
# F701-P

**WEIGHING INDICATOR**

## OPERATION MANUAL

01AUG2020REV.1.07

UNIPULSE

# Introduction

We appreciate your kind purchase of F701-P Weighing Indicator. The F701-P is a weighing indicator for load cell(s). It is best suited for checker and hopper scale measurements.
To take full advantage of high performance of F701-P, thoroughly read this operating manual first before use and understand the explanations contained herein for correct operating procedures.
Also, carefully store this instruction manual so that it can be referred to at any time.

# Safety Precautions

**For safety reasons, please read the following safety precautions thoroughly.**

Installation, maintenance and inspection of the F701-P should be performed by personnel having technical knowledge of electricity.
In order to have an F701-P Weighing Indicator used safely, notes I would like you to surely follow divide into "⚠ WARNING" and "⚠ CAUTION", and are indicated by the following documents. Notes indicated here are the serious contents related to safely. Please use F701-P after understanding the contents well.

| ⚠ WARNING |
|---|
| This sign forewarns the presence of hazards that could result in serious injury or fatality when incorrectly handled. |

| ⚠ CAUTION |
|---|
| This sign forewarns the presence of hazards that could result in personnel injury or property damage when incorrectly handled. |

# ⚠ WARNING

**This sign forewarns the presence of hazards that could result in serious injury or fatality when incorrectly handled.**

## Warning on design

- For the entire system to function safely when the F701-P becomes faulty or malfunctions, provide a safety circuit outside the F701-P.
- Since the F701-P has no power switch, install a breaker.
- Before using the F701-P as described below, make sure to consult with our sales personnel.
  - Use in environments not described in the operation manual.
  - Use greatly impacting human lives and assets, such as medical devices, transport devices entertainment devices, and safety devices.

## Warning on installation

- Do not disassemble, repair, or modify the F701-P. Doing so may cause a fire or an electric shock.
- Do not install in the following environments.
  - Places containing corrosive gas or flammable gas.
  - Where the product may be splashed with water, oil or chemicals.

## Warning on wiring

- Do not connect a commercial power source directly to the signal input/output terminals.
- Be sure to ground the protective ground terminal.
- The attached AC cable is designed for domestic use in Japan, and its rating is 125V AC, 7A. For use at voltages exceeding the rating and for overseas use, have a separate AC cable prepared.
- Before performing the following, make sure that no power is applied.
  - Attachment/detachment of connectors of options, etc.
  - Wiring/connection of cables to the signal input/output terminals.
  - Connection to the ground terminal.
- For connection to the signal input/output terminals, check the signal names and pin assignment numbers, and then carry out wiring properly.
- Do not connect anything to unused terminal(s).
- Before applying power, carefully check the wiring, etc.

## Warning during startup and maintenance

- Use a power supply voltage and load within the specified and rated ranges.
- Do not damage the power cord. Doing so may cause fire or electric shocks.
- Do not touch any signal input/output terminal while applying power. Doing so may cause electric shocks or malfunctions.
- If the cover of the main body is opened, it may cause an electric shock internally. Even if the power is off, the internal capacitor is charged. Contact us for internal inspection or repair.
- In the case of smoke, an abnormal smell or strange sound, immediately turn off the power, and disconnect the power cable.

# ⚠ CAUTION

**This sign forewarns the presence of hazards that could result in personnel injury or property damage when incorrectly handled.**

**Caution on installation**

- Use the F701-P as it is incorporated in a control panel, etc.
- Do not install in the following environments.
  - Where the temperature/humidity exceeds the range of the specifications.
  - Where the temperature changes remarkably or there is a danger of freezing or condensing.
  - Outdoors, or where the altitude exceeds 2000m.
  - Places exposed to direct sunlight.
  - Dusty places.
  - Locations with poor ventilation.
  - Places containing large quantities of salt or iron powder.
  - Where the main body is directly affected by vibrations or shocks.
- Take adequate shielding measures when using at the following locations.
  - Near a power line.
  - Where a strong electric field or magnetic field is formed.
  - Where static electricity, relay noise or the like is generated.
- Install the F701-P as far away from devices generating high frequency, high voltage, large current, surge, etc., as possible. Also, carry out wiring separately from their power lines. Do not carry out parallel wiring and common wiring.
- Do not use it, broken down.

**Caution on wiring**

- Tighten the screws for the terminals at the specified torque.
  If they are loose, shorts, fire or malfunctions may occur.
  Tightening torque: 0.5N•m
- For sensors, external inputs/outputs and RS-485, use shielded cables.
- The temporary overvoltage applied to the power should not exceed 1500V.

**Caution during startup and maintenance**

- For turning on/off the power, be sure to keep intervals of 5 seconds or more.
- After power-on, make sure to warm up the F701-P for at least 30 minutes or more before use.
- If the F701-P is not used by the specified method, its protective performance may be impaired.
- Maintenance
  - When performing maintenance, disconnect the power.
  - Do not wipe with a wet rag, or with benzine, thinner, alcohol, etc. Doing so may cause discoloration or deformation of the F701-P. In the case of heavy contamination, wipe off the contamination with a cloth after dipping it into a diluted neutral detergent and wringing it well, and then wipe with a soft, dry cloth.

**⚠ CAUTION** **This sign forewarns the presence of hazards that could result in personnel injury or property damage when incorrectly handled.**

Caution during transportation

- When the F701-P is shipped, spacers made of corrugated cardboard are used as cushioning materials.
  Though it is factory-designed so that shocks can sufficiently be absorbed, breakage may result if shocks are applied when the spacers are reused for transportation. If you send the F701-P to us for repair, etc., take adequate measures against shocks by using polyurethane materials, etc., separately.

Caution during disposal

- If you dispose of the product, handle it as industrial waste.

# 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

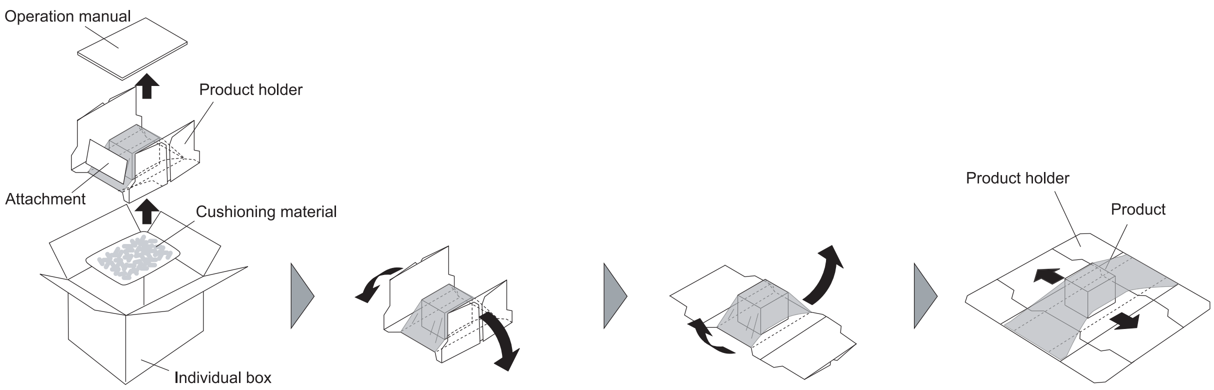
It is based on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE). The Directive restricts the use of specific substances in electrical and electronic equipments that could harm environment and human body. The substances are lead, mercury, cadium, 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).

# Notice at the Time of Unpacking or Re-packing

Please be careful following matters when you unpack the carton containing our product.

- Unpack the carton in the clean space to prevent troubles caused by dust or dirt.
- Check the product visually whether there is any crack or damage on the external appearance after unpacking.
- Check the attachments and confirm the number of them.

1. The attachments are packed in the carton box with the product.
   Take out the product holder and the attachments from the individual box.
   Then take the product out of the product holder as shown in the figures below.




①Take the product holder, attachment case and operation manual out of the individual box. Attachments are contained in the attachment case.

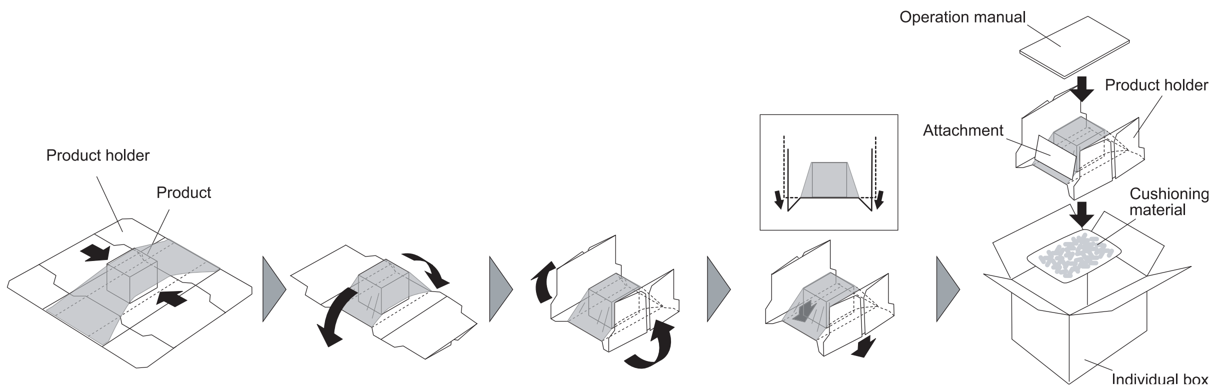
②Take the product out of the product holder. Return the each part of bent cardboard downward.

③Then return the lower part of card board in the 90 degrees direction of ② to ease the tension of film.

④Take out the product between the cardboard and film.

* The durability of product holder is not enough for the use of repetition. Reuse of the product holder is not recommended. In case you have to use it for re-packing, Please confirm the deterioration of the film and cardboard then follow procedure below. Depending on deterioration of the film, We recommend to pack with additional cushioning material or pack with new cushioning material.

2. When you re-pack the product please follow the guidance of figures below.




①Insert the product between the center of the film and the card board of the product holder.

②Then bend the each part of cardboard downward to the direction of stretching the film as shown in the figure.

③Bent the each part of cardboard in the 90 degrees direction of ②upward as shown in the figure.

④Bend fold line inside of fold line made by ③ to downward as shown in the figure so as to narrow width of the product folder.

⑤Place cushioning material in a bottom of the individual box then put attachment and operation manual into the individual box as shown in the figure.

If you find any damage on the product or lack of contents, please contact the department of Unipulse or our agency where you purchased the product with having kept the state as it is.

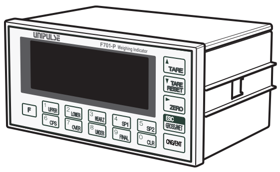
# Contents

# M E M O

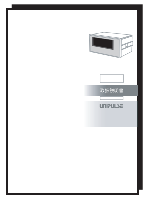
# 1 OUTLINE

## 1-1. Contents of the package

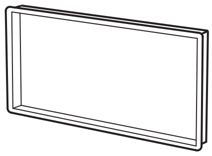
The packaging box contains the following.
Make sure to check them before use.



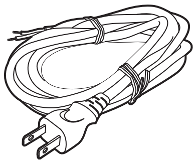
F701-P body ・・・1



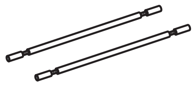
F701-P operation manual ・・・1



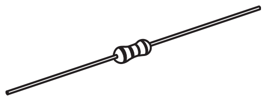
Packing・・・1



AC input cord・・・1

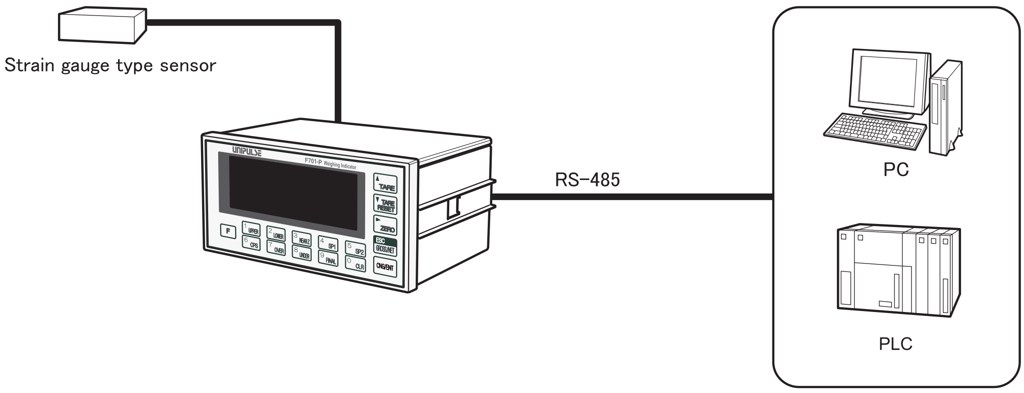


Jumper wire・・・2



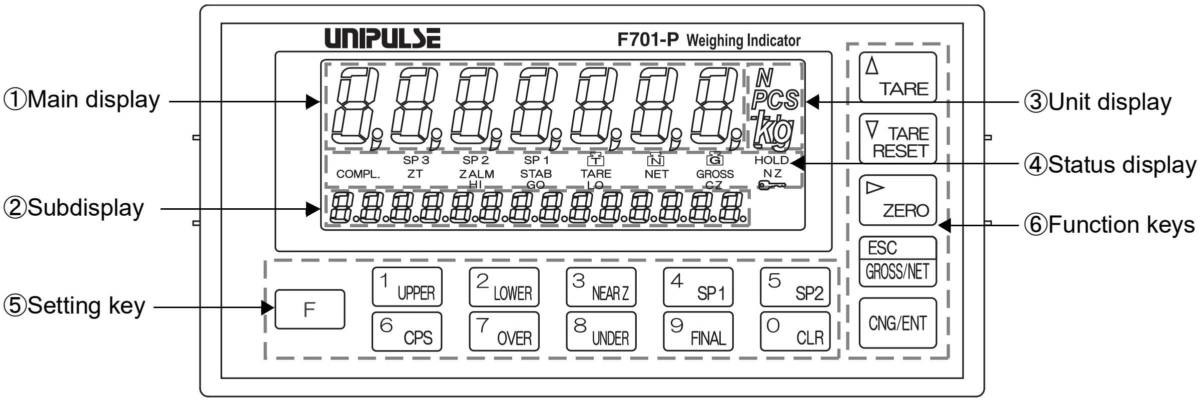
Terminating resistance・・・1

## 1-2. About connectable devices



# 1-3. Appearance description

## ■Front panel




### ①Main display

The following three types of displays will appear.

(1) Weight value display

Gross weight or net weight is displayed.

In the case of a calibration error, the error and weight value are displayed alternately.

(2) Over scale/error display

Over scale and other errors are displayed.

* See "11-2.Over scale/error display" on page 100.

(3) Setting value display

Various setting values are displayed.

### ②Subdisplay

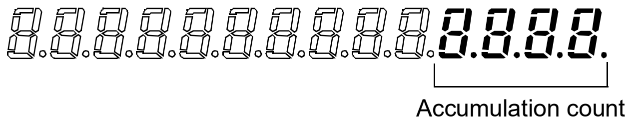
Weighing data, such as accumulation value, and various setting values are displayed by setting.

* See "5-2.Subdisplay selection (setting mode 4-5)" on page 31.

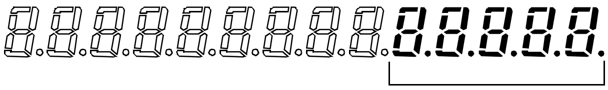
(1) Accumulation count and accumulation value


(2) Accumulation value

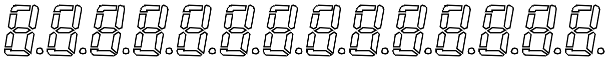

(3) Accumulation count



(4) Final




(5) None



| | |
|---|---|
| Accumulation count | An accumulated count is displayed. No more accumulations are made after "9999", which cannot be counted up any more. It is initialized to "0" by performing Accumulation Clear. |
| Accumulation value | An accumulated value is displayed. It is initialized to "0" by performing Accumulation Clear. |
| Final setting value | "Final (target value)" set by setting mode 0-9 is displayed. |

## ③Unit display

A selection can be made from t, g, kg, lb, and none by setting.

## ④Status display

| | |
|---|---|
| NZ | Lights when the weight value ≦ near zero setting value.<br>* The type of weight value is determined by near zero comparison mode (Weighing function 1 in setting mode 1-4). |
| CZ | Lights at the true zero point (0±1/4 scale division) (when 1/4 scale division in setting mode 4-5 "display selection" is off).<br><br>Lights at the true zero point (0±1/4 scale division) and the central point of the scale interval of the indicated value {indicated value±(1/4×min scale division)} (when 1/4 scale division in setting mode 4-5 "display selection" is on). |
| ZT | Lights when the zero tracking function is working. |
| HOLD | Lights when the weight value is held. |
| ZALM | Blinks when the total amount of digital zero exceeds the DZ regulation value by digital zero or zero tracking operation. |
| STAB | Lights when the weight value is stable.<br>* For the definition of stability, see "5-6.Motion detection(MD) (setting mode 1-5, 2-3)" on page 33. |
|  | Lights when the LOCK(soft) is on. |

| | |
|---|---|
| TARE | Lights when tare subtraction is performed.<br>Blinks when the tare weight is displayed by setting mode 1-9 "tare display." |
| NET | Lights when the net weight is displayed.<br>Goes out when the gross weight is displayed. |
| GROSS | Lights when the gross weight is displayed.<br>Goes out when the net weight is displayed. |

The contents of the display differ according to the setting of the comparison mode. (Comparison timing in weighing function 1 of setting mode 1-4)

●When comparison mode 0 (upper/lower limit comparison mode) is set

| | |
|---|---|
| HI | Lights when the weight value > upper limit setting value. |
| GO | Lights when the lower limit setting value≦weight value≦upper limit setting value. |
| LO | Lights when the weight value < lower limit setting value. |

●When comparison mode 1 (over/under comparison mode) is set

| | |
|---|---|
| HI | Lights when the weight value > (target value + over). |
| GO | Lights when (target value - under) ≦ weight value ≦ (target value + over). |
| LO | Lights when the weight value < (target value - under). |

●When comparison mode 2 (discharging control mode) is set

| | |
|---|---|
| COMPL. | Lights while the complete signal is output. |
| SP 3 | Lights when the weight value ≧ (final - compensation). |
| SP 2 | Lights when the weight value ≧ (final - Set point 2). |
| SP 1 | Lights when the weight value ≧ (final - Set point 1). |

## ⑤Setting keys

| | |
|---|---|
| 0 CLR | Pressing 0 CLR → CNG/ENT immediately executes Accumulation Clear (when in setting mode 0). |
| 1 UPPER – 9 FINAL | Numeric keys to make settings. |
| F | Function key to change the setting mode. |

## ⑥Function keys

△ TARE

< TARE >

Pressing this key immediately performs tare subtraction to zero the net weight.
At the same time, “ TARE “ lights.

< ▲ >

While a setting item is displayed, this key functions to change the selected item number. Also, while an item is changed, this key functions to increment the numerical value of each digit by one.


< TARE RESET >

Tare subtraction is reset by this key. However, the tare weight by digital tare subtraction (preset tare weight) is not reset.

< ▼ >

While a setting item is displayed, this key functions to change the selected item number. Also, while an item is changed, this key functions to decrement the numerical value of each digit by one.


< ZERO >

Pressing this key immediately zeros the gross weight.
If this operation is performed in a range exceeding the DZ regulation value, the DZ regulation value is subtracted from the gross weight, and a zero alarm results. At the same time, "ZALM" will blink.

< ▶ >

While an item is changed, this key functions to move over digits.


< ESC >

Pressing this key while a setting item is displayed returns you to the weight value display.

< GROSS/NET >

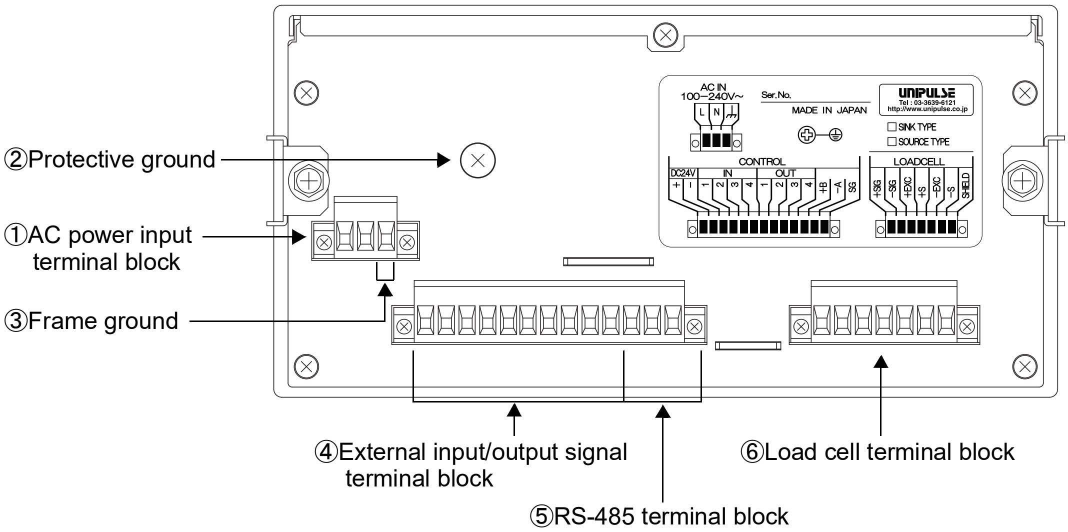
Pressing this key when a weight value is displayed immediately switches between gross weight and net weight. Switching is performed to the net weight display by pressing this key when gross weight is displayed ("G GROSS" is on), and switching is performed to the gross weight display by pressing this key when net weight is displayed ("N NET" is on).


While a setting item is displayed, this key functions to start changing the item, and while an item is changed, it functions to fix the setting item.

**Point**

The functioning of TARE, TARE RESET, ZERO, and GROSS/NET can be disabled by key invalid (setting mode 3-5).

## ■Rear panel




### ①AC power input terminal block

Connect AC power code. The input voltage is 100V - 240V AC.

The applicable terminal block is JITE-manufactured PTB750B-04-2-3P-3.

### ②Protective ground ⏚

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

### ③Frame 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.

### ④External input/output signal terminal block

This is a terminal block to make external signal inputs and external signal outputs. Output circuit become sink type or source type by designated when shipped.

The input/output and internal circuits are electrically insulated by photocoupler.

The applicable terminal block is JITE-manufactured PTB750B-04-2-3P-3.

### ⑤RS-485 terminal block

This RS-485 terminal block is intended for sending and receiving weight data, information, etc.

### ⑥Load cell input terminal bblock

This is a terminal block to connect load cell(s).

The applicable terminal block is Osada-manufactured ETB42-07P.

# 2 CONNECTION

Precautions about connection to the signal input/output terminal block are given below.
The precautions described here are important for safety.
Please properly understand the descriptions before connection.

## ⚠ WARNING

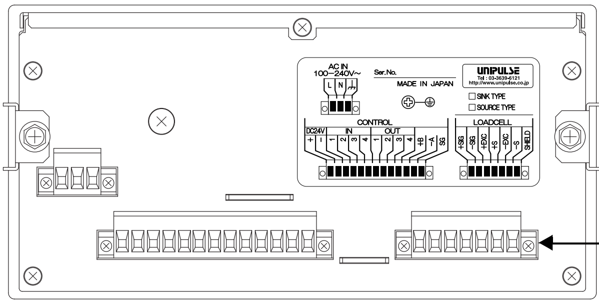
- Do not connect a commercial power source directly to the signal input/output terminals.
- Connect to the signal input/output terminals with no power applied because it may cause an electric shock.
- For connection to the signal input/output terminals, check the signal names and pin assignment numbers, and then carry out wiring properly.
- Before applying power, carefully check the wiring, etc.
- Do not touch any signal input/output terminal while applying power.
  Doing so may cause electric shocks or malfunctions.

## ⚠ CAUTION

- Tighten the terminal screws at the specified torque.
  If they are loose, shorts, fire or malfunctions may occur.
  Tightening torque: 0.5N•m
- Use shielded cables.

# 2-1. Load cell connection

The applied voltage and maximum current of the F701-P, to which up to six 350-ohm load cells can be connected in parallel, are 5V and 90mA, respectively.

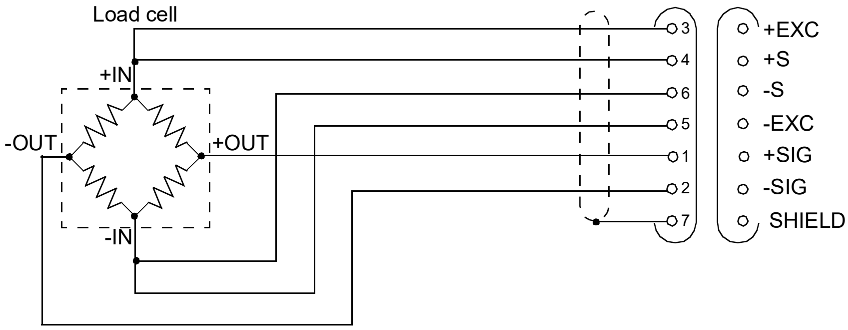



Load cell terminal block pin assignments

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

## ■6-wire connection

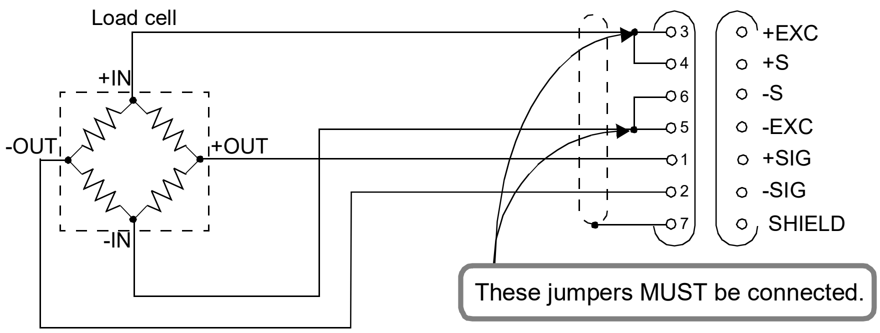
The load cell input of the F701-P is a 6-wire (remote sense) connection. 6-wire shielded load cell cable should be used and kept separate from AC or other noise generating wire.




