



F701-S

WEIGHING INDICATOR

OPERATION MANUAL

01AUG2020REV.1.08

UNIPULSE

Introduction

We appreciate your kind purchase of F701-S Weighing Indicator. The F701-S is a weighing indicator for load cell(s).



To take full advantage of high performance of F701-S, 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-S should be performed by personnel having technical knowledge of electricity.

In order to have an F701-S 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 safety. Please use F701-S 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

- Since the F701-S is defined as an open type (built-in device), it should be used installed and fixed to a panel, etc.. Moreover, install a breaker so that the operator can turn off a power supply quickly, and label them clearly.
- For the entire system to function safely when the F701-S becomes faulty or malfunctions, provide a safety circuit outside the F701-S.
- Before using the F701-S 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-S. 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 a test use in Japan, and its rating is 125V AC, 10A. 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 frame ground.
- 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

- 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
 - 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-S 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 RS-485 terminal at the specified torque.
If they are loose, shorts, fire or malfunctions may occur.
Tightening torque: 0.5N•m
- For sensors, external inputs/outputs, RS-485 and options, use shielded cables.

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-S for at least 30 minutes or more before use.
- If the F701-S 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-S. 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 during transportation

- When the F701-S 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-S 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.

Notice at the Time of Unpacking or Re-packing

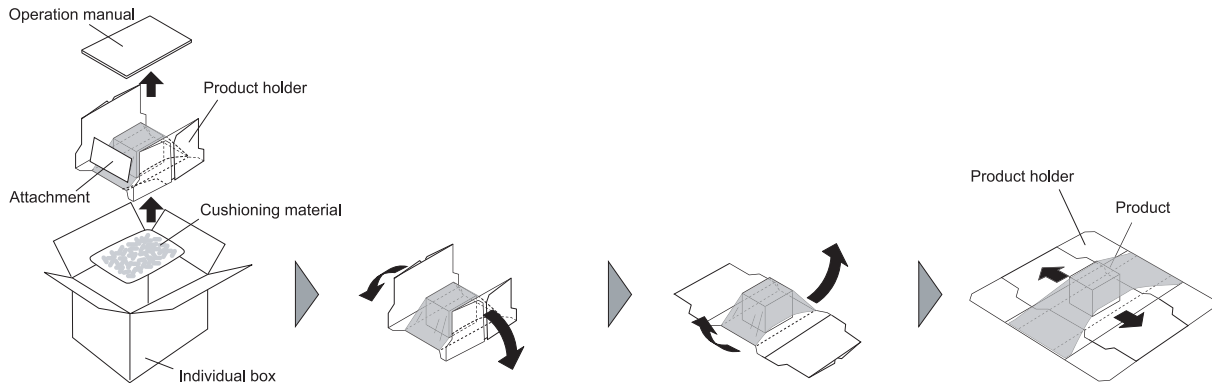
Please be careful following matters when you unpack the carton containing our product.

- 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.

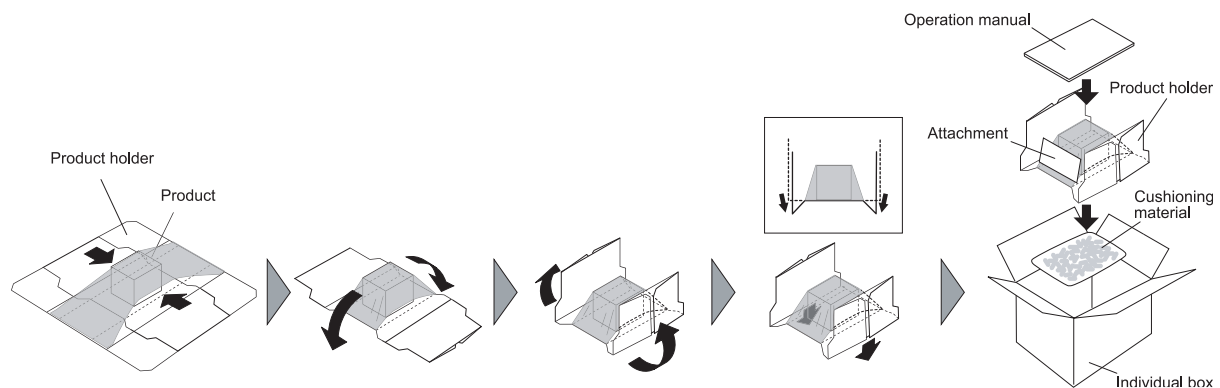
Then take the product out of the product holder as shown in the figures below.



- ① Take the product holder, attachment case and operation manual out of the individual box. Attachments are contained in the attachment case.
- ② Take the product out of the product holder. Return the each part of bent cardboard downward.
- ③ Then return the lower part of cardboard in the 90 degrees direction of ② to ease the tension of film.
- ④ Take 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.



- ① Insert the product between the center of the film and the card board of the product holder.
- ② Then bend the each part of cardboard downward to the direction of stretching the film as shown in the figure.
- ③ Bent the each part of cardboard in the 90 degrees direction of ② upward as shown in the figure.
- ④ Bend 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.
- ⑤ Place 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.

Product Compliant to RoHS2 Directive

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

RoHS2 Directive

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

CONTENTS

1	OUTLINE	1
1-1.	Contents of the package.	1
1-2.	About connectable devices.	1
1-3.	Appearance description	2
■	Front panel	2
■	Rear panel	6
2	CONNECTION	8
2-1.	Load cell connection.	9
■	6-wire connection	9
■	4-wire connection	10
■	Connecting load cells in parallel.	11
■	Sensor cable	11
2-2.	External input/output signal connection	12
■	Connector pin assignments	12
■	How to assemble the connector.	13
2-3.	Connection of the RS-485	13
2-4.	Connection of the protective ground.	14
2-5.	Connection of the frame ground.	14
3	SETTING METHOD	15
3-1.	Setting procedure	15
■	How to designate a setting mode No.	15
■	How to register a setting value.	16
3-2.	Setting modes.	19
■	Code setting	19
■	Setting mode 0	19
■	Setting mode 1	20
■	Setting mode 2	21
■	Setting mode 3	22
■	Setting mode 4	24
■	Setting mode 5	25
■	Setting mode 6	25
■	Setting mode 7	27
■	Setting mode 8	28
■	Setting mode 9	29
4	COMPLIANCE WITH OIML (OIML R76-1 compliance)	30
4-1.	Specifications	30
4-2.	Preparation	30
4-3.	OIML-compliant setting values	31

4-4. Caution for calibration	32
5 CALIBRATION	33
5-1. Span calibration	33
5-2. Actual calibration procedure	34
5-3. Secondary calibration procedure (equivalent calibration)	35
5-4. Preparation before calibration	36
■ LOCK release	36
■ Unit display (setting mode 6-5)	37
■ Decimal place (setting mode 6-5)	37
■ Capacity (setting mode 6-2)	37
■ Min scale division (setting mode 6-3)	37
■ Balance weight value (setting mode 6-1)	37
■ Gravitational acceleration (setting mode 6-6)	38
■ 1/4 scale division (setting mode 6-5)	39
5-5. Zero calibration	40
5-6. Span calibration (setting mode 9-1)	42
5-7. Secondary calibration (equivalent calibration) (setting mode 9-2)	42
6 FUNCTION SETTINGS	43
6-1. Display update rate (setting mode 6-5)	43
6-2. Subdisplay selection (setting mode 6-5)	43
6-3. Digital low pass filter (setting mode 2-1)	43
6-4. Moving average filter (setting mode 2-2)	44
6-5. Filter in stable condition (setting mode 5-2)	44
6-6. Motion detection (MD) (setting mode 2-3, 5-2)	45
■ Setting of motion detection parameters	46
6-7. Zero tracking (ZT) (setting mode 2-4, 2-5)	46
6-8. Digital zero (DZ)(setting mode 5-1)	47
6-9. Digital zero clear	47
6-10.DZ regulation value (setting mode 6-4)	48
6-11.Gross weight display/net weight display	48
6-12.One-touch tare subtraction (TARE)	48
6-13.One-touch tare subtraction reset	48
6-14.Digital tare subtraction (preset tare weight)	49
■ Preset tare weight (setting mode 1-7)	49
■ Tare setting (setting mode 1-8)	49
6-15.Tare weight display (setting mode 1-9)	49
6-16.Tare subtraction function limits (setting mode 5-1)	50

6-17.Reversing the sign of the net weight (setting mode 5-2)	50
6-18.Key invalid · LOCK (setting mode 3-2).	50
6-19.Net over/gross over	51
6-20.Display -OFL2 (setting mode 6-9)	51
7 WEIGHING SETTINGS AND OPERATIONS	52
7-1. Code.	52
■ Weighing code - setting code (setting mode 1-7).	52
7-2. Final/SP2/SP1/Compensation/Over/Under	54
7-3. AFFC regulation / AFFC ON/OFF / Average count of AFFC / AFFC coefficient	55
7-4. Quantitative discharge control	57
■ Feed weighing and discharge weighing	57
■ Switching between feed and discharge	58
■ Discharging control mode (setting mode 1-6)	58
7-5. Simple comparison control and sequence control	59
7-6. Weighing mode (setting mode 4-6)	61
7-7. Near zero comparison	61
7-8. Upper/lower limit comparison and filling promotion comparison	61
7-9. Over/under comparison	62
7-10.Complete signal output mode / Complete output time / Judging time / Comparison inhibit time	63
7-11.Sequence-control-related settings	64
■ Normal sequence control	68
■ Sequence control with adjust feeding.	69
■ Sequence control with discharge gate	70
■ Discharge gate operation	73
■ Manually discharge	73
■ Double sequence control	75
8 ACCUMULATION-FUNCTION- RELATED SETTINGS AND OPERATIONS.	77
8-1. Accumulation command	77
8-2. Accumulation command input condition (setting mode 5-2).	77
8-3. Total comparison selection/total limit/count limit	77
8-4. Accumulation clear	78
8-5. Auto accumulation command (setting mode 5-2).	78
9 SYSTEM-RELATED SETTINGS AND OPERATIONS	79
9-1. LOCK (soft) (setting mode 3-2)	79
9-2. Password (setting mode 3-9)	79

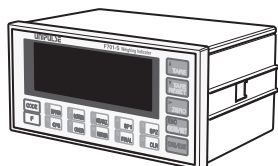
9-3. Self-check.	80
9-4. Option display (setting mode 9-9)	80
10EXTERNAL INPUT/OUTPUT SIGNALS (CONTROL CONNECTOR)	81
10-1.Connector pin assignments	81
10-2.External control equipment connection	83
■ Equivalent circuit and example connection, when specify the sink type	83
■ Equivalent circuit and example connection, when specify the source type	84
10-3.External input signals	85
■ Allow operate <level input>	85
■ Weighing start <level input, edge input>	85
■ Stop <level input, edge input>	85
■ Discharging command <edge input>	86
■ Manually discharge <edge input>	86
■ Open discharge gate <level input>.	86
■ Close discharge gate <level input>	86
■ Accumulation clear <edge input>.	86
■ G/N <edge input>.	86
■ D/Z ON <edge input>	86
■ TARE ON <edge input>	86
■ TARE OFF <edge input>	86
■ Accumulation command <edge input>.	87
■ Complete for slave <edge input>	87
■ Feed/discharge <level input>	87
■ Hold <level input>.	87
■ Judge <level input>	87
■ Code <level input>	87
10-4.External output signals	88
■ SP1, SP2, SP3.	88
■ Complete	88
■ Discharge	88
■ Clamp	89
■ NZ.	89
■ Total limit	89
■ Stable	89
■ Filling promotion over.	89
■ Over, under, go	89
■ Upper limit, lower limit	90
■ Discharging command for slave.	90
■ Weight error	90
■ Seq. error	90
■ Final error.	90
■ Accumulation count error	90
■ RUN	90
■ Discharge count error.	90
11INTERFACE	91
11-1.RS-485 interface	91
■ Communication specifications	91
■ RS-485 connection.	92
■ RS-485-related setting values	93

■ UNI-Format commands	95
■ UNI-Format (continuous, auto)	104
■ Modbus-RTU	105
12 SPECIFICATIONS	133
12-1. Specifications	133
■ Analog section	133
■ Display section	133
■ Setting section	134
■ External signals	135
■ Interface	135
■ General performance	138
■ Accessories	138
12-2. Dimensions	138
■ Standard equipment	138
■ When the external input/output signals is connected	139
■ When the CCL option is equipped	139
■ Mounting on a panel	140
■ Packing installation	141
12-3. Block diagram	142
12-4. Compliance with EC directives	143
13 SUPPLEMENTS	144
13-1. List of setting values	144
■ CODE	144
■ Setting mode 0 (comparison setting value)	144
■ Setting mode 1 (extended setting value)	145
■ Setting mode 2 (operation setting value)	145
■ Setting mode 3 (function setting value)	145
■ Setting mode 4 (sequence mode setting value)	146
■ Setting mode 5 (extended function setting value)	146
■ Setting mode 6 (calibration setting value)	146
■ Setting mode 7 (interface setting value 1)	147
■ Setting mode 8 (interface setting value 2)	147
■ Setting mode 9 (calibration mode)	147
13-2. Over scale/error display	148
■ Over scale display	148
■ Sequence error display	148
■ Calibration error display	148
13-3. Troubleshooting	149
■ Over scale display	149
■ Error display	150
■ Calibration error display	151
■ Checksum error display	154
■ F-RAM check error display	154
■ NOV. RAM check error display	154
■ Setting value not changed	154

1 OUTLINE

1-1. Contents of the package

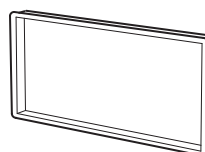
The packaging box contains the following.
Make sure to check them before use.



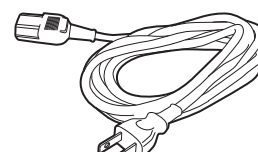
F701-S body ... 1



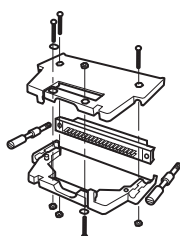
F701-S operation manual ... 1



Packing ... 1



AC input cord ... 1



External input/output connector ... 1

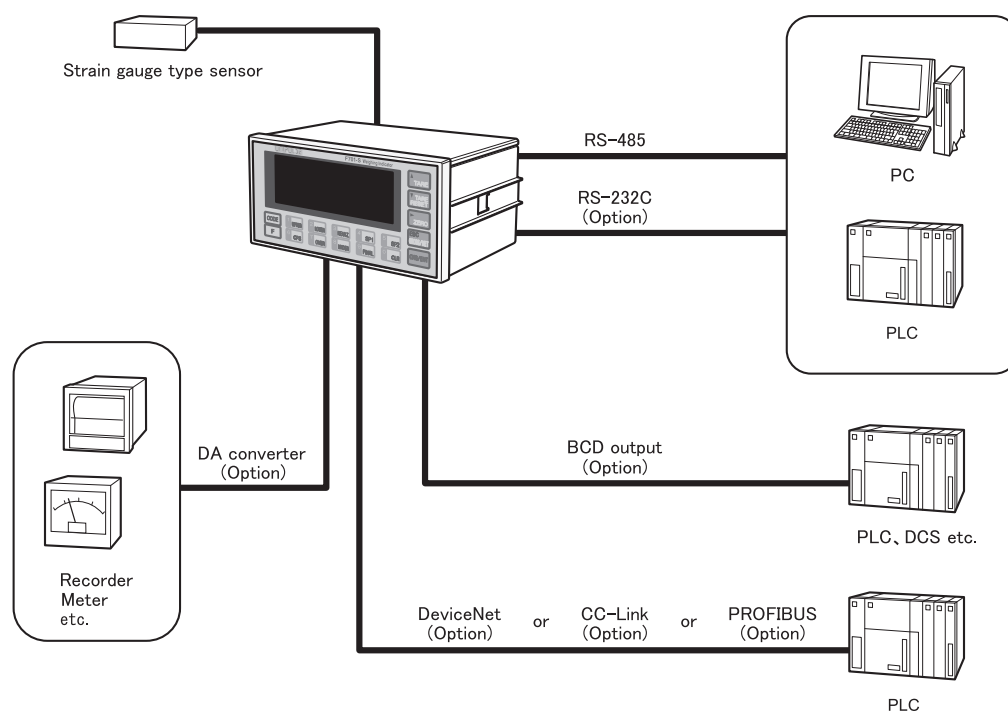


Load cell connector ... 1



Load cell connector rubber ... 1

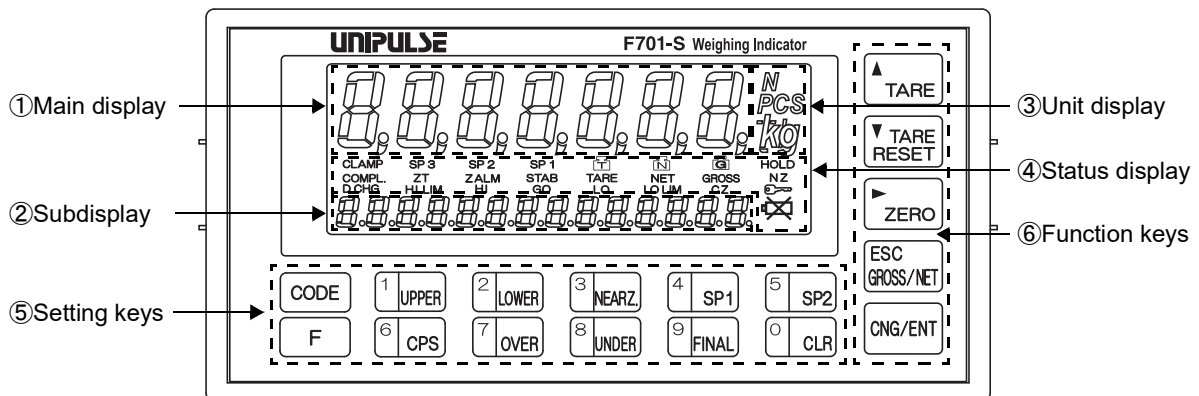
1-2. About connectable devices



* Up to three options, including any one of DeviceNet, CC-Link, and PROFIBUS, can be mounted.

1-3. Appearance description

■ Front panel



① Main 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 or sequence error, the error and weight value are displayed alternately.

(2) Over scale/error display

Over scale and other errors are displayed.

* See "13-2. Over scale/error display" on page 148.

(3) Setting value display

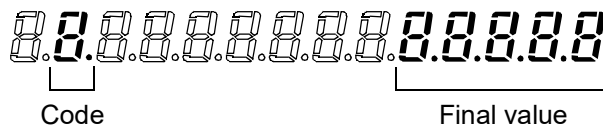
Various setting values are displayed.

② Subdisplay

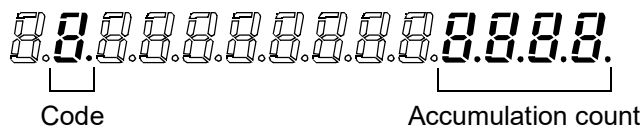
Weighing data, such as accumulation value, and various setting values are displayed by setting.

* See "6-2. Subdisplay selection (setting mode 6-5)" on page 43.

(1) Code and final



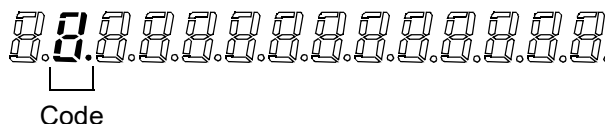
(2) Code and accumulation count



(3) Code and accumulation value



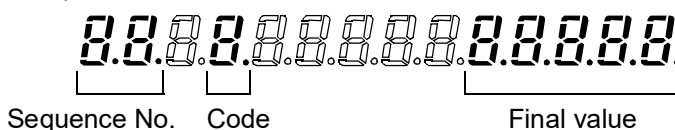
(4) Code



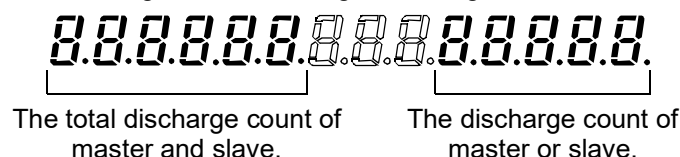
(5) Accumulation count and accumulation value



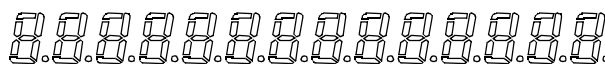
(6) Sequence No., code and final value



(7) Total discharge count and single discharge count



(8) None



Code

A selected code is displayed.

Normally, a weighing code is displayed, and when a setting value is displayed, a setting code is displayed.

* For details, see "3-1.Setting procedure" on page 15.

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.

Also, when the accumulation count reaches "9999", an accumulation count error results until performing Accumulation Clear.

Accumulation value

An accumulated value is displayed.

It is initialized to "0" by performing Accumulation Clear.

Weight values are accumulated when the complete output signal is ON.

Final setting value

"Final" set by setting mode 0-9 is displayed.

Sequence No.

In sequence mode, a status number is displayed. This display is intended for maintenance and inspection.

When sequence No. is "1", becomes waiting for weighing start.

The total discharge count of master and slave

The total discharge count of master and slave is displayed. However, this count is displayed when the master/slave selection (setting mode 4-7 sequence mode 2) setting is "0:master". It is initialized to "0" by performing Accumulation Clear.

The discharge count of master or slave

A discharge count of this unit is displayed. It is initialized to "0" by performing Accumulation Clear. Also, when the discharge count reaches "99999", a discharge count error results until performing Accumulation Clear.

- * The accumulation count, accumulation value, final setting value, total discharge count, and single discharge count are for each code. Usually, the displayed values are relative to the weighing code, and when a setting mode, the displayed values are relative to the setting code.

③Unit display

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

④Status display

NZ

Lights when the weight value \leq near zero setting value.

* The type of weight value is determined by near zero comparison mode.

CZ

Lights at the true zero point ($0 \pm 1/4$ scale division) (when $1/4$ scale division in setting mode 6-5 "display selection 1" is off).

Lights at the true zero point ($0 \pm 1/4$ scale division) and the central point of the scale interval of the indicated value {indicated value $\pm (1/4 \times \text{min scale division})$ } (when $1/4$ scale division in setting mode 6-5 "display selection 1" 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.

* For the definition of stability, see "6-6.Motion detection (MD) (setting mode 2-3, 5-2)" on page 45.



TARE

Lights when tare subtraction is performed.

Blinks when the tare weight is displayed by setting mode 1-9 "tare display."



NET

Lights when the net weight is displayed.

Goes out when the gross weight is displayed.



GROSS

Lights when the gross weight is displayed.

Goes out when the net weight is displayed.

HI

Lights when the weight value $>$ (final + over).

GO

Lights when the (final - under) \leq weight value \leq (final + over).

LO

Lights when the weight value $<$ (final - under).

HI LIM

Lights when the weight value $>$ upper limit setting value.

LO LIM

Lights when the weight value $<$ lower limit setting value.

COMPL. Lights while the complete signal is output.

SP 3 Lights when the weight value \geq (final - compensation).

SP 2 Lights when the weight value \geq (final - set point 2).

SP 1 Lights when the weight value \geq (final - set point 1).

* SP1, SP2, SP3 blink during waiting for weighing start sequence mode.

CLAMP Lights while the clamp signal is output.

D.CHG Lights when the discharging control mode (setting mode 1-6) setting is "Discharging control" (when the weighing mode in setting mode 4-6 is simple comparison mode).

Lights when the discharge during discharging gate control (when the weighing mode in setting mode 4-6 is sequence mode).



Lights when the LOCK switch is on.



This specification is not used. Always has been goes out.

⑤ Setting keys



Pressing \rightarrow immediately executes Accumulation Clear (when in setting mode 0).



Numeric keys to make settings.



Function key to change the setting mode.



A code is set by pressing \rightarrow \rightarrow \rightarrow \rightarrow .

⑥ Function keys



<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, a zero alarm will result and “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 (“ ” is on), and switching is performed to the gross weight display by pressing this key when net weight is displayed (“ ” is on).



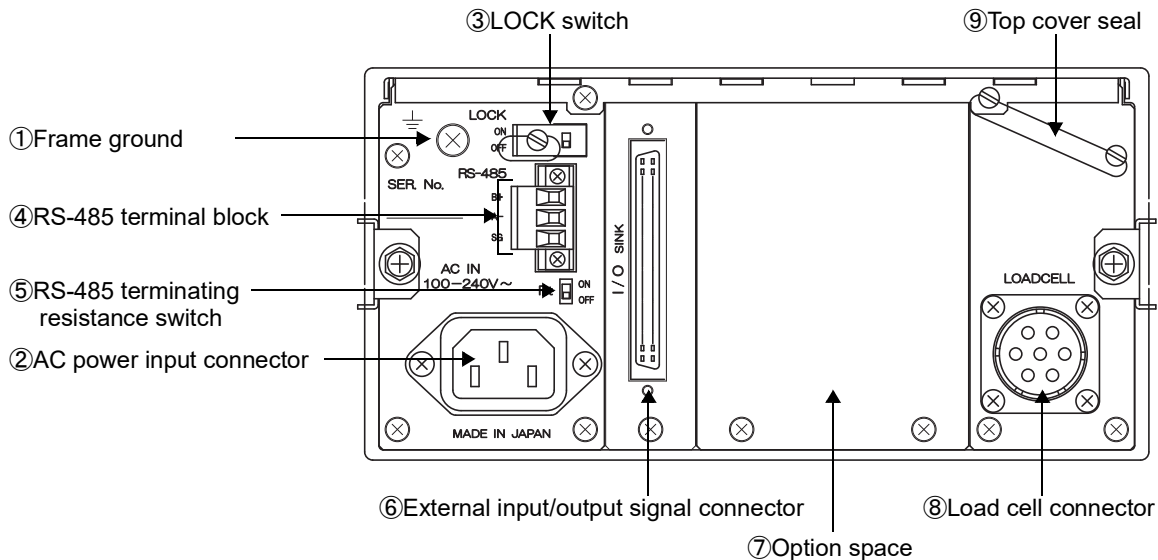
While a setting item is displayed, this key functions to start changing the item, and while an item is changed, it functions to fix the setting item.



Point

The functioning of TARE, TARE RESET, ZERO, and GROSS/NET can be disabled by key invalid · LOCK (setting mode 3-2).

■ Rear panel



① Frame ground

This is a frame ground terminal block. Make sure to ground the frame ground terminal to prevent shock hazards and electrostatic hazards. (The casing and frame ground terminal are being conducted.)

②AC power input connector

Input AC power. The input voltage is 100V - 240V AC [50/60Hz].

③LOCK switch

This LOCK switch prevents setting values from being changed by mistake.

When this switch is on, setting values are protected from changes.

④RS-485 terminal block

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

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

⑤RS-485 terminating resistance switch

This is a switch for RS-485 terminating resistance.

Turning on this RS-485 terminating resistance switch brings about a terminating resistance connected state, in which there is no need to install external resistance.

⑥External input/output signal connector

This is a connector 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 adaptable connector is FUJITSU COMPONENT-manufactured FCN-361J040-AU (cover: FCN-360C040-B).

⑦Option space

Up to three of the following options, including any one of the options marked with an *, can be mounted. Two or more of the same option cannot be mounted.

- BCD parallel data output interface (BCO or BSC)
- RS-232C interface (232)
- D/A converter interface (DAC)
- CC-Link interface (CCL) *
- DeviceNet interface (ODN) *
- PROFIBUS interface (PRF) *

⑧Load cell connector

This is a connector to connect load cell(s).

The adaptable connector is HIROSE-manufactured JR16PN-7S.

⑨Top cover seal

Seal to not open the top cover.

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

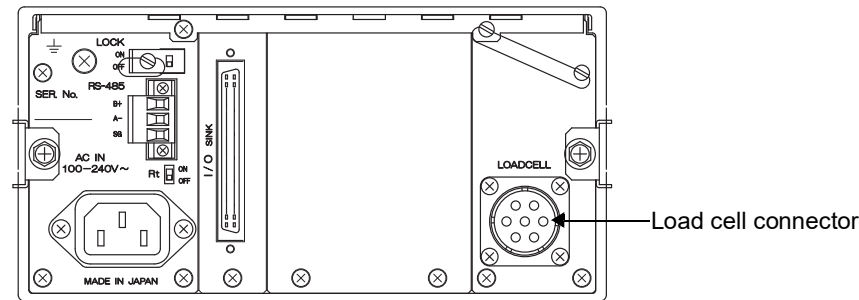
- Do not connect a commercial power source directly to the signal input/output terminals.
- Connect to the signal input/output terminals with no power applied because it may cause an electric shock.
- For connection to the signal input/output terminals, check the signal names and pin assignment numbers, 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.
- The F701-S conforms to the EMC Directive as an industrial environment product (class A). If it is used in a housing environment, interference may be caused. In that case, take appropriate measures.

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-S, to which up to six 350-ohm load cells can be connected in parallel, are 5V and 90mA, respectively.

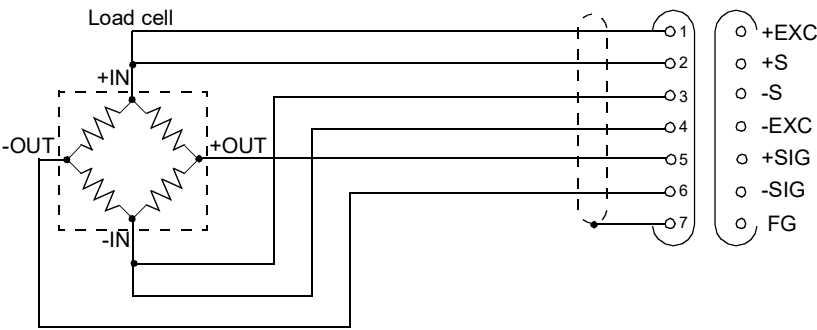


Load cell connector pin assignments

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

■ 6-wire connection

The load cell input of the F701-S 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.

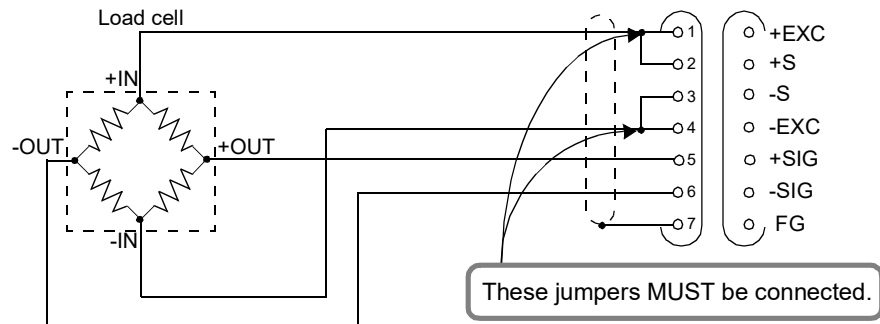


Remote sense lines are used to detect and correct variations in excitation voltage over long cable runs.

■ 4-wire connection

Connect 1 and 2, and 3 and 4 as shown below.

Even 2 and 3 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.



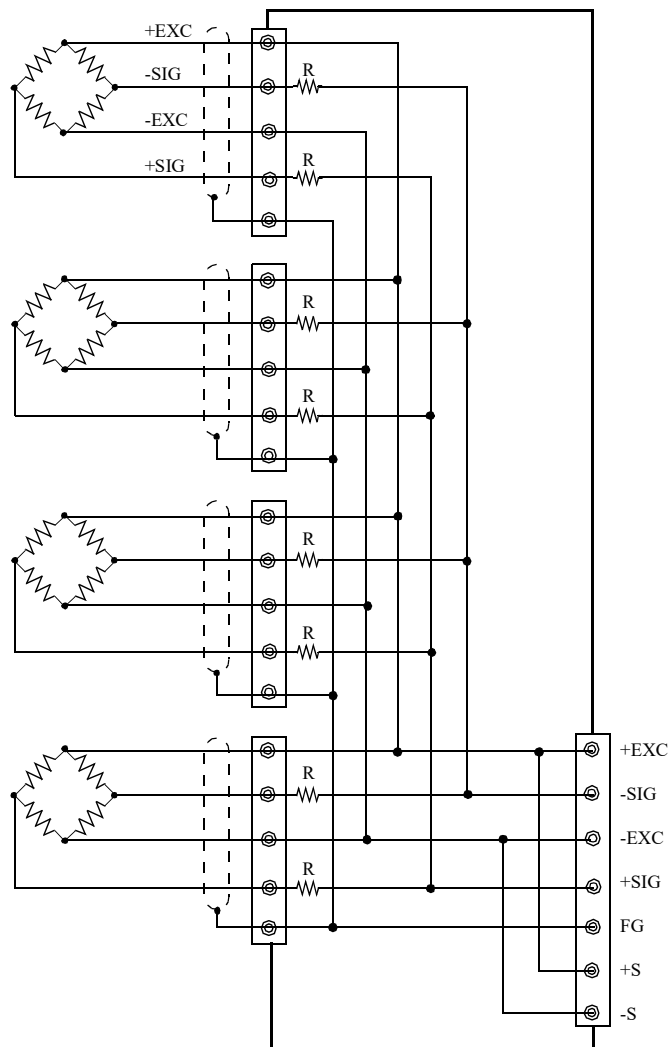
⚠ CAUTION

- The load cell excitation voltage of the F701-S is 5V. Heating or breakage may occur unless the load cells maximum excitation voltage is 5V or more.
- When using the F701-S 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.

■ Sensor 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. External input/output signal connection

The adaptable connector is FUJITSU COMPONENT-manufactured.

connector: FCN-361J040-AU

cover: FCN-360C040-B

(attached) or equivalent are adaptable.

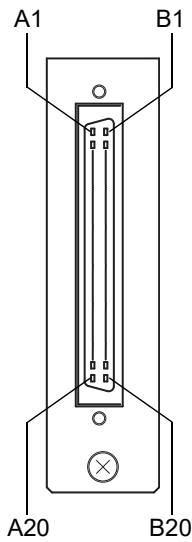
Chapter

2

CONNECTION

Connector pin assignments

* For details, see "10.EXTERNAL INPUT/OUTPUT SIGNALS (CONTROL CONNECTOR)" on page 81.



No.		Signal		No.		Signal	
A1	In	Allow operate		B1	In	Input select 2	
A2	In	Weighing start		B2	In	Input select 3	
A3	In	Stop		B3	In	Input select 4	
A4	In	Discharging command		B4	In	Input select 5	
A5	In	Manually discharge		B5	In	Input select 6	
A6	In	Open discharge gate		B6	In	Code 1	
A7	In	Accumulation clear		B7	In	Code 2	
A8	In	Input select 1		B8	In	Code 4	
A9	*	COM (Input)		B9	*	COM (Input)	
A10	*	COM (Input)		B10	*	COM (Input)	
A11	*	DC24V	Sink type: +	B11	*	DC24V	Sink type: +
			Source type: -				Source type: -
A12	*	DC24V	Sink type: -	B12	*	DC24V	Sink type: -
			Source type: +				Source type: +
A13	Out	SP1		B13	Out	Output select 1	
A14	Out	SP2		B14	Out	Output select 2	
A15	Out	SP3		B15	Out	Output select 3	
A16	Out	Complete		B16	Out	Output select 4	
A17	Out	Discharge		B17	Out	Output select 5	
A18	Out	Clamp		B18	Out	Output select 6	
A19	Out	Error check select 1		B19	Out	Reserve 1	
A20	Out	Error check select 2		B20	Out	Reserve 2	

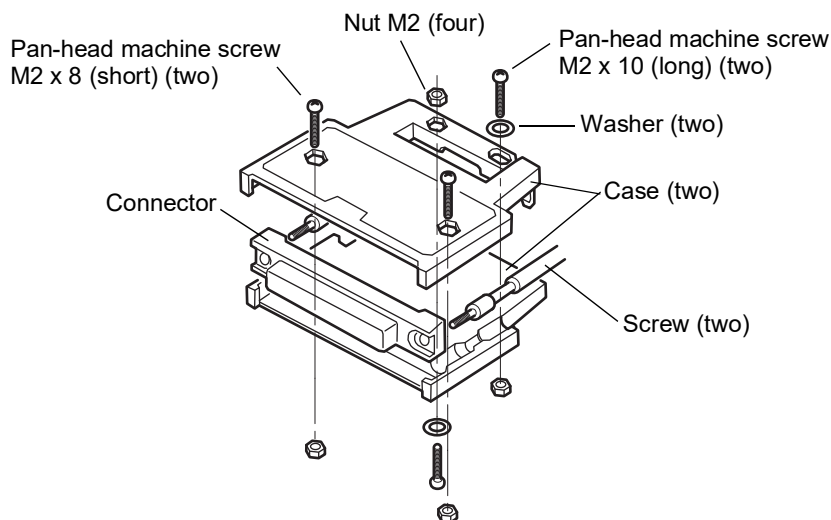
* The COM (Input) (pins A9, A10, B9, and B10) are internally connected.

* There is a need to prepare external 24V DC (power supply for external input/output signal circuit) separately.

* For input selection 1 to 6, output selection 1 to 6, error check selection 1 and 2, and reserve 1 and 2, see "10.EXTERNAL INPUT/OUTPUT SIGNALS (CONTROL CONNECTOR)" (explanation on page 81 and later).

* If input selections level input signal only are plural assigned identically content, priority is given to lower-order numbers, and the other side becomes invalid.

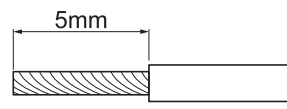
■ How to assemble the connector



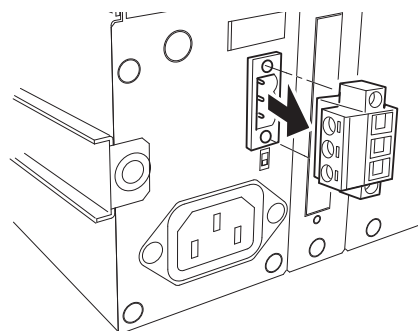
1. Set the connector and screws (two) into the grooves of the case (one side).
2. Cover with the other case, and fit the cases.
3. Tighten the M2 x 8 pan-head machine screws (two).
Tighten the M2 x 10 pan-head machine screws (two).
Be aware that washers should be set to the M2 x 10 pan-head machine screws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

2-3. Connection of the RS-485

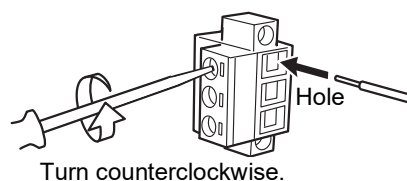
1. Peel the sheath of the wire to be connected 5mm, and twist the end to such an extent that it will not become loose.



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



3. Loosen the screw with a screwdriver to open the hole.
A screwdriver with a shaft diameter of 3.0mm is recommendable.
(precision screwdriver, etc.)



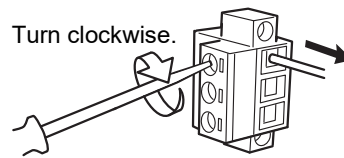
4. Insert the wire into the hole so as not to loosen the end.

5. Tighten the screw with the screwdriver.

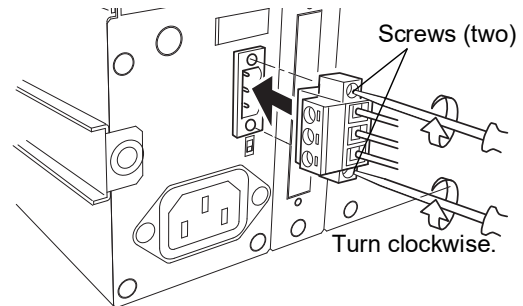
6. Lightly pull the wire to check that it is clamped securely.

