AD-4430C

for CC-Link

DIN Rail Weighing Module

INSTRUCTION MANUAL

1WMPD4002993A

A&D Company, Limited

The manual and Marks

All safety messages are identified by the following, “WARNING” or “CAUTION”, of ANSI Z535.4 (American National Standard Institute: Product Safety Signs and Labels). The meanings are as follows:

⚠**WARNING**	A potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠**CAUTION**	A potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

⚠ This is a hazard alert mark.

- This manual is subject to change without notice, at any time, to improve the product.
- The contents of the product specifications and this manual are subject to change without any obligation on the part of the manufacturer.
- Under the copyright laws, the software (program) described in this manual is copyrighted, with all rights reserved.
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Teflon is a registered trademark of DuPont.

Contents

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1. Compliance

1.1. Compliance with FCC rules

- Please note that this equipment generates, uses and can radiate radio frequency energy. This equipment has been tested and has been found to comply with the limits of a Class A computing device pursuant to Subpart J of Part 15 of FCC rules. These rules are designed to provide reasonable protection against interference when this equipment is operated in a commercial environment. If this unit is operated in a residential area it may cause some interference and under these circumstances the user would be required to take, at his/her own expense, whatever measures are necessary to eliminate the interference.
  (FCC = Federal Communications Commission in the U.S.A.)

1.2. Compliance with European Directives

CE This appliance complies with the statutory EMC (Electromagnetic Compatibility) directive 2004/108/EC and the Low Voltage Directive 2006/95/EC for safety of electrical equipment designed for certain voltages.

Note: The displayed value may be adversely affected under extreme electromagnetic influences.

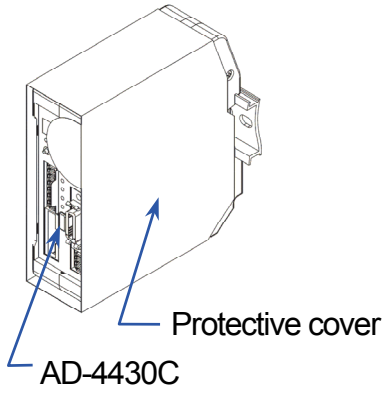
1.3. Precautions for Safety Use

Before use, confirm the following articles for safe operation.

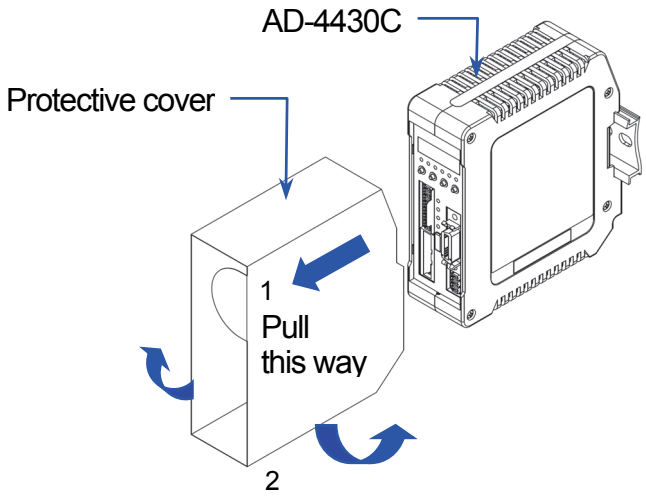
- **Grounding the Module**
  Ground the module to the DIN rail certainly. Separate this earth ground line from others, such as ground lines for the motor, inverter or power source. Unless the indicator is grounded, it may result in electric shock, operation error or fire.
- **Proper Power Source and Power Cable**
  Confirm the AC voltage, frequency and power tolerance of the power cable. If the voltage range of the cable is lower than the power line voltage, it may cause leakage or catch fire. Use pole compression terminals to connect the power cable to the terminals.
- **Fuse**
  The fuse is installed to help prevent the module from catching fire. The module is equipped with many safety circuits, so if the internal circuits are functioning properly, the fuse is not damaged. If the fuse is damaged, do not replace it but contact your local A&D dealer. This may have been caused by strong electric discharge. The fuse must not be relaced by users.
- **Splashing Water**
  The module is not water resistant.
- **Flammable Gas**
  Do not install the module where flammable gas is present.
- **Heat Radiation of the Module**
  Space out instruments to radiate heat sufficiently. Use a cooling fan to keep the operating temperature of the module within specifications.
  AD-4430C is covered with a protective transparent-resin cover. After the installation is

complete, take off the protective cover prior to turning on the AD-4430R. Heat damage may be caused if you do not remove the protective cover.
The protective cover is for preventing wire chips when you will install and wire so please do not take off the cover until complete the installing and wiring.

AD-4430C with a protective cover



How to remove the protective cover



Take off the two tabs on the back of the protective cover.

2. Outline and Features

The AD-4430C has the following features.

- The AD-4430C is a weighing indicator that amplifies signals from a load cell, converts them to digital data and outputs after converting them to a weighing values.

- This indicator has the following performance:
  - Input sensitivity ····· 0.15 μV/d (d = minimum division)
  - Display resolution ····· 99,999 d maximum
  - Sampling rate ····· 1000 times/second
  - Input voltage range ····· −35 to +35 mV (−7 to +7 mV/V)

- The CC-Link communication
  When connected to the CC-Link (Control & Communication Link) which makes seamless data communication possible, the weighing system can be built on the network, enhancing flexibility and convenience compared to the conventional communication connections.
  - The calibration can be performed using the command of the CC-Link.
  - Monitoring and changing of functions can be performed.
  - Up to 42 indicators can be connected to one master device when multiple AD-4430C are only used.

- Remote I/O function (User I/O)
  The remote I/O is a function for the user's arbitrary application to use the control I/O terminals as the remote I/O. External sensors and switches can be monitored and controlled.

- The calibration using gravity acceleration correction
  The function compensates for weighing error due to the difference of gravity acceleration between the calibration place and the measurement place.

- The digital linearization function
  The digital linearization function can rectify and reduce the deviation using weighing points during the zero and maximum capacity. Up to four weighing points excluding zero point can be specified. The high-order correction curve is used between each point.

- The digital span mode
  Simplified calibration is possible using numerical input, even without an actual load.

- Weighing sequence
  The AD-4430C can use a normal batch and loss in weight.

- Digital filter
  The digital filter is used to prevent electrical signal movement from the load cell.
  This module has two channels so that each cutoff frequency can be set separately.

  - Digital filter 1 (FnC05)
  - Digital filter 2 (FnC06)

- Flow rate (change volume)
  The AD4430C can display the current flow rate (change rate) every second.

3. Specifications

3.1. Analog Part (Load cell Input, A/D Converter)

Input sensitivity		0.15 μV/d or greater (d = minimum division)
Input voltage range		−35 mV to +35 mV (−7 to +7 mV/V)
Zero range		−35 mV to +35 mV (−7 to +7 mV/V)
Load cell excitation voltage		5 VDC ±5%, 60 mA with remote sense capability (Maximum 4 x 350 Ω load cells)
Temperature coefficient	Zero	±0.02 μV/°C Typ. ±0.1 μV/°C max
	Span	±3 ppm/°C Typ. ±15 ppm/°C max
Non-Linearity		0.005% of full scale
A/D conversion method		Delta-sigma method
A/D resolution count		Approximately 16,000,000 counts
Display resolution		99,999 d max. (d = minimum division)
Sampling rate		1000 times/second

3.2. Digital Part (Display and Keys)

Display element	Measurement display Status indicators	5−digit 7−segment red LED 6 red LEDs
Measurement display	Numerical display Decimal point Overflow display	Switches between NET and GROSS Selectable decimal places (10^1, 10^2, 10^3, 10^4) All the digits turn OFF. (When the polarity is negative, the minus sign appears at the highest-order digit.)
Status indicators	**G**: GROSS, **N**: NET, **H**: HOLD, **S**: STABLE, **Z**: ZERO, **X**: Preset function selected from the function list.	
Key switches	**F/ESC**, ➔ (ZERO), ↑ (TARE), **ENT**	

3.3. General

3.3.1. Interface

Interface	Specification	Connector
Control I/O	Refer to "6.1. Control I/O"	MDR connector 20 pins female Connector is not included
Standard serial output	Refer to "6.2. Serial Output (Current Loop)"	
CC−Link	Refer to "6.3. The CC-Link"	Power clamp connector (3M)
USB	USB 2.0 (High-speed)	Micro−B Cable is not included

3.3.2. Weighing Function

Zero operation	Sets the gross weight to zero by pressing the → (ZERO) key. Selection of disable or enable for the operation when unstable. The zero value is stored in the nonvolatile memory (FRAM). Zero adjustable range : Can be set optionally in the range of 1 to 100% of the maximum capacity.
Zero tracking	Tracks the weight drift around the zero point to maintain zero. Zero tracking time : 0.0 to 5.0 sec. Can be set optionally within the range Zero tracking band : 0.0 to 9.9 d Can be set optionally within the range
Tare	Sets the net weight to zero by pressing the ↑ (TARE) key. The inhibition / permission switch of the tare function can be used when the weighing value is unstable and negative. The tare value is stored in the nonvolatile memory (FRAM). Tare range : Gross weight ≤ Maximum capacity
Stability detection	Turns ON the stabilization indicator **S** when the variation amount of the weight values per sampling are within the set band in the set time. Detection time : 0.0 to 9.9 sec. Can be set optionally within the range Detection band : 0 to 9d Can be set optionally within the range
Digital filter 1	Cutoff frequency (−3 dB) range : 0.7 to 100 Hz
Digital filter 2	Cutoff frequency (−3 dB) range : 0.07 to 100 Hz
Zero detection	Non loading can be detected as near-zero and it is output.
HI/LO limit detection	Compares the measurement with HI/OK/LO limits and outputs the results.
Hold function	Displays the measurement value held. Select from sample hold, peak hold, average hold.
Weighing sequence function	Normal batch, Loss in weight.

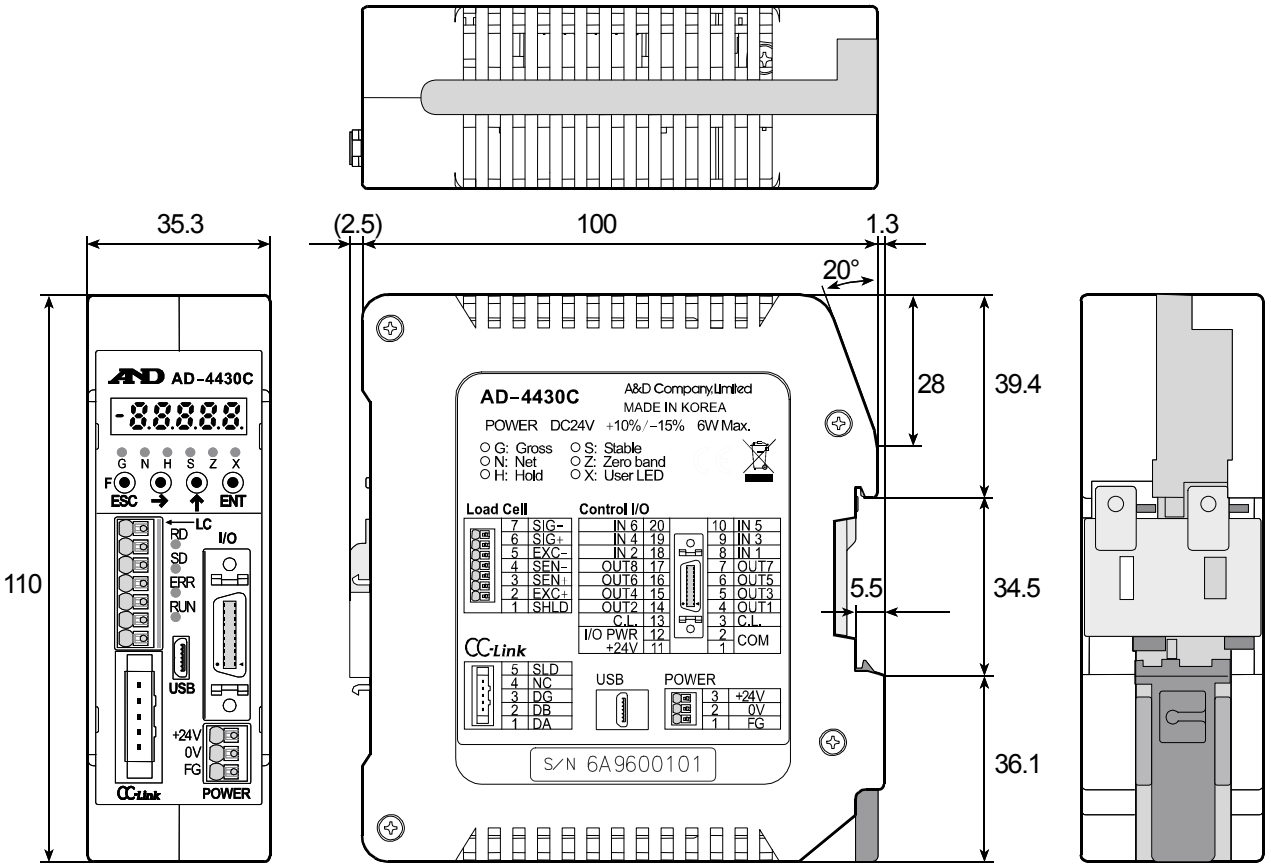
3.3.3. General

Memory backup method	Nonvolatile memory, data storage duration: 10 years or more
Power source (DC power)	DC 24 V, +10%, −15%
Power consumption	6 W at maximum
Operating temperature Operating humidity	−10 °C to +50 °C, 85 %RH or less (no condensation)
Installation method	DIN rail mount
Mass	Approximately 200 g