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.
Even 4 and 6 on the terminal block are open, normal operation is performed apparently, but heating or breakage may occur because excessive voltage is applied to the load cell.
For connection, use the accessory jumper lines.



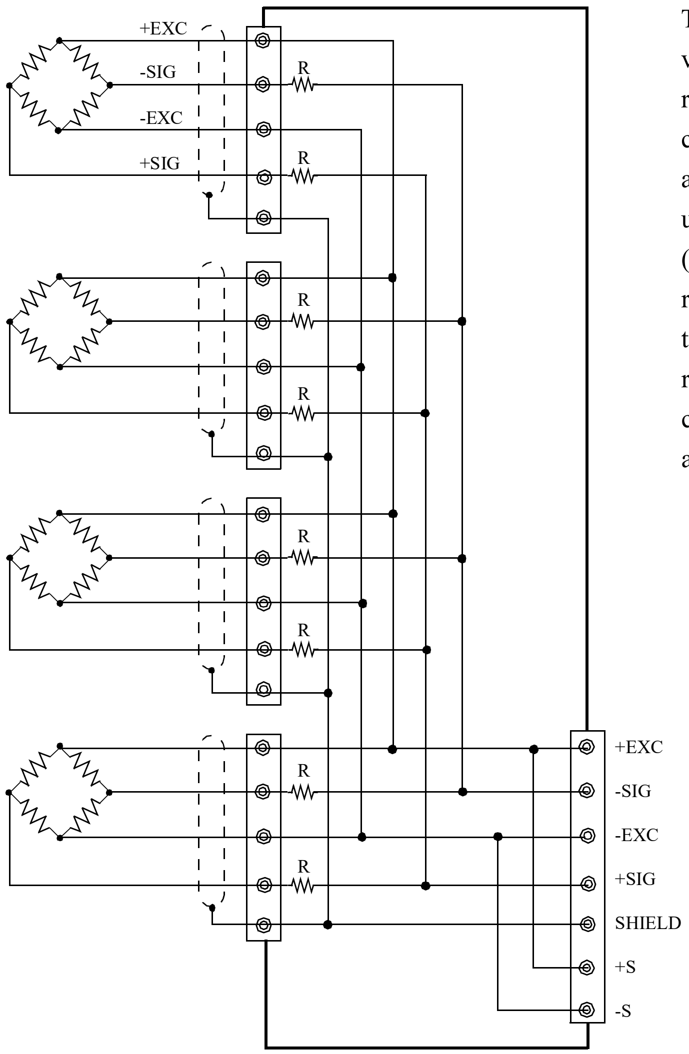

### ⚠ CAUTION

- The load cell excitation voltage of the F701-P is 5V. Heating or breakage may occur unless the load cells maximum excitation voltage is 5V or more.
- When using the F701-P with the four-wire load cell connected, be sure to connect +EXC and +S, and -EXC and -S. Even if +S and -S are not connected, normal operation is performed apparently, but heating or breakage may occur because excessive voltage is applied to the load cell.

## ■Connecting load cells in parallel

In some industrial weighing apparatus, two or more load cells may be connected in parallel to form a hopper scale or track scale. The manner of connection is shown below.

Parallel connection can simply be made by using the optionally available B410 (summing box for 4-point multi load cell).




The group of "n" parallel load cells viewed from this device side can be regarded as a unit load cell the rated capacity of which is multiplied by "n" and the sensitivity of which is unchanged. The averaging resistance (R) should be 300 - 500Ω, equal in relative ratio and excellent in temperature coefficient. No averaging resistance is needed if load cells with consideration for parallel connection are used.

**Attention**

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

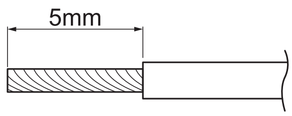
## ■Sensors cable

Cable colors of sensors may differ from one manufacturer to another (it may even differ from one model to another for some products).

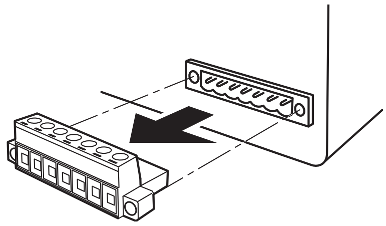
Refer to the sensor manual (or data sheet) and check signal names and colors in order to connect the cables correctly.

# 2-2. Connection of the load cell, power input terminal,RS-485 and external input/output signal terminal blocks

**1.** Peel the sheath of the wire to be connected 5mm, and twist the end to such an extent that it will not become loose.

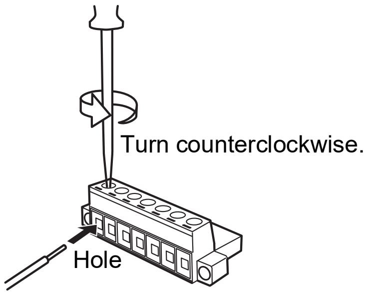



**2.** Remove the terminal block from the F701-P body with a strong pull.



**3.** Loosen the screw with a screwdriver to open the hole.
A Phillips screwdriver with a shaft diameter of 3 - 3.5mm #1 is recommendable.
(precision screwdriver, etc.)

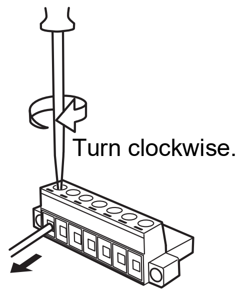
**4.** Insert the wire into the hole so as not to loosen the end.



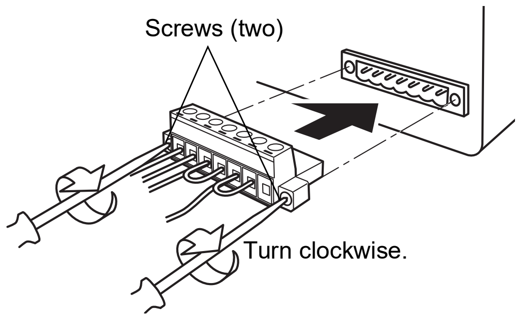

**5.** Tighten the screw with the screwdriver.

**6.** Lightly pull the wire to check that it is clamped securely.

* Connectable wires are 0.21 - 3.31mm$^2$ (AWG12 - 24).
Recommendable tightening torque is 0.5Nm.

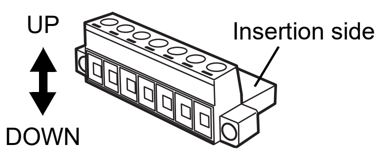



**7.** Insert the wire-connected plug into the F701-P body, and tighten the screws (two).




**Attention**

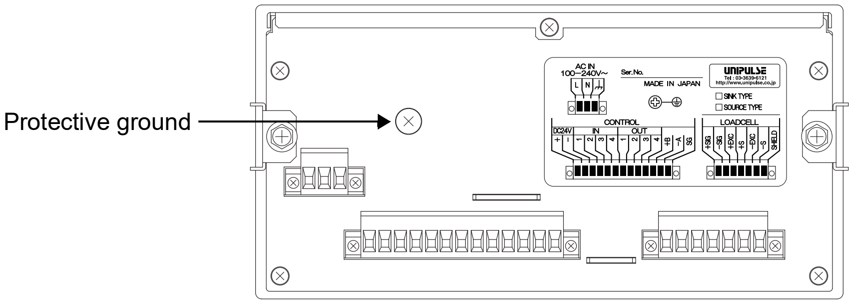
When mounting the terminal block to the F701-P body, check its vertical orientation. (See the illustration on the right-hand side.)



* The above is an example of connection of a load cell (7P). In connection of a power supply input, RS-485, and an external I/O signal, the form (the number of pins) of a connector is different. (A screwdriver with a shaft diameter of 3.0mm is recommendable.)
Moreover, make sure that no power voltage is applied when connecting the power input.
The input voltage is 100V to 240V AC. The frequency is 50/60Hz.

# 2-3. Connection of the protective ground

The grounding terminal is for prevention of electric shocks.
Use an approx. 0.75mm$^2$ thick wire, and be sure to ground.




## ⚠ WARNING

- Connect with no power applied because it may cause an electric shock.
- The attached AC cable is designed for domestic use in Japan, and its rating is 125V AC, 7A. For use at voltages exceeding the rating and for overseas use, have a separate AC cable prepared.
- Since the F701-P has no power switch, install a breaker.
- Be sure to ground the protective ground terminal to prevent electric shocks.
  Do not use other screws than that attached to the main body.

# 3 SETTING METHOD

## 3-1. Setting procedure

Change settings in the order of
"selection of a setting mode"→"selection of a setting item"→"registration of a setting value."

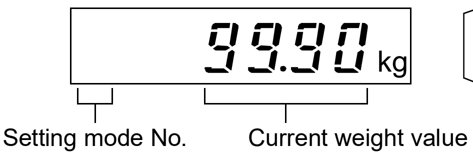
### ■How to designate a setting mode No.

In the text, how to designate a setting mode No. is described as follows:

Example) For designating setting mode 4

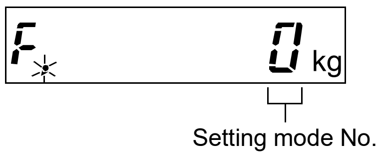
[F] → [CNG/ENT] → [4 SP1] → [CNG/ENT]

This operation can be performed by the following procedure.



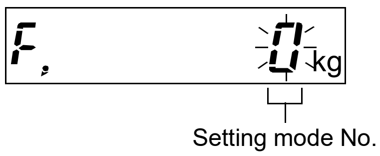

[Usual condition is setting mode 0.
In mode 0, no mode number is displayed.]

**1.** When a weight value is displayed, press the [F] key.



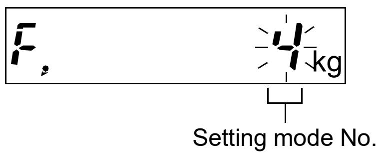

[The display changes.]

**2.** Press the [CNG/ENT] key.



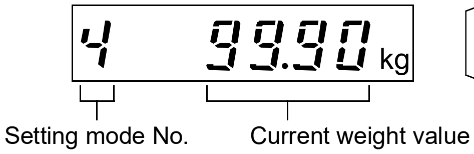

[The setting mode No. blinks.]

**3.** Select a setting mode No.. ([4 SP1])




[The input number blinks.]

**4.** Press the [CNG/ENT] key.




(The selected setting mode No. and weight value are displayed (Setting mode No. display).)

**Point**

Pressing the [ESC GROSS/NET] key when a setting mode No. is displayed restores the usual display (setting mode 0).

## ■How to register a setting value

In the text, how to register a setting value is described as follows:

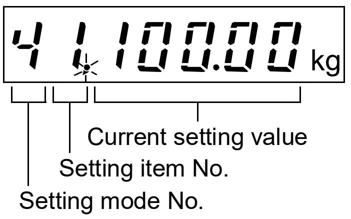
Example 1) For setting a balance weight value of 50.00kg (setting by numerical input)

[1 UPPER] → [CNG/ENT] → [ ] [ ] [ ] [ ] [ ] → [CNG/ENT]

This operation can be performed by the following procedure.

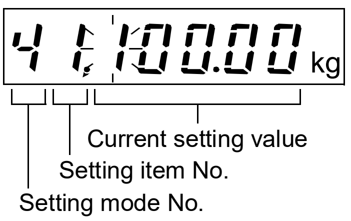
* However, it is assumed that setting mode 4 is selected.

**1.** Select a setting item.
(Press the [1 UPPER] key because the balance weight value setting item No. is 1.)



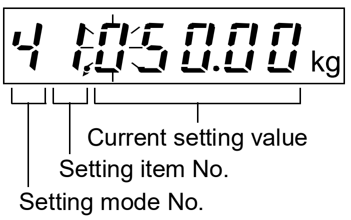

(The setting mode No., setting item No., and current setting value are displayed.)

**2.** Press the [CNG/ENT] key.



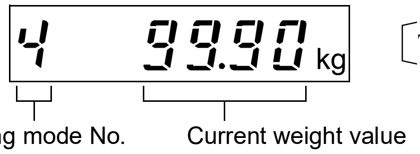

(The highest-order digit of the setting value blinks.)

**3.** Input a setting value. ([0 CLR] [5 SP2] [0 CLR] [0 CLR] [0 CLR])




(The blinking number moves to a lower-order digit each time a number is pressed.
When a number is input to the lowest-order digit, the highest-order digit starts blinking again, so that you can redo the setting as many times as you want.)

**4.** Upon input of a proper setting value, press the [CNG/ENT] key to register the setting value.



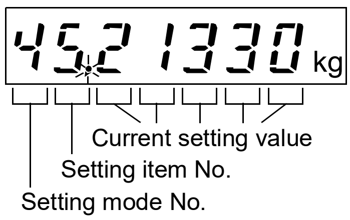

[The display returns to the setting mode No. display.]

Example 2) For turning off 1/4 scale division (setting by choice)

[5 SP2] → [CNG/ENT] → [▷ ZERO] [ ] → [CNG/ENT]

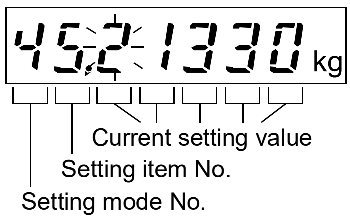
This operation can be performed by the following procedure.
* However, it is assumed that setting mode 4 is selected.

**1.** Select a setting item.
(Press the [5 SP2] key because the 1/4 scale division setting item No. is 5.)



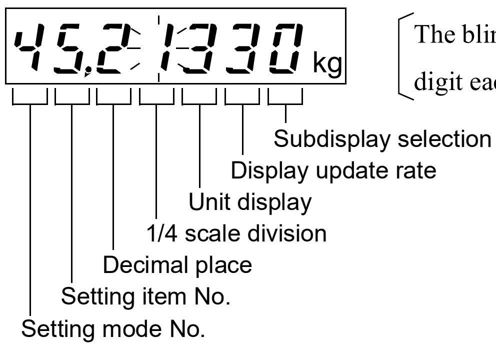

[The setting mode No., setting item No., and current setting value are displayed.]

**2.** Press the [CNG/ENT] key.




[The highest-order digit of the setting value blinks.]

**3.** Move by using the [▷ ZERO] key until the digit you want to set blinks. ([▷ ZERO])




[The blinking number moves to a lower-order digit each time the [▷ ZERO] key is pressed.]

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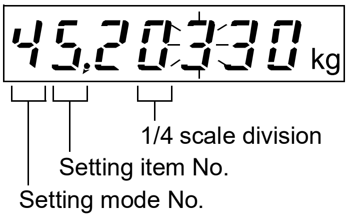
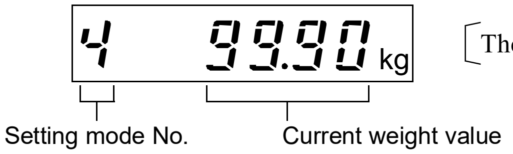
**4.** Make a choice among the alternatives.
(Press the [O CLR] key because 1/4 scale division should be turned off.)




(Since the blinking number moves to a lower-order digit each time the [▷ ZERO] key is pressed, you can redo the setting as many times as you want.)

**5.** Upon input of a proper choice, press the [CNG/ENT] key to register the choice.




[The display returns to the setting mode No. display.]

**Point**

By pressing the [ESC GROSS/NET] key when a setting item No. is displayed (while a setting value is changed after an item is selected), you can exit the item. (The display returns to the setting mode No. display.)

# 3-2. Setting modes

## ■Setting mode 0

Setting mode 0 relates to weighing comparison.

- Upper limit

| | | | |
|---|---|---|---|
| 1 UPPER | 01 | □□□□□ | (0 - 99999) |

- Lower limit

| | | | |
|---|---|---|---|
| 2 LOWER | 02 | □□□□□ | (0 - 99999) |

- Near zero

| | | | |
|---|---|---|---|
| 3 NEAR Z | 03 | □□□□□ | (0 - 99999) |

- Set point 1

| | | | |
|---|---|---|---|
| 4 SP1 | 04 | □□□□□ | (0 - 99999) |

- Set point 2

| | | | |
|---|---|---|---|
| 5 SP2 | 05 | □□□□□ | (0 - 99999) |

- Compensation

| | | | |
|---|---|---|---|
| 6 CPS | 06 | □□□□ | (0 - 9999) |

- Over

| | | | |
|---|---|---|---|
| 7 OVER | 07 | □□□□ | (0 - 9999) |

- Under

| | | | |
|---|---|---|---|
| 8 UNDER | 08 | □□□□ | (0 - 9999) |

- Final (target value)

| | | | |
|---|---|---|---|
| 9 FINAL | 09 | □□□□□ | (0 - 99999) |

## ■Setting mode 1

Setting mode 1 relates to weighing supplements.

- Comparison inhibit time

| | | | |
|---|---|---|---|
| 1 UPPER | 11 | □.□□ | (0 - 9.99) |

- Judging time

| | | | |
|---|---|---|---|
| 2 LOWER | 12 | □.□ | (0 - 9.9) |

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- Complete output time (hold time)

3 NEAR Z | 13 | . | (0 - 9.9)

- Weighing function 1

4 SP1 | 14 | ☐☐☐☐☐

Comparison mode
0: Uppert/Lower limit comparison mode
1: Over/Under comparison mode
2: Discharging control mode

Comparison timing
Comparison mode 0:
Upper/Lower limit comparison mode
0: Compare regularly
1: Compare in a stable condition
2: Compare regularly except near zero
3: Compare in a stable condition except near zero
4: Comparison is made when the external judgment input is ON

Comparison mode 1:
Over/Under comparison mode
0: Compare regularly
1: Compare in a stable condition
2: Compare regularly except near zero
3: Compare in a stable condition except near zero
4: Comparison is made when the external judgment input is ON

Comparison mode 2:
Discharging control mode
(COMPLETE signal output timing)
0: ON from when the judging timer has elapsed
1: ON from when stable condition is established after the judging timer has elapsed
2: ON from when the judging timer has elapsed or from when stable condition is established

Comparison weight value
Comparison weight in each comparison mode
0: GROSS
1: NET
2: Comparison OFF

Near zero comparison mode
0: Near zero signal ON when gross weight ≦ near zero setting value
1: Near zero signal ON when net weight ≦ near zero setting value
2: Near zero signal ON when |gross weight| ≦ near zero setting value
3: Near zero signal ON when |net weight| ≦ near zero setting value
4: Comparison OFF

Auto hold mode
0: Invalid
1: Valid

- Weighing function 2

5 SP2 | 15 | ☐☐☐

Preset tare weight
0: ON
1: OFF

Stable detection mode
0: Stable mode
1: Checker mode

Filter in stable condition
0: Insert (256 times)
1: Not insert

- Tare setting

8 UNDER | 18 | □□□□□ (0 - 99999)

- Tare display

9 FINAL | 19 | □□□□□ (-99999 - 99999) * Display only

## ■Setting mode 2

Setting mode 2 relates to internal operations.

- Digital low pass filter

1 UPPER | 21 | □

| | |
|---|---|
| 0: 1.5Hz | 3: 3Hz |
| 1: 2Hz | 4: 4Hz |
| 2: 2.5Hz | 5: 5Hz |

- Moving average filter

2 LOWER | 22 | □□□ (1 - 512)

- Motion detection (period - range)

3 NEAR Z | 23 | □.□ - □□ (0.0 - 9.9 — 0 - 99)

period (sec.) range (count)

- Zero tracking (period)

4 SP1 | 24 | □.□ (0 - 9.9)

- Zero tracking (range)

5 SP2 | 25 | □□□□ (0 - 9999)

## ■Setting mode 3

Setting mode 3 relates to weighing.

- Total comparison selection

1 UPPER | 31 | □

0: Comparison OFF
1: Total comparison ON
2: Count comparison ON

- Total limit (high 4)

2 LOWER | 32 | □□□□ (0 - 9999)

- Total limit (under 5)

3 NEAR Z | 33 | □□□□□ | (0 - 99999)

- Count limit

4 SP1 | 34 | □□□□ | (0 - 9999)

- Key invalid

5 SP2 | 35 | □□□□

[TARE] key
0: Invalid
1: Valid

[TARE RESET] key
0: Invalid
1: Valid

[ZERO] key
0: Invalid
1: Valid

[GROSS/NET] key
0: Invalid
1: Valid

- LOCK

6 CPS | 36 | □□

LOCK1
0: OFF
1: ON

LOCK2
0: OFF
1: ON

- External input selection

7 OVER | 37 | □□□□

External input 1
External input 2
External input 3
External input 4

0: G/N
1: D/Z ON
2: TARE ON
3: TARE OFF
4: Accumulation clear
5: HOLD/JUDGE

- External output selection

8 UNDER | 38 | □□□□

External output 1
External output 2
External output 3
External output 4

0: COMPL.
1: SP1
2: SP2
3: SP3
4: HI
5: GO
6: LO
7: STAB
8: Weight Error
9: Total limit

- Password

9 FINAL | 39 | □□□□ | (0 - 9999)

## ■Setting mode 4

Setting mode 4 relates to calibration.

### - Balance weight value

1 UPPER | 41 | □□□□□ | (0 - 99999)

### - Capacity

2 LOWER | 42 | □□□□□ | (1 - 99999)

### - Min scale division

3 NEAR Z | 43 | □□ | (1 - 50)

### - DZ regulation value

4 SP1 | 44 | □□□□ | (0 - 9999)

### - Display selection

5 SP2 | 45 | □□□□□

Decimal place
- 0: None
- 1: 0.0
- 2: 0.00
- 3: 0.000

1/4 scale division
- 0: OFF
- 1: ON

Unit display
- 0: None
- 1: t
- 2: g
- 3: kg
- 4: lb

Display update rate
- 0: 1 times/sec.
- 1: 2 times/sec.
- 2: 5 times/sec.
- 3: 10 times/sec.
- 4: 20 times/sec.

Subdisplay selection
- 0: Accumulation Count / Accumulation Value
- 1: Accumulation Value
- 2: Accumulation Count
- 3: Final
- 4: None

### - Gravitational acceleration

6 CPS | 46 | 9.□□□□ | (9.7500 - 9.8500)

* Set four digit after decimal places only.

## ■Setting mode 5

Setting mode 5 relates to I/F.

### - RS-485 I/F setting

1 UPPER　　5 1　　□□□□□

Baud rate
0: 1200bps
1: 2400bps
2: 4800bps
3: 9600bps
4: 19200bps
5: 38400bps

The length of character
0: 7bit
1: 8bit

Parity bit
0: None
1: Odd
2: Even

Stop bit
0: 1bit
1: 2bit

Terminator
(effective at only UNI-Format)
0: CR
1: CR+LF

### - Communication type

2 LOWER　　5 2　　□□

Mode
0: Command
1: Auto
2: Continuous
3: Modbus-RTU

Format
(effective at "Auto" or "Continuous")
0: Gross weight
1: Net weight
2: Gross weight + Net weight

### - RS-485 ID

3 NEAR Z　　5 3　　□□　　(0 - 31)

### - Transmission delay time

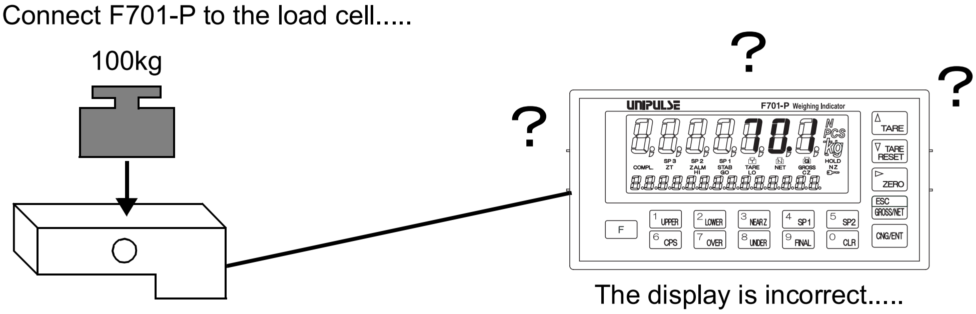
4 SP1　　5 4　　□□　　(0 - 99)

# 4 CALIBRATION

## 4-1. Span calibration

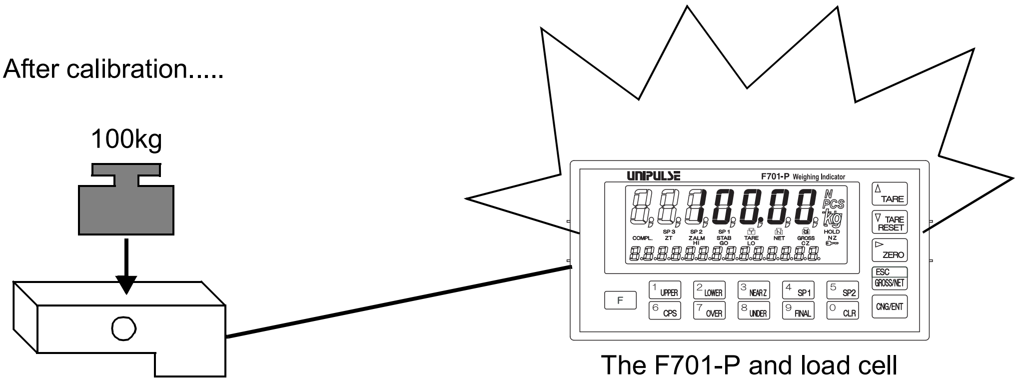
Calibration is performed for matching the F701-P to a load cell. For example, it is work to adjust so that the F701-P accurately displays 100.00kg when an actual load (or weight) of 100kg is applied to the load cell (balance section) of the weighing apparatus to which the F701-P is connected. This operation is called Span Calibration.