* Connectable wires are 0.21 - 3.31mm²
(AWG12 - 24).

Recommendable tightening torque is 0.5Nm.

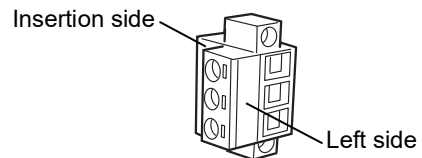


7. Insert the wire-connected plug into the F701-S body, and tighten the screws (two).



Attention

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



2-4. Connection of the protective ground

The grounding pole of AC power input connector is the protective ground.

⚠ WARNING

- The attached AC cable is designed for a test use in Japan, and its rating is 125V AC, 10A. For use at voltages exceeding the rating and for overseas use, have a separate AC cable prepared.
- Be sure to ground the protective ground terminal to prevent electric shocks and failures by static electricity.
- Since the F701-S is defined as an open type (built-in device), it should be used installed and fixed to a panel, etc.. Moreover, install a breaker so that the operator can turn off a power supply quickly, and label them clearly.

2-5. Connection of the frame ground

The frame ground terminal is for prevention of failures caused by a noise etc..

Use an approx. 0.75mm² thick wire, and be sure to ground.

⚠ WARNING

- Connect with no power applied because it may cause an electric shock.
- Be sure to ground the frame ground terminal to prevent failures by noise etc..
(The frame and frame ground terminal are conducted.)
- Do not use other screws than that attached to the main body.

3 SETTING METHOD

3-1. Setting procedure

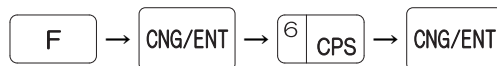
Change settings in the order of

"selection of a setting mode"→"selection of a setting item"→"registration of a setting value."

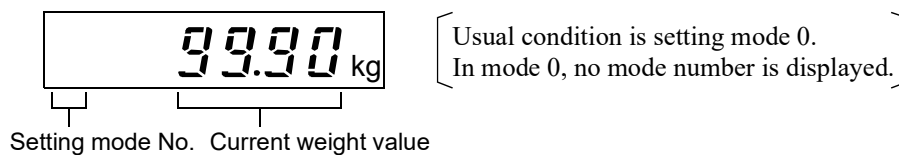
■ How to designate a setting mode No.

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

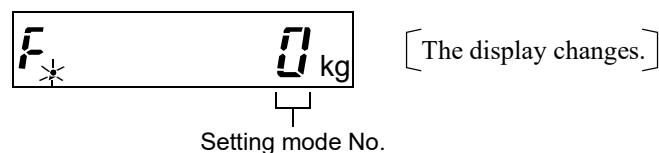
Example) For designating setting mode 6



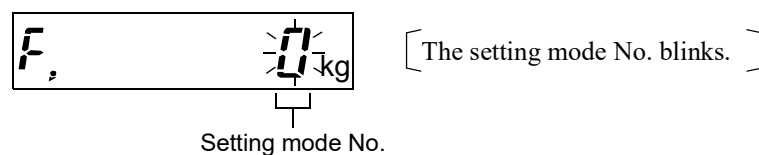
This operation can be performed by the following procedure.



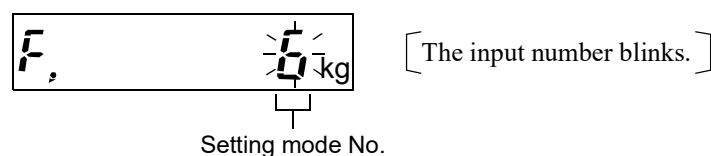
1. When a weight value is displayed, press the **F** key.



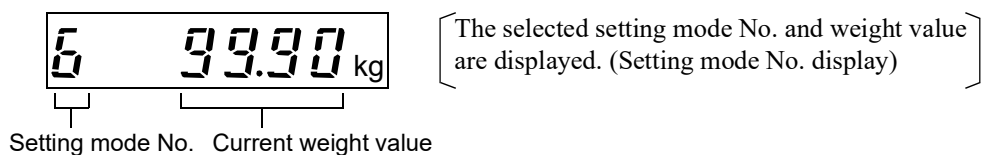
2. Press the **CNG/ENT** key.




3. Select a setting mode No. (**6** CPS)



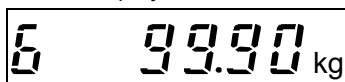
4. Press the  key.



Point

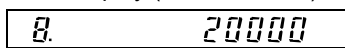
- Pressing the  key when a setting mode No. is displayed restores the usual display (setting mode 0).
- While the current weight value is displayed even if setting mode No. is displayed, code displayed on the subdisplay is the weighing code.

< Main display >



Setting mode No. Current weight value

< Subdisplay (code and final) >



Weighing code Final value at the weighing code

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)

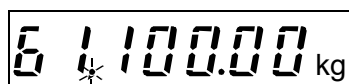


This operation can be performed by the following procedure.

* However, it is assumed that setting mode 6 is selected.

1. Select a setting item.

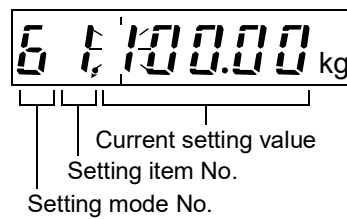
(Press the  key because the balance weight value setting item No. is 1.)



Current setting value
Setting item No.
Setting mode No.

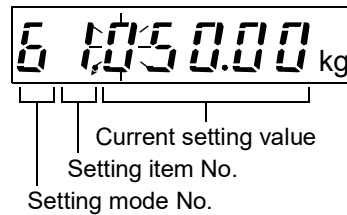
The setting mode No., setting item No., and current setting value are displayed.

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



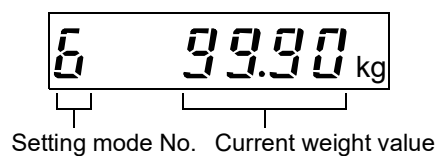
〔The highest-order digit of the setting value blinks.〕

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)

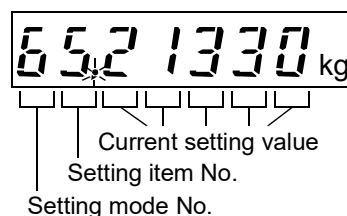


This operation can be performed by the following procedure.

* However, it is assumed that setting mode 6 is selected.

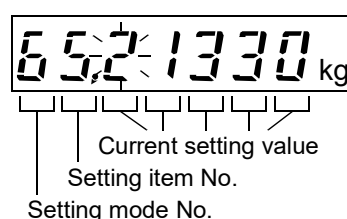
1. Select a setting item.

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





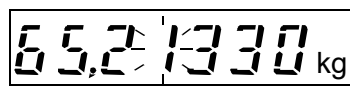
〔The setting mode No., setting item No., and current setting value are displayed.〕


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




〔The highest-order digit of the setting value blinks.〕

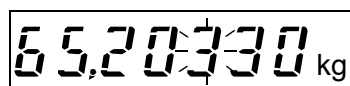
3. Move by using the  key until the digit you want to set blinks. ()




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

4. Make a choice among the alternatives.

(Press the  key because 1/4 scale division should be turned off.)



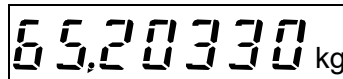
Since the blinking number moves to a lower-order digit each time the  key is pressed, you can redo the setting as many times as you want.



Point

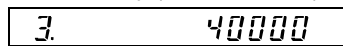
While the setting value is displayed, code displayed on the subdisplay is the setting code.

< Main display >



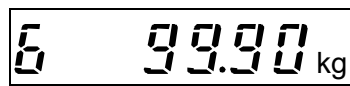
Setting value
Setting item No.
Setting mode No.

< Subdisplay (code and final) >



Setting code Final value at the setting code

5. Upon input of a proper choice, press the  key to register the choice.




Setting mode No. Current weight value

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



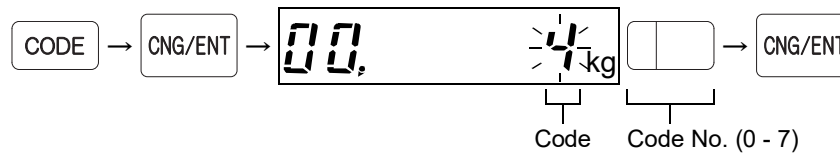
Point

By pressing the  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

■ Code setting

Set code No. before making a setting having a setting values for each code, such as final or compensation.



■ 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 NEARZ 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

9 FINAL 09 [] [] [] [] (0 - 99999)

■ Setting mode 1

Setting mode 1 relates to weighing supplements.

- Comparison inhibit time

1

UPPER

11

.

(0.00 - 9.99)

- Judging time

2

LOWER

12

.

(0.0 - 9.9)

- Complete output time

3

NEARZ

13

.

(0.0 - 9.9)

- Compensation feeding time

4

SP1

14

.

(0.00 - 9.99)

- Auto free fall compensation regulation

5

SP2

15

(0 - 99999)

- Weighing function 1

6

CPS

16

Discharging control mode

0: Feeding control

1: Discharging control

2: External selection

Final and over/under comparison weight

0: GROSS

1: NET

2: Comparison OFF

Near zero comparison mode

0: Near zero signal ON when gross weight \leq near zero setting value

1: Near zero signal ON when net weight \leq near zero setting value

2: Near zero signal ON when $|\text{gross weight}| \leq$ near zero setting value

3: Near zero signal ON when $|\text{net weight}| \leq$ near zero setting value

4: Comparison OFF

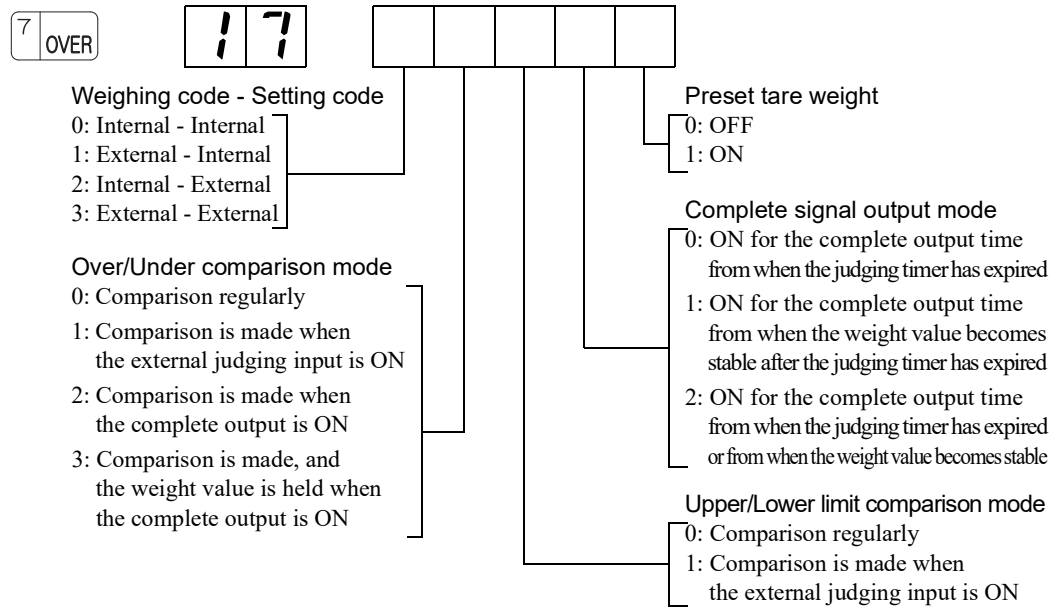
Upper/Lower limit comparison weight

0: GROSS

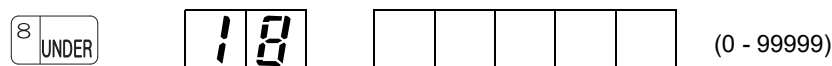
1: NET

2: Comparison OFF

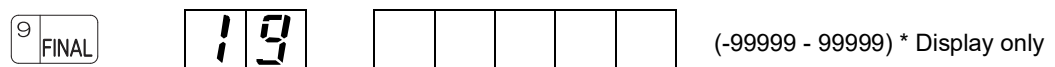
- Weighing function 2



- Tare setting



- Tare display



■ Setting mode 2

Setting mode 2 relates to internal operations.

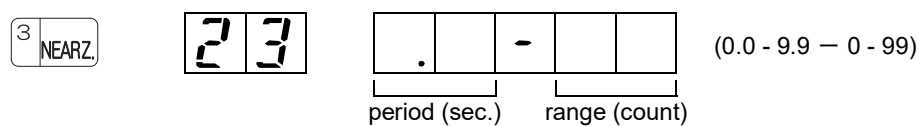
- Digital low pass filter



- Moving average filter



- Motion detection (period — range)



- Zero tracking (period)



- Zero tracking (range)

5 SP2

25

(0 - 9999)

- Total comparison selection

6 CPS

26

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

- Total limit (high 4)

7 OVER

27

(0 - 9999)

- Total limit (under 5)

8 UNDER

28

(0 - 99999)

- Count limit

9 FINAL

29

(0 - 9999)

■ Setting mode 3

Setting mode 3 relates to weighing.

- Weighing function 3

1 UPPER

31

Auto free fall compensation coefficient

0: 1
 1: 3/4
 2: 2/4
 3: 1/4

Average count of auto free fall compensation (1 - 9)

Auto free fall compensation

0: OFF
 1: ON
 2: ON (Communication option OFF)

- Key invalid · LOCK

2 LOWER

32

TARE key

0: Invalid
 1: Valid

TARE RESET key

0: Invalid
 1: Valid

ZERO key

0: Invalid
 1: Valid

Setting LOCK

0: Lock1 OFF, Lock2 OFF
 1: Lock1 ON, Lock2 OFF
 2: Lock1 OFF, Lock2 ON
 3: Lock1 ON, Lock2 ON

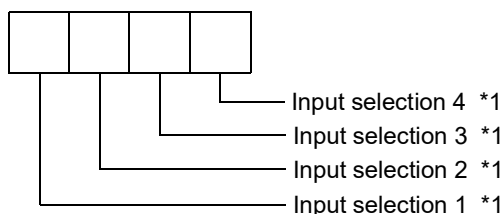
GROSS/NET key

0: Invalid
 1: Valid

- Input selection 1

3 NEARZ

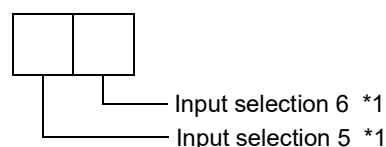
33



- Input selection 2

4 SP1

34

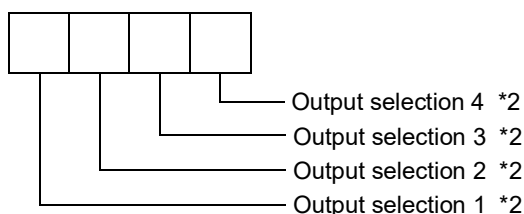


- | | | |
|-----------------------|-------------------------|-------------------------|
| *1 0: G/N | 1: D/Z ON | 2: TARE ON |
| 3: TARE OFF | 4: Accumulation command | 5: Close discharge gate |
| 6: Complete for slave | 7: Feed/ Discharge | 8: Hold/ Judge |

- Output selection 1

5 SP2

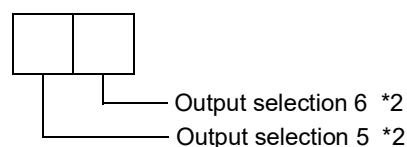
35



- Output selection 2

6 CPS

36

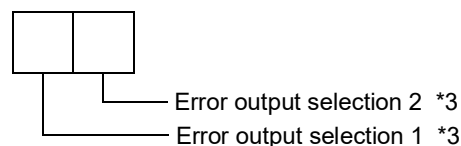


- | | | | |
|----------------|----------------------------------|-----------|---------------------------|
| *2 0: NZ | 1: Total limit | 2: Stable | 3: Filling promotion over |
| 4: Over | 5: Under | 6: Go | 7: Upper limit |
| 8: Lower limit | 9: Discharging command for slave | | |

- Error output selection

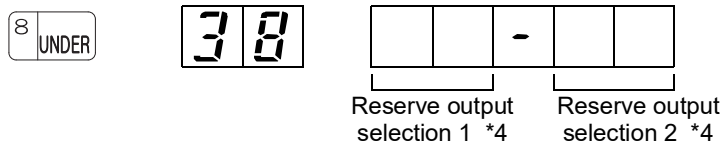
7 OVER

37



- | | | | |
|--------------------|--------------------------|----------------|-----------------------------|
| *3 0: Weight error | 1: Seq.error | 2: Final error | 3: Accumulation count error |
| 4: RUN | 5: Discharge count error | | |

- Reserve output selection



- | | | | |
|------------------------------|-----------------------------------|---------------------------|----------------------------|
| *4 00: NZ | 01: Total limit | 02: Stable | 03: Filling promotion over |
| 04: Over | 05: Under | 06: Go | 07: Upper limit |
| 08: Lower limit | 09: Discharging command for slave | 10: SP1 | |
| 11: SP2 | 12: SP3 | 13: Complete | 14: Discharge |
| 15: Clamp | 16: Weight error | 17: Seq.error | 18: Final error |
| 19: Accumulation count error | 20: RUN | 21: Discharge count error | |

■ Setting mode 4

Setting mode 4 relates to sequence mode.

- Bag clamp output time



- Discharging time



- Weighing start time



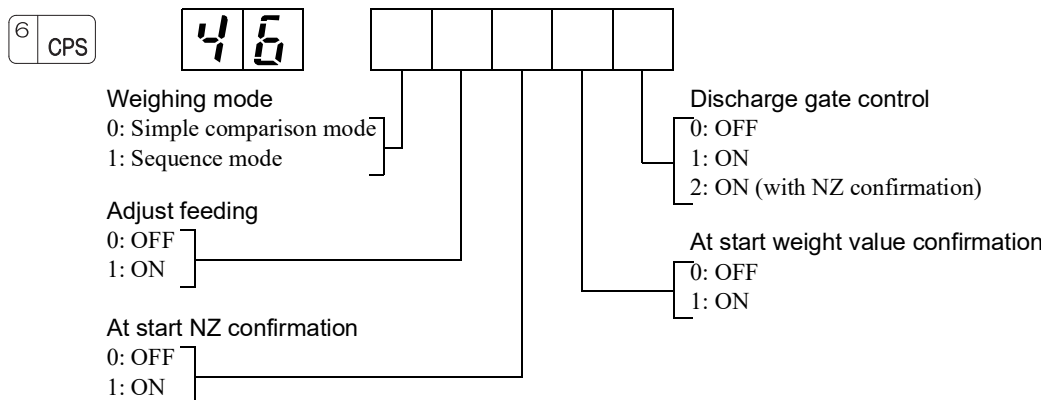
- AZ times



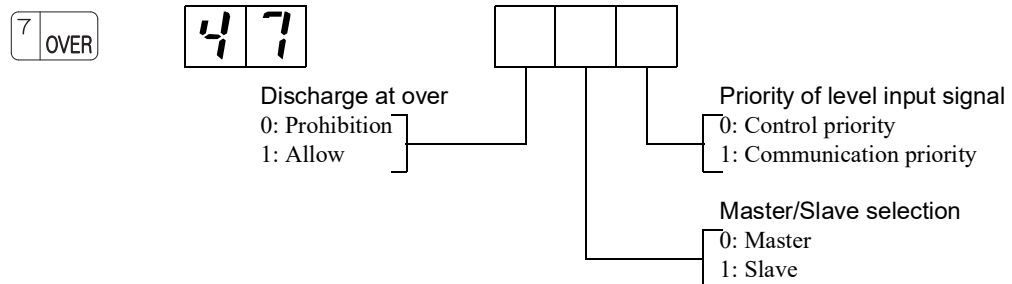
- Judging times



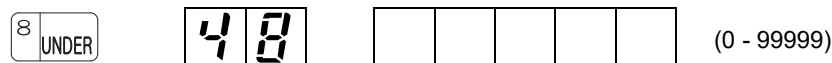
- Sequence mode 1



- Sequence mode 2



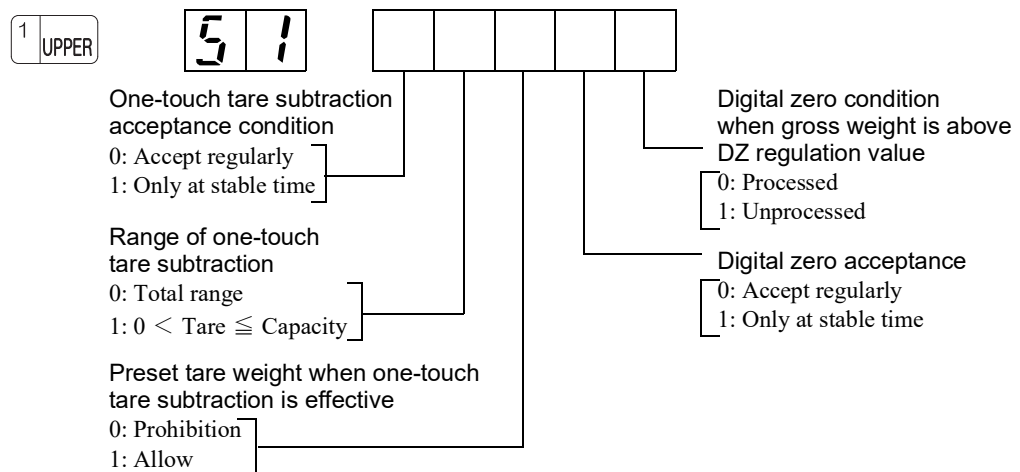
- Filling promotion weight



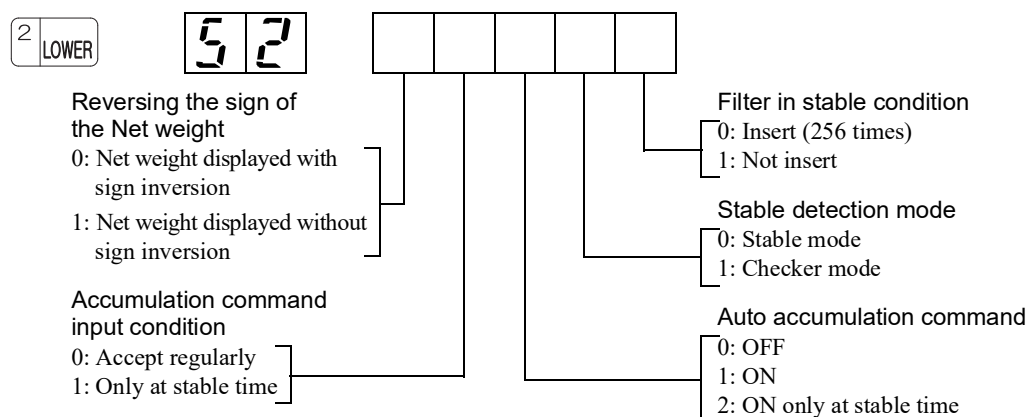
■ Setting mode 5

Setting mode 5 relates to extended functions.

- Extended function selection 1



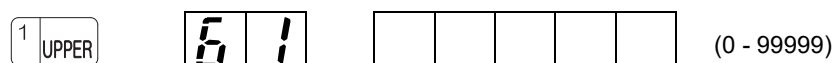
- Extended function selection 2



■ Setting mode 6

Setting mode 6 relates to calibration.

- Balance weight value



- Capacity

2 LOWER

6 2

--	--	--	--	--

(1 - 99999)

- Min scale division

3 NEARZ

6 3

--	--

(1 - 50)

- DZ regulation value

4 SP1

6 4

--	--	--	--

(0 - 9999)

- Display selection 1

5 SP2

6 5

--	--	--	--	--

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

Subdisplay selection

0: Code/ Final

1: Code/ Accumulation count

2: Code/ Accumulation value

3: Code

4: Accumulation count/
Accumulation value

5: Sequence No./ Code/ Final

6: Total discharge count/
Single discharge count

7: None

Display update rate

0: 1 times/sec.

1: 2 times/sec.

2: 5 times/sec.

3: 10 times/sec.

4: 20 times/sec.

- Gravitational acceleration

6 CPS

6 6

9.				
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(9.7500 - 9.8500)

* Set four digit after decimal places only.

- Net over

7 OVER

6 7

--	--	--	--	--

(0 - 99999)

- Gross over

8 UNDER

6 8

--	--	--	--	--

(0 - 99999)

- Display selection 2

9 FINAL

6 9

--

-OFL2

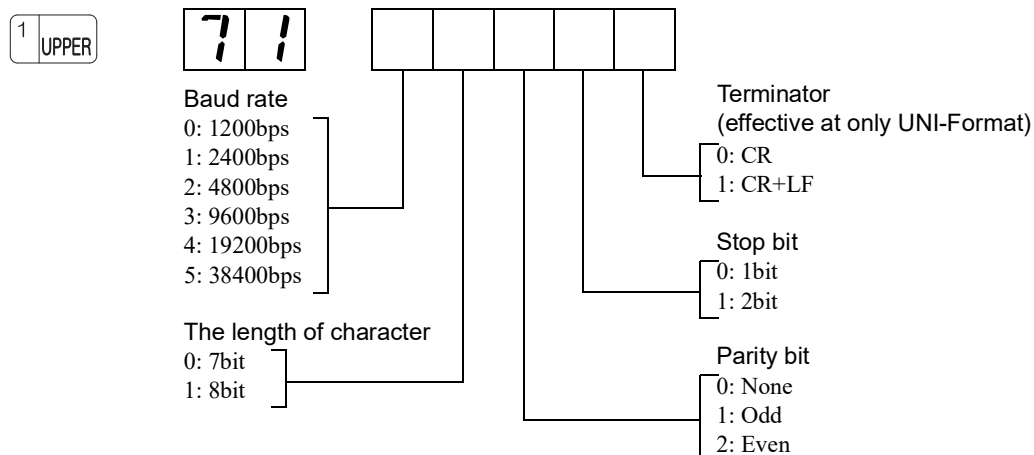
0: Gross weight < -Capacity

1: Gross weight < -20 scale divisions

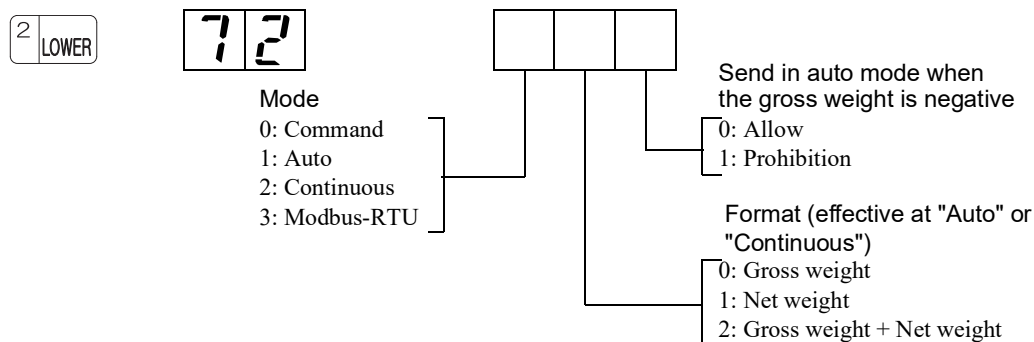
Setting mode 7

Setting mode 7 relates to I/F.

- RS-485 I/F setting



- RS-485 communication type



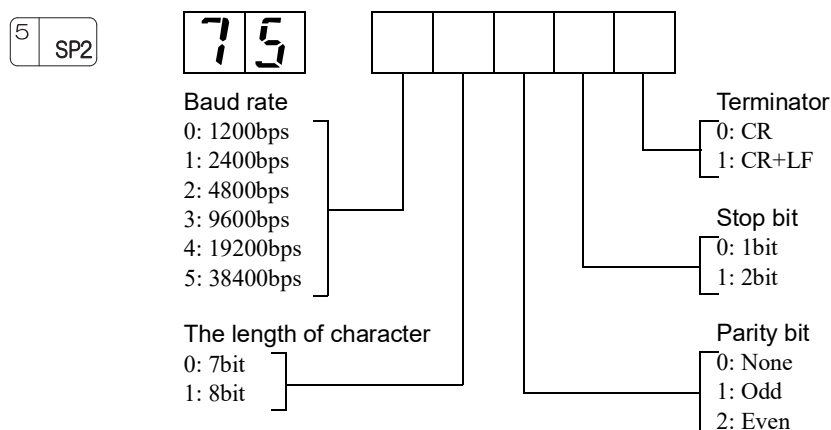
- RS-485 ID



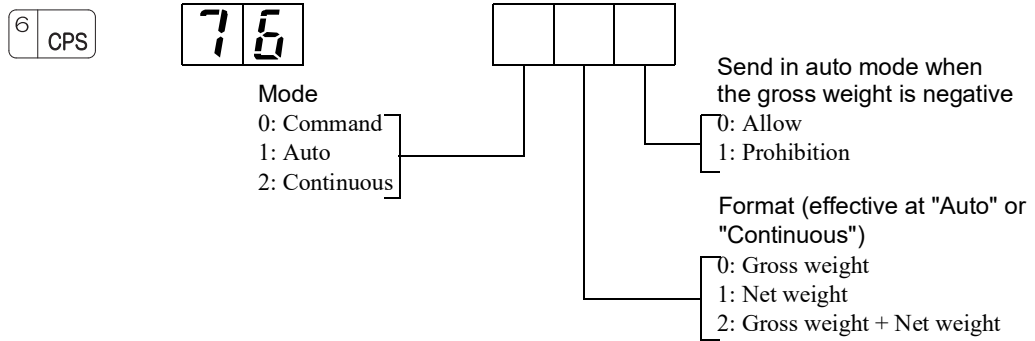
- Transmission delay time



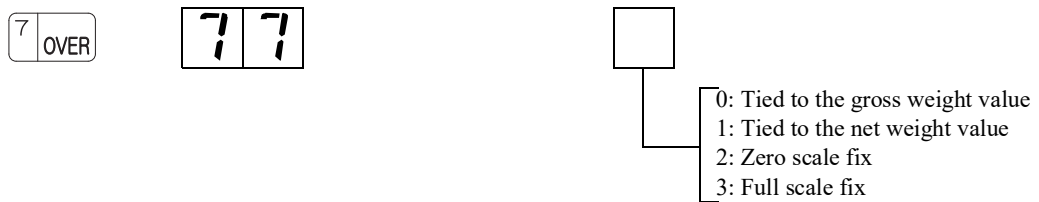
- RS-232C I/F setting



- RS-232C Communication type



- D/A output mode



- D/A zero output weight



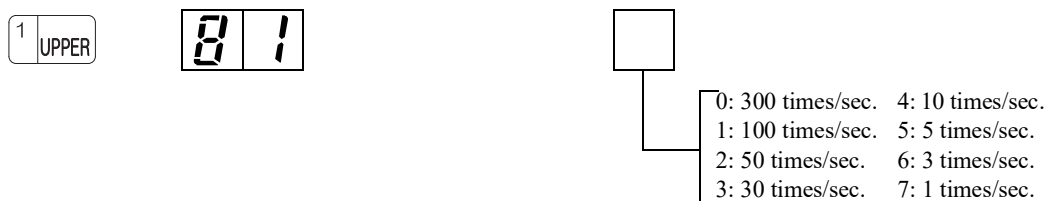
- D/A full scale value



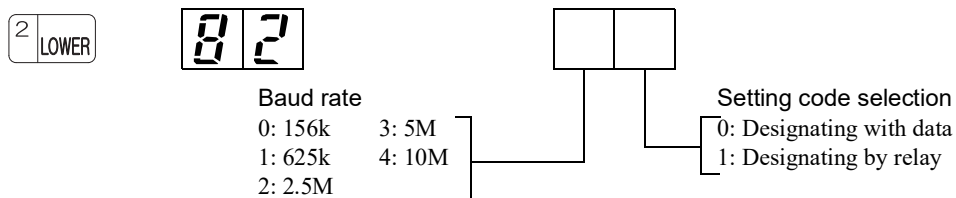
■ Setting mode 8

Setting mode 8 relates to I/F.

- BCD data update rate



- CC-Link I/F setting



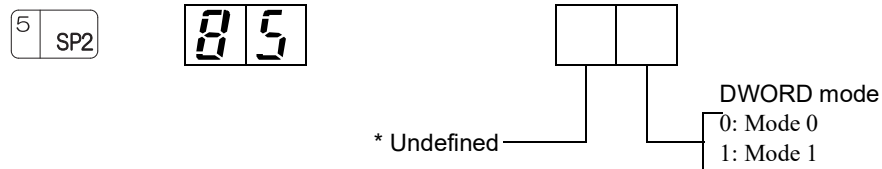
- CC-Link station number



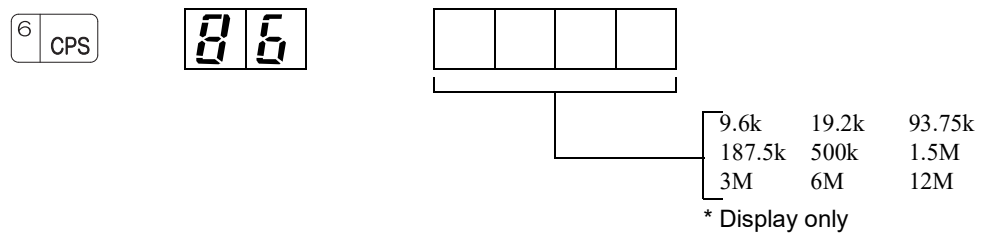
- DeviceNet node address



- PROFIBUS I/F setting



- PROFIBUS baudrate display



- PROFIBUS station No.



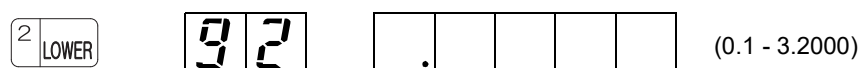
Setting mode 9

Setting mode 9 is calibration mode.

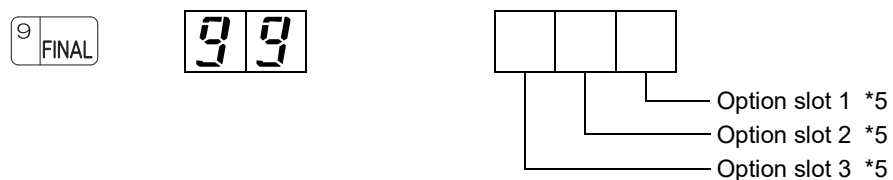
- Span calibration



- Equivalent calibration



- Option display



*5 0: None 1: BCO or BSC 2: DAC 3: DeviceNet
 4: RS-232C 5: CC-Link 6: PROFIBUS

4 COMPLIANCE WITH OIML (OIML R76-1 compliance)

4-1. Specifications

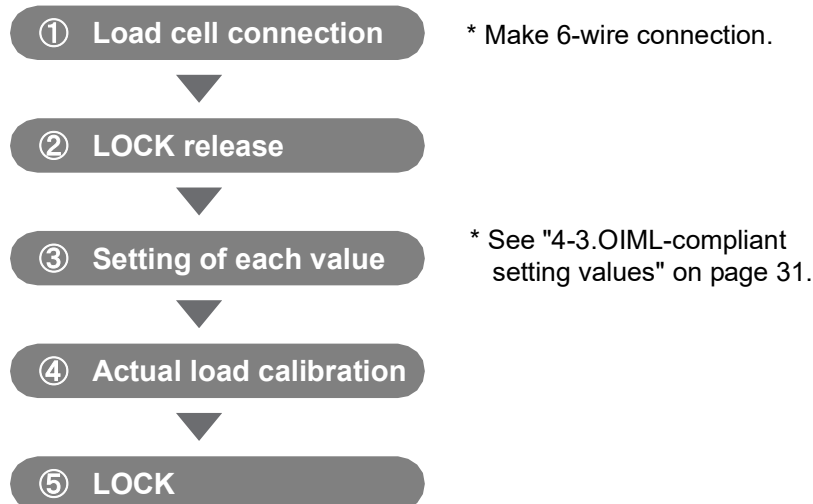
For compliance with OIML, this product is restricted as specified as follows:

■ Analog section

Signal input range	0 - 3.0mV/V
Zero adjustment range	0 - 2.0mV/V
Span adjustment range	0.6 - 3.0mV/V
Minimum input sensitivity	0.5μV/count
Minimum indication resolution	1/6000

4-2. Preparation

To comply with OIML, perform calibration by the following procedure before use.



4-3. OIML-compliant setting values

To comply with OIML, set each value in the following range.

● Motion detection (period — range) (setting mode 2-3)

1.0 - 9.9 [sec] — 1 [count]

Set the period in the range of 1.0 - 9.9 [sec]. The range should always be set at 1 [count].

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

Set at 0.0 or in the range of 1.0 - 9.9 [sec].

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

Set in the range of 0 - (min scale division×2).

* Set the range in 1/4 scale divisions of weight display.

● Extended function selection 1 (setting mode 5-1)

Make each setting as follows:

One-touch tare subtraction acceptance condition	1: Only at stable time
Range of one-touch tare subtraction	1: $0 < \text{Tare} \leq \text{Capacity}$
Preset tare weight when one-touch tare subtraction is effective	0: Prohibition
Digital zero acceptance	1: Only at stable time
Digital zero condition when gross weight is above DZ regulation value	1: Unprocessed

● Extended function selection 2 (setting mode 5-2)

Make each setting as follows:

Reversing the sign of the net weight	1: Net weight displayed without sign inversion
Accumulation command input condition	1: Only at stable time
Auto accumulation command	2: ON only at stable time
Stable detection mode	0: Stable mode

● Min scale division (setting mode 6-3)

Select and set from 10, 20, 50, 1, 2, 5, 0.1, 0.2, 0.5, 0.01, 0.02, 0.05, 0.001, 0.002, 0.005, 0.010, 0.020, and 0.050.



Point

The decimal place setting is also related.

● DZ regulation value (setting mode 6-4)

Set within 2% of the capacity.

●Display selection 1 (setting mode 6-5)

Make each setting as follows:

Decimal place	Set according to the min scale division setting.
1/4 scale division	0: OFF *Only the true zero point is displayed.
Unit display	Select from 1: t, 2: g, and 3: kg.

●Gravitational acceleration (setting mode 6-6)

This cannot be used. Do not change the setting after calibration.

●Display selection 2 (setting mode 6-9)

Set "-OFL2" to "1: Gross weight < -20 scale divisions".

●RS-485 communication type (setting mode 7-2)

Set "Send in auto mode when the gross weight is negative" to "1: Prohibition".

- * When the mode is auto (auto print) and the gross weight < 0, no communication format is output. However, in the case of transmission format 2, where net weight data are to be output, the above condition will not apply.

●RS-232C communication type (setting mode 7-6) (when option RS-232C is mounted)

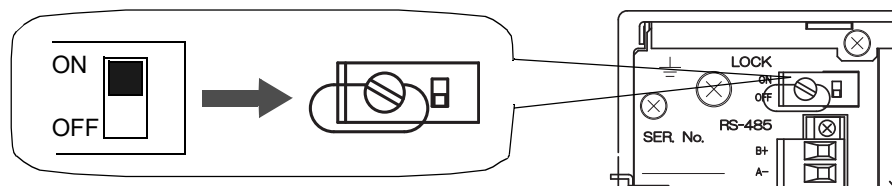
Set "Send in auto mode when the gross weight is negative" to "1: Prohibition".

- * When the mode is auto (auto print) and the gross weight < 0, no communication format is output. However, in the case of transmission format 2, where net weight data are to be output, the above condition will not apply.