3.3.4. Accessories

Item	Quantity	Model name
CC−Link connector	1	Power clamp wire mount socket, 3M, 35505−6000−B0M GF

3.3.5. Dimensions



Unit : mm

Illustration 1 Dimensions

3.4. Names (The Front Panel and Rear Panel)

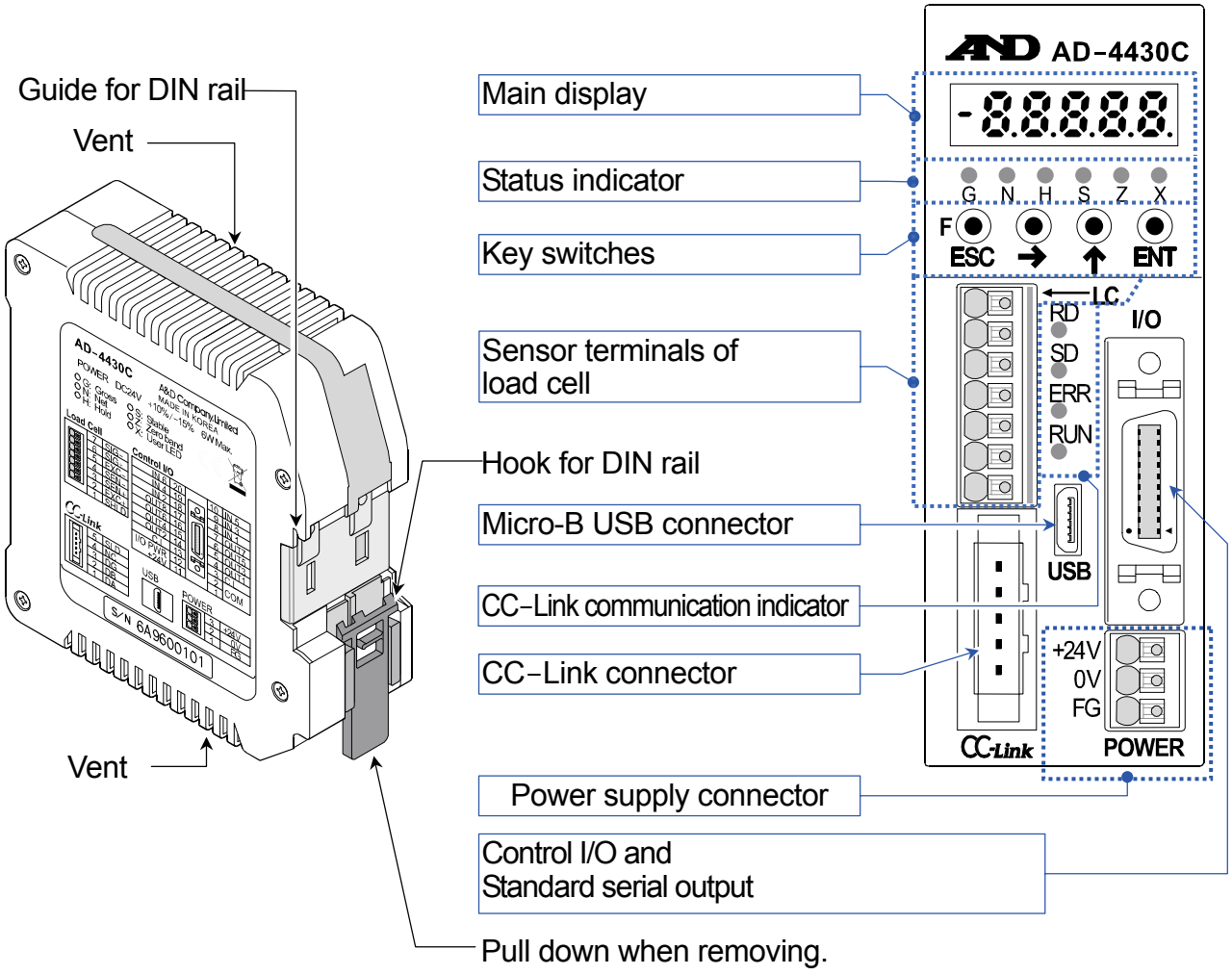


Illustration 2 Front panel & rear panel

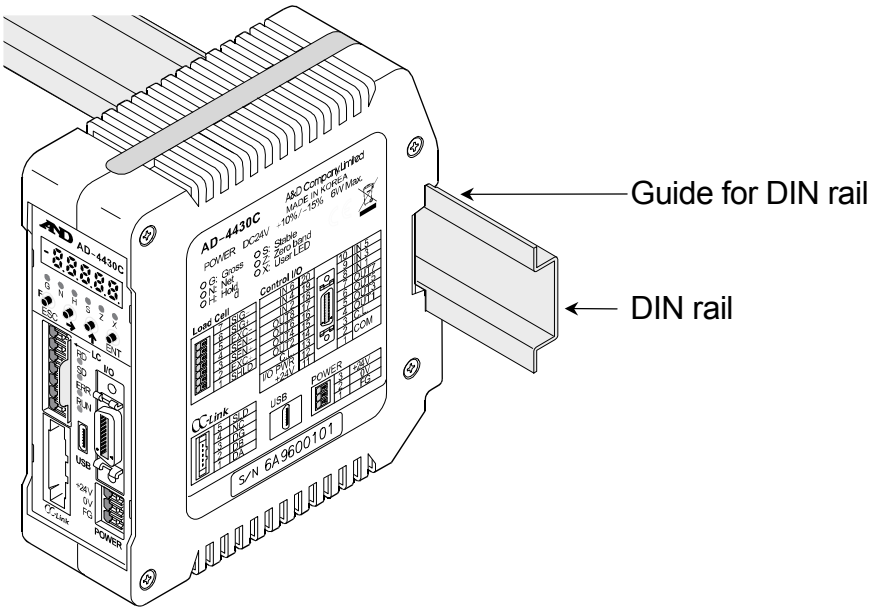


Illustration 3 Mounting the module

4. Installing the Module

In this section, installation environment, power terminal and load cell cable, and how to connect them are explained. Refer to each chapter for other external I/O.

4.1. Conditions to Install the Module

- ❑ The module is a precision electronic instrument. Handle it carefully.
- ❑ The operating temperature is −10 °C to +50 °C.
- ❑ Do not install the module in direct sunlight.

4.2. Power Supply

⚠CAUTION
❑ Earth ground the module to prevent electrical shock or indicator malfunction. If the module is not grounded, it may cause of an electric shock, or malfunction due to static electricity.

- ❑ Before connecting the module to the power source, read the instruction manual thoroughly.
- ❑ Do not turn the power for the module on before the installation is complete.
- ⚠❑ To avoid electrical shock, do not handle the power cable with wet hands.
- ⚠❑ Earth ground the module. Do not share the ground line with other electrical power equipment.
- ❑ The power requirement is 24 DCV, +10% to −15%.
  Use a stable power source free from instantaneous power failure or noise.
- ❑ To avoid a malfunction, do not share the power line with other devices.
- ❑ The output voltage of a load cell is a very sensitive signal. Keep all electrical noise sources away from the load cell and load cell cable.
- ❑ Use cables shielded for input and output. Connect the cable shield to the F.G. terminal or the module housing.
- ❑ Ground terminal. (Connector shields of all are connected inside.)

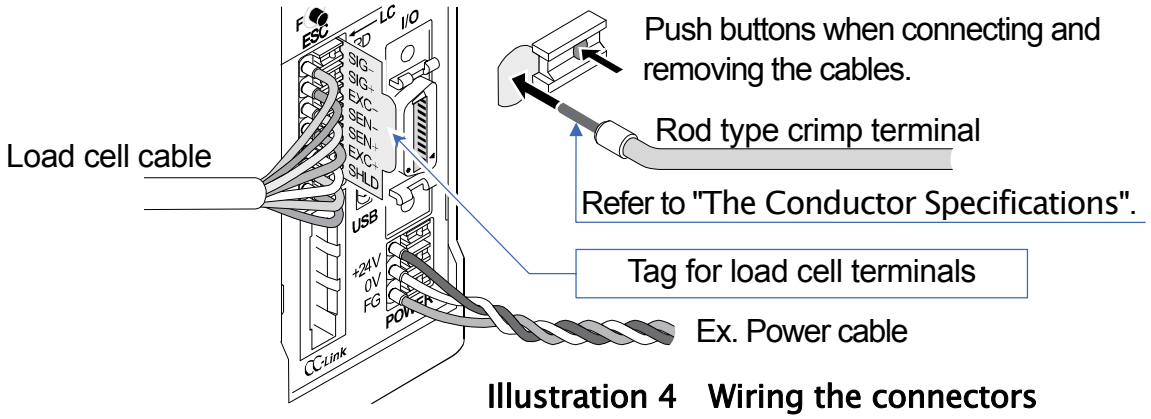


Illustration 4 Wiring the connectors

The Conductor Specifications

Clamp range (typ.)		0.13 mm²	to	1.5 mm²
AWG		AWG24	—	AWG16
Solder plated wire		0.2 mm²	to	1.5 mm²
Twisted wire		0.2 mm²	to	1.5 mm²
Rod crimp terminal	DIN 46228 Part1	0.25 mm²	to	1.5 mm²
Rod crimp terminal with cover	DIN 46228 Part4	0.25 mm²	to	0.75 mm²
Lead length		8 mm		

4.3. Connecting Load Cell Cable

Load Cell

- The cable that extends from the load cell is a part of the load cell. Do not cut the load cell cable even if there is the remainder of the cable.
- Bundle the load cell cable if there is the remainder of the cable.
- The load cell is compensated for temperature change including the resistance value of this cable.
- Basically, connect the shield wire to a point of the shield terminal of the AD-4430C and do not ground it. If there are multiple ground points, it may result in noise due to a ground loop.

Remote Sensing (Compensation for length of the extension cable)

- The AD-4430C is equipped with the compensation function that monitors a drop voltage for the excitation voltage and rectifies the A/D conversion value.
- Use the 6-wire extension cable to use the remote sensing function for the load cell.
- Connect terminals of SEN+ and SEN−. If they are not connected, measurements cannot be performed.
- When the 4-wire cable is used , connect terminals of EXC+ and SEN+ and terminals of EXC− and SEN− at the load cell terminal of the AD-4430C.

Load Cell Cable

- Load cell cables should have high electrical insulation and shield performance.
- Use shielded cables with the insulator that is made of materials with high insulation resistance such as Teflon and polyethylene. **NOTE: Teflon is a registered trademark of DuPont.**
- We recommend using the load cell extension cable produced by A&D co., ltd. when using it.
  AX−KO162−5M to 100M (5m to 100m)
  Cable diameter ····· ϕ9 mm
  Cross-sectional area of the conducting wire ····· 0.5 mm^2, 6-wire cable equipped

Terminal No.	Terminal name & Function of the AD-4430C	
7	SIG−	Load cell input (−)
6	SIG+	Load cell input (+)
5	EXC−	Load cell excitation voltage (−)
4	SEN−	Sensing input (−)
3	SEN+	Sensing input (+)
2	EXC+	Load cell excitation voltage (+)
1	SHLD	Shield

6-wire connection to load cell (Recommended)