Connect F701-P to the load cell.....




The display is incorrect.....

After calibration.....




The F701-P and load cell
function as a weighing device

# 4-2. Span calibration procedure

Follow the steps below to perform Span Calibration.

| Step | Setting mode | Description |
|---|---|---|
| Setting value LOCK release | (Setting mode 3-6) | Release the setting value LOCK that disables calibration. |
| ↓ Unit display | (Setting mode 4-5) | Set the unit for display. |
| ↓ Decimal place | (Setting mode 4-5) | Set the decimal place. |
| ↓ Capacity | (Setting mode 4-2) | Set the capacity for use as a scale.<br>If the value set here is exceeded by 9 scale divisions, over scale display "oFL2" will appear. |
| ↓ Min scale division | (Setting mode 4-3) | Set the minimum unit (scale interval) for weighing. |
| ↓ Balance weight value | (Setting mode 4-1) | Set the value of the load (balance weight) applied to the load cell (scale). |
| ↓ Gravitational acceleration | (Setting mode 4-6) | Input the acceleration of the region in which calibration is performed. |
| ↓ Zero calibration | (Setting mode 9) | Register the initial zero point. |
| ↓ Span calibration | (Setting mode 9-1) | Apply the load (balance weight) to the load cell (scale) and register the span (gain). |
| ↓ Setting value LOCK | (Setting mode 3-6) | Disable calibration to prevent misoperation. |

**Attention**

- Set the balance weight value below the capacity.
- For performing calibration at the rated value in the specifications of the load cell, set the capacity identical to the rated value of the load cell.
- In the case where load cells are connected in parallel, which can be associated with a voltage drop by wiring material depending on the connection method, the input value may differ from the output value in the specifications of the load cell. In such a case, register the actual input value to perform proper calibration.
- If the region of use changes from the region where calibration was performed, weight errors may occur due to a difference in gravitational acceleration. Re-input the gravitational acceleration in the region of use, referring to the gravitational acceleration correction table.

# 4-3. Preparation before calibration

## ■LOCK release

Calibration values and setting values can be locked so as not to be changed by misoperation.
In LOCK, there is software LOCK applied by setting. To perform calibration, release the lock.

1. Select setting mode 3-6(LOCK).

2. Set the setting LOCK2 to OFF.


Now, the LOCK is released. Upon completion of calibration, apply the LOCK to protect the calibration values.

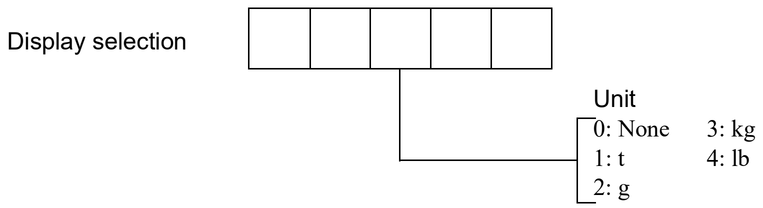
**Point**

For the LOCK and setting values protected, see "11-1.List of setting values" on page 97.



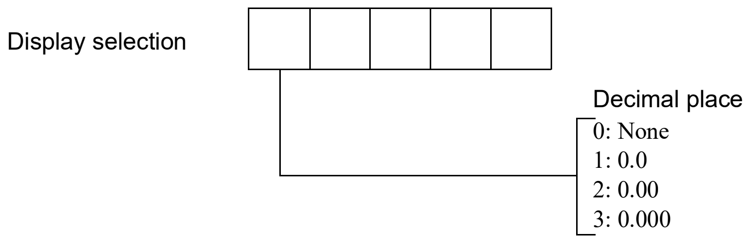
## ■Unit display (setting mode 4-5)

Set the unit for weighing.
Select the unit from 0: None/1: t/2: g/3: kg/4: lb.




## ■Decimal place (setting mode 4-5)

Set the decimal place common to weight-related displays and setting items, etc., by this selection.
Select the decimal place from 0: None/1: 0.0/2: 0.00/3: 0.000.




**Point**

In the F701-P, the decimal place is fixed for all other than weight-related data.
* It cannot be changed.

## ■Capacity (setting mode 4-2)

Set the maximum value (capacity) for use as a scale. If the value set here is exceeded by 9 scale divisions, over scale display "oFL2" will appear.
(Input range/1 - 99999)

## ■Min scale division (setting mode 4-3)

Set the minimum unit (scale interval) for weighing.
(Input range/1 - 50)

## ■Balance weight value (setting mode 4-1)

Set in advance the value of the balance weight applied to the load cell (scale) during span calibration.
(Input range/0 - 99999)



## ■Gravitational acceleration (setting mode 4-6)

This function is to correct weight errors caused by differences in gravitational acceleration from region to region in the case where the calibration location and installation location of the scale are different.
If the calibration location and installation location are in the same region, this setting is not required.
Find the acceleration of the region in which actual load calibration is performed from the following gravitational acceleration correction table, set the acceleration value, and then perform actual load calibration. Next, find the actual installation area from the table, and re-set the gravitational acceleration. This corrects the difference in gravitational acceleration from the calibration location.

World's gravitational accelerations

| Area | (G) | Area | (G) | Area | (G) |
|---|---|---|---|---|---|
| Amsterdam | 9.8128m/s$^2$ | Hanoi | 9.7870m/s$^2$ | Oslo | 9.8191m/s$^2$ |
| Athens | 9.7999m/s$^2$ | Havana | 9.7883m/s$^2$ | Ottawa | 9.8066m/s$^2$ |
| Auckland | 9.7986m/s$^2$ | Helsinki | 9.8193m/s$^2$ | Paris | 9.8097m/s$^2$ |
| Bangkok | 9.7832m/s$^2$ | Ho Chi Minh | 9.7820m/s$^2$ | Phnom Penh | 9.7824m/s$^2$ |
| Beijing | 9.8155m/s$^2$ | Hong kong | 9.7878m/s$^2$ | Rio de janeiro | 9.7879m/s$^2$ |
| Berlin | 9.8129m/s$^2$ | Kualalumpur | 9.7805m/s$^2$ | Rome | 9.8034m/s$^2$ |
| Birmingham | 9.8127m/s$^2$ | Kuwait | 9.7928m/s$^2$ | San Francisco | 9.7994m/s$^2$ |
| Brussels | 9.8115m/s$^2$ | Lisbon | 9.8006m/s$^2$ | Seoul | 9.7995m/s$^2$ |
| Buenos Aires | 9.7970m/s$^2$ | London | 9.8120m/s$^2$ | Shanghai | 9.7946m/s$^2$ |
| Kolkata | 9.7878m/s$^2$ | Los Angelse | 9.7965m/s$^2$ | Singapore | 9.7804m/s$^2$ |
| Capetown | 9.7964m/s$^2$ | Madrid | 9.8021m/s$^2$ | Stockholm | 9.8186m/s$^2$ |
| Chicago | 9.8030m/s$^2$ | Manila | 9.7836m/s$^2$ | Sydney | 9.7961m/s$^2$ |
| Copenhagen | 9.8156m/s$^2$ | Melbourne | 9.7995m/s$^2$ | Taipei | 9.7896m/s$^2$ |
| Nikosia | 9.7975m/s$^2$ | Mexico City | 9.7860m/s$^2$ | Tokyo | 9.7979m/s$^2$ |
| Djakarta | 9.7809m/s$^2$ | Milan | 9.8065m/s$^2$ | Vancouver,BC | 9.8099m/s$^2$ |
| Frankfurt | 9.8107m/s$^2$ | Mumbai | 9.7856m/s$^2$ | Washinton DC | 9.8007m/s$^2$ |
| Glasgow | 9.8155m/s$^2$ | New Delhi | 9.7922m/s$^2$ | Wellington | 9.8028m/s$^2$ |
| Istanbul | 9.8026m/s$^2$ | New York | 9.8021m/s$^2$ | Zurich | 9.8082m/s$^2$ |

China's gravitational accelerations

| Region | Acceleration (G) | Region | Acceleration (G) | Region | Acceleration (G) |
|---|---|---|---|---|---|
| Beijing | $9.8155 m/s^2$ | Wuhan | $9.7936 m/s^2$ | Kaifeng | $9.7966 m/s^2$ |
| Tianjin | $9.8011 m/s^2$ | Hohhot | $9.7986 m/s^2$ | Nanchang | $9.7920 m/s^2$ |
| Tangshan | $9.8016 m/s^2$ | Jilin | $9.8048 m/s^2$ | Guangzhou | $9.7883 m/s^2$ |
| Shijiazhuang | $9.7997 m/s^2$ | Changchun | $9.8048 m/s^2$ | Tsingtau | $9.7985 m/s^2$ |
| Kunming | $9.7836 m/s^2$ | Xi'an | $9.7944 m/s^2$ | Nanjing | $9.7948 m/s^2$ |
| Nanning | $9.7877 m/s^2$ | Chongqing | $9.7914 m/s^2$ | Shanghai | $9.7946 m/s^2$ |
| Liuzhou | $9.7885 m/s^2$ | Chengdu | $9.7913 m/s^2$ | Fuzhou | $9.7891 m/s^2$ |
| Urumqi | $9.8015 m/s^2$ | Harbin | $9.8067 m/s^2$ | Hangzhou | $9.7936 m/s^2$ |
| Hong Kong | $9.7878 m/s^2$ | | | | |

* If the region of calibration location is not listed, set the gravitational acceleration of a region close in latitude. However, the value in the list may differ from the actual value depending on latitude, altitude, etc. If accuracy is required, re-calibration in the region of use is recommended.

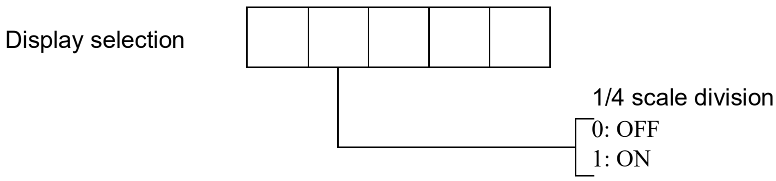


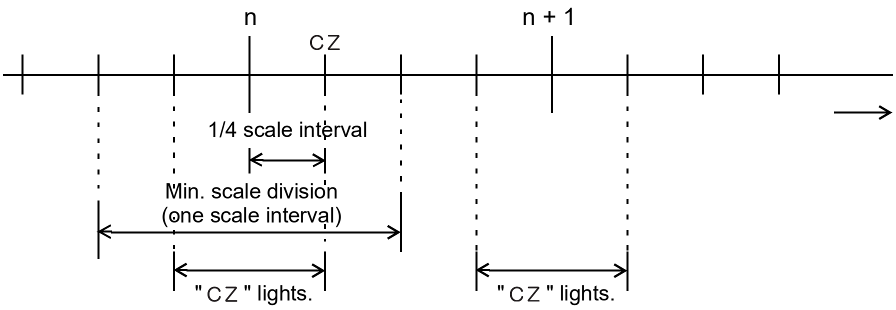
## ■1/4 scale division (setting mode 4-5)

This function detects the central point of the scale interval of the indicated value. The min scale division is further divided into four, and if the indicated value is at the central point, "CZ" is displayed.

Select the 1/4 scale division from 0: OFF/1: ON.

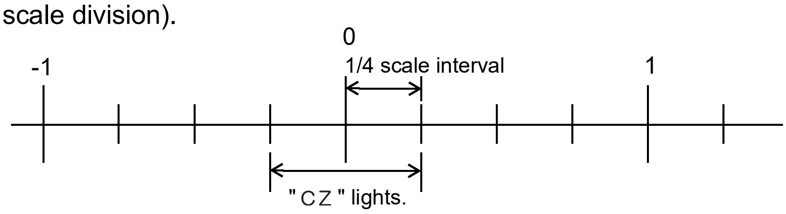
1. Select setting mode 4-5 (display selection).
2. SSelect the 1/4 scale division from 0: OFF/1: ON.




**Point**

If the 1/4 scale division is OFF, "CZ" lights only at the true zero point (display of 0±1/4 scale division).



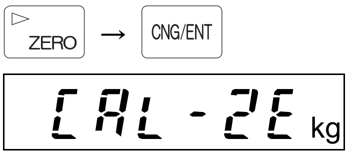
# 4-4. Zero calibration

Register the initial zero point.

- Check around the load cell (scale) for unwanted loads such that foreign matter is placed or there is contact with peripheral equipment.
- Check that " STAB " is on.
  (When the indicated value is not stable, accurate calibration cannot be performed.)

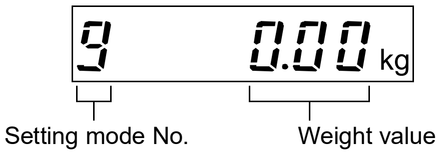
**1.** Select setting mode 9 (calibration mode).

**2.** Register the zero point.




[Display of zero calibration in progress.]

**3.** Zero calibration ends with the weight value display of "0".




* If a calibration error is displayed, take measures according to the error message, and perform zero calibration again. (See "11-2.Over scale/error display" on page 100.)

## c Err2 (calibration error)

The initial dead load exceeds the zero adjustment range.
Connect a resistor of an appropriate value between the +EXC and -SIG terminals of the load cell, shift the zero point, and then perform zero calibration again.

**Point**

For reference, relationships between connected resistance values and input signals are listed below.

| Resistance value | | Input conversion strain | |
|---|---|---|---|
| Calculated value | Approximate value | μ-STRAIN | mV/V |
| 875 kΩ | 866 kΩ | 200 | 0.1 |
| 437 kΩ | 442 kΩ | 400 | 0.2 |
| 291 kΩ | 294 kΩ | 600 | 0.3 |
| 219 kΩ | 221 kΩ | 800 | 0.4 |
| 175 kΩ | 174 kΩ | 1000 | 0.5 |
| 146 kΩ | 147 kΩ | 1200 | 0.6 |
| 125 kΩ | 124 kΩ | 1400 | 0.7 |
| 109 kΩ | 110 kΩ | 1600 | 0.8 |
| 97 kΩ | 97.6 kΩ | 1800 | 0.9 |
| 87.3 kΩ | 86.6 kΩ | 2000 | 1.0 |
| 79.4 kΩ | 78.7 kΩ | 2200 | 1.1 |
| 72.7 kΩ | 73.2 kΩ | 2400 | 1.2 |
| 67.1 kΩ | 66.5 kΩ | 2600 | 1.3 |
| 62.3 kΩ | 61.9 kΩ | 2800 | 1.4 |
| 58.2 kΩ | 57.6 kΩ | 3000 | 1.5 |
| 54.5 kΩ | 54.9 kΩ | 3200 | 1.6 |
| 51.3 kΩ | 51.1 kΩ | 3400 | 1.7 |
| 48.4 kΩ | 48.7 kΩ | 3600 | 1.8 |
| 45.9 kΩ | 46.4 kΩ | 3800 | 1.9 |
| 43.6 kΩ | 43.2 kΩ | 4000 | 2.0 |
| 41.5 kΩ | 41.2 kΩ | 4200 | 2.1 |
| 39.6 kΩ | 39.2 kΩ | 4400 | 2.2 |
| 37.9 kΩ | 38.3 kΩ | 4600 | 2.3 |
| 36.3 kΩ | 36.5 kΩ | 4800 | 2.4 |
| 34.8 kΩ | 34.8 kΩ | 5000 | 2.5 |

- The numerical values in this table assume that one 350-ohm load cell is used. In the case where four load cells are connected in parallel, the sensitivity decreases to 1/4; therefore, the resistance values should be considered as 1/4.
- The temperature coefficient of the resistance connected here directly affects the accuracy of the indicator.
  Use resistance of 50ppm/℃ or higher (approx. 5 - 10ppm/℃ recommended) at least.

## c Err3 (calibration error)

The initial dead load is negative.
Check to see if the load cell is put under load in the correct direction and check the wiring of +SIG and -SIG for reversal, and then perform zero calibration again.

# 4-5. Span calibration (setting mode 9-1)

Put a balance weight on the load cell (scale), and register the span (gain).

- Put a balance weight of the weight set by balance weight value on the load cell (scale). (Calibration with a balance weight of 50% or more of the capacity is advantageous in terms of linearity, etc.)

- Check for unwanted loads as in the case of zero calibration.

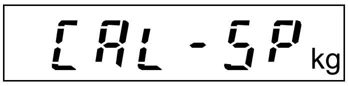
- Check that " STAB " is on.
  (When the indicated value is not stable, accurate calibration cannot be performed.)



**1.** Select setting mode 9-1 (span calibration).

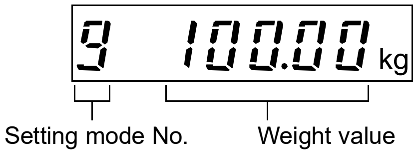
**2.** Perform span calibration.

Press the CNG/ENT key and start the registration of balance weight value.
Upon completion of input, fix it with the CNG/ENT key.




[Display of span calibration in progress.]

**3.** Span calibration ends with the weight value display equal to the balance weight value.




* If an error message is displayed, see "11-2.Over scale/error display" on page 100.

# 5 FUNCTION SETTINGS

## 5-1. Display update rate (setting mode 4-5)

Set the number of updates of the indicated value per second. What is selected here is only the display update rate. The internal A/D conversion rate and CPU processing speed stay unchanged.
The display update rate can be selected from 1 time/sec, 2 times/sec, 5 times/sec, 10 times/sec, and 20 times/sec. Normally, use 20 times/sec.
If the indicated value flickers too much to read at 20 times/sec, decrease the display update rate.

Display selection

Display update rate
- 0: 1 times/sec.
- 1: 2 times/sec.
- 2: 5 times/sec.
- 3: 10 times/sec.
- 4: 20 times/sec.

* When the temperature is low, may automatically adjust the display update rate.



## 5-2. Subdisplay selection (setting mode 4-5)

Set the data displayed in the subdisplay area.
The data set here are displayed in the subdisplay area.
The contents of display are any of the following: Accumulation Count/Accumulation Value, Accumulation Value, Accumulation Count, Final, and none.
(For the contents of display in detail, see ② Subdisplay under "■Front panel" on page 2.)

Display selection

Subdisplay selection
- 0: Accumulation Count/Accumulation Value
- 1: Accumulation Value
- 2: Accumulation Count
- 3: Final
- 4: None

## 5-3. Digital low pass filter (setting mode 2-1)

This low pass filter cancels undesired noise components by filtering the A/D-converted data.
Set the cutoff frequency like a low pass filter in an analog circuit.
The cutoff frequency can be selected from 1.5, 2, 2.5, 3, 4, and 5Hz. Select an optimum value according to the type of weighing and setting environment.

# 5-4. Moving average filter (setting mode 2-2)

This function restrains the indicated value from fluctuating by moving-averaging the A/D-converted data.

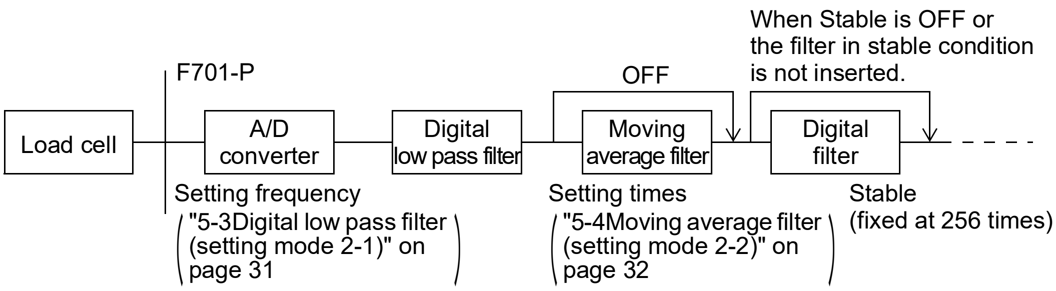
The moving average times can be selected in the range of OFF (1 time) - 512 times. With an increasing number of moving average times, the indicated value becomes more stable, while the response becomes slower. On the other hand, with a decreasing number of moving average times, the response becomes faster, while the indicated value becomes easier to fluctuate.

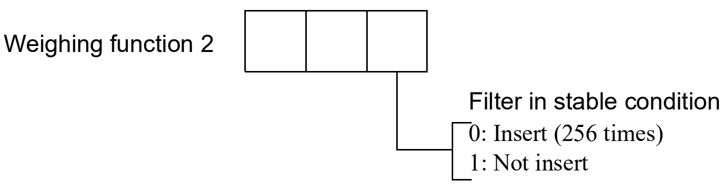
Set an optimum value according to the type of weighing.

# 5-5. Filter in stable condition (setting mode 1-5)

This function automatically inserts the digital filter to restrain the indicated value in a stable condition from fluctuating. Select whether or not to insert it.

Definition of stability is given by "5-6.Motion detection(MD) (setting mode 1-5, 2-3)" on page 33.



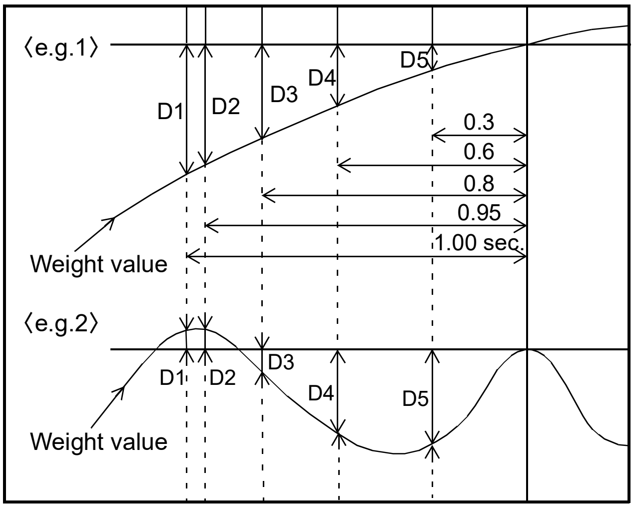
# 5-6. Motion detection(MD) (setting mode 1-5, 2-3)

Set the parameters to detect that the indicated value is stable.
When the variation width of the weight value becomes a set width or less and the state continues for a set period or more, the weight value is assumed to be stable, and the stable signal turns on. There are two modes of motion detection: stable mode and checker mode.

## ●Stable mode

D1 to D5 in the figure on the right-hand side are compared with the set width from A/D conversion to A/D conversion, and if at least one of them exceeds the width, the stable signal turns off immediately.

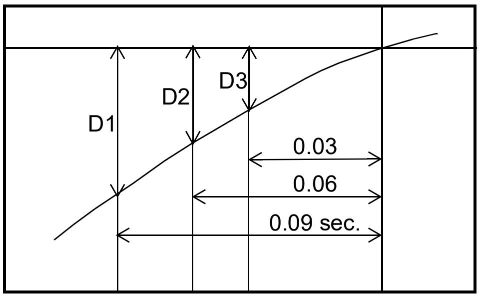
* D1 is the difference between the current weight value and one-second-old weight value.




## ●Checker mode

D1 to D3 in the figure on the right-hand side are compared with the set width from A/D conversion to A/D conversion, and if at least one of them exceeds the width, the stable signal turns off immediately.

* D1 is the difference between the current weight value and 0.09-second-old weight value.

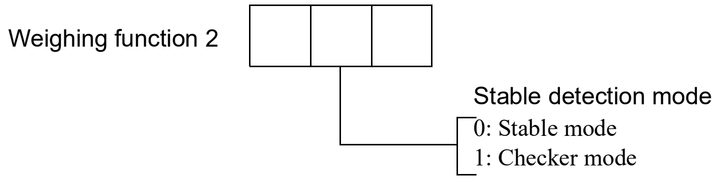



You can insert the digital filter to restrain the weight value from fluctuating when the stable signal is ON.
(See "5-5.Filter in stable condition (setting mode 1-5)" on page 32.)

## ■Setting of motion detection parameters

### - Motion detection mode (setting mode 1-5)

elect the stable condition from stable mode and checker mode.




### - Motion detection period (setting mode 2-3)

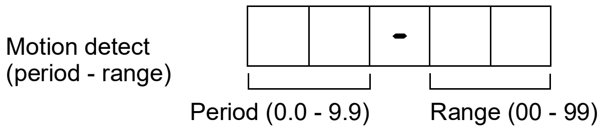
Set the period to judge that the weight value is stable.

(Input range/0.0 - 9.9)

### - Motion detection range (setting mode 2-3)

The variation width of the weight value is compared with this setting value multiplied by the min scale division.

(Input range/0 - 99)



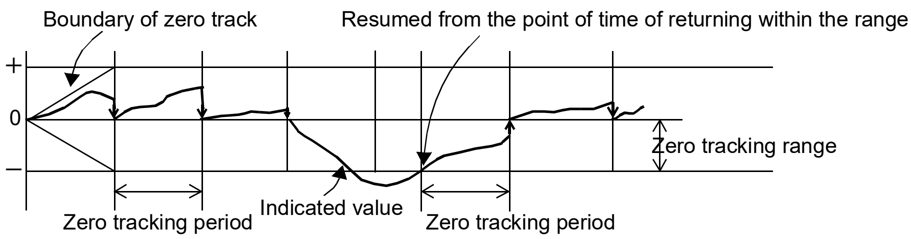



# 5-7. Zero tracking(ZT) (setting mode 2-4, 2-5)

This function automatically corrects slow zero drifts and minute zero point displacements caused by weighing residue, mud, dust, snow, and other accumulations.

Point

- Zero tracking is the function to automatically zero the gross weight when the state in which zero point displacements are within the set tracking range continues for the set period or more.
- Set the zero tracking period in the range of 0.0 - 9.9 sec, and zero tracking range (digit) in the range of 0 - 9999 in units of 1/4 of weight display. (Setting values of 0002 and 0012 are equivalent to 0.5 and 3, respectively.) Also, when the period is set at 0.0 sec and the range is set at 0000, zero tracking does not work.