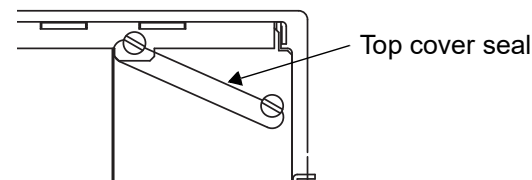
Attention

To comply with OIML, make settings under the above conditions, and then make sure to turn on the LOCK switch. Also, please seal the top cover.

< LOCK switch >



< Top cover seal >



4-4. Caution for calibration

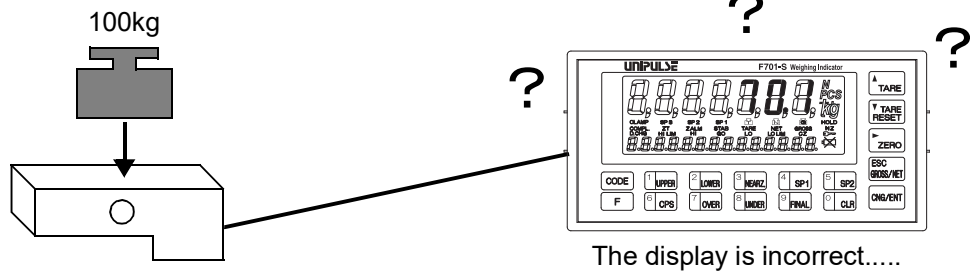
Use 6-wire load cell(s).

5 CALIBRATION

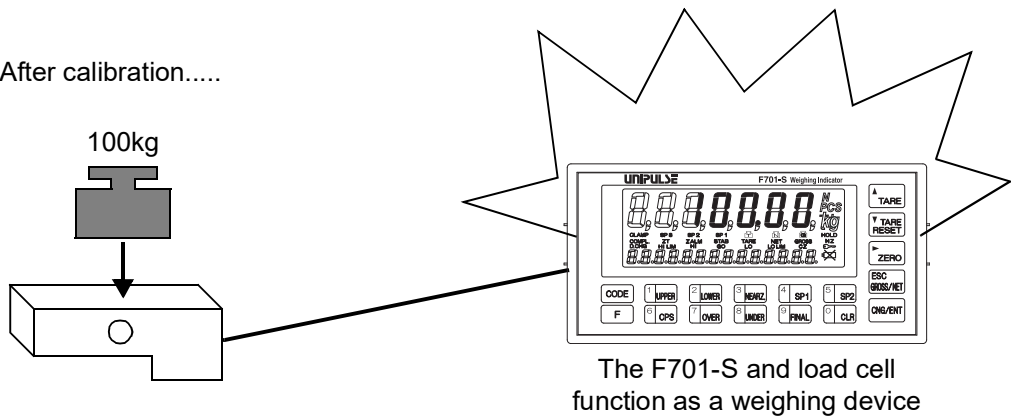
5-1. Span calibration

Calibration is performed for matching the F701-S to a load cell. For example, it is work to adjust so that the F701-S 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-S is connected. This operation is called Span Calibration.

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

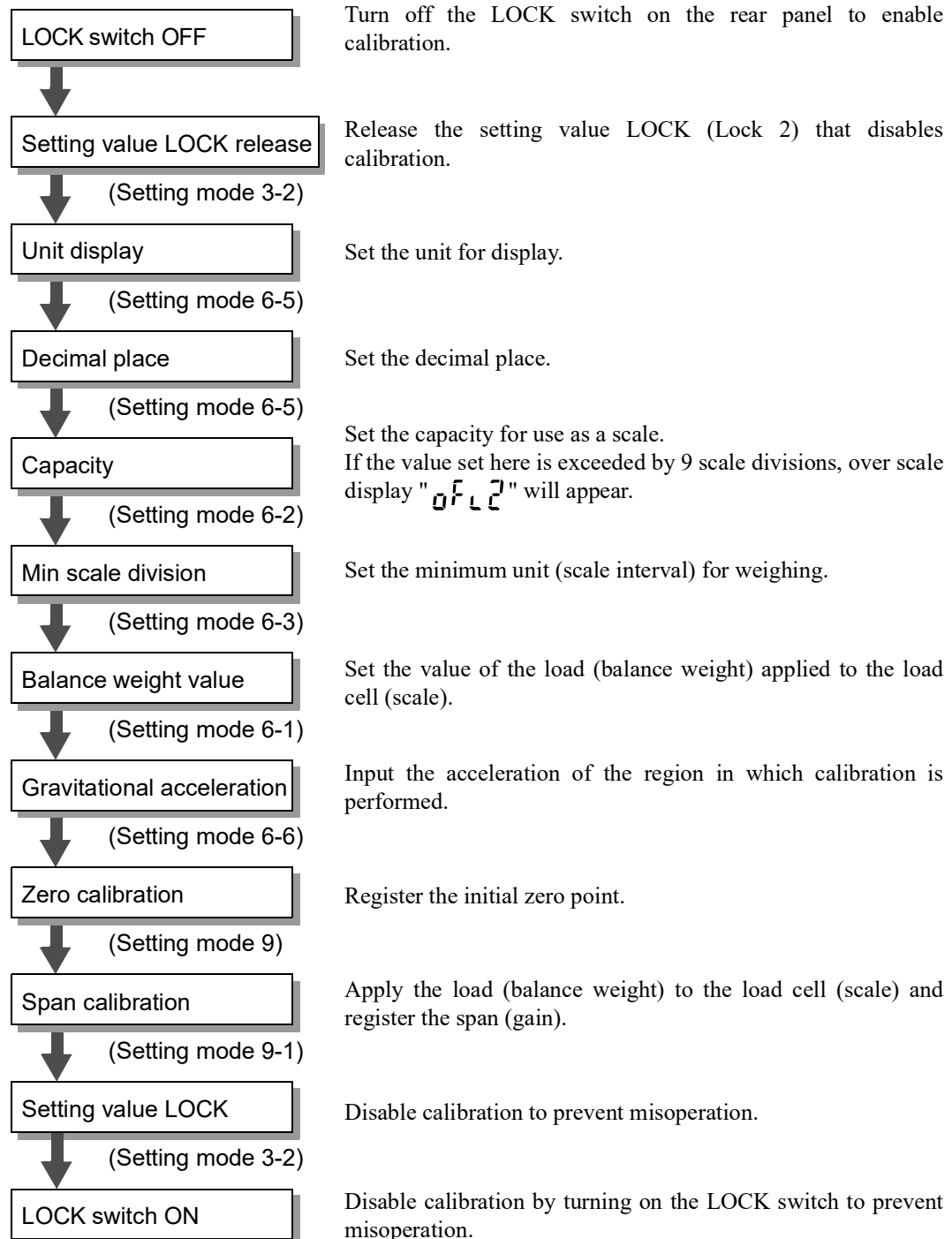


After calibration.....



5-2. Actual calibration procedure

Perform actual load calibration by the following procedure.

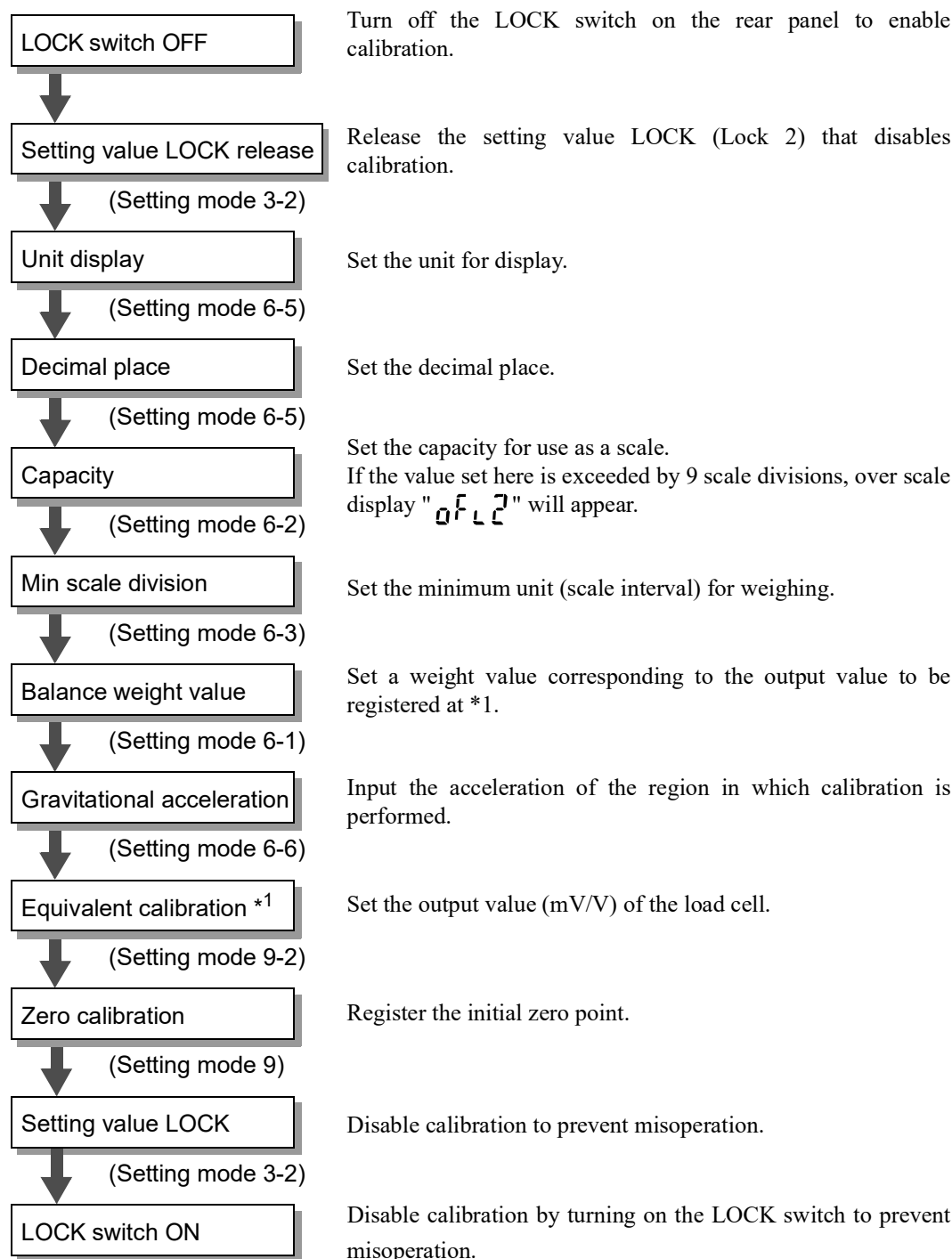


5-3. Secondary calibration procedure (equivalent calibration)

This calibration is not by actual load but by simple key input of a weight value (value you want to display) corresponding to the output value (mV/V) of the load cell.

Rough span calibration can be performed without a balance weight in such cases where this device is replaced due to failure or span calibration is performed by mistake.

Since equivalent calibration is a temporary measure, regular actual load calibration should be performed early. Perform equivalent calibration by the following procedure.



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.

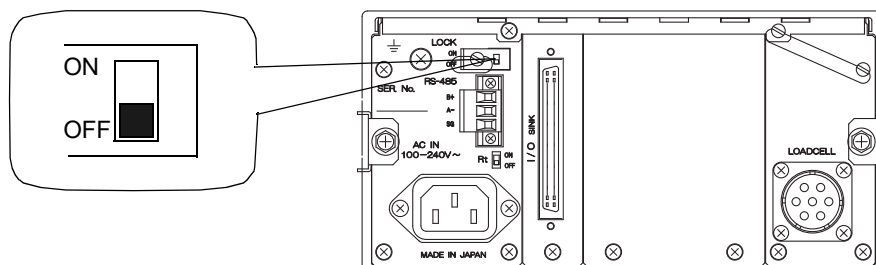
5-4. Preparation before calibration

■ LOCK release

Calibration values and setting values can be locked so as not to be changed by misoperation.

There are two types of locks: software lock applied by setting and hardware lock by the switch on the rear panel. To perform calibration, release both of the locks.

1. Turn off the LOCK switch on the rear panel.



2. Select setting mode 3-2 (key invalid • LOCK).

3. Set the setting LOCK to "0" or "1."

Key invalid • LOCK

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Setting LOCK

- | | |
|---------------|-----------|
| 0: Lock1 OFF, | Lock2 OFF |
| 1: Lock1 ON, | Lock2 OFF |
| 2: Lock1 OFF, | Lock2 ON |
| 3: Lock1 ON, | Lock2 ON |

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 "13-1.List of setting values" on page 144.

■ Unit display (setting mode 6-5)

Set the unit for weighing.

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

Display selection 1

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Unit display

0: None	3: kg
1: t	4: lb
2: g	

■ Decimal place (setting mode 6-5)

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.

Display selection 1

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Decimal place

0: None
1: 0.0
2: 0.00
3: 0.000



Point

In the F701-S, the decimal place is fixed for all other than weight-related data.

* It cannot be changed.

■ Capacity (setting mode 6-2)

Set the maximum value (capacity) for use as a scale. If the value set here is exceeded by 9 scale divisions, over scale display "OFL" will appear.

(Input range/1 - 99999)

■ Min scale division (setting mode 6-3)

Set the minimum unit (scale interval) for weighing.

(Input range/1 - 50)

■ Balance weight value (setting mode 6-1)

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 6-6)

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

Region	Acceleration (G)	Region	Acceleration (G)	Region	Acceleration (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
Jakarta	9.7809m/s ²	Milano	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	9.8155m/s ²	Wuhan	9.7936m/s ²	Kaifeng	9.7966m/s ²
Tianjin	9.8011m/s ²	Hohhot	9.7986m/s ²	Nanchang	9.7920m/s ²
Tangshan	9.8016m/s ²	Jilin	9.8048m/s ²	Guangzhou	9.7883m/s ²
Shijiazhuang	9.7997m/s ²	Changchun	9.8048m/s ²	Tsingtau	9.7985m/s ²
Kunming	9.7836m/s ²	Xi'an	9.7944m/s ²	Nanjing	9.7948m/s ²
Nanning	9.7877m/s ²	Chongqing	9.7914m/s ²	Shanghai	9.7946m/s ²
Liuzhou	9.7885m/s ²	Chengdu	9.7913m/s ²	Fuzhou	9.7891m/s ²
Urumqi	9.8015m/s ²	Harbin	9.8067m/s ²	Hangzhou	9.7936m/s ²
Hong Kong	9.7878m/s ²				

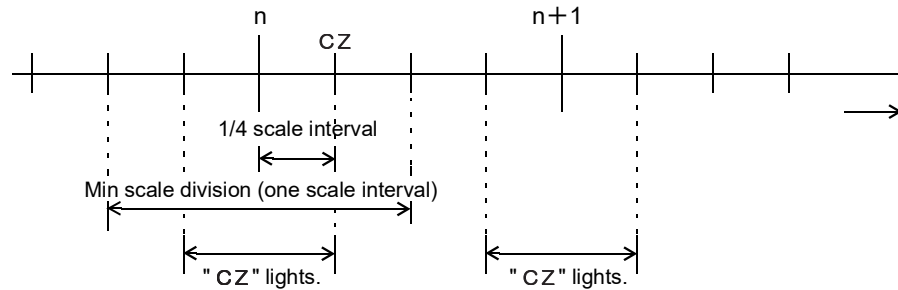
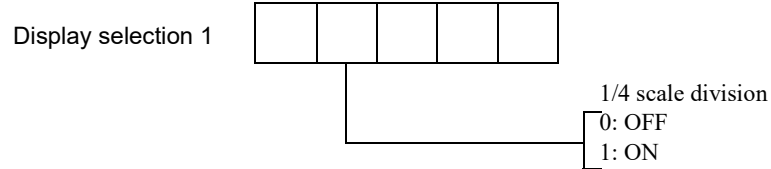
- * If the region of calibration location is not listed, set the gravitational acceleration of a region close in latitude. However, the value in the list may differ from the actual value depending on latitude, altitude, etc. If accuracy is required, re-calibration in the region of use is recommended.

■ 1/4 scale division (setting mode 6-5)

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.

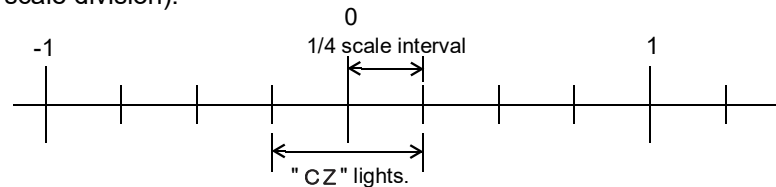
Select the 1/4 scale division from 0: OFF/1: ON.

1. Select setting mode 6-5 (display selection 1).
2. Select 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 $0 \pm 1/4$ scale division).



5-5. Zero calibration

Register the initial zero point.

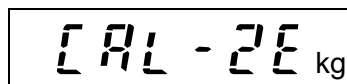
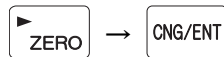
- Check around the load cell (scale) for unwanted loads such that foreign matter is placed or there is contact with peripheral equipment.

- 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."



Setting mode No.

Weight value

- * If a calibration error is displayed, take measures according to the error message, and perform zero calibration again. (See "13-2.Over scale/error display" on page 148.)

⚠ {err2} (calibration error)

The initial tare 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/°C or higher (approx. 5 - 10ppm/°C recommended) at least.

⚠ {err3} (calibration error)

The initial tare 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.

5-6. 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.

CAL - SP kg

[Display of span calibration in progress]

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

9 100.00 kg

Setting mode No. Weight value

* If an error message is displayed, see "13-2.Over scale/error display" on page 148.

5-7. Secondary calibration (equivalent calibration) (setting mode 9-2)

By key input of a weight value corresponding to the output value (mV/V) of the load cell, calibration is performed so that the registered weight value is displayed by inputting the registered output value.

1. Select setting mode 9-2 (equivalent calibration).

2. Input the output value of the load cell.

Press the CNG/ENT key and start the registration of the output value [mV/V] of the load cell.

Upon completion of input, fix it with the CNG/ENT key.

* Set capacity, min scale division, balance weight value, gravitational acceleration, etc., before performing equivalent calibration.

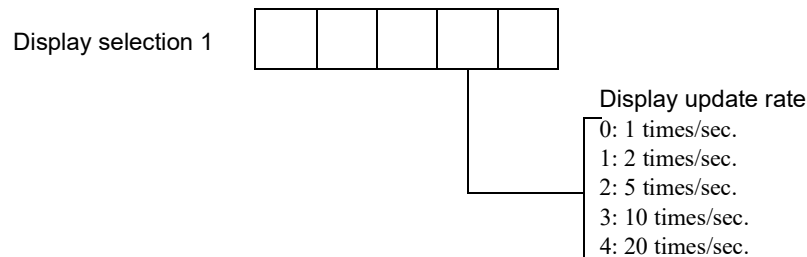
* If an error message is displayed, see "13-2.Over scale/error display" on page 148.

6 FUNCTION SETTINGS

6-1. Display update rate (setting mode 6-5)

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.



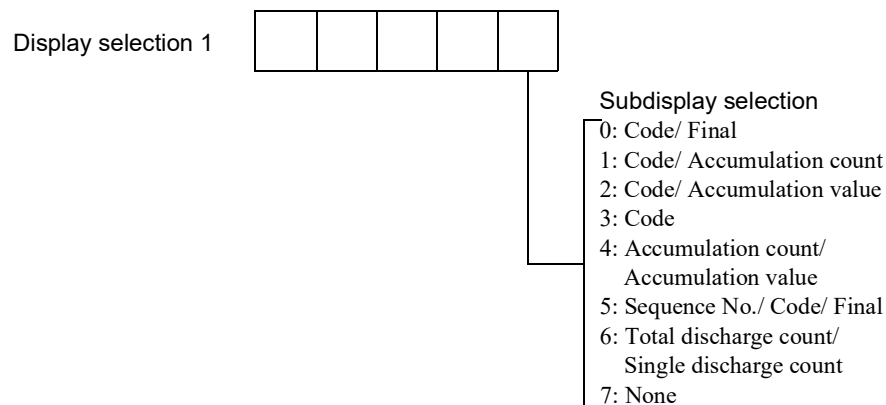
* When the temperature is low, may automatically adjust the display update rate.

6-2. Subdisplay selection (setting mode 6-5)

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: code/final, code/accumulation count, code/accumulation value, code, accumulation count/accumulation value, sequence No./code/final, total discharge count/single discharge count, and none. (For the contents of display in detail, see ② Subdisplay under ■ Front panel on page 2.)



6-3. 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.

6-4. Moving average filter (setting mode 2-2)

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

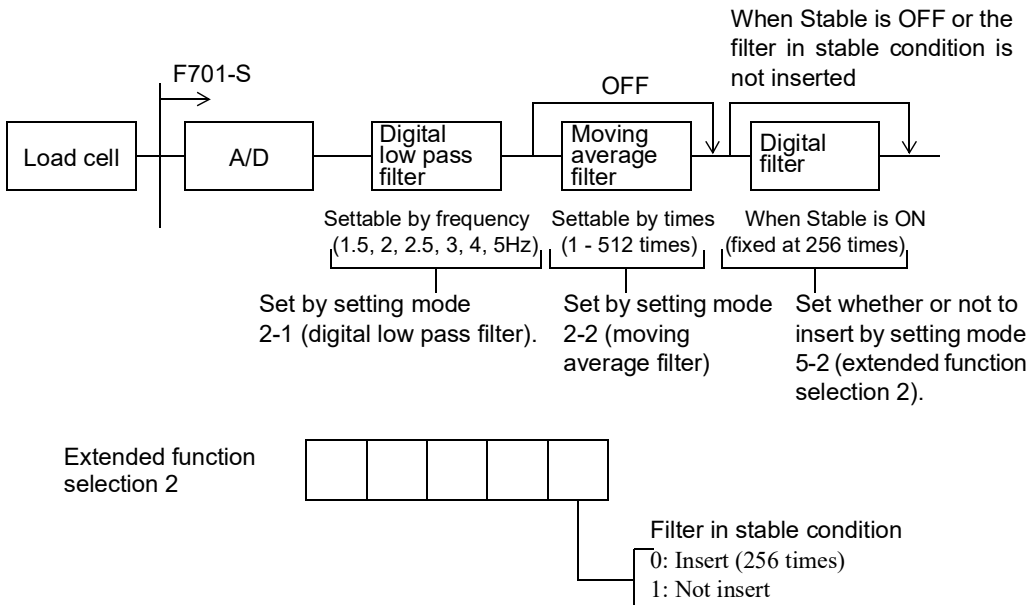
The moving average times can be selected in the range of OFF (1 time) - 512 times. With an increasing number of moving average times, the indicated value becomes more stable, while the response becomes slower. On the other hand, with a decreasing number of moving average times, the response becomes faster,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

Set an optimum value according to the type of weighing.

6-5. Filter in stable condition (setting mode 5-2)

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 motion detection (MD).



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

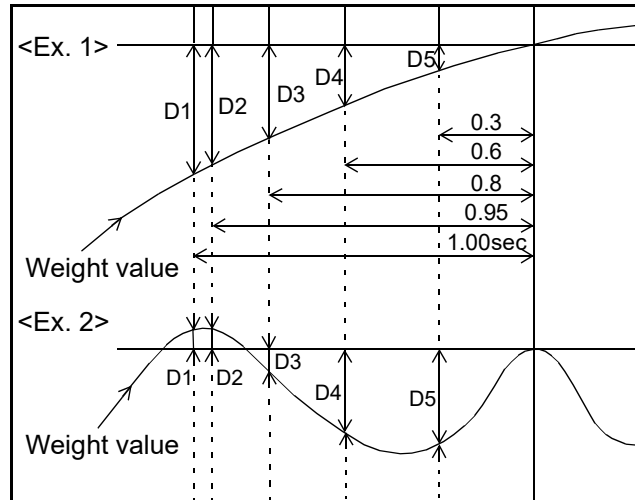
Set the parameters to detect that the indicated value is stable.

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.

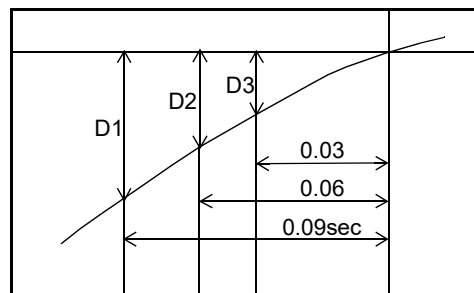
- * D1 is the difference between the current weight value and one-second-old weight value.



● 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.



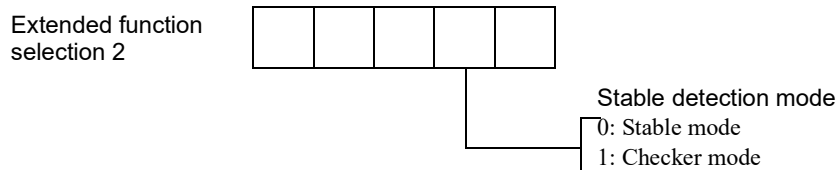
You can insert the digital filter to restrain the weight value from fluctuating when the stable signal is ON.

(See "6-5.Filter in stable condition (setting mode 5-2)" on page 44.)

■ Setting of motion detection parameters

- Motion detection mode (setting mode 5-2)

Select the stable condition from stable mode and checker mode.



- Motion detection period (setting mode 2-3)

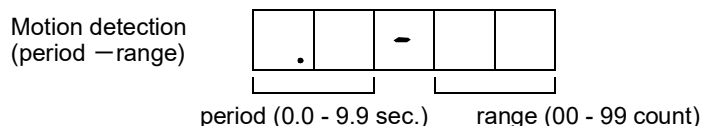
Set the period to judge that the weight value is stable.

(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)



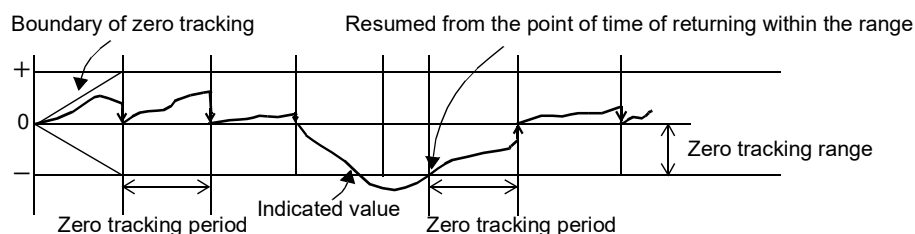
6-7. Zero tracking (ZT) (setting mode 2-4, 2-5)

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

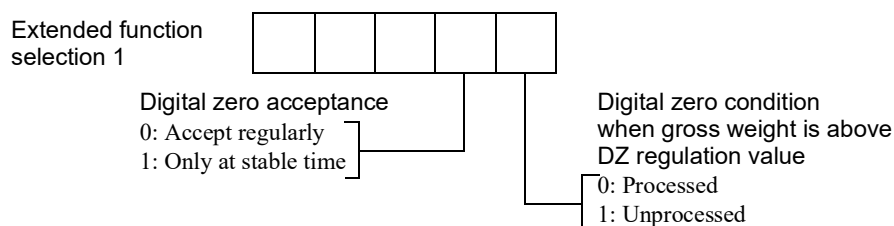
6-8. Digital zero (DZ)(setting mode 5-1)

This function forcibly zeros the gross weight. However, if the digital zero acceptance setting is "1: Only at stable time," it works only when the weight value is stable. Also, the gross weight exceeding the DZ regulation value cannot be zeroed.

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

If digital zero operation is performed when the gross weight > DZ regulation value, processing is performed according to the digital zero condition setting when gross weight is above DZ regulation value.

- If the digital zero condition when gross weight is above DZ regulation value is 0: Processed, the weight value of the DZ regulation value is subtracted, and "ZALM" blinks to give an alarm.
- If the digital zero condition when gross weight is above DZ regulation value is 1: Unprocessed, no processing is performed.





If a zero alarm occurs, take the following measures.

Measures
Change the DZ regulation value setting, and perform digital zero operation again. (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.

6-9. 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  key while pressing the  key.
2. The zero point correction amount is cleared.

6-10.DZ regulation value (setting mode 6-4)

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 only when the digital zero condition setting when gross weight is above DZ regulation value is "0: Processed."
(Input range/0 - 9999)

6-11.Gross weight display/net weight display

The F701-S can display gross weight or net weight selectively. Switch between gross weight display and net weight display with the  key. Each time the  key is pressed, switching is performed between gross weight display and net weight display alternately. When gross weight is displayed, " " goes out, and when net weight is displayed, " " 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 "6-12.One-touch tare subtraction (TARE)" on page 48.



* For digital tare subtraction, see "6-14.Digital tare subtraction (preset tare weight)" on page 49.

6-12.One-touch tare subtraction (TARE)

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


1. Press the  key.
2. One-touch tare subtraction is completed and " " 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  key to display the net weight. (When "  " is lit, net weight is displayed.)

6-13.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  key.
2. Tare subtraction is reset.

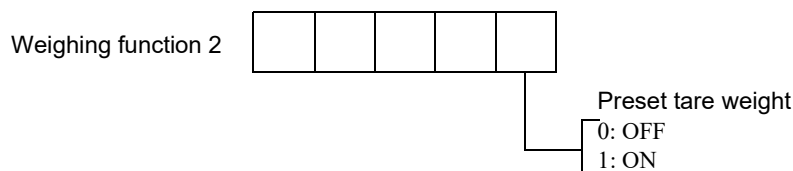
6-14. Digital tare subtraction (preset tare weight)

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 "1: ON."

■ Preset tare weight (setting mode 1-7)

(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



key.




However, depending on the tare subtraction function limits setting, the preset tare weight ON/OFF and tare weight settings may be prohibited when one-touch tare subtraction is working.

6-15. 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.



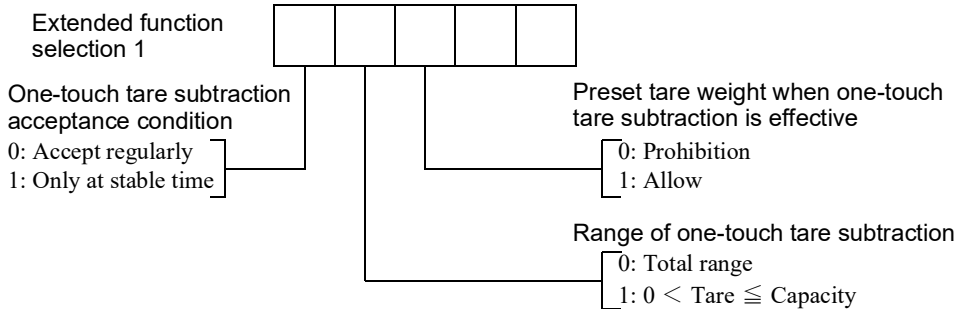
Point

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

6-16.Tare subtraction function limits (setting mode 5-1)

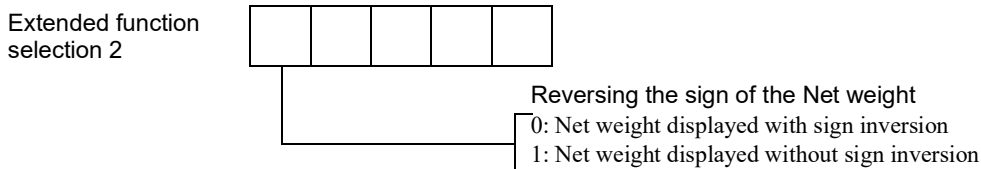
The operations of digital tare subtraction and one-touch tare subtraction can be limited.

- One-touch tare subtraction acceptance condition (Select from 0: Accept regularly/1: Only at stable time.)
- Range of one-touch tare subtraction (Select from 0: Total range/1: $0 < \text{Tare} \leq \text{Capacity}$.)
- Preset tare weight when one-touch tare subtraction is effective (Select from 0: Prohibition/1: Allow.)



6-17.Reversing the sign of the net weight (setting mode 5-2)

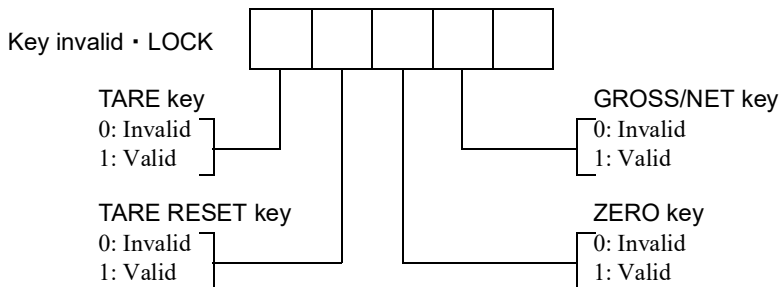
When constant amounts are discharged from a material-containing tank, the net weight becomes negative. By reversing the sign of the net weight, the amounts discharged can be made positive. Select whether or not to reverse the sign of the net weight from net weight displayed with sign inversion and net weight displayed without sign inversion.



6-18.Key invalid · LOCK (setting mode 3-2)

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)



6-19. Net over/gross over

This function gives an alarm if the net weight or gross weight exceeds a fixed regulation value.
The regulation value and display are as follows:

	Conditional expression	Display
Net over	Net weight > Net over setting value	OFL 1
Gross over	Gross weight > Gross over setting value	OFL 3

- Net over (setting mode 6-7)

Input range/0 - 99999

- Gross over (setting mode 6-8)

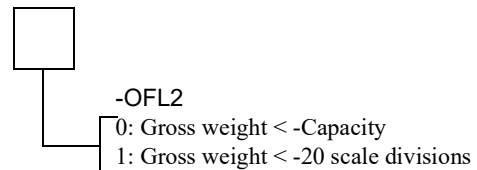
Input range/0 - 99999

6-20. Display -OFL2 (setting mode 6-9)

Select to display the -OFL2 display condition.

* For -OFL2, see "13-2. Over scale/error display" on page 148.

Display selection 2



7 WEIGHING SETTINGS AND OPERATIONS

7-1. Code

The F701-S can perform control by designating setting values for each code that is assigned to quantitative discharge setting values, such as final, set point 2, set point 1, and compensation. Up to eight different codes can be stored.



Point

For compensation feeding time, see page 67.
For accumulation clear, see page 78.

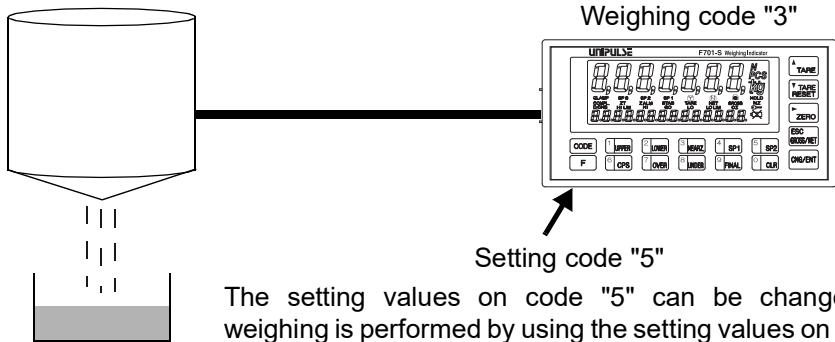
<Example setting>

Code No.	Final	Set point 2	Set point 1	Compensation	Over	Under	AFFC regulation	CPS feeding time
0	100.00	20.00	10.00	1.00	0.50	0.50	1.50	1.00
1	50.00	10.00	5.00	0.50	0.50	0.50	0.75	0.75
.
.
.
.
.
7	200.00	50.00	10.00	5.00	1.00	1.00	6.00	2.00

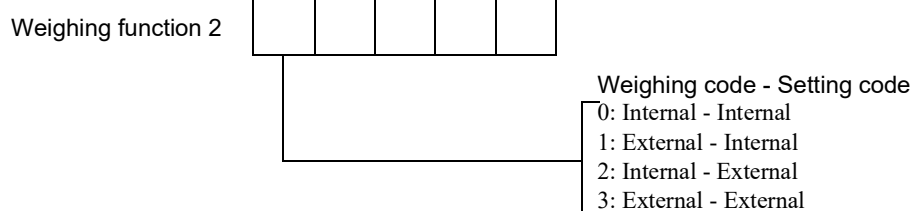
* Quantitative discharge setting values can be switched by calling a desired code.

■ Weighing code - setting code (setting mode 1-7)

The F701-S has two types of codes: code to control weighing (weighing code) and code to make settings (setting code).



WEIGHING SETTINGS AND OPERATIONS

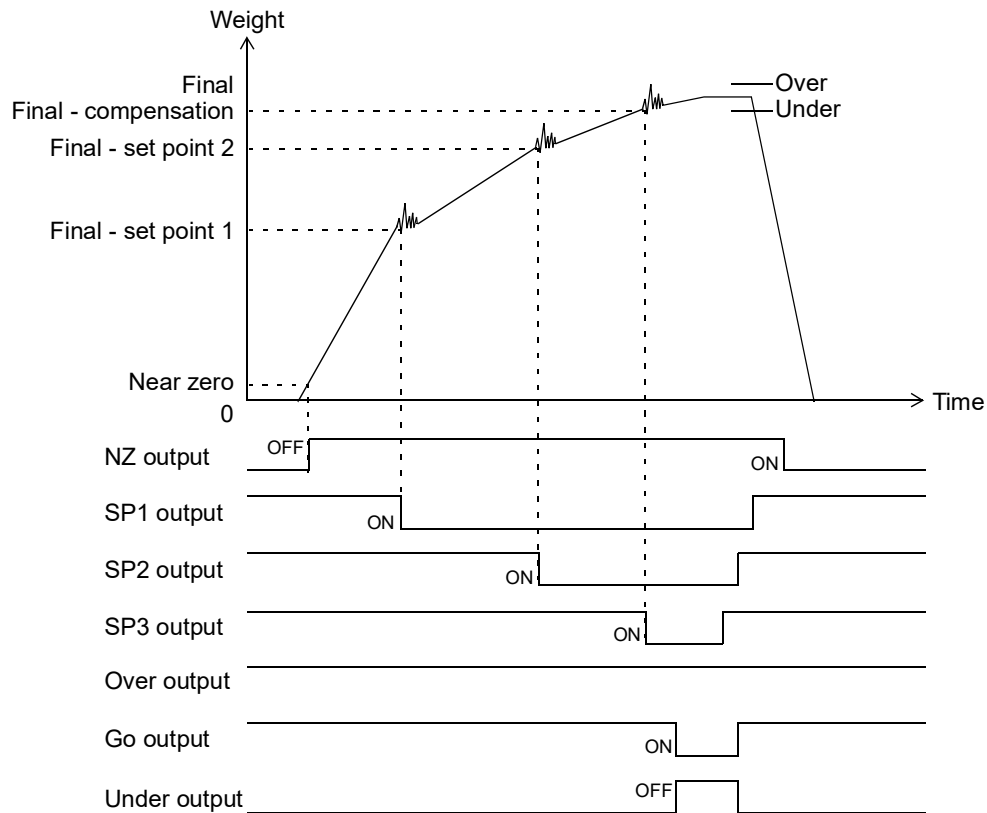


Do not use in such a way as changing codes (weighing codes) in the middle of weighing or switching to not-weighing codes periodically.

Weighing is performed by using the quantitative discharge setting values on the selected weighing code. In the case of such uses as the above, normal operation may not be performed.

7-2. Final/SP2/SP1/Compensation/Over/Under

These are settings to control and judge quantitative discharge.



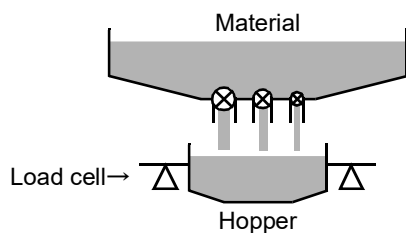
Control signals are outputted from the external input/output connector according to the setting values set here.