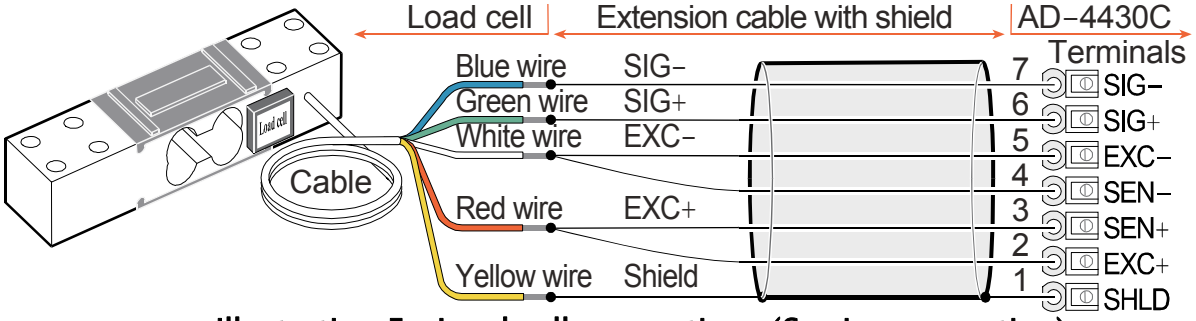
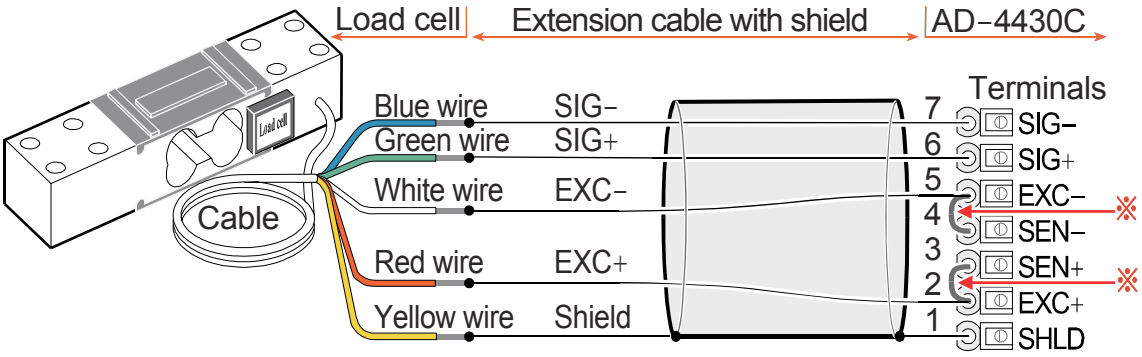
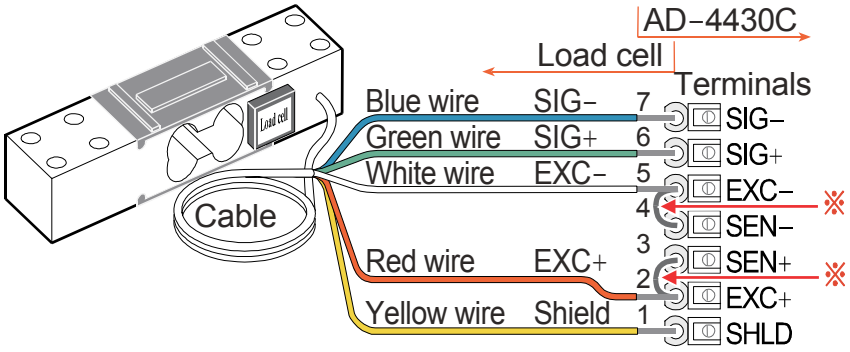


Illustration 5 Load cell connections (6-wire connection)

4-wire connection to load cell



Direct connection to load cell



※ Be sure to connect terminals between EXC+ and SEN+ , SEN- and EXC-.

Illustration 6 Load cell connections (4-wire connection & direct connection)

4.4. Verifying Load Cell Cable

When the load cell connection is complete, perform a connection check using the following procedure.

- ❑ Perform a visual check to ensure that the wiring is correct.
- ❑ Turn the module on.
  When the calibration has not yet been carried out, the indication value may be blank. However, as long as there are no problems with the display, confirmation can still be carried out using the check mode.
- ❑ Enter to the check mode and check the load cell output value.
  Refer to "**7.2.Check Mode**" to enter to the A/D check mode.
- ❑ Confirm that the displayed load cell output value matches the specified value. Normally the displayed value will be the load cell rated output value or less.
- ❑ If an error occurs, refer to "**7.4. Verifying The Load Cell Connections (DIAGNOS)**" or "**7.5. Verifying The Load Cell Connections Using Multimeter**".

5. Operations

5.1. General Functions

5.1.1. Zero Operation

- Zero operation is a function to set the gross weight to zero.
  It is performed by pressing the [➔(ZERO)] key.
- The zero range is set in **C-F05** (Zero range) and is expressed in percent of the maximum capacity with the calibration zero point as the center.
- Zero operation is disabled, even within the zero range, when the A/D converter overflow occurs.
- A ZERO error is output if zero operation is not performed when the value is unstable or out of range.
- The zero value is stored in the non-volatile memory and is maintained, even if the power is disconnected.
- Clearing the zero value is performed using the [F] key assigned to clear the zero value.
- **Functions Related to Zero Operation**
  - **C-F05** (Zero range) : A value between 0% and 100% can be specified.
  - **C-F10** (Tare and zero at unstable weight value) **:** The selection to enable or disable tare and zero operation when unstable.
  - **C-F16** (Zero setting when power is turned on) **:** The selection whether or not to perform zero setting when power is turned on.

5.1.2. Zero Tracking

- The zero tracking function traces the gross weight drift around the zero point to maintain zero.
- The zero tracking time is set in **C-F06** (Zero tracking time) and the zero tracking band is set in **C-F07** (Zero tracking band). When the gross weight drift is within the specified ranges, zero tracking is performed automatically.
- A ZERO error is not output even if zero tracking is not performed.
- **Functions Related to Zero Tracking**
  - **C-F06** (Zero tracking time) **:** The value between 0.0 and 5.0 seconds can be specified.
  - **C-F07** (Zero tracking band) **:** The value between 0.0 and 9.9 d can be specified.
    (d = minimum division)

5.1.3. The Tare Function

- Tare is a function to store the gross weight as the tare value and set the net weight to zero.
  It is performed by pressing the [➔(TARE)] key.
- The tare value is stored in the non-volatile memory and is maintained, even if the power is disconnected.
- Clearing the tare value is performed using the [F] key assigned to clear the tare value.
- **Functions Related to the Tare Function**
  - **C-F10** (Tare and zero at unstable weight value) **:** The selection to enable or disable tare and zero operation when unstable.
  - **C-F11** (Tare when the gross weight is negative) **:** The selection to enable or disable tare when the gross weight is negative.

5.1.4. Clearing the Tare Value and Zero Operation

To clear the tare value and zero operation, hold the [↑(TARE)] key and turn on the module. Or: In off mode, hold the [↑(TARE)] key and press the [ENT] key.

5.1.5. Customizing the Function of the F Switch

- Assign a function to the [F] key in the general functions.
- **Functions Related to the [F] Key**
  - Assigns a function to the [F] key from the functions of **Fnc02** ([F] key) below :

0: None
1: Manual print command
2: Hold
3: Alternative switch (Active [F] key)
4: Momentary switch (Active [F] key)
5: Display exchange
6: Tare clear
7: Zero clear
8: Weighing start / Pause / Re-start
9: Actual free fall input
10: One shot, Small flow
11: Flow rate monitor (Change volume)
12: mV/V monitor
13: Digital filter 2

[5] means factory settings.

  - **C-F15** (Clear the zero value) **:** The selection to enable or disable clearing the zero value.

Alternate switch and momentary switch

By assigning these switches to the [F] key, the ON/OFF status of the [F] key can be transmitted to the master station. This is useful when building a network or performing maintenance. When "Active [F] key" is specified to the function of the display x, the operation of the [F] key can be monitored by the display x. These switches work as follows :

Alternate switch

When pressing and releasing the switch once, the state of the switch is maintained. Press the switch again to turn off or on.

Momentary switch

Only while the switch is being pressed, the switch is ON. When it is released, it is OFF.

Additional monitor

For confirmation, the AD-4430C can display weighing data or other data.
The decimal point of other data is flashed to separate weighing data, both LEDs of G: gross and N: Net are lit. When pressing the [F] key again, the AD-4430C returns to weighing mode.

Flow rate (Change rate)	Flow rate (Change rate) per second.
mV/V	Output voltage of load cell in the unit of mV/V.
Digital filter 2	Response of weighing data by digital filter 2

5.1.6. Customizing the Function of the x Display

- Assign a function to the **x** display in the general functions.

- **Functions Related to the Display x**
  - Assigns a function to the **x** display from the functions of **Fnc04** (x display) below :

0: None
1: Zero tracking in progress
2: Alarm (Zero range setting error, over)
3: Active F key
4: Near-zero
5: HI output (Over the upper limit value)
6: OK output (Between upper and lower limit values)
7: LO output (Below the lower limit value)
8: Large flow
9: Medium flow
10: Small flow
11: Over
12: OK
13: Under
14: Full value
15: Weighing sequence, finished
16: Weighing sequence, in processing
17: Weighing sequence, error
18: Normal batch / Loss-in weight, Identification
19 to 24: User input1 to 6
25 to 32: User output 1 to 8

5 means factory settings.

> F key status
> When alternate switch or momentary switch is selected at **Fnc02**, the F works.
> The display turns ON when the F key is ON and turns OFF when the F key is OFF.

5.1.7. Memory Backup

- Zero value, tare value, display status, calibration data and function data are written into non-volatile memory. The data retention period is more than 10 years. This module is not equipped with a battery for memory backup.

5.1.8. The Detection for the Near-Zero

- Near-zero detects whether an object has been placed on the weighing pan.
  The near-zero state is defined when the weighing value is within the preset value for the near-zero range.

- **Related functions**
  - **Fnc08** (Near-zero): The value of near-zero.
  - **Fnc09** (Near-zero comparison weight): Selection of the gross weight or net weight to compare the value of near-zero.
    1: Gross weight 2: Net weight

5.1.9. Upper or Lower Limit Detection Function

- This function detects whether the weighed value is above an upper limit value or below a lower limit value.

- **Related Functions**
  - Comparative upper or lower limit values can be set with **Fnc10** (Upper limit value) or **Fnc11** (Lower limit value).

Result of Detection	Required value
HI	Weighing value ＞ Upper limit value
OK	Upper limit value ≧ Weighing value ≧ Lower limit value
LO	Lower limit value ＞ Weighing value

- **Fnc12** (Comparison mass of upper and lower limit): Select value to be compared with the upper or lower limit from gross weight or net weight.
  1: Gross weight 2: Net weight

5.1.10. Full Value Detection Function

The full value detection function detects that a weighing value has reached the maximum value.

❑ **Functions Related to the Detection Function**

- **Fnc13** (Full): The comparative value of the full value can be preset.

For information on detection conditions, refer to "5.5.1. Sequential Weighing".

5.1.11. User I/O (Remote I/O)

User I/O (user input and user output) can be used for the user's arbitrary application and is not directly related to the weighing system. Therefore it can turn on the control output using a command on the interface and can check the state of the control input terminal.

❑ **Example 1. of Use**

We want to monitor a photo sensor using the PLC, but, there is not an input port.

- Assign a control input terminal to user input. Connect a photo sensor to this terminal.
- Monitor this terminal connected to the photo sensor using user I/O of the CC-Link.

❑ **Example 2. of Use**

We want to control a relay using remote operation by the PLC, but, there is no output port.

- Assign a control output terminal to user output. Connect a relay to this terminal.
- Control this terminal connected to relay using user I/O of the CC-Link.

❑ **Example 3. of Use**

We want to monitor a controlled relay by the PLC on the front panel of the AD-4430C.

- Assign a control output terminal to user output. Connect a relay to this terminal.
- Assign a monitored output terminal to the dispaly x.

5.1.12. Digital Filter 1 and 2 (Fnc05 and Fnc06)

The AD-4430C has two digital filters. The cutoff frequency setting range is different for each.

- Digital filter 1 (**Fnc05**: None, 100.0Hz (high) to 0.7Hz (low))
- Digital filter 2 (**Fnc06**: None, 100.0Hz (high) to 0.07Hz (low))

Setting cutoff frequency

The cutoff frequency is the frequency where the vibration starts to decline.

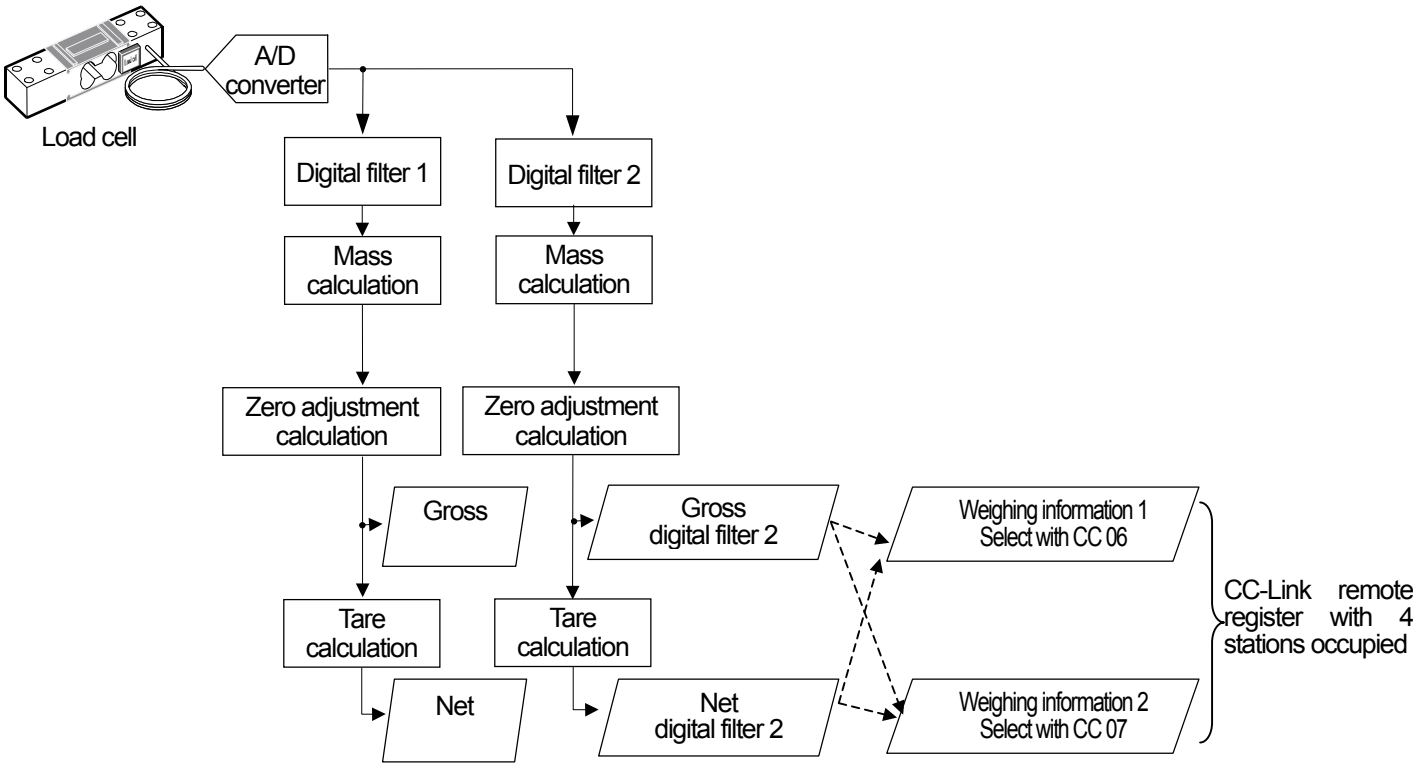
- If the weighing value is unstable, lower the cutoff frequency.
  (Response rate is slow. Resistant to disturbance.)
- To make the response faster, higher the cutoff frequency.
  (Response rate is fast. Susceptible to disturbance.)