### - Zero tracking period (setting mode 2-4)

Input range/0.0 - 9.9

### - Zero tracking range (setting mode 2-5)

Input range/0 - 9999

# 5-8. Digital zero(DZ)

This function forcibly zeros the gross weight. However, the gross weight exceeding the DZ regulation value cannot be zeroed.

1. Press the ZERO key once.
2. The gross weight is zeroed.

If digital zero operation is performed when gross weight > DZ regulation value, gross weight from which the DZ regulation value is subtracted is displayed. At the same time, " ZALM " flashes to give an alarm of the problem. In such a case, take the following measures.

| Measure |
| --- |
| Change the DZ regulation value setting, and perform digital zero operation again.<br>(However, since this is a temporary measure, zero calibration should be performed early.) |
| Remove weighing residue adhering to the tank, etc. |
| Check around the load cell (scale) for mechanical contacts. |





# 5-9. Digital zero clear

This function clears the zero point correction amount by digital zero operation.
By performing this operation, the zero point is brought back to the state in which zero calibration was registered. Also, " ZALM " if blinking, goes out.

1. Press the CNG/ENT key while pressing the ZERO key.
2. The zero point correction amount is cleared.

# 5-10. DZ regulation value (setting mode 4-4)

Set the range of zero point correction amount (deviation from the zero calibration point) by digital zero and zero tracking. If digital zero operation is performed or zero tracking is actuated where the DZ regulation value is exceeded, " ZALM " blinks to give an alarm.
(Input range/0 - 9999)

# 5-11. Gross weight display/net weight display

The F701-P can display gross weight or net weight selectively. Switch between gross weight display and net weight display with the ESC GROSS/NET key. Each time the ESC GROSS/NET key is pressed, switching is performed between gross weight display and net weight display alternately. When gross weight is displayed, " NET " goes out, and when net weight is displayed, " NET " lights.

The display is as follows: Net weight = Gross weight - Tare weight

The tare weight is determined by tare subtraction. The tare subtraction includes one-touch tare subtraction and digital tare subtraction.

* For one-touch tare subtraction, see "5-12.One-touch tare subtraction (TARE)" on page 36.
* For digital tare subtraction, see "5-14.Digital tare subtraction (preset tare weight)" on page 36.

# 5-12.One-touch tare subtraction (TARE)

This function makes the gross weight and tare weight equal to zero the net weight.

1. Press the [△ TARE] key.
2. One-touch tare subtraction is completed and " T TARE " lights.

* If the net weight is not zeroed in spite of tare subtraction operation, the following cause is conceivable. Take the following measure.

| Cause | Measure |
|---|---|
| The display shows gross weight. | Press the [ESC GROSS/NET] key to display the net weight.<br>(When " N NET " is lit, net weight is displayed.) |

# 5-13.One-touch tare subtraction reset

This function resets tare subtraction. By performing this operation, the tare weight by one-touch tare subtraction operation can be cleared.

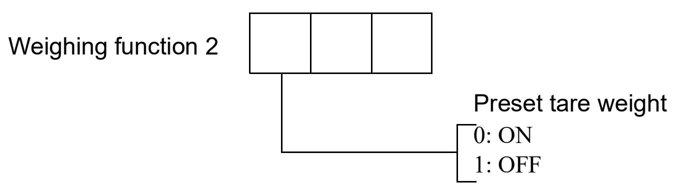
1. Press the [▽ TARE RESET] key.
2. Tare subtraction is reset.

# 5-14.Digital tare subtraction (preset tare weight)

This function subtracts a desired setting value from the net weight value.
Digital tare subtraction (preset tare weight) can be executed by setting a desired tare value and making the preset tare weight setting "0: ON."

## ■Preset tare weight (setting mode 1-5)

(Select from 0: OFF/1: ON)



### ■Tare setting (setting mode 1-8)

A value exceeding the capacity or a scale interval falling below the min scale division cannot be input.
(Input range/0 - 99999)

**Point**

One-touch tare subtraction and digital tare subtraction (preset tare weight) work independently. Even when the preset tare weight setting is ON, one-touch tare subtraction is immediately performed to zero the net weight value by pressing the [△ TARE] key.

# 5-15. Tare weight display (setting mode 1-9)

This function displays the current tare weight. The tare weight displayed here is a result with one-touch tare subtraction and digital tare subtraction (preset tare weight) taken into consideration.

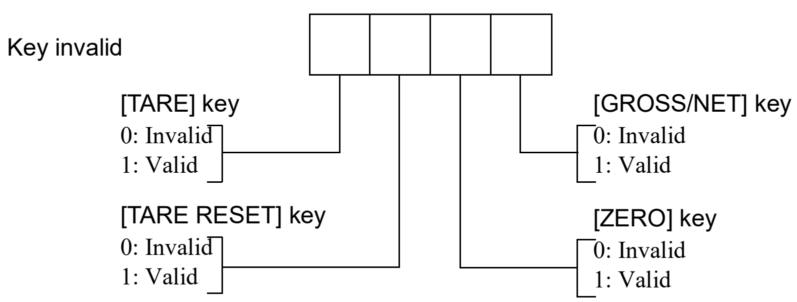
**Point**

- If the tare weight is 0, " TARE " goes out.
- If the tare weight is other than 0, " TARE " lights.
- If (tare weight by one-touch tare subtraction) - (tare weight by digital tare subtraction) = 0, " TARE " goes out.

# 5-16. Key invalid (setting mode 3-5)

Function keys on the front panel can be disabled to prevent misoperation by key operation.

**- [TARE] key** (Select from 0: Invalid/1: Valid)
**- [TARE RESET] key** (Select from 0: Invalid/1: Valid)
**- [ZERO] key** (Select from 0: Invalid/1: Valid)
**- [GROSS/NET] key** (Select from 0: Invalid/1: Valid)



# 6 WEIGHING SETTING AND OPERATIONS

## 6-1. Comparison mode (setting mode 1-4 weighing function 1)

On the F701-P, three weighing methods can be selected by comparison mode.
Select from three comparison modes.

Weighing function 1

Comparison mode
- 0: Upper/Lower limit comparison mode
- 1: Over/Under comparison mode
- 2: Discharging control mode



## 6-2. Near zero comparison

This function is to detect that the weight value is near zero.
Near zero can be set as desired. The comparison condition depends on the near zero comparison mode.

### - Near zero (setting mode 0-3)

Input range/0 - 99999

### - Near zero comparison mode (weighing function 1 in setting mode 1-4)

Select the condition for near zero comparison.

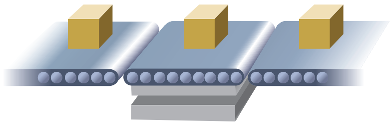
Weighing function 1

Near zero comparison mode
- 0: Near zero signal ON when gross weight ≦ near zero setting value
- 1: Near zero signal ON when net weight ≦ near zero setting value
- 2: Near zero signal ON when |gross weight| ≦ near zero setting value
- 3: Near zero signal ON when |net weight| ≦ near zero setting value
- 4: Comparison OFF

* When the near zero signal is on, "NZ" lights.

# 6-3. Upper/lower limit comparison mode

The upper limit and lower limit are set, with respect to each of which weight values are compared in this mode. This is convenient to simple checkers.



Checkers scale

## ■Upper/lower limit comparison

Set the upper limit and lower limit as desired, and set the weight to be compared by comparison weight value. Also, set the comparison timing accordingly.

### - Upper limit (setting mode 0-1)/ lower limit (setting mode 0-2)

Input range/0 - 99999

### - Comparison weight value (setting mode 1-4 weighing function 1)

Determine the weight to be compared with the upper limit and lower limit.

Weighing function 1 | | | | | |

Comparison weight value
0: GROSS
1: NET
2: Comparison OFF

* If "Comparison OFF" is selected, control outputs (HI, GO, LO) are not made.

### - Comparison condition

In upper/lower limit comparison mode, control outputs (HI, GO, LO) are made under the following conditions:

- HI output (HI lights):
  Turns ON when the weight value > upper limit setting value
- GO output (GO lights):
  Turns ON when the lower limit setting value ≦ weight value ≦ upper limit setting value
- LO output (LO lights):
  Turns ON when the weight value < lower limit setting value

### - Comparison timing (setting mode 1-4 weighing function 1)

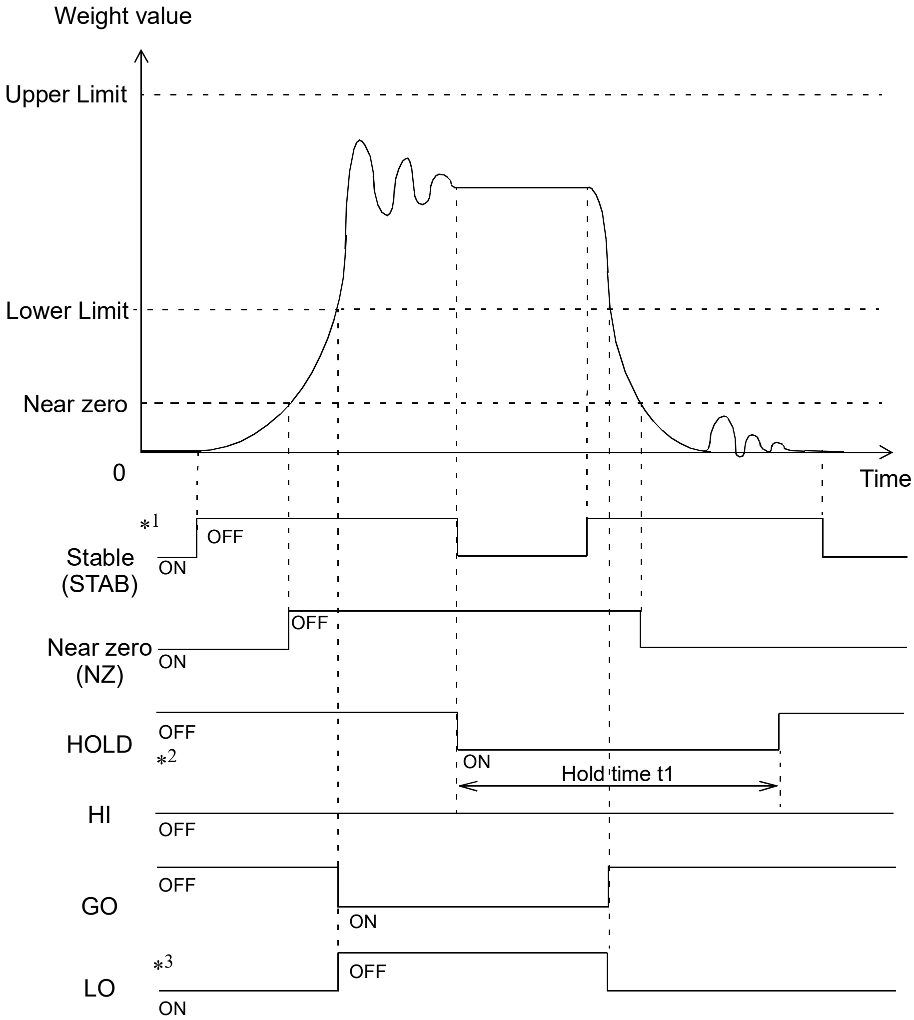
Determine the timing of comparison with the upper limit and lower limit.

Weighing function 1 | | | | | |

Comparison timing
0: Compare regularly
1: Compare in a stable condition.
2: Compare regularly except near zero.
3: Compare in a stable condition except near zero.
4: Comparison is made when the external judgment input is ON.

* If "Compare in a stable condition" is selected, comparison is made only in a stable condition (while " STAB " is lit).
* Determine whether near zero is ON or OFF by near zero comparison mode.
  Also, “except near zero” indicates a state in which " NZ " is unlit.

- Time chart in upper/lower limit comparison mode



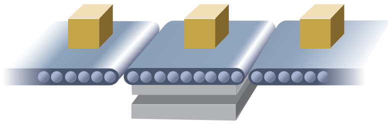

*1: Determine the stable condition by stable detection mode (weighing function 2 in setting mode 1-5) and motion detection (setting mode 2-3).

*2: To hold weight values, there is a need to set the auto hold mode (weighing function 1 in setting mode 1-4) to 1(Valid) in advance.
Determine hold time t1 by setting mode 1-3 (Input range/0.0 - 9.9 sec.).

*3: Control outputs are described as an example in which the comparison timing is set to compare regularly.

# 6-4. Over/under comparison mode

Over and Under based on the target value are set, with respect to each of which weight values are compared in this mode.
This is convenient to simple checkers.



Checkers scale

## ■Over/under comparison mode

Set Target, Over, and Under as desired, and set the weight to be compared by comparison weight value. Also, set the comparison timing accordingly.

### - Target value (setting mode 0-9)

Input range/0 - 99999

### - Over (setting mode 0-7), under (setting mode 0-8)

Input range/0 - 9999

### - Comparison weight value (setting mode 1-4 weighing function 1)

Determine the weight to be compared with (target value + over) and (target value - under).

Weighing function 1 □□□□□

Comparison weight value
0: GROSS
1: NET
2: Comparison OFF

* If "Comparison OFF" is selected, control outputs (HI, GO, LO) are not made.

### - Comparison condition

In over/under comparison mode, control outputs (HI, GO, LO) are made under the following conditions:

- HI output (HI lights):
  Turns ON when the weight value > (target value + over)
- GO output (GO lights):
  Turns ON when (target value - under) ≦ weight value ≦ (target value + over)
- LO output (LO lights):
  Turns ON when the weight value < (target value - under)

### - Comparison timing (setting mode 1-4 weighing function 1)

Determine the timing of comparison with (target value - under) and (target value + over).

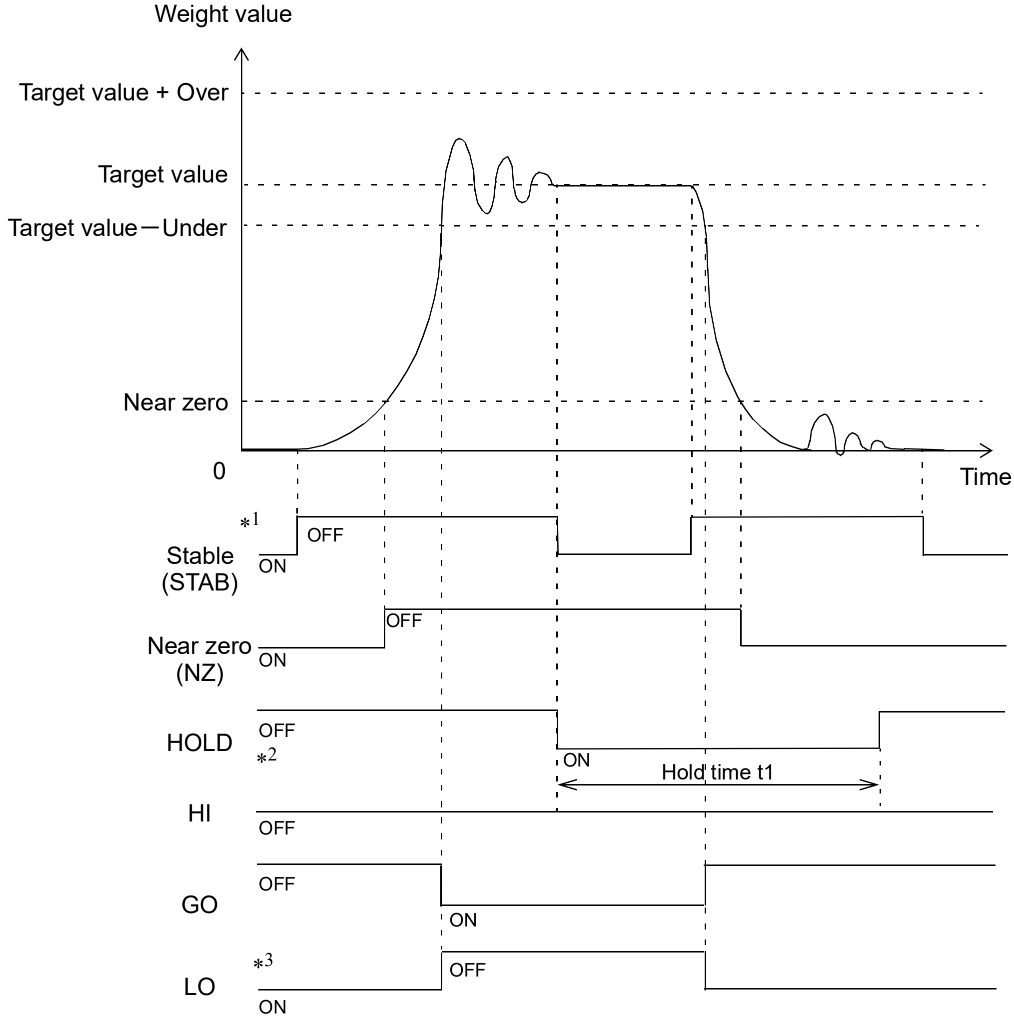
Weighing function 1 □□□□□

Comparison timing
0: Compare regularly
1: Compare in a stable condition.
2: Compare regularly except near zero.
3: Compare in a stable condition except near zero.
4: Comparison is made when the external judgment input is ON.

* If "Compare in a stable condition" is selected, comparison is made only while " STAB " is lit (in a stable condition).

* Determine whether near zero is ON or OFF by near zero comparison mode.
Also, "except near zero" indicates a state in which " NZ " is unlit.

- Time chart in over/under comparison mode



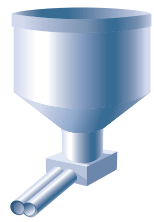

*1: Determine the stable condition by stable detection mode (weighing function 2 in setting mode 1-5) and motion detection (setting mode 2-3).

*2: To hold weight values, there is a need to set the auto hold mode (weighing function 1 in setting mode 1-4) to 1(Valid) in advance.
Determine hold time t1 by setting mode 1-3 (Input range/0.0 - 9.9 sec.).

*3: Control outputs are described as an example in which the comparison timing is set to compare regularly.

# 6-5. Discharging control mode

A fixed amount is accurately discharged from a tank like a hopper in this mode. In this mode, after completion of the previous weighing, when the weight drops below 25% of the fixed amount, the state is judged as the next weighing is possible.
If the start of weighing cannot be judged, the COMPLETE signal cannot also be output.
Also, the HI, GO, and LO output signals cannot be used.


Hopper scale

## ■Discharging control

Set Final, Compensation, and Set point 1 as desired. Set the weight to be compared by comparison weight value.
Also, set the comparison timing accordingly.

### - Final (setting mode 0-9)/ set point 1 (setting mode 0-4)/ set point 2 (setting mode 0-5)

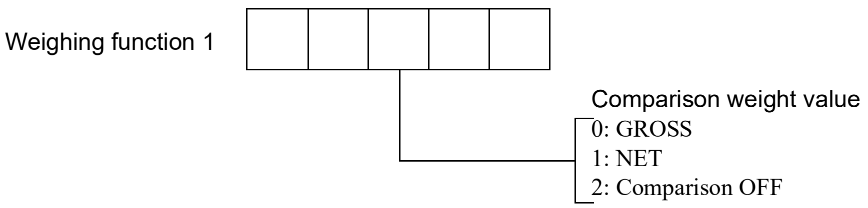
Input range/0 - 99999

### - Compensation (setting mode 0-6)

Input range/0 - 9999

### - Comparison weight value (setting mode 1-4 weighing function 1)

Determine the weight to be compared with (final - compensation), (final - Set point 2) and (final - Set point 1).




* If "2: Comparison OFF" is selected, control outputs (COMPL, SP3, SP2, SP1) are not made.

### - Comparison condition

In discharging control mode, control outputs (COMPL, SP3, SP2, SP1) are made under the following conditions:

- COMPL output (COMPL lights):
  Turns ON while the COMPLETE signal is output
- SP3 output (SP3 lights):
  Turns ON when the weight value ≧ (final - compensation)
- SP2 output (SP2 lights):
  Turns ON when the weight value ≧ (final - set point 2)
- SP1 output (SP1 lights):
  Turns ON when the weight value ≧ (final - set point 1)

* If Set point 1 = 0, Set point 2 = 0, the SP1, SP2 signal are not output constantly.
* If SP1, SP2 are not used, Set point 1, Set point 2 should be set at 0.

## - Comparison inhibit time (setting mode 1-1)

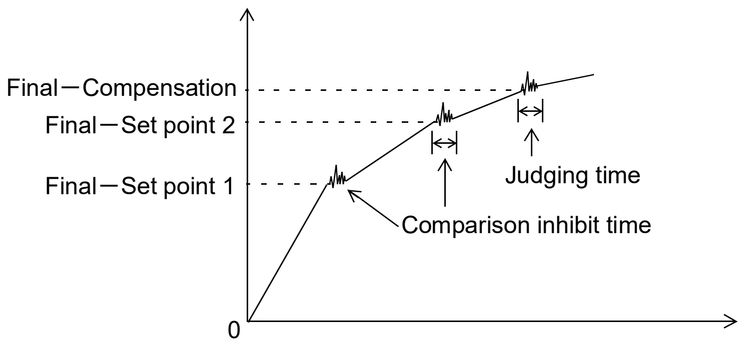
Input range/0.00 - 9.99 (sec.)

In discharging control mode, comparison can be inhibited for a fixed time to prevent inappropriate control operation by mechanical vibrations associated with valve opening and closing.
Comparison inhibit time works from when the weight value reaches (final - set point 1), (final - set point 2).

## - Judging time (setting mode 1-2)

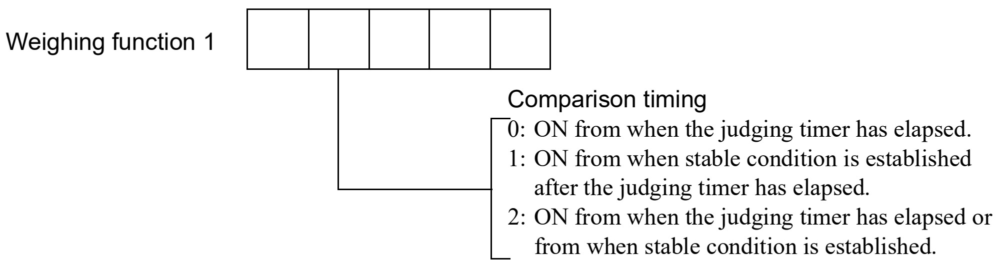
Input range/0.0 - 9.9 (sec.)

In a manner similar to comparison inhibit time, comparison judgment is inhibited for a fixed time to prevent inappropriate judgment by mechanical vibrations associated with valve opening and closing. Judging time works from when the weight value reaches (final - compensation).



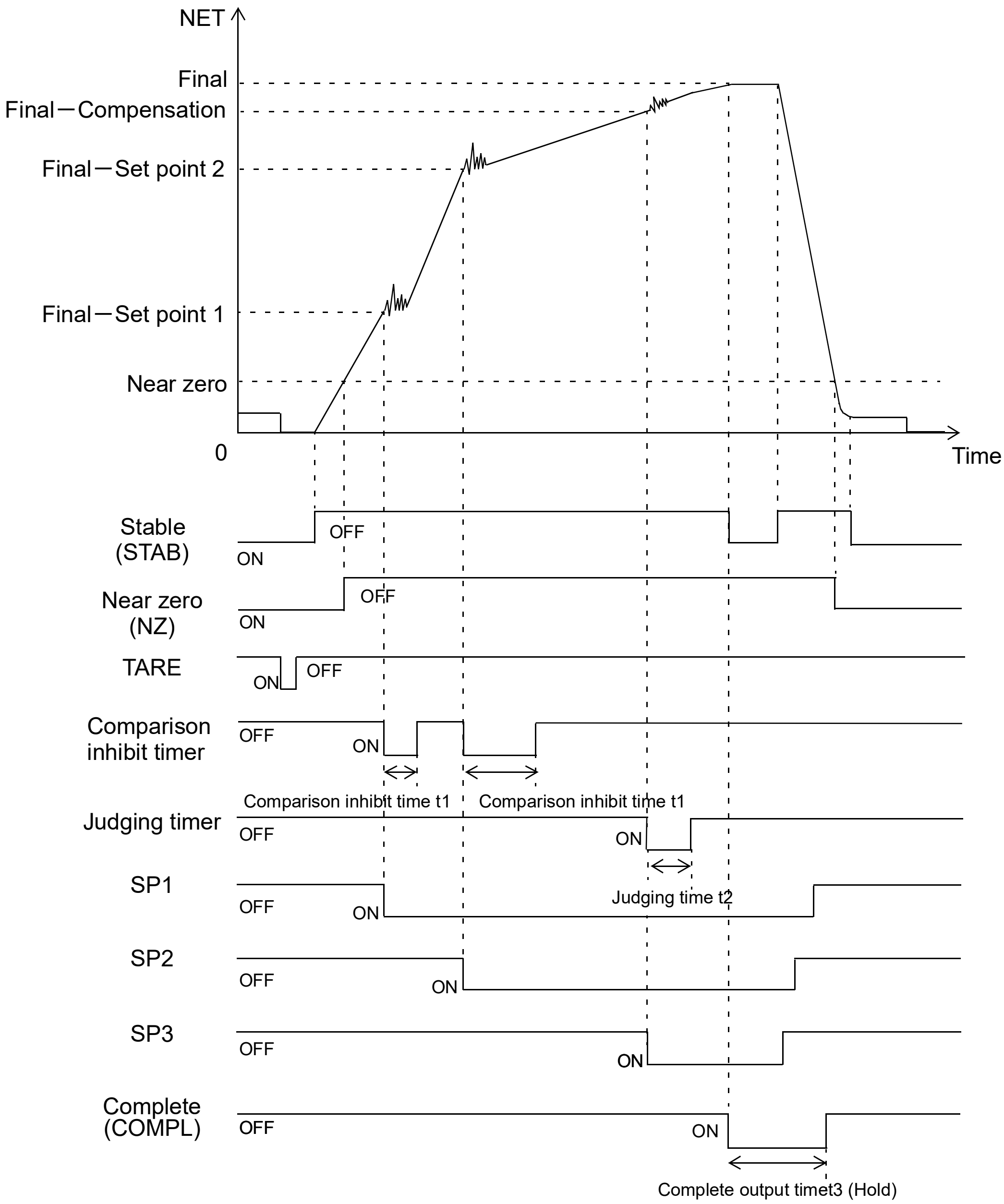

## - Comparison timing (setting mode 1-4 weighing function 1)

Determine the timing of the complete signal output.