<Quantitative discharge setting values>

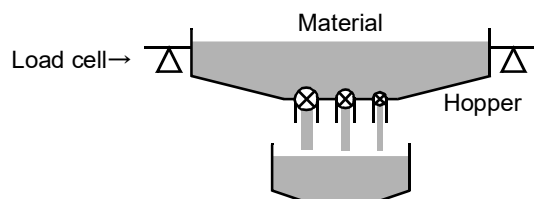
Setting	Display	Expression for judgment
Near Zero	NZ	Weight value \leq Near zero
Set point 1	SP1	Weight value \geq Final - Set point 1
Set point 2	SP2	Weight value \geq Final - Set point 2
Set point 3	SP3	Weight value \geq Final - Compensation
Under	LO	Weight value $<$ Final - Under
Over	HI	Weight value $>$ Final + Over
Go	GO	Final + Over \geq Weight value \geq Final - Under

Furthermore, the F701-S can perform control by switching eight types (eight codes) of these quantitative discharge setting values that are stored internally. Advanced combination weighing can also be performed by this function.

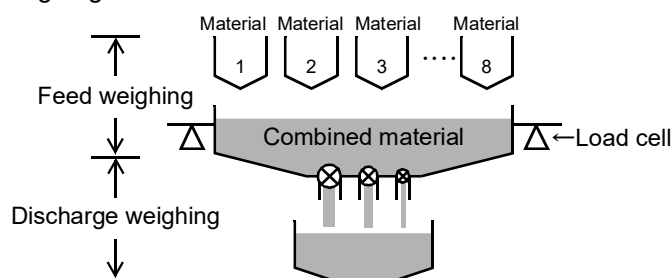
Feed weighing



Discharge weighing



Combination weighing



- Final (setting mode 0-9)/Set point 2 (setting mode 0-5)/Set point 1 (setting mode 0-4)
Input range/0 - 99999
- Compensation (setting mode 0-6)
Input range/0 - 9999
- Over (setting mode 0-7)/Under (setting mode 0-8)
Input range/0 - 9999

* For not using SP1 and SP2, set point 1 and set point 2 should be set identical to final.

7-3. AFFC regulation / AFFC ON/OFF / Average count of AFFC / AFFC coefficient

Variations in free fall, which are a main factor to weighing errors, are automatically adjusted for accurate weighing by the auto free fall compensation function. Here, set the parameters of this auto free fall compensation.

Principle of auto free fall compensation

When the complete signal turns on after the end of SP3, each weighing value is sampled. Then, the average of differences (D) between the final-set value and actual weighing-completed value recorded by a predetermined count (set count) (A) is calculated, and the average is multiplied by a compensation coefficient (C), which is added to or subtracted from the compensation setting value.

$$\text{Value added to or subtracted from the compensation setting value} = \frac{(D_1 + D_2 + D_3 + \dots + D_A)}{A} \times C$$

In order to minimize errors, the D values can also be regulated.

In this case, if in the range of (final + regulation value) \geq weighing value \geq (final - regulation value), processing of auto free fall compensation is performed.

Also, if adjust feeding is ON in sequence mode, weighing values before the start of adjust feeding are sampled.

* Auto free fall compensation is performed for each code.

Attention

The auto free fall compensation function stores compensation samples by using the over and under judge signals. If the number of judging times is set to "0" (no judgment), the F701-S cannot store samples for auto free fall compensation, so that the compensation function will not work.

For using the free fall compensation function, set the judging times to "1" or more.

Example)	Final setting value	20.000
	Auto free fall compensation regulation	0.100
	Average count of auto free fall compensation	4
	Auto free fall compensation coefficient	2/4

Weighing count	Actual value	Weighing error	FF CPS counter	CPS
0			0	←At power-on
1	20.050	+0.050	1	0.500
2	20.040	+0.040	2	0.500
3	20.070	+0.070	3	0.500
4	20.080	+0.080	4→0	0.500
		$+0.240/4 = 0.060$		
		$0.060 \times 2/4 = 0.030$		→Cal. CPS value
5	20.020	+0.020	1	0.530
6	20.000	0.000	2	0.530
7	20.010	+0.010	3	0.530
8	20.110	(+0.110)	←×3	0.530
9	20.010	+0.010	4→0	0.530
		$+0.040/4 = 0.010$		
		$0.010 \times 2/4 = 0.005$		→Cal. CPS value
10	19.880	(-0.120)	←×1	0.535
11	19.990	-0.010	1	0.535
12	20.010	+0.010	2	0.535
13	20.000	0.000	3	0.535
14	19.980	-0.020	4→0	0.535
		$-0.020/4 = -0.005$		
		$-0.005 \times 2/4 = -0.003$		→Cal. CPS value
				0.532

* When the compensation setting value is changed, the average count of auto free fall compensation and free fall compensation counter value become "0."

**Point**

Auto free fall compensation coefficient setting

The auto free fall compensation coefficient can be selected from among 1/4, 2/4, 3/4, and 1.

Higher-accuracy free fall compensation values can be calculated by selecting "1" for weighing such that each weighing value is about the same or selecting "1/4" to "2/4" for weighing such that each weighing value fluctuates.

- Auto free fall compensation regulation (setting mode 1-5)

Set a regulation value for each code to prevent the compensation value from becoming extremely large (or small).

Input range/0 - 99999

- Auto free fall compensation (setting mode 3-1)

Select whether or not to use the auto free fall compensation function.

In the case where a communication option is used, writing of free fall data can also be inhibited in writing from each option.

Select from 0: OFF/1: ON/2: ON (Communication option OFF).

- Average count of auto free fall compensation (setting mode 3-1)

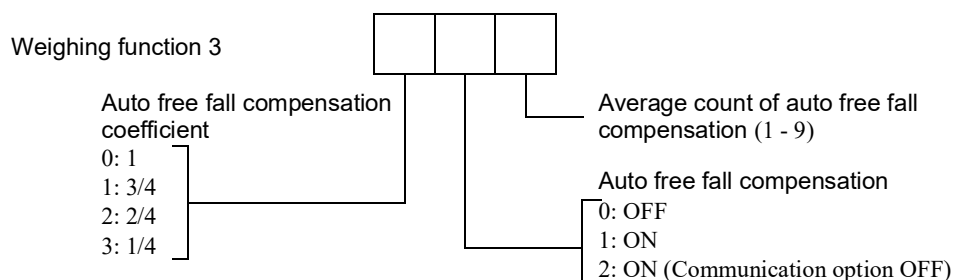
Set the count of records of weighing values to calculate the average.

Input range/1 - 9

- Auto free fall compensation coefficient (setting mode 3-1)

This setting prevents variations in compensation values by multiplying them by a coefficient of 1 or less.

Select from 0: 1/1: 3/4/2: 2/4/3: 1/4.



7-4. Quantitative discharge control

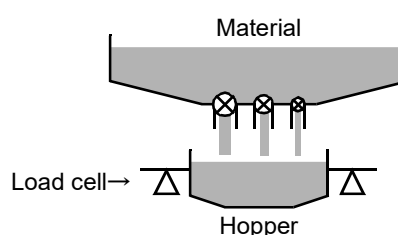
Quantitative discharge control is a control method for discharging constant amounts of material from a hopper tank, etc.

Constant amounts can accurately be discharged by appropriately combining the control settings of final, set point 2, set point 1, and compensation, judge settings of over, under, and go, and timer settings of comparison inhibit time and judging time, etc.

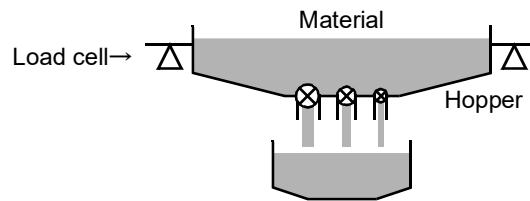
According to discharging methods, feed weighing and discharge weighing, and simple comparison control and sequence control are available.

■ Feed weighing and discharge weighing

Feed weighing Weighing values in feeding material in a weighing tank (hopper) are controlled by this weighing method.



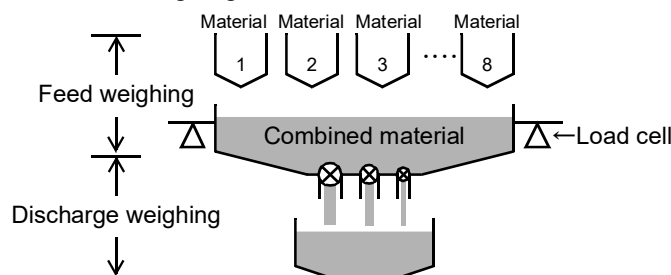
Discharge weighingWeighing values in discharging material from a material-filled weighing tank (hopper) is controlled by this weighing method.



■ Switching between feed and discharge

The F701-S can perform weighing while switching between feed and discharge. This function also allows advanced combination weighing.

Example of combination weighing



For switching between feed and discharge, either setting from membrane key or input signal from the external input/output connector (rear panel) is selectable.

■ Discharging control mode (setting mode 1-6)

Set feeding/discharging control. Feeding control, discharging control, or external selection (switching between feed and discharge by signal from the external input/output connector) is selectable.

Weighing function 1



Discharging control mode

- 0: Feeding control
- 1: Discharging control
- 2: External selection

In the case of external selection, switching between feed and discharge is performed by setting one of the input selections from 1 to 6 (pins A8, and B1 to B5) to "feed/discharge."

When it is OFF (HI), feeding control is brought about, and when it is ON (LO), discharging control is brought about.

* For setting the input selections from 1 to 6, see "10.EXTERNAL INPUT/OUTPUT SIGNALS (CONTROL CONNECTOR)" on page 81.

7-5. Simple comparison control and sequence control

- Simple comparison control

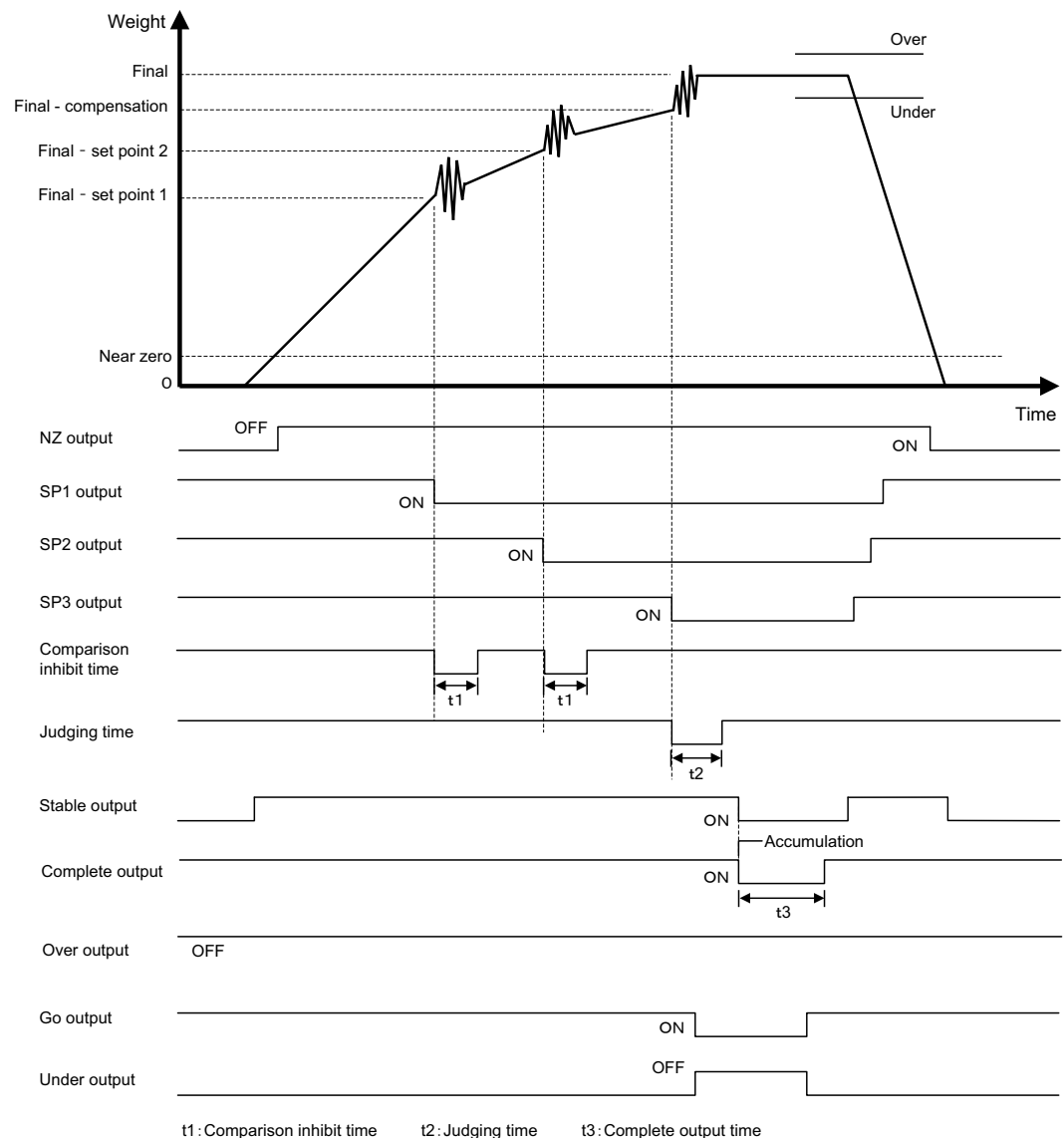
Weighing values and quantitative discharge setting values are always compared by this control method. Whenever each weight value meets the conditions of the quantitative discharge setting items, the output turns on.

In simple comparison control, the next weighing is judged to be possible at the instant when the weight falls below 25% of the final setting value after completion of the previous weighing.

<Conditional expression>

Near Zero	Weight value \leq Near zero	ON
Set point 1	Weight value \geq Final - Set point 1	ON
Set point 2	Weight value \geq Final - Set point 2	ON
Set point 3	Weight value \geq Final - Compensation	ON
Under	Weight value $<$ Final - Under	ON
Over	Weight value $>$ Final + Over	ON
Go	Final + Over \geq Weight value \geq Final - Under	ON

Simple comparison control



- Sequence control

Weighing values and quantitative discharge setting values are compared after the weighing start signal is input. When the weighing start signal is input, each output of set point 1, set point 2, and final turns on, and they turn off when each weight value meets the corresponding condition. In sequence control, control can be performed sequentially without external connection of PLC, etc.

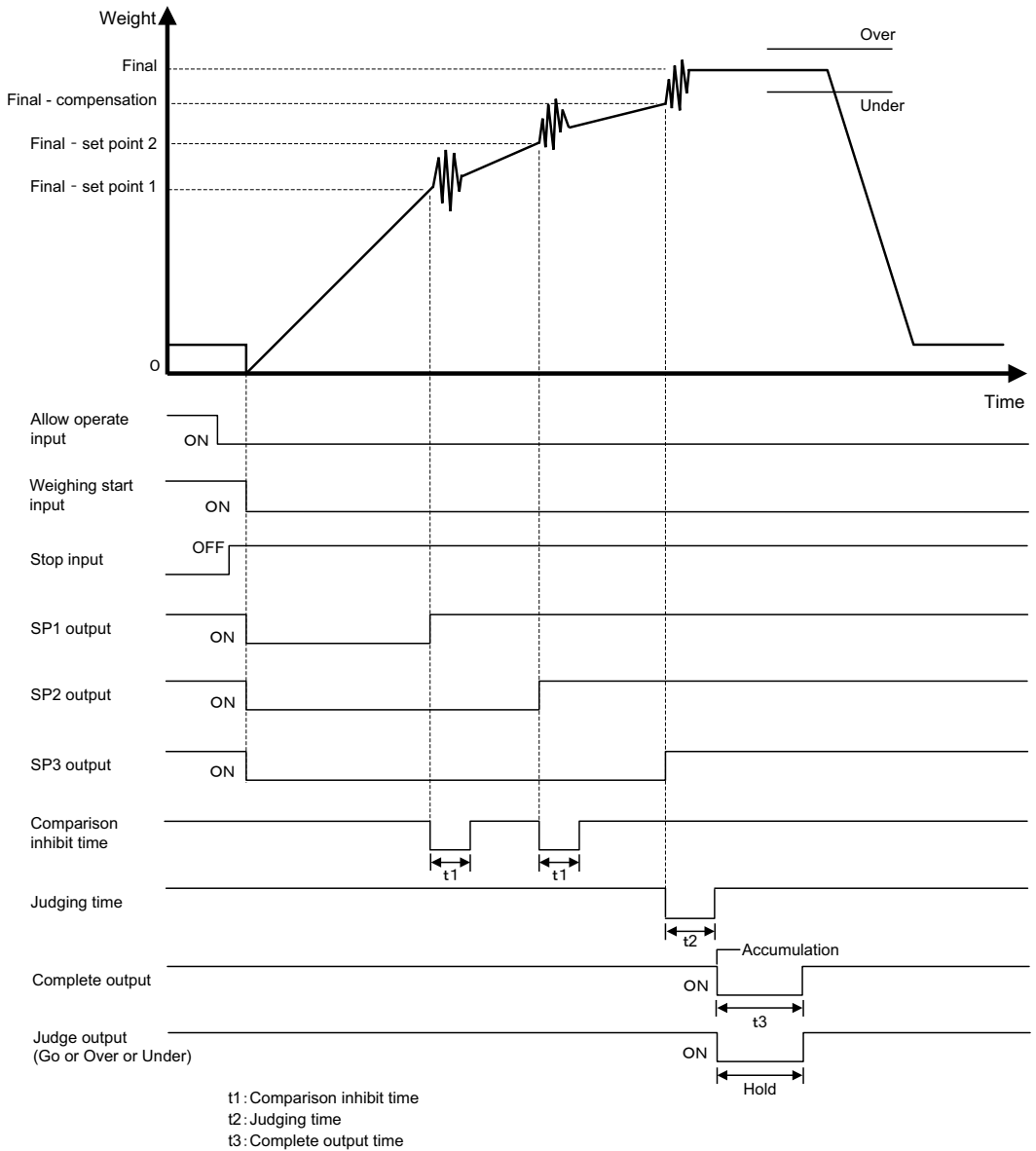
<Conditional expression>

Near zero	Weight value \leq Near zero	ON
-----------	-------------------------------	----

* The SP1, SP2, and SP3 gate signals turn on at the ON edge (OFF→ON) of the weighing start signal.

Set point 1	Weight value \geq Final - Set point 1	OFF
Set point 2	Weight value \geq Final - Set point 2	OFF
Set point 3	Weight value \geq Final - Compensation	OFF
Under	Weight value $<$ Final - Under	ON
Over	Weight value $>$ Final + Over	ON
Go	Final + Over \geq Weight value \geq Final - Under	ON

Sequence control



7-6. Weighing mode (setting mode 4-6)

Set simple comparison or sequence control.

Sequence mode 1

--	--	--	--	--

Weighing mode

- 0: Simple comparison mode
- 1: Sequence mode

7-7. 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 (setting mode 1-6)

Select the condition for near zero comparison.

Weighing function 1

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Near zero comparison mode

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

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

7-8. Upper/lower limit comparison and filling promotion comparison

Upper limit, lower limit, and filling promotion weight can be set as desired. Set the weight to be compared by upper/lower limit comparison weight.

Also, set the comparison timing by upper/lower limit comparison mode.

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

Input range/0 - 99999

- Filling promotion weight (setting mode 4-8)

Input range/0 - 99999

- Upper/lower limit comparison weight (setting mode 1-6)

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

Weighing function 1

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Upper/Lower limit comparison weight

- 0: GROSS
- 1: NET
- 2: Comparison OFF

* If Comparison OFF is selected, the external output signals of upper limit, lower limit, and filling promotion over are always off.

<Conditional expression>

The external signals are output under the following conditions.

- The upper limit output (HI LIM lights) turns on when the weight value > upper limit setting value.
- The lower limit output (LO LIM lights) turns on when the weight value < lower limit setting value.
- The filling promotion over output turns on when the weight value \geq filling promotion weight.

- Upper/lower limit comparison mode (setting mode 1-7)

Set the timing for comparison with the upper limit and lower limit.

* "Comparison regularly" applies to filling promotion.

Weighing function 2

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Upper/Lower limit comparison mode

- 0: Comparison regularly
- 1: Comparison is made when the external judging input is ON

7-9. Over/under comparison

The over and under settings can be made as desired. Set the weight to be compared by final and over/under comparison weight.

Also, set the timing for comparison by over/under comparison mode.

- Final and over/under comparison weight (setting mode 1-6)

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

Weighing function 1

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Final and over/under comparison weight

- 0: GROSS
- 1: NET
- 2: Comparison OFF

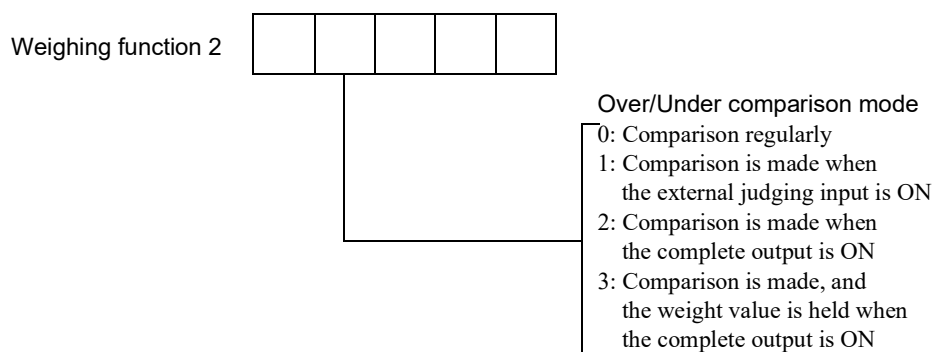
* If Comparison OFF is selected, the external output signals of over, under, and go are always off.

<Conditional expression>

The external signals are output under the following conditions.

- The over output (HI lights) turns on when the weight value > (final + over).
- The go output (GO lights) turns on when (final - under) \leq weight value \leq (final + over).
- The under output (LO lights) turns on when the weight value < (final - under).

- Over/under comparison mode (setting mode 1-7)



* If the weighing mode is set at "1: Sequence mode," comparison is made, and the weight value is held when the complete output is ON irrespective of the over/under comparison mode.

7-10. Complete signal output mode / Complete output time / Judging time / Comparison inhibit time

- Comparison inhibit time (setting mode 1-1)

Input range/0.00 - 9.99 (sec)

Comparison can be inhibited for a fixed time to prevent inappropriate control action by mechanical vibrations associated with valve opening and closing.

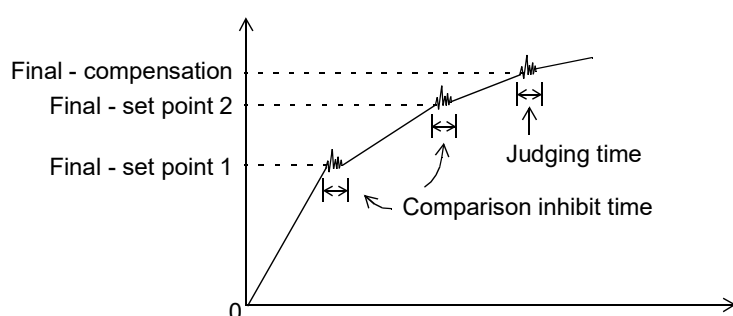
The comparison inhibit time operates from the time when the weight value reaches (final - set point 2) and (final - set point 1).

- Judging time (setting mode 1-2)

Input range/0.0 - 9.9 (sec)

This function inhibits comparative judgment for a fixed time to prevent inappropriate judgment by mechanical vibrations associated with valve opening and closing as is the case with the comparison inhibit time.

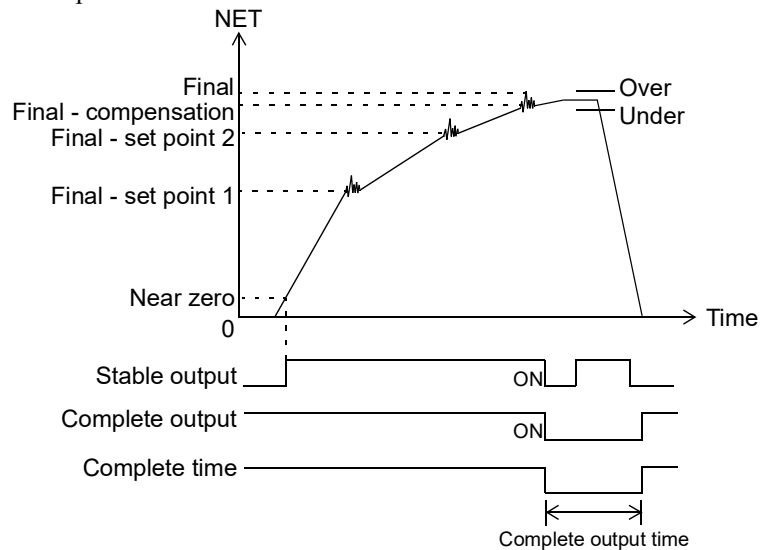
The judging time operates from the time when the weight value reaches (final - compensation).



- Complete output time (setting mode 1-3)

Input range/0.0 - 9.9 (sec)

Set the time of outputting the complete signal (external input/output connector pin A16) when weighing is completed.



- Complete signal output mode (setting mode 1-7)

Determine the timing for outputting the complete signal.

Weighing function 2

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Complete signal output mode

- 0: ON for the complete output time from when the judging timer has expired
- 1: ON for the complete output time from when the weight value becomes stable after the judging timer has expired
- 2: ON for the complete output time from when the judging timer has expired or from when the weight value becomes stable

Attention

When weighing repeatedly according to the weighing start time, complete signal does not turn off before next weighing start, sequence error 1 will result. Confirm the time chart of each sequence and set an appropriate time in advance.

7-11. Sequence-control-related settings

Set various parameters to perform a series of operations from the start to completion of weighing. Sequence control is classified as follows:

1) Normal sequence control

By this control method, weighing starts with the weighing start signal and ends with outputting of the complete signal.

2) Sequence control with adjust feeding

By this control method, adjust feeding is performed for the time set by compensation feeding time when the weighing result is under.

3) Sequence control with discharge gate

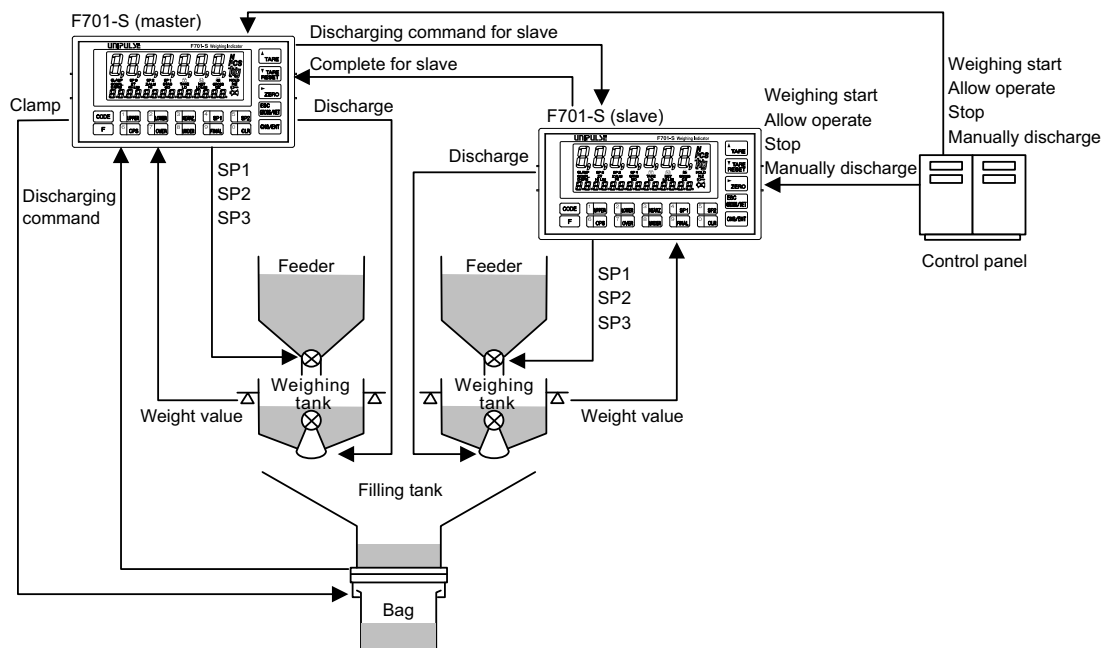
By this control method, discharging control is performed by using the discharge gate after completion of weighing.

4) Double sequence control

By this control method, bagging is performed in the order of weighing completed as weighing is performed by two F701-S.

* Simultaneous discharging cannot be performed.

* Master and slave in different output types of sink type and source type can not connect.



- Judging times (setting mode 4-5)

Select whether or not to make over, under, and go judgments when the complete signal is outputted after completion of weighing in sequence mode.

Input range/0 - 99 (times)

00 : No judgment (Over, go, and under judgments are not made.)

01 : Judgments are made each time.

02 : Judgments are made once every two times of weighing.

03 : Judgments are made once every three times of weighing.

⋮

99 : Judgments are made once every 99 times of weighing.

Attention

The auto free fall compensation function stores compensation samples by using the over/under judge signal.

If the number of judging times is set to "00" (no judgment), the F701-S cannot store samples for auto free fall compensation, so that the compensation function will not work. For using the free fall compensation function, set the judging times to "01" or more.

- AZ times (setting mode 4-4)

Select whether or not to zero the weighing value at the time when weighing is started in sequence mode. If the weighing value is gross, digital zero is performed, and if it is net, tare subtraction is performed to zero the weighing value.

Input range/0 - 99 (times)

- 00 : No auto zero (Auto zero is not performed.)
- 01 : Auto zero is performed each time.
- 02 : Auto zero is performed once every two times of weighing.
- 03 : Auto zero is performed once every three times of weighing.
- ⋮
- 99 : Auto zero is performed once every 99 times of weighing.

Attention

- Timing is the following 2ways.
 - Immediately after receiving the ON edge of the weighing start signal.
 - The weighing start is at the ON level, and an elapse of weighing start time after the last weighing.
- If a zero alarm occurs as a result of auto zero, sequence error 3 is displayed.
- Even if no auto zero (00) is set here, TARE and digital zero operations from the front panel keys and external input/output connector are valid.

- At start NZ confirmation (setting mode 4-6)

Set whether or not to confirm that the near zero signal is on at the time when weighing is started.

(Select from 0: OFF/1: ON.)

If the near zero signal is on, a normal start is made, and if the signal is off, **sequence error 4** is displayed.

For the near zero setting, see " - Near zero (setting mode 0-3)" on page 61.

- At start weight value confirmation (setting mode 4-6)

Set whether or not to confirm that the weighing value has reached the SP1 point (final - set point 1) at the time when weighing is started.

(Select from 0: OFF/1: ON.)

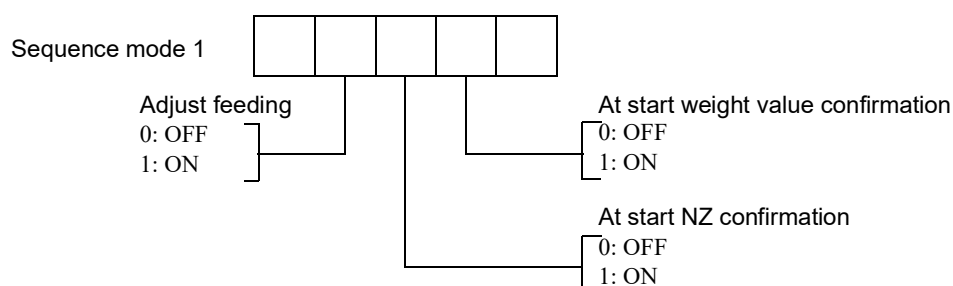
If the weighing value has reached the set point 1 setting value, **sequence error 5** is displayed.

For the set point 1 setting, see " - Final (setting mode 0-9)/Set point 2 (setting mode 0-5)/Set point 1 (setting mode 0-4)" on page 55.

- Adjust feeding (setting mode 4-6)

Set whether or not to perform adjust feeding after completion of weighing.

(Select from 0: OFF/1: ON.)



- Compensation feeding time (setting mode 1-4)

Set the time to perform adjust feeding after completion of weighing.

Input range/0.00 - 9.99 (sec)

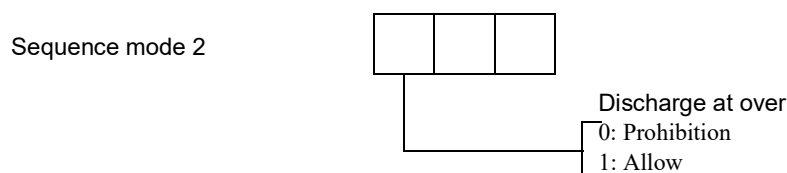
- Weighing start time (setting mode 4-3)

If the weighing start input signal is at the ON level, reweighing can be repeated automatically after an elapse of this setting time after the last weighing.

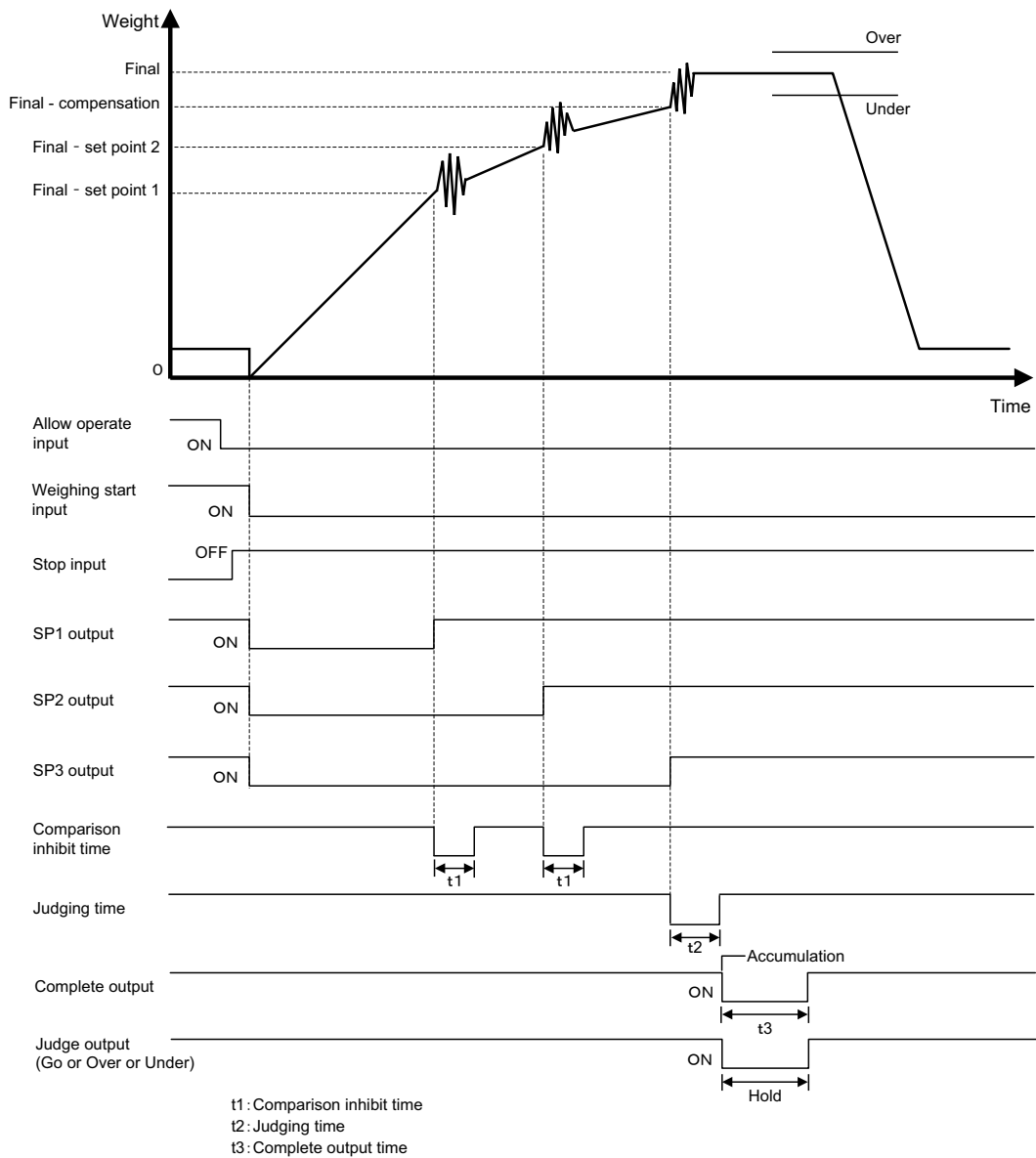
Input range/0.0 - 9.9 (sec)

- Discharge at over (setting mode 4-7)

Set whether to allow or prohibit auto discharge when the weighing result is over.