It is possible to make adjustments while watching the effects of the digital filter.

Press the [→] key while setting values as shown in Step 4 in **"5.7.1.Setting"** to check the weight displayed.

- The [↑] key changes the cutoff frequency. You can check the setting value on the LED status indicator (binary number).
- The [→] key returns to the value setting display. (The setting value changed above using the [↑] key will be displayed)

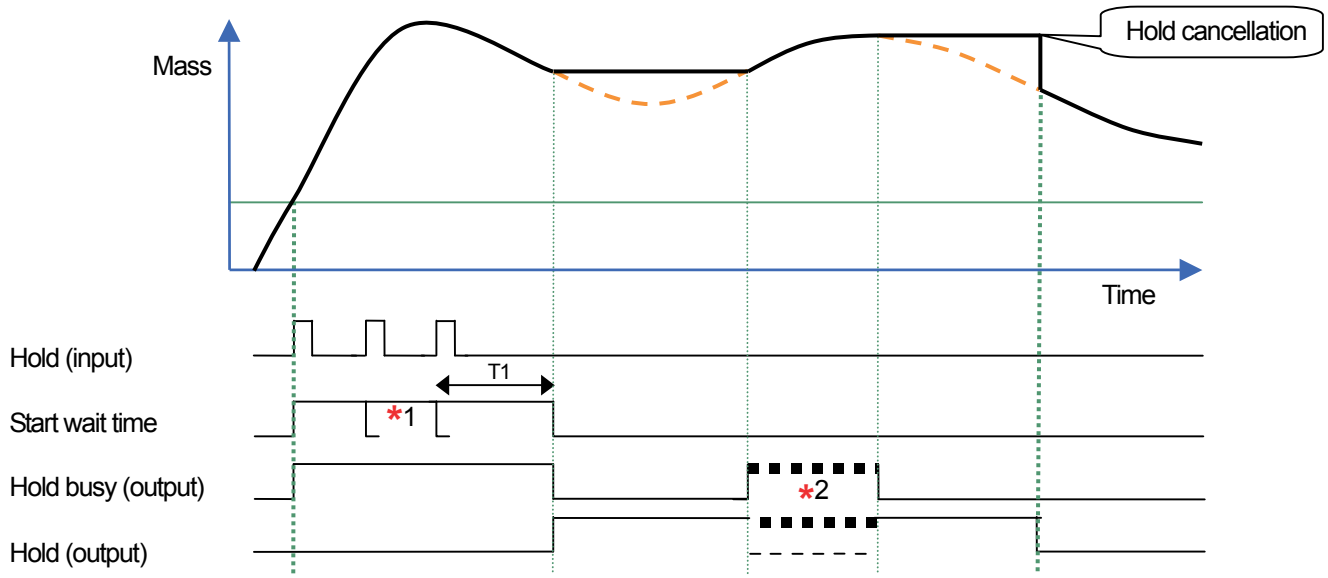
The digital filter flow chart is shown below.



5.1.13. The Hold Function

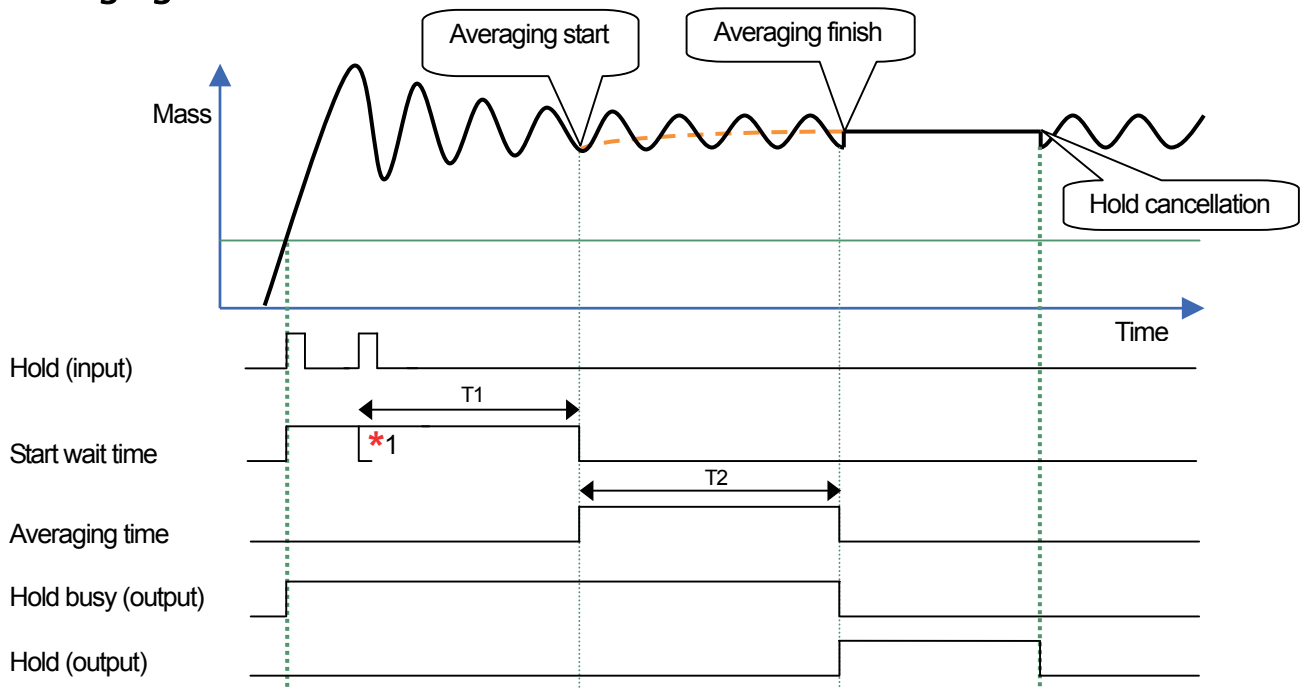
- There are three types of hold functions which can be used for different purposes.
- **Normal hold**
  The normal hold function holds the value displayed at the time the hold command was received.
- **Peak hold**
  The Peak hold function holds the maximum value reached after the hold command was received. The value will be refreshed if it increases again.
- **Averaging hold**
  The averaging hold function averages weighing data over a certain period of time and then holds the result. It is useful for measuring things that are difficult to weigh such as an animal that won't settle down, or for averaging out the weight of an object in an unstable state. In addition, it can reduce the effects of breezes which the digital filter cannot eliminate.
- **Functions Related to the Hold Function**
  - **Fnc07**(Hold) **:** The type of hold function can be selected.
  - To set operating conditions for the hold function, set the averaging time length, standby time, or start and stop conditions with **HLd01** to **HLd07**. (Will not affect normal holds)

Peak hold



T1 : Time set for the start wait time in **Hld02**. Scale: 0.01 sec. Range 0.00 to 9.99 sec.
*1 : Each additional hold input resets the start wait time.
*2 : When the hold value is updated, the hold (output) and the hold busy signals turn on and off.
(The hold busy variation depends on the change of the mass value).

Averaging hold



T1 : Time set for the start wait time in **Hld02**. Scale: 0.01 sec. Range 0.00 to 9.99 sec.

T2 : Time set for the averaging time in **Hld01**. Scale: 0.01 sec. Range 0.00 to 9.99 sec.

*1 : Each additional hold input resets the start wait time.

5.2. State Diagram And Operation Switches

5.2.1. State Diagram

The nonvolatile memory always stores either OFF mode or other mode. It starts from the following state depending on the mode that has been kept when the automatic power is on.

- OFF mode (standby) : Starts from OFF mode.
- Other mode : Starts from Weighing mode.

State diagram can be switched as follows.

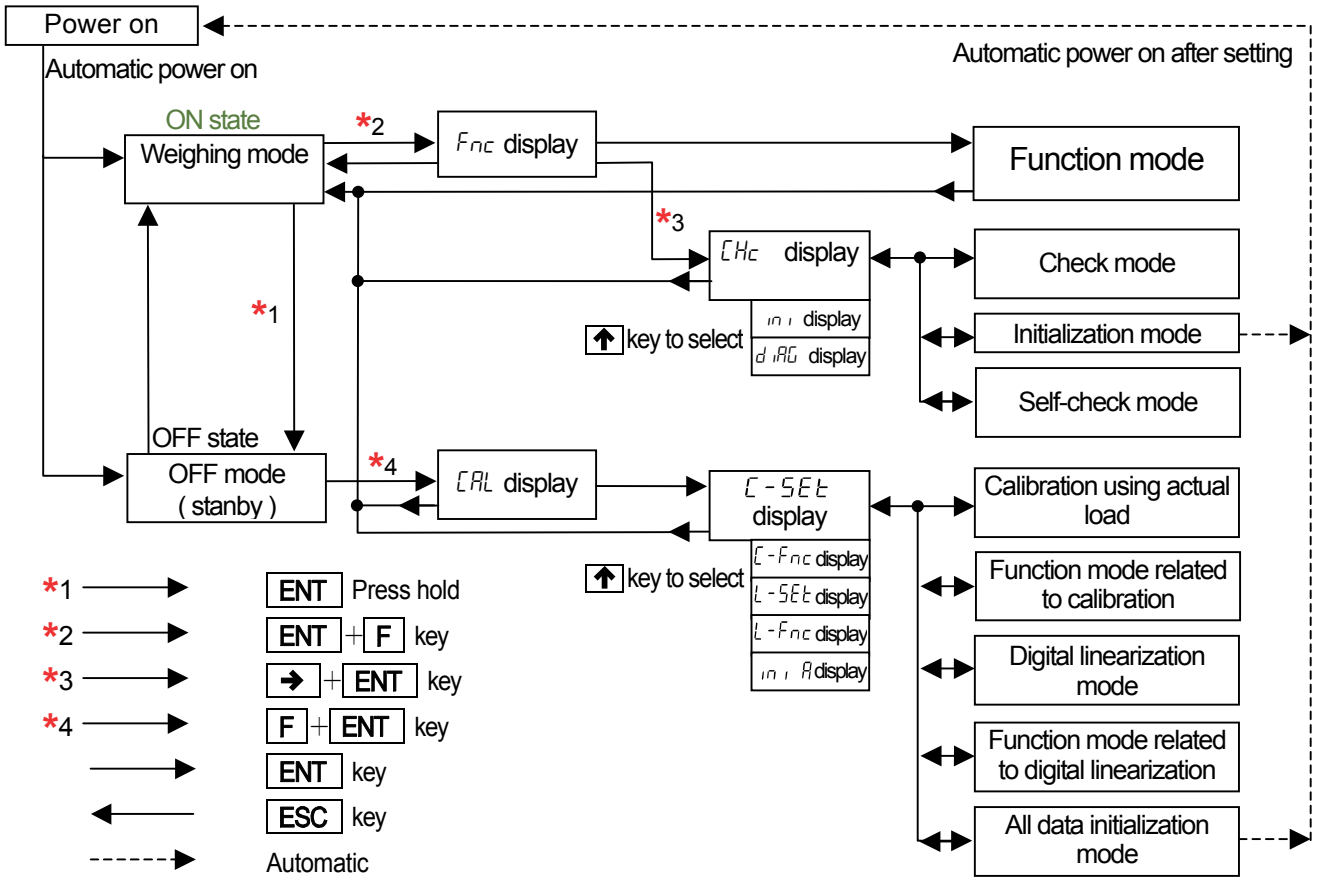


Illustration 7 State diagram

5.2.2. Operation Switches

Key	State	Function and Use
F	Weighing mode	The display switch between gross and net in factory setting. The function key to able to select an arbitrary function and use.
	Setting mode	The ESC key.
→	Weighing mode	The zero key to perform the zero operation.
	Setting mode	The key to change a selected item or move a flashed figure.
↑	Weighing mode	The tare key.
	Setting mode	The key to select parameter or increase number.
ENT	Weighing mode	The key to turn the module off when pressing and holding the key.
	OFF state (Standby)	The key to turn the module on.
	Setting mode	The key to store new settings.
ESC	Weighing mode	The function key (F key) to be selected the function and use.
	Setting mode	The return key or escape key.
ENT + F	Weighing mode	The keys to proceed to the function mode from weighing mode.
→ + ENT	Setting mode	The keys to proceed to the check mode from function mode.
F + ENT	OFF state (Standby)	The keys to proceed to the calibration mode from OFF state (Standby).