* Stable condition indicates a state in which " STAB " is lit (stable state).

- Time chart in discharging control mode




*1: Determine the stable condition by stable detection mode (weighing function 2 in setting mode 1-5) and motion detection (setting mode 2-3).

*2: To hold weight values, there is a need to set the auto hold mode (weighing function 1 in setting mode 1-4) to 1(Valid) in advance.
In discharging control mode, weight values are held for the complete output time only under the above conditions. Determine complete output time t3 by setting mode 1-3 (Input range/0.0 - 9.9 sec).

## 6-6. About accumulation

The timing which makes a weight value accumulate is as follows by comparison mode (setting mode 1-4).

### - Upper/lower limit comparison mode / over/under comparison mode

Accumulation is performed when the near zero signal is OFF and stable signal is ON.
After the last completion of measurement, when near zero turns ON, it is judged as a state measurable next time.

### - Discharging control mode

Accumulation is performed at the timing of outputting the complete signal.
* It does not accumulate if a measurement result is minus data, or when overscale.

## 6-7. Total comparison selection/total limit/count limit

Comparison can be made with respect to the accumulation value or accumulation count.

### - Total comparison selection

Select the comparison target from
Comparison OFF/ Total comparison ON/ Count comparison ON.

| | |
|---|---|
| Comparison OFF: | Comparison is not made. |
| Total comparison ON: | The total limit signal is output when the accumulation value ≧ total limit setting value. |
| Count comparison ON: | The total limit signal is output when the accumulation count ≧ count limit setting value. |

### - Total limit (high 4)

Set the value of four high-order digits for total comparison.
(Input range/0 - 9999)

### - Total limit (under 5)

Set the value of five low-order digits for total comparison.
(Input range/0 - 99999)

### - Count limit

Set the value for count comparison.
(Input range/0 - 9999)

## 6-8. Accumulation clear

This function clears the accumulated data (count and accumulation value).

**1.** Press the [0 CLR] key.

ACC.CLr kg  [Blinking display.]

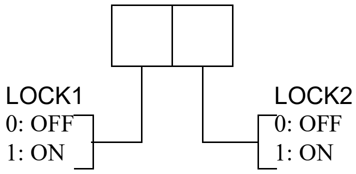
**2.** If [CNG/ENT] key is pressed, accumulation count and accumulation value is zeroed.

# 7 SYSTEM-RELATED SETTINGS AND OPERATIONS

## 7-1. LOCK (soft)

This lock is intended to prevent misoperation. For setting values effective on LOCK (soft), see"11-1.List of setting values" on page 97.
Select from 0:OFF or 1:ON.

LOCK



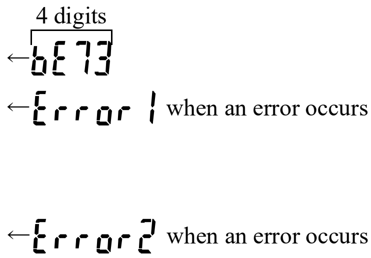

## 7-2. Password

For future extension purpose only. Normally, it is not used.

## 7-3. Self-check

This device is provided with the self-check function to automatically check the memory and detect abnormality and the visual-check function by which the display can be checked visually.
Turn on the power while pressing the CNG/ENT key. This immediately starts checking.

| | Description | Type |
|---|---|---|
| 1 | Full lighting on display | Display |
| 2 | Software version | Display |
| 3 | Full lighting on display | Display |
| 4 | Checksum | Display |
| 5 | ROM checksum check | Auto |
| 6 | Status display lighting in succession | Visual |
| 7 | 7-segment lighting on display | Visual |
| 8 | F-RAM read/write check | Auto |
| 9 | Display of PASS and end of checking | Display |




* The software version display may differ depending on the time of purchase.

* Visually check the display.

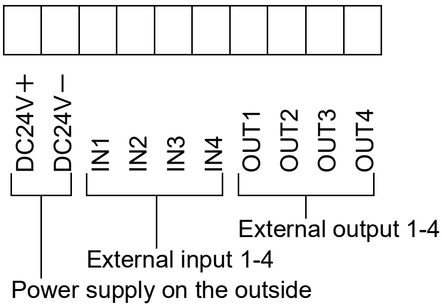
* If there is any abnormality in memory check, checking stops instantly.

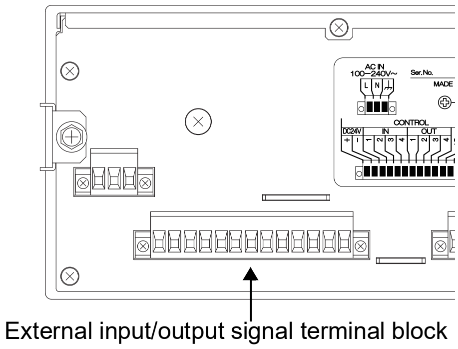
* If checking stops in midstream or the display does not show properly, it indicates a failure. Ask us or your distributor for repair.

# 8 EXTERNAL INPUT/OUTPUT SIGNALS (CONTROL CONNECTOR)

The input/output and internal circuits are electrically insulated by photocoupler.
There is a need to prepare external 24V DC (power supply for external input/output signal circuit) separately.

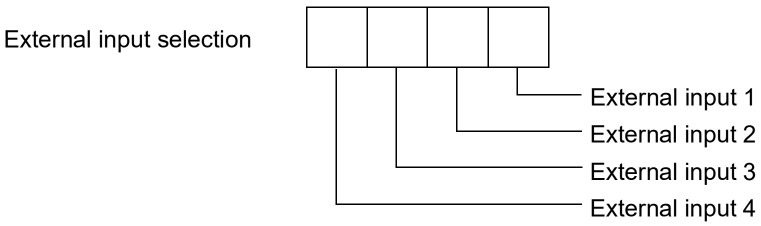
## 8-1. Connector pin assignments




* Signal can be assigned. (For details, please refer to “External input selection (Setting mode 3-7)” and “External output selection (Setting mode 3-8)”)

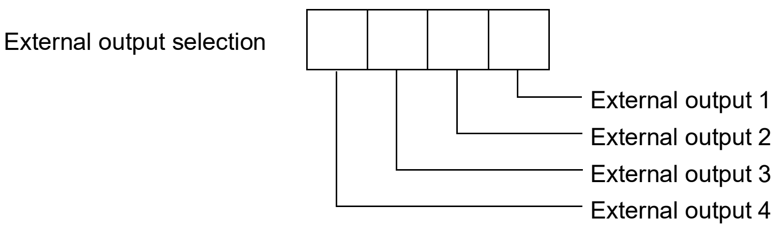
### - External input selection (setting mode 3-7)




| | | |
|---|---|---|
| 0: G/N | 3: TARE OFF | 1: D/Z ON |
| 4: Accumulation clear | 2: TARE ON | 5: HOLD/JUDGE |

* If same level input signal is assigned to more than one input, priority is given to lower-order numbers, and the other becomes invalid.

### - External output selection (setting mode 3-8)




| | | | | |
|---|---|---|---|---|
| 0: COMPL. | 4: HI | 8: Weight Error | 1: SP1 | 5: GO |
| 9: Total limit | 2: SP2 | 6: LO | 3: SP3 | 7: STAB |

# 8-2. External control equipment connection

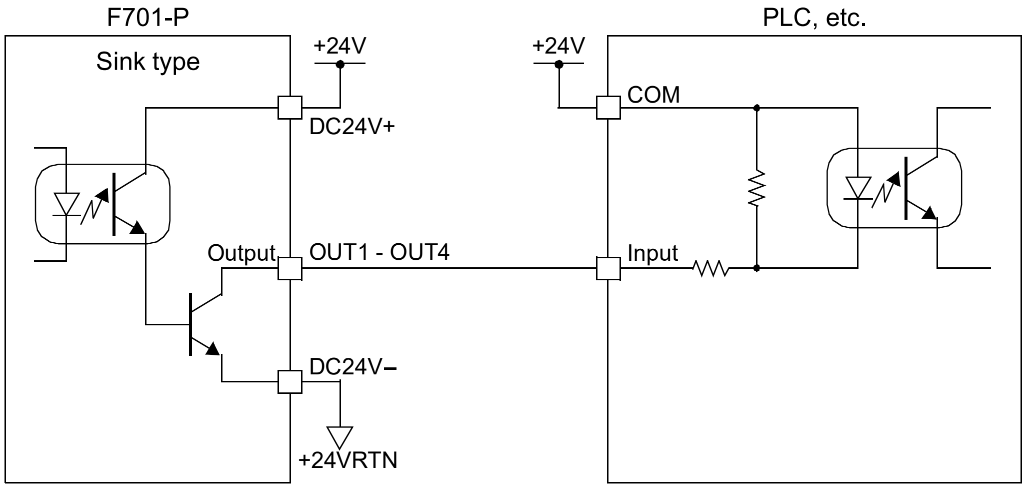
Point

External input and output signals can only be connected to either the sink type or source type.
Specify at order-time.

## ■Equivalent circuit and example connection, when specify the sink type

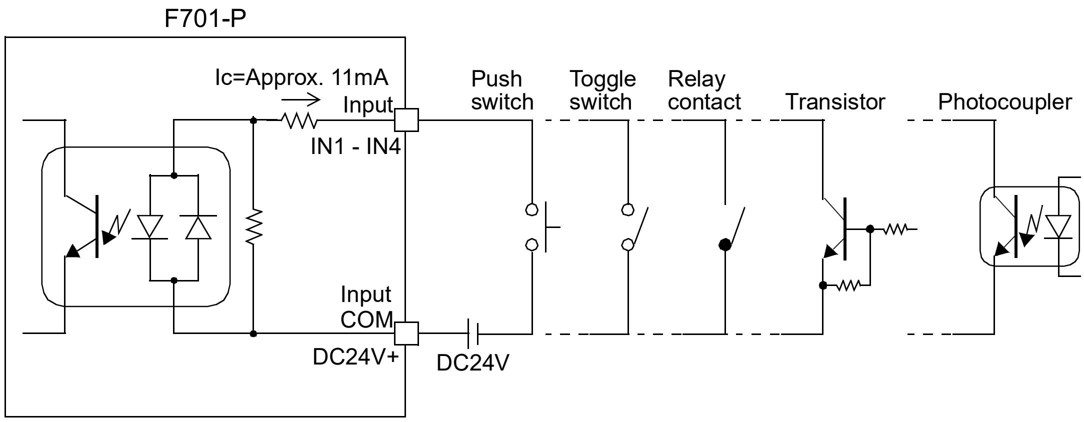
### - Output

The signal output circuit is photocoupler isolated open-collector output (current sink type).




### - Input

Switch, relay, transistor and photocoupler, etc. can be connected.
To connect the transistor and photocoupler, etc., connect unit of sink type.



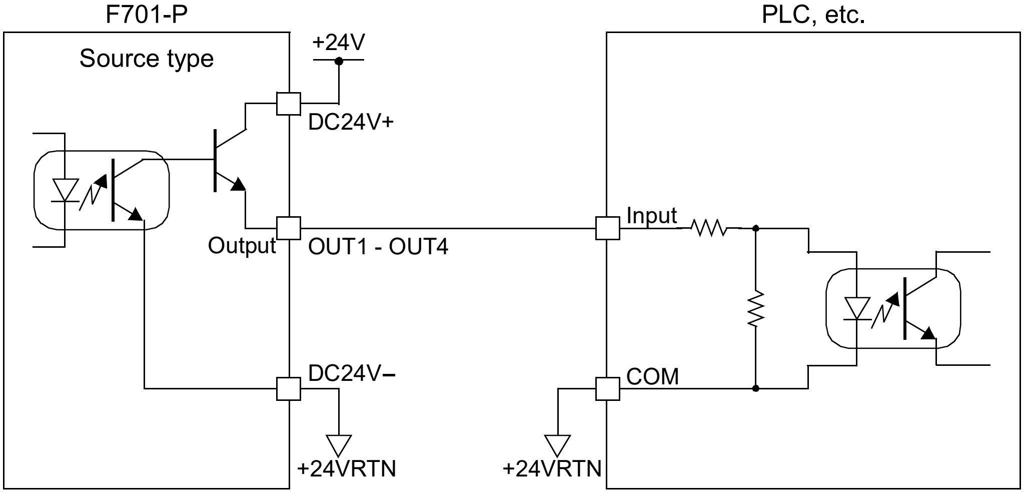

Chapter 8

EXTERNAL INPUT/OUTPUT SIGNALS (CONTROL CONNECTOR)

## ■Equivalent circuit and example connection, when specify the source type

### - Output

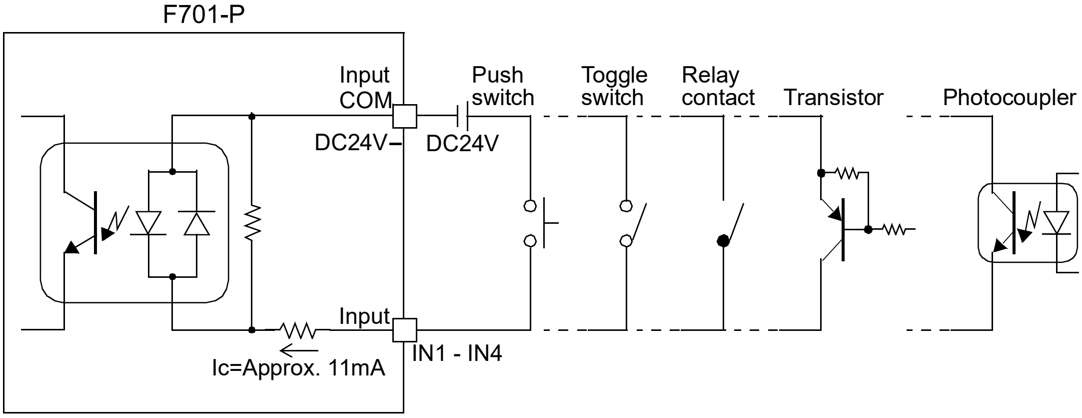
The signal output circuit is photocoupler isolated output (current source type).




### - Input

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

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



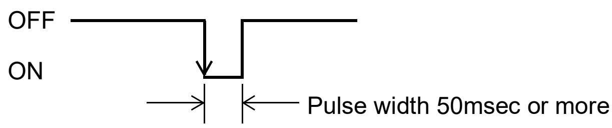
# 8-3. External input signals

## ■Gross/net switch (G/N) <edge input>

Net weight display is brought about at the ON edge.
Gross weight display is brought about at the OFF edge.

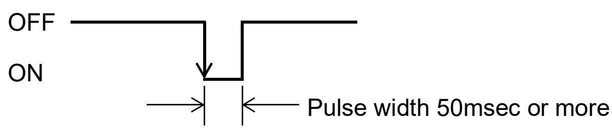

## ■Digital zero (D/Z ON) <edge input>

The gross weight is zeroed at the ON edge.
The same operation is also performed with the ZERO key (only when the ZERO key is set at "1: Valid" by setting mode 3-5).
What can be zeroed is within the range of DZ regulation value. If out of this range, zero will not result, but "ZALM" flashes.



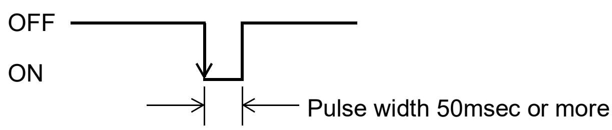

## ■Tare subtraction (TARE ON) <edge input>

Tare subtraction is immediately performed and the net weight is zeroed at the ON edge.
The same operation is also performed with the TARE key (only when the TARE key is set at "1: Valid" by setting mode 3-5).
* During tare subtraction, " TARE " lights.




## ■Tare subtraction reset (TARE OFF) <edge input>

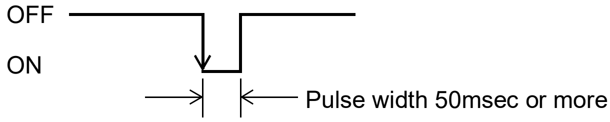
The above tare subtraction is reset at the ON edge.
The same operation is also performed by pressing the TARE RESET key (only when the TARE RESET key is set at "1: Valid" by setting mode 3-5).



## ■Accumulation clear <edge input>

Accumulation data is cleared at the ON edge.

The same operation is also performed with the [O CLR] → [CNG/ENT] key.



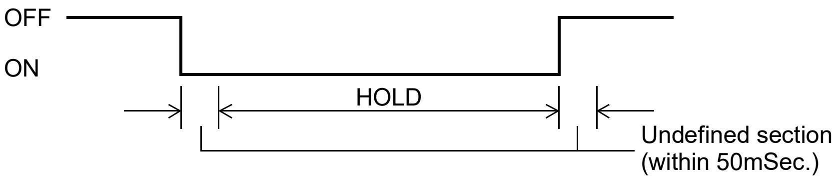

## ■HOLD <level input>

While this is ON, the weight value and comparison are held.

This input terminal serves as JUDGE according to setting.

This cannot be used as HOLD if either of the setting mode 1-4 over/under or upper/lower limit comparison is "external judgment input".

* During hold, "HOLD" lights.

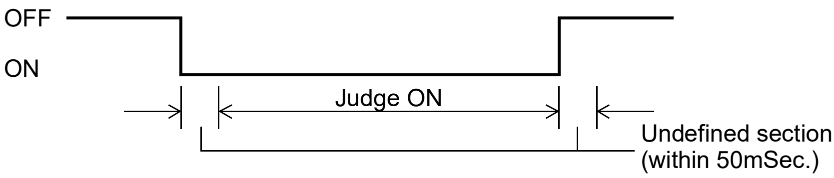



## ■JUDGE <level input>

This is valid when comparison timing (Weighing Function 1 in setting mode 1-4) is "external judgment input".

This input terminal serves as HOLD according to setting.

This cannot be used as JUDGE if either of the setting mode 1-4 over/under or upper/lower limit comparison is "external judgment input".




# 8-4. External output signals

The meanings of the external output signals differ according to the state of the comparison mode. Determine the comparison mode by weighing function 1 (setting mode 1-4).

## ■When comparison mode 0 (upper/lower limit comparison mode) is set

### HI, GO, LO

Each signal turns on under the following condition.

- HI: Weight value ＞ Upper limit setting value
- GO: Lower limit setting value ≦ Weight value ≦ Upper limit setting value
- LO: Weight value ＜ Lower limit setting value

## ■When comparison mode 1 (over/under comparison mode) is set

### HI, GO, LO

Each signal turns on under the following condition.

- HI: Weight value ＞ (Target value + Over)
- GO: (Target value - Under) ≦ Weight value ≦ (Target value + Over)
- LO: Weight value ＜ (Target value - Under)

## ■When comparison mode 2 (discharging control mode) is set

### COMPL, SP3, SP2, SP1

Each signal turns on under the following condition.

- COMPL: While the COMPLETE signal is output
- SP3: Weight value ≧ Final - Compensation
- SP2: Weight value ≧ Final - Set point 2
- SP1: Weight value ≧ Final - Set point 1

Point

- If Set point 1 = 0, Set point 2 = 0, the SP1, SP2 signal are not output constantly.
- Determine the COMPLETE signal output timing by weighing function 1 (setting mode 1-4).
- The next weighing is regarded as being able to be started only when the weight value once falls below 25% of the final setting value after outputting the complete signal. If the start of weighing cannot be judged, the complete signal cannot also be output.

## ■Stable

The output turns on when the weight value is stable.

* For details, see "5-6.Motion detection(MD) (setting mode 1-5, 2-3)" on page 33.

## ■Weight error

The output turns on when the display is LOAD, OFL, or ZALM (zero alarm).

* For error displays, see "11-2.Over scale/error display" on page 100.

## ■Total limit

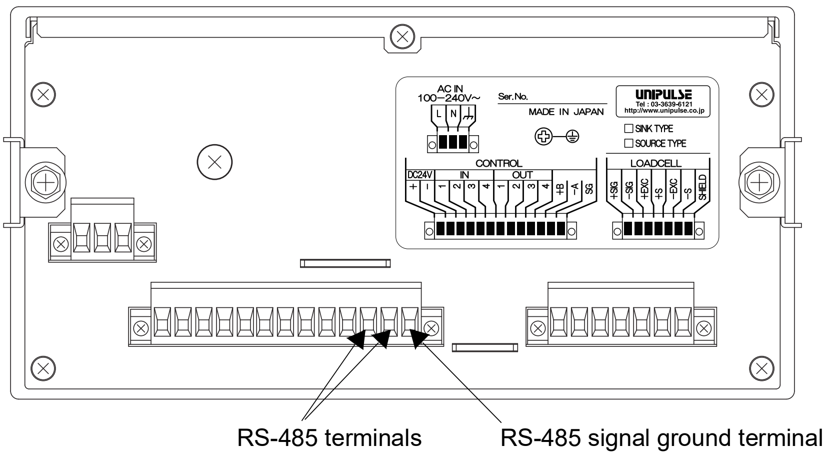
If the total comparison selection setting is "Total comparison ON" or "Count comparison ON," the output turns on under the following condition.

### ON condition

- Total comparison ON: The output turns on when the accumulation value ≧ total limit setting value.
- Count comparison ON: The output turns on when the accumulation count ≧ count limit setting value.

# 9 RS-485 INTERFACE

The RS-485 interface is intended to read the indicated value and status of the F701-P and read/write setting values with the F701-P. It is convenient for processing of control, compilation, recording, etc., as the F701-P is connected to a PLC, programmable display, etc.



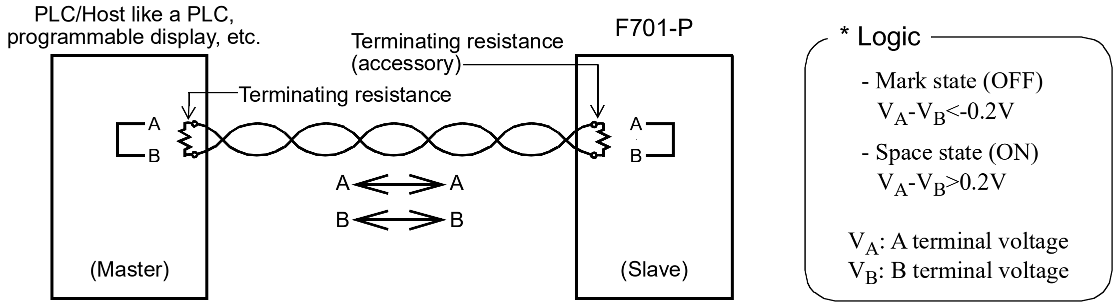

## 9-1. Communication specifications

### ■Standards

| | | |
|---|---|---|
| Message format: | Modbus-RTU, UNI-Format | |
| Signal level: | RS-485-compliant, two-wire | |
| Transmission distance: | Approx. 1km | |
| Transmission mode: | Asynchronous, half-duplex communication | |
| Transmission speed: | 1200, 2400, 4800, 9600, 19200, 38400bps selectable | |
| Number of connectable units: | Max. 32 (including one master) | |
| Bit configuration: | Start bit | 1 bit |
| | Length of character | 7 or 8 bits selectable<br>(8 bits for Modbus-RTU) |
| | Stop bit | 1 or 2 bits selectable |
| | Parity bit | None, odd, or even selectable |
| Code: | Binary (for Modbus-RTU)<br>ASCII (for UNI-Format) | |

# 9-2. RS-485 connection

## ■Two-wire type (point to point)

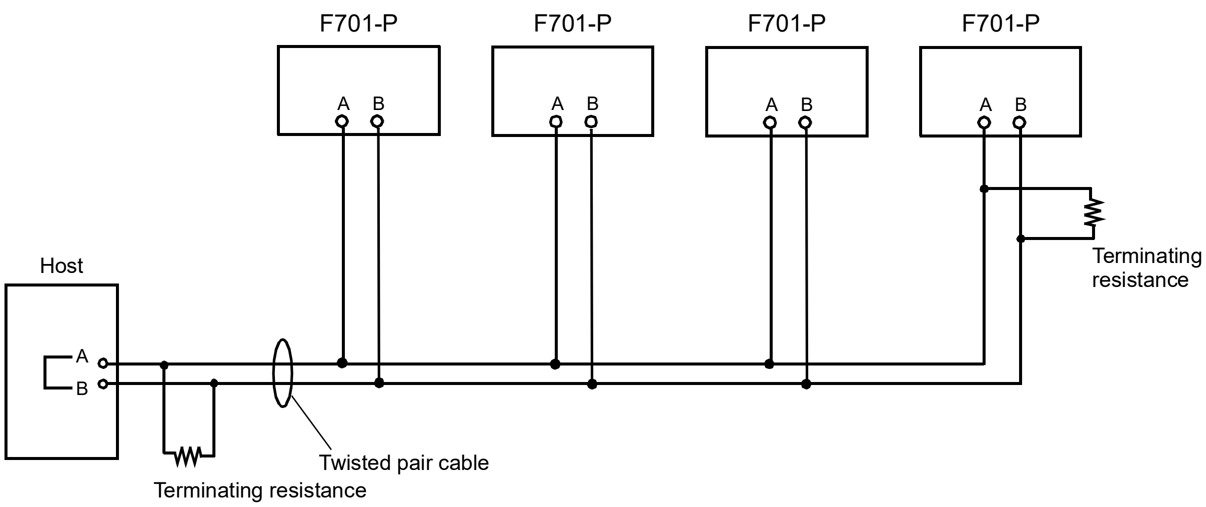



- Use a twisted pair cable for connection. (Noise margin is improved.)
  However, a parallel two-core cable is enough for short-distance connection.
- Install terminating resistance each on the host side and F701-P side.
- The SG terminal is a ground terminal used in circuits (to protect the circuits).
  If the F701-P 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.