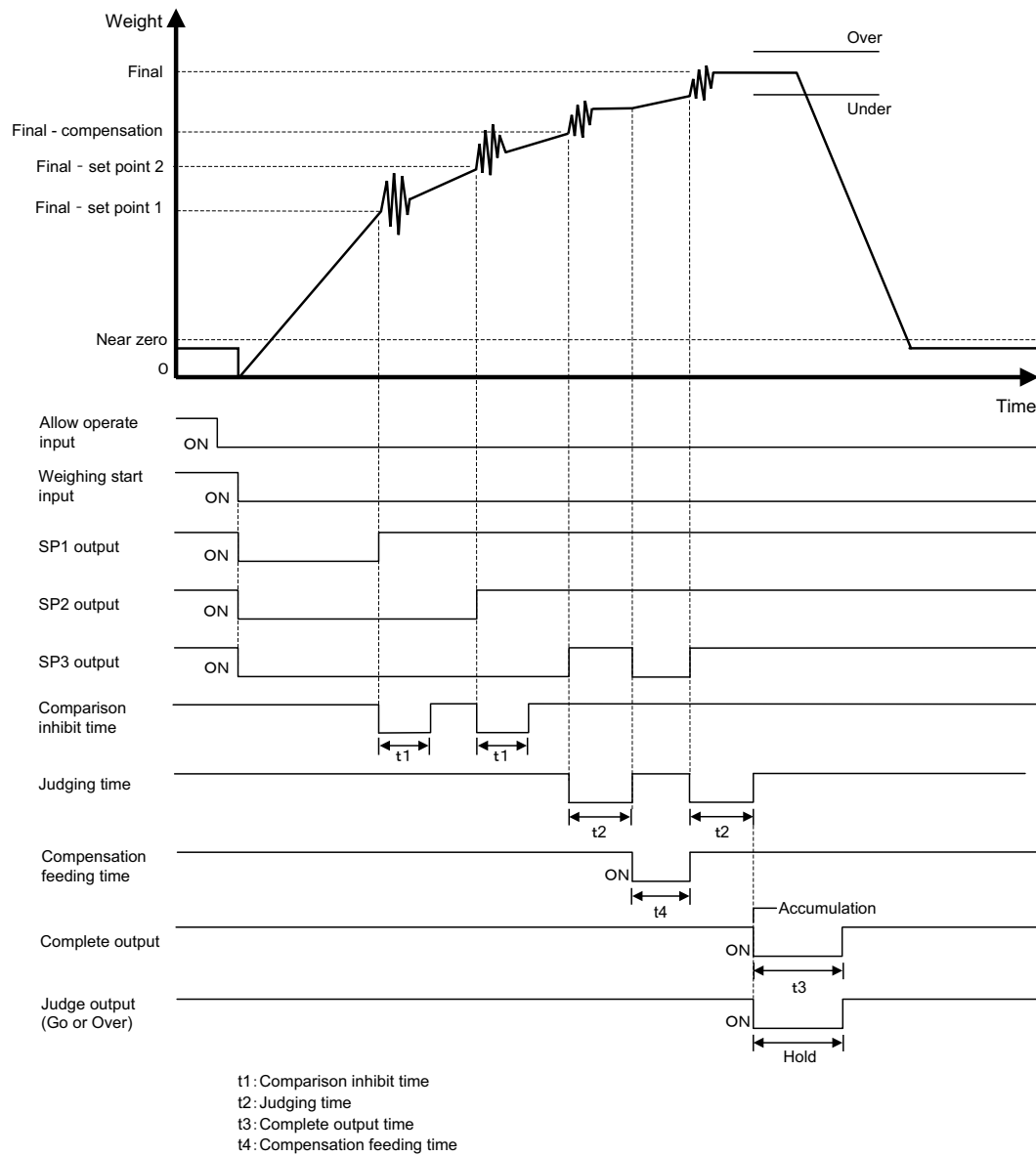


■ Normal sequence control



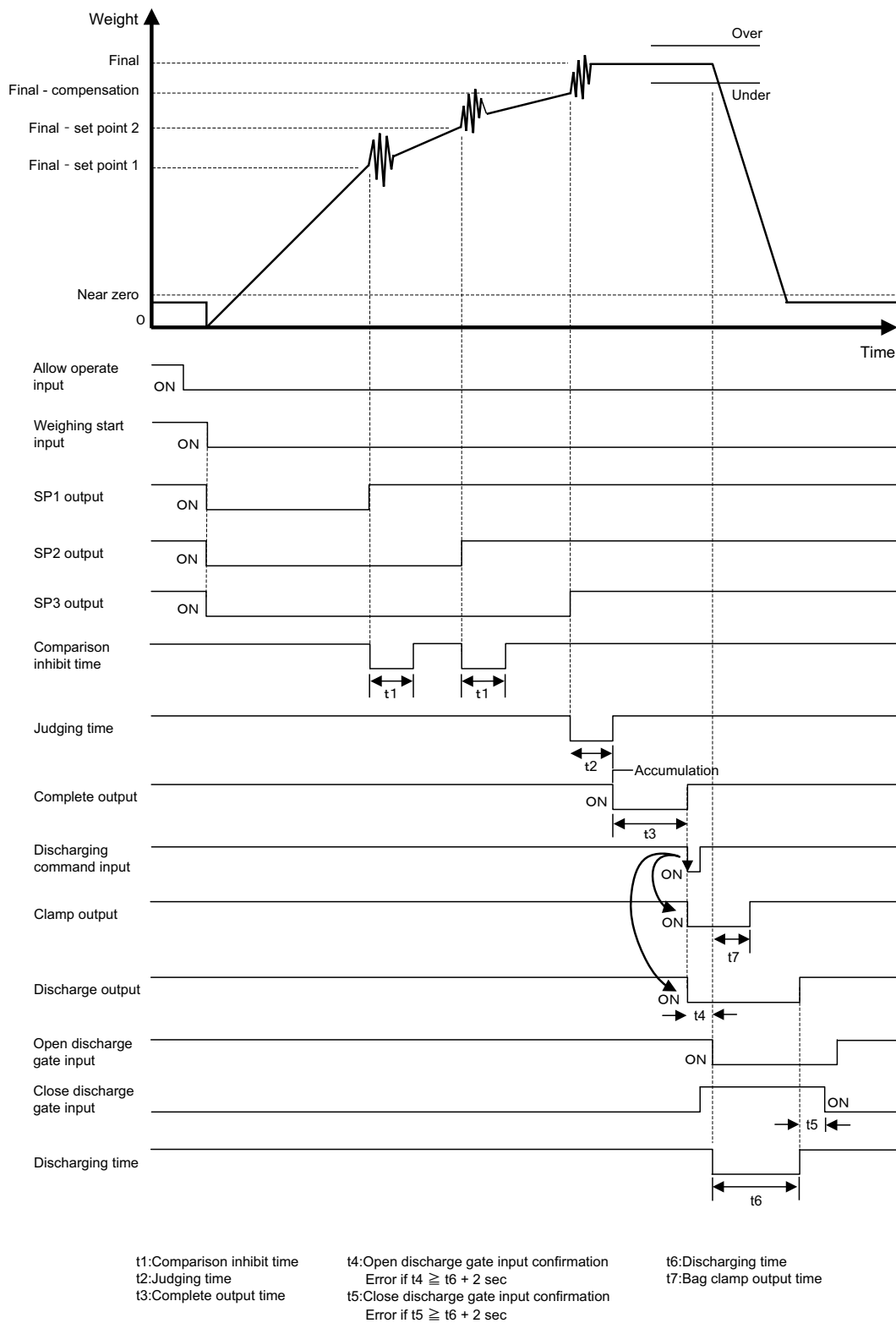
For normal sequence control, the ends sequence of series with complete output time elapsed and moves the waiting for next weighin start.

Sequence control with adjust feeding



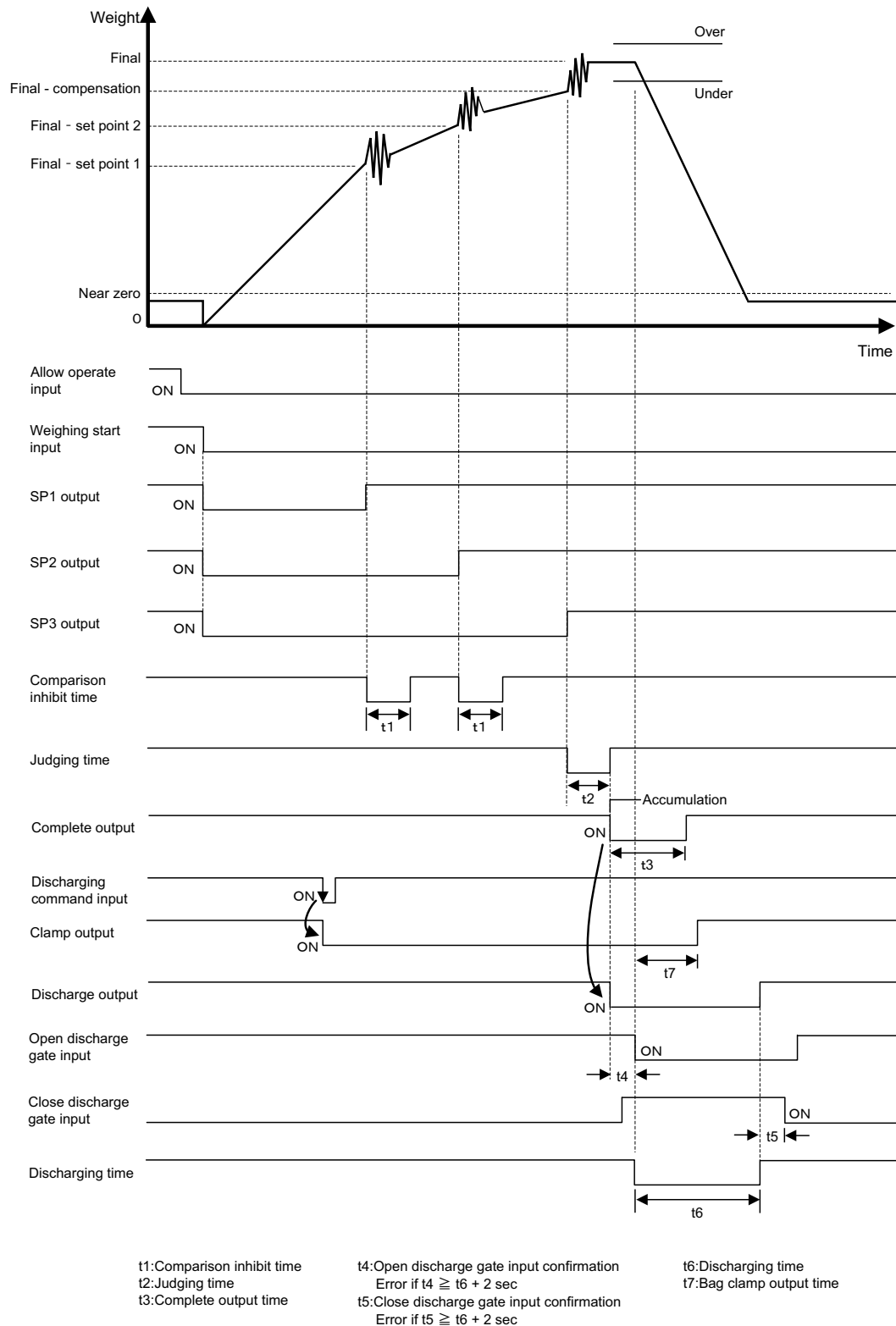
■ Sequence control with discharge gate

- Discharging command input after completion

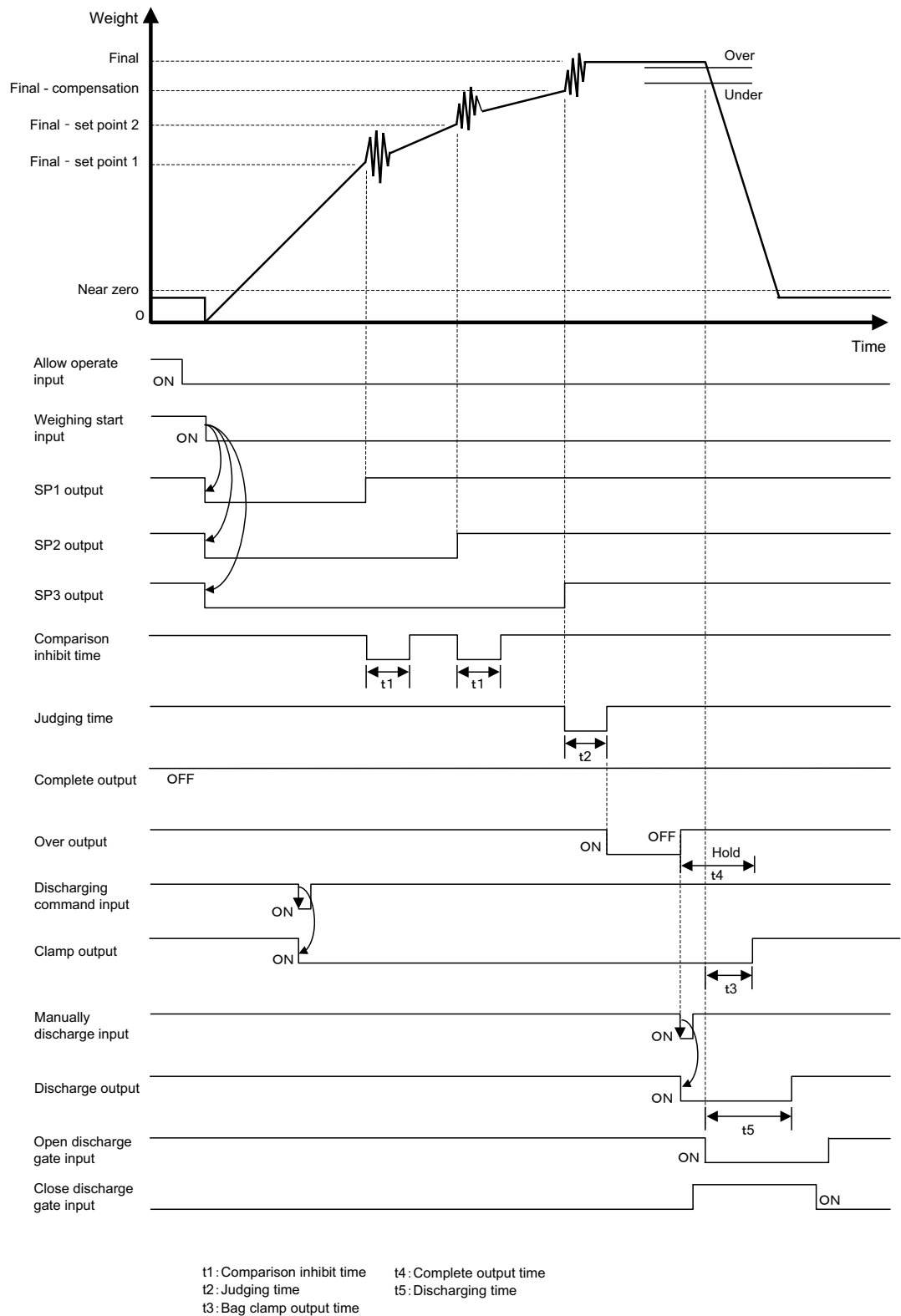


For sequence control with discharge gate, the ends sequence of series with a close discharge gate input signal changes from OFF to ON and moves the waiting for next weighing start.

- Discharging command input before completion



- When the discharge at over setting is prohibited (input discharging command before completion)



■ Discharge gate operation

- 1) At start-time, it is confirmed that the close discharge gate input is on. At this time, if it is off, **sequence error 9** will result. (However, the error is reset if the close discharge gate input turns on after that.)
- 2) It is kept confirmed that the close discharge gate input is on until the complete signal turns on after the start, and if it is off, **sequence error 6** will result and weighing will stop (the gate signal turns off).
- 3) After the complete signal is output, the discharge signal turns on upon receipt of turning-on of the discharging command input (level input).
- 4) After the discharge signal turns on, if the open discharge gate input does not turn on even with an elapse of the discharging time + 2 sec, **sequence error 8** will result. (However, the error is reset to continue operation if the open discharge gate input turns on after that.)
 - * In the case where the discharge gate control setting is "2: ON (with NZ confirmation)," the error cannot be reset unless the near zero signal is on even if the open discharge gate input is on.
- 5) The discharge signal turns off after an elapse of the discharging time with the open discharge gate input on.
- 6) After the discharge signal turns off, if the close discharge gate input does not turn on even with an elapse of the discharging time + 2 sec, **sequence error 9** will result. (However, the error is reset to continue operation if the close discharge gate input turns on after that.)
- 7) A series of weighing operations ends with the close discharge gate input on.
 - * For the open discharge gate and close discharge gate inputs, limit switches, etc., are usually connected. When not in use, they should be short-circuited to the input COM so that the inputs are always ON.



Point

After completion of weighing, while the discharge gate control is in operation, it cannot be forcibly terminated by the stop input signal.

■ Manually discharge

- 1) The discharge signal turns on at the ON edge (OFF→ON) of the manually discharge input to perform discharge operation.
At this time, weighing, if in progress, is stopped. If a sequence error has occurred, the sequence error is reset.
- 2) If the weighing result is over with the discharge at over setting "prohibition," terminate the sequence by either decreasing the weighed object manually or making a shift to discharge operation through the input of this signal.
- 3) The open discharge gate and close discharge gate inputs are confirmed as in the case of usual discharge.



Point

- For resetting sequence errors (**from 1 to 9** other than **sequence error 3**), normally turn the stop signal from OFF to ON.
- If **sequence error 3** has occurred, digital zero needs to be cleared. After clearing digital zero, input the stop signal, and start again with the weighing start signal. For the method of clearing digital zero, see "6-9.Digital zero clear" on page 47.

- Discharge gate control (setting mode 4-6)

Determine whether discharge gate control upon completion of weighing is on or off.

(Select from 0: OFF/1: ON/2: ON (with NZ confirmation).)

Sequence mode 1

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Discharge gate control

0: OFF

1: ON

2: ON (with NZ confirmation)

- * When the discharge gate control setting is ON (with NZ confirmation), the near zero signal is confirmed at the same time when the open discharge gate input is confirmed.

- Discharging time (setting mode 4-2)

Determine the time of outputting the discharge signal.

Input range/0.0 - 9.9 (sec)

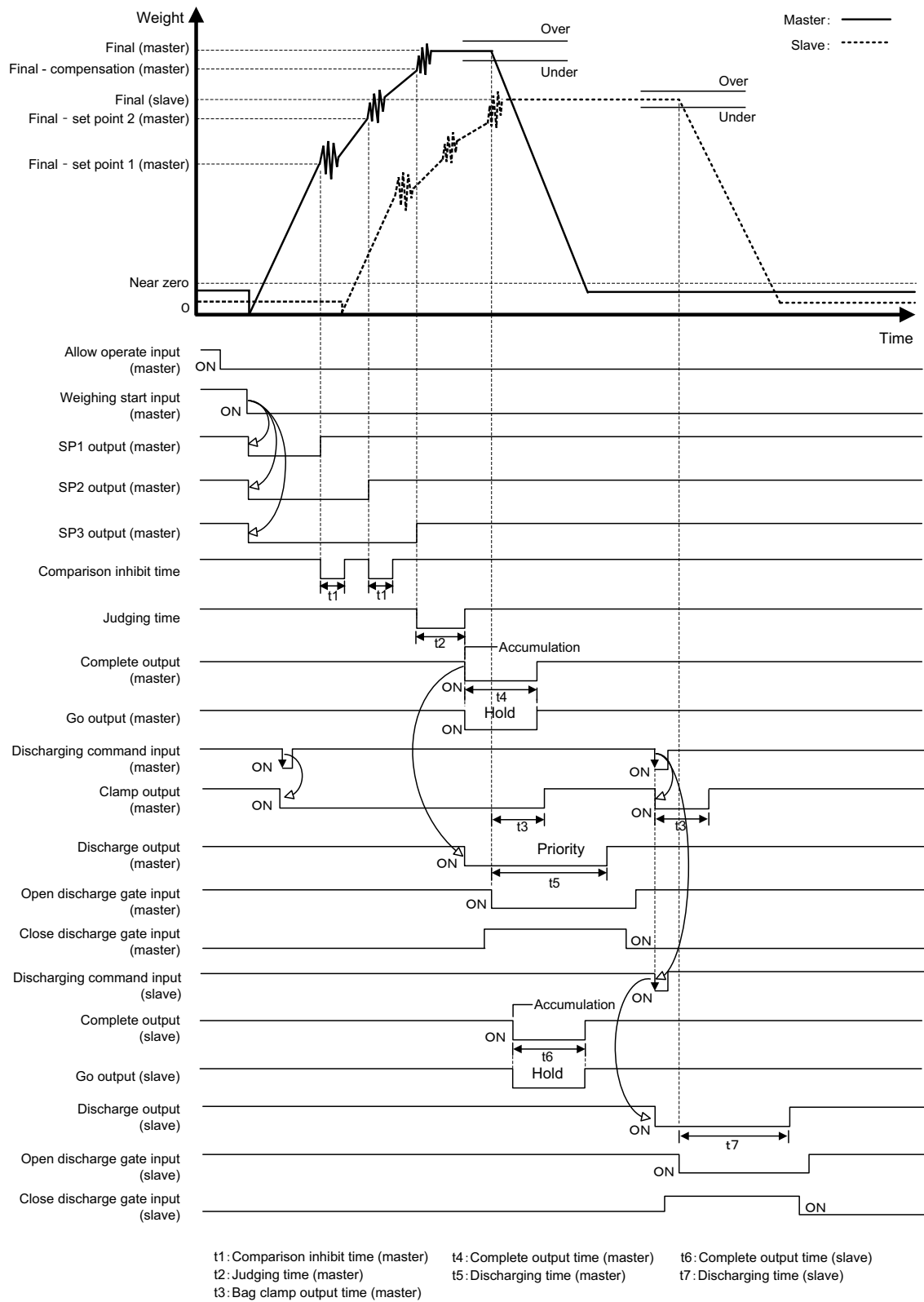
- Bag clamp output time (setting mode 4-1)

The clamp signal turns off after elapse of the bag clamp output time with the open discharge gate signal on.

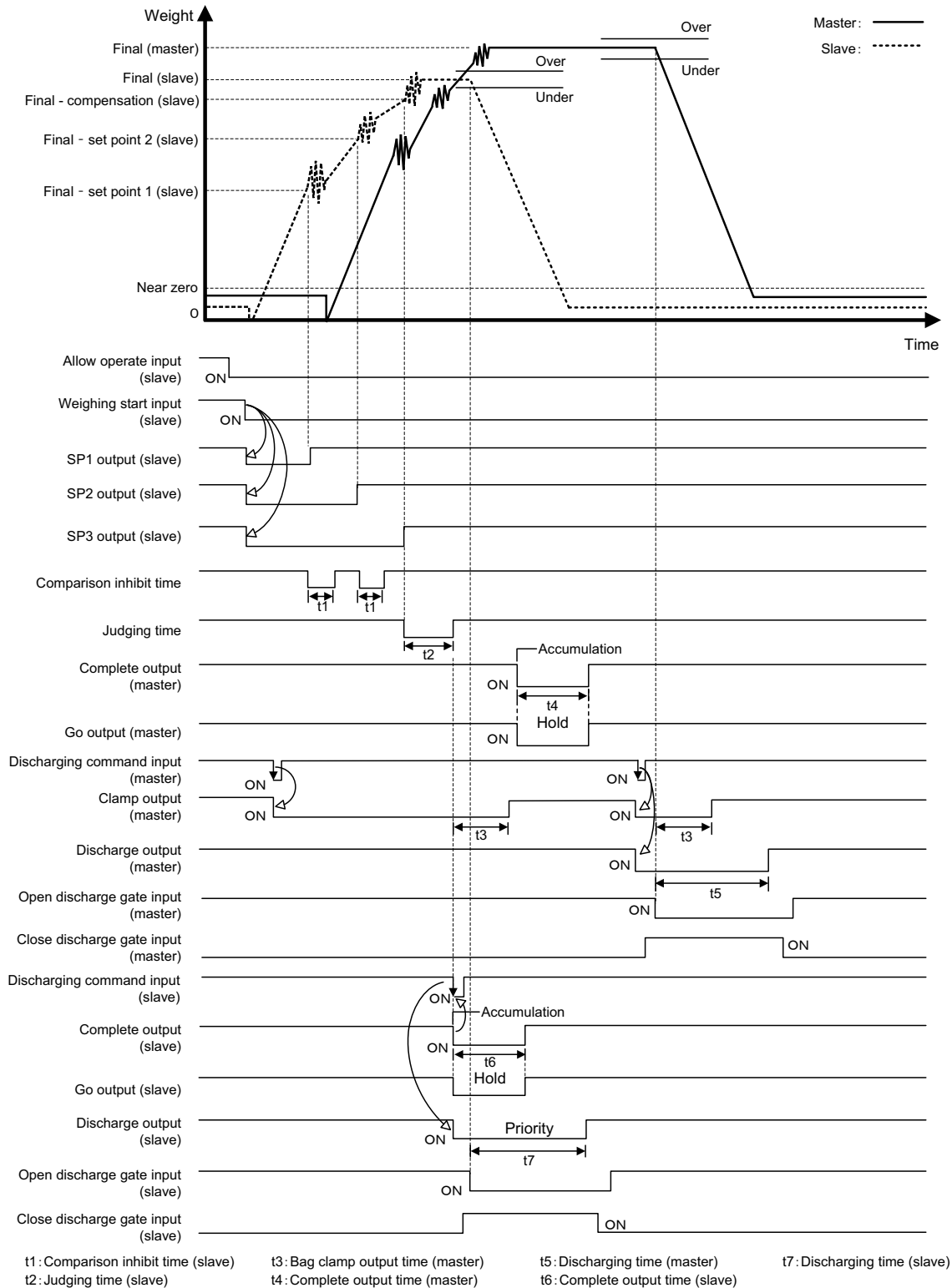
Input range/0.0 - 9.9 (sec)

Double sequence control

- Priority given to master discharge



- Priority given to slave discharge



- Master/slave selection (setting mode 4-7)

Designate master/slave.

Sequence mode 2



Master/Slave selection

0: Master

1: Slave

8 ACCUMULATION-FUNCTION- RELATED SETTINGS AND OPERATIONS

Weight values are accumulated to each code by auto accumulation command or external input signal accumulation command.

However, they may be accumulated only at a stable time depending on the accumulation command input condition setting.

Up to 9999 accumulations can be made, but when the accumulation count reaches 9999, an accumulation count error results. Even if an accumulation count error has occurred, other weighing operations, etc., are not affected.

The accumulation value and accumulation count can be referred to on the subdisplay.



Point

- The types of weight values to be accumulated are weight values set by final and over/under comparison weight (gross weight or net weight).
- Weight values, if negative, are not accumulated.

8-1. Accumulation command

Weight values can be accumulated by external input signal or communication I/F (RS-485, etc.) with desired timing. However, weight values, if negative, are not accumulated.

8-2. Accumulation command input condition (setting mode 5-2)

Set whether to accept the accumulation command regularly or accept it only when the indicated value is stable.

Extended function
selection 2

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Accumulation command input condition

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

8-3. Total comparison selection/total limit/count limit

Comparison of accumulation value or accumulation count of weighing data can be made with respect to the total limit or count limit.

It can be set for each code.

- Total comparison selection (setting mode 2-6)

Select the comparison target from

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

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

- Total limit (high 4) (setting mode 2-7)

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

- Total limit (under 5) (setting mode 2-8)



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

- Count limit (setting mode 2-9)

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

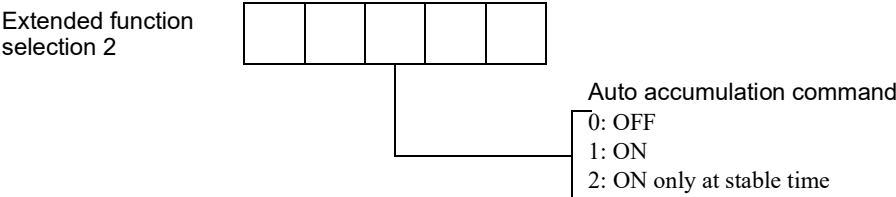
8-4. Accumulation clear

This function clears the accumulated data (count and accumulation value) on the code in weighing.

1. Press the   key.
2. The accumulation count and accumulation value are zeroed.

8-5. Auto accumulation command (setting mode 5-2)

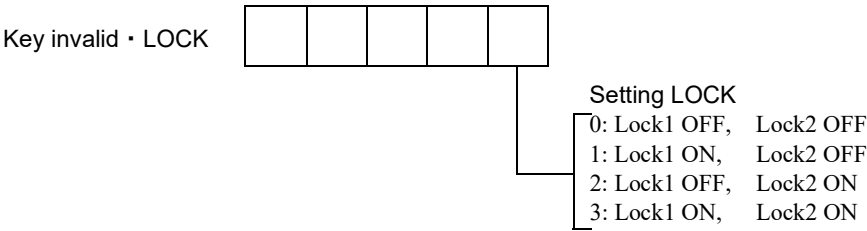
This function accumulates the F701-S weight values automatically.
By enabling the auto accumulation command, they are accumulated when the F701-S complete signal turns on.
With this timing, the count and accumulation value on the code in weighing are updated.
However, they are not accumulated if the weighing result is negative or over scale or if no judgment is set.



9 SYSTEM-RELATED SETTINGS AND OPERATIONS

9-1. LOCK (soft) (setting mode 3-2)


This lock is intended to prevent misoperation. For setting values effective on Lock1 and Lock2, see "13-1.List of setting values" on page 144.



9-2. Password (setting mode 3-9)

Setting values registered in F-RAM are initialized into factory-shipped values.
Calibration values (zero calibration and span calibration) and setting values recorded in NOV.RAM are not cleared.
Also, the internal status (tare weight, DZ, G/N display) is cleared at the same time.

Input the password in the order of "1269 → 6842".

 Point

- Initialization cannot be performed when setting LOCK1 is ON.
- For initial setting values and storage of setting values, see "13-1.List of setting values" on page 144.

9-3. 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	
6	F-RAM read/write check	Auto
7	Status display lighting in succession	Visual
8	7-segment lighting on display	Visual
9	NOV RAM read/write check	Auto
10	Display of PASS and end of checking	Display

4 digits

← 6F73

← Error 1 when an error occurs

← Error 2 when an error occurs

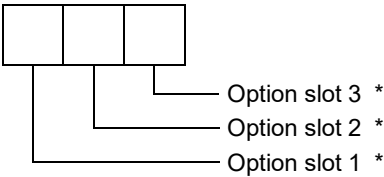
← Error 3 when an error occurs

- * The software version display may differ depending on the time of purchase.
- * When the LOCK switch on the rear panel is ON, NOV RAM is not checked.
- * 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.

9-4. Option display (setting mode 9-9)

Display the type of option mounted on the F701-S.

Option display



- | | | | |
|------------|---------------|-------------|--------------|
| * 0: None | 1: BCO or BSC | 2: DAC | 3: DeviceNet |
| 4: RS-232C | 5: CC-Link | 6: PROFIBUS | |

10 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.

10-1. Connector pin assignments

The adaptable connector is FUJITSU COMPONENT-manufactured.

connector: FCN-361J040-AU

cover: FCN-360C040-B

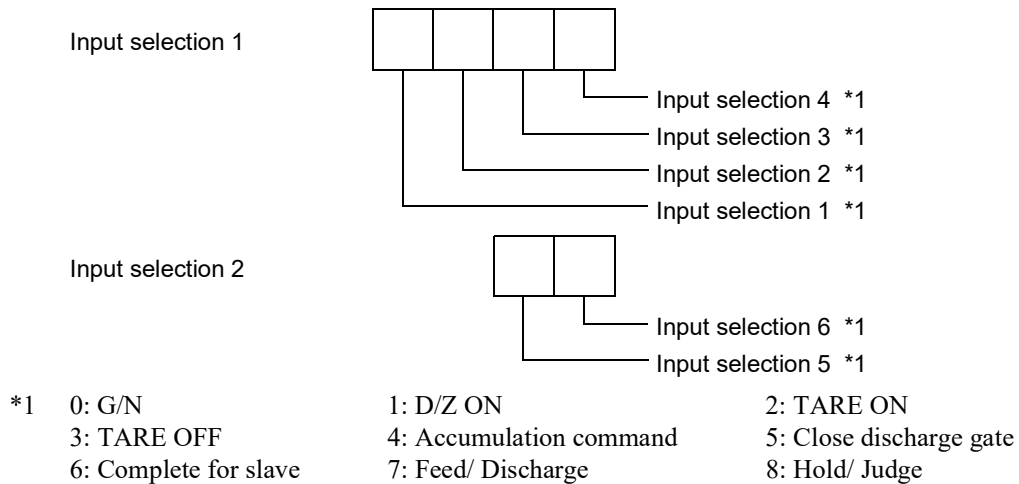
Equivalent are adaptable.

No.		Signal		No.		Signal	
A1	In	Allow operate		B1	In	Input select 2	
A2	In	Weighing start		B2	In	Input select 3	
A3	In	Stop		B3	In	Input select 4	
A4	In	Discharging command		B4	In	Input select 5	
A5	In	Manually discharge		B5	In	Input select 6	
A6	In	Open discharge gate		B6	In	Code 1	
A7	In	Accumulation clear		B7	In	Code 2	
A8	In	Input select 1		B8	In	Code 4	
A9	*	COM (Input)		B9	*	COM (Input)	
A10	*	COM (Input)		B10	*	COM (Input)	
A11	*	DC24V	Sink type: +	B11	*	DC24V	Sink type: +
			Source type: -				Source type: -
A12	*	DC24V	Sink type: -	B12	*	DC24V	Sink type: -
			Source type: +				Source type: +
A13	Out	SP1		B13	Out	Output select 1	
A14	Out	SP2		B14	Out	Output select 2	
A15	Out	SP3		B15	Out	Output select 3	
A16	Out	Complete		B16	Out	Output select 4	
A17	Out	Discharge		B17	Out	Output select 5	
A18	Out	Clamp		B18	Out	Output select 6	
A19	Out	Error check select 1		B19	Out	Reserve 1	
A20	Out	Error check select 2		B20	Out	Reserve 2	

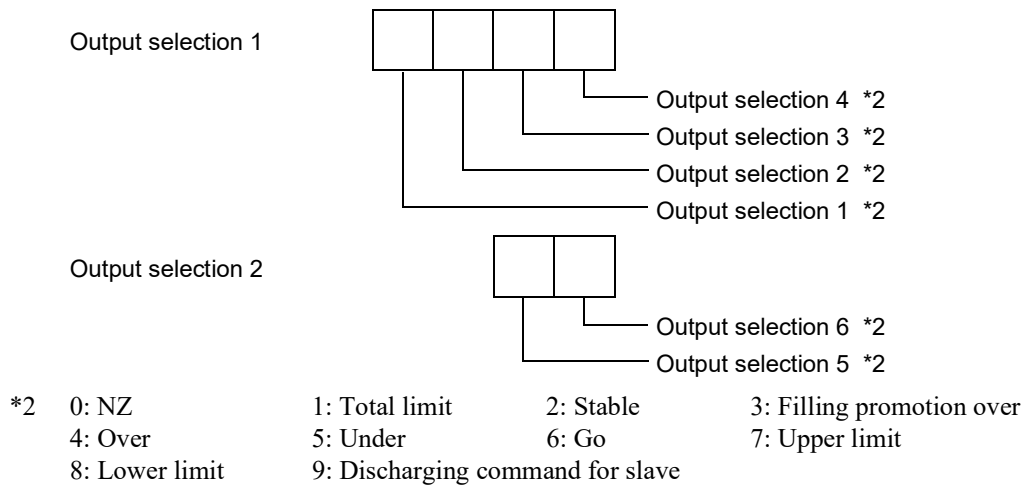
* The COM (Input) (pins A9, A10, B9, and B10) are internally connected.

* If input selections level input signal only are plural assigned identically content, priority is given to lower-order numbers, and the other side becomes invalid.

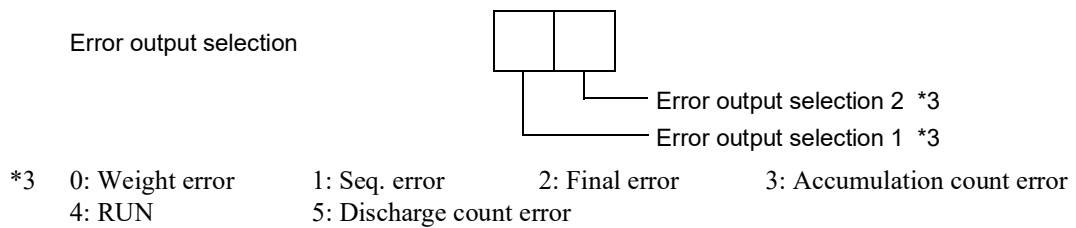
- External input selection (setting mode 3-3, setting mode 3-4)



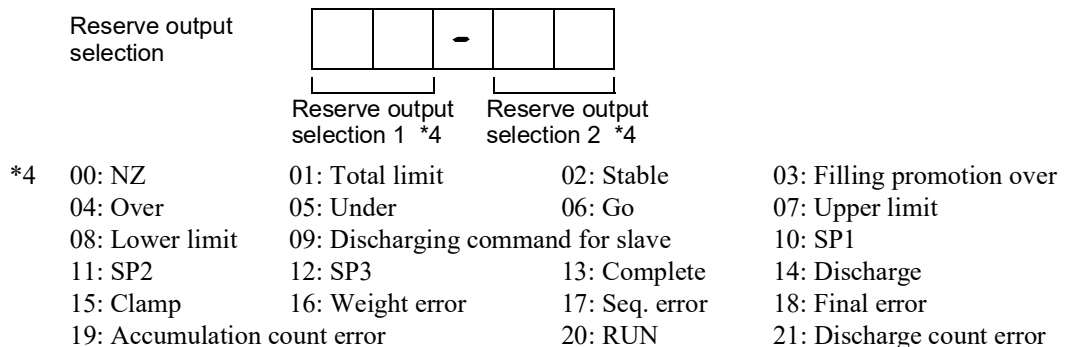
- External output selection (setting mode 3-5, setting mode 3-6)



- Error output selection (setting mode 3-7)



- Reserve output selection (setting mode 3-8)



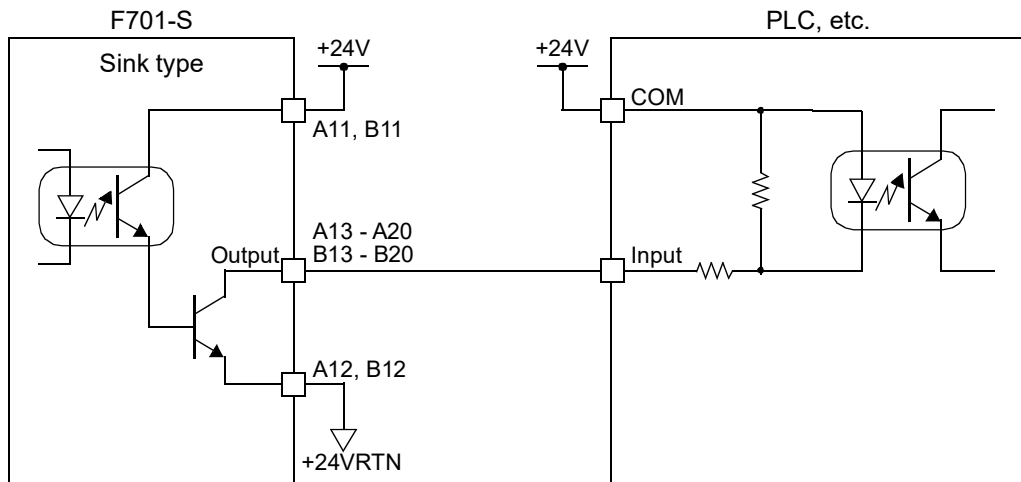
10-2.External control equipment connection

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

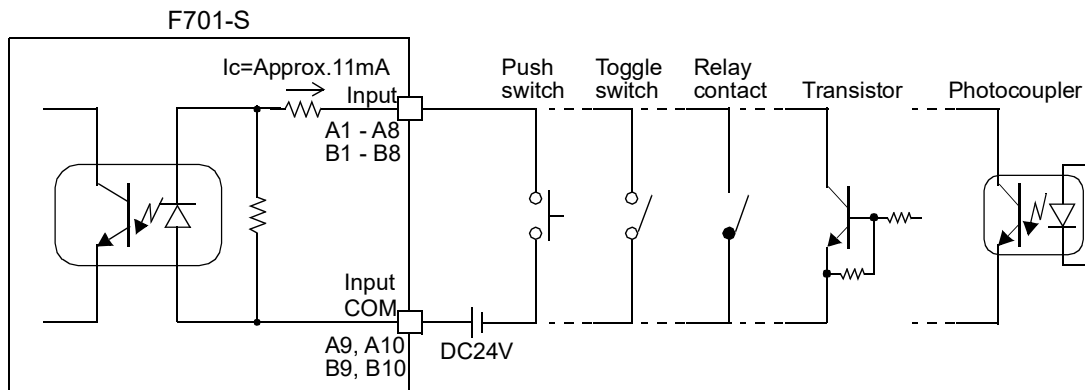
The signal output circuit is photocoupler isolated open-collector output (current sink type).



- Input

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

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



- Output

The diagram shows the internal wiring of the F701-S module. It includes a 'Source type' section with a switch and a transistor. The module has three main terminals: A12, B12 (connected to +24V), A13 - A20 / B13 - B20 (labeled 'Input'), and A11, B11 (labeled 'Output' and connected to +24VRTN). The 'Input' terminal is connected to a PLC input through a resistor. The 'Output' terminal is connected to a PLC output through a resistor. The PLC side is labeled 'PLC, etc.' and shows the 'Input' and 'COM' terminals connected to +24VRTN.

F701-S

Input COM

Push switch

Toggle switch

Relay contact

Transistor

Photocoupler

DC24V

A9, A10
B9, B10

Input

A1 - A8
B1 - B8

$I_c \approx 11\text{mA}$

10-3.External input signals

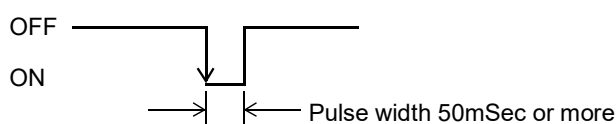
External inputs include edge inputs and level inputs.