5.3. The Calibration

5.3.1. Outline of the Calibration

In the calibration mode, operations relating the load cell output voltage to the weighing value can be performed as well as operations directly related to weighing can be performed.

The calibration using actual load	The calibration is performed using a calibration weight.。 ■ Zero calibration **:** Press ENT key when no load is applied. ■ Span calibration **:** Enter the calibration weight value and place the calibration weight. When the module enters the calibration mode using an actual load, the tare value and the zero value will be automatically cleared.
Digital span	The calibration is performed without an actual load by numerical input of the load cell output voltage (mV/V). Set these functions related to the calibration. ■ Zero input voltage **:** Numerical input of the load cell output at zero. ■ Span input voltage **:** Numerical input of the load cell output of span. (Load cell output at full capacity – load cell output at zero) ■ The calibration weight value of span **:** Numerical input of the calibration weight value corresponding to the span input voltage. (These values relate the span input voltage and the calibration weight value.)
Gravity acceleration correction	The span error is calculated and corrected when gravity acceleration between the calibration location and use location is different.
Digital linearization	The nonlinearity correction function to correct weighing errors that occur halfway between the zero point and maximum capacity. Up to 4 points can be input in addition to the zero point, and the intervals between each point will be calculated using curves.
Function related to the calibration	The function stores basic parameters of the module such as the minimum division and maximum capacity and other data directly related to weighing is performed. Digital span calibration and gravity acceleration correction setting are also performed here.
All data initialization	All the data such as zero value, tare value, calibration data and function data are initialized.

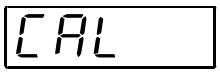
- ❑ All the parameters in the calibration mode are stored in the FRAM.
- ❑ Actual load calibration and digital span can be mixed.
  Example**:** For the zero calibration, an actual load is used. For the span calibration, the digital span is used.

5.3.2. The Calibration using Actual Load (C-SEt)

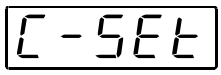
The calibration using actual load (C-SEt) is performed using a calibration weight. When performing the calibration for the first time, preset **C-F01** (Unit), **C-F02** (Decimal point position), **C-F03** (Minimum division) and **C-F04** (Maximum capacity) related to the calibration.

Note To avoid drift caused by changes in temperature, warm up the indicator for ten minutes or more before performing the calibration with an actual load.

Step 1 In the OFF mode (Standby), Press the **F** + **ENT** key to enter to the calibration mode and display CAL.

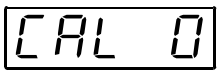


Step 2 Press the **ENT** key to start the calibration and display C-SEt. To return to the weighing mode, press the **ESC** key.

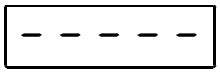


Zero Calibration

Step 3 Press the **ENT** key to display CAL 0. If zero calibration is not to be performed, press the ↑ key and proceed to Step 5. To check the current weighing value, press the → key. When pressing the ↑ key again, CAL 0 is display.

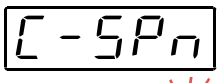


Step 4 Wait for the stabilization (**S** LED). Press the **ENT** key. ----- is displayed for approximately two seconds. If span calibration is not performed, press the **ESC** key twice to return to the weighing mode.



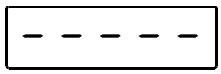
Span Calibration

Step 5 Press the **ENT** key when C-SPn is displayed. The calibration weight value (the current maximum capacity) is displayed and the least digit of the value blinks. Correct the value using the → and ↑ key so as to be the value of the calibration weight used. If span calibration is not performed, press the **ESC** key three times to return to the weighing mode.



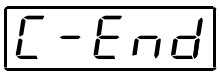
Example

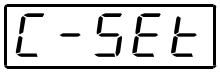
Step 6 Place the calibration weight on the pan. Wait for the stabilization (**S** LED). Press the **ENT** key. ----- is displayed for approximately two seconds.



Step 7 C-End is displayed.

Step 8 Press the **ESC** key. C-SEt is displayed and the calibration data is stored in the nonvolatile memory.





Step 9 The current state is the same as that of Step 2. To return to the weighing mode, press the **ESC** key.

- If C Er X is displayed, an error has occurred. Refer to "**5.3.8. Error Codes for the Calibration**" to take corrective action. X : error number.
- The blinking decimal point means that the current value is not the weight value.

5.3.3. Gravity Acceleration Correction

- When the scale (weighig indicator) has been calibrated in the same place as it is being used, gravity acceleration correction is not required.
- A span error will appear if gravity accelerations are different between the calibration place and the use place. The gravity acceleration correction calculates and corrects this span error by these gravity acceleration correction values for both points (the calibration place and use place).

Note **When the span is calibrated using actual load, the gravity acceleration correction settings are cleared, and the two gravity acceleration settings return to their default values.**

- **Functions Related to the Gravity Acceleration Correction**
  - **C-F26** (Gravity acceleration of the calibration place)**:**
    The gravity acceleration where the module has been calibrated.
  - **C-F27** (Gravity acceleration of use place)**:**
    The gravity acceleration where the module is being used.

Gravity Acceleration Table

Amsterdam	9.813	m/s^2	Manila	9.784	m/s^2
Athens	9.800	m/s^2	Melbourne	9.800	m/s^2
Auckland NZ	9.799	m/s^2	Mexico City	9.779	m/s^2
Bangkok	9.783	m/s^2	Milan	9.806	m/s^2
Birmingham	9.813	m/s^2	New York	9.802	m/s^2
Brussels	9.811	m/s^2	Oslo	9.819	m/s^2
Buenos Aires	9.797	m/s^2	Ottawa	9.806	m/s^2
Calcutta	9.788	m/s^2	Paris	9.809	m/s^2
Chicago	9.803	m/s^2	Rio de Janeiro	9.788	m/s^2
Copenhagen	9.815	m/s^2	Rome	9.803	m/s^2
Cyprus	9.797	m/s^2	San Francisco	9.800	m/s^2
Djakarta	9.781	m/s^2	Singapore	9.781	m/s^2
Frankfurt	9.810	m/s^2	Stockholm	9.818	m/s^2
Glasgow	9.816	m/s^2	Sydney	9.797	m/s^2
Havana	9.788	m/s^2	Tainan	9.788	m/s^2
Helsinki	9.819	m/s^2	Taipei	9.790	m/s^2
Kuwait	9.793	m/s^2	Tokyo	9.798	m/s^2
Lisbon	9.801	m/s^2	Vancouver, BC	9.809	m/s^2
London (Greenwich)	9.812	m/s^2	Washington DC	9.801	m/s^2
Los Angeles	9.796	m/s^2	Wellington NZ	9.803	m/s^2
Madrid	9.800	m/s^2	Zurich	9.807	m/s^2

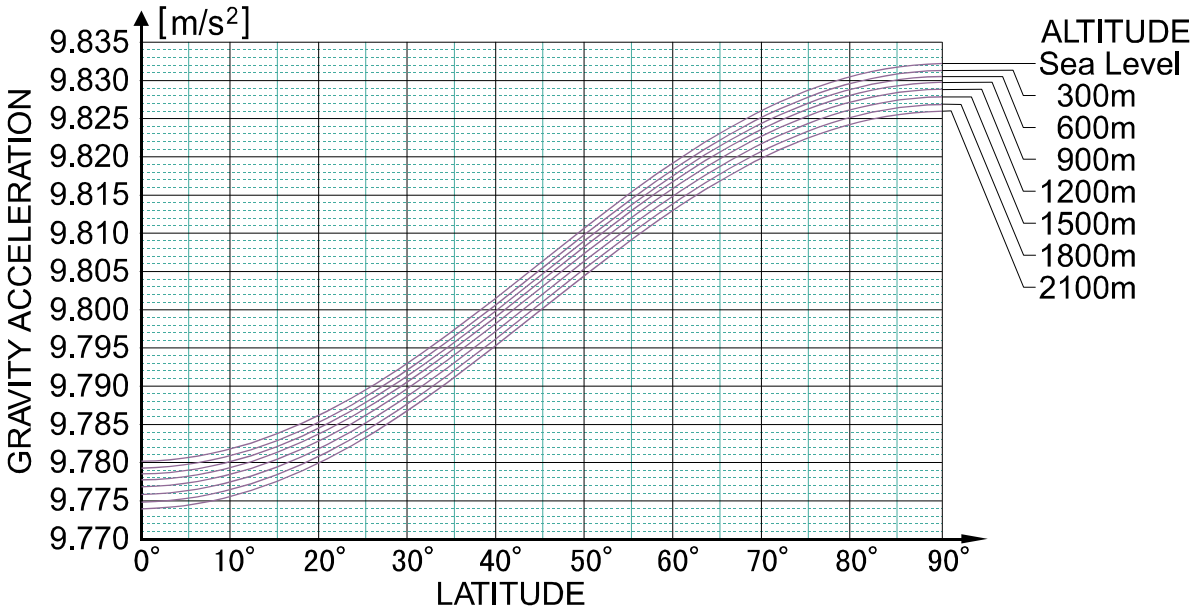


Illustration 8 Gravity acceleration graph

5.3.4. The Linearization Function

Outline

Even if zero and span calibration have been performed, weighing errors may occur between the zero point and maximum capacity. The digital linearization (L-SEt) is a corrective function designed to non-linearly correct weighing errors.

- It is possible to input up to four points in addition to the zero point.
- The zero point and each input point will be corrected to put them in a straight line.
- Areas between input points that could not be corrected completely with straight line correction or with secondary correction will be corrected using a curved line derived from high-order equations.
- When the actual load input for digital linearization is performed, the calibrated data will be refreshed using zero point and final input point data. It is not necessary to calibrate again.

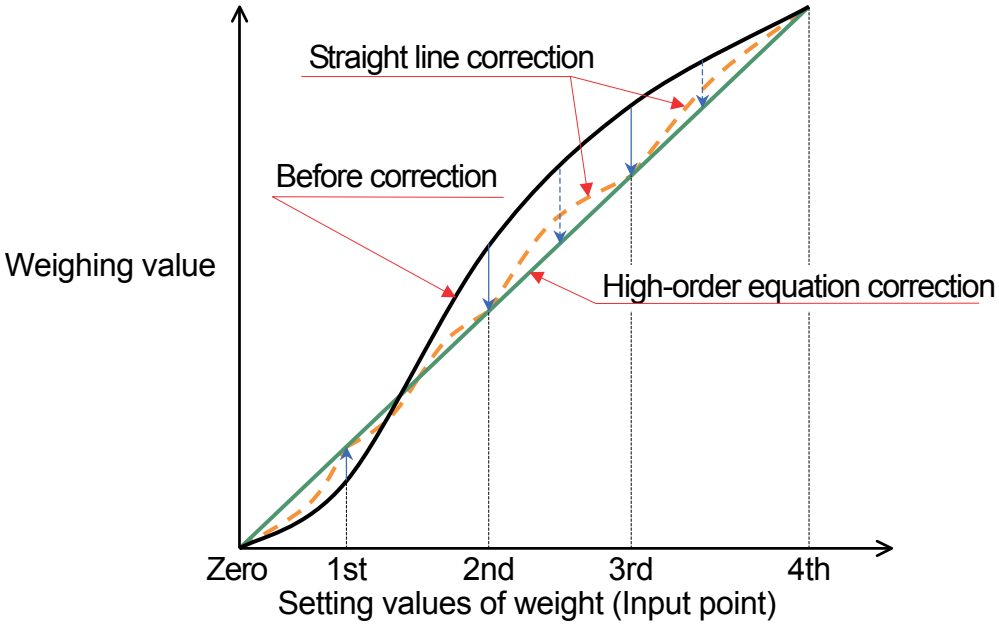


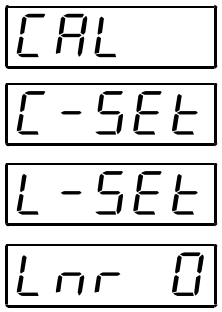
Illustration 9 Digital linearization

5.3.5. The Actual Load Linearization Function (L-SEt)

Set the digital linearization by loading/unloading masses.

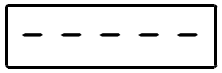
- Warm up the module for at least ten minutes to avoid the effects of temperature drift.
- The input order should proceed from the smallest mass to the largest mass.

Step 1 Press the F + ENT key to enter to the calibration mode and display CAL. Press the ENT key to start the calibration and display C-SEt. Select L-SEt using the ↑ key and press the ENT key.

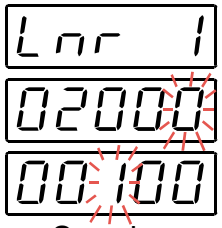


Step 2 Lnr 0 is displayed.
If monitoring the current weighing value, press the → key.
When pressing the → key again, Lnr 0 is display.

Step 3 Wait for the stabilization (S LED). Press the ENT key.
----- is displayed for approximately two seconds.