**Attention**

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

## ■Two-wire type (multi point)



# 9-3. RS-485-related setting values

## ■RS-485 I/F setting

**1.** Set the RS-485 port of this device. (Setting mode 5-1)

* If the communication type 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).

RS-485 I/F setting

Baud rate
0: 1200bps
1: 2400bps
2: 4800bps
3: 9600bps
4: 19200bps
5: 38400bps

The length of character
0: 7bit
1: 8bit

Parity bit
0: None
1: Odd
2: Even

Stop bit
0: 1bit
1: 2bit

Terminator
(effective at only UNI-Format)
0: CR
1: CR+LF

**2.** Make initial settings of the RS-485 port of the personal computer, PLC, etc., connected according to the settings of this device.

## ■RS-485 ID/ slave address for MODBUS-RTU

Input the ID setting (setting mode 5-3)

RS-485 ID (slave address)

ID setting (0 - 31)

## ■Communication type

Set the RS-485 operation. (setting mode 5-2)

Communication type

Mode
0: Command
1: Auto
2: Continuous
3: Modbus-RTU

Format
(effective at “auto” or “continuous”)
0: Gross weight
1: Net weight
2: Gross weight + Net weight

## ■Communication type

### - Communication type 0 (mode=0: Command)

Communication is performed with the command from the host computer.
(Weight data is not transmitted automatically.)
Terminator is selectable from CR or CR + LF.

### - Communication type 1 (mode=2: Continuous, format=0: Gross weight)

Gross weight is transmitted continuously.
Various commands of R, W, and C are all ignored.

Transmission on format 1 (24byte)

### - Communication type 2 (mode=2: Continuous, format=1: Net weight)

Net weight is transmitted continuously.
Various commands of R, W, and C are all ignored.

Transmission on format 2 (24byte)

### - Communication type 3 (mode=2: Continuous, format=2: Gross weight + net weight)

Gross weight and net weight are transmitted continuously.
Various commands of R, W, and C are all ignored.

Transmission on format 3 (26byte)

### - Communication type 4 (mode=1: Auto, format=0: Gross weight)

Gross weight is transmitted once with the timing of accumulation.
Various commands of R, W, and C are all ignored.

Transmission on format 1 (24byte)

### - Communication type 5 (mode=1: Auto, format=1: Net weight)

TNet weight is transmitted once with the timing of accumulation.
Various commands of R, W, and C are all ignored.

Transmission on format 2 (24byte)

### - Communication type 6 (mode=1: Auto, format=2: Gross weight + net weight)

Gross weight and net weight are transmitted once with the timing of accumulation.
Various commands of R, W, and C are all ignored.

Transmission on format 3 (26byte)

- Communication type 7 (mode=3: Modbus-RTU)

Communication is performed by a request from the host computer.
(Communication protocol Modbus-RTU)
Various commands of R, W, and C are all ignored.

**Attention**

For transmission formats, see "■UNI-Format (continuous, auto)" on page 64.

**Point**

About the timing for continuous transmission

According to the communication baud rate setting, the continuous transmission intervals in the case where any of the communication modes from 1 to 3 is selected are as follows:

| Communication baud rate | Continuous transmission interval |
|---|---|
| 38400 bps | 100 times/sec. |
| 19200 bps | 50 times/sec. |
| 9600 bps | 25 times/sec. |
| 4800 bps | 12 times/sec. |
| 2400 bps | 6 times/sec. |
| 1200 bps | 3 times/sec. |

## ■UNI-Format commands

### ■Command communication formats

- Read the gross weight (sign, 5-digit weight, decimal point)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Host | N | O | IDNo. | IDNo. | R | A | CR |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F701-P | I | D | IDNo. | IDNo. | R | A | + | 1 | 0 | 0 | . | 0 | 0 | CR | LF |

- Read the net weight (sign, 5-digit weight, decimal point)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Host | N | O | IDNo. | IDNo. | R | B | CR |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F701-P | I | D | IDNo. | IDNo. | R | B | + | 1 | 0 | 0 | . | 0 | 0 | CR | LF |

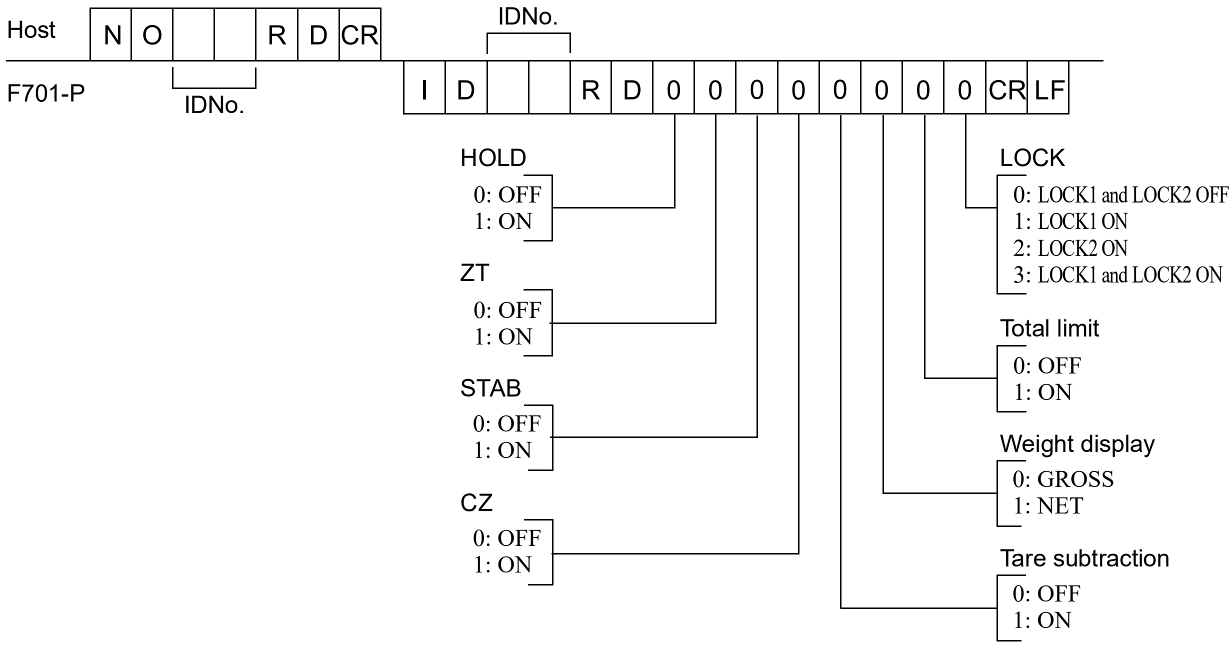
- Read the tare (sign, 5-digit weight, decimal point)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Host | N | O | IDNo. | IDNo. | R | C | CR |

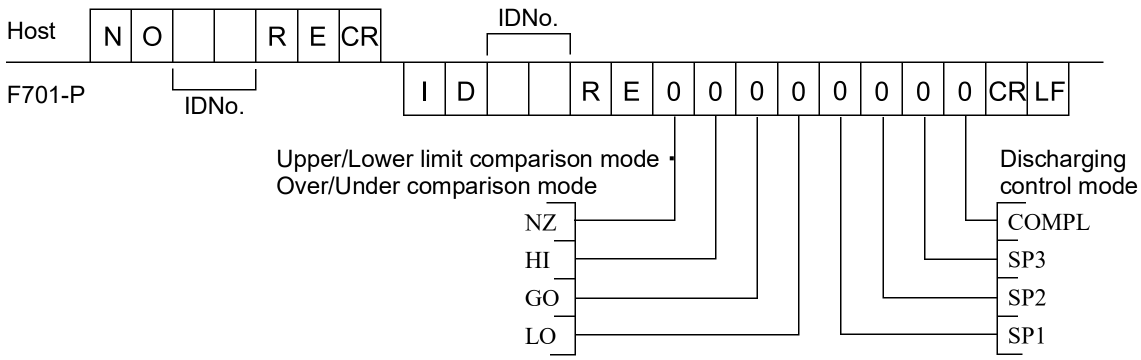
| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| F701-P | I | D | IDNo. | IDNo. | R | C | + | 1 | 0 | 0 | . | 0 | 0 | CR | LF |

* Without the decimal point, put the decimal point in after the 5-digit number (before the CR).

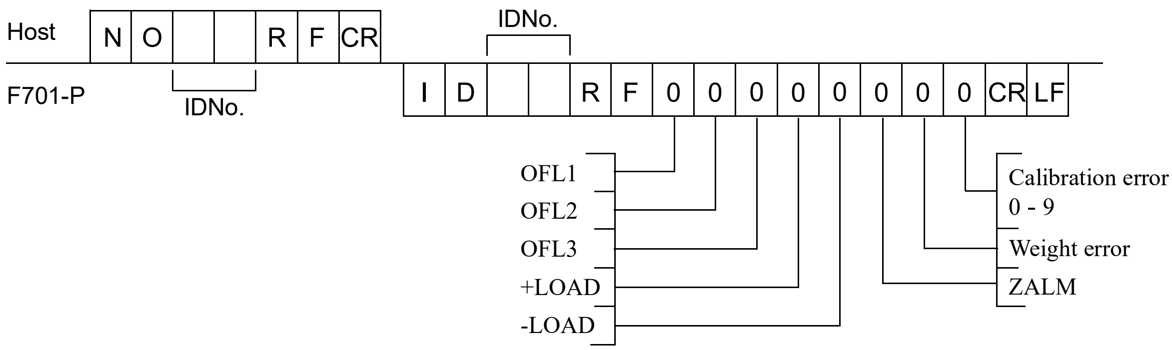
- Read status 1 (8-digit)



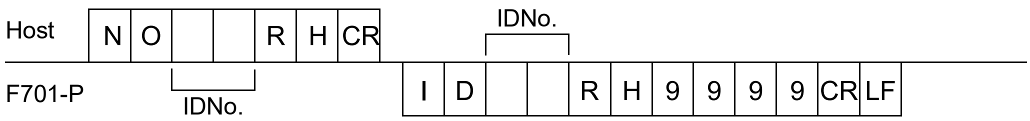

- Read status 2 (8-digit)




- Read status 3 (8-digit)




- Read the accumulation count (4-digit count)




Chapter 9

RS-485 INTERFACE

- Read the accumulation value (9-digit accumulation, decimal point)

Host: | N | O | IDNo. | IDNo. | R | I | CR |

F701-P: | I | D | IDNo. | IDNo. | R | I | 9 | 9 | 9 | 9 | 9 | 9 | 9 | . | 9 | 9 | CR | LF |

- Read the accumulation data (5-digit weight, decimal point)

Host: | N | O | IDNo. | IDNo. | R | J | CR |

F701-P: | I | D | IDNo. | IDNo. | R | J | + | 1 | 0 | 0 | . | 0 | 0 | CR | LF |

Measurement value / Accumulated value: + 1 0 0 . 0 0

* Up to 256 data can be stored in the buffer in memory, and clears data in the order of their occurrence from reading data.

Host: | N | O | IDNo. | IDNo. | R | J | CR |

F701-P: | I | D | IDNo. | IDNo. | R | J | CR | LF |

Data returned when the accumulated data is not in the buffer.

- Write the setting value

Host: | N | O | IDNo. | IDNo. | W | Setting value No. | Setting value No. | Setting value (5-digit, no decimal point) | | | | | CR | LF |

F701-P: * No data returned

* For setting value No., see "■Setting value communication formats" on page 63.

- Read the setting value

Host: | N | O | IDNo. | IDNo. | W | Setting value No. | Setting value No. | CR |

F701-P: | I | D | IDNo. | IDNo. | W | Setting value No. | Setting value No. | Setting value (5-digit, no decimal point) | | | | | CR | LF |

* For setting value No., see "■Setting value communication formats" on page 63.

- Zero calibration

F701-P: | N | O | IDNo. | IDNo. | C | A | CR |

Calibration in progress

F701-P: | I | D | IDNo. | IDNo. | N | A | 0 | CR | LF |

0: Normal end
2 - 9: Error
(same as the F701-P error display No.)
L: Calibration disabled by LOCK2
R: Calibration in progress

Chapter 9

RS-485 INTERFACE

- Span calibration

| Host | N | O | | | C | B | CR |
|---|---|---|---|---|---|---|---|

IDNo.

| F701-P | I | D | | | N | B | 0 | CR | LF |
|---|---|---|---|---|---|---|---|---|---|

Calibration in progress

IDNo.

| | |
|---|---|
| 0: | Normal end |
| 2 - 9: | Error (same as the F701-P error display No.) |
| L: | Calibration disabled by LOCK2 |
| R: | Calibration in progress |

**Attention**

Zero calibration/span calibration
Before sending this command, set the capacity, min scale division, balance weight value, etc.

- Display switching; gross weight

| Host | N | O | | | C | C | CR |
|---|---|---|---|---|---|---|---|

F701-P IDNo. * No data returned

- Display switching; net weight

| Host | N | O | | | C | D | CR |
|---|---|---|---|---|---|---|---|

F701-P IDNo. * No data returned

- Tare subtraction

| Host | N | O | | | C | E | CR |
|---|---|---|---|---|---|---|---|

F701-P IDNo. * No data returned

- Tare subtraction reset

| Host | N | O | | | C | F | CR |
|---|---|---|---|---|---|---|---|

F701-P IDNo. * No data returned

- Digital zero

| Host | N | O | | | C | G | CR |
|---|---|---|---|---|---|---|---|

F701-P IDNo. * No data returned

## - Digital zero reset

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Host | N | O | | | C | H | CR |
| F701-P | | | IDNo. | | | | |

* No data returned

## - Hold ON

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Host | N | O | | | C | I | CR |
| F701-P | | | IDNo. | | | | |

* No data returned

## - Hold OFF

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Host | N | O | | | C | J | CR |
| F701-P | | | IDNo. | | | | |

* No data returned

**Attention**

Since combined use with external input cannot be performed when using HOLD ON/OFF of a communication command, please do not set up "HOLD/JUDGE" by external input selection (setting mode 3-7).

## - Accumulation clear

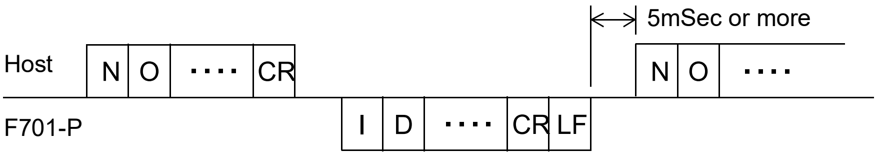
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Host | N | O | | | C | K | CR |
| F701-P | | | IDNo. | | | | |

* No data returned

* The RJ buffer (storing data for the RJ command) is also cleared.

**Attention**

- After receiving a response from the F701-P, keep an interval of 5mSec or more until sending the next command from the host.




- Sending from the host with ID No. "99" results in a broadcast.
  In this case, setting values should simply be written, and should not be read.

## ■Setting value communication formats

These are used for reading and writing setting values.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper limit | N | O | | | W | 0 | 1 | | | | | | CR | LF | (When LOCK1 can not write in) |
| Lower limit | N | O | | | W | 0 | 2 | | | | | | CR | LF | (When LOCK1 can not write in) |
| Near zero | N | O | | | W | 0 | 3 | | | | | | CR | LF | (When LOCK1 can not write in) |
| Set point 1 | N | O | | | W | 0 | 4 | | | | | | CR | LF | (When LOCK1 can not write in) |
| Set point 2 | N | O | | | W | 0 | 5 | | | | | | CR | LF | (When LOCK1 can not write in) |
| Compensation | N | O | | | W | 0 | 6 | 0 | | | | | CR | LF | (When LOCK1 can not write in) |
| Over | N | O | | | W | 0 | 7 | 0 | | | | | CR | LF | (When LOCK1 can not write in) |
| Under | N | O | | | W | 0 | 8 | 0 | | | | | CR | LF | (When LOCK1 can not write in) |
| Final (target value) | N | O | | | W | 0 | 9 | | | | | | CR | LF | (When LOCK1 can not write in) |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Comparison inhibit time | N | O | | | W | 1 | 1 | 0 | 0 | | | | CR | LF | (When LOCK2 can not write in) |
| Judging time | N | O | | | W | 1 | 2 | 0 | 0 | 0 | | | CR | LF | (When LOCK2 can not write in) |
| Complete output time (Hold time) | N | O | | | W | 1 | 3 | 0 | 0 | 0 | | | CR | LF | (When LOCK2 can not write in) |
| Weighing function 1 | N | O | | | W | 1 | 4 | | | | | | CR | LF | (When LOCK2 can not write in) |
| Weighing function 2 | N | O | | | W | 1 | 5 | 0 | 0 | | | | CR | LF | (When LOCK2 can not write in) |
| Tare setting | N | O | | | W | 1 | 8 | | | | | | CR | LF | (When LOCK1 can not write in) |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Digital low-pass filter | N | O | | | W | 2 | 1 | 0 | 0 | 0 | 0 | | CR | LF | (When LOCK2 can not write in) |
| Moving average filter | N | O | | | W | 2 | 2 | 0 | 0 | | | | CR | LF | (When LOCK2 can not write in) |
| Motion detection (period - range) | N | O | | | W | 2 | 3 | | | 0 | | | CR | LF | (When LOCK2 can not write in) |
| Zero tracking (period) | N | O | | | W | 2 | 4 | 0 | 0 | 0 | | | CR | LF | (When LOCK2 can not write in) |
| Zero tracking (range) | N | O | | | W | 2 | 5 | 0 | | | | | CR | LF | (When LOCK2 can not write in) |

ID No. (2 blank digits after N O)
Setting value No. (2 digits after W)
Setting value up to 5 digits

* Values other than "0" should not put in places where "0" is set.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total comparison selection | N | O | | | W | 3 | 1 | 0 | 0 | 0 | 0 | | CR | LF | (When LOCK1 can not write in) |
| Total limit (high 4) | N | O | | | W | 3 | 2 | 0 | | | | | CR | LF | (When LOCK1 can not write in) |
| Total limit (under 5) | N | O | | | W | 3 | 3 | | | | | | CR | LF | (When LOCK1 can not write in) |
| Count limit | N | O | | | W | 3 | 4 | 0 | | | | | CR | LF | (When LOCK1 can not write in) |
| Key invalid | N | O | | | W | 3 | 5 | 0 | | | | | CR | LF | (When LOCK2 can not write in) |
| LOCK | N | O | | | W | 3 | 6 | 0 | 0 | 0 | | | CR | LF | |
| External input selection | N | O | | | W | 3 | 7 | 0 | | | | | CR | LF | (When LOCK2 can not write in) |
| External output selection | N | O | | | W | 3 | 8 | 0 | | | | | CR | LF | (When LOCK2 can not write in) |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Balance weight value | N | O | | | W | 4 | 1 | | | | | | CR | LF | (When LOCK2 can not write in) |
| Capacity | N | O | | | W | 4 | 2 | | | | | | CR | LF | (When LOCK2 can not write in) |
| Minimum scale division | N | O | | | W | 4 | 3 | 0 | 0 | 0 | | | CR | LF | (When LOCK2 can not write in) |
| DZ regulation value | N | O | | | W | 4 | 4 | 0 | | | | | CR | LF | (When LOCK2 can not write in) |
| Display selection | N | O | | | W | 4 | 5 | | | | | | CR | LF | (When LOCK2 can not write in) |
| Gravitational acceleration | N | O | | | W | 4 | 6 | | | | | | CR | LF | (When LOCK2 can not write in) |

ID No. Setting value up to 5 digits

Setting value No.

* Values other than "0" should not put in places where "0" is set.

## ■UNI-Format (continuous, auto)

### - Transmission on format 1

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| G | S | I | D | , | *1 | , | *2 | , | *3 | , | *4 | , | *5 | , | ± | | | | | | | CR | LF |

HEADER

Sign + or -

5-digit gross weight + decimal point

### - Transmission on format 2

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| N | T | I | D | , | *1 | , | *2 | , | *3 | , | *4 | , | *5 | , | ± | | | | | | | CR | LF |

HEADER

Sign + or -

5-digit net weight + decimal point

- Transmission on format 3

| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOH | W | T | I | D | STX | *1 | *2 | *3 | *4 | *5 | *6 | ± | | | | | | ± | | | | | | ETX | BCC |

HEADER (1–2)
Sign (gross weight) + or - (12)
5-digit gross weight (13–17)
Sign (net weight) + or - (18)
5-digit net weight (19–23)
BCC calculation target (1–24)

Each ASCII code of SOH, STX, and ETX

SOH : 01
STX : 02
ETX : 03

BCC calculation method

Each code targeted for BCC calculation is expressed in hexadecimal notation, and the result of XOR with all data enters BCC.

*1 O : Overload (LOAD, OFL)
S : Stable
M : Unstable
H : Hold

Order of priority: H > O > (S or M)

*2 A : Zero tracking OFF
T : Zero tracking ON
Z : Zero alarm (ZALM)

Order of priority: Z > (A or T)

*3 Upper/lower limit comparison and over/under comparison modes
H : Upper limit/over ON
L : Lower limit/under ON
G : Upper limit/over and Lower limit/under OFF
N : Upper limit and lower limit ON
F : Comparison OFF

Priority : N, F ＞ (H or L) ＞ G

Discharging control Mode
0 : SP1, SP2, SP3, Complete OFF
1 : SP1 ON
2 : SP2 ON
3 : SP3 ON
C : Complete ON
F : Comparison OFF

Priority : C, F ＞ 3 ＞ 2 ＞ 1 ＞ 0

*4 N : Near zero OFF
Z : Near zero ON

*5 Unit display
0 : None　3: kg
1 : t　4: lb
2 : g

*6 Decimal place
0 : None
1 : 0.0
2 : 0.00
3 : 0.000

* If two or more F701-P are connected, do not specify continuous mode.

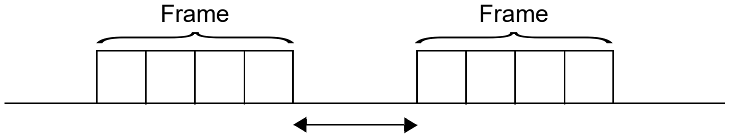
## ■Modbus-RTU

### ■Transmission delay time (setting mode 5-4)

Set this when the master equipment cannot process responses from the F701-P.

Transmission delay time □□

Input range/0 - 99



## ■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 - 0xFFFF |
| Number of coils | 2 bytes | 1 - 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 |
| Start address; higher | 00 |
| Start address; lower | 04 |
| Number of coils; higher | 00 |
| Number of coils; lower | 01 |

[Response]

| | |
|---|---|
| Function | 01 |
| Number of data bytes | 01 |
| Digital zero | 00 |

Keep in mind that the relative address for reading the digital zero value is 0x04.
In cases less than 8 bits, the remainder bits become "0".

* The F701-P 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) Force signal coil or 15 (0x0F) Force 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 - 0xFFFF |
| Number of statuses | 2 bytes | 1 - 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 NEAR ZERO (address 10001) to COMPL. (address 10008).

[Request]

| | |
|---|---|
| Function | 02 |
| Start address; higher | 00 |
| Start address; lower | 00 |
| Number of statuses; higher | 00 |
| Number of statuses; lower | 08 |

[Response]

| | |
|---|---|
| Function | 02 |
| Number of data bytes | 01 |
| NEAR ZERO - COMPL. | F4 |

Keep in mind that the relative address for reading the NEAR ZERO value is 0x00.
The example shows the case where the F701-P conditions are as follows:

| | |
|---|---|
| NEAR ZERO | OFF (0) |
| HI | OFF (0) |
| GO | ON (1) |
| LO | OFF (0) |
| SP1 | OFF (1) |
| SP2 | OFF (1) |
| SP3 | OFF (1) |
| COMPL. | ON (1) |

The LSB of the first data corresponds to the status of the beginning address.
It is expressed as 11110100 (0xF4) 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.

[Request]

| | | |
|---|---|---|
| Function | 1 byte | 0x03 |
| Start address | 2 bytes | 0x0000 - 0xFFFF |
| Number of registers | 2 bytes | 1 - 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 compensation (address 40031) to over (address 40032).

[Request]

| | |
|---|---|
| Function | 03 |
| Start address; higher | 00 |
| Start address; lower | 1E |
| Number of registers; higher | 00 |
| Number of registers; lower | 02 |

[Response]

| | |
|---|---|
| Function | 03 |
| Number of data bytes | 04 |
| Compensation; higher | 00 |
| Compensation; lower | 64 |
| Over; higher | 00 |
| Over; lower | 32 |

Keep in mind that the relative address for reading the compensation value is 0x1E.

The example shows the case where the F701-P settings are as follows:

| | |
|---|---|
| Compensation | 100 (0x0064) |
| Over | 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 - 0xFFFF |
| Number of registers | 2 bytes | 1 - 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 30003 - 30004).

[Request]

| | |
|---|---|
| Function | 04 |
| Start address; higher | 00 |
| Start address; lower | 02 |
| Number of registers; higher | 00 |
| Number of registers; lower | 02 |

[Response]

| | |
|---|---|
| Function | 04 |
| Number of data bytes | 04 |
| Gross weight (higher) (higher) | 20 |
| Gross weight (higher) (lower) | 00 |
| Gross weight (lower) (higher) | 25 |
| Gross weight (lower) (lower) | 1C |

Keep in mind that the relative address for reading the gross weight value is 0x02.

The example shows the case where the indicated value of the F701-P is as follows:

Weight status

| | |
|---|---|
| Code | OFF (0) |
| Unused | OFF (0) |
| Unused | OFF (0) |
| OVER | OFF (0) |
| 1/4 sale division ▼ | OFF (0) |
| CZ | ON (1) |
| 1/4 scale division ▲ | OFF (0) |
| True CZ | 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 - 0xFFFF |
| Output data | 2 bytes | 0x0000 or 0xFF00 |

[Response]

| | | |
|---|---|---|
| Function | 1 byte | 0x05 |
| Start address | 2 bytes | 0x0000 - 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 |
| Start address; higher | 00 |
| Start address; lower | 00 |
| Gross display; higher | FF |
| Gross display; lower | 00 |

[Response]

| | |
|---|---|
| Function | 05 |
| Start address; higher | 00 |
| Start address; lower | 00 |
| Gross display; higher | FF |
| 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.

[Request]

| | | |
|---|---|---|
| Function | 1 byte | 0x06 |
| Start address | 2 bytes | 0x0000 - 0xFFFF |
| Output data | 2 bytes | |

[Response]

| | | |
|---|---|---|
| Function | 1 byte | 0x06 |
| Start address | 2 bytes | 0x0000 - 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 compensation (address 40031) value to 20 (0x0014).

[Request]

| | |
|---|---|
| Function | 06 |
| Start address; higher | 00 |
| Start address; lower | 1E |
| Compensation; higher | 00 |
| Compensation; lower | 14 |

[Response]

| | |
|---|---|
| Function | 06 |
| Start address; higher | 00 |
| Start address; lower | 1E |
| Compensation; higher | 00 |
| Compensation; lower | 14 |

Keep in mind that the relative address for writing in the compensation is 0x1E.
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 40031 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 - 0xFFFF |
| Number of coils | 2 bytes | 0x0001 - 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 - 0xFFFF |
| Number of coils | 2 bytes | 0x0001 - 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 00005) to accumulation clear (address 00009) ON/OFF.

[Request]

| | |
|---|---|
| Function | 0F |
| Start address; higher | 00 |
| Start address; lower | 04 |
| Number of coils; higher | 00 |
| Number of coils; lower | 05 |
| Number of data bytes | 01 |
| (Digital zero - Accumulation clear) | 10 |

[Response]

| | |
|---|---|
| Function | 0F |
| Start address; higher | 00 |
| Start address; lower | 04 |
| Number of coils; higher | 00 |
| Number of coils; lower | 05 |

Keep in mind that the relative address for writing in digital zero is 0x04.
The example shows rewriting of the F701-P ON (1)/OFF (0) as follows:
Fill unused bits with "0".

| Coil | 00012 | 00011 | 00010 | Accumu-lation clear | Hold OFF | Hold ON | 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 and 00002
- Addresses from 00003 to 00006
- Addresses 00007 and 00008
- Addresses 00013 and 00014

## 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.

[Request]

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

[Error response]

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

Example 1) Change the weighing function 2 (address 40047) to 111 (0x006F) and digital low pass filter to 5Hz (*) in the 16-bit wide integer data area.

* Select the F701-P digital low pass filter setting from:
0: 1.5Hz, 1: 2Hz, 2: 2.5Hz, 3: 3Hz, 4: 4Hz, 5: 5Hz.
Write "5" for 5Hz in the example.

[Request]

| | |
|---|---|
| Function | 10 |
| Start address; higher | 00 |
| Start address; lower | 2E |
| Register; higher | 00 |
| Register; lower | 02 |
| Number of data bytes | 04 |
| Weighing function 2; higher | 00 |
| Weighing function 2; lower | 6F |
| Digital low pass filter; higher | 00 |
| Digital low pass filter; lower | 05 |

[Response]

| | |
|---|---|
| Function | 10 |
| Start address; higher | 00 |
| Start address; lower | 2E |
| Register; higher | 00 |
| Register; lower | 02 |

Keep in mind that the relative address for writing in weighing function 2 is 0x2E.

Example 2) Change the upper limit (address 40001 - 40002) to 99999 (0x0001869F) and the lower limit (address 40003 - 40004) to 5000 (0x00001388) in the 32-bit wide integer data area.

[Request]

| | |
|---|---|
| Function | 10 |
| Start address; higher | 00 |
| Start address; lower | 00 |
| Register; higher | 00 |
| 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 |

[Response]

| | |
|---|---|
| Function | 10 |
| Start address; higher | 00 |
| Start address; lower | 00 |
| Register; higher | 00 |
| Register; lower | 04 |

Keep in mind that the relative address for writing in upper limit is 0x00.

* 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 - 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 - 0xFFFF |
| Message count | 2 bytes | 0x0000 - 0xFFFF |
| Event counter | n bytes | 0 - 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 F701-P) |
| 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 F701-P) |
| 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 F701-P 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<br>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 - 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 F701-P.
* 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 F701-P)

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 F701-P)

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 F701-P)

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

## ■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 3, 6, 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 - 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 25.
  (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 - 6, 8, 15, 16)

**Point**

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".

## ■Data address

| Data type | Address | Data name | Data format | |
|---|---|---|---|---|
| Coil 0XXXX | 00001 | Gross display | B1 | |
| | 00002 | Net display | | |
| | 00003 | One-touch tare subtraction | | |
| | 00004 | One-touch tare subtraction reset | | |
| | 00005 | Digital zero | | |
| | 00006 | Digital zero reset | | |
| | 00007 | Hold ON | | |
| | 00008 | Hold OFF | | |
| | 00009 | Accumulation clear | | |
| | 00010 – 00012 | Reserve (no assignments) | | |
| | 00013 | Zero calibration | | |
| | 00014 | Span calibration (actual load calibration) | | |
| | 00015 – 00025 | Reserved area (can not be used) | | |
| | 00026 – 09999 | Reserve (no assignments) | | |
| Input status 1XXXX | 10001 | NEAR ZERO | B1 | |
| | 10002 | HI | | |
| | 10003 | GO | | |
| | 10004 | LO | | |
| | 10005 | SP1 | | |
| | 10006 | SP2 | | |
| | 10007 | SP3 | | |
| | 10008 | COMPL. | | |
| | 10009 | STAB | | |
| | 10010 | HOLD | | |
| | 10011 | ZT | | |
| | 10012 | TARE | | |
| | 10013 | G/N | | |
| | 10014 | Total limit | | |
| | 10015 | WEIGHT ERROR | | |
| | 10016 | ZALM | | |
| | 10017 | LOCK1 | | |
| | 10018 | LOCK2 | | |
| | 10019 – 19999 | Reserve (no assignments) | | |
| Input register 3XXXX | 30001 | Status 1 | – | I16 |
| | 30002 | Status 2 | | |
| | 30003 | Gross weight (higher) | No decimal point | I32 |
| | 30004 | Gross weight (lower) | | |
| | 30005 | Net weight (higher) | | |
| | 30006 | Net weight (lower) | | |
| | 30007 | Tare (higher) | | |
| | 30008 | Tare (lower) | | |

| | | | | |
|---|---|---|---|---|
| Input register 3XXXX | 30009 | Reserve (no assignments) | | |
| | — | | | |
| | 39999 | | | |
| Holding register 4XXXX | 40001 | Upper limit (higher) | Unsigned No decimal point | I32 |
| | 40002 | Upper limit (lower) | | |
| | 40003 | Lower limit (higher) | | |
| | 40004 | Lower limit (lower) | | |
| | 40005 | Near zero (higher) | | |
| | 40006 | Near zero (lower) | | |
| | 40007 | Set point 1 (higher) | | |
| | 40008 | Set point 1 (lower) | | |
| | 40009 | Set point 2 (higher) | | |
| | 40010 | Set point 2 (lower) | | |
| | 40011 | Final/Target value (higher) | | |
| | 40012 | Final/Target value (lower) | | |
| | 40013 | Weighing function 1 (higher) | | |
| | 40014 | Weighing function 1 (lower) | | |
| | 40015 | Tare setting (higher) | | |
| | 40016 | Tare setting (lower) | | |
| | 40017 | Total limit (higher) | | |
| | 40018 | Total limit (lower) | | |
| | 40019 | Balance weight value (higher) | | |
| | 40020 | Balance weight value (lower) | | |
| | 40021 | Capacity (higher) | | |
| | 40022 | Capacity (lower) | | |
| | 40023 | Display selection (higher) | | |
| | 40024 | Display selection (lower) | | |
| | 40025 | Gravitational acceleration (higher) | | |
| | 40026 | Gravitational acceleration (lower) | | |
| | 40027 | Latest accumulation data (higher) | | |
| | 40028 | Latest accumulation data (lower) | | |
| | 40029 | Accumulation value (higher) | | |
| | 40030 | Accumulation value (lower) | | |
| | 40031 | Reserve (no assignments) | | |
| | — | | | |
| | 40040 | | | |
| | 40041 | Compensation | Unsigned No decimal point | I16 |
| | 40042 | Over | | |
| | 40043 | Under | | |
| | 40044 | Comparison inhibit time | | |
| | 40045 | Judging time | | |
| | 40046 | Complete output (hold) time | | |
| | 40047 | Weighing function 2 | | |
| | 40048 | Digital low pass filter | | |
| | 40049 | Moving average filter | | |
| | 40050 | Motion detection (period - range) | | |
| | 40051 | Zero tracking (period) | | |
| | 40052 | Zero tracking (range) | | |
| | 40053 | Total comparison selection | | |
| | 40054 | Count limit | | |
| | 40055 | Key invalid | | |

| | | | | |
|---|---|---|---|---|
| Holding register 4XXXX | 40056 | LOCK1, 2 | Unsigned No decimal point | I16 |
| | 40057 | External input selection | | |
| | 40058 | External output selection | | |
| | 40059 | Min scale division | | |
| | 40060 | DZ regulation value | | |
| | 40061 | Accumulation count (read only) | | |
| | 40062 | Reserve (no assignments) | | |
| | — | | | |
| | 49999 | | | |

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

Point

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.

## ■About data

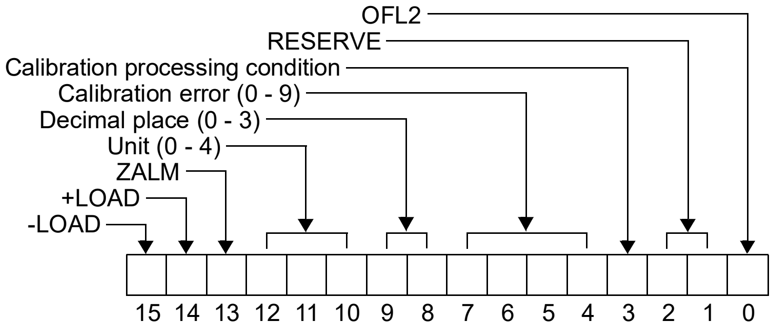
| Data type | Data name | Meaning of data |
|---|---|---|
| Coil | Gross display | Switches the weight display to gross weight. |
| | Net display | Switches the weight display to net weight. |
| | One-touch tare subtraction | Executes one-touch tare subtraction. |
| | One-touch tare subtraction reset | Resets one-touch tare subtraction. |
| | Digital zero | Zeroes gross weight. |
| | Digital zero reset | Resets digital zero. |
| | Hold ON | Holds weight value. |
| | Hold OFF | Cancels weight value hold. |
| | Accumulation clear | Clears accumulation value. |
| | Zero calibration | Executes zero calibration. |
| | Span calibration (actual load calibration) | Executes span calibration (actual load calibration). |
| Input status | NEAR ZERO | Indicates the state of the NZ signal of the indicator. |
| | HI | Indicates the state of the over signal of the indicator. |
| | GO | Indicates the state of the go signal of the indicator. |
| | LO | Indicates the state of the under signal of the indicator. |
| | SP1 | Indicates the state of the SP1 signal of the indicator. |
| | SP2 | Indicates the state of the SP2 signal of the indicator. |
| | SP3 | Indicates the state of the SP3 signal of the indicator. |
| | COMPL. | Indicates the state of the complete signal of the indicator. |
| | STAB | Turns ON while weight value of the indicator is stable. |
| | 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. |

| | | |
|---|---|---|
| Input status | G/N | Turns ON when the weight displayed by the indicator is net, and turns OFF when it is gross. |
| | Total limit | Indicates the state of the total limit signal. |
| | 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). |
| | LOCK1 | Indicates the state of setting LOCK1. |
| | LOCK2 | Indicates the state of setting LOCK2. |
| Input register | Status 1 | Shows weight condition. (*2) |
| | Status 2 | Shows weighing condition. (*3) |
| | Gross weight | Shows gross weight. (-99999 to 99999) (*4) |
| | Net weight | Shows net weight. (-99999 to 99999) (*4) |
| | Tare weight | Shows tare weight. (0 to 99999) (*4) |
| Holding register | Upper limit | Shows upper limit. (0 to 99999) |
| | Lower limit | Shows lower limit. (0 to 99999) |
| | Near zero | Shows near zero. (0 to 99999) |
| | Set point 1 | Shows set point 1. (0 to 99999) |
| | Set point 2 | Shows set point 2. (0 to 99999) |
| | Final (target value) | Shows final (target value). (0 to 99999) |
| | Weighing function 1 | Shows weighing function 1. |
| | Tare setting | Shows tare weight. (0 to 99999) |
| | Total limit | Shows total limit. (0 to 999999999) |
| | Balance weight value | Shows balance weight value. (0 to 99999) |
| | Capacity | Shows capacity. (1 to 99999) |
| | Display selection | Shows display selection. |
| | Gravitational acceleration | Shows 4 digits after decimal point of gravitational acceleration. (9.**7500** to 9.**8500**) |
| | Latest accumulation data | Shows latest accumulation data. (0 to 99999) |
| | Accumulation value | Shows accumulation value. (0 to 999999999) |
| | Compensation | Shows compensation. (0 to 9999) |
| | Over | Shows over. (0 to 9999) |
| | Under | Shows under. (0 to 9999) |
| | Comparison inhibit time | Shows comparison inhibit time. (0 to 999) |
| | Judging time | Shows judging time. (0 to 99) |
| | Complete output (hold) time | Shows complete output (hold) time. (0 to 99) |
| | Weighing function 2 | Shows weighing function 2. |
| | Digital low pass filter | Shows digital low pass filter. (0 to 5) |
| | Moving average filter | Shows moving average filter. (1 to 512) |
| | Motion detection (period - range) | Shows motion detection (period - range). (00-00 to 99-99 *5) |
| | Zero tracking (period) | Shows zero tracking (period). (0 to 99) |
| | Zero tracking (range) | Shows zero tracking (range). (0 to 9999) |
| | Total comparison selection | Shows total comparison selection. (0 to 2) |
| | Count limit | Shows count limit. (0 to 9999) |
| | Key invalid | Shows key invalid. |
| | LOCK 1 and 2 | Shows LOCK. |
| | External input selection | Shows external input selection. |
| | External output selection | Shows external output selection. |
| | Min scale division | Shows min scale division. (1 to 50) |
| | DZ regulation value | Shows DZ regulation value. (0 to 9999) |
| | Accumulation count | Shows accumulation count. (0 to 9999) |

*1: WEIGHT ERROR

OFL1, OFL2, -OFL2, OFL3, LOAD, -LOAD, and ZALM are included.

*2: Status 1




- Decimal place: Shows decimal place.

| Decimal place | Bit No. | |
|---|---|---|
| | 9 | 8 |
| None | 0 | 0 |
| 0.0 | 0 | 1 |
| 0.00 | 1 | 0 |
| 0.000 | 1 | 1 |

- Unit: Shows unit.

| Unit | Bit No. | | |
|---|---|---|---|
| | 12 | 11 | 10 |
| None | 0 | 0 | 0 |
| t | 0 | 0 | 1 |
| g | 0 | 1 | 0 |
| kg | 0 | 1 | 1 |
| lb | 1 | 0 | 0 |

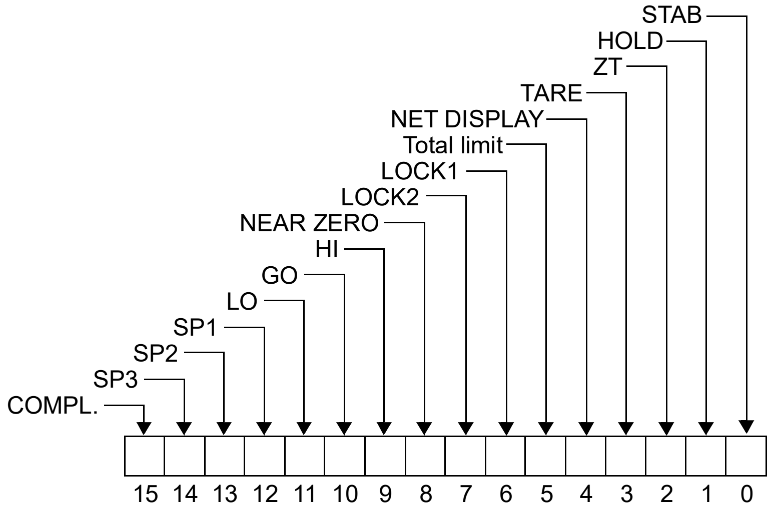
- -OFL2, OFL2, -LOAD, +LOAD, ZALM:
  "1" when each error occurs.

- Calibration processing condition:
  "1" during zero calibration or span calibration.

- Calibration error: Shows the error No. of the calibration error that has occurred.
  "0" means that no calibration error is given.

| Cal. err | Bit No. | | | |
|---|---|---|---|---|
| | 7 | 6 | 5 | 4 |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 2 | 0 | 0 | 1 | 0 |
| 3 | 0 | 0 | 1 | 1 |
| 4 | 0 | 1 | 0 | 0 |
| 5 | 0 | 1 | 0 | 1 |
| 6 | 0 | 1 | 1 | 0 |
| 7 | 0 | 1 | 1 | 1 |
| 8 | 1 | 0 | 0 | 0 |
| 9 | 1 | 0 | 0 | 1 |

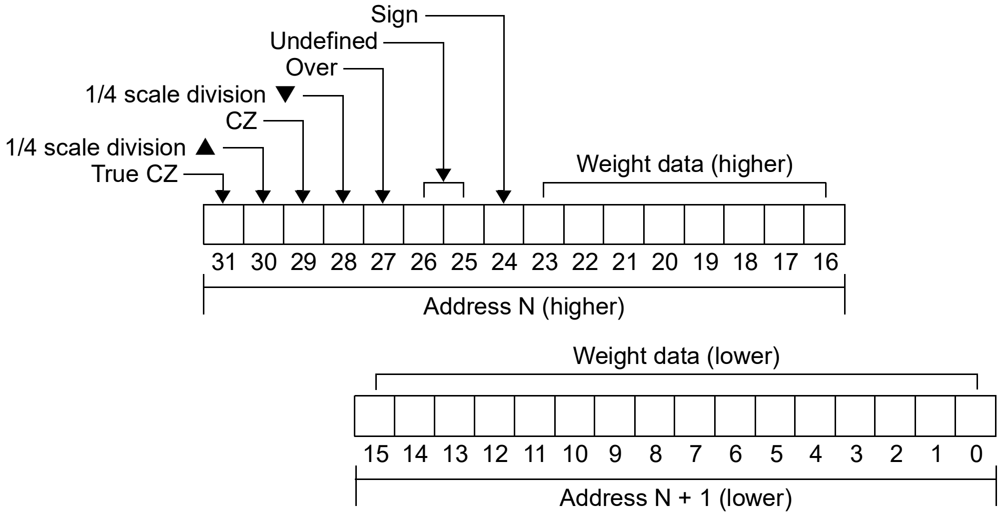
*3: Status 2




"1" when each status is ON.

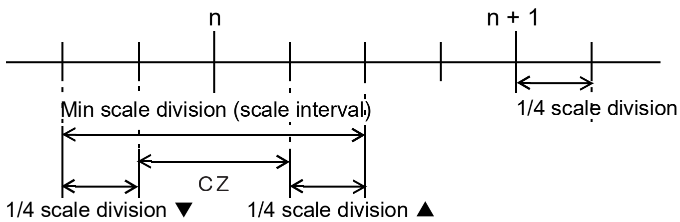
* For the ON condition of each status, see [Input status] under "■About data" on page 85.

*4: Gross weight, net weight, tare weight




- True CZ: "1" at the true zero point (weight 0±1/4 scale division).

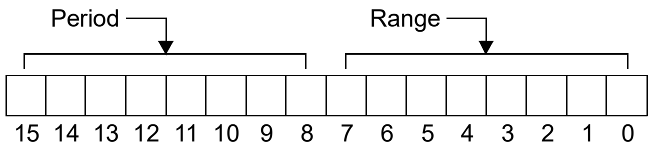
- 1/4 scale division ▲, CZ, 1/4 scale division ▼:
"1" when weight data is in the following range.



- Over: "1" in the following cases:
  In gross weight: OFL3
  In net weight: OFL1
  In tare weight: Tare > 99999

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

*5: Motion detection (period - range)




**Attention**

Since combined use with external input cannot be performed when using HOLD ON/OFF of Modbus-RTU, please do not set up "HOLD/JUDGE" by external input selection (setting mode 3-7).

# 10 SPECIFICATIONS

## 10-1. Specifications

### ■Analog section

| | | |
|---|---|---|
| Excitation voltage | 5V DC±5%<br>Output current within 90mA<br>Ratiometric system<br>(Up to six 350Ω load cells can be connected in parallel.) | |
| Signal input range | -0.5 to 3.0mV/V | |
| Zero adjustment range | Automatic adjustment by digital computation<br>-0.2 to 2.0mV/V | |
| Span adjustment range | Automatic adjustment by digital computation<br>0.3 to 3.0mV/V | |
| Minimum input sensitivity | 0.15μV/count | |
| Accuracy | Non-linearity:<br>Zero drift:<br>Gain drift: | Within 0.01%FS<br>0.025μV/℃RTI Typ<br>1ppm/℃ Typ |
| A/D converter | Conversion rate:<br>Conversion resolution: | 300 times/sec<br>24 bits (binary) |
| Minimum indication resolution | 1/10000 | |

### ■Display section

| | | |
|---|---|---|
| Display | 18.5mm in character height<br>Numerical display by liquid crystal display module (7-digit)<br>Subdisplay 7.3mm in character height (14-digit) | |
| Weight display | 5-digit<br>Sign: Negative sign at the highest-order digit | |
| Accumulation display | 9-digit<br>* Also switchable to accumulation count (4-digit) or final (5-digit) | |
| Display update rate | 1, 2, 5, 10, 20 times/sec selectable (system speed: 300 times/sec) | |
| Unit | None, g, kg, t, lb selectable | |
| Capacity | 5-digit | |
| Min scale division | Settable in the range of 1 to 50 | |
| Decimal place | 0, 0.0, 0.00, 0.000 selectable | |
| Over display | A/D converter input over<br>Net over<br>Capacity + 9 scale divisions over<br>Gross over | LOAD<br>OFL1<br>OFL2<br>OFL3 |
| Center zero | True zero point or center of each value is displayed. | |
| Status | NZ/ HOLD/ ZALM/ STAB/ TARE/ NET/ GROSS/ CZ/ ZT/ HI/ GO/ LO/ COMPL/ SP3/ SP2/ SP1 displayed | |

## ■Setting section

| | |
|---|---|
| Setting method | Settings are made by membrane key operation.<br>Also, settings can be made from a host computer through RS-485 I/F, etc. |
| Storage of setting values | Stored in F-RAM (nonvolatile RAM) |
| Protection of setting values | Software LOCK of a set value and the calibration value is possible. |
| Setting items | Upper limit/ Lower limit/ Near zero/ Set point 1/ Set point 2/ Compensation/ Over/ Under/ Final/ Comparison inhibit time/ Judging time/ Complete output time (Hold time)/ Weighing function 1/ Weighing function 2/ Tare setting/ Tare display/ Digital low-pass filter/ Moving average filter/ Motion detection (Period - Range)/ Zero tracking (Period)/ Zero tracking (Range)/ Total comparison selection/ Total limit (high 4)/ Total limit (under 5)/ Count limit/ Key invalid/ LOCK/ External input selection/ External output selection/ PASSWORD/ Balance weight value/ Capacity/ Minimum scale division/ DZ regulation value/ Display selection/ Gravitation acceleration/ RS-485 I/F/ Communication type/ RS-485 ID/ Transmission delay time/ Span calibration/ Zero calibration |

## ■External signals

Source type or sink type selected at order-time.

### - Output signals

| | |
|---|---|
| Output type | When each signal turns ON, the output transistor turns ON.<br>* There is a need to prepare an external power supply. |
| Number of outputs | 4 points |
| Isolation method | Photocoupler isolation |
| Rated input voltage | DC24V |
| Operating voltage range | DC20.4 to 26.4V (ripple percent within 5%) |
| Max. voltage | DC30V |
| Max. current | DC120mA |

### - Input signals

| | |
|---|---|
| Input type | Contact (relay, switch, etc.) or non-contact (transistor, photocoupler, etc.) connectable<br>* There is a need to prepare an external DC power supply. |
| Number of inputs | 4 points |
| Isolation method | Photocoupler isolation |
| Rated input voltage | DC24V |
| Operating voltage range | DC20.4 to 26.4V (ripple percent within 5%) |
| Load current | Approx. 11mA (when 24V DC load) |

## ■Interface

### <Standard>

#### RS-485 communication interface [485]

Weight data and various statuses are read by the host computer.
Furthermore, various setting values are read and written from the host computer.

| | | |
|---|---|---|
| Message format | Modbus-RTU, UNI-Format | |
| Signal level | RS-485-compliant | |
| Transmission distance | Approx. 1km | |
| Transmission mode | Asynchronous, half-duplex communication | |
| Transmission speed | 1200, 2400, 4800, 9600, 19200, 38400bps selectable | |
| Bit configuration | Start bit: | 1 bit |
| | Length of character: | 7 or 8 bits selectable<br>(8 bits for Modbus-RTU) |
| | Stop bit: | 1 or 2 bits selectable |
| | Parity bit: | None, odd, or even selectable |
| | Terminator: | CR, CR + LF selectable |
| Code | Binary (for Modbus-RTU)<br>ASCII (for UNI-Format) | |

## ■General performance

| | | |
|---|---|---|
| Power supply voltage | 100 to 240V AC (+10% -15%) [free power supply 50/60Hz] | |
| Power consumption | Approx. 5W | |
| Rush current | 1.5A, 0.7mSec: 100V AC average load condition<br>(ordinary temperature, at a cold start)<br>2.5A, 0.7mSec: 200V AC average load condition<br>(ordinary temperature, at a cold start) | |
| Operation conditions | Temperature: | Operation temperature range: -10 C to +40 C<br>Storage temperature range: -20 C to +85 C |
| | Humidity: | 85%RH or less (non-condensing) |
| Dimensions | 192(W)×96(H)×102(D) mm (* projections excluded) | |
| Panel cutout size | 186W ($^{+2}_{-0}$)×92H ($^{+1}_{-0}$) mm | |
| Weight | Approx. 1.3kg | |

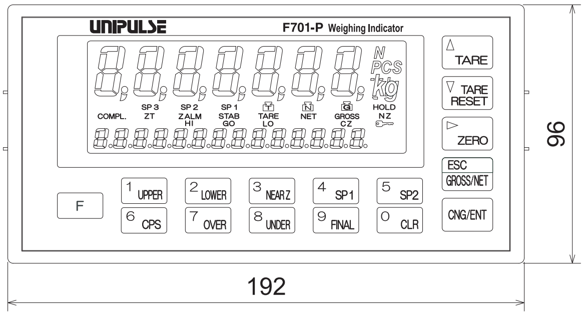
## ■Accessories

- AC input cord *1(3m) ........ 1
- Jumper line ........ 2
- Terminating resistance ........ 1
- Operation manual ........ 1
- Packing ........ 1

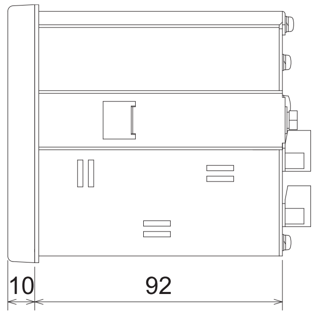
*1: The attached power cable is for 100V AC power in Japan.

# 10-2. Dimensions

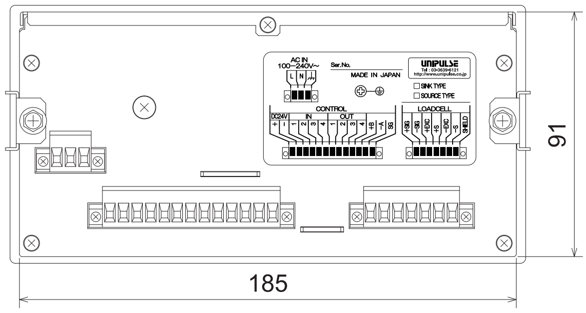
Unit: mm



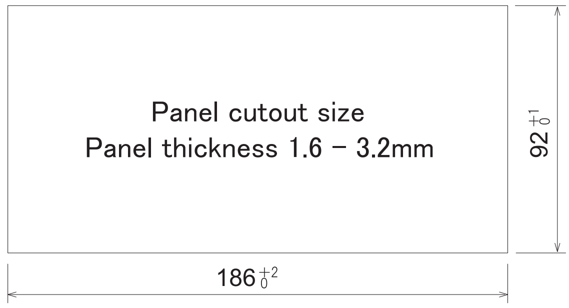

[Front]




[Side]




[Rear]



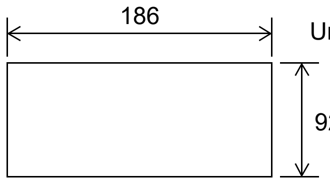

## ■Mounting on a panel

Please follow the procedure for mounting a panel to F701-P.

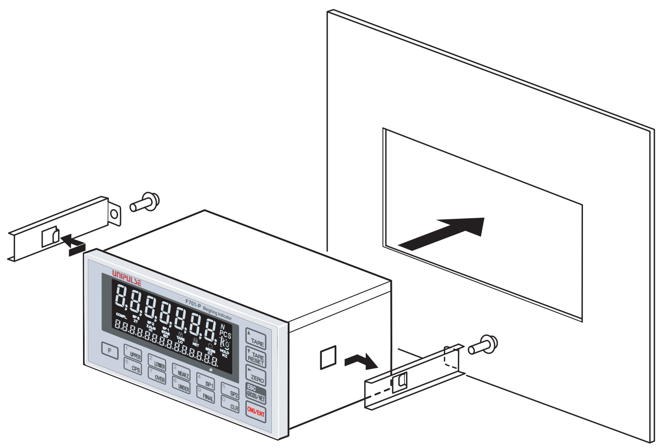
**1.** Make a hole in the mounting panel.

Panel cutout size
186(W)×92(H) mm

Mounting panel thickness
1.6 - 3.2 mm




**2.** Remove the mounting rails on both sides of the indicator, and insert the indicator into the panel.



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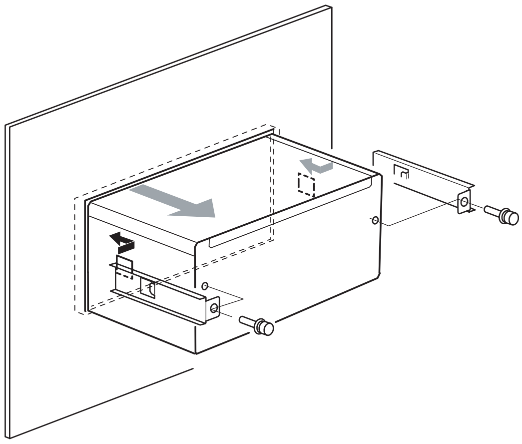
SPECIFICATIONS

**3.** Insert the mounting rails into both sides from the back of the indicator.



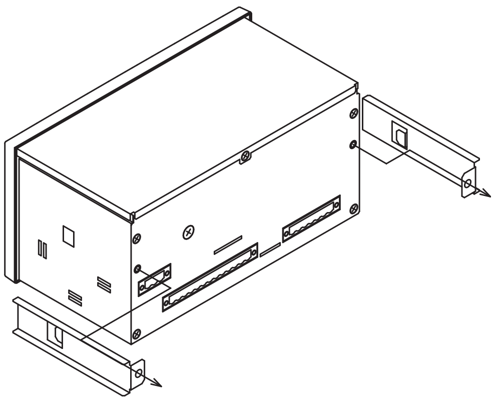
**4.** Securely fix the mounting hardware on both sides with the attached M4 screws.

| ⚠ CAUTION |
|---|
| For transportation after panel-mounting, consideration should be given so as not to give excessive shocks or vibration. |

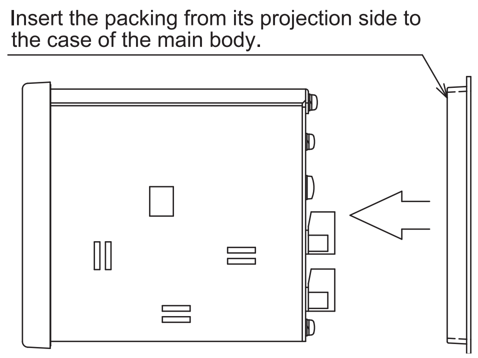
## ■Packing installation

By attaching attached packing, it becomes simple dustproof and drip-proof.

**1.** Remove the guide rails.

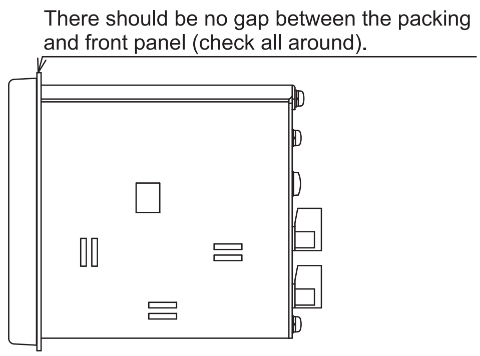


**2.** Insert the packing from its projection side to the case of the main body.

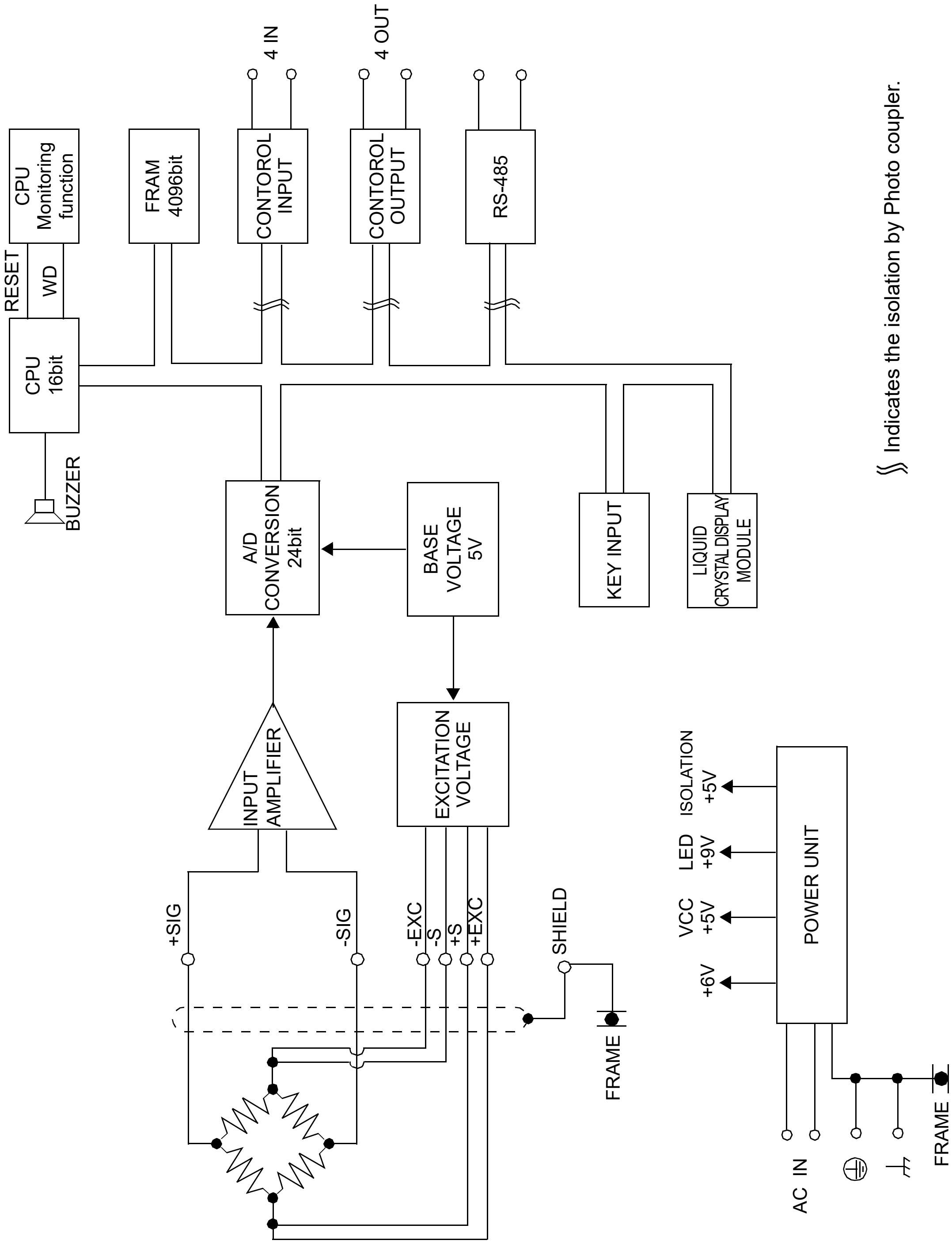



**3.** Insert the projection of the packing all around the clearance of the front panel.


**4.** Check that there is no gap or twist between the inserted packing and front panel.
If there is a gap, push in the packing to bring them into close contact.



# 10-3. Block diagram



# 11 SUPPLEMENTS

## 11-1. List of setting values

Initial value: Factory-shipped value

LOCK1: Soft switch (setting mode 3-6_LOCK1) prevents the setting value from being changed.

LOCK2: Soft switch (setting mode 3-6_LOCK2) prevents the setting value from being changed.

Display only: The setting cannot be changed.

Page: Reference page number on which details of each item are described.

### ■Setting mode 0

| | Item | Initial value | LOCK1 | LOCK2 | Display | Page |
|---|---|---|---|---|---|---|
| 1 | Upper limit | 075.00 | ◎ | | | P39 |
| 2 | Lower limit | 025.00 | ◎ | | | P39 |
| 3 | Near zero | 001.00 | ◎ | | | P38 |
| 4 | Set point 1 | 030.00 | ◎ | | | P43 |
| 5 | Set point 2 | 020.00 | ◎ | | | P43 |
| 6 | Compensation | 00.50 | ◎ | | | P43 |
| 7 | Over | 00.50 | ◎ | | | P41 |
| 8 | Under | 00.25 | ◎ | | | P41 |
| 9 | Final (target value) | 100.00 | ◎ | | | P41, P43 |

### ■Setting mode 1

| | Item | Initial value | LOCK1 | LOCK2 | Display | Page |
|---|---|---|---|---|---|---|
| 1 | Comparison inhibit time | 0.50 | | ◎ | | P44 |
| 2 | Judging time | 1.5 | | ◎ | | P44 |
| 3 | Complete output time (Hold time) | 3.0 | | ◎ | | P40, P42, P45 |
| 4 | Weighing function 1 | 03000 | | ◎ | | P38, P39, P41, P43, P44 |
| 5 | Weighing function 2 | 100 | | ◎ | | P32, P34, P36 |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | Tare setting | 000.00 | ◎ | | | P37 |
| 9 | Tare display | 000.00 | | | ◎ | P37 |

## ■Setting mode 2

| | Item | Initial value | LOCK1 | LOCK2 | Display | Page |
|---|---|---|---|---|---|---|
| 1 | Digital low-pass filter | 1 | | ◎ | | P31 |
| 2 | Moving average filter | 030 | | ◎ | | P32 |
| 3 | Motion detection (Period - Range) | 1.5-0.5 | | ◎ | | P34 |
| 4 | Zero tracking (Period) | 0.0 | | ◎ | | P34 |
| 5 | Zero tracking (Range) | 0000 | | ◎ | | P34 |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

## ■Setting mode 3

| | Item | Initial value | LOCK1 | LOCK2 | Display | Page |
|---|---|---|---|---|---|---|
| 1 | Total comparison selection | 0 | ◎ | | | P46 |
| 2 | Total limit (high 4) | 0 | ◎ | | | P46 |
| 3 | Total limit (under 5) | 0.00 | ◎ | | | P46 |
| 4 | Count limit | 0 | ◎ | | | P46 |
| 5 | Key invalid | 1111 | | ◎ | | P37 |
| 6 | LOCK | 00 | | | | P47 |
| 7 | External input selection | 0124 | | ◎ | | P48 |
| 8 | External output selection | 0123 | | ◎ | | P48 |
| 9 | Password | 0000 | | | | P47 |

## ■Setting mode 4

| | Item | Initial value | LOCK1 | LOCK2 | Display | Page |
|---|---|---|---|---|---|---|
| 1 | Balance weight value | 100.00 | | ◎ | | P26 |
| 2 | Capacity | 100.00 | | ◎ | | P26 |
| 3 | Minimum scale division | 0.01 | | ◎ | | P26 |
| 4 | DZ regulation value | 02.00 | | ◎ | | P35 |
| 5 | Display selection | 21340 | | ◎ | | P25, P27, P31 |
| 6 | Gravitational acceleration | 9.8067 | | ◎ | | P26 |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

## ■Setting mode 5

| | Item | Initial value | LOCK1 | LOCK2 | Display | Page |
|---|---|---|---|---|---|---|
| 1 | RS-485 I/F setting | 51000 | | ◎ | | P56 |
| 2 | Communication type | 00 | | ◎ | | P56 |
| 3 | RS-485 ID | 01 | | ◎ | | P56 |
| 4 | Transmission delay time | 00 | | ◎ | | P65 |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

## ■Setting mode 9

| | Item | Initial value | LOCK1 | LOCK2 | Display | Page |
|---|---|---|---|---|---|---|
| 1 | Span calibration | 100.00 | | ◎ | | P30 |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| 6 | | | | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |
| Zero | Zero calibration | 0.00 | | ◎ | | P28 |

# 11-2. Over scale/error display

## ■Over scale display

The weight error output turns ON.

| | |
|---|---|
| A/D converter input over | LoAd |
| Net weight > Net over setting value | oFL1 |
| Gross weight > Capacity + 9 scale divisions | oFL2 |
| Gross weight > Gross over setting value | oFL3 |

* Net weight = Gross weight - Tare

## ■Calibration error display

| Error description | Alarm message |
|---|---|
| The initial tare exceeds the zero adjustment range. | c Err2 |
| The initial tare is minus (negative). | c Err3 |
| The span setting value is larger than the capacity. | c Err4 |
| The span setting value is "00000". | c Err5 |
| The load cell (scale) output has not reached the span adjustment range. | c Err6 |
| The load cell (scale) output is minus (negative). | c Err7 |
| The load cell (scale) output exceeds the span adjustment range. | c Err8 |
| The weight value is not stable and calibration is stopped. | c Err9 |

# 11-3. Troubleshooting

## ■Over scale display

### LoAd (A/D converter over)

A signal beyond the signal input range of the F701-P is input.
Check to see if the load cell output is not beyond the span calibration range and check the cable connecting the F701-P and load cell for breaks. This display may also appear when nothing is connected to the load cell input connector on the rear panel.

### - LoAd (A/D converter minus over)

A signal below the signal input range of the F701-P is input.
Check to see if the load cell output is not below the span calibration range and check the cable connecting the F701-P and load cell for breaks. This display may also appear when nothing is connected to the load cell input connector on the rear panel.

### oFL1 (Net weight > 99999)

The net weight exceeds 99999 (display allowable limit). To put this over scale display back to a normal weight display, lower the input signal from the load cell until the over scale display goes out.

### oFL3 (Gross weight > 99999)

The gross weight exceeds 99999 (display allowable limit). To put this over scale display back to a normal weight display, lower the input signal from the load cell until the over scale display goes out.

### oFL2 (Gross weight > Capacity + 9 scale divisions)

The gross weight exceeds the capacity + 9 scale divisions. To put this over scale display back to a normal weight display, lower the input signal from the load cell until the over scale display goes out.

**Attention**

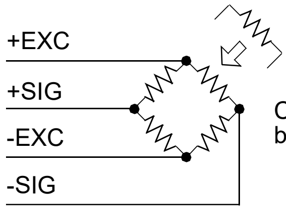
The capacity is a basic value for using the F701-P as a weighing apparatus. Every time the capacity is changed, calibration must be redone. Be careful not to carelessly change the capacity in order to put "oFL2" back to a normal state.

## ■Calibration error display

### c Err2 (Calibration error)

The initial tare exceeds the zero calibration range of the F701-P. Check the load cell for unnecessary load.

If " c Err2 " is displayed under a normal load, there is a need to connect resistance between the +EXC and -SIG terminals of the load cell and redo zero calibration after shifting the zero point. The relationships between connected resistance values and input signals are shown below.




| Resistance value | | Input conversion strain | |
|---|---|---|---|
| Approximate value | Calculated value | μ-STRAIN | mV/V |
| 875 kΩ | 866 kΩ | 200 | 0.1 |
| 437 kΩ | 442 kΩ | 400 | 0.2 |
| 291 kΩ | 294 kΩ | 600 | 0.3 |
| 219 kΩ | 221 kΩ | 800 | 0.4 |
| 175 kΩ | 174 kΩ | 1000 | 0.5 |
| 146 kΩ | 147 kΩ | 1200 | 0.6 |
| 125 kΩ | 124 kΩ | 1400 | 0.7 |
| 109 kΩ | 110 kΩ | 1600 | 0.8 |
| 97 kΩ | 97.6 kΩ | 1800 | 0.9 |
| 87.3 kΩ | 86.6 kΩ | 2000 | 1.0 |
| 79.4 kΩ | 78.7 kΩ | 2200 | 1.1 |
| 72.7 kΩ | 73.2 kΩ | 2400 | 1.2 |
| 67.1 kΩ | 66.5 kΩ | 2600 | 1.3 |
| 62.3 kΩ | 61.9 kΩ | 2800 | 1.4 |
| 58.2 kΩ | 57.6 kΩ | 3000 | 1.5 |
| 54.5 kΩ | 54.9 kΩ | 3200 | 1.6 |
| 51.3 kΩ | 51.1 kΩ | 3400 | 1.7 |
| 48.4 kΩ | 48.7 kΩ | 3600 | 1.8 |
| 45.9 kΩ | 46.4 kΩ | 3800 | 1.9 |
| 43.6 kΩ | 43.2 kΩ | 4000 | 2.0 |
| 41.5 kΩ | 41.2 kΩ | 4200 | 2.1 |
| 39.6 kΩ | 39.2 kΩ | 4400 | 2.2 |
| 37.9 kΩ | 38.3 kΩ | 4600 | 2.3 |
| 36.3 kΩ | 36.5 kΩ | 4800 | 2.4 |
| 34.8 kΩ | 34.8 kΩ | 5000 | 2.5 |

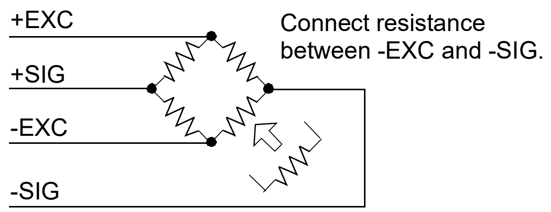
- The numerical values in this table assume that one 350Ω load cell is used.
- The temperature coefficient of the resistance connected here directly affects the accuracy of the indicator.
  Use resistance of 50ppm/ C or higher (approx. 5ppm/ C is recommended).

## c Err3 (Calibration error)

The initial tare is minus (negative). Check to see if the load cell is loaded in the correct direction and if the wiring of +SIG and -SIG of the load cell is not in reverse.

If " c Err3 " is displayed with the load applied in the normal direction and the wiring correct, there is a need to connect resistance between the -EXC and -SIG terminals of the load cell and redo zero calibration after shifting the zero point.

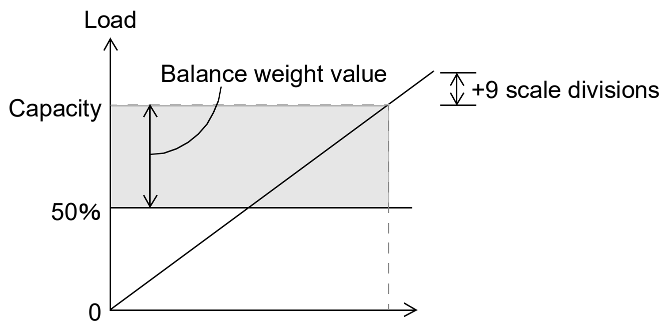
The relationships between connected resistance values and input signals are the same as for " c Err2 ".




## c Err4 (Calibration error)

The balance weight value or span calibration value is set larger than the capacity. Reset the balance weight value or capacity, and redo span calibration.

Relationship between capacity and balance weight value




For accurate span calibration, it is recommended to perform it with the balance weight value between 50% and 100% of the capacity.

## c Err5 (Calibration error)

The balance weight value or span calibration value is set at "00000." Reset the balance weight value appropriately.

## c Err6 (Calibration error)

The load cell output has not reached the span adjustment range of the F701-P. Check to see if the load cell is properly loaded and if the load cell output can reach the span adjustment range in performance, and redo span calibration.

## c Err7 (Calibration error)

The load cell output is minus (negative). Check to see if the load cell is loaded in the correct direction and if the wiring of +SIG and -SIG of the load cell is not in reverse, and redo span calibration.

### c Err8 (Calibration error)

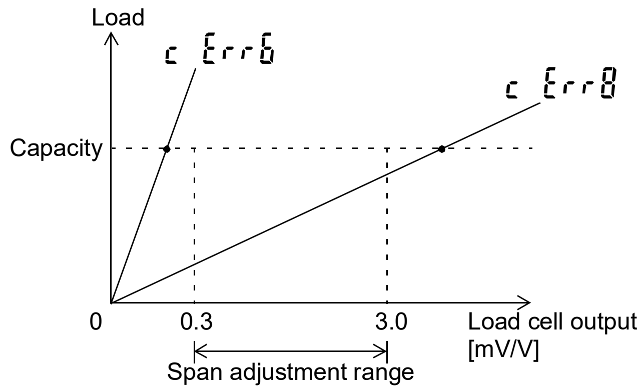
The load cell output exceeds the span adjustment range of the F701-P. Check to see if the load cell is properly loaded and if the rated output value of the load cell is within the span adjustment range, and redo span calibration.

### c Err9 (Calibration error)

Calibration is not completed properly because the indicated value of the F701-P fluctuates during calibration.
Adjust the stable setting parameters (period and range), check that "STAB" lights, and then redo calibration.

**Point**

The span adjustment range of the F701-P is 0.3 to 3.0 (mV/V).
Since display up to the capacity is ensured during span calibration, calibration fails if the load cell output is under 0.3 (mV/V) ( c Err6 ) or over 3.0 (mV/V) ( c Err8 ) when the capacity is reached.




## ■Checksum error display

### Error 1 (Checksum error)

This error is displayed if a checksum error is given during self-check.

## ■F-RAM check error display

### Error 2 (F-RAM check error)

This error is displayed if an F-RAM check error is given during self-check.

* Checksum error display or F-RAM check error display indicates a failure.
Ask us or your distributor for repair.

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