<Edge input>

Processing is switched at the ON edge (OFF→ON) and OFF edge (ON→OFF) of each external input.



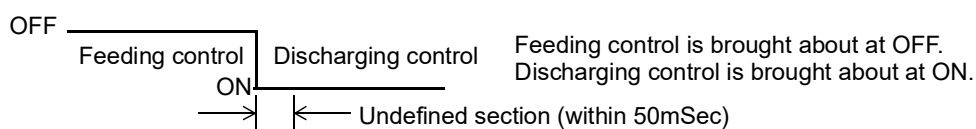
For processing at the ON edge (OFF→ON).



<Level input>

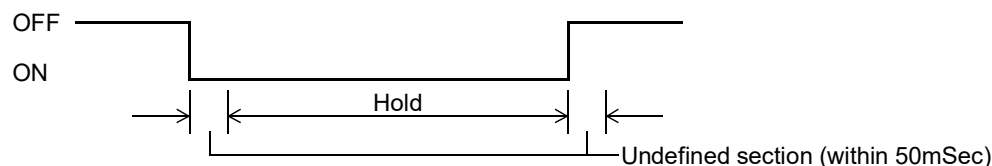
Processing is switched by ON and OFF of each external input.

Example) Feed/discharge switching



Processing is performed while each external input is ON.

Example) HOLD



■ Allow operate <level input> *1

This is used in sequence mode. This signal needs to be turned on before weighing.

The weighing start turn ON when this signal is OFF, sequence error1 is displayed.

■ Weighing start <level input, edge input> *1

This is used in sequence mode. Weighing starts at the ON edge (OFF→ON).

For reweighing repeatedly according to the weighing start time, this signal needs to be at the ON level.

■ Stop <level input, edge input> *1

This is used in sequence mode. If this signal is turned on in the middle of weighing, a sequence error is displayed and the weighing is stopped.

The sequence error is cleared at the ON edge.

■ Discharging command <edge input>

This is used in sequence mode.

ON edge in the middle of weighing:

Discharge of the weighed object is allowed after completion of weighing.

ON edge after completion of weighing:

Discharge of the weighed object is started after completion of weighing.

■ Manually discharge <edge input>

This is used in sequence mode. A shift is made to discharge processing at the ON edge.

■ Open discharge gate <level input> *1

This is used in sequence mode where the discharge gate control setting is ON.

This signal should immediately be turned on after the start of discharge.



■ Close discharge gate <level input> *1

This is used in sequence mode where the discharge gate control setting is ON.

This needs to be turned on before and after discharging.

■ Accumulation clear <edge input>

Accumulation data on the code in weighing are cleared at the ON edge.

The same operation is also performed with the  →  key.

■ G/N <edge input>

Net weight display is brought about at the ON edge.

Gross weight display is brought about at the OFF edge.

■ D/Z ON <edge input>

The gross weight is zeroed at the ON edge.

The same operation is also performed with the  key (only when the ZERO key is set at "1: Valid" by key invalid • LOCK).

However, what can be zeroed is within the range of DZ regulation value. If outside this range, either the weight value of the DZ regulation value is subtracted or no processing is performed depending on the digital zero condition setting when gross weight is above DZ regulation value. Also, they may zeroed only at a stable time depending on the digital zero acceptance setting.


■ 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  key (only when the TARE key is set at "1: Valid" by key invalid • LOCK).


Select the range of one-touch tare subtraction by setting "total range" or "0 < Tare ≤ Capacity."

However, this may operate only when the indicated value is stable depending on the one-touch tare subtraction condition.

* During tare subtraction, "" lights.

■ TARE OFF <edge input>

The above tare subtraction is reset at the ON edge.

The same operation is also performed by pressing the  key (only when the TARE RESET key is set at "1: Valid" by key invalid • LOCK).

However, the tare setting is not canceled.

■ Accumulation command <edge input>

Each weight value is added to the corresponding accumulation and the count is incremented at the ON edge. The weight value to be added at this time depends on the final and over/under comparison weight setting.

However, this may operate only when the indicated value is stable depending on the accumulation command input condition.

* As eight types of accumulations are stored to each code, the weight value is added to the accumulation on the current weighing code.

* If the weight value is negative, no addition and counting-up are performed.

■ Complete for slave <edge input>

This is used in sequence mode. The completion of weighing of the slave is recognized at the ON edge. This signal of the master is connected to the complete output signal of the slave, when double sequence control is performed by master and slave.

■ Feed/discharge <level input>

This is valid when the discharging control mode setting is "External selection".

Feeding control is brought about at OFF-time, and discharging control is brought about at ON-time.

■ Hold <level input> *1

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 over/under comparison mode and upper/lower limit comparison mode settings is "Comparison is made when the external judging input is ON".

Also, this input is invalid in sequence mode.

* During hold, "HOLD" lights.

■ Judge <level input>

This is valid when either of the over/under comparison mode and upper/lower limit comparison mode settings is "Comparison is made when the external judging input is ON".

This input terminal serves as HOLD according to setting.

This cannot be used as JUDGE unless either of the over/under comparison mode and upper/lower limit comparison mode settings is "Comparison is made when the external judging input is ON".

Also, this input is invalid in sequence mode.

■ Code <level input>

This is valid when the weighing code - setting code setting is "External."

The externally-set code is set in BCD code.

Code

4	2	1
---	---	---

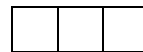
 0 - 7



Point

*1 These input signals are valid when the priority of level input signal setting is "Control priority".

Sequence mode 2



Priority of level input signal

0: Control priority

1: Communication priority

■ SP1, SP2, SP3

Each signal turns on under the following condition.

■ Clamp

This is valid in sequence mode when discharge gate control is ON.

The output turns on at the ON edge of the discharging command input after completion of weighing.

■ NZ

The output turns on when the weight value \leq near zero setting value with comparison made regularly.

|
Selected by near zero comparison mode

■ 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 \geq total limit setting value.
- Count comparison ON: The output turns on when the accumulation count \geq count limit setting value.

■ Stable

The output turns on when the weight value is stable.

* For details, see "6-6.Motion detection (MD) (setting mode 2-3, 5-2)" on page 45.

■ Filling promotion over

The output turns on when the weight value \geq filling promotion weight.

|
Selected by upper/lower limit comparison weight.

■ Over, under, go**● In simple comparison mode**

Select the comparison timing by over/under comparison mode.

● In sequence mode

Comparison is made when the complete output is ON and the weight value is held regardless of the over/under comparison mode setting (with judgment).

Each signal turns on under the following condition:

- Under: Weight value $<$ Final setting value - Under setting value
- Over: Weight value $>$ Final setting value + Over setting value
|
Selected by final and over/under comparison weight
- Go: Final setting value + Over setting value \geq Weight value
 \geq Final setting value - Under setting value

■ Upper limit, lower limit

Select the upper/lower limit comparison mode from "Comparison regularly" or "Comparison is made when the external judging input is ON."

The conditional expressions are as follows:

The lower limit output turns on when the weight value $<$ lower limit setting value.

The upper limit output turns on when the weight value $>$ upper limit setting value.

|
Selected by upper/lower limit comparison weight

■ Discharging command for slave

This is valid in sequence mode when the discharge gate control setting is ON.

The discharging command is output to the slave.

This signal of the master is connected to the discharging command input signal of the slave, when double sequence control is performed by master and slave.

■ Weight error

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

* For error displays, see "13-2.Over scale/error display" on page 148.

■ Seq. error

The output turns on when a sequence error occurs.

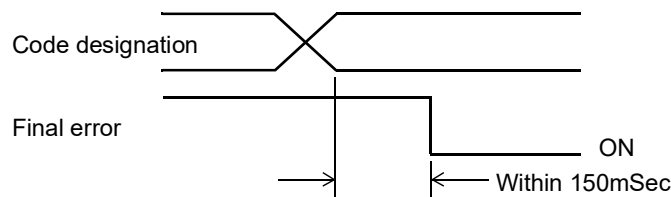
* For sequence errors, see "13-2.Over scale/error display" on page 148.

■ Final error

The output turns on when (final - compensation) $<$ 0.

The same operation is performed in both simple comparison and sequence modes.

Output timing



If the weighing start signal turns on when the final error is ON, the feed gate signals (SP1, SP2, and SP3) do not turn on but sequence error 5 results (in sequence mode).

■ Accumulation count error

The output turns on when the accumulation count reaches 9999.

The output turns off when the accumulation count less than 9999.

■ RUN

The output turns on during normal operation.

■ Discharge count error

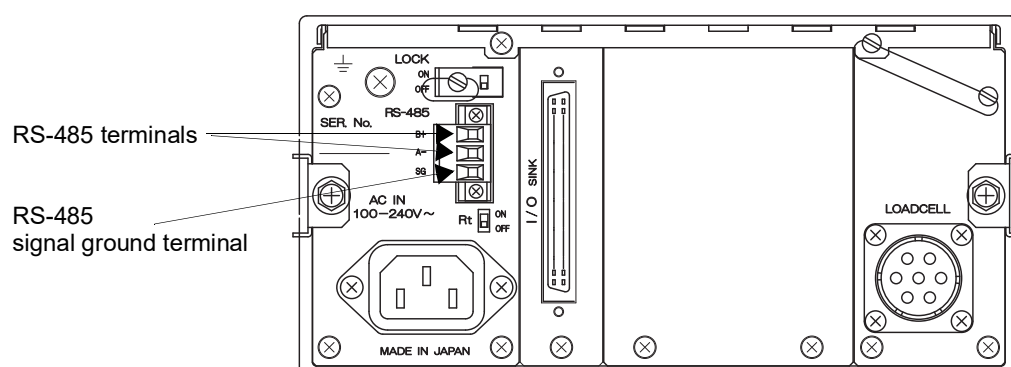
The output turns on when the discharge count reaches 99999.

The output turns off when the discharge count less than 99999.

11 INTERFACE

11-1. RS-485 interface

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



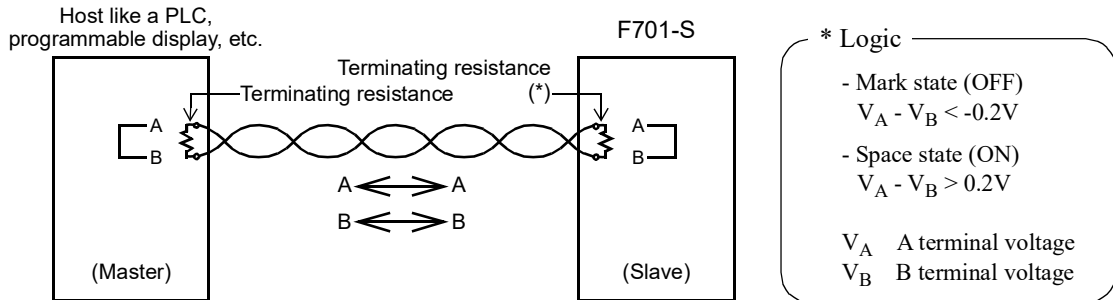
■ Communication specifications

■ Specifications

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 (8 bits for Modbus-RTU)
	Stop bit	1 or 2 bits selectable
	Parity bit	None, odd, or even selectable
Code:	Binary (for Modbus-RTU)	
	ASCII (for UNI-Format)	

■ RS-485 connection

■ Two-wire type (point to point)



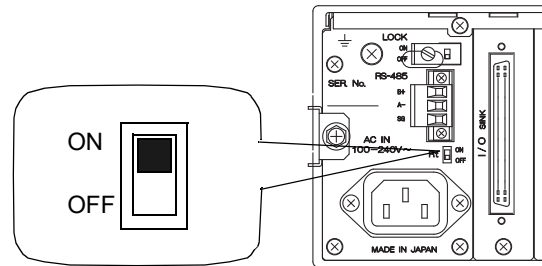
* The F701-S side terminating resistance (110Ω) can be switch-installable/uninstallable.

- 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-S side.
On the F701-S side, set the switch upward.

- The SG terminal is a ground terminal used in circuits (to protect the circuits).
If the F701-S 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.

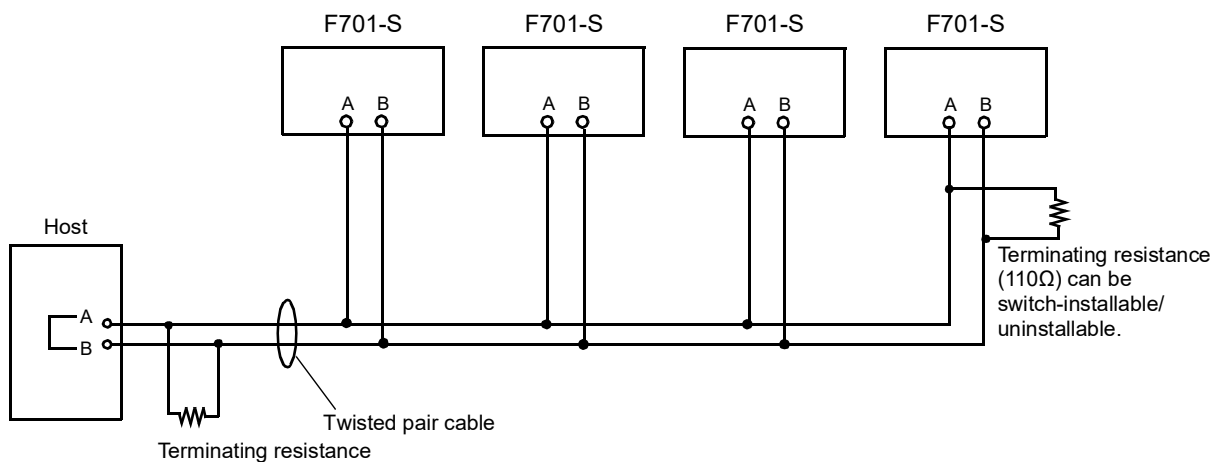
However, if there is a need to connect it according to the on-site situation, connect it after checking the specifications of the equipment on the other end.



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)

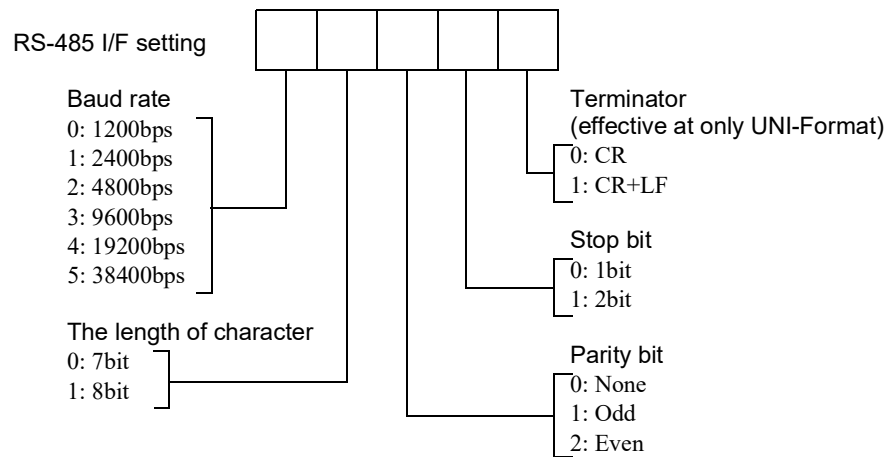


■ RS-485-related setting values

■ RS-485 I/F setting (setting mode 7-1)

1. Set the RS-485 port of this device.

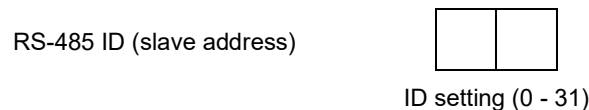
* If the communication type is Modbus-RTU, set as length of character: 8 bits and stop bit: 1 bit (stop bit: 2 bits if the parity bit is none).



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

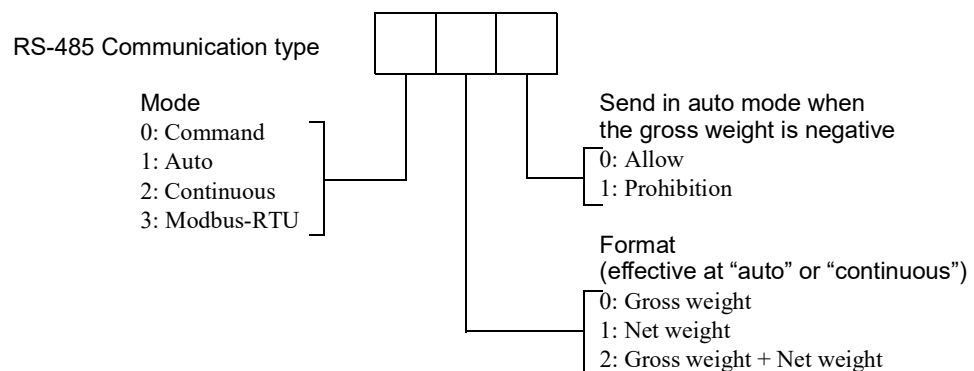
■ RS-485 ID (slave address for Modbus-RTU) (setting mode 7-3)

Input the ID setting.



■ RS-485 communication type (setting mode 7-2)

Set the RS-485 operation.



■ Communication type

- Communication type 0 (mode=0: Command)

Communication is performed with the command from the host computer.

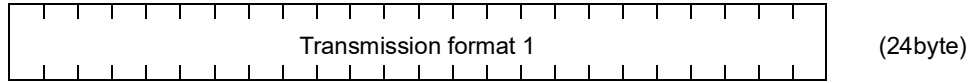
(Weight data is not transmitted automatically.)

Terminator is selectable from CR or CR + LF.

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

Gross weight is transmitted continuously.

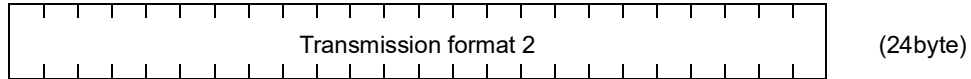
Various commands of R, W, and C are all ignored.



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

Net weight is transmitted continuously.

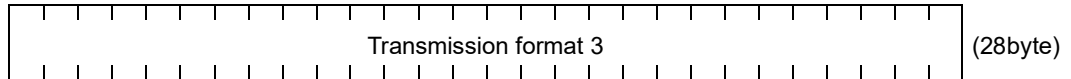
Various commands of R, W, and C are all ignored.



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

Gross weight and net weight are transmitted continuously.

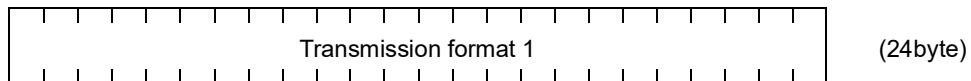
Various commands of R, W, and C are all ignored.



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

Gross weight is transmitted once with the timing of completion.

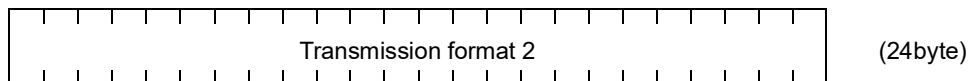
Various commands of R, W, and C are all ignored.



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

Net weight is transmitted once with the timing of completion.

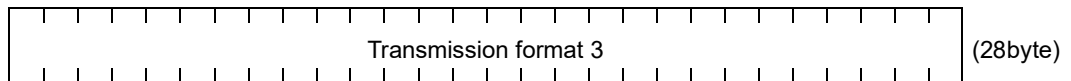
Various commands of R, W, and C are all ignored.



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

Gross weight and net weight are transmitted once with the timing of completion.

Various commands of R, W, and C are all ignored.



- 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 "■ Continuous and auto transmission formats" on page 104.

**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 types 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.

■ Send in auto mode when the gross weight is negative

Select whether or not to allow transmission in auto mode when the gross weight is negative.

* This setting is valid only when the communication mode setting is auto and the communication format setting is "0: Gross weight" or "2: Gross weight + net weight".

■ UNI-Format commands

■ Command communication formats

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

Host

N	O			R	A	CR
---	---	--	--	---	---	----

IDNo.	
-------	--

F701-S

IDNo.	
-------	--

I	D			R	A	+	1	0	0	.	0	0	CR	LF
---	---	--	--	---	---	---	---	---	---	---	---	---	----	----

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

Host

N	O			R	B	CR
---	---	--	--	---	---	----

IDNo.	
-------	--

F701-S

IDNo.	
-------	--

I	D			R	B	+	1	0	0	.	0	0	CR	LF
---	---	--	--	---	---	---	---	---	---	---	---	---	----	----

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

Host

N	O			R	C	CR
---	---	--	--	---	---	----

IDNo.	
-------	--

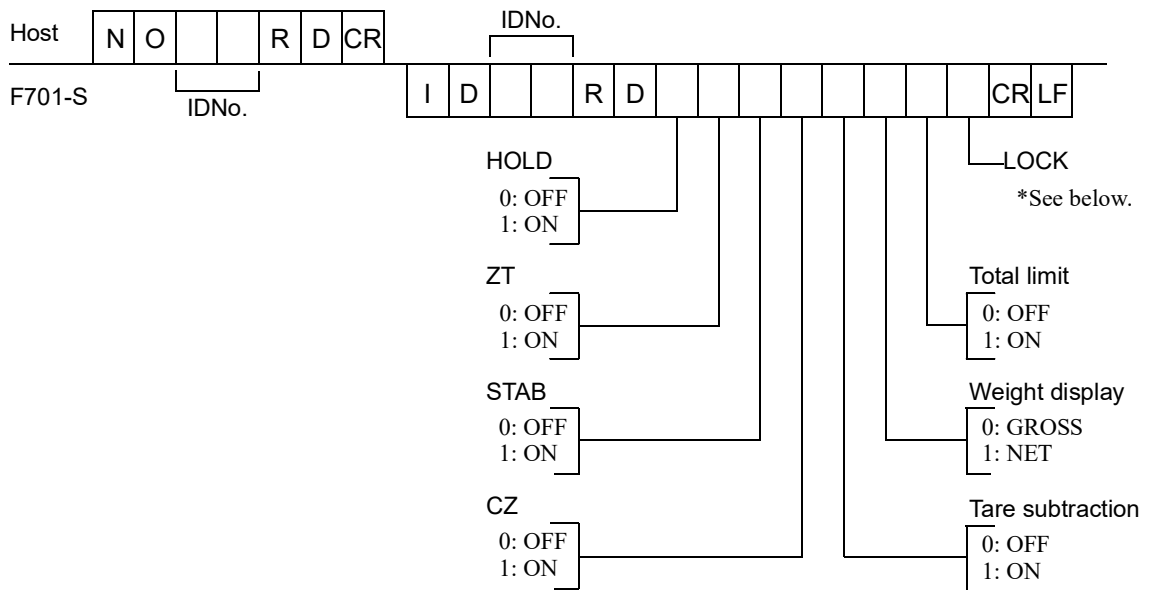
F701-S

IDNo.	
-------	--

I	D			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).

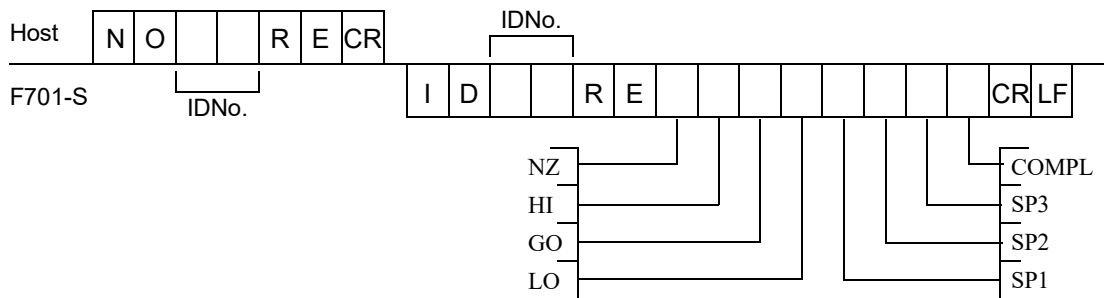
- Read status 1 (8-digit)



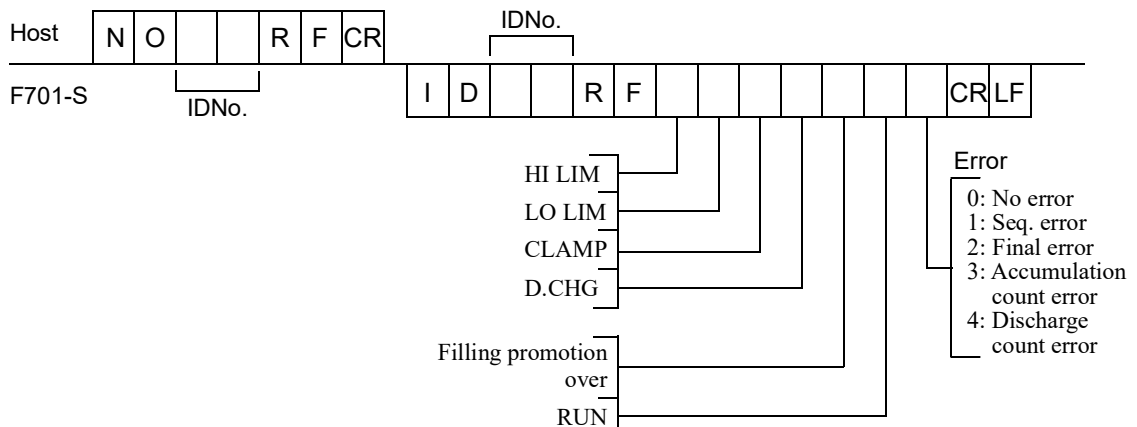
* LOCK

- 0: LOCK (SW), Lock1 (soft), and Lock2 (soft) are all OFF.
- 1: Only LOCK (SW) is ON.
- 2: Only Lock1 (soft) is ON.
- 3: Only Lock2 (soft) is ON.
- 4: LOCK (SW) and Lock1 (soft) are both ON.
- 5: LOCK (SW) and Lock2 (soft) are both ON.
- 6: Lock1 (soft) and Lock2 (soft) are both ON
- 7: LOCK (SW), Lock1 (soft), and Lock2 (soft) are all ON.

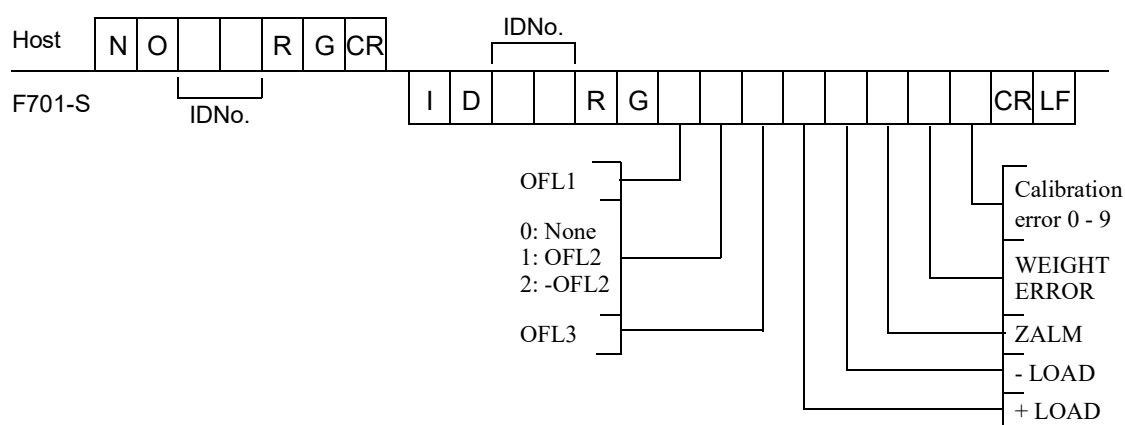
- Read status 2 (8-digit)



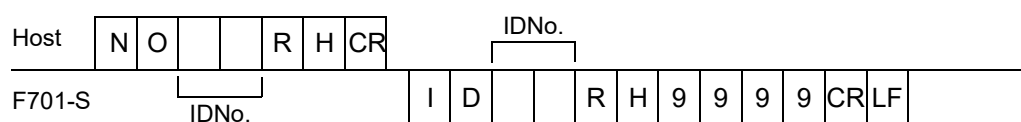
- Read status 3 (7-digit)



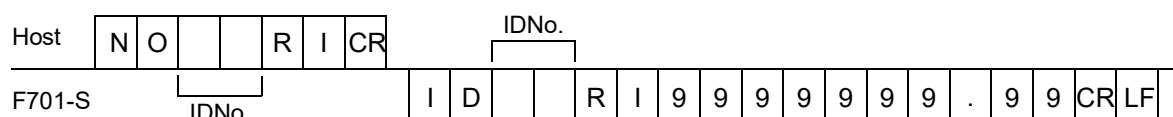
- Read status 4 (8-digit)



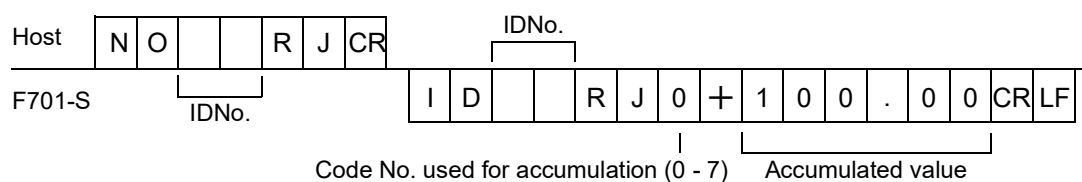
- Read the accumulation count (4-digit count)



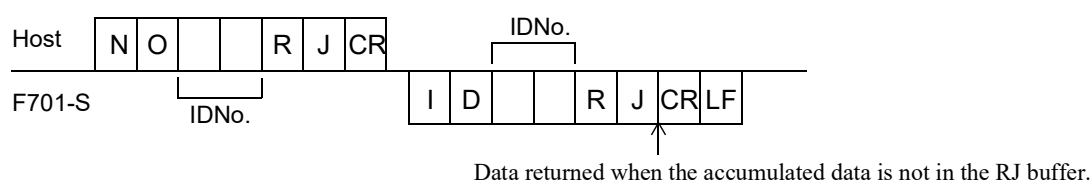
- Read the accumulation value (9-digit accumulation, decimal point)



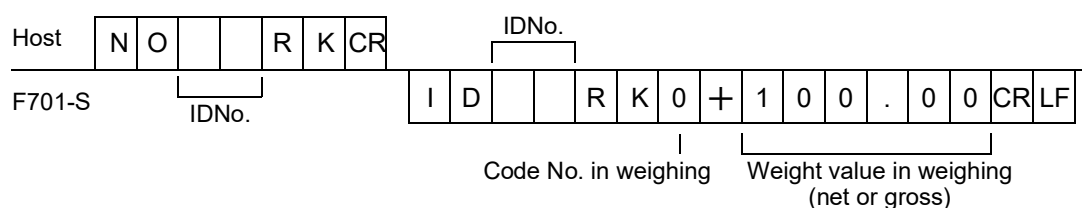
- Read the accumulation data (code, 5-digit weight, decimal point)



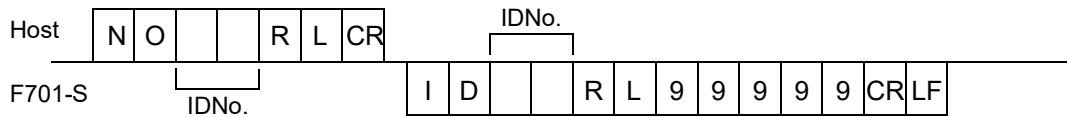
* Up to 256 data can be stored in the buffer (RJ buffer) in memory, and clears data in the order of their occurrence from reading data.



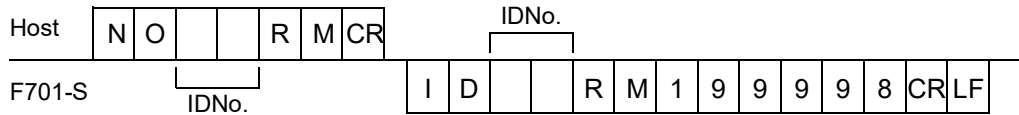
- Read the weighing data (code, 5-digit weight, decimal point)



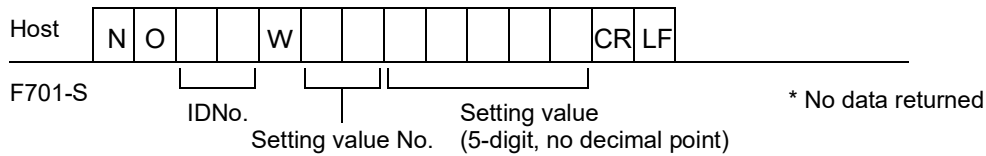
- Read the discharge count (5-digit count)



- Read the total discharge count (6-digit count)

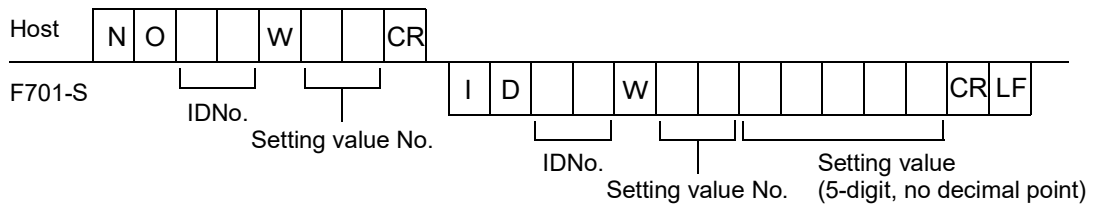


- Write the setting value



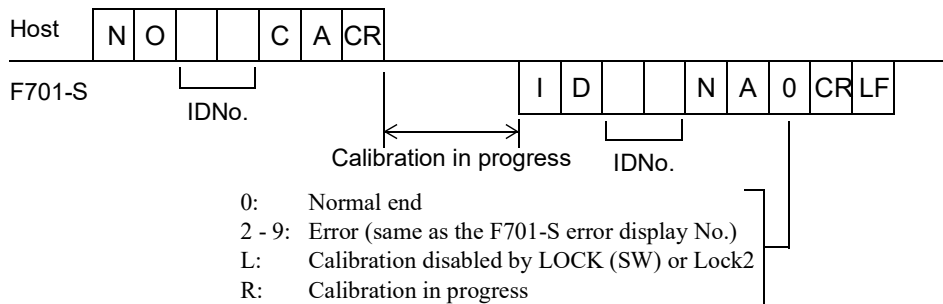
* For setting value No., see "■Setting value communication formats" on page 102.

- Read the setting value

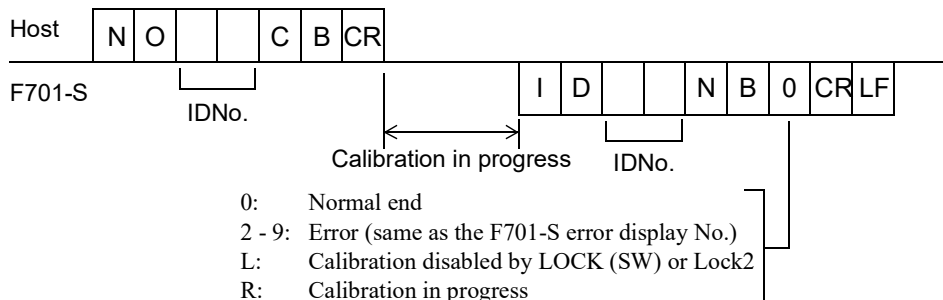


* For setting value No., see "■Setting value communication formats" on page 102.

- Zero calibration



- Span calibration



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-S IDNo. * No data returned

- Display switching; net weight

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

F701-S IDNo. * No data returned

- One-touch tare subtraction

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

F701-S IDNo. * No data returned

- One-touch tare subtraction reset

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

F701-S IDNo. * No data returned

- Digital zero

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

F701-S IDNo. * No data returned

- Digital zero reset

Host	N	O			C	H	CR
------	---	---	--	--	---	---	----

F701-S IDNo. * No data returned

- Hold ON

Host	N	O			C	I	CR
------	---	---	--	--	---	---	----

F701-S IDNo. * No data returned

- Hold OFF

Host	N	O			C	J	CR
------	---	---	--	--	---	---	----

F701-S							
--------	--	--	--	--	--	--	--

IDNo. * No data returned

- Accumulation clear

Host	N	O			C	K	CR
------	---	---	--	--	---	---	----

F701-S							
--------	--	--	--	--	--	--	--

IDNo. * No data returned

* Accumulation data on the selected weighing code are cleared.

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

- Accumulation data all clear (clearing eight codes of accumulation data)

Host	N	O			C	L	CR
------	---	---	--	--	---	---	----

F701-S							
--------	--	--	--	--	--	--	--

IDNo. * No data returned

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

- Accumulation command

Host	N	O			C	M	CR
------	---	---	--	--	---	---	----

F701-S							
--------	--	--	--	--	--	--	--

IDNo. * No data returned

- Allow operate ON

Host	N	O			C	N	1	CR
------	---	---	--	--	---	---	---	----

F701-S							
--------	--	--	--	--	--	--	--

IDNo. * No data returned

- Allow operate OFF

Host	N	O			C	N	2	CR
------	---	---	--	--	---	---	---	----

F701-S							
--------	--	--	--	--	--	--	--

IDNo. * No data returned

- Weighing start ON

Host	N	O			C	N	3	CR
------	---	---	--	--	---	---	---	----

F701-S							
--------	--	--	--	--	--	--	--

IDNo. * No data returned

- Weighing start OFF

Host	N	O			C	N	4	CR
------	---	---	--	--	---	---	---	----

F701-S							
--------	--	--	--	--	--	--	--

IDNo. * No data returned

- Stop ON

Host	N	O			C	N	5	CR
------	---	---	--	--	---	---	---	----

F701-S IDNo. * No data returned

- Stop OFF

Host	N	O			C	N	6	CR
------	---	---	--	--	---	---	---	----

F701-S IDNo. * No data returned

- Discharging command

Host	N	O			C	N	7	CR
------	---	---	--	--	---	---	---	----

F701-S IDNo. * No data returned

- Manually discharge

Host	N	O			C	N	8	CR
------	---	---	--	--	---	---	---	----

F701-S IDNo. * No data returned

- Open discharge gate ON

Host	N	O			C	N	9	CR
------	---	---	--	--	---	---	---	----

F701-S IDNo. * No data returned

- Open discharge gate OFF

Host	N	O			C	N	A	CR
------	---	---	--	--	---	---	---	----

F701-S IDNo. * No data returned

- Close discharge gate ON

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

F701-S IDNo. * No data returned

- Close discharge gate OFF

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

F701-S IDNo. * No data returned

■ Setting value communication formats

These are used for reading and writing setting values.