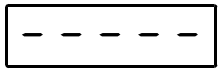


Step 4 Lnr 1 is displayed.
If you want to check the current weighing value, press the → key. When pressing the → key again, Lnr 1 is displayed.
Press the ENT key. The weight value (the current maximum capacity) is displayed and the least digit of the value blinks.
Correct the value using the → and ↑ key so as to be the weight value used.

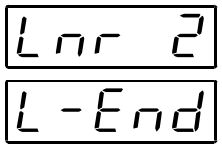


Step 5 Place the weight on the pan. Wait for the stabilization (S LED).
Press the ENT key. ----- is displayed for approximately two seconds.

Sample

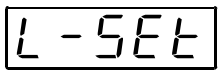


Step 6 Lnr 2 is displayed. Repeat step 4 and step 5. The procedure proceeds in order of Lnr 3 → Lnr 4 → L-End.



Step 7 Proceed to step 8 to finish the input operation.
If you re-input the digital linearization, select the input point using the ↑ key. All data following the new input point will be cleared.

Step 8 Press the ESC key. L-SEt is displayed and the inputted data will be stored in the nonvolatile memory. At the same time, the calibrated data is also refreshed. Press again the ESC key to return to weighing mode.



- When C Er x is displayed, an error will occur. x : error number.
  Refer to "**5.3.8. Error Codes for the Calibration**" for details.
- The blinking decimal point means that the current value is not the weight value.

5.3.6. The Calibration Function (C-Fnc)

Step 1 Press the F + ENT key to enter to the calibration mode and display CAL .
Press the ENT key to start the calibration and display C-SEt .
Press the ESC key to return to weighing mode.

Step 2 Select C-Fnc using the ↑ key and press the ENT key.

Step 3 Select a desired function item (a function group name with function number) using the ↑ key and press the ENT key.
The current data is displayed.

Step 4 When changing data, two methods of parameter selection and digital input depending on the function are available.

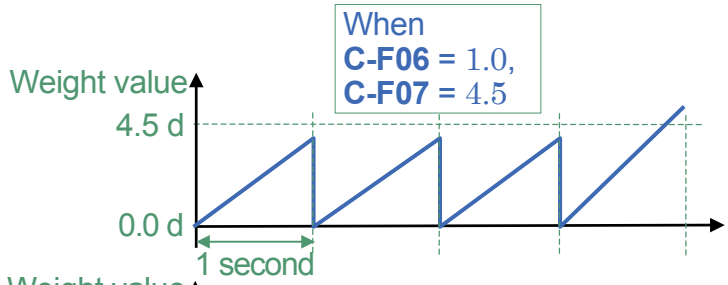
Type	Description of method to change data
Parameter selection	Only the available parameter is displayed and blinks. Select a number using the ↑ key.
Digital input	All the digits are displayed. A digit to be changed blinks. Select a digit using the → key and change the value using the ↑ key.

After changing data, press the ENT key. The next function number is displayed.
When the value is not to be changed, press the ESC key to return to the function number display.

Step 5 Press the ESC key to store new data in FRAM and C-Fnc is displayed.
Press again the ESC key to return to the weighing mode.

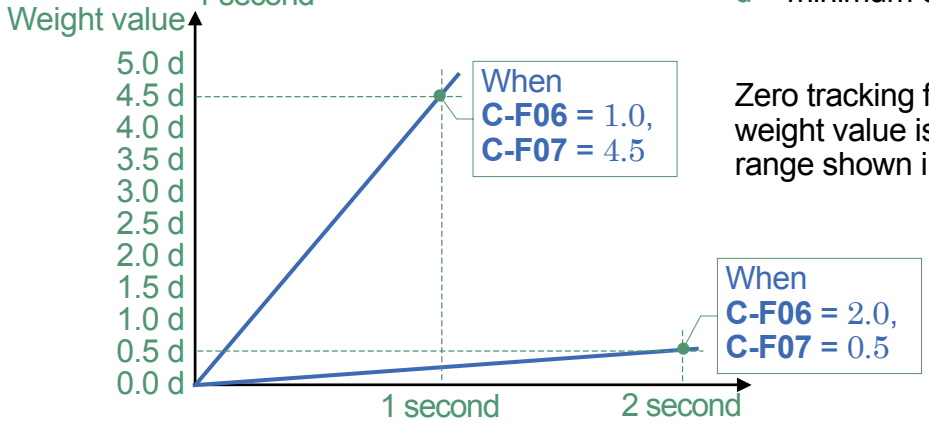
- The blinking decimal point means that the current value is not the weight value.
- If digital input data is out of range, Errdt is displayed, and the data is canceled.
- The function code on the next page is used for commands of the CC-Link and USB.

Item Name	Function code	Description, Range and Default value
C-F01 Unit	1001	0 : Not used 1 : g [2]: kg 3 : t 4 : N 5 : kN
C-F02 Decimal point position	1002	Decimal point position of the weighting value [0]: 0 1 : 0.0 2 : 0.00 3 : 0.000 4 : 0.0000
C-F03 Minimum division	1003	Minimum division (d) of the weighting value [1]: 1 2 : 2 3 : 5 4 : 10 5 : 20 6 : 50
C-F04 Weighing capacity	1004	Maximum capacity of the module. Weighing is possible up to the value of this setting plus 8 digits. If the value exceeds this, overflow will occur and will not be displayed. **#1** 1 to [70000] to 99999
C-F05 Zero range	1005	The range to enable zero operation by the [→(ZERO)] key expressed as a percentage of the maximum capacity with the calibration zero point as the center. For example, if 2 is set, the value in the range of ±2% of the maximum capacity with the center at the calibration zero point will be to zero. When a power-ON zero is performed, the initial zero point will be the center. 0 to [2] to 100
C-F06 Zero tracking time	1006	Performs zero tracking using this setting in combination with the setting of **C-F07**. When **C-F06** stores 0.0, zero tracking will not be performed. Scale : 0.1 seconds. [0.0] to 5.0
C-F07 Zero tracking width	1007	Performs zero tracking using this setting in combination with the setting of **C-F06**. When **C-F07** stores 0.0, zero tracking will not be performed. Scale : 0.1 d (minimum division). [0.0] to 9.9



Zero tracking follows the weight value drifting around the zero point and adjusts to display as zero.

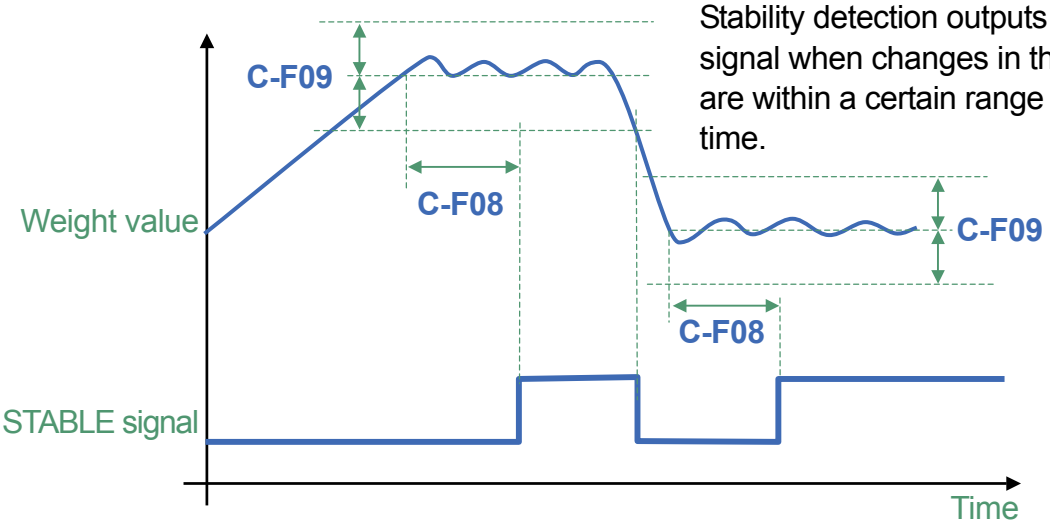
d = minimum division = 1 digit



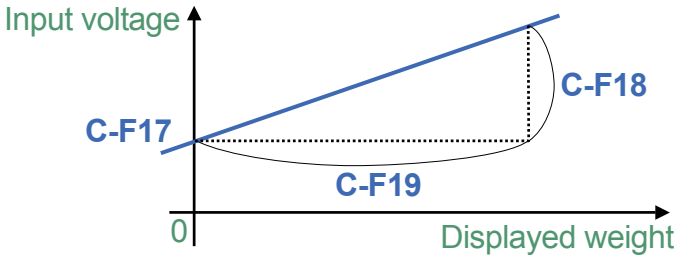
Zero tracking functions when the weight value is drifting within the range shown in the graph.

#1: The decimal point position depends on **C-F02** (Decimal point position).

- The function code on the next page is used for commands of the CC-Link and USB.

Item Name / Function code	Description, Range and Default value
C-F08 1008 Stability detection time	Performs stability detection using this setting in combination with the setting of **C-F09**. When **C-F08** stores 0.0, stability detection will not be performed. (Stable all the time) Scale : 0.1 seconds. 0.0 to [1.0] to 9.9
C-F09 1009 Stability detection width	Performs stability detection using this setting in combination with the setting of **C-F08**. When **C-F09** stores 0, stability detection will not be performed. (Stable all the time) Scale : 0.1 d (minimum division). 0 to [2] to 9
	Stability detection outputs the STABLE signal when changes in the weight value are within a certain range during a certain time.
C-F10 1010 Tare and zero at unstable weight value	Tare and zero operation when unstable 0 : Disables both functions. [1] : Enables both functions.
C-F11 1011 Tare when the gross weight is negative	Tare when the gross weight is negative. 0 : Disables tare. [1] : Enables tare.
C-F12 1012 Output when out of range and unstable	Standard serial output when the weight value overflows or is unstable. 0 : Disables output. [1] : Enables output.
C-F13 1013 Exceeding negative gross weight	To judge when the negative gross weight is exceeded. [1] : Gross weight < -99999 2 : Gross weight < Negative maximum capacity 3 : Gross weight < -19 d
C-F14 1014 Exceeding negative net weight	To judge when the negative net weight is exceeded. [1] : Net weight < -99999 2 : Net weight < Negative maximum capacity
C-F15 1015 Clear the zero value	Select whether or not to clear the zero value. 0 : Disables. [1] : Enables.
C-F16 1016 Zero setting when power is turned on	Select whether or not to perform zero setting when power is turned on. [0] : Not used. 1 : Use.

Item Name / Function code	Description, Range and Default value
C-F17 1017 Input voltage at zero	Input voltage from a load cell at zero. Scale : mV/V. This value is determined in zero calibration during the calibration with an actual load. Scale : 0.0001 mV/V. −7.0000 to [0.0000] to 7.0000
C-F18 1018 Span input voltage	Input voltage from a load cell at span. This value and the value of **C-F19** are determined in span calibration during the calibration with an actual load. Scale : 0.0001 mV/V. 0.0100 to [3.2000] to 9.9999
C-F19 1019 Weight against span Input voltage	The calibration weight value corresponding to the input voltage at span of **C-F18**. When performing digital span, **C-F17**, **C-F18** and **C-F19** are required for the calibration. **#1** 1 to [32000] to 99999



NOTE:

***1** Record the setting values of **C-F17**, **C-F18** and **C-F19** in the "Function list" at the end of the manual to prepare against a malfunction.

***2** By changing the parameters of **C-F17**, **C-F18** and **C-F19**, "Zero calibration" and "Span calibration" can be adjusted optionally. (Digital span accuracy approximately 1/5000. The accuracy varies depending on the load cell output accuracy and the conditions of the calibration.)

Caution Excluding emergencies, perform the calibration with an actual load.

C-F26 1026 Gravity acceleration of the calibration place	Gravity acceleration of the place where the scale is calibrated. Scale : 0.0001 m/s^2. 9.7500 to [9.8000] to 9.8500
C-F27 1027 Gravity acceleration of use place	Gravity acceleration of the place where the scale is being used. Scale : 0.0001 m/s^2. 9.7500 to [9.8000] to 9.8500
C-F28 1028 Suppression of the hold function	[0]: Permission 1: Prohibition

#1 : The decimal point position depends on **C-F02** (Decimal point position).

5.3.7. The Linearization Function (L-Fnc)

❑ Confirm and change linearity settings.
To use this function, select [L-Fnc] in the same way as the function related to the calibration are selected.

Item Name	Function code	Description, Range and [Default value]
L-F01 Number of input points	1101	Number of points where linear input was done. The linear-zero input is included as one point. Digital linearization is not performed when the set value is between 0 and 2. [0] to 5
L-F02 Linear−zero	1102	Voltage for linear-zero input. Scale : 0.0001 mV/V. −7.0000 to [0.0000] to 7.0000
L-F03 Setting value for linear 1	1103	The setting value of weight for linear 1 input. #1 [0] to 99999
L-F04 Span at linear 1	1104	The span voltage between linear-zero and linear 1 input. Scale : 0.0001 mV/V. [0.0000] to 9.9999
L-F05 Setting value for linear 2	1105	The setting value of weight for linear 2 input. #1 [0] to 99999
L-F06 Span at linear 2	1106	The span voltage between linear-zero and linear 2 input. Scale : 0.0001 mV/V. [0.0000] to 9.9999
L-F07 Setting value for linear 3	1107	The setting value of weight for linear 3 input. #1 [0] to 99999
L-F08 Span at linear 3	1108	The span voltage between linear-zero and linear 3 input. Scale : 0.0001 mV/V. [0.0000] to 9.9999
L-F09 Setting value for linear 4	1109	The setting value of weight for linear 4 input. #1 [0] to 99999
L-F10 Span at linear 4	1110	The span voltage between linear-zero and linear 4 input. Scale : 0.0001 mV/V. [0.0000] to 9.9999

#1 : The decimal point position depends on **C-F02** (Decimal point position).

5.3.8. Error Codes for the Calibration (C Er8)

When an error occurs during the calibration, the error number is displayed. If calibration is finished without removing the error, the setting values will be restored to the state before calibration.

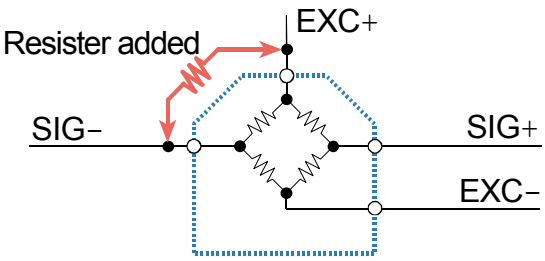
Calibration errors and remedies

Error No.	Description of cause	Treatment
C Er1	The display resolution (maximum capacity / minimum division) exceeds the specified value.	Make the minimum division greater or make the maximum capacity smaller. The specified value depends on specifications of the weighing system.
C Er2	Voltage at zero calibration exceeds in the positive direction.	Check the load cell rating and connection. When nothing is wrong with the rating and connection, adjust the load cell output as described in the next section. When the load cell or A/D converter may be the cause of error, confirm this by using the check mode.
C Er3	Voltage at zero calibration exceeds in the negative direction.	
C Er4	The value of the calibration weight exceeds the maximum capacity.	Use an appropriate the calibration weight and calibrate again.
C Er5	The value of the calibration weight is less than the minimum division.	
C Er6	The load cell sensitivity is not sufficient.	Use a load cell with higher sensitivity or make the minimum division greater.
C Er7	Voltage at span calibration is less than voltage at the zero point.	Check the load cell connection.
C Er8	The load cell output voltage is too high when the mass of maximum capacity is weighed.	Use a load cell with a greater rating or make the maximum capacity smaller.

5.3.9. Adjustment of the Load Cell Output

Add a resistor as shown below to adjust the load cell output.
Use a resistor with a high resistance value and a low temperature coefficient.

"C Er2"
When exceeding in the positive direction.



"C Er3"
When exceeding in the negative

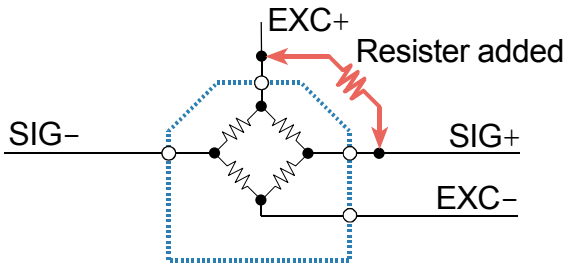


Illustration 10 Load cell output adjustment

- Because the zero point of the module has a wide adjustable range, correcting the output of a normal load cell is hardly ever required.
  Before an output correction is carried out, confirm load cells (deformation, wiring mistakes, contact with anything, or model selection etc.) and connections.

5.4. The List of General Functions

General functions are divided into groups according to function and are indicated by function item (function group name with function number).

All the parameters in the general functions are stored in the nonvolatile memory (FRAM).

5.4.1. The Procedure to Store New Parameters

Step 1 Press the ENT + F key to enter to the function mode and display Fnc F .
Press the ENT key to start the function mode.
To return to the weighing mode, press the ESC key.

Step 2 Press the ↑ key to select the function group to be set.
Pre

Display	Group name
Fnc F	Basics function
HLd F	Hold function
SQ F	Sequence function
SP F	Setpoint function
IO F	Control I/O function
CL F	Standard serial output function
CC F	CC-Link function

ss the ENT key. The function group is as follows :

Step 3 Press the ↑ key to select the function number to be set.
Press the ENT key. The current setting value is displayed.

Step 4 When changing parameter, two methods of parameter selection and digital input depending on the function are available.

Type	Description of method to change data
Parameter selection	Only the available parameter is displayed and blinks. Select a number using the ↑ key.
Digital input	All the digits are displayed. The digit to be changed blinks. Select the digit using the → key. Change the value using the ↑ key.

After changing data, press the ENT key. The next function number is displayed.
When the value is not to be changed, press the ESC key to return to the function number display.

Step 5 Press the ESC key to turn off the function number display and return to Step 2.
Press the ESC key once more to store new parameters in the nonvolatile memory (FRAM) and to return to the weighing mode.

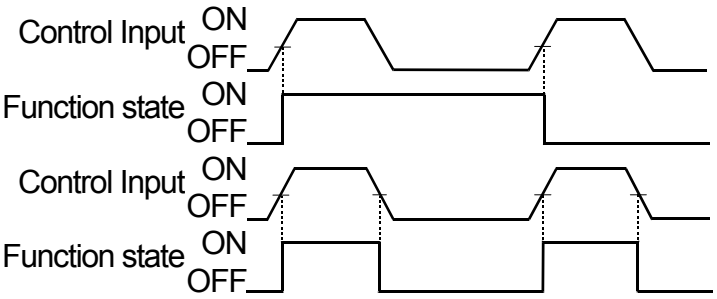
- The blinking decimal point means that the current value is not the weight value.
- If a data exceeding the available range is inputted, Errdt is displayed, and the data is canceled.
- The function code on the next page is used for commands of the CC-Link and USB.

5.4.2. The Basics Function (Fnc F)

Item Function code Name	Description, Range and Default value
Fnc01 1201 Key switch disable	Each digit of the setting corresponds to a key switch. Only available in the weighing mode. Key assignment to each binary digit. 0: Permission 4th 3rd 2nd 1st digit 1: Prohibition ESC → ↑ ENT 0000 to 1111
Fnc02 1202 F key	0: None 7: Zero clear 1: Manual print command 8: Weighing start / Pause / Re-start 2: Hold 9: Actual free fall input 3: Alternative switch (Active F key) 10: One shot, Small flow 4: Momentary switch (Active F key) 11: Sequence flow rate monitor 5: Display exchange 12: mV/V monitor 6: Tare clear 13: Digital filter 2
Fnc03 1203 Display update rate	1: 20 times/sec. 2: 10 times/sec. 3: 5 times/sec.
Fnc04 1204 x display	0 : None 11: Over 1: Zero tracking in progress 12: OK 2: Alarm (Zero range setting error, over) 13: Under 3: Active F key 14: Full value 4: Near-zero 15: Weighing sequence, finished 5: HI output (Over the upper limit value) 16: Weighing sequence, in processing 6: OK output (Between upper and lower limit values) 17: Weighing sequence, error 7: LO output (Below the lower limit value) 18: Normal batch / Discharge, Identification (ON = Loss in weight) 8: Large flow 9: Medium flow 19 to 24: User input1 to 6 10: Small flow 25 to 32: User output 1 to 8
Fnc05 1205 Digital filter 1	Selects a cutoff frequency. 0 : None 6 : 20.0 Hz 12 : 2.8 Hz 1 : 100.0 Hz 7 : 14.0 Hz 13 : 2.0 Hz 2 : 70.0 Hz 8 : 10.0 Hz 14 : 1.4 Hz 3 : 56.0 Hz 9 : 7.0 Hz 15 : 1.0 Hz 4 : 40.0 Hz 10 : 5.6 Hz 16 : 0.7 Hz 5 : 28.0 Hz 11 : 4.0 Hz
Fnc06 1206 Digital Filter 2	Selects a cutoff frequency. 0 : None 6 : 20.0 Hz 12 : 2.8 Hz 18 : 0.40 Hz 1 : 100.0 Hz 7 : 14.0 Hz 13 : 2.0 Hz 19 : 0.28 Hz 2 : 70.0 Hz 8 : 10.0 Hz 14 : 1.4 Hz 20 : 0.20 Hz 3 : 56.0 Hz 9 : 7.0 Hz 15 : 1.0 Hz 21 : 0.14 Hz 4 : 40.0 Hz 10 : 5.6 Hz 16 : 0.7 Hz 22 : 0.10 Hz 5 : 28.0 Hz 11 : 4.0 Hz 17 : 0.56 Hz 23 : 0.07 Hz
Fnc07 1207 Hold	1: Normal hold 2 : Peak hold 3 : Averaging hold
Fnc08 1208 Set near-zero	The reference value for near-zero. Decimal point position depends on **C-F02** (Decimal point position). −99999 to 10 to 99999

Item Name / Function code	Description, Range and Default value
Fnc09 1209 Comparison target at near-zero	Item to be compared with near-zero. 1: Gross weight 2: Net weight
Fnc10 1210 Upper limit value	Decimal point position depends on C-F02. −99999 to 10 to 99999
Fnc11 1211 Lower limit value	Decimal point position depends on C-F02. −99999 to −10 to 99999
Fnc12 1212 Comparison target of upper and lower limit	Item to be compared with the upper and lower limit. 1: Gross weight 2: Net weight
Fnc13 1213 Full value	Target of comparison is gross weight. Decimal point position depends on C-F02. −99999 to 99999

5.4.3. The Hold Function (HLd F)

Item Name / Function code	Description, Range and Default value
HLd01 1301 Averaging time	Time to perform the averaging. 0.00 is not averaged. Scale : 0.01 seconds. 0.00 to 9.99
HLd02 1302 Start wait time	Waiting time to commence holding or averaging. Scale : 0.01 seconds. 0.00 to 9.99
HLd03 1303 Condition of automatic start	The condition to commence holding or averaging. 0: Not used 2 : Above the near-zero 1: Above the near-zero, and stable
HLd04 1304 Release using control input	Release when control input of the hold terminal is falling. 0: Do not release 1: Release 
HLd05 1305 Release time	Release after a set amount of time has passed. 0.00 is not averaged. Scale : 0.01 seconds. 0.00 to 9.99
HLd06 1306 Release using fluctuation range	Release when fluctuation from the holding value exceeds a set value. Scale : 0.01 seconds. #1 0 to 99999
HLd07 1307 Release at near-zero	Release when the weighing value is in the near-zero. 0 : Do not release. 1 : Release.

- This hold function only works when **Fnc07** (Hold) stores 2 (peak hold) or 3 (averaging hold). This hold function has no function when **Fnc07** (hold) stores 1 (normal hold).
- **HLd01** (averaging time) works only when **Fnc07** (hold) stores 3 (averaging hold).

#1 : The decimal point position depends on **C-F02** (Decimal point position).

5.4.4. The Weighing Sequence Program Function (59 F)

Item Name	Function code	Description, Range and Default value
Sq 01 Final value	1401	Decimal point position depends on C-F02. −99999 to 0 to 99999
Sq 02 Free fall	1402	Decimal point position depends on C-F02. −99999 to 0 to 99999
Sq 03 Preliminary	1403	Decimal point position depends on C-F02. −99999 to 0 to 99999
Sq 04 Optional preliminary	1404	Decimal point position depends on C-F02. −99999 to 0 to 99999
Sq 05 Over	1405	Decimal point position depends on C-F02. −99999 to 0 to 99999
Sq 06 Under	1406	Decimal point position depends on C-F02. −99999 to 0 to 99999
Sq 07 Weighing mode	1407	0 : Not used 2 : Discharge sequence 3 : Specifying with control input 1 : Normal batch sequence 4 : Specifying with CC-Link
Sq 08 Automatic free fall correction	1408	0 : Not used 3 : Real time free fall compensation (updated coefficient) 1 : Moving average of four times 2 : Real time free fall compensation(fixed coefficient)
Sq 09 Automatic free fall band	1409	Weighing value is compensated automatically when net weight is within (final value ± this band). #1 0 to 99999
Sq 10 Active free fall coefficient	1410	Active free fall coefficient. Scale : 0.001 seconds. −99.999 to 0.000 to 99.999
Sq 11 OK/Over/Under output timing	1411	1 : Always 2 : In synchronization with weighing end
Sq 12 Stability at judgment	1412	0 : Disable 1 : Enable
Sq 13 Automatic tare at weighing start	1413	0 : Disable 1 : Enable
Sq 21 Flow timeout time	1421	Time to detect that weighing sequence is not complete 0 : Not used Scale : 0.1 seconds. 0 to 600
Sq 22 Weighing start input delay time	1422	Waiting time from the start of weighing sequence to the output. Scale : 0.1 seconds. 0.0 to 60.0
Sq 23 Large flow comparison disable time	1423	Timer for preventing gate from malfunctioning due to vibration when opening and closing the gate. Scale : 0.1 seconds. 0.0 to 60.0
Sq 24 Medium flow comparison disable time	1424	
Sq 25 Small flow comparison disable time	1425	
Sq 26 Judging delay time	1426	Waiting time between closing small flow gate and outputting comparison. Scale : 0.1 seconds. 0.0 to 0.1 to 60.0
Sq 27 Weighing end output time	1427	Duration time of outputting weighing result. If 0.0 is set, the result is output until next weighing. Scale : 0.1 seconds. 0.0 to 60.0
Sq 28 One shot time for small flow rate	1428	One shot timer for small flow rate. Scale : 0.01 seconds. 0.00 to 6.00

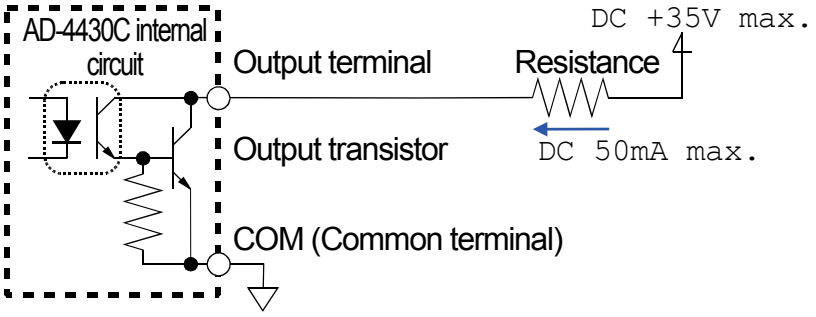
#1 : The decimal point position depends on **C-F02** (Decimal point position).

5.4.5. The Setpoint Function (SP F)

Item Name / Function code	Description, Range and Default value	
SP 01 1501 Object of SP1	Setting values concerning setpoints (SP) Caution : Do not select the same item to plural setpoints. 0 : Not used 1 : Final value 2 : Optional preliminary 3 : Preliminary 4 : Free fall 5 : Over 6 : Under 7 : Full 8 : Near-zero 9 : Free fall coefficient 10 : Upper limit 11 : Under limit	0 to [1] to 11
SP 02 1502 Object of SP2		0 to [2] to 11
SP 03 1503 Object of SP3		0 to [3] to 11
SP 04 1504 Object of SP4		0 to [4] to 11
SP 05 1505 Object of SP5		0 to [5] to 11
SP 06 1506 Object of SP6		0 to [6] to 11
SP 07 1507 Object of SP7		0 to [7] to 11
SP 08 1508 Object of SP8		0 to [8] to 11
SP 11 1511 Parameter of SP1	Setting parameters of setpoints (SP). The decimal point position depends on **C-F02** (Decimal point position).	−99999 to [0] to 99999
SP 12 1512 Parameter of SP2		−99999 to [0] to 99999
SP 13 1513 Parameter of SP3		−99999 to [0] to 99999
SP 14 1514 Parameter of SP4		−99999 to [0] to 99999
SP 15 1515 Parameter of SP5		−99999 to [0] to 99999
SP 16 1516 Parameter of SP6		−99999 to [0] to 99999
SP 17 1517 Parameter of SP7		−99999 to [99999]
SP 18 1518 Parameter of SP8		−99999 to [10] to 99999

The setpoint (comparator data) is the function to compare data.

5.4.6. The Control I/O Function (io F)

Item Name / Function code	Description, Range and Default value	
io 01 1601 Function of IN1	0 : Not used 1 to 6 : User input 1 to 6 7 : Zero 8 : Tare 9 : Hold 10 : Gross / Net exchange 11 : Diagnose 12 : Print command 13 : Weighing start 14 : Pause 15 : Restart 16 : Emergency stop (Level input) 17 : Error reset 18 : Normal batch/ Loss-in-weight exchange 19 : Actual free fall input 20 : One shot, Small flow 21 : Full open (Level input) 22 : Zero clear 23 : Tare clear 24 : Operation same as a [F] key	0 to [1] to 24
io 02 1602 Function of IN2		0 to [2] to 24
io 03 1603 Function of IN3		0 to [3] to 24
io 04 1604 Function of IN4		0 to [4] to 24
io 05 1605 Function of IN5		0 to [5] to 24
io 06 1606 Function of IN6		0 to [6] to 24
io 11 1611 Function of OUT1	0 : Not used 1 to 8 : User output 1 to 8 9 : Stability 10 : Over capacity 11 : Net display 12 : During tare 13 : Hold 14 : Hold busy 15 : HI output (Over the upper limit value) 16 : OK output (Between upper and lower limit values) 17 : LO output (Below the lower limit value) 18 : Near-zero 19 : Full 20 : Over 21 : OK 22 : Under 23 : Large flow 24 : Medium flow 25 : Small flow 26 : Normal batch/ Loss-in-weight exchange 27 : In weighing sequence 28 : End of weighing sequence 29 : Error of weighing sequence 30 : In weighing (ON) 31 : In weighing (1 Hz) 32 : In weighing (50 Hz) 33 : Alarm 34 : Active [F] key #2	0 to [1] to 34
io 12 1612 Function of OUT2		0 to [2] to 34
io 13 1613 Function of OUT3		0 to [3] to 34
io 14 1614 Function of OUT4		0 to [4] to 34
io 15 1615 Function of OUT5		0 to [5] to 34
io 16 1616 Function of OUT6		0 to [6] to 34
io 17 1617 Function of OUT7		0 to [7] to 34
io 18 1618 Function of OUT8		0 to [8] to 34
io 21 1621 OUT1 Logic	1 : Inverting output If data is "0" level, the output transistor conducts (ON). [2] : Non inverting output If data is "1" level, the output transistor conducts (ON).  	
io 22 1622 OUT2 Logic		
io 23 1623 OUT3 Logic		
io 24 1624 OUT4 Logic		
io 25 1625 OUT5 Logic		
io 26 1626 OUT6 Logic		
io 27 1627 OUT7 Logic		
io 28 1628 OUT8 Logic		

#1 When **Fnc02** (F key) stores 3 (Alternative switch), the fnuction is effective.
When **Fnc02** (F key) stores 4 (Momentary switch), the function is ineffective.
#2 When **Fnc04** (x display) stores 3 (Active F key), the function becomes the same as the display x.

5.4.7. The Standard Serial Output Function (CL F)

Item Name / Function code	Description, Range and Default value
CL 01 1701 Serial data	1 : Weighing display 3 : Net 5 : Gross / Net / Tare 2 : Gross 4 : Tare
CL 02 1702 Communication mode	1 : Stream 2 : Automatic print 3 : Manual print
CL 03 1703 Baud rate	1 : 600 bps 2: 2400 bps

5.4.8. The CC-Link Function (CC F)

Item Name / Function code	Description, Range and Default value
CC 01 1801 Station number	Station number for this module 1 to 64
CC 02 1802 Number of the remote register occupied	0 : 1 station 1 : 2 stations 2: 4 stations
CC 03 1803 Baud rate	0 : 156 kbps 2 : 2.5 Mbps 4: 10 Mbps 1 : 625 kbps 3 : 5 Mbps
CC 04 1804 Initial process	0 : Not needed 1: Necessary
CC 05 1805 Output data	0: Weighing display 1 : Net 2 : Gross
CC 06 1806 Weighing information 1	0: Not used 6 : Sequence flow rate (In small flow OFF) 1 : Sequence number 7 : Sequence flow rate (Real time) 2 : Batch weighing error 8 : Load cell output. Scale : 1 nV/V 3 : Actual free fall 9 : Net (Digital filter 2) 4 : Free fall (Averaging) #1 10 : Gross (Digital filter 2) 5 : Free fall coefficient (Averaging) #1
CC 07 1807 Weighing information 2	

#1 : Free fall and free fall coefficient are recalculated at the end of the weighing even if **Sq 08** (Automatic free fall correction) is set either parameter.

If **Sq 08** (Automatic free fall correction) is set to 2 (Real time free fall compensation(fixed coefficient)), **Sq 10** (Active free fall coefficient) is always used.

If **Sq 08** (Automatic free fall correction) is set to 3 (Real time free fall compensation (updated coefficient)), **Sq 10** (Active free fall coefficient) is always recalculated.

5.5. Batch Weighing

Batch weighing is a procedure to automatically weigh up to the final value.
Select a weighing mode (**Sq 07**) from the following:

0 : Disable
1 : Normal batch sequence
2 : Loss-in-weight sequence
3 : Specifying with control input
4 : Specifying with CC-Link

■ **Feeding process**

1. Input the weighing start signal.
2. When the weighing start input delay time (**Sq 22**) has passed, the large flow, medium flow and small flow outputs turn ON.
3. When the large flow comparison disable time (**Sq 23**) has passed, the large flow output turns OFF under the large flow off output conditions.
4. When the medium flow comparison disable time (**Sq 24**) has passed, the medium flow output turns OFF under the medium flow off output conditions.
5. When the small flow comparison disable time (**Sq 25**) has passed, the small flow output turns OFF under the small flow off output conditions.
6. When the judging delay time (**Sq 26**) has passed and the net value is stable (**Sq 12**), the net value is judged.
7. The weighing end output turns ON and the OK / Over / Under output of the judgment result turns ON.
8. When the weighing end output time (**Sq 27**) has passed, the weighing end output turns OFF and the OK / Over / Under output of the judgment result turns OFF.

❑ The OK / Over / Under output can be always output by setting the OK / Over / Under output timing (**Sq 11**).

■ Weighing start / pause / restart / emergency stop.
When restarted from the pause, the weighing starts with one flow below the previous flow.

Relation between inputs and outputs (Example : with the large flow to turn on)

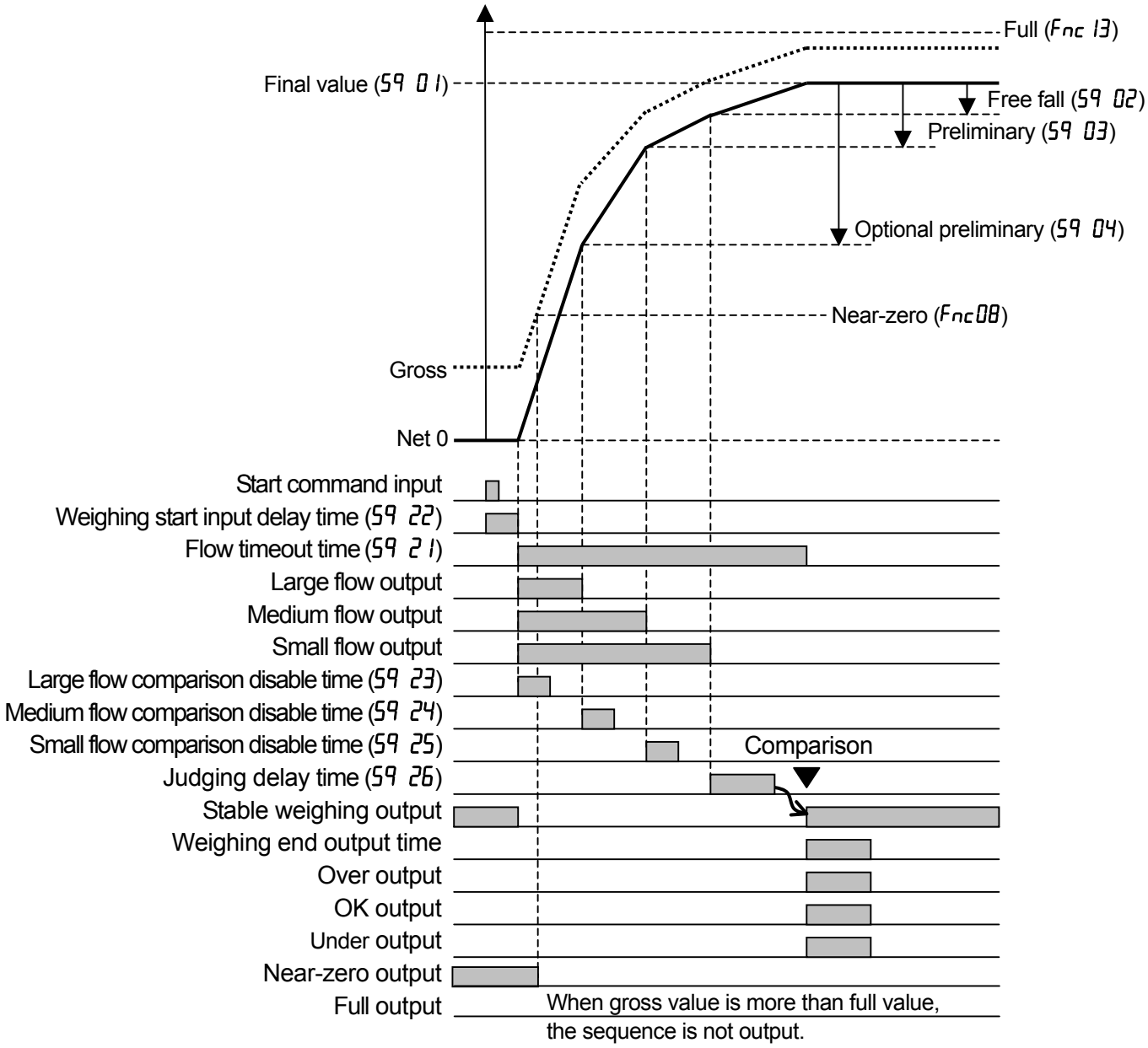
Start and stop command		Large flow	Medium flow	Small flow	Weighing end	Weighing error	Ref.
Weighing start		**ON**	**ON**	**ON**	OFF	OFF	
Pause during flowing		OFF	OFF	OFF	OFF	**ON**	
Restart from pause	First	OFF	**ON**	**ON**	OFF	OFF	
	Second	OFF	OