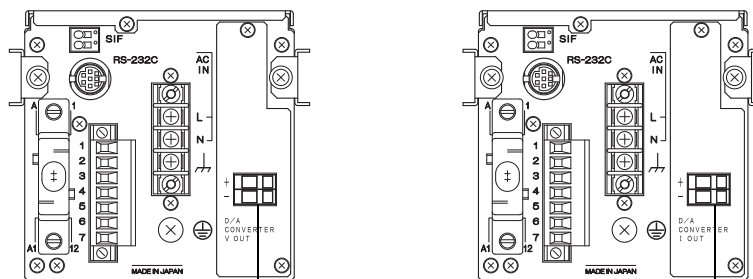
D/A converter is provided for obtaining analog output synchronized with the indicated value of the F650-CK.

The analog output ranges are 0 to +10V output or 4 to 20mA constant-current output.

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

The output circuit and the main unit circuit are isolated. The resolution is 1/10000 to 0 to +10V, and the conversion rate is 1000 times/sec. The output has an overrange of approx.  $\pm 10\%$ FS.

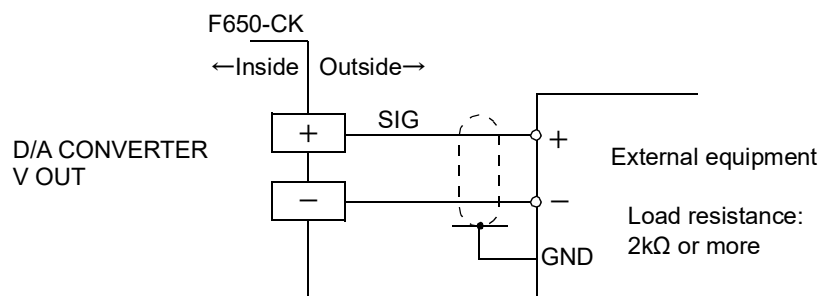
\* Either voltage output or current output can be mounted.



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

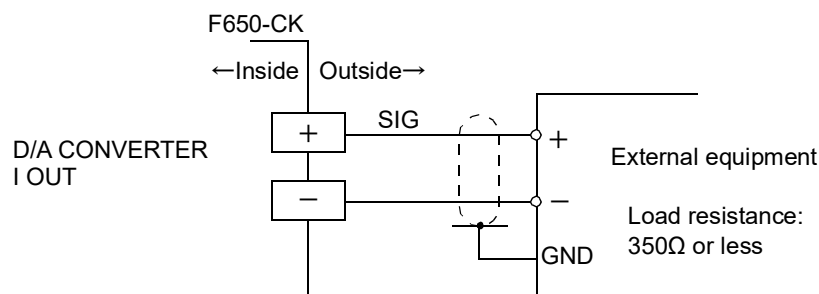
### - Taking voltage output signals

Connect external equipment (2k $\Omega$  or more load resistance) to + and - of the F650-CK.  
For connection, refer to "16-1. Connection of the D/A converter options" on page 66.



### - Taking current output signals

Connect external equipment (350 $\Omega$  or less load resistance) to + and - of the F650-CK.



## - Resolution

The D/A converter has a resolution of 1/10000 to 0 to 10V (4 to 20mA).



### Notice

- 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.

## 16-1. Connection of the D/A converter options

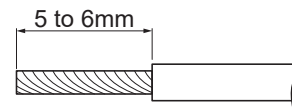
The terminal block for the D/A converter options is the cage clamp type. Connect according to the following procedures.

As for wire materials, use parallel 2-core cables, cabtyre cables, or the like.

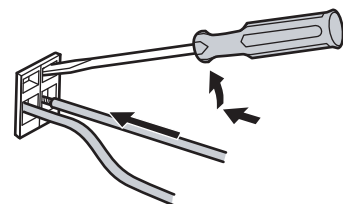
Connect to the cage clamp type terminal block by using the attached miniscrewdriver.

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

Twist the bare wire to fit the terminal hole.

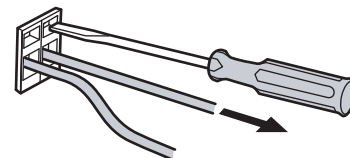


- 2) Insert the supplied screwdriver into the upper hole and lift upward.



- 3) Insert the twisted wires into the lower hole.

- 4) Pull the screwdriver out from the upper hole.



- 5) Make sure cable is clamped securely and does not come out with a slight tug.



### Notice

- Cable can be from 24 to 14AWG (0.2 to 2.5mm<sup>2</sup>).
- 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.

## 16-2. D/A converter setting

### ■ D/A output mode

Alternatives: [GROSS] [NET] [ZERO SCALE] [FULL SCALE] [RESULT]

#### □ Explanation of each alternative

[GROSS]	Output is ganged with the gross.
[NET]	Output is ganged with the net.
[ZERO SCALE]	The output is fixed at zero output (0V or 4mA).
[FULL SCALE]	The output is fixed at full scale (10V or 20mA).
[RESULT]	Output is ganged with the result.

### ■ Zero output

Set the indicated value for outputting 4mA (0V).


Setting range: 0 to 99998




### ■ Full scale output

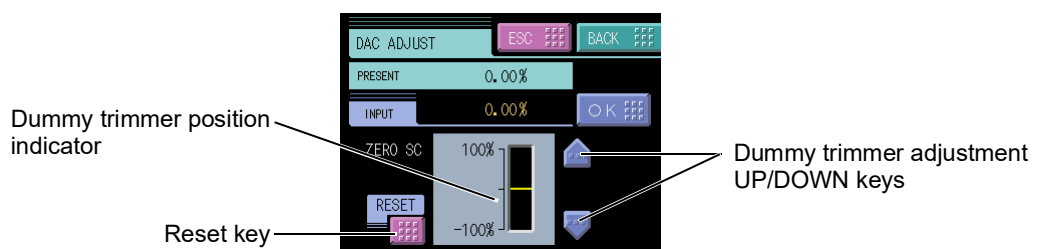
Set the indicated value for outputting 20mA (10V).



Setting range: 0 to 99999 (However, the preset zero output value should be smaller than the preset full scale value.)

### How to adjust

Adjust the output with the dummy trimmer that appears on the adjustment screen after selecting each fixed output in the D/A output mode setting and pressing the  key.

While monitoring the output value, finely adjust the output with the dummy trimmer the UP/DOWN   keys, and press the  key to confirm, so that the trimmer position is entered.

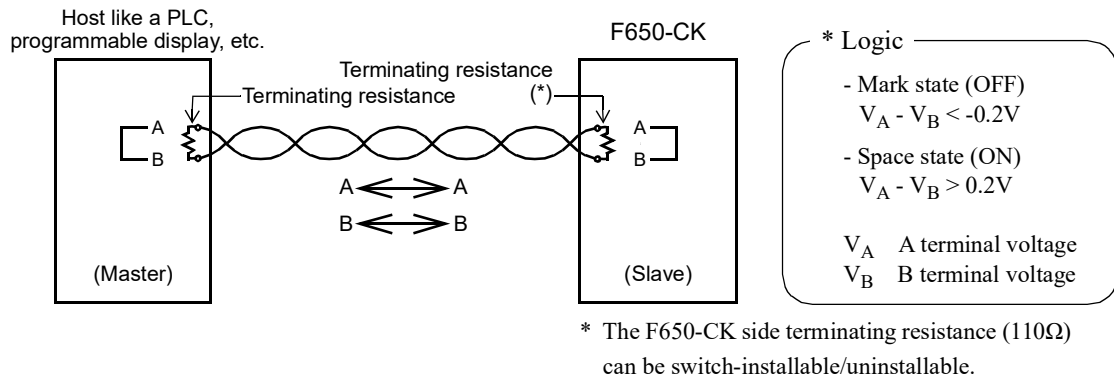


- \* Pressing the dummy trimmer the UP/DOWN   keys continuously performs continuous operation.
- \* The trimmer adjusting ranges are as follows: voltage;  $\pm 1.0\text{V}$ , and current;  $\pm 1.6\text{mA}$ .
- \* The reset key resets the dummy trimmer position to the trimmer center point (0%).



## 17-2. RS-485 connection

### ■ Two-wire type (point to point)

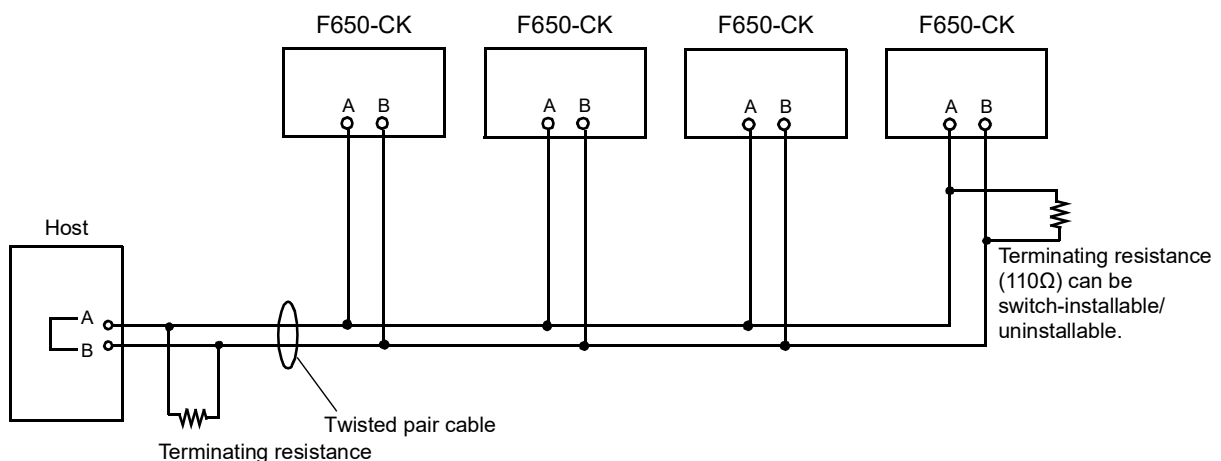


- Use a twisted pair cable for connection. (Noise margin is improved.)  
However, a parallel two-core cable is enough for short-distance connection.
- Install terminating resistance each on the host side and F650-CK side.  
On the F650-CK side, set the switch upward.
- The SG terminal is a ground terminal used in circuits (to protect the circuits).  
If the F650-CK body and the equipment on the other end of the connection are class-D-grounded, usually there is no need to use the SG terminal.  
However, if there is a need to connect it according to the on-site situation, connect it after checking the specifications of the equipment on the other end.



On some master equipment, A and B may be expressed in reverse.  
If communication fails, interchange A and B.

### ■ Two-wire type (multi point)



## 17-3. RS-485 interface setting

Set the RS-485 communication conditions of the F650-CK.

\* If the communication mode is Modbus-RTU, set as length of character: 8 bits and stop bit: 1 bit (stop bit: 2 bits if the parity bit is none).

### ■ Communication mode

Alternatives: [HAND SH.] [CONTINUITY] [AT PRINT] [Modbus-RTU]

#### □ Explanation of each alternative

[HAND SH.]	Communications are carried out according to the commands from the host computer. Reading of weight values, status and setting values, writing of setting values, and instructions of operations can be performed.
[CONTINUITY]	The displayed weight value and status are transmitted continuously.
[AT PRINT]	The result and status are transmitted at the print timing. For the print timing, refer to "Auto print command" on page 44.
[Modbus-RTU]	Communications are carried out according to the commands from the host computer. Reading of weight values, status and setting values, writing of setting values, and instructions of operations can be performed.

### ■ Baud rate

Alternatives: [4800bps] [9600bps] [19200bps] [38400bps] [57600bps] [115.2kbps]

### ■ Character length

Alternatives: [7bit] [8bit]

### ■ Parity bit

Alternatives: [NONE] [ODD] [EVEN]

### ■ Stop bit

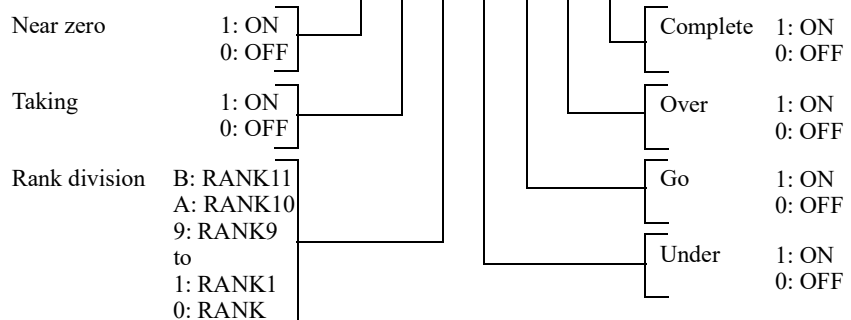
Alternatives: [1bit] [2bit]

### ■ Terminator

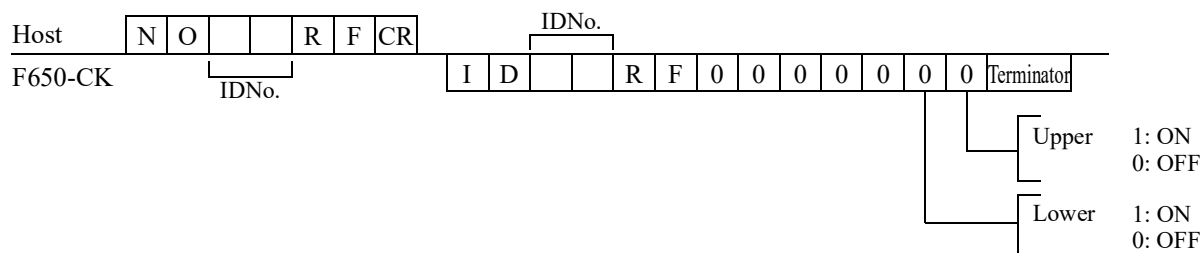
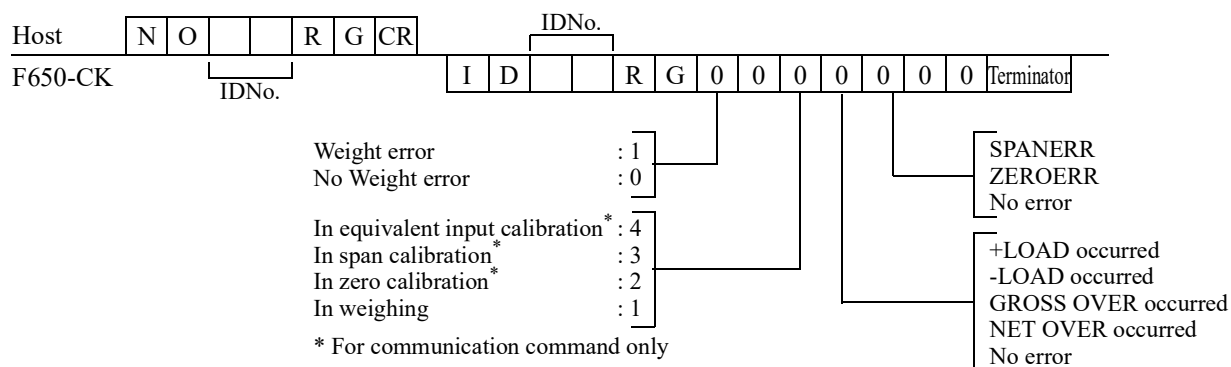
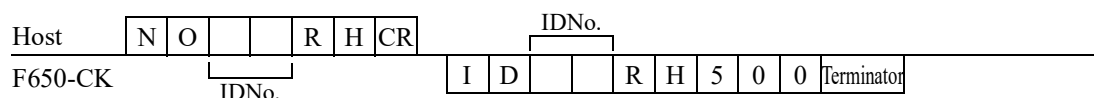
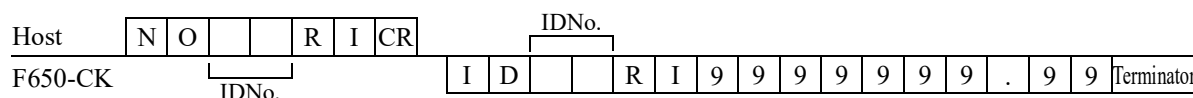
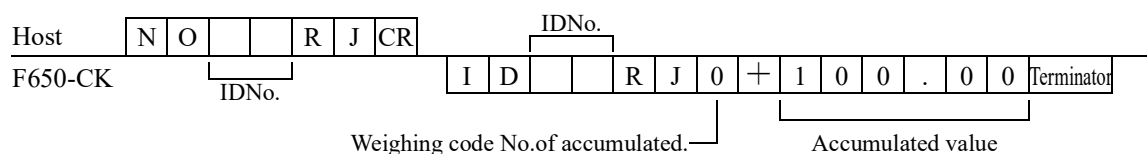
Alternatives: [CR] [CR+LF]

### ■ RS-485 ID (slave address for Modbus-RTU)

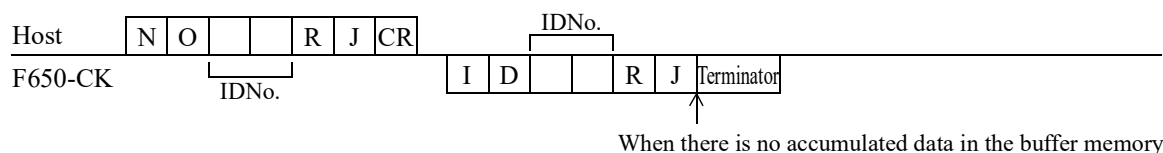
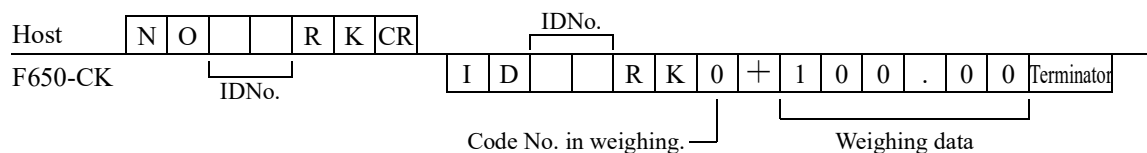
Setting range: 0 to 31





**- Read out the status (7-digits)****- Read out the status (7-digits)****- Read out the accumulation times (3-digits)****- Read out the accumulation value (9-digits, decimal point)****- Read out the accumulation data**

\* Up to 256 data entries are stored in the memory buffer. Oldest data will be cleared when buffer is read.

**- Read out the weighing data**

**- Read out over count (3-digits)**

Host	N	O			R	L	CR	IDNo.
F650-CK					I	D		R L 5 0 0 Terminator

**- Read out go count (3-digits)**

Host	N	O			R	M	CR	IDNo.
F650-CK					I	D		R M 5 0 0 Terminator

**- Read out under count (3-digits)**

Host	N	O			R	N	CR	IDNo.
F650-CK					I	D		R N 5 0 0 Terminator

**- Read out RANK1 count (3-digits)**

Host	N	O			R	O	CR	IDNo.
F650-CK					I	D		R O 5 0 0 Terminator

**- Read out RANK2 count (3-digits)**

Host	N	O			R	P	CR	IDNo.
F650-CK					I	D		R P 5 0 0 Terminator

**- Read out RANK3 count (3-digits)**

Host	N	O			R	Q	CR	IDNo.
F650-CK					I	D		R Q 5 0 0 Terminator

**- Read out RANK4 count (3-digits)**

Host	N	O			R	R	CR	IDNo.
F650-CK					I	D		R R 5 0 0 Terminator

**- Read out RANK5 count (3-digits)**

Host	N	O			R	S	CR	IDNo.
F650-CK					I	D		R S 5 0 0 Terminator

**- Read out RANK6 count (3-digits)**

Host	N	O			R	T	CR	IDNo.
F650-CK					I	D		R T 5 0 0 Terminator

**- Read out RANK7 count (3-digits)**

Host	N	O			R	U	CR	IDNo.
F650-CK					I	D		R U 5 0 0 Terminator

**- Read out RANK8 count (3-digits)**

Host	N	O			R	V	CR	IDNo.
F650-CK								I D R V 5 0 0 Terminator

**- Read out RANK9 count (3-digits)**

Host	N	O			R	W	CR	IDNo.
F650-CK								I D R W 5 0 0 Terminator

**- Read out RANK10 count (3-digits)**

Host	N	O			R	X	CR	IDNo.
F650-CK								I D R X 5 0 0 Terminator

**- Read out RANK11 count (3-digits)**

Host	N	O			R	Y	CR	IDNo.
F650-CK								I D R Y 5 0 0 Terminator

**- Read out the setting value [ex. upper]**

Host	N	O			W	0	4	CR	IDNo.	Sign
F650-CK									I D W 0 4 ± 1 0 0 0 0 Terminator	

Setting value No.      5-digits value (without a decimal point)

**- Write in the setting value [ex. upper]**

Host	N	O			W	0	4	±	1	0	0	0	0	CR	Sign
F650-CK															

IDNo.      Command No.      5-digits value (without a decimal point)

\* When you write in a setup which it is not with the sign, put "0" in the sign digit.

**- Read out the setting code**

Host	N	O			W	0	0	CR	IDNo.
F650-CK									I D W 0 0 0 0 0 0 0 Terminator

Setting code 0 to 7

**- Write in the setting code**

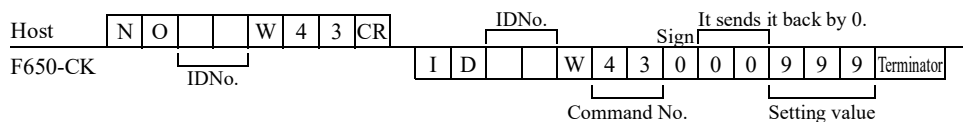
Host	N	O			W	0	0	0	0	0	0	0	CR
F650-CK													

IDNo.      Setting code 0 to 7



- Please refer to "22. Setting Item List" on page 111 for command No. of setting value read (write) and set digit.
- When the digit is less than five digits, it treats by "0".

Ex.) Read out the complete output time



## - Command

Zero calibration	N	O			C	A	CR	Span calibration	N	O			C	B	CR
Gross weight switch	N	O			C	C	CR	Net weight switch	N	O			C	D	CR
Tare subtraction	N	O			C	E	CR	Tare subtraction reset	N	O			C	F	CR
Digital zero	N	O			C	G	CR	Digital zero reset	N	O			C	H	CR
Accumulation command	N	O			C	I	CR	Accumulation clear	N	O			C	J	CR
Accumulation data all clear	N	O			C	K	CR	Equiv. calibration	N	O			C	L	CR
Output state ON	N	O			C	M	CR	Output state OFF	N	O			C	N	CR
Error switch	N	O			C	O	CR	Result switch	N	O			C	P	CR



### How to use the CL command (equivalent input calibration execution)

- 1) Correct values should previously be set to “equivalent input calibration” and “balance weight”.

Therefore, check the rated output and rated capacity of the load cell as in the case of equivalent input calibration by the touch panel.

Ex.) It is assumed that the rated output and the rated capacity of the load cell are 2.0000mV/V and 100.00kg, respectively.

- 2) Set the rated input by using the command W83 (equivalent input calibration).

Ex.) For 100.00kg (assuming that the decimal place is positioned as 0.00), input as follows:

N	O			W	8	3	0	2	0	0	0	0	CR	LF
---	---	--	--	---	---	---	---	---	---	---	---	---	----	----

IDNo.

Input 2.0000mV/V as a value of 20000 with no decimal point.

- 3) Set the rated capacity by using the command W84 (balance weight).

Ex.) For 100.00kg (assuming that the decimal place is positioned as 0.00), input as follows:

N	O			W	8	4	0	1	0	0	0	0	CR	LF
---	---	--	--	---	---	---	---	---	---	---	---	---	----	----

IDNo.

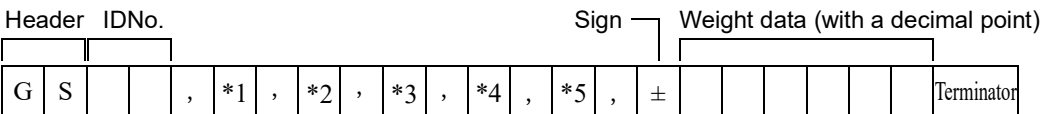
Input 100.00kg as a value of 10000 with no decimal point.

- 4) Give the equivalent input calibration execution command (CL).

This allows slope calculation from the currently registered “balance weight” and “equivalent input calibration” value.

17-4-2. Continuity transmission/ transmission at print-time

The formats of continuity transmission and transmission at print-time are common.  
Setting values cannot be read or written.



At continuity

The header becomes "GS" when gross is displayed, and weight data sends gross.  
The header becomes "NT" when net weight is displayed, and weight data sends net weight.

At print

The header becomes "GS" when standard comparison selection is gross, and weight data sends result.  
The header becomes "NT" when standard comparison selection is net, and weight data sends result.

- \*1

H ..... In holding  
O ..... Weight error  
S ..... Stable  
M ..... Unstable
- \*2

T ..... Zero tracking ON  
A ..... Zero tracking OFF
- \*3

G ..... Upper and lower OFF  
N ..... Upper and lower ON  
H ..... Upper ON  
L ..... Lower ON
- \*4

For H, L comparison  
G ..... Over and under OFF  
V ..... Over ON  
U ..... Under ON

For rank division  
B ..... RANK11 ON  
A ..... RANK10 ON  
9 ..... RANK9 ON  
8 ..... RANK8 ON  
7 ..... RANK7 ON  
6 ..... RANK6 ON  
5 ..... RANK5 ON  
4 ..... RANK4 ON  
3 ..... RANK3 ON  
2 ..... RANK2 ON  
1 ..... RANK1 ON  
G ..... RANK1 to 11 OFF
- \*5

N ..... Near zero OFF  
Z ..... Near zero ON

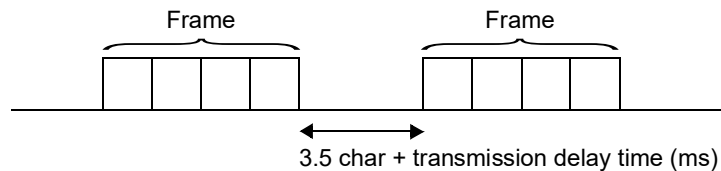
\* If two or more F650-CK are connected, do not specify continuous mode.

## 17-5. Modbus-RTU

### 17-5-1. Transmission delay time

Set this when the master equipment cannot process responses from the F650-CK.

Setting range: 0 to 99



### 17-5-2. Function codes for Modbus

Function codes are explained in detail.

In this chapter, function fields and data fields varying by function codes are explained.

Each actual message frame consists of an address field, function field, data field, and error check field, which are transmitted in this order.

#### List of function codes

Code	Function name	Command
01 (0x01)	Read coils	Read out coils
02 (0x02)	Read discrete inputs	Read out input statuses
03 (0x03)	Read holding registers	Read out holding registers
04 (0x04)	Read input register	Read out the input register
05 (0x05)	Write single coil	Write in a coil (single)
06 (0x06)	Write single register	Write in a holding register (single)
15 (0x0F)	Write multiple coils	Write in coils (multiple)
16 (0x10)	Write multiple registers	Write in holding registers (multiple)
08 (0x08)	Diagnostics	Diagnosis mode
11 (0x0B)	Get comm event counter	Read out the event counter
12 (0x0C)	Get comm event log	Read out communication events
17 (0x11)	Report slave ID	Read out slave ID information

**01 (0x01) Read coils**

ON/OFF states of slave coils are read.

Since this is a read command, no broadcast can be specified.

Specify the coil start address and number of coils.

[Request]	Function	1 byte	0x01
	Start address	2 bytes	0x0000 to 0xFFFF
	Number of coils	2 bytes	1 to 2000 (0x07D0)

[Response]	Function	1 byte	0x01
	Number of data bytes	1 byte	N *
	Coil status	n bytes	N or N+1

\* N = Number of coils/8 or N = N + 1 if indivisible

[Error response]	Error code	1 byte	0x81 (function + 0x80)
	Exception code	1 byte	01 or 02 or 03

Example) Read the digital zero (address 00005) state.

[Request]	Function	01	[Response]	Function	01
	Start address; higher	00		Number of data bytes	01
	Start address; lower	06		Digital zero	00
	Number of coils; higher	00			
	Number of coils; lower	01			

Keep in mind that the relative address for reading the digital zero value is 0x06.

In cases less than 8 bits, the remainder bits become "0".

\* The F650-CK response (coil state) is always "0" (because processing is executed at the stage of reading the command).

To confirm coil execution, judge as complete with a normal response to function code 05 (0x05)

Write signal coil or 15 (0x0F) Write multiple coils.



**02 (0x02) Read discrete inputs**

ON/OFF states of slave input statuses are read.

No broadcast can be specified.

Specify the status start address and number of statuses.

[Request]	Function	1 byte	0x02
	Start address	2 bytes	0x0000 to 0xFFFF
	Number of statuses	2 bytes	1 to 2000 (0x07D0)

[Response]	Function	1 byte	0x02
	Number of data bytes	1 byte	N *
	Status state	n bytes	N or N+1

\* N = Number of statuses/8 or N = N + 1 if indivisible

[Error response]	Error code	1 byte	0x82 (function + 0x80)
	Exception code	1 byte	01 or 02 or 03

Example) Read the states from over (address 10001) to RANK5 (address 10008).

[Request]	Function	02	[Response]	Function	02
	Start address; higher	00		Number of data bytes	01
	Start address; lower	00		Over to RANK5	08
	Number of statuses; higher	00			
	Number of statuses; lower	08			

Keep in mind that the relative address for reading the over value is 0x00.

The example shows the case where the F650-CK conditions are as follows:

Over	OFF (0)
Go	OFF (0)
Under	OFF (0)
RANK1	ON (1)
RANK2	OFF (0)
RANK3	ON (0)
RANK4	ON (0)
RANK5	ON (0)

The LSB of the first data corresponds to the status of the beginning address.

It is expressed as 00001000 (0x08) in binary notation.

\* The statuses can also be read by function code 04 (0x04) Read input registers.

The statuses can be read together with weight values by function code 04.

**03 (0x03) Read holding registers**

Contents of slave holding registers are read.

No broadcast can be specified.

Specify the holding register start address and number of registers.

The slave transmits the contents of one register as expanded in double bytes.

\* For reading setting values for each code, make sure to pre-designate each setting code.

[Request]	Function	1 byte	0x03
	Start address	2 bytes	0x0000 to 0xFFFF
	Number of registers	2 bytes	1 to 125 (0x7D)

[Response]	Function	1 byte	0x03
	Number of data bytes	1 byte	2×N *
	Register value	N×2 bytes	

\* N = Number of registers

[Error response]	Error code	1 byte	0x83 (function + 0x80)
	Exception code	1 byte	01 or 02 or 03

Example) Read the contents from over (address 40067) to under (address 40068).

[Request]	Function	03	[Response]	Function	03
	Start address; higher	00		Number of data bytes	04
	Start address; lower	42		Compensation; higher	00
	Number of registers; higher	00		Compensation; lower	64
	Number of registers; lower	02		Over; higher	00
				Over; lower	32

Keep in mind that the relative address for reading the over value is 0x42.

The example shows the case where the F650-CK settings are as follows:

Over	100 (0x0064)
Under	50 (0x0032)

\* In function code 03, if the lower word in the 32-bit wide integer data area is designated at the start address, or the higher word in the 32-bit wide integer data area is designated at the end of the start address + number of registers, results in lower word or higher word alone.

**04 (0x04) Read input registers**

Contents of slave input registers are read.

No broadcast can be specified.

Specify the input register start address and number of registers.

The slave transmits the contents of one register as expanded in double bytes.

[Request]	Function	1 byte	0x04
	Start address	2 bytes	0x0000 to 0xFFFF
	Number of registers	2 bytes	1 to 125 (0x7D)

[Response]	Function	1 byte	0x04
	Number of data bytes	1 byte	2×N *
	Register value	N×2 bytes	

\* N = Number of registers

[Error response]	Error code	1 byte	0x84 (function + 0x80)
	Exception code	1 byte	01 or 02 or 03

Example) Read the contents of gross weight (address 30005 to 30006).

[Request]	Function	04	[Response]	Function	04
	Start address; higher	00		Number of data bytes	04
	Start address; lower	04		Gross weight (higher) (higher)	20
	Number of registers; higher	00		Gross weight (higher) (lower)	00
	Number of registers; lower	02		Gross weight (lower) (higher)	25
				Gross weight (lower) (lower)	1C

Keep in mind that the relative address for reading the gross weight value is 0x04.

The example shows the case where the indicated value of the F650-CK is as follows:

Weight status	Code	OFF (0)
	Unused	OFF (0)
	Unused	OFF (0)
	OVER	OFF (0)
	Unused	OFF (0)
	Unused	ON (0)
	Unused	OFF (0)
	Unused	OFF (0)

Weight data: 9500 (0x251C)

\* In function code 04, if the lower word in the 32-bit wide integer data area is designated at the start address, or the higher word in the 32-bit wide integer data area is designated at the end of the start address + number of registers, results in lower word or higher word alone.

**05 (0x05) Write single coil**

A slave coil is changed to ON or OFF.

If broadcast (0) is specified, all slave coils of the same address are rewritten.

To request, specify the coil address and output value.

0xFF and 0x00 correspond to ON, and 0x00 and 0x00 correspond to OFF.

No change is made with other data, which are considered as improper data.

[Request]	Function	1 byte	0x05
	Start address	2 bytes	0x0000 to 0xFFFF
	Output data	2 bytes	0x0000 or 0xFF00

[Response]	Function	1 byte	0x05
	Start address	2 bytes	0x0000 to 0xFFFF
	Output data	2 bytes	0x0000 or 0xFF00

[Error response]	Error code	1 byte	0x85 (function + 0x80)
	Exception code	1 byte	01 or 02 or 03

Example) Turn on the gross display (address 00001).

[Request]	Function	05	[Response]	Function	05
	Start address; higher	00		Start address; higher	00
	Start address; lower	00		Start address; lower	00
	Gross display; higher	FF		Gross display; higher	FF
	Gross display; lower	00		Gross display; lower	00

Keep in mind that the relative address for writing in the gross display is 0x00.

In the case of normal writing, the response becomes identical to the request.

\* To confirm coil execution, judge as complete with a normal response.

**06 (0x06) Write single register**

A slave holding register is changed (rewritten).

If broadcast (0) is specified, all slave holding registers of the same address are rewritten.

To request, specify the holding register address and change data.

\* For writing setting values for each code, make sure to pre-designate each setting code.

[Request]	Function	1 byte	0x06
	Start address	2 bytes	0x0000 to 0xFFFF
	Output data	2 bytes	

[Response]	Function	1 byte	0x06
	Start address	2 bytes	0x0000 to 0xFFFF
	Output data	2 bytes	

[Error response]	Error code	1 byte	0x86 (function + 0x80)
	Exception code	1 byte	01 or 02 or 03

Example) Change the over (address 40067) value to 20 (0x0014).

[Request]	Function	06	[Response]	Function	06
	Start address; higher	00		Start address; higher	00
	Start address; lower	42		Start address; lower	42
	Compensation; higher	00		Compensation; higher	00
	Compensation; lower	14		Compensation; lower	14

Keep in mind that the relative address for writing in the over is 0x42.

In the case of normal writing, the response becomes identical to the request.

\* In function code 06, write the 16-bit wide integer data from address 40065 onward. (If a 32-bit wide integer data area is designated at the start address, an error response is returned.)

## 15 (0x0F) Write multiple coils

On slave coils, data is changed by the specified number of coils from the specified address.

If broadcast (0) is specified, all slave coils of the same address are rewritten.

To request, specify the coil address and the number of bytes and output value to change.

[Request]	Function	1 byte	0x0F
	Start address	2 bytes	0x0000 to 0xFFFF
	Number of coils	2 bytes	0x0001 to 0x07B0
	Number of bytes	1 byte	N *
	Change data	N×2 bytes	

\* N = Number of coils/8 or N = N + 1 if indivisible

[Response]	Function	1 byte	0x0F
	Start address	2 bytes	0x0000 to 0xFFFF
	Number of coils	2 bytes	0x0001 to 0x07B0

[Error response]	Error code	1 byte	0x8F (function + 0x80)
	Exception code	1 byte	01 or 02 or 03

Example) Switch the digital zero (address 00007) to accumulation command (address 00011) ON/OFF.

[Request]	Function	0F	[Response]	Function	0F
	Start address; higher	00		Start address; higher	00
	Start address; lower	06		Start address; lower	06
	Number of coils; higher	00		Number of coils; higher	00
	Number of coils; lower	05		Number of coils; lower	05
	Number of data bytes	01			
	(Digital zero to Accumulation command)	10			

Keep in mind that the relative address for writing in digital zero is 0x06.

The example shows rewriting of the F650-CK ON (1)/OFF (0) as follows:

Fill unused bits with "0".

Coil	00014	00013	00012	Accumulation command	Accumulation data all clear	Accumulation clear	Digital zero reset	Digital zero
Bit	0	0	0	1	0	0	0	0
0x10								

\* To judge coil execution, judge as complete with a normal response.

\* Due to the nature of the commands, simultaneous execution in combination with the following addresses should be avoided.

In this case, sequential execution results but correct operation may not be performed.

- Addresses 00001 to 00004
- Addresses 00012 and 00013
- Addresses 00005 to 00008
- Addresses 00017 to 00019
- Addresses 00009 and 00010

**16 (0x10) Write multiple registers**

On slave holding registers, data is changed by the specified number from the specified address.

If broadcast (0) is specified, all slave holding registers of the same address are rewritten.

To request, specify the register address and the number of registers and data to change.

The slave transmits the contents of one register as expanded in double bytes.

\* For writing setting values for each code, make sure to pre-designate each setting code.

[Request]

Function	1 byte	0x10
Start address	2 bytes	0x0000 to 0xFFFF
Number of registers	2 bytes	0x0001 to 0x0078 (120)
Number of bytes	1 byte	2×N *
Change data	N×2 bytes	

\* N = Number of registers

[Response]

Function	1 byte	0x10
Start address	2 bytes	0x0000 to 0xFFFF
Number of registers	2 bytes	0x0001 to 0x007B (123)

[Error response]

Error code	1 byte	0x90 (function + 0x80)
Exception code	1 byte	01 or 02 or 03

Example 1) Change the empty count (address 40073) to 20 (0x0014) and digital low pass filter to 50 (0x0032) in the 16-bit wide integer data area.

[Request]

Function	10
Start address; higher	00
Start address; lower	48
Register; higher	00
Register; lower	02
Number of data bytes	04
Empty count; higher	00
Empty count; lower	14
Digital low pass filter; higher	00
Digital low pass filter; lower	32

[Response]

Function	10
Start address; higher	00
Start address; lower	48
Register; higher	00
Register; lower	02

Keep in mind that the relative address for writing in empty count is 0x48.

Example 2) Change the upper limit (address 40003 to 40004) to 99999 (0x0001869F) and the lower limit (address 40005 to 40006) to 5000 (0x00001388) in the 32-bit wide integer data area.

[Request]	Function	10	[Response]	Function	10
	Start address; higher	00		Start address; higher	00
	Start address; lower	02		Start address; lower	02
	Register; higher	00		Register; higher	00
	Register; lower	04		Register; lower	04
	Number of data bytes	08			
	Upper limit (higher); higher	00			
	Upper limit (higher); lower	01			
	Upper limit (lower); higher	86			
	Upper limit (lower); lower	9F			
	Lower limit (higher); higher	00			
	Lower limit (higher); lower	00			
	Lower limit (lower); higher	13			
	Lower limit (lower); lower	88			

Keep in mind that the relative address for writing in upper limit is 0x02.

\* In function code 16, if the lower word in the 32-bit wide integer data area is designated at the start address, or the higher word in the 32-bit wide integer data area is designated at the end of the start address + number of registers, an error response is returned.

## 11 (0x0B) Get comm event counter

The event counter is incremented by one each time each slave processes a request.

It is not incremented if there is an error in any frame or by reading other counters.

With the master, whether or not processing is executed can be judged by reading this counter before and after the request.

As status, 0x0000 (slave is not busy) is always returned.

[Request]	Function	1 byte	0x0B
[Response]	Function	1 byte	0x0B
	Status	2 bytes	0x0000
	Event counter	2 bytes	0x0000 to 0xFFFF
[Error response]	Error code	1 byte	0x8B (function + 0x80)
	Exception code	1 byte	01

Example) Read the event counter.

[Request]	Function	0B	[Response]	Function	0B
				Status; higher	00
				Status; lower	00
				Event counter; higher	01
				Event counter; lower	08

The example shows the case of 264 (0x0108) commands having been processed so far in a not-busy state (0x0000).



## 12 (0x0C) Get comm event log

This function is to read the event conditions from each slave.

The contents of status and event counter are the same as status 11 (Get comm event counter). The message count is the same as subfunction 11 (Return bus message count) of status 08. As events, 64 byte conditions in which the slave receives and sends messages are held.

The most recent condition of events always comes at the 0th byte, and if 64 is exceeded, they are discarded in the order of their occurrence.

The details of events will be defined later.

[Request]	Function	1 byte	0x0C
-----------	----------	--------	------

[Response]	Function	1 byte	0x0C
	Byte count	1 byte	N *
	Status	2 bytes	0x0000
	Event counter	2 bytes	0x0000 to 0xFFFF
	Message count	2 bytes	0x0000 to 0xFFFF
	Event counter	n bytes	0 to 64 (number of events)

\* N = Number of events + (3×2)

[Error response]	Error code	1 byte	0x8C (function + 0x80)
	Exception code	1 byte	01

Example) Read the event conditions.

[Request]	Function	0C	[Response]	Function	0C
				Byte count	08
				Status; higher	00
				Status; lower	00
				Event counter; higher	01
				Event counter; lower	08
				Message count; higher	01
				Message count; lower	21
				Event 0	C0
				Event 1	00

The example shows the event counter 264 (0x0108), message count 289 (0x0121), and not-busy state (0x0000). The events indicate as follows: since the most recent condition of events is 11000000 (0xC0) and bit 6 is "1," broadcast has been received; and since the one-time-old event is 00, the slave has received Communications restart.

## Event log and details of events

Events can be classified into four types.

### ◎ Receiving event (when bit 7 is "1")

Bit	
0	Unused
1	Communication error
2	Unused
3	Unused
4	Character overrun
5	In listen-only mode ("0" on the F650-CK)
6	Receiving broadcast
7	1

### ◎ Sending event (when bit 7 is "0")

Bit	
0	Sending exception code 1 to 3
1	Sending exception code 4
2	0
3	0
4	Send and write timeout
5	In listen-only mode ("0" on the F650-CK)
6	1
7	0

### ◎ Slave in listen-only mode

In listen-only mode, 04 is recorded.

### ◎ Communication initialized by communication restart

This event is recorded when communications are restarted.

The event becomes 00.

If each slave is in Continue-on-error mode, the event is written in the existing log.

If in Stop-on-error mode, the log is cleared and 00 is written in event 0.

(The F650-CK is fixed in Stop-on-error mode.)

**17 (0x11) Report slave ID**

Each slave returns operation mode, current conditions, etc.

The contents of the response vary with products.

[Request]	Function	1 byte	0x11
-----------	----------	--------	------

[Response]	Function	1 byte	0x11
	Number of bytes	1 byte	
	Slave ID	1 byte	
	RUN indicator	1 byte	0x00: Weight error or calibration error 0xFF: Normal
	Additional information	3 bytes	Version information

\* Slave ID is different from address.

[Error response]	Error code	1 byte	0x91 (function + 0x80)
	Exception code	1 byte	01

Example) Read slave ID.

[Request]	Function	11	[Response]	Function	11
				Number of bytes	5
				Slave ID	
				RUN indicator	00
				Additional information	*

\* Version information is expressed in 3 bytes.

In the case of 0x01, 0x02, 0x03, the version is 1.23.

**08 (0x08) Diagnostic code**

By requesting diagnostics, communication conditions between the master and each slave can be checked.

What are checked vary with subfunctions added after usual functions.

In cases other than errors, the slave response is the received request frame returned as it is.

Also, all counts provided for diagnostics are cleared at power-on.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	
	Data	N×2 bytes	

[Response]	Function	1 byte	0x08
	Subfunction	2 bytes	
	Data	N×2 bytes	

[Error response]	Error code	1 byte	0x88 (function + 0x80)
	Exception code	1 byte	01 or 03

### List of subfunction codes

Code	Function name	Command
00 (0x0000)	Return query data	Echo request
01 (0x0001)	Restart communications option	Initialize the communication port
02 (0x0002)	Return diagnostic register	Echo request
03 (0x0003)	Change ASCII input delimiter	—
04 (0x0004)	Force listen only mode	Receive-only mode
05 to 09	Unused	
10 (0x000A)	Clear counters and diagnostic register	Clear the counters and register
11 (0x000B)	Return bus message count	Read the message count
12 (0x000C)	Return bus communication error count	Read the CRC error count
13 (0x000D)	Return bus exception error count	Read the exception error count
14 (0x000E)	Return slave message count	Read the slave receiving count
15 (0x000F)	Return slave No response count	Read the no response count
16 (0x0010)	Return slave NAK count	—
17 (0x0011)	Return slave busy count	Read the busy count
18 (0x0012)	Return bus character overrun count	Read the character overrun error count
20 (0x0014)	Clear overrun counter and flag	Clear the character overrun error counter

\* Code 03, 05 to 09, and 16 are not supported by the F650-CK.

\* Code 04 brings about receive-only mode, while additions to each counter and event log (always 0x04 when in code 04) are executed.

#### 00 (0x0000) Return query data

Request frame is returned as it is.

[Request]

Function	1 byte	0x08
Subfunction	2 bytes	0x00, 0x00
Data	N×2 bytes	Desired 16-bit data

[Response]

Echo of request

#### 01 (0x0001) Restart communication option

Communication port is initialized. Communication event counter is also cleared.

Response is made before initialization.

In Listen-only mode, processing is also performed but no response is returned.

[Request]

Function	1 byte	0x08
Subfunction	2 bytes	0x00, 0x01
Data	2 bytes	

\* If the data is 0xFF, 0x00, the event log is also cleared.

If 0x00, 0x00, the event log is kept.

**02 (0x0002) Return diagnostic register (not supported by the F650-CK)**

Request frame is returned as it is.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x02
	Data	N×2 bytes	Desired 16-bit data

[Response]          Echo of request

**04 (0x0004) Force listen only mode**

Slave is brought into receive-only mode.

All messages are ignored and no action and response are made, but each counter and event log are processed.

However, only subfunction 1 is accepted, by which communication is initialized to restart, and the receive-only mode is canceled.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x04
	Data	2 bytes	0x00, 0x00

[Response]          None

**10 (0x000A) Clear counters and diagnostic register**

All counters and the diagnostic register are cleared.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0A
	Data	2 bytes	0x00, 0x00

[Response]          Echo of request

**11 (0x000B) Return bus message count**

The total number of frames detected by slave is read.

The count is incremented when slave ID is consistent and at broadcast-time.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0B
	Data	2 bytes	0x00, 0x00

[Response]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0B
	Data	2 bytes	Message count

**12 (0x000C) Return bus communication error count**

The total number of CRC errors detected by slave is read.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0C
	Data	2 bytes	0x00, 0x00

[Response]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0C
	Data	2 bytes	CRC error count

**13 (0x000D) Return bus exception error count**

The total number of exception responses sent by slave is read.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0D
	Data	2 bytes	0x00, 0x00

[Response]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0D
	Data	2 bytes	Exception response count

**14 (0x000E) Return slave message count**

The total number of frames consistent in slave address is read.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0E
	Data	2 bytes	0x00, 0x00

[Response]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0E
	Data	2 bytes	Self-address message count

**15 (0x000F) Return slave no response count**

The number of times of not sending a response back to frames consistent in slave address is read.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0F
	Data	2 bytes	0x00, 0x00

[Response]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x0F
	Data	2 bytes	No response count

**17 (0x0011) Return slave busy count (not counted up by the F650-CK)**

The count of slave-busy issued by slave is sent back.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x11
	Data	2 bytes	0x00, 0x00

[Response]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x11
	Data	2 bytes	Busy

**18 (0x0012) Return bus character overrun count (not counted up by the F650-CK)**

The number of times of detecting a character overrun error in frames consistent in slave address is read.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x12
	Data	2 bytes	0x00, 0x00

[Response]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x12
	Data	2 bytes	Character, overrun, count

**20 (0x0014) Clear overrun counter and flag**

The overrun counter and the error flag are cleared.

[Request]	Function	1 byte	0x08
	Subfunction	2 bytes	0x00, 0x14
	Data	N×2 bytes	0x00, 0x00

[Response] Echo of request

**17-5-3. About error response**

If there is any problem with request from the master, each slave will not execute the command but return error response. In function code, the value of the requested function code + 0x80 is used.

Exception code judgment is made after the received frame.

The order of priority of exception code judgment is 1 → 3 → 2.

Exception code No.	
1	Function code error
2	Address out-of-range error
3	Data value error

**Exception code = 01**

A nonexistent function code has been specified.  
Check the function code.

**Exception code = 02**

An unusable address has been specified.

- Check the start address or start address + (number of coils or number of statuses or number of registers).  
(Function code 1 to 6, 15, 16)
- Check to see if the start address is the higher bits of a 32-bit variable or the start address + number of registers includes down to the lower bits of the 32 bits.  
(Function code 16)

**Exception code = 03**

The specified number is out of range.

- Check to see if the (number of coils or number of statuses or number of registers) is within the reading range.  
(Function code 1 to 4)
- Check to see if the output value is 0x0000 or 0xFF00.  
(Function code 5)
- Check to see if the output value is 0x0000 to 0xFFFF.  
Or, check for designation at up to start address 60.  
(Function code 6)  
\* A 32-bit variable cannot be written in function code 6.
- Check to see if the (number of coils or number of registers) is within the range.  
(Function code 15, 16)
- Check to see if the number of bytes is a value obtained from the (number of coils or number of registers).  
(Function code 15, 16)
- Check to see if the total number of bytes in the transmitted format is correct.  
(Function code 1 to 6, 8, 15, 16)



When the following errors occur, each slave does not return a response regardless of the request from the master.

- The specified slave address No. is inconsistent with the self-address.
- The error check code is inconsistent.
- A parity error or any other communication error is detected.
- The character gap in frame-configuring data is 1.5 or more characters.
- Slave address No. is set at "0".



## 17-5-4. Data address

Data type	Address	Data name	Data format
Coil 0XXXX	00001	Gross display	B1
	00002	Net display	
	00003	Error display	
	00004	Result display	
	00005	One-touch tare subtraction	
	00006	One-touch tare subtraction reset	
	00007	Digital zero	
	00008	Digital zero reset	
	00009	Accumulation clear	
	00010	Accumulation data all clear	
	00011	Accumulation command	
	00012	Measurement start	
	00013	Measurement reset	
	00017	Zero calibration	
	00018	Span calibration (actual load calibration)	
	00019	Span calibration (equivalent calibration)	
	00020	Reserved area (cannot be used)	
	—		
Input status 1XXXX	00027	Reserve (no assignments)	
	00028		
	—	Reserve (no assignments)	
	09999		
	10001	Over	B1
	10002	Go	
	10003	Under	
	10004	RANK1	
	10005	RANK2	
	10006	RANK3	
	10007	RANK4	
	10008	RANK5	
	10009	RANK6	
	10010	RANK7	
	10011	RANK8	
	10012	RANK9	
	10013	RANK10	
	10014	RANK11	
	10015	Upper	
	10016	Lower	
	10017	NZ	
	10018	Complete	
	10019	Output	
	10020	Taking	
	10021	Stab	
	10022	RUN	
	10023	Hold	
	10024	ZT	
	10025	TARE	

Input status 1XXXX	10026	LOCK1	B1	
	10027	LOCK2		
	10028	LOCK3		
	10029	Weight error		
	10030	ZALM		
	10031	Reserve (no assignments)		
	—			
	19999			
Input register 3XXXX	30001	Status 1	—	I16
	30002	Status 2		
	30003	Status 3		
	30004	Undefined		
	30005	Gross weight (higher)	No decimal point	I32
	30006	Gross weight (lower)		
	30007	Net weight (higher)		
	30008	Net weight (lower)		
	30009	Tare weight (higher)		
	30010	Tare weight (lower)		
	30011	Reserve (no assignments)		
	—			
	39999			

Data type	Address	Data name	Data format		For each code
Holding register 4XXXX	40001	Standard (higher)	Unsigned	I32	⊙
	40002	Standard (lower)			⊙
	40003	Upper (higher)			⊙
	40004	Upper (lower)			⊙
	40005	Lower (higher)			⊙
	40006	Lower (lower)			⊙
	40007	Boundary 0 (higher)			⊙
	40008	Boundary 0 (lower)			⊙
	40009	Boundary 1 (higher)			⊙
	40010	Boundary 1 (lower)			⊙
	40011	Boundary 2 (higher)			⊙
	40012	Boundary 2 (lower)			⊙
	40013	Boundary 3 (higher)			⊙
	40014	Boundary 3 (lower)			⊙
	40015	Boundary 4 (higher)			⊙
	40016	Boundary 4 (lower)			⊙
	40017	Boundary 5 (higher)			⊙
	40018	Boundary 5 (lower)			⊙
	40019	Boundary 6 (higher)			⊙
	40020	Boundary 6 (lower)			⊙
	40021	Boundary 7 (higher)			⊙
	40022	Boundary 7 (lower)			⊙
	40023	Boundary 8 (higher)			⊙
	40024	Boundary 8 (lower)			⊙
	40025	Boundary 9 (higher)			⊙
	40026	Boundary 9 (lower)			⊙
	40027	Near zero (higher)			⊙
	40028	Near zero (lower)			⊙

Holding register 4XXXX	40029	Histogram target (higher)	Unsigned	132	⊙
	40030	Histogram target (lower)			
	40031	Trigger level (higher)			⊙
	40032	Trigger level (lower)			
	40033	Y start point (higher)	Signed		⊙
	40034	Y start point (lower)			⊙
	40035	Y end point (higher)			
	40036	Y end point (lower)			
	40037	Tare setting (higher)	Unsigned		
	40038	Tare setting (lower)			
	40039	Equivalent calibration (vol.) (higher)			
	40040	Equivalent calibration (vol.) (lower)			
	40041	Balance weight (higher)			
	40042	Balance weight (lower)			
	40043	Net over (higher)			
	40044	Net over (lower)			
	40045	Gross over (higher)			
	40046	Gross over (lower)			
	40047	Average weight (higher) *read only			⊙
	40048	Average weight (lower) *read only			⊙
	40049	Maximum weight (higher) *read only			⊙
	40050	Maximum weight (lower) *read only			⊙
	40051	Minimum weight (higher) *read only			⊙
	40052	Minimum weight (lower) *read only			⊙
	40053	General standard deviation (higher) *read only			⊙
	40054	General standard deviation (lower) *read only			⊙
	40055	Sample standard deviation (higher) *read only			⊙
	40056	Sample standard deviation (lower) *read only			⊙
	40057	Maximum - Minimum (higher) *read only			⊙
	40058	Maximum - Minimum (lower) *read only			
	40059	Latest accumulation data (higher) *read only			
	40060	Latest accumulation data (lower) *read only			
	40061	Reserve (no assignments)			
	—				
	40064				
	40065	Weighing code	Unsigned	116	
	40066	Setting code			
	40067	Over			⊙
	40068	Under			⊙
	40069	Taking mode			⊙
40070	Trigger mode	⊙			
40071	Taking count	⊙			
40072	Taking ratio	⊙			
40073	Empty count	⊙			
40074	Digital low pass filter	⊙			
40075	Moving average filter	⊙			
40076	Gross ratio	⊙			
40077	Histogram range	⊙			
40078	Output selection 0	⊙			
40079	Output selection 1	⊙			
40080	Output selection 2	⊙			
40081	Output selection 3	⊙			
40082	Output selection 4	⊙			

Holding register 4XXXX	40083	Graphic mode	Unsigned	I16	⊙
	40084	X end point			⊙
	40085	Drawing weight selection			⊙
	40086	Pre trigger value			⊙
	40087	Front of filter			⊙
	40088	Comparison mode selection			
	40089	Standard comparison selection			
	40090	Complete output time			
	40091	Near zero comparison selection			
	40092	HI/LO limit comparison selection			
	40093	Tare setting selection			
	40094	Hold selection			
	40095	Motion detection (period)			
	40096	Motion detection (range)			
	40097	Zero tracking (period)			
	40098	Zero tracking (range)			
	40099	Indicate color			
	40100	Backlight low time			
	40101	Backlight on time			
	40102	Auto accumulation			
	40103	Output mode			
	40104	Output comparison mode			
	40105	Weighing code input			
	40106	Zero tracking mode			
	40107	Auto zero average			
	40108	LOCK1			
	40109	LOCK2			
	40110	LOCK3			
	40111	Language (言語)			
	40112	[GROSS/NET] key			
	40113	[DZ] key			
	40114	[TARE ON] key			
	40115	Minimum scale division			
40116	Unit display				
40117	Decimal place				
40118	DZ regulation value				
40119	Count of data *read only	⊙			
40120	SI/F out1 select				
40121	SI/F out2 select				
40122	B4 terminal function selection				
40123	Taking speed				
40124	Reserve (no assignments)				
—					
49999					

B1: 1 bit    I16: 16-bit integer    I32: 32-bit integer



The address number used on a message is a relative address.

The relative address is calculated by the following equation.

Relative address = Last 4 digits of address No. - 1

For example, it is 0014 (0x0E) when holding register 40015 is designated.

### 17-5-5. About data

Data type	Data name	Meaning of data
Coil	Gross display	Switches the weight display to gross weight.
	Net display	Switches the weight display to net weight.
	Error display	Switches the weight display to error.
	Result display	Switches the weight display to result.
	One-touch tare subtraction	Executes one-touch tare subtraction.
	One-touch tare subtraction reset	Resets one-touch tare subtraction.
	Digital zero	Executes digital zero.
	Digital zero reset	Resets digital zero.
	Accumulation clear	Clears accumulation value on weighing code.
	Accumulation data all clear	Clears accumulation values on all codes.
	Accumulation command	Accumulates weight value. Makes accumulation on the code in weighing (weighing code).
	Measurement start	Becomes measurement start signal by ON edge.
	Measurement reset	Becomes measurement reset signal by ON edge.
	Zero calibration	Executes zero calibration.
	Span calibration (actual load calibration)	Executes span calibration (actual load calibration).
	Span calibration (equivalent calibration)	Executes equivalent calibration.
Input status	Over	Indicates the state of the over signal of the indicator. ON (1), OFF (0)
	Go	Indicates the state of the go signal of the indicator.
	Under	Indicates the state of the under signal of the indicator.
	RANK1	Indicates the state of the RANK1 signal of the indicator.
	RANK2	Indicates the state of the RANK2 signal of the indicator.
	RANK3	Indicates the state of the RANK3 signal of the indicator.
	RANK4	Indicates the state of the RANK4 signal of the indicator.
	RANK5	Indicates the state of the RANK5 signal of the indicator.
	RANK6	Indicates the state of the RANK6 signal of the indicator.
	RANK7	Indicates the state of the RANK7 signal of the indicator.
	RANK8	Indicates the state of the RANK8 signal of the indicator.
	RANK9	Indicates the state of the RANK9 signal of the indicator.
	RANK10	Indicates the state of the RANK10 signal of the indicator.
	RANK11	Indicates the state of the RANK11 signal of the indicator.
	Upper	Indicates the state of the upper limit signal of the indicator.
	Lower	Indicates the state of the lower limit signal of the indicator.
	NZ	Indicates the state of the NZ signal of the indicator.
	Complete	Indicates the state of the complete signal of the indicator.
	Output	Indicates the state of the output signal of the indicator.
	Taking	Turns ON during data taking.
	Stab	Turns ON while weight value of the indicator is stable.
	RUN	Indicates the state of the RUN signal of the indicator.
	Hold	Turns ON while weight value is held.
	ZT	Turns ON while zero tracking of the indicator is in operation.
	TARE	Turns ON when tare subtraction is performed.
	LOCK1	Indicates the state of LOCK1.
	LOCK2	Indicates the state of LOCK2.
	LOCK3	Indicates the state of LOCK3.
	Weight error	Turns ON when the weight is abnormal. (*1)
	ZALM	Turns ON when a zero alarm is given (ZALM on the indicator is ON).

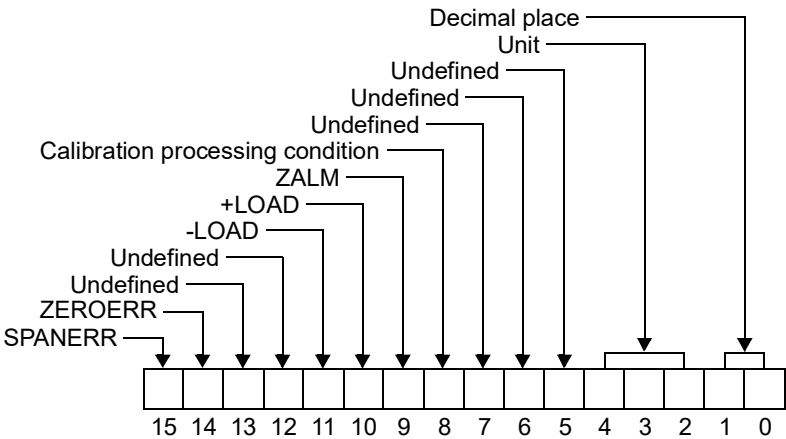
Input register	Status 1	Shows weighing condition. (*2)
	Status 2	Shows weighing condition. (*3)
	Status 3	Shows weighing condition. (*4)
	Gross weight (higher)	Shows gross weight. (-99999 to 99999) (*5)
	Gross weight (lower)	
	Net weight (higher)	Shows net weight. (-99999 to 99999) (*5)
	Net weight (lower)	
	Tare weight (higher)	Shows tare weight. (-99999 to 99999) (*5)
	Tare weight (lower)	
Holding register	Standard	Shows standard. (0 to 99999) *For each code
	Upper	Shows upper. (0 to 99999) *For each code
	Lower	Shows lower. (0 to 99999) *For each code
	Boundary 0	Shows boundary 0. (0 to 99999) *For each code
	Boundary 1	Shows boundary 1. (0 to 99999) *For each code
	Boundary 2	Shows boundary 2. (0 to 99999) *For each code
	Boundary 3	Shows boundary 3. (0 to 99999) *For each code
	Boundary 4	Shows boundary 4. (0 to 99999) *For each code
	Boundary 5	Shows boundary 5. (0 to 99999) *For each code
	Boundary 6	Shows boundary 6. (0 to 99999) *For each code
	Boundary 7	Shows boundary 7. (0 to 99999) *For each code
	Boundary 8	Shows boundary 8. (0 to 99999) *For each code
	Boundary 9	Shows boundary 9. (0 to 99999) *For each code
	Near zero	Shows near zero. (0 to 99999) *For each code
	Histogram target	Shows histogram target. (5 to 99994) *For each code
	Trigger level	Shows trigger level. (0 to 99999) *For each code
	Y start point	Shows Y start point. (-99999 to 99999) *For each code
	Y end point	Shows Y end point. (-99999 to 99999) *For each code
	Tare setting	Shows tare weight. (0 to 99999)
	Equivalent calibration (vol.)	Shows voltage of equivalent calibration. (1 to 31250)
	Balance weight	Shows balance weight value. (1 to 99999)
	Net over	Shows net over. (0 to 99999)
	Gross over	Shows gross over. (0 to 99999)
	Average weight	Shows average weight. (read only) (0 to 99999)
	Maximum weight	Shows maximum weight. (read only) (0 to 99999)
	Minimum weight	Shows minimum weight. (read only) (0 to 99999)
	General standard deviation	Shows general standard deviation. (read only) (0 to 99999)
	Sample standard deviation	Shows sample standard deviation. (read only) (0 to 99999)
	Maximum - Minimum	Shows maximum - minimum. (read only) (0 to 99999)
	Latest accumulation data	Shows latest accumulation data. (read only) (0 to 99999)
	Weighing code	Shows weighing code No. (0 to 7)
	Setting code	Shows setting code No. (0 to 7)
	Over	Shows over. (0 to 9999) *For each code
	Under	Shows under. (0 to 9999) *For each code
	Taking mode	Shows taking mode. (0 to 4) *For each code
	Trigger mode	Shows trigger mode. (0 to 1) *For each code
	Taking count	Shows effective sampling. (1 to 5000) *For each code
	Taking ratio	Shows taking ratio. (0 to 5) *For each code
	Empty count	Shows ineffective sampling. (0 to 5000) *For each code
	Digital low pass filter	Shows digital low pass filter. (20 to 100) *For each code
	Moving average filter	Shows moving average filter. (1 to 999) *For each code

Holding register	Gross ratio	Shows gross ratio. (1 to 9999)	*For each code
	Histogram range	Shows histogram range. (5 to 9999)	*For each code
	Output selection 0	Shows output selection 0. (0 to 8)	*For each code
	Output selection 1	Shows output selection 1. (0 to 8)	*For each code
	Output selection 2	Shows output selection 2. (0 to 8)	*For each code
	Output selection 3	Shows output selection 3. (0 to 8)	*For each code
	Output selection 4	Shows output selection 4. (0 to 8)	*For each code
	Graphic mode	Shows graphic mode. (0 to 3)	*For each code
	X end point	Shows X end point. (2 to 998)	*For each code
	Drawing weight selection	Shows drawing weight selection. (0 to 1)	*For each code
	Pre trigger value	Shows pre trigger value. (0 to 20)	*For each code
	Front of filter	Shows front of filter. (0 to 1)	*For each code
	Comparison mode selection	Shows comparison mode selection. (0 to 2)	
	Standard comparison selection	Shows standard comparison selection. (0 to 1)	
	Complete output time	Shows complete output time. (0 to 999)	
	Near zero comparison selection	Shows near zero comparison selection. (0 to 1)	
	HI/LO limit comparison selection	Shows HI/LO limit comparison selection. (0 to 1)	
	Tare setting selection	Shows tare setting selection. (0 to 1)	
	Hold selection	Shows hold selection. (0 to 2)	
	Motion detection (period)	Shows motion detection (period). (0 to 999)	
	Motion detection (range)	Shows motion detection (range). (0 to 99)	
	Zero tracking (period)	Shows zero tracking (period). (0 to 99)	
	Zero tracking (range)	Shows zero tracking (range). (0 to 99)	
	Indicate color	Shows indicate color. (0 to 3)	
	Backlight low time	Shows backlight low time. (0 to 99)	
	Backlight on time	Shows backlight on time. (0 to 99)	
	Auto accumulation	Shows auto accumulation. (0 to 1)	
	Output mode	Shows output mode. (0 to 1)	
	Output comparison mode	Shows output comparison mode. (0 to 1)	
	Weighing code input	Shows weighing code input. (0 to 1)	
	Zero tracking mode	Shows zero tracking mode. (0 to 1)	
	Auto zero average	Shows Auto zero average.. (0 to 3)	
	LOCK1	Shows LOCK1. (0 to 1)	
	LOCK2	Shows LOCK2. (0 to 1)	
	LOCK3	Shows LOCK3. (0 to 1)	
	Language (言語)	Shows Language (言語). (0 to 1)	
	[GROSS/NET] key	Shows [GROSS/NET] key. (0 to 1)	
	[DZ] key	Shows [DZ] key. (0 to 1)	
	[TARE ON] key	Shows [TARE ON] key. (0 to 1)	
	Minimum scale division	Shows minimum scale division. (1 to 100)	
	Unit display	Shows unit display. (0 to 5)	
	Decimal place	Shows decimal place. (0 to 3)	
	DZ regulation value	Shows DZ regulation value. (0 to 9999)	
	Count of data	Shows count of data. (read only) (0 to 500)	
	SI/F out1 select	Shows SI/F out1 select. (0 to 4)	
	SI/F out2 select	Shows SI/F out2 select. (0 to 4)	
	B4 terminal function selection	Shows B4 terminal function selection. (0 to 1)	
	Taking speed	Shows interval sampling rate. (0 to 1)	

\*1: Weight error

Net over, gross over, LOAD, -LOAD, and ZALM are included.

\*2: Status 1



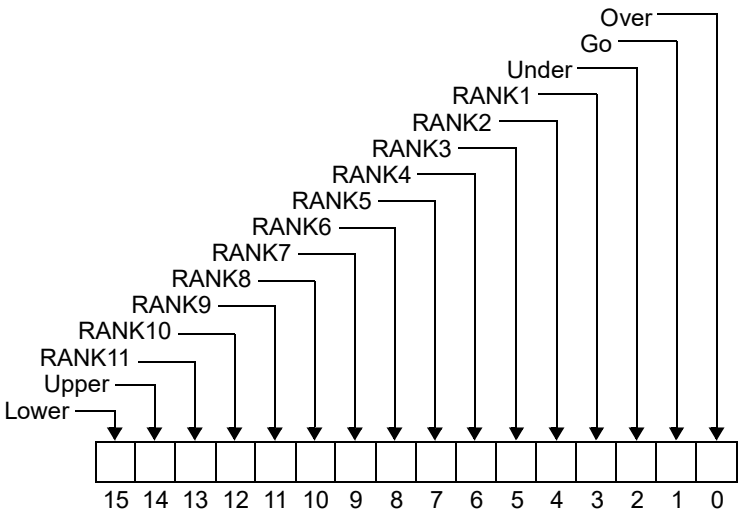
- -LOAD, +LOAD, ZALM, SPANERR, ZEROERR: "1" when each error occurs.
- Calibration processing condition: "1" during zero calibration or span calibration.
- Unit: Shows unit.

Unit	Bit No.		
	4	3	2
None	0	0	0
kg	0	0	1
t	0	1	0
g	0	1	1
N	1	0	0
lb	1	0	1

- Decimal place: Shows decimal place.

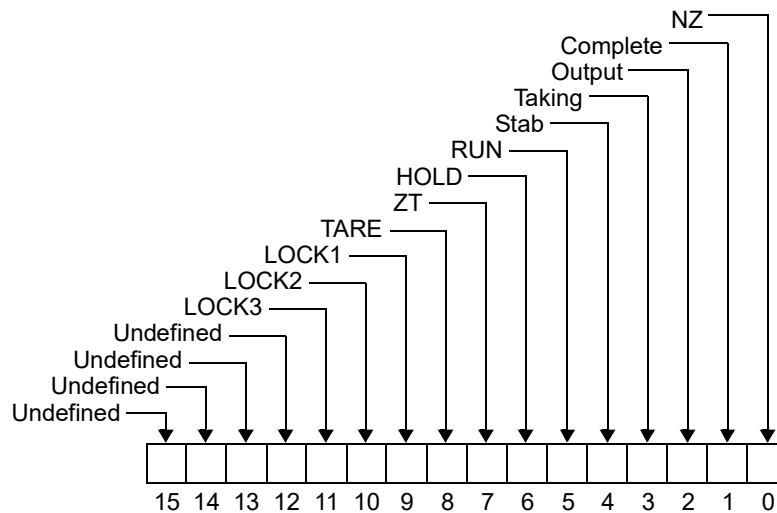
Decimal place	Bit No.	
	1	0
None	0	0
0.0	0	1
0.00	1	0
0.000	1	1

\*3: Status 2

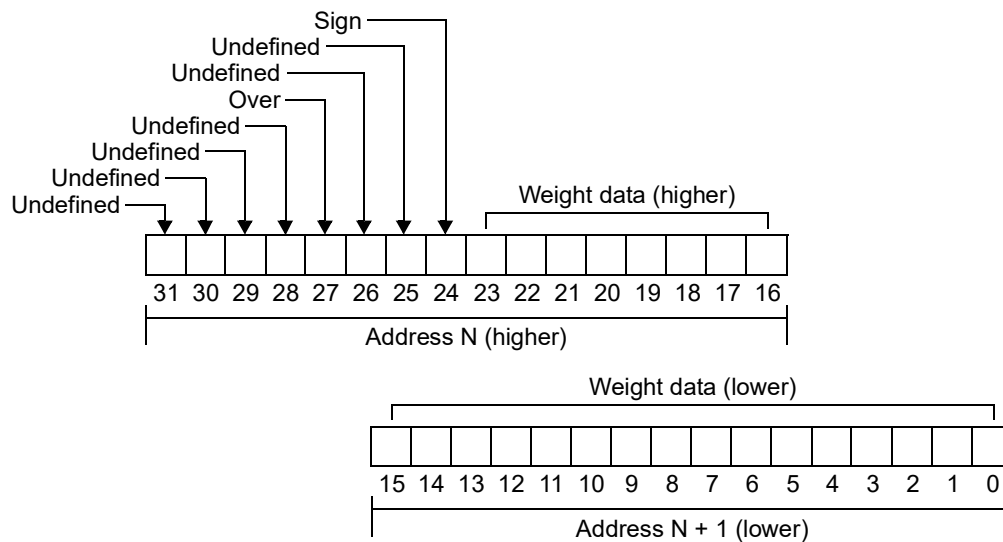




\*4: Status 3



\*4: Gross weight, net weight, tare weight



- Over: "1" in the following cases:  
Gross over, net over, and tare > 99999

- Sign: "1" when weight data is negative.

## 18. Error Message

### **“+LOAD” or “-LOAD”**

Voltage exceeding the ADC input range is input.

Check to see if the output voltage of the loadcell exceeds the range, and check the cables for breaks.

This message is also displayed when wiring is incorrect or nothing is connected.

### **“NET OVER”**

The net weight value exceeds the “NET OVER” setting value. Check the “NET OVER” setting value.

### **“GROSS OVER”**

The gross weight exceeds the “GROSS OVER” setting value. Check the “GROSS OVER” setting value.

### **“GRAPH ERR”**

The setting value of the “Y-axis (load) start point” is larger than the setting value of the “Y-axis (load) end point”.

Set again so that the “Y-axis (load) start point” becomes smaller than the “Y-axis (load) end point”.

### **“LOCK IS ON”**

Key operation is locked.

Please make the key operation "ON" referring to following instructions.

"LOCK1/ LOCK2/ LOCK3" on page 50, "[GROSS/NET] key" on page 50, "[DZ] key" on page 50, "[TARE ON] key" on page 50.

### **“Zero 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”**

The span calibration error occurs under the following conditions.

- 1) An actual load set value of zero is inputted.
- 2) The electrical signal is input at 0.050mV/V or less.

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 F650-CK 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 F650-CK. 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 F650-CK.)

## 19. Self-Check



Self-check is performed when the setting is called.


### ■ Self-check DSP1

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.

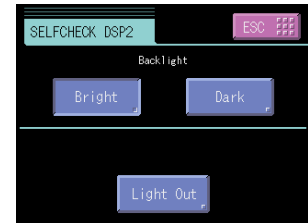
### ■ Self-check DSP2

Check the backlight and status indicator lamp.


The backlight turns bright by pressing the  key, and turns dark by pressing the  key.

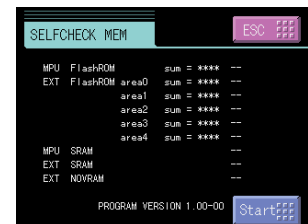
The backlight goes out when the  key is pressed, and after that, it recovers when the screen is touched.

The status indicator lamp lights in green and red alternately.




### ■ Self-check MEM

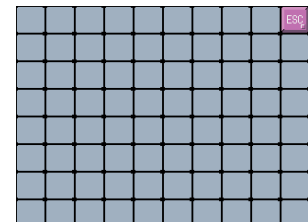
Check the memory to see that it is free from defects. The result is displayed in a moment after the  key at the lower right of the screen is pressed. Or, check the version here.



### ■ Self-check KEY

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

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

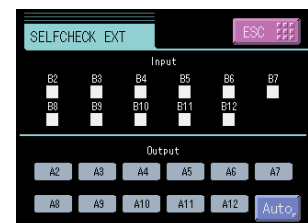


### ■ Self-check EXT


Check the operations of the external input/output signals.

Each output turns on when the corresponding key is pressed.

Each input turns green when its ON state is recognized.



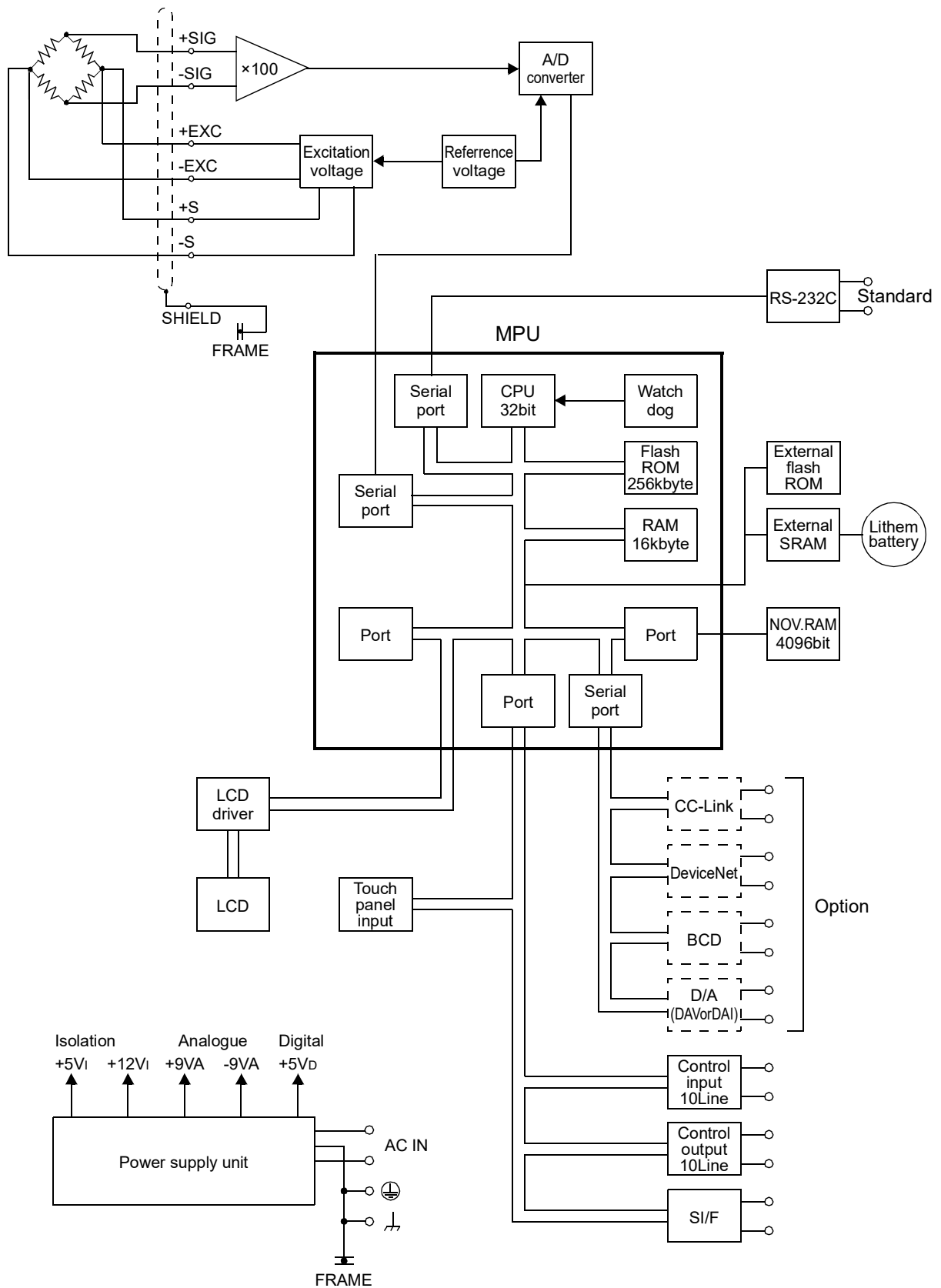
### ■ Self-check COM

The data displayed under "Transmit data" is sent by pressing the  key.

Under "Receive data", externally transmitted data is displayed.



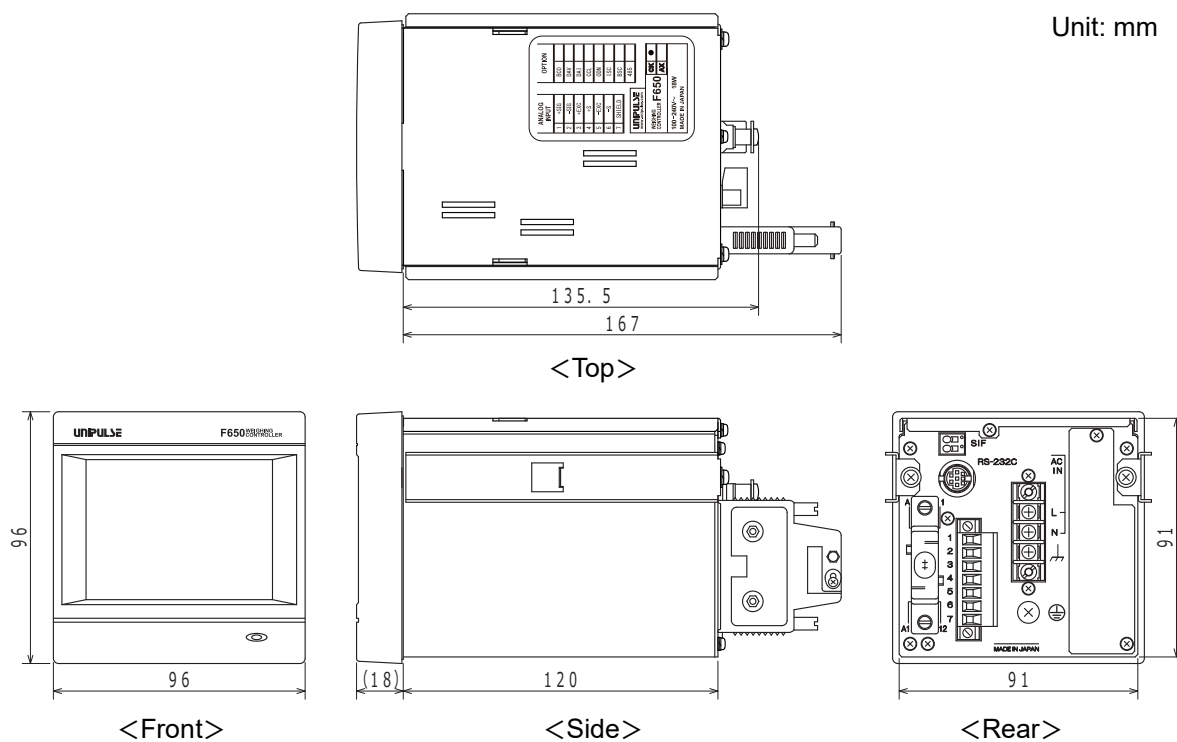
## 20. Block Diagram



## 21. Dimensions

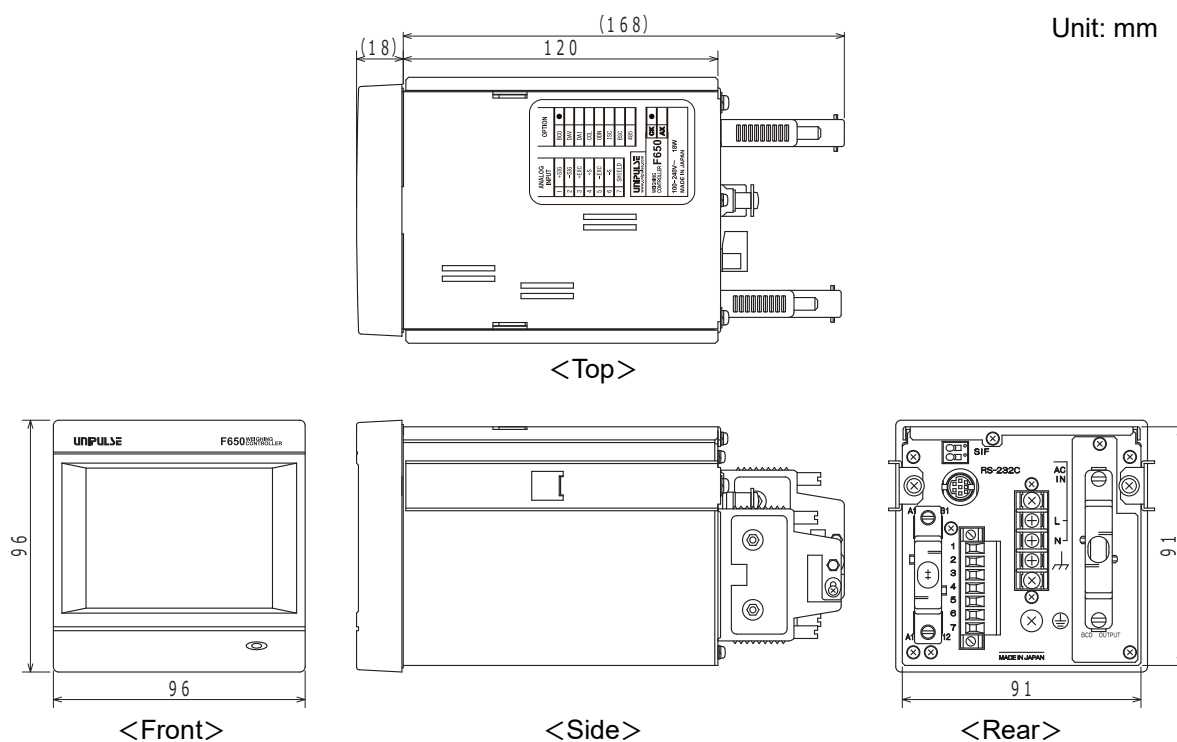
### ■ Standard equipment

Unit: mm



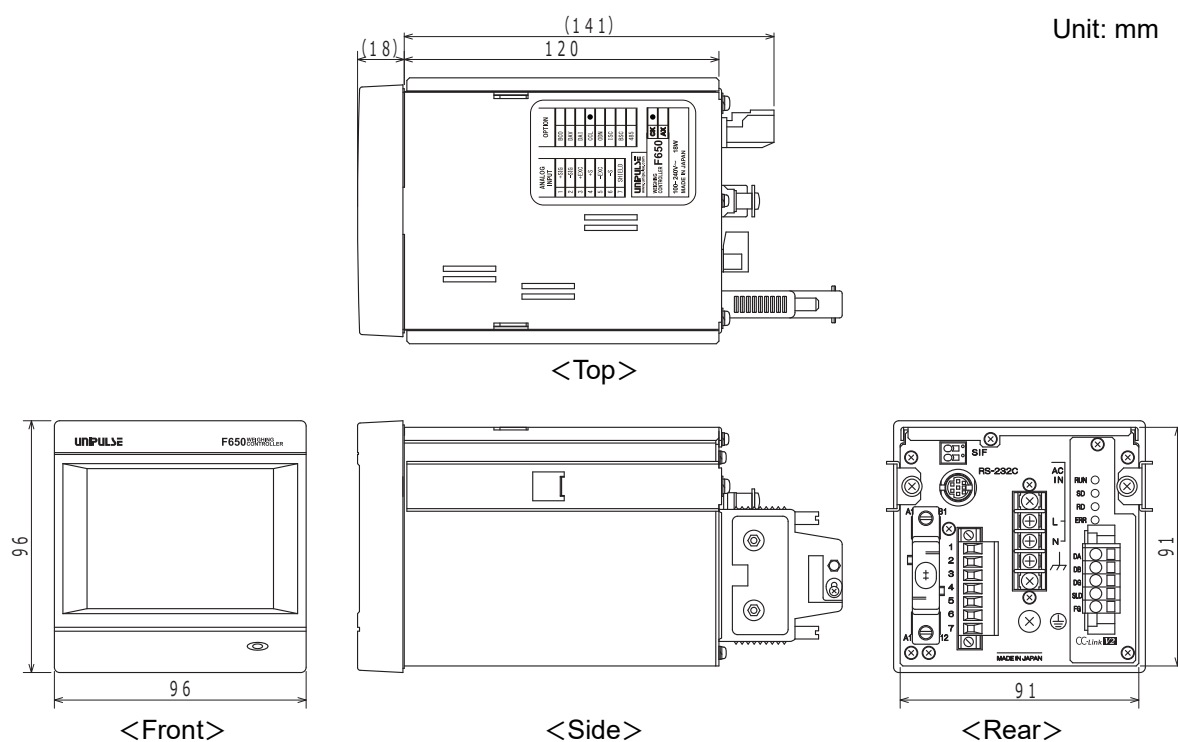
### ■ When the BCD option is equipped

Unit: mm



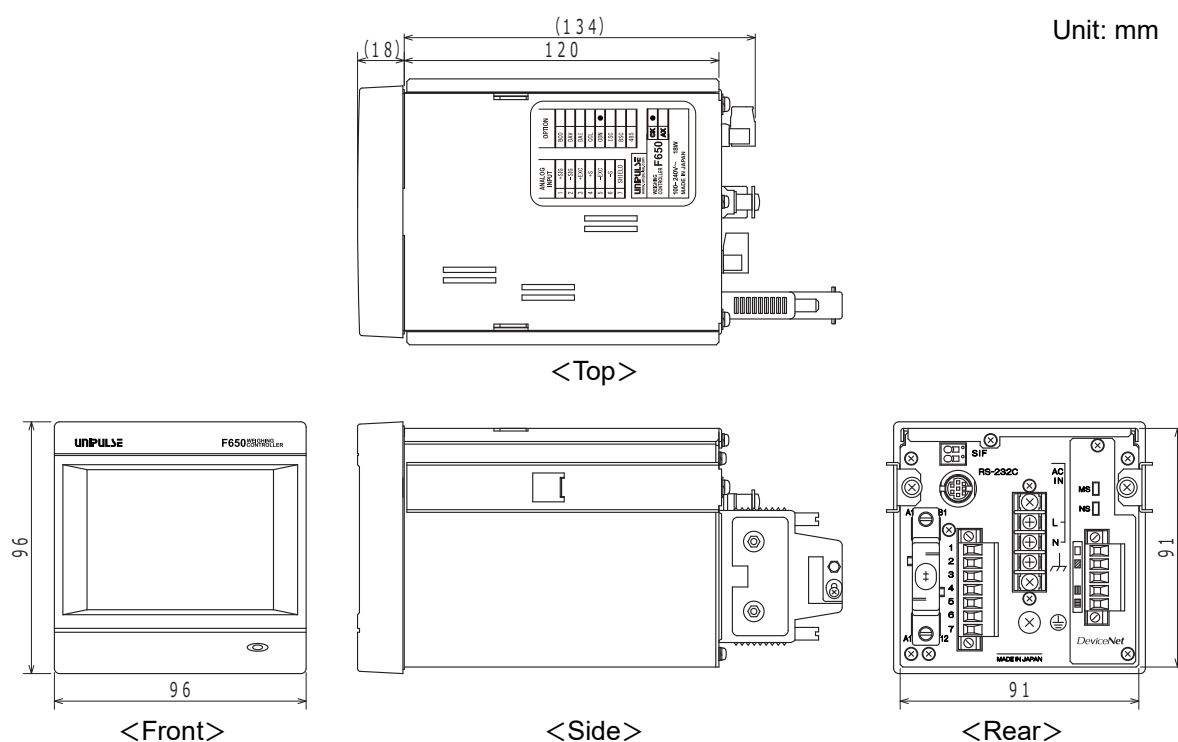
### ■ When the CC-Link option is equipped

Unit: mm



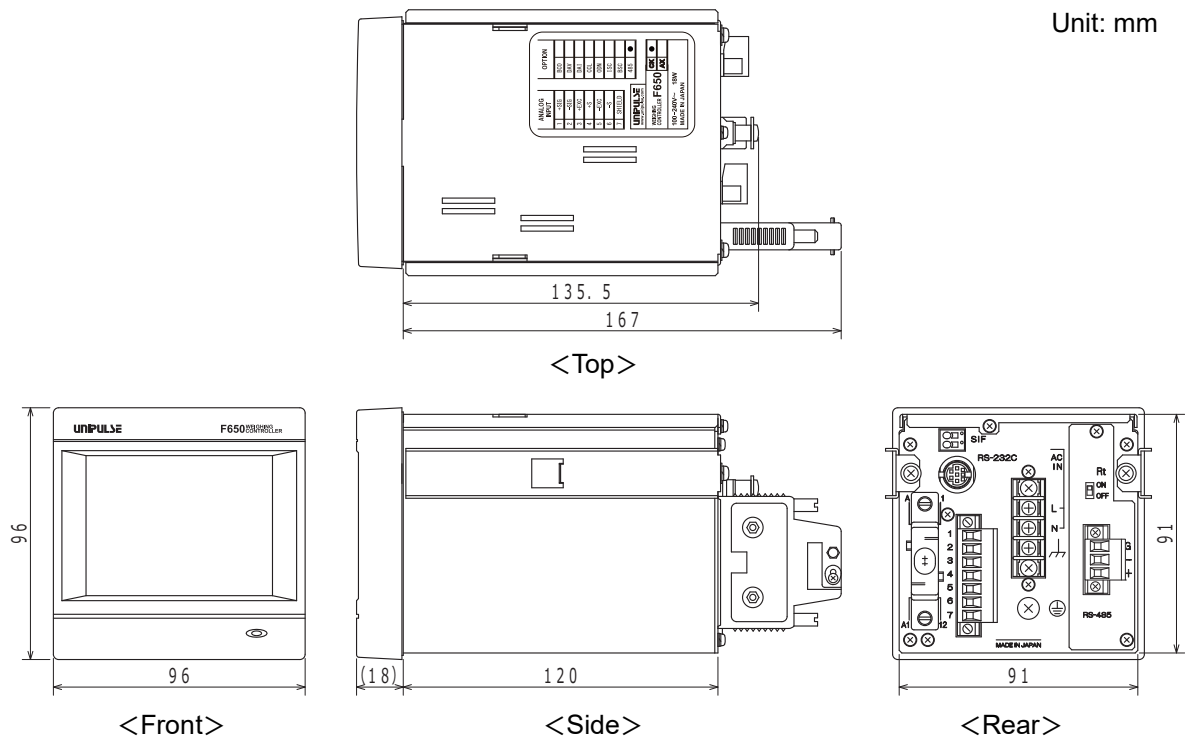
### ■ When the DeviceNet option is equipped

Unit: mm



## ■ When the RS-485 option is equipped

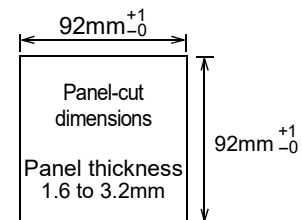
Unit: mm



### 21-1. Installation in a panel

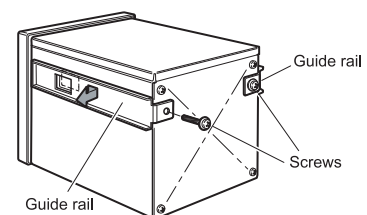
To install the F650-CK into a control panel, use the following procedure.

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.

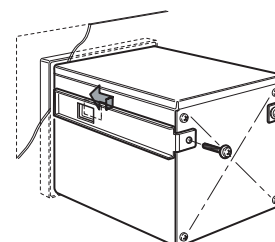
\* Do not use other screws than those installed to the F650-CK body



3. Fit in the F650-CK 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).



## 22. Setting Item List

- \* L1: Setting that LOCK is controlled by LOCK1
- \* L2: Setting that LOCK is controlled by LOCK2
- \* L3: Setting that LOCK is controlled by LOCK3
- \* S: Saved in SRAM (Lithium-battery-backed-up)
- \* N: Saved in NOV.RAM (Saved in non-volatile memory)

### Standard mode (COMP MODE SEL.: COMP)

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
		CODE	0				○		0 to 7	00(R/W)
1	1	STANDARD	0.00	○			○		00000 to 99999	01(R/W)
	2	OVER	0.00	○			○		0000 to 9999	02(R/W)
	3	UNDER	0.00	○			○		0000 to 9999	03(R/W)
	4	UPPER	0.00	○			○		00000 to 99999	04(R/W)
2	5	LOWER	0.00	○			○		00000 to 99999	05(R/W)

### Standard mode (COMP MODE SEL.: RANK.1)

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
		CODE	0				○		0 to 7	00(R/W)
1	1	BOUNDARY 0	0.00	○			○		00000 to 99999	06(R/W)
	2	BOUNDARY 1	0.00	○			○		00000 to 99999	07(R/W)
	3	BOUNDARY 2	0.00	○			○		00000 to 99999	08(R/W)
	4	BOUNDARY 3	0.00	○			○		00000 to 99999	09(R/W)
2	5	UPPER	0.00	○			○		00000 to 99999	04(R/W)
	6	LOWER	0.00	○			○		00000 to 99999	05(R/W)

### Standard mode (COMP MODE SEL.: RANK.2)

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
		CODE	0				○		0 to 7	00(R/W)
1	1	BOUNDARY 0	0.00	○			○		00000 to 99999	06(R/W)
	2	BOUNDARY 1	0.00	○			○		00000 to 99999	07(R/W)
	3	BOUNDARY 2	0.00	○			○		00000 to 99999	08(R/W)
	4	BOUNDARY 3	0.00	○			○		00000 to 99999	09(R/W)
2	5	BOUNDARY 4	0.00	○			○		00000 to 99999	0A(R/W)
	6	BOUNDARY 5	0.00	○			○		00000 to 99999	0B(R/W)
	7	BOUNDARY 6	0.00	○			○		00000 to 99999	0C(R/W)
	8	BOUNDARY 7	0.00	○			○		00000 to 99999	0D(R/W)
3	9	BOUNDARY 8	0.00	○			○		00000 to 99999	0E(R/W)
	10	BOUNDARY 9	0.00	○			○		00000 to 99999	0F(R/W)
	11	UPPER	0.00	○			○		00000 to 99999	04(R/W)
	12	LOWER	0.00	○			○		00000 to 99999	05(R/W)



## Checker mode

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
		CODE	0				O		0 to 7	00(R/W)
1	1	TAKING MODE	ARITHMETIC	O			O		0: [SAMPLE] 1: [PEAK] 2: [ARITHMETIC] 3: [REMOVAL] 3: [STABILITY]	11(R/W)
	2	TRIGGER MODE	LEVEL	O			O		0: [LEVEL] 1: [EXTERNAL]	12(R/W)
	3	TAKING COUNT	5000	O			O		0001 to 5000	13(R/W)
	4	TAKING RATIO	100%	O			O		0: [100%] 1: [50%] 2: [25%] 3: [12.5%] 4: [5%] 5: [2.5%]	14(R/W)
2	5	EMPTY COUNT	0	O			O		0000 to 5000	15(R/W)
	6	NEAR ZERO	10.00	O			O		00000 to 99999	16(R/W)
	7	DIGITAL LPF	2.0Hz	O			O		2.0 to 10.0	17(R/W)
	8	MOV. AVE. FILTER	16 times	O			O		1 to 999	18(R/W)
3	9	GROSS RATIO	1.000	O			O		0.001 to 9.999	19(R/W)
	10	HISTOGRAM TARGET	100.00	O			O		00005 to 99994	1A(R/W)
	11	HISTOGRAM RANGE	10.00	O			O		0005 to 9999	1B(R/W)

## State output

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
		CODE	0				O		0 to 7	00(R/W)
1	1	OUTPUT SEL.0	COMPLETE	O			O		0: [OUTPUT] 1: [COMPLETE] 2: [NZ] 3: [TAKING] 4: [ERROR] 5: [UPPER] 6: [LOWER] 7: [STAB] 8: [RUN]	21(R/W)
	2	OUTPUT SEL.1	UPPER	O			O			22(R/W)
	3	OUTPUT SEL.2	LOWER	O			O			23(R/W)
	4	OUTPUT SEL.3	NZ	O			O			24(R/W)
2	5	OUTPUT SEL.4	ERROR	O			O			25(R/W)

## Graph

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
		CODE	0				O		0 to 7	00(R/W)
1	1	GRAPHIC MODE	CONTINUITY	O			O		0: [CONTINUITY] 1: [LEVEL] 2: [EXTERNAL] 3: [OPERATING]	31(R/W)
	2	TRIGGER LEVEL	1.00	O			O		00000 to 99999	32(R/W)
	3	X END POINT	10.0 Sec	O			O		0.2 to 99.8	33(R/W)
	4	Y START POINT	0.00	O			O		±00000 to ±99999	34(R/W)
2	5	Y END POINT	100.00	O			O		±00000 to ±99999	35(R/W)
	6	DRAWING WEIGHT	NET	O			O		0: [GROSS] 1: [NET]	36(R/W)
	7	PRE TRIG.VALUE	10%	O			O		00 to 20	37(R/W)
	8	FRONT OF FILTER	ON	O			O		0: [OFF] 1: [ON]	38(R/W)

## Result

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
		CODE	0				○		0 to 7	00(R/W)
1	1	AVE.WEIGHT	0.00							91(R)
	2	MAX.WEIGHT	0.00							92(R)
	3	MIN.WEIGHT	0.00							93(R)
	4	CNT.OF DATA	0							
2	5	GEN.STAN.DEV.	0.00							94(R)
	6	SMP.STAN.DEV.	0.00							95(R)
	7	MAX. - MIN.	0.00							96(R)
	8	LATEST DATA	0.00							

## Comparison

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
1	1	COMP MODE SEL.	COMP			○		○	0: [COMP] 1: [RANK.1] 2: [RANK.2]	41(R/W)
	2	STAND. CMP SEL.	NET			○		○	0: [GROSS] 1: [NET]	42(R/W)
	3	COMPLETE OUT T.	3.00 Sec			○		○	0.00 to 9.99	43(R/W)
	4	NEAR ZERO COMP.	GROSS			○		○	0: [GROSS] 1: [NET]	44(R/W)
	5	HI/LO COMP. SEL.	GROSS			○		○	0: [GROSS] 1: [NET]	45(R/W)
2	6	PRESET TARE WGT.1	ON			○		○	0: [OFF] 1: [ON]	46(R/W)
	7	PRESET TARE WGT.2	0.00			○		○	00000 to 99999	47(R/W)
	8	HOLD SELECT	ON			○		○	0: [OFF] 1: [ON] 2: [CONDITIONAL]	48(R/W)

## Operation

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
1	1	MD (PERIOD)	0.30 Sec			○		○	0.00 to 9.99	51(R/W)
	2	MD (RANGE)	5CNT			○		○	00 to 99	52(R/W)
	3	ZT (PERIOD)	0.00 Sec			○		○	0.0 to 9.99	53(R/W)
	4	ZT (RANGE)	0CNT			○		○	00 to 99	54(R/W)
	5	INDICATE COLOR	YELLOW			○		○	0: [YELLOW] 1: [GREEN] 2: [BLUE] 3: [COMP.]	55(R/W)
2	6	BACKLIGHT LOW TM	0 Min			○		○	00 to 99	56(R/W)
	7	BACKLIGHT ON TM	10 Min			○		○	00 to 99	57(R/W)
	8	AUTO ACCUMULAT.	ON			○		○	0: [OFF] 1: [ON]	58(R/W)
	9	OUTPUT MODE	OFF			○		○	0: [OFF] 1: [ON]	59(R/W)
	10	OUTPUT COMP. MODE	OFF			○		○	0: [OFF] 1: [ON]	5A(R/W)
3	11	WGT CODE INPUT	KEY INPUT			○		○	0: [KEY INPUT] 1: [EXT INPUT]	5B(R/W)
	12	ZT MODE	BAND MODE			○		○	0: [BAND MODE] 1: [NZ MODE] 2: [AVE. MODE]	5C(R/W)
	13	AUTO ZERO AVE.	100ms			○		○	0: [10ms] 1: [20ms] 2: [50ms] 3: [100ms]	5D(R/W)
	14	B4 FUCN. SELECT	CODE2			○		○	0: [CODE2] 1: [KEY LOCK]	5E(R/W)
	15	TAKING SPEED	1000/s			○		○	0: [1000/s] 1: [500/s]	5F(R/W)

## Communication

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
1	1	COMM. MODE	HAND SH.			○		○	0: [HAND SH.] 1: [CONTINUITY] 2: [AT PRINT]	D1(R)
	2	BAUDRATE	19200bps			○		○	0: [9600bps] 1: [19200bps] 2: [38400bps] 3: [57600bps] 4: [76800bps] 5: [115.2kbps]	D2(R)
	3	LENGTH	8bit			○		○	0: [7bit] 1: [8bit]	D3(R)
	4	PARITY BIT	ODD			○		○	0: [NONE] 1: [ODD] 2: [EVEN]	D4(R)
	5	STOP BIT	1bit			○		○	0: [1bit] 1: [2bit]	D5(R)
2	6	TERMINATOR	CR+LF			○		○	0: [CR] 1: [CR+LF]	D6(R)
	7	FLOW CONTROL	OFF			○		○	0: [OFF] 1: [RTS/CTS]	DA(R)
	8	SI/F OUT1 SELECT	RESULT			○		○	0: [GROSS] 1: [NET] 2: [ERROR] 3: [RESULT]	DB(R/W)
	9	SI/F OUT2 SELECT	GROSS			○		○	4: [STANDARD]	DC(R/W)

## System

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
1	1	INITIALIZATION	CODE						[CODE] [CAL.] [e.t.c.]	
	2	LOCK1	OFF					○	0: [OFF] 1: [ON]	62(R)
	3	LOCK2	OFF					○	0: [OFF] 1: [ON]	63(R)
	4	LOCK3	OFF					○	0: [OFF] 1: [ON]	64(R)
	5	PASSWORD	0000					○	0000 to 9999	
2	6	LANGUAGE( 言語 )	JPN( 日 )			○		○	0: [JPN( 日 )] 1: [ENG( 英 )]	66(R/W)
	7	[GROSS/NET] KEY	ON			○		○	0: [OFF] 1: [ON]	67(R/W)
	8	[DZ] KEY	ON			○		○	0: [OFF] 1: [ON]	68(R/W)
	9	[TARE ON] KEY	ON			○		○	0: [OFF] 1: [ON]	69(R/W)
	10	SELF CHECK DSP1								
3	11	SELF CHECK DSP2								
	12	SELF CHECK MEM								
	13	SELF CHECK KEY								
	14	SELF CHECK EXT								
	15	SELF CHECK COM								

## Calibration

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
1	1	ZERO CAL.	0		○			○	[OK]	Command
	2	SPAN CAL.	100.00		○			○	00001 to 99999	Command
	3	EQUIV. CAL.	3.0000mV/V		○			○	(VOL.) 0.0001 to 3.1250mV/V (WEIGHT) 00001 to 99999	83(R/W)
	4	BALANCE WEIGHT	100.00		○			○	00001 to 99999	84(R/W)
	5	MIN. SCALE DIV.	0.01		○			○	001 to 100	85(R/W)
2	6	NET OVER	999.99		○			○	00000 to 99999	86(R/W)
	7	GROSS OVER	999.99		○			○	00000 to 99999	87(R/W)
	8	UNIT DISPLAY	kg		○			○	0: [NONE] 1: [kg] 2: [t] 3: [g] 4: [N] 5: [lb]	88(R/W)
	9	DECIMAL PLACE	0.00		○			○	0: [NONE] 1: [0.0] 2: [0.00] 3: [0.000]	89(R/W)
	10	DZ REGULATION VAL.	02.00		○			○	0000 to 9999	8A(R/W)

## Option (In case of used BCD OUTPUT)

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
1	1	DATA UPDATA RATE	100 times		○			○	0: [1000 times] 1: [500 times] 2: [200 times] 3: [100 times] 4: [50 times] 5: [20 times] 6: [10 times] 7: [5 times]	
	2	OUTPUT WEIGHT	INDICATE		○			○	0: [INDICATE] 1: [GROSS] 2: [NET] 3: [RESULT]	

## Option (In case of used D/A OUTPUT)

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
1	1	D/A OUTPUT MODE	GROSS		○			○	0: [GROSS] 1: [NET] 2: [ZERO SCALE] 3: [FULL SCALE] 4: [RESULT]	
	2	ZERO OUTPUT	000.00		○			○	00000 to 99998	
	3	FULLSCALE OUT.	100.00		○			○	00000 to 99999	

## RS-485 (In case of used RS-485)

Page		Parameter	Initial value	L1	L2	L3	S	N	Alternatives • setting range	Communication command No.
1	1	COMM. MODE	HAND SH.			○		○	0: [HAND SH.] 1: [CONTINUITY] 2: [AT PRINT] 3: [Modbus-RTU]	
	2	BAUDRATE	19200bps			○		○	0: [4800bps] 1: [9600bps] 2: [19200bps] 3: [38400bps] 4: [57600bps] 3: [115.2kbps]	
	3	LENGTH	8bit			○		○	0: [7bit] 1: [8bit]	
	4	PARITY BIT	ODD			○		○	0: [NONE] 1: [ODD] 2: [EVEN]	
	5	STOP BIT	1bit			○		○	0: [1bit] 1: [2bit]	
2	6	TERMINATOR	CR+LF			○		○	0: [CR] 1: [CR+LF]	
	7	RS-485 ID	1			○		○	0 to 31	
	8	TRANSMISSION DELAY TIME	0ms			○		○	0 to 99	

## 23. Specifications

### ■ Analog section

Sensor excitation	5V DC	Output current: Within 90mA 6-wire (Up to six 350Ω load cells can be connected.)
Signal input range	-0.3 to 3.0mV/V	
Zero adjusting range	-0.2 to 3.0mV/V	
Accuracy	Nonlinearity	Within 0.01%FS ±1digit (When 3mV/V is input)
	Zero drift	0.025μV/ °C RTI Typ
	Gain drift	1ppm/ °C Typ
A/Dconverter	Speed	1000times/sec.
	Resolution	24bit (binary)
Calibration	Equivalent input calibration and actual load calibration	

### ■ Display section

Display	3.5 inch TFT color LCD module (Display area: 71mm×53mm) 320×240 dots	
Weight value display	5-digit Sign: Minus sign display	
Minimum scale division	Can be set in the range of 1 to 100.	
Decimal point	8 8. 8. 8. 8 The display position can be set.	
Over scale	A/D converter input over:	“LOAD”
	A/D converter input minus over :	“-LOAD”
	Net weight exceeding the “NET OVER” setting:	“NET OVER”
	Gross weight exceeding the “GROSS OVER” setting:	“GROSS OVER”
Unit display	NONE, kg, t, g, N, lb is selectable.	
Status display	Various states of weight are displayed.	

### ■ Setting section

How to set	Set by touch panel operation (with a key click buzzer). External setting can also be made by RS-232C etc..	
Memory of setting values	Initial values	NOV RAM (nonvolatile RAM)
	Other values	Lithium-battery-backed-up C-MOS RAM (The memory life is approx. 7 years or more, which varies depending on the operating conditions and storage environment.)
Protection of setting values	Setting operation can be prohibited to prevent changes by misoperation. (LOCK1, LOCK2, LOCK3)	

## ■ Interface

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

Transmitting method	Asynchronous
Baud rate	600bps
Number of times of output	Approx. 3times/sec.

RS-232C communications interface

Signal level	Based on RS-232C	
Transmitting distance	Approx.15m	
Transmitting method	Asynchronous	
Baud rate	9600/ 19200/ 38400/ 57600/ 76800/ 115.2k bps	
Bit configuratio	Start bit	1bit
	Character length	7/ 8 bit selectable
	Stop bit	1/ 2 bit selectable
	Parity bit	None, odd or even selectable
Communication mode	HAND SH./ CONTINUITY/ AT PRINT	
Code	ASCII	

## Option

BCD data output (BCO)

Specify sink type and source type at the time of order.

\* In case of source type, power supply should be externally arranged.

Output circuit	Open collector
Rated voltage	30V
Rated current	50mA or less
Output logic	Positive/negative logic selection
Input	BCD output logic, BCD output data hold
Output	Indicated value five-digits, sign, OVER, STROBE

D/A voltage output (DAV)

Output voltage range	0 to 10V
Conversion rate	1000times/sec.
Resolution	1/10000
Overrange	-2.0 to 12.0V

D/A current output (DAI)

Output current range	4 to 20mA
Conversion rate	1000times/sec.
Resolution	1/10000
Overrange	3.2 to 20.8mA

**CC-Link interface (CCL)**

Version	ver2.00
Occupied station	1 stations/ 2 stations/ 1 stations 2 times
Baud rate	156k/ 625k/ 2.5M/ 5M/ 10M bps
Station number	1 to 64 (when 1 stations or 1 stations 2 times is occupied) 1 to 63 (when 2 stations is occupied)

**DeviceNet interface (ODN)**

Baud rate	125k/ 250k/ 500k bps
Node address	0 to 63

**RS-485 communications interface**

Signal level	RS-485-compliant, two-wire	
Transmitting distance	Approx. 1km	
Transmitting method	Asynchronous, half-duplex communication	
Baud rate	4800/ 9600/ 19200/ 38400/ 57600/ 115.2k bps	
Bit configuratio	Start bit	1bit
	Character length	7/ 8 bit selectable (8 bits for Modbus-RTU)
	Stop bit	1/ 2 bit selectable
	Parity bit	None, odd or even selectable
	Terminator	CR, CR + LF selectable
Communication mode	HAND SH./ CONTINUITY/ AT PRINT/ Modbus-RTU	
Code	Binary (for Modbus-RTU)	
	ASCII (for UNI-Format)	

**■ External Input/Output**

Specify sink type and source type at the time of order.

\* In case of source type, power supply should be externally arranged.

External output signal (10 points)	Transistor open collector output. (Emitter = COM terminal) The output turns ON when the transistor turns ON.
External input signal (10 points)	ON when shorted with COM terminals by contact (relay, switch, etc.) or non-contact (transistor, TTL open-collector output, etc.)

**■ General Performance**

Required power supply	AC100V to AC240V (+10% -15%) [Free power supply 50/60Hz]	
Power consumption	18W max	
Operating conditions	Temperature	Operating temperature range: -10 °C to +40 °C Storage temperature range: -20 °C to +60 °C
	Humidity	80%RH or less (non-condensing)
Dimensions	96W × 96H × 138D (mm) (not including projections)	
Weight	Approx. 1.0kg	



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