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

Setting code

N	O			W	0	0	0	0	0	0	0	C	R	L	F
---	---	--	--	---	---	---	---	---	---	---	---	---	---	---	---

Weighing code

N	O			W	1	0	0	0	0	0	0	C	R	L	F
---	---	--	--	---	---	---	---	---	---	---	---	---	---	---	---

Upper limit

N	O			W	0	1						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied)

Lower limit

N	O			W	0	2						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied)

Near zero

N	O			W	0	3						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied)

Set point 1

N	O			W	0	4						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Set point 2

N	O			W	0	5						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Compensation

N	O			W	0	6	0					C	R	L	F
---	---	--	--	---	---	---	---	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Over

N	O			W	0	7	0					C	R	L	F
---	---	--	--	---	---	---	---	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Under

N	O			W	0	8	0					C	R	L	F
---	---	--	--	---	---	---	---	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Final

N	O			W	0	9						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Comparison inhibit time

N	O			W	1	1	0	0				C	R	L	F
---	---	--	--	---	---	---	---	---	--	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) is applied)

Judging time

N	O			W	1	2	0	0	0			C	R	L	F
---	---	--	--	---	---	---	---	---	---	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) is applied)

Complete output time

N	O			W	1	3	0	0	0			C	R	L	F
---	---	--	--	---	---	---	---	---	---	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) is applied)

Compensation feeding time

N	O			W	1	4	0	0				C	R	L	F
---	---	--	--	---	---	---	---	---	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Auto free fall compensation regulation

N	O			W	1	5						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Weighing function 1

N	O			W	1	6	0					C	R	L	F
---	---	--	--	---	---	---	---	--	--	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) is applied)

Weighing function 2

N	O			W	1	7						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) is applied)

Tare setting

N	O			W	1	8						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied)

Digital low pass filter

N	O			W	2	1	0	0	0	0		C	R	L	F
---	---	--	--	---	---	---	---	---	---	---	--	---	---	---	---

(write-inhibited when LOCK2 (soft) is applied)

Moving average filter

N	O			W	2	2	0	0				C	R	L	F
---	---	--	--	---	---	---	---	---	--	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) is applied)

Motion detection (period - range)

N	O			W	2	3			0			C	R	L	F
---	---	--	--	---	---	---	--	--	---	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) and LOCK (SW) are applied)

Zero tracking (period)

N	O			W	2	4	0	0	0			C	R	L	F
---	---	--	--	---	---	---	---	---	---	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) and LOCK (SW) are applied)

Zero tracking (range)

N	O			W	2	5	0					C	R	L	F
---	---	--	--	---	---	---	---	--	--	--	--	---	---	---	---

(write-inhibited when LOCK2 (soft) and LOCK (SW) are applied)

Total comparison selection

N	O			W	2	6	0	0	0	0		C	R	L	F
---	---	--	--	---	---	---	---	---	---	---	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Total limit (high 4)

N	O			W	2	7	0					C	R	L	F
---	---	--	--	---	---	---	---	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Total limit (under 5)

N	O			W	2	8						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

Count limit

N	O			W	2	9	0					C	R	L	F
---	---	--	--	---	---	---	---	--	--	--	--	---	---	---	---

(write-inhibited when LOCK1 (soft) is applied) (for each code)

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

N	O			W	3	1	0	0				CR	LF
---	---	--	--	---	---	---	---	---	--	--	--	----	----

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

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

N	O			W	3	4	0	0	0			CRLF
---	---	--	--	---	---	---	---	---	---	--	--	------

N	O			W	3	5	0					CR	LF
---	---	--	--	---	---	---	---	--	--	--	--	----	----

N	O			W	3	6	0	0	0			CR	LF
---	---	--	--	---	---	---	---	---	---	--	--	----	----

N	O			W	3	7	0	0	0			CR	LF
---	---	--	--	---	---	---	---	---	---	--	--	----	----

N	O			W	3	8			0			C	R	L	F
---	---	--	--	---	---	---	--	--	---	--	--	---	---	---	---

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

N	O			W	4	2	0	0	0			C	R	L	F
---	---	--	--	---	---	---	---	---	---	--	--	---	---	---	---

N	O			W	4	3	0	0	0			C	R	L	F
---	---	--	--	---	---	---	---	---	---	--	--	---	---	---	---

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

N	O			W	4	5	0	0	0			CR	LF
---	---	--	--	---	---	---	---	---	---	--	--	----	----

```

N O      W 4 6      CR LF

```

N	O			W	4	7	0	0					C	R	L	F
---	---	--	--	---	---	---	---	---	--	--	--	--	---	---	---	---

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

N	O			W	5	1						CR	LF
---	---	--	--	---	---	---	--	--	--	--	--	----	----

N	O			W	5	2						CR	LF
---	---	--	--	---	---	---	--	--	--	--	--	----	----

N	O			W	6	1							C	R	L	E
---	---	--	--	---	---	---	--	--	--	--	--	--	---	---	---	---

N	O			W	6	2						C	R	L	F
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---	---

N	O			W	6	3	0	0	0			CRLF
---	---	--	--	---	---	---	---	---	---	--	--	------

N	O			W	6	4	0						C	B	E
---	---	--	--	---	---	---	---	--	--	--	--	--	---	---	---

N	O			W	6	5						C	B	E
---	---	--	--	---	---	---	--	--	--	--	--	---	---	---

N	O			W	6	6					CBI	E
---	---	--	--	---	---	---	--	--	--	--	-----	---

N	O			W	6	7					CRIE
---	---	--	--	---	---	---	--	--	--	--	------

N	O			W	6	8					CRIE
---	---	--	--	---	---	---	--	--	--	--	------

N	O			W	6	9	0	0	0	0		C	B	E
---	---	--	--	---	---	---	---	---	---	---	--	---	---	---

ID No. Setting value No. Setting value up to 5 digits

103

Equivalent calibration

N	O			W	7	2					CRLF
---	---	--	--	---	---	---	--	--	--	--	------

(write-inhibited when LOCK2 (soft) and LOCK (SW) are applied)

D/A output mode

N	O			W	7	7	0	0	0	0		CR	LF
---	---	--	--	---	---	---	---	---	---	---	--	----	----

(write-inhibited when LOCK2 (soft) is applied)

D/A zero output weight

N	O			W	7	8						CRLF
---	---	--	--	---	---	---	--	--	--	--	--	------

(write-inhibited when LOCK2 (soft) is applied)

D/A full scale value

N	O			W	7	9						CRLF
---	---	--	--	---	---	---	--	--	--	--	--	------

(write-inhibited when LOCK2 (soft) is applied)

BCD data updata rate

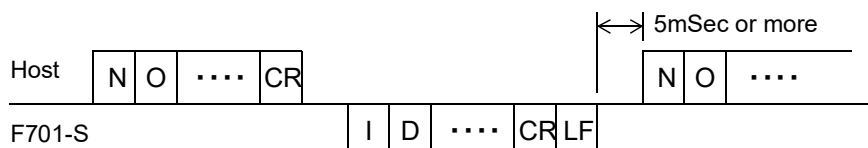
N	O			W	8	1	0	0	0	0		CRLF
---	---	--	--	---	---	---	---	---	---	---	--	------

(write-inhibited when LOCK2 (soft) is applied)

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

Attention

- After receiving a response from the F701-S, 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.

■ UNI-Format (continuous, auto)

■ Continuous and auto transmission formats

- Transmission 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			,	*1	,	*2	,	*3	,	*4	,	*5	,	±								CRLF

HEADER ID

Sign
+ or -

5-digit gross weight + decimal point

- Transmission format 2

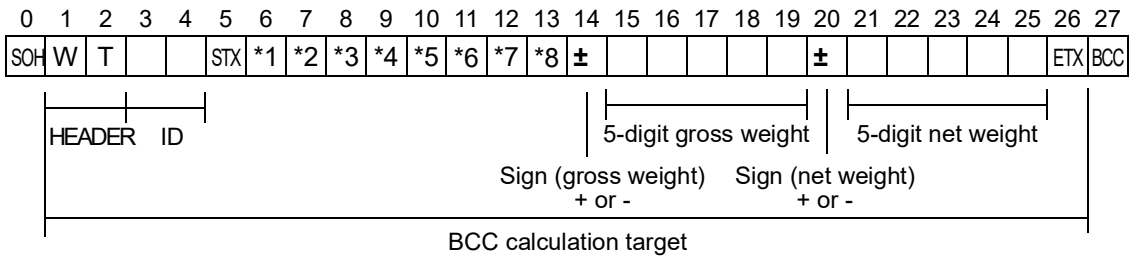
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
N	T			,	*1	,	*2	,	*3	,	*4	,	*5	,	±								CR	LF

HEADER ID

Sign
+ or -

5-digit net weight + decimal point

- Transmission format 3



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)
- *4** H : Over ON
L : Under ON
G : Over and under OFF
F : Comparison OFF

Order of priority: (H or L), F > G
- *7** Unit display
0 : None 3 : kg
1 : t 4 : lb
2 : g
- *2** A : Zero tracking OFF
T : Zero tracking ON
Z : Zero alarm (ZALM)

Order of priority: Z > (A or T)
- *5** 0 : SP1, SP2, SP3, complete OFF
1 : SP1 ON
2 : SP2 ON
3 : SP3 ON
C : Complete ON

Order of priority: C > 3 > 2 > 1 > 0
- *8** Decimal place
0 : None
1 : 0.0
2 : 0.00
3 : 0.000
- *3** H : Upper limit ON
L : Lower limit ON
G : Upper limit and lower limit OFF
N : Upper limit and lower limit ON
F : Comparison OFF

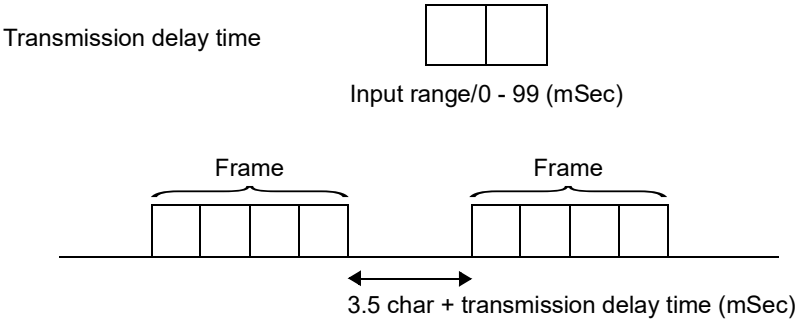
Order of priority: N, F > (H or L) > G
- *6** N : Near zero OFF
Z : Near zero ON

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

■ Modbus-RTU

■ Transmission delay time (setting mode 7-4)

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



■ 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	[Response]	Function	01
	Start address; higher	00		Number of data bytes	01
	Start address; lower	04		Digital zero	00
	Number of coils; higher	00			
	Number of coils; lower	01			

Keep in mind that the relative address for reading the digital zero value is 0x04.

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

* The F701-S response (coil state) is always "0" (because processing is executed at the stage of reading the command).

To confirm coil execution, judge as complete with a normal response to function code 05 (0x05) Write signal coil or 15 (0x0F) Write multiple coils.

02 (0x02) Read discrete inputs

ON/OFF states of slave input statuses are read.

No broadcast can be specified.

Specify the status start address and number of statuses.

[Request]	Function	1 byte	0x02
	Start address	2 bytes	0x0000 - 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 HI LIM (address 10001) to SP3 (address 10008).

[Request]	Function	02	[Response]	Function	02
	Start address; higher	00		Number of data bytes	01
	Start address; lower	00		HI LIM - SP3	E8
	Number of statuses; higher	00			
	Number of statuses; lower	08			

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

The example shows the case where the F701-S conditions are as follows:

HI LIM	OFF (0)
LO LIM	OFF (0)
HI	OFF (0)
GO	ON (1)
LO	OFF (0)
SP1	ON (1)
SP2	ON (1)
SP3	ON (1)

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

It is expressed as 11101000 (0xE8) in binary notation.

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

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

03 (0x03) Read holding registers

Contents of slave holding registers are read.

No broadcast can be specified.

Specify the holding register start address and number of registers.

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

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

[Request]	Function	1 byte	0x03
	Start address	2 bytes	0x0000 - 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 40063) to over (address 40064).

[Request]	Function	03	[Response]	Function	03
	Start address; higher	00		Number of data bytes	04
	Start address; lower	3E		Compensation; higher	00
	Number of registers; higher	00		Compensation; lower	64
	Number of registers; lower	02		Over; higher	00
				Over; lower	32

Keep in mind that the relative address for reading the compensation value is 0x3E.

The example shows the case where the F701-S 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 30005 - 30006).

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

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

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

Weight status	Code	OFF (0)
	Unused	OFF (0)
	Unused	OFF (0)
	OVER	OFF (0)
	1/4 scale 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.

* When rewriting the coil that set the signal is ON level or OFF level, make sure to pre-set the priority of level input signal (setting mode 6-5) to "1: Communication priority".

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

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

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

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

06 (0x06) Write single register

A slave holding register is changed (rewritten).

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

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

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

[Request]	Function	1 byte	0x06
	Start address	2 bytes	0x0000 - 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 40063) value to 20 (0x0014).

[Request]	Function	06	[Response]	Function	06
	Start address; higher	00		Start address; higher	00
	Start address; lower	3E		Start address; lower	3E
	Compensation; higher	00		Compensation; higher	00
	Compensation; lower	14		Compensation; lower	14

Keep in mind that the relative address for writing in the compensation is 0x3E.

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 40061 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.

* When rewriting the coil that set the signal is ON level or OFF level, make sure to pre-set the priority of level input signal (setting mode 6-5) to "1: Communication priority".

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

Keep in mind that the relative address for writing in digital zero is 0x04.

The example shows rewriting of the F701-S ON (1)/OFF (0) as follows:

Fill unused bits with "0".

Coil	00012	00011	00010	Accumulation 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 from 00009 to 00011
- Addresses from 00012 to 00023
- Addresses from 00025 to 00027

16 (0x10) Write multiple registers

On slave holding registers, data is changed by the specified number from the specified address. If broadcast (0) is specified, all slave holding registers of the same address are rewritten. To request, specify the register address and the number of registers and data to change. The slave transmits the contents of one register as expanded in double bytes.

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

[Request]

Function	1 byte	0x10
Start address	2 bytes	0x0000 - 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 complete output time (address 40071) to 20 (0x0014) and digital low pass filter to 5Hz (*) in the 16-bit wide integer data area.

* Select the F701-S 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	46
Register; higher	00
Register; lower	02
Number of data bytes	04
Complete output time; higher	00
Complete output time; lower	14
Digital low pass filter; higher	00
Digital low pass filter; lower	05

[Response]

Function	10
Start address; higher	00
Start address; lower	46
Register; higher	00
Register; lower	02

Keep in mind that the relative address for writing in complete output time is 0x46.

Example 2) Change the upper limit (address 40011 - 40012) to 99999 (0x0001869F) and the lower limit (address 40013 - 40014) to 5000 (0x00001388) in the 32-bit wide integer data area.

[Request]	Function	10	[Response]	Function	10
	Start address; higher	00		Start address; higher	00
	Start address; lower	0A		Start address; lower	0A
	Register; higher	00		Register; higher	00
	Register; lower	04		Register; lower	04
	Number of data bytes	08			
	Upper limit (higher); higher	00			
	Upper limit (higher); lower	01			
	Upper limit (lower); higher	86			
	Upper limit (lower); lower	9F			
	Lower limit (higher); higher	00			
	Lower limit (higher); lower	00			
	Lower limit (lower); higher	13			
	Lower limit (lower); lower	88			

Keep in mind that the relative address for writing in upper limit is 0x0A.

* 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-S)
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-S)
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-S is fixed in Stop-on-error mode.)

17 (0x11) Report slave ID

Each slave returns operation mode, current conditions, etc.

The contents of the response vary with products.

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

*Slave ID is different from address.

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

Example) Read slave ID.

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

* Version information is expressed in 3 bytes.

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

08 (0x08) Diagnostic code

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

What are checked vary with subfunctions added after usual functions.

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

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

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

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

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

List of subfunction codes

Code	Function name	Command
00 (0x0000)	Return query data	Echo request
01 (0x0001)	Restart communications option	Initialize the communication port
02 (0x0002)	Return diagnostic register	Echo request
03 (0x0003)	Change ASCII input delimiter	—
04 (0x0004)	Force listen only mode	Receive-only mode
05 - 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-S.

* 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-S)

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-S)

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-S)

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 54.
(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

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

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	Accumulation data all clear	
	00011	Accumulation command	
	00012	Allow operate ON	
	00013	Allow operate OFF	
	00014	Weighing start ON	
	00015	Weighing start OFF	
	00016	Stop ON	
	00017	Stop OFF	
	00018	Discharging command	
	00019	Manually discharge	
	00020	Open discharge gate ON	
	00021	Open discharge gate OFF	
	00022	Close discharge gate ON	
	00023	Close discharge gate OFF	
	00024	Reserve (no assignments)	
	00025	Zero calibration	
	00026	Span calibration (actual load calibration)	
	00027	Span calibration (equivalent calibration)	
	00028	Reserved area (can not be used)	
	—		
	00036		
	00037	Reserve (no assignments)	
	—		
	09999		
Input status 1XXXX	10001	HI LIM	B1
	10002	LO LIM	
	10003	HI	
	10004	GO	
	10005	LO	
	10006	SP1	
	10007	SP2	
	10008	SP3	
	10009	NEAR ZERO	
	10010	COMPL.	
	10011	CLAMP	
	10012	D.CHG	
	10013	Filling promotion over	
	10014	TOTAL LIMIT	

Input status 1XXXX	10015	STAB	B1	
	10016	HOLD		
	10017	RUN		
	10018	TARE		
	10019	G/N (NET: ON)		
	10020	WEIGHT ERROR		
	10021	ZALM		
	10022	SEQ. ERROR		
	10023	Final error		
	10024	Accumulation count error		
	10025	ZERO TRACKING		
	10026	Lock1 (setting)		
	10027	Lock2 (setting)		
	10028	LOCK (SW)		
	10029	Discharge count error		
10030	Reserve (no assignments)			
—				
19999				
Input register 3XXXX	30001	Status 1	—	I16
	30002	Status 2		
	30003	Status 3		
	30004	RESERVE		
	30005	Gross weight (higher)	*1 No decimal point	I32
	30006	Gross weight (lower)		
	30007	Net weight (higher)		
	30008	Net weight (lower)		
	30009	Tare (higher)		
	30010	Tare (lower)		
	30011	Reserve (no assignments)		
	—			
	39999			

Data type	Address	Data name	Data format		For each code
Holding register 4XXXX	40001	Set point 1 (higher)	Unsigned No decimal point	I32	⊙
	40002	Set point 1 (lower)			
	40003	Set point 2 (higher)			⊙
	40004	Set point 2 (lower)			
	40005	Final (higher)			⊙
	40006	Final (lower)			
	40007	Auto free fall compensation regulation (higher)			⊙
	40008	Auto free fall compensation regulation (lower)			
	40009	Total limit (higher)			⊙
	40010	Total limit (lower)			
	40011	Upper limit (higher)			
	40012	Upper limit (lower)			
	40013	Lower limit (higher)			
	40014	Lower limit (lower)			

Holding register 4XXXX	40015	Near zero (higher)	Unsigned No decimal point	I32	
	40016	Near zero (lower)			
	40017	Weighing function 1 (higher)			
	40018	Weighing function 1 (lower)			
	40019	Weighing function 2 (higher)			
	40020	Weighing function 2 (lower)			
	40021	Tare setting (higher)			
	40022	Tare setting (lower)			
	40023	Key invalid · LOCK (higher)			
	40024	Key invalid · LOCK (lower)			
	40025	Sequence mode 1 (higher)			
	40026	Sequence mode 1 (lower)			
	40027	Filling promotion weight (higher)			
	40028	Filling promotion weight (lower)			
	40029	Extended function selection 1 (higher)			
	40030	Extended function selection 1 (lower)			
	40031	Extended function selection 2 (higher)			
	40032	Extended function selection 2 (lower)			
	40033	Balance weight value (higher)			
	40034	Balance weight value (lower)			
	40035	Capacity (higher)			
	40036	Capacity (lower)			
	40037	Display selection 1 (higher)			
	40038	Display selection 1 (lower)			
	40039	Gravitational acceleration (higher)			
	40040	Gravitational acceleration (lower)			
	40041	Net over (higher)			
	40042	Net over (lower)			
	40043	Gross over (higher)			
	40044	Gross over (lower)			
	40045	Equivalent calibration (higher)			
	40046	Equivalent calibration (lower)			
	40047	D/A zero output weight (higher)			
	40048	D/A zero output weight (lower)			
	40049	D/A full scale value (higher)			
	40050	D/A full scale value (lower)			
	40051	Latest accumulation data (higher)			
	40052	Latest accumulation data (lower)			
	40053	Accumulation value (higher)			⊙
	40054	Accumulation value (lower)			⊙
	40055	Discharge count (higher)			⊙
	40056	Discharge count (lower)			⊙
	40057	Total discharge count (higher)			⊙
	40058	Total discharge count (lower)			⊙
	40059	Reserve (no assignments)			
	—				
	40060				
	40061	Weighing code	Unsigned No decimal point	I16	
	40062	Setting code			
	40063	Compensation			⊙
	40064	Over			⊙

Holding register 4XXXX	40065	Under	Unsigned No decimal point	I16	⊙
	40066	Compensation feeding time			⊙
	40067	Total comparison selection			⊙
	40068	Count limit			⊙
	40069	Comparison inhibit time			
	40070	Judging time			
	40071	Complete output time			
	40072	Digital low pass filter			
	40073	Moving average filter			
	40074	Motion detection (period - range)			
	40075	Zero tracking (period)			
	40076	Zero tracking (range)			
	40077	Weighing function 3			
	40078	Input selection 1			
	40079	Input selection 2			
	40080	Output selection 1			
	40081	Output selection 2			
	40082	Error output selection			
	40083	Reserve output selection			
	40084	Bag clamp output time			
	40085	Discharging time			
	40086	Weighing start time			
	40087	AZ times			
	40088	Judging times			
	40089	Sequence mode 2			
	40090	Min scale division			
	40091	DZ regulation value			
	40092	Display selection 2			
	40093	D/A output mode			
	40094	BCD data update rate			
	40095	Accumulation count	⊙		
	40096				
	—	Reserve (no assignments)			
	49999				

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

*1: For sign, see "*5: Gross weight, net weight, tare weight" on page 132.



Point

The address number used on a message is a relative address.
The relative address is calculated by the following equation.

$$\text{Relative address} = \text{Last 4 digits of address No.} - 1$$

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 on weighing code.
	Accumulation data all clear	Clears accumulation values on all codes.
	Accumulation command	Accumulates weight value. Makes accumulation on the code in weighing (weighing code).
	Allow operate ON *	Makes the allow operate signal ON-level.
	Allow operate OFF *	Makes the allow operate signal OFF-level.
	Weighing start ON *	Makes the weighing start signal ON-level.
	Weighing start OFF *	Makes the weighing start signal OFF-level.
	Stop ON *	Makes the stop signal ON-level.
	Stop OFF *	Makes the stop signal OFF-level.
	Discharging command	If this turns ON during weighing, discharge of the weighed object is allowed after completion of weighing. If this turns ON after completion of weighing, discharge of the weighed object is started.
	Manually discharge	Makes a shift to discharge processing at the ON edge.
	Open discharge gate ON *	Makes the open discharge gate signal ON-level.
	Open discharge gate OFF *	Makes the open discharge gate signal OFF-level.
	Close discharge gate ON *	Makes the close discharge gate signal ON-level.
	Close discharge gate OFF *	Makes the close discharge gate signal OFF-level.
	Zero calibration	Executes zero calibration.
	Span calibration (actual load calibration)	Executes span calibration (actual load calibration).
	Span calibration (equivalent calibration)	Executes equivalent calibration.
Input status	HI LIM	Indicates the state of the upper limit signal of the indicator. ON (1), OFF (0)
	LO LIM	Indicates the state of the lower limit 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.
	NEAR ZERO	Indicates the state of the NZ signal of the indicator.
	COMPL.	Indicates the state of the complete signal of the indicator.
	CLAMP	Indicates the state of the clamp signal of the indicator.
	D.CHG	Indicates the state of the discharge signal of the indicator.
	Filling promotion over	Indicates the state of the filling promotion over signal of the indicator.
	TOTAL LIMIT	Indicates the state of the total limit signal.
	STAB	Turns ON while weight value of the indicator is stable.
	HOLD	Turns ON while weight value is held.
	RUN	Indicates the state of the RUN signal of the indicator.
	TARE	Turns ON when tare subtraction is performed.
	G/N	Turns ON when the weight displayed by the indicator is net, and turns OFF when it is gross.

Input status	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).
	SEQ. ERROR	Turns ON when a sequence error is given.
	Final error	Turns ON when a final error is given.
	Accumulation count error	Turns ON when an accumulation count error is given.
	ZERO TRACKING	Turns ON while zero tracking of the indicator is in operation.
	Lock1 (setting)	Indicates the state of setting Lock1.
	Lock2 (setting)	Indicates the state of setting Lock2.
	LOCK (SW)	Indicates the state of LOCK SW.
	Discharge count error	Turns ON when a discharge count error is given.
Input register	Status 1	Shows abnormal condition. (*2)
	Status 2	Shows weighing condition. (*3)
	Status 3	Shows weighing condition. (*4)
	Gross weight (higher)	Shows gross weight. (-99999 to 99999) (*5)
	Gross weight (lower)	
	Net weight (higher)	Shows net weight. (-99999 to 99999) (*5)
	Net weight (lower)	
	Tare weight (higher)	Shows tare weight. (0 to 99999) (*5)
	Tare weight (lower)	
Holding register	Set point 1	Shows set point 1. (0 to 99999) *For each code
	Set point 2	Shows set point 2. (0 to 99999) *For each code
	Final	Shows final. (0 to 99999) *For each code
	Auto free fall compensation regulation	Shows auto free fall compensation regulation. (0 to 99999) *For each code
	Total limit	Shows total limit. (0 to 999999999) *For each code
	Upper limit	Shows upper limit. (0 to 99999)
	Lower limit	Shows lower limit. (0 to 99999)
	Near zero	Shows near zero. (0 to 99999)
	Weighing function 1	Shows weighing function 1.
	Weighing function 2	Shows weighing function 2.
	Tare setting	Shows tare weight. (0 to 99999)
	Key invalid · LOCK	Shows key invalid · LOCK.
	Sequence mode 1	Shows sequence mode 1.
	Filling promotion weight	Shows filling promotion weight. (0 to 99999)
	Extended function selection 1	Shows extended function selection 1.
	Extended function selection 2	Shows extended function selection 2.
	Balance weight value	Shows balance weight value. (0 to 99999)
	Capacity	Shows capacity. (1 to 99999)
	Display selection 1	Shows display selection 1.
	Gravitational acceleration	Shows 4 digits after decimal point of gravitational acceleration. (9. <u>7500</u> to 9. <u>8500</u>)
	Net over	Shows net over. (0 to 99999)
	Gross over	Shows gross over. (0 to 99999)
	Equivalent calibration	Shows equivalent calibration value. (0.1 to 3.2000)
	D/A zero output weight	Shows D/A zero output weight. (0 to 99998)
	D/A full scale value	Shows D/A full scale value. (1 to 99999)
	Latest accumulation data	Shows latest accumulation data. (read only) (0 to 99999)
	Accumulation value	Shows accumulation value. (read only) (0 to 999999999) *For each code
	Discharge count	Shows discharge count. (read only) (0 to 99999) *For each code
	Total discharge count	Shows total discharge count of master and slave. (read only) (0 to 199998) *For each code
	Weighing code	Shows weighing code No. (0 to 7)

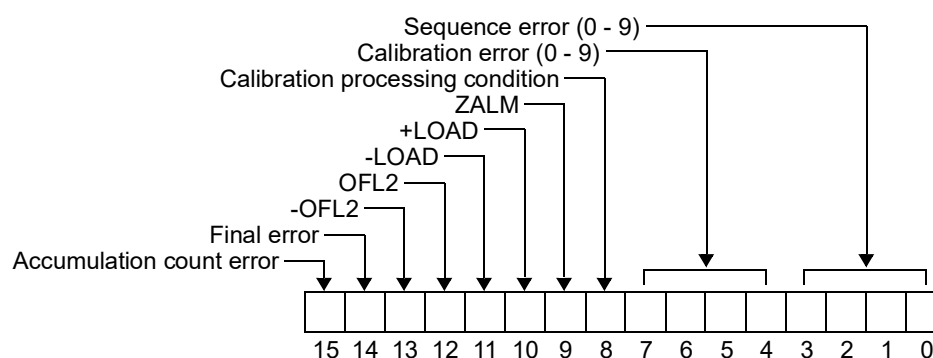
Holding register	Setting code	Shows setting code No. (0 to 7)
	Compensation	Shows compensation. (0 to 9999) *For each code
	Over	Shows over. (0 to 9999) *For each code
	Under	Shows under. (0 to 9999) *For each code
	Compensation feeding time	Shows compensation feeding time. (0 to 999) *For each code
	Total comparison selection	Shows total comparison selection. (0 to 2) *For each code
	Count limit	Shows count limit. (0 to 9999) *For each code
	Comparison inhibit time	Shows comparison inhibit time. (0 to 999)
	Judging time	Shows judging time. (0 to 99)
	Complete output time	Shows complete output time. (0 to 99)
	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 *6)
	Zero tracking (period)	Shows zero tracking (period). (0 to 99)
	Zero tracking (range)	Shows zero tracking (range). (0 to 9999)
	Weighing function 3	Shows weighing function 3.
	Input selection 1	Shows input selection 1.
	Input selection 2	Shows input selection 2.
	Output selection 1	Shows output selection 1.
	Output selection 2	Shows output selection 2.
	Error output selection	Shows error output selection.
	Reserve output selection	Shows reserve output selection. (*7)
	Bag clamp output time	Shows bag clamp output time. (0 to 99)
	Discharging time	Shows discharging time. (0 to 99)
	Weighing start time	Shows weighing start time. (0 to 99)
	AZ times	Shows AZ times. (0 to 99)
	Judging times	Shows judging times. (0 to 99)
	Sequence mode 2	Shows sequence mode 2.
	Min scale division	Shows min scale division. (1 to 50)
	DZ regulation value	Shows DZ regulation value. (0 to 9999)
	Display selection 2	Shows display selection 2. (0 to 1)
	D/A output mode	Shows D/A output mode. (0 to 3)
	BCD data update rate	Shows BCD data update rate. (0 to 7)
	Accumulation count	Shows accumulation count. (read only) (0 to 9999) *For each code

*: These data are valid when the priority of level input signal (setting mode 4-7) setting is "1: Communication priority".

*1: WEIGHT ERROR

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

*2: Status 1 (abnormal condition)



- Accumulation count error, final error:

"1" when each status is ON.

* For the ON condition of each status, see [Input status] under "

■ About data" on page 127.

- -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.

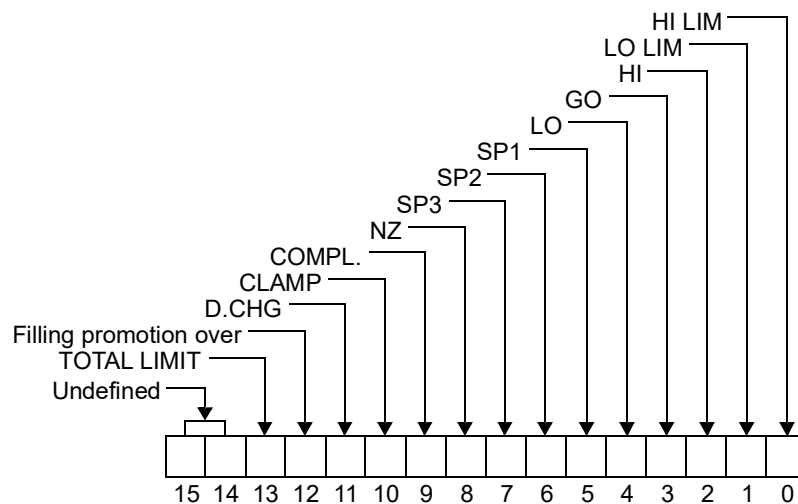
- Sequence error:

Shows the error No. of the sequence error that has occurred.

"0" means that no sequence error is given.

	Bit No.			
Seq. err	3	2	1	0
Cal. err	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

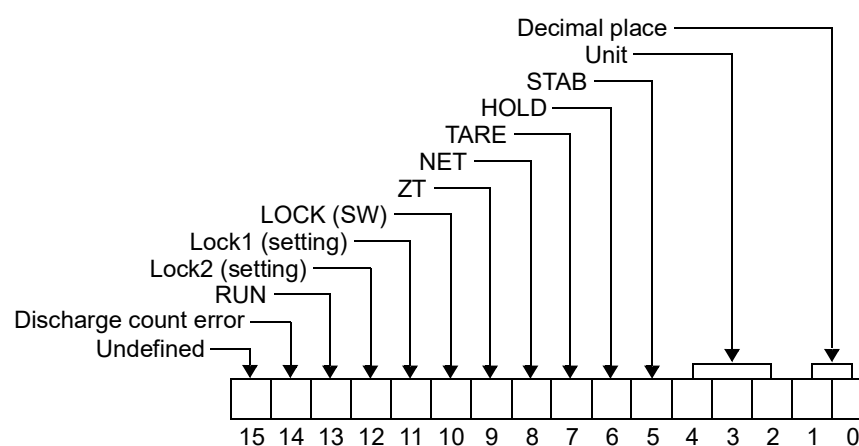
*3: Status 2 (weighing condition)



"1" when each status is ON.

* For the ON condition of each status, see [Input status] under "■ About data" on page 127.

*4: Status 3 (weighing condition)



- Discharge count error, RUN, ZT, TARE, HOLD, STAB:

"1" when each status is ON.

* For the ON condition of each status, see [Input status] under

"■ About data" on page 127.

- LOCK (SW):

"1" when LOCK SW is ON.

- Lock1 (setting):

"1" when setting Lock1 is ON.

- Lock2 (setting):

"1" when setting Lock2 is ON.

- NET:

0: Gross weight display, 1: Net weight display

- Unit:

Shows unit.

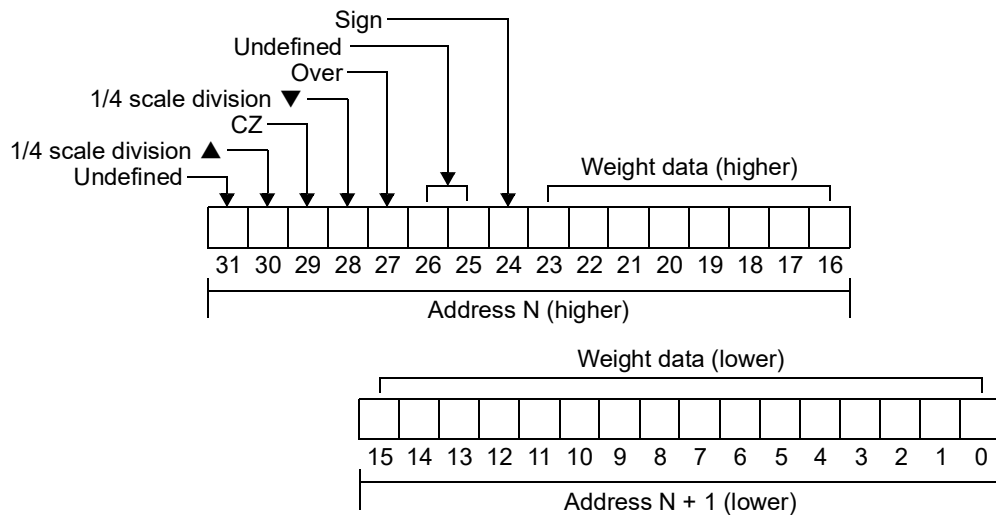
Unit	Bit No.		
	4	3	2
None	0	0	0
t	0	0	1
g	0	1	0
kg	0	1	1
lb	1	0	0

- Decimal place:

Shows decimal place.

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

*5: Gross weight, net weight, tare weight



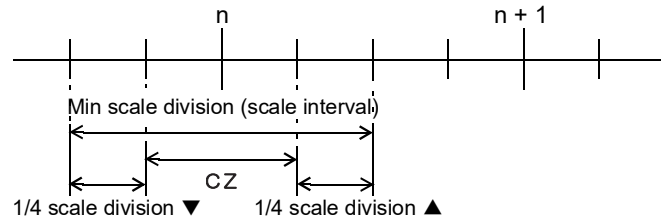
- 1/4 scale division ▲, CZ, 1/4 scale division ▼:

When 1/4 scale division (setting mode 6-5) is "0: OFF", CZ is

"1" at the true zero point (weight $0 \pm 1/4$ scale division).

When 1/4 scale division (setting mode 6-5) is "1: ON",

"1" when weight data is in the following range.



- Over:

"1" in the following cases:

In gross weight: OFL3

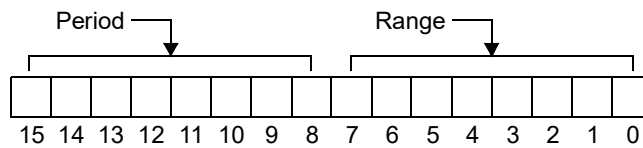
In net weight: OFL1

In tare weight: Tare > 99999

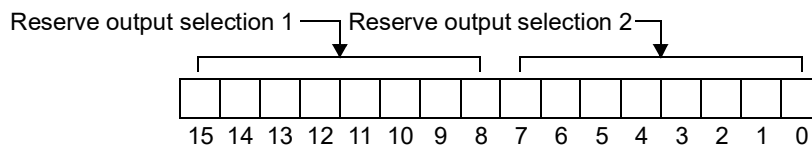
- Sign:

"1" when weight data is negative.

*6: Motion detection (period - range)



*7: Reserve output selection



00: NZ	01: Total limit	02: Stable	03: Filling promotion over
04: Over	05: Under	06: Go	07: Upper limit
08: Lower limit	09: Discharging command for slave	10: SP1	
11: SP2	12: SP3	13: Complete	14: Discharge
15: Clamp	16: Weight error	17: Seq.error	18: Final error
19: Accumulation count error		20: RUN	21: Discharge count error

12 SPECIFICATIONS

12-1. Specifications

■ Analog section

Excitation voltage	5V DC \pm 5%
	Output current within 90mA
	Ratiometric system
	(Up to six 350 Ω load cells can be connected in parallel.)
Signal input range	-0.5 to 3.0mV/V
	0 to 3.0mV/V (when OIML R76-1-compliant)
Zero adjustment range	Automatic adjustment by digital computation
	-0.2 to 2.0mV/V
	0 to 2.0mV/V (when OIML R76-1-compliant)
Span adjustment range	Automatic adjustment by digital computation
	0.3 to 3.0mV/V
	0.6 to 3.0mV/V (when OIML R76-1-compliant)
Minimum input sensitivity	0.15 μ V/count
	0.5 μ V/count (when OIML R76-1-compliant)
Accuracy	Non-linearity: Within 0.01%FS
	Zero drift: 0.025 μ V/ $^{\circ}$ CRTI Typ
	Gain drift: 1ppm/ $^{\circ}$ C Typ
A/D converter	Conversion rate: 300 times/sec.
	Conversion resolution: 24 bits (binary)
Minimum indication resolution	1/10000
	1/6000 (when OIML R76-1-compliant)
Secondary calibration	Equivalent calibration
	Minimum indication resolution for secondary calibration:
	1/1000 (ordinary temperature)

Other specifications for OIML R76-1

Load cell resistance	Min.: 55 Ω
	Max.: 1200 Ω
6-wire load cell cable	600m/mm ²
Allocation error	0.5pind

■ Display section

Display	18.5mm in character height
	Numerical display by liquid crystal display module (7-digit)
	Subdisplay 7.3mm in character height (14-digit)
Weight display	5-digit
	Sign: Negative sign at the highest-order digit

Accumulation display	9-digit * Also switchable to accumulation count (4-digit), final (5-digit), code (1 digit), total discharge count (6-digit), or discharge count (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 * Only the following settings are valid when OIML R76-1-compliant: 0.001, 0.002, 0.005, 0.010, 0.020, 0.050, 0.01, 0.02, 0.05, 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50
Decimal place	0, 0.0, 0.00, 0.000 selectable
Over display	A/D converter input over LOAD Net over OFL1 Capacity + 9 scale divisions over OFL2 Capacity minus over or 20 scale divisions minus over -OFL2 Gross over OFL3
Center zero	True zero point or center of each value is displayed. * Only true zero point is displayed when OIML R76-1-compliant.
Status	CLAMP/ SP3/ SP2/ SP1/ HOLD/ COMPL./ ZT/ ZALM/ STAB/ TARE/ NET/ GROSS/ NZ/ D.CHG/ HI/ GO/ LO/ HI LIM/ LO LIM/ CZ/ LOCK displayed

■ Setting section

Setting method	Settings are made by membrane key operation. Also, settings can be made from a host computer through RS-485 I/F, etc.
Storage of setting values	Calibration values and part of setting values are stored in NOV. RAM (nonvolatile RAM) Other setting values are stored in F-RAM (nonvolatile RAM)
Protection of setting values	Protectable by LOCK switch
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/ Compensation feeding time/ Auto free fall compensation regulation/ 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/ Count limit/ Weighing function 3/ Key invalid • LOCK/ Input selection 1/ Input selection 2/ Output selection 1/ Output selection 2/ Error output selection/ Reserve output selection/ Password/ Bag clamp output time/ Discharging time/ Weighing start time/ AZ times/ Judging times/ Sequence mode 1/ Sequence mode 2/ Filling promotion weight/ Extended function selection 1/ Extended function selection 2/ Balance weight value/ Capacity/ Min scale

division/ DZ regulation value/ Display selection 1/ Gravitational acceleration/ Net over/ Gross over/ Display selection 2/ RS-485 I/F setting/ RS-485 communication type/ RS-485 ID/ transmission delay time/ Zero calibration/ Span calibration/ Equivalent calibration/ Option display

■ 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. * There is a need to prepare an external power supply.
Number of outputs	16 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 * There is a need to prepare an external DC power supply.
Number of inputs	16 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, two-wire
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 (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) ASCII (for UNI-Format)
------	---

<Options>

(Number of connectable options: 3,
however, can not be mounted with two or more in the CCL, ODN, and PRF.)

BCD parallel data output interface (sink type) [BCO]

Weight data is outputted as BCD (binary coded decimal) data.

The interface of the output circuit current sink type.

* There is a need to prepare an external DC power supply.

Output signal	Weight data (5-digit)
Output logic	Positive logic/negative logic switchable
Output circuit	Photocoupler isolated open-collector output (current sink type)
Rated input voltage	DC24V
Operating voltage range	DC20.4 to 26.4V (ripple percent within 5%)
Max. voltage	DC30V
Max. current	DC120mA
Input signal	Logic switch, hold, output data selection
Input circuit	Can be connected to contact or sink type output circuit.
Rated input voltage	DC24V
Operating voltage range	DC20.4 to 26.4V (ripple percent within 5%)
Load current	Approx. 11mA (when 24V DC load)

BCD parallel data output interface (source type) [BSC]

Weight data is outputted as BCD (binary coded decimal) data.

The interface of the output circuit current source type.

* There is a need to prepare an external DC power supply.

Output signal	Weight data (5-digit)
Output logic	Positive logic/negative logic switchable
Output circuit	Photocoupler isolated output (current source type)
Rated input voltage	DC24V
Operating voltage range	DC20.4 to 26.4V (ripple percent within 5%)
Max. voltage	DC30V
Max. current	DC120mA
Input signal	Logic switch, hold, output data selection
Input circuit	Can be connected to contact or source type output circuit.
Rated input voltage	DC24V
Operating voltage range	DC20.4 to 26.4V (ripple percent within 5%)
Load current	Approx. 11mA (when 24V DC load)

RS-232C interface [232]

Weight data is read by the host computer.

Furthermore, various setting values are read and written by commands from the host computer.

Signal level	RS-232C-compliant	
Transmission mode	Asynchronous, full-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
	Stop bit:	1 or 2 bits selectable
	Parity bit:	None, odd, or even selectable
Code	ASCII	

D/A converter interface [DAC]

Weight data are output as converted into analog signals.

Voltage output	0 to 10V	
Current output	4 to 20mA	
Conversion rate	300 times/sec.	
Load resistance	Voltage:	2k Ω or more
	Current:	350 Ω or less
Resolution	1/10000	
Over range	10% of the full scale	
	Voltage:	-1.0 to 11.0V
	Current:	2.4 to 21.6mA

CC-Link interface [CCL]

Directly linkable with a general-purpose PLC as a remote device station supporting CC-Link Ver. 1.10.

Occupation stations	4
Baud rate	156k, 625k, 2.5M, 5M, 10M bps selectable
Station No.	Slave station No. specified in the range of 1 to 61.

DeviceNet interface [ODN]

Seamlessly connectable with a DeviceNet-compliant general-purpose PLC.

Node address	Specified in the range of 0 to 63.
--------------	------------------------------------

PROFIBUS interface [PRF]

Connectable as a slave device to PROFIBUS fieldbus.

Standard	PROFIBUS-DPV0
Communication speed	9.6kbps to 12Mbps supported (automatic follow-up) * However, 45.45kbps is not supported.
Occupied memory	OUT/12 bytes (6 words), IN/26 bytes (13 words)
Station No.	0 to 125
GSD file name	UNIP0DC4.GSD

* Sync Mode, Freeze Mode supported

* Special Clear Mode (Fail Safe Mode) not supported

■General performance

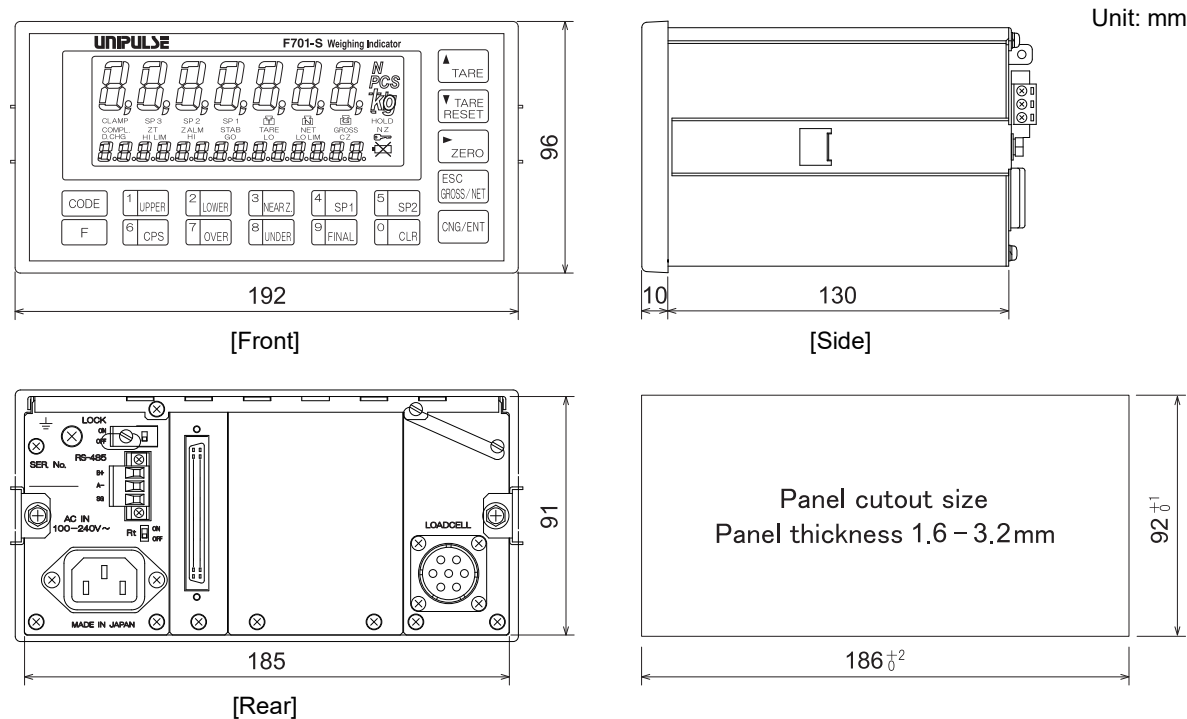
Power supply voltage	100 to 240V AC (+10% -15%) [free power supply 50/60Hz]
Power consumption	15W max.
Inrush current	2A, 3mSec: 240V AC average load condition (ordinary temperature, at a cold start)
Operation conditions	Temperature: Operation temperature range: -10 to +40℃ Storage temperature range: -20 to +85℃ Humidity: 85%RH or less (non-condensing)
Dimensions	192(W)×96(H)×140(D) mm (* projections excluded)
Panel cutout size	186W (+2/-0)×92H (+1/-0) mm
Weight	Approx. 2kg

■Accessories

- AC input cord..... 1
- Load cell connector..... 1
- Load cell connector rubber..... 1
- External input/output connector..... 1
- Operation manual..... 1
- Packing..... 1

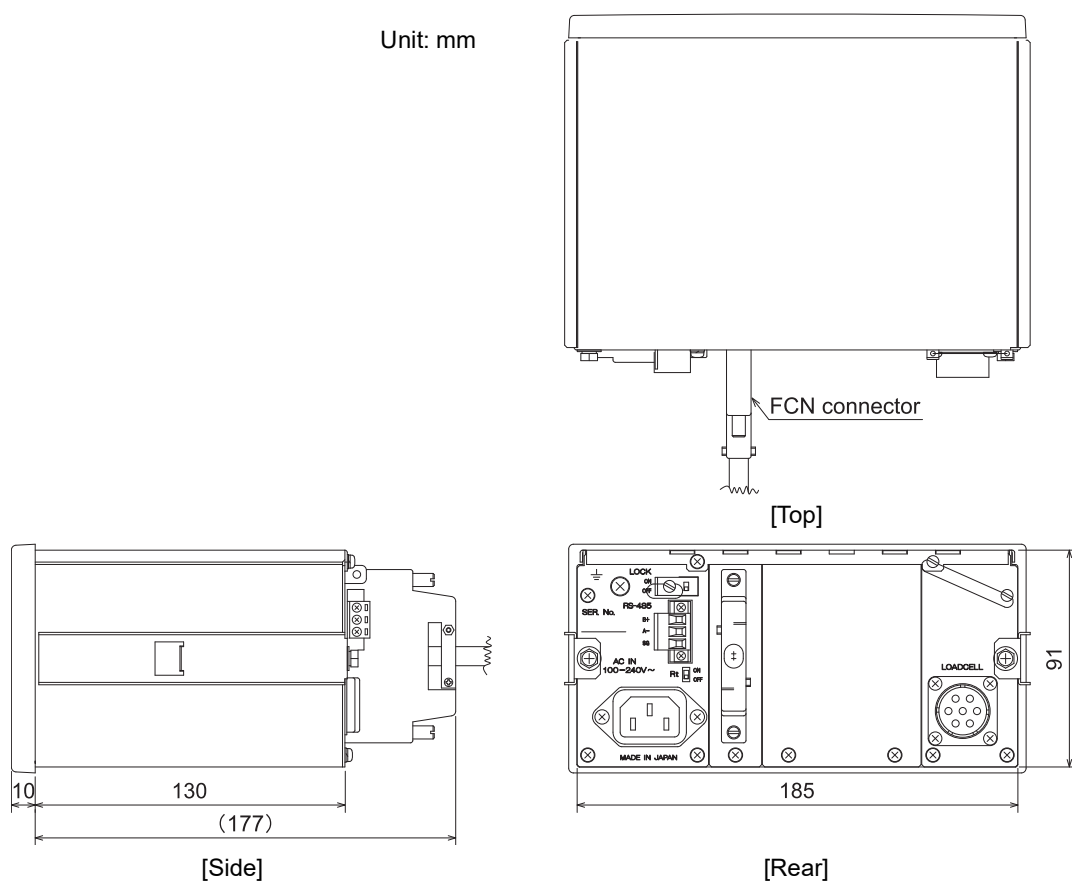
12-2.Dimensions

■Standard equipment



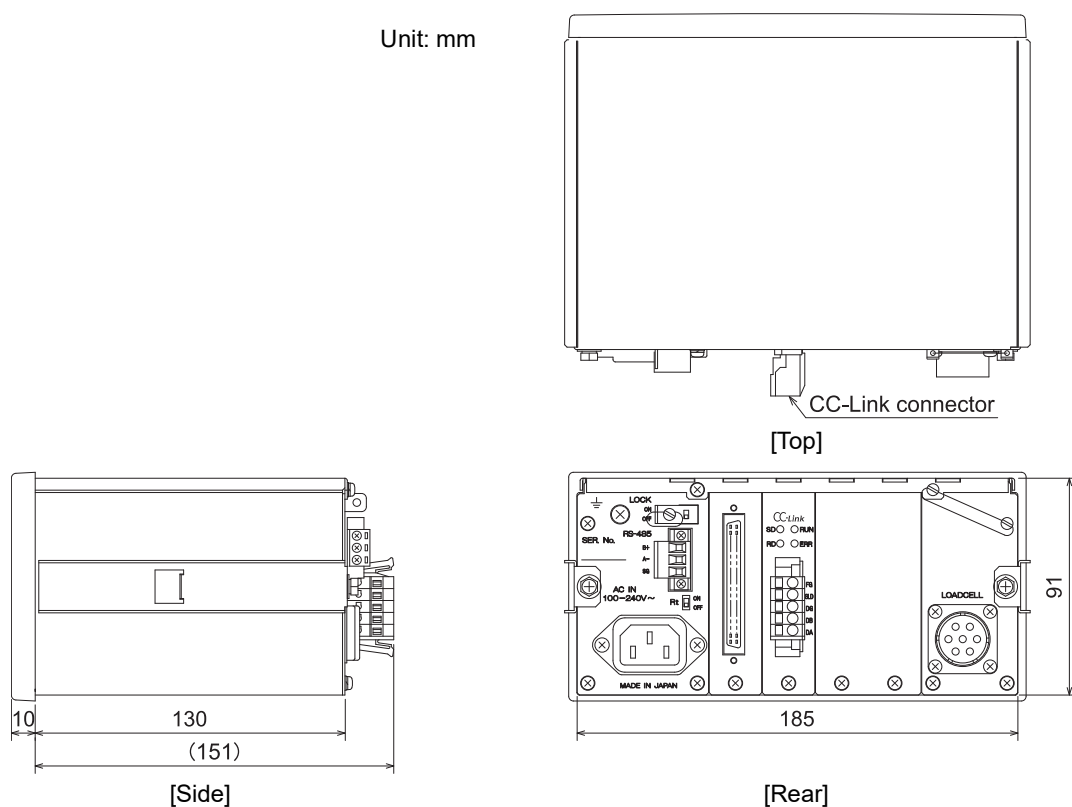
■When the external input/output signals is connected

Unit: mm



■When the CCL option is equipped

Unit: mm



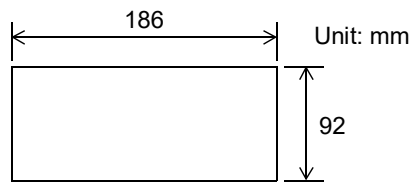
■ Mounting on a panel

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

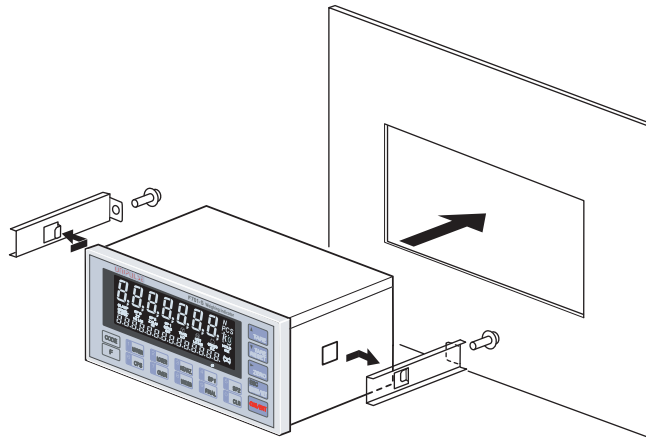
1. Make a hole in the mounting panel.

Panel cutout size
186(W)×92(H) mm

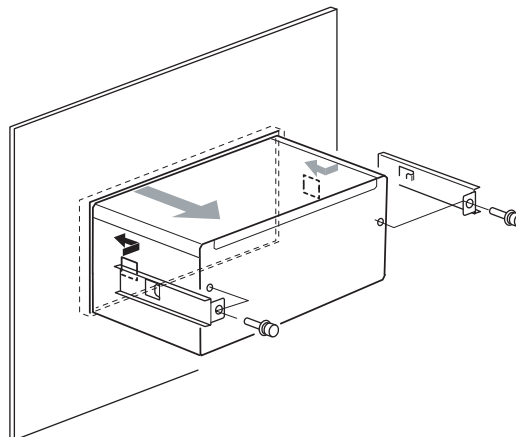
Mounting panel thickness
1.6 - 3.2 mm



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



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.

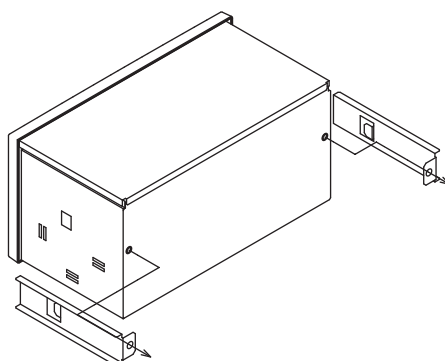
⚠ CAUTION

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

■ Packing installation

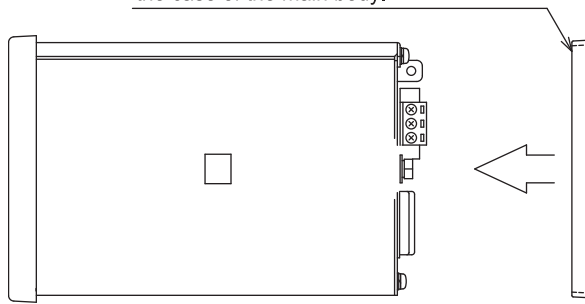
By attaching attached packing, it becomes simple dustproof and drip-proof.

1. Remove the guide rails.



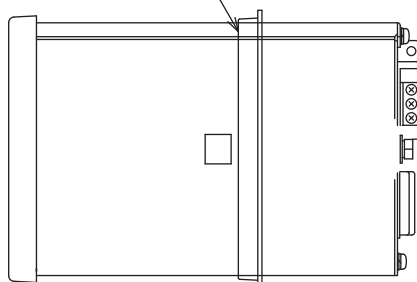
2. Insert the packing from its projection side to the case of the main body.

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



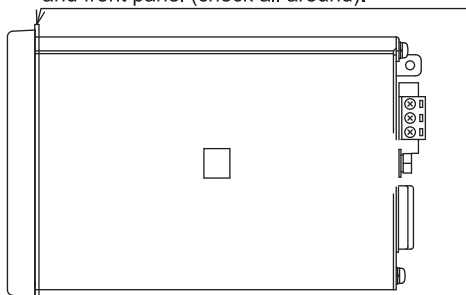
3. Insert the projection of the packing all around the clearance of the front panel.

It is careful so that packing cannot be turned over.

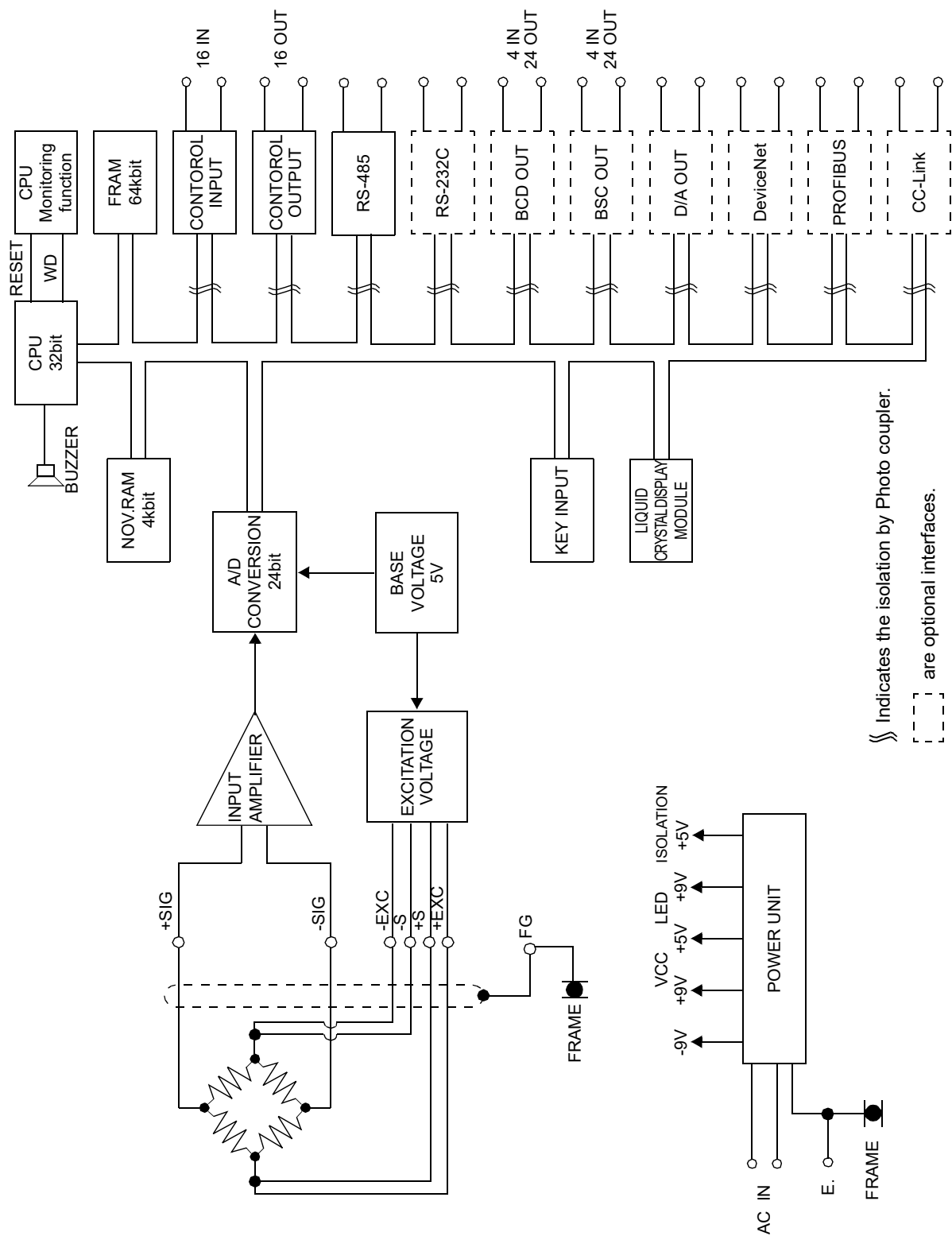


4. Check that there is no gap or twist between the inserted packing and front panel.
If there is a gap, push in the packing to bring them into close contact.

There should be no gap between the packing and front panel (check all around).



12-3. Block diagram



12-4. Compliance with EC directives

* The F701-S is CE-compliant. When using it, observe the following:

The F701-S weighing indicator is compliant with EC Directives (based on Council of the European Union) and CE-marked.

- Low-Voltage Directive EN61010-1

(Installation category II
Pollution degree 2)

- EMC Directive EN61326-1

(EN55011, EN61000-4-2, EN61000-4-3, EN61000-4-4,
EN61000-4-5, EN61000-4-6, EN61000-4-8,
EN61000-4-11, EN61000-3-2, EN61000-3-3)

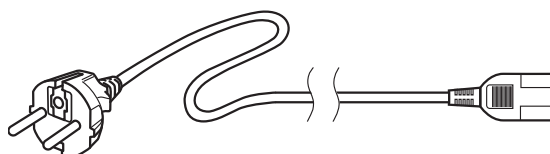
The following precautions should be taken for installation.

1. Since the F701-S is defined as an open type (built-in device), it should be used installed and fixed to a panel, etc.
2. The power cable attached to this product as a standard can be used in the AC100V power supply in Japan. This AC cable is designed for a test. (Official ratings voltage 125V AC, 10A)
When you use this product outside Japan, use a power cable certified in that country.
3. Use shielded cable for connections other than power supply (load cell, external input/output, RS-485, and optional interface).



Point

A 250V AC high-voltage cable in EU outlet form (See below: Standard product in Europe) is optionally available (TSU02).
For details, contact our sales department.



13 SUPPLEMENTS

13-1. List of setting values

Initial value:	Factory-shipped value
Each code:	The setting is made for each code.
NOV. ROM:	The setting value is stored in NOV. RAM (nonvolatile RAM).
F-RAM:	The setting value is stored in F-RAM (nonvolatile RAM).
Lock1 (soft):	Soft switch (setting mode 3_key invalid • LOCK) Lock1 prevents the setting value from being changed.
Lock2 (soft):	Soft switch (setting mode 3_key invalid • LOCK) Lock2 prevents the setting value from being changed.
LOCK (SW):	The LOCK switch on the rear panel 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.

■ CODE

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
CODE	CODE No.	0								P19

■ Setting mode 0 (comparison setting value)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
0-1	Upper limit	075.00			⊙	⊙				P61
0-2	Lower limit	025.00			⊙	⊙				P61
0-3	Near zero	001.00			⊙	⊙				P61
0-4	Set point 1	030.00	⊙		⊙	⊙				P55
0-5	Set point 2	020.00	⊙		⊙	⊙				P55
0-6	Compensation	00.50	⊙		⊙	⊙				P55
0-7	Over	00.50	⊙		⊙	⊙				P55
0-8	Under	00.25	⊙		⊙	⊙				P55
0-9	Final	100.00	⊙		⊙	⊙				P55

■ Setting mode 1 (extended setting value)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
1-1	Comparison inhibit time	0.50		⊙			⊙			P63
1-2	Judging time	1.5		⊙			⊙			P63
1-3	Complete output time	3.0		⊙			⊙			P64
1-4	Compensation feeding time	1.00	⊙		⊙	⊙				P67
1-5	Auto free fall compensation regulation	010.00	⊙		⊙	⊙				P57
1-6	Weighing function 1	0000		⊙			⊙			P58, P61, P62
1-7	Weighing function 2	00000		⊙			⊙			P49, P53, P62, P63, P64
1-8	Tare setting	000.00			⊙	⊙				P49
1-9	Tare display	0.00							⊙	P49

■ Setting mode 2 (operation setting value)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
2-1	Digital low pass filter	1		⊙			⊙			P43
2-2	Moving average filter	030		⊙			⊙			P44
2-3	Motion detection (period - range)	1.5-05		⊙			⊙	⊙		P45
2-4	Zero tracking (period)	0.0		⊙			⊙	⊙		P46
2-5	Zero tracking (range)	0000		⊙			⊙	⊙		P46
2-6	Total comparison selection	0	⊙		⊙	⊙				P78
2-7	Total limit (high 4)	0000	⊙		⊙	⊙				P78
2-8	Total limit (under 5)	000.00	⊙		⊙	⊙				P78
2-9	Count limit	0000	⊙		⊙	⊙				P78

■ Setting mode 3 (function setting value)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
3-1	Weighing function 3	014		⊙			⊙			P57
3-2	Key invalid • LOCK	11110		⊙						P50, P79
3-3	Input selection 1	0125		⊙			⊙			P82
3-4	Input selection 2	67		⊙			⊙			P82
3-5	Output selection 1	0126		⊙			⊙			P82
3-6	Output selection 2	78		⊙			⊙			P82
3-7	Error output selection	01		⊙			⊙			P82
3-8	Reserve output selection	04-05		⊙			⊙			P82
3-9	Password	0000								P79

■ Setting mode 4 (sequence mode setting value)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
4-1	Bag clamp output time	3.0		⊙			⊙			P74
4-2	Discharging time	3.0		⊙			⊙			P74
4-3	Weighing Start Time	2.0		⊙			⊙			P67
4-4	AZ times	01		⊙			⊙			P66
4-5	Judging times	01		⊙			⊙			P65
4-6	Sequence mode 1	00000		⊙			⊙			P61, P66, P74
4-7	Sequence mode 2	000		⊙			⊙			P76, P67, P87
4-8	Filling Promotion Weight	000.00		⊙			⊙			P61
4-9										

■ Setting mode 5 (extended function setting value)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
5-1	Extended function selection 1	00000		⊙			⊙	⊙		P47, P50
5-2	Extended function selection 2	00100		⊙			⊙	⊙		P44, P46, P50, P77, P78
5-3										
5-4										
5-5										
5-6										
5-7										
5-8										
5-9										

■ Setting mode 6 (calibration setting value)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
6-1	Balance weight value	100.00		⊙			⊙	⊙		P37
6-2	Capacity	100.00		⊙			⊙	⊙		P37
6-3	Min scale division	0.01		⊙			⊙	⊙		P37
6-4	DZ regulation value	02.00		⊙			⊙	⊙		P48
6-5	Display selection 1	21340		⊙			⊙	⊙		P37, P39, P43
6-6	Gravitational acceleration	9.8067		⊙			⊙	⊙		P38
6-7	Net over	999.99		⊙			⊙			P51
6-8	Gross over	999.99		⊙			⊙			P51
6-9	Display selection 2	0		⊙			⊙	⊙		P51

■ Setting mode 7 (interface setting value 1)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
7-1	RS-485 I/F setting	51000		⊙			⊙			P93
7-2	RS-485 communication type	000		⊙			⊙	⊙		P93
7-3	RS-485 ID	01		⊙			⊙			P93
7-4	Transmission delay time	00		⊙			⊙			P105
7-5	RS-232C I/F setting	51000		⊙			⊙			
7-6	RS-232C communication type	000		⊙			⊙	⊙		
7-7	D/A output mode	0		⊙			⊙			
7-8	D/A zero output weight	000.00		⊙			⊙			
7-9	D/A full scale value	100.00		⊙			⊙			

■ Setting mode 8 (interface setting value 2)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
8-1	BCD data updata rate	0		⊙			⊙			
8-2	CC-Link I/F setting	40		⊙			⊙			
8-3	CC-Link station number	01		⊙			⊙			
8-4	Device Net node address	00		⊙			⊙			
8-5	PROFIBUS I/F setting	00		⊙			⊙			
8-6	PROFIBUS baudrate display	----							⊙	
8-7	PROFIBUS station No.	125		⊙			⊙			
8-8										
8-9										

■ Setting mode 9 (calibration mode)

Setting item	Name	Initial value	Each code	NOV. RAM	F-RAM	Lock1 (soft)	Lock2 (soft)	LOCK (SW)	Display only	Page
9-1	Span calibration	100.00		⊙			⊙	⊙		P42
9-2	Equivalent calibration	2.0000		⊙			⊙	⊙		P42
9-3										
9-4										
9-5										
9-6										
9-7										
9-8										
9-9	Option display	000							⊙	P80
ZERO	Zero calibration	0.00		⊙			⊙	⊙		P40

13-2. Over scale/error display

■ Over scale display

The weight error output turns ON.

A/D converter input over	LoRd
Net weight > Net over setting value	oFL1
Gross weight > Capacity + 9 scale divisions	oFL2
Gross weight < -Capacity or Gross weight < -20 scale divisions	- oFL2
Gross weight > Gross over setting value	oFL3

* Net weight = Gross weight - Tare

■ Sequence error display

Error description	Alarm message
When the start of weighing, the allow operate signal is OFF or the stop signal is ON or the complete signal of the previous weighing is not OFF.	Err1
The stop signal turns ON during weighing and the weighing is stopped.	Err2
Auto zero is actuated according to AZ times and a zero alarm is given.	Err3
The near zero signal is OFF at the start of weighing (when the "At start NZ confirmation" is ON).	Err4
Weight value \geq Final - Set point 1 at the start of weighing (when the "At start weight value confirmation" is ON).	Err5
"Close discharge gate" turns OFF during weighing and the weighing is stopped.	Err6
The stop signal turns ON during discharging and the discharging is stopped.	Err7
"Open discharge gate" is not confirmed.	Err8
"Close discharge gate" is not confirmed.	Err9

■ 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

13-3. Troubleshooting

■ Over scale display

$L O R d$ (A/D converter over)

A signal beyond the signal input range of the F701-S is input.

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

- $L O R d$ (A/D converter minus over)

A signal below the signal input range of the F701-S is input.

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

$o f L 1$ (Net weight > Net over setting value)

The net weight exceeds the net over setting value. 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, or change the net over setting value.

To not display " $o f L 1$ ", make the net over setting value equal to the capacity.

$o f L 3$ (Gross weight > Gross over setting value)

The gross weight exceeds the gross over setting value. 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, or change the gross over setting value.

To not display " $o f L 3$ ", make the gross over setting value equal to the capacity.

$o f L 2$ (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.

- $o f L 2$ (Gross weight < -Capacity or Gross weight < -20 scale divisions)

The gross weight falls below -capacity (When display selection 2 in setting mode 6-9 is "0: Gross weight < -Capacity"). Or the gross weight falls below -20 scale divisions (When display selection 2 in setting mode 6-9 is "1: Gross weight < -20 scale divisions"). To put this over scale display back to a normal weight display, raise 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-S 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 " $o f L 2$ " or "- $o f L 2$ " back to a normal state.

■ Error display

{ r r 1 } (Sequence error)

When the weighing start signal turns ON, the allow operate signal is OFF or the stop signal is ON or the complete signal of the previous weighing is not OFF.

Confirm condition of each signal, and input the weighing start signal.

Or, input the manually discharge signal to clear of sequence error and complete signal.

{ r r 2 } (Sequence error)

This error is displayed if the stop signal turns ON during weighing in sequence control.

Turn OFF the stop signal, turn the stop signal ON→OFF again to correct the sequence error, and then input the weighing start signal to start weighing. Or, input the manually discharge signal.

{ r r 3 } (Sequence error)

This error is displayed if a ZALM state is brought about when auto zero operation is performed in sequence control. Reset the digital zero, and then turn the stop signal ON→OFF, and input the weighing start signal again to start weighing. Or, input the manually discharge signal.

{ r r 4 } (Sequence error)

This error is displayed if the near zero signal is OFF at the start of weighing. (When the "At start NZ confirmation" setting is "1: ON".)

Turn the stop signal ON→OFF, and input the weighing start signal again to start weighing.

Or, input the manually discharge signal.

{ r r 5 } (Sequence error)

This error is displayed if the weight value \geq (Final - Set point 1) at the start of weighing. (When the "At start weight value confirmation" setting is "1: ON".)

Turn the stop signal ON→OFF, and input the weighing start signal again to start weighing. Or, input the manually discharge signal.

{ r r 6 } (Sequence error)

This error is displayed if the "Close discharge gate" signal turns OFF during weighing and the weighing is stopped.

Turn ON the "Close discharge gate" signal, turn the stop signal ON→OFF, and then input the weighing start signal again to start weighing. Or, input the manually discharge signal.

{ r r 7 } (Sequence error)

This error is displayed if the stop signal turns ON during discharging and the discharging is stopped.

Turn OFF the stop signal, turn the stop signal ON→OFF, and then input the weighing start signal again to start weighing. Or, input the manually discharge signal.

{ r r 8 } (Sequence error)

This error is displayed if the open discharge gate signal does not turn ON in the discharging time + 2 sec, after the discharge signal turns ON. Turn ON the open discharge gate signal, so that the error is reset and the discharging continues.

{rr} (Sequence error)

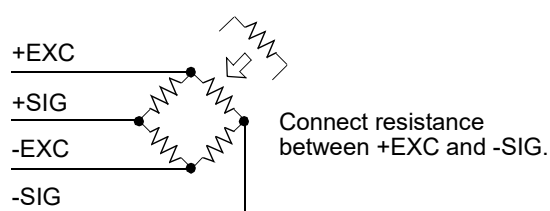
This error is displayed if the close discharge gate signal does not turn ON in the discharging time + 2 sec, after the discharge signal turns OFF. Turn ON the close discharge gate signal, so that the error is reset and the discharging continues.

■ Calibration error display

c {rr} (Calibration error)

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

If " c {rr} " 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

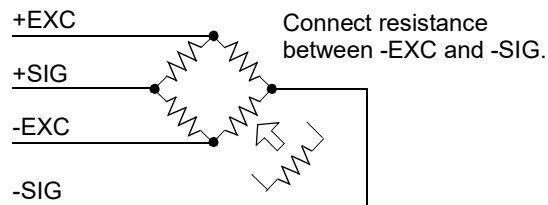
- The numerical values in this table assume that one 350Ω load cell is used.
 - The temperature coefficient of the resistance connected here directly affects the accuracy of the indicator.
- Use resistance of 50ppm/°C or higher (approx. 5ppm/°C is recommended).

└ { r r 3 } (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 "└ { r r 3 }" is displayed with the load applied in the normal direction and the wiring correct, there is a need to redo zero calibration after shifting the zero point by connect resistance between the -EXC and -SIG terminals of the load cell.

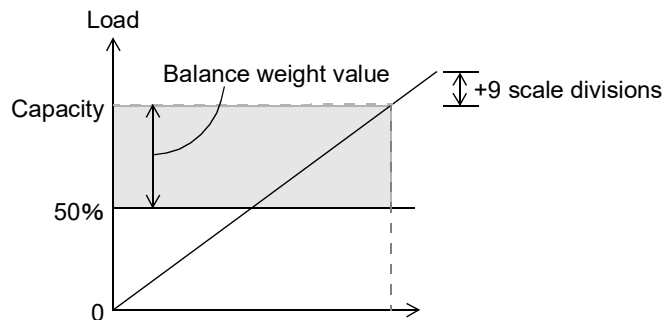
The relationships between connected resistance values and input signals are the same as for "└ { r r 2 }".



└ { r r 4 } (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.

└ { r r 5 } (Calibration error)

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

⌂ [err6] (Calibration error)

The load cell output has not reached the span adjustment range of the F701-S. 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.

⌂ [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.

⌂ [err8] (Calibration error)

The load cell output exceeds the span adjustment range of the F701-S. 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.

⌂ [err9] (Calibration error)

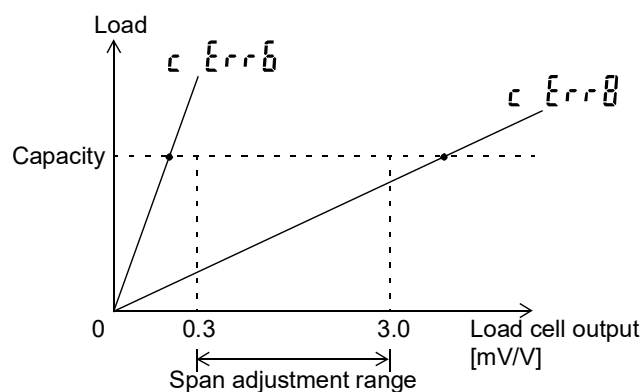
Calibration is not completed properly because the indicated value of the F701-S fluctuates during calibration.

Adjust the stable setting parameters (period and range), check that "STAB" lights, and then redo calibration.



Point

The span adjustment range of the F701-S 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) (⌂ [err6]) or over 3.0 (mV/V) (⌂ [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.

■NOV. RAM check error display

{error 3} (NOV. RAM check error)

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

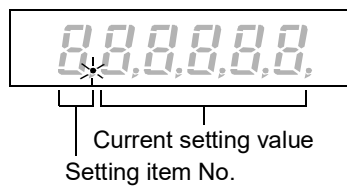
* Checksum error display, F-RAM check error display, or NOV. RAM check error display indicates a failure.

Ask us or your distributor for repair.

■Setting value not changed

Setting value change may have failed due to the discontinuation of writing in NOV. RAM.

If a setting value is changed, "." (See the position shown below.) lights.



"." lights to indicate a condition in which the setting value is being written in NOV. RAM. If the power is turned off at this time, it cannot be written normally.

While "." stays lit, do not turn off the power of the F701-S.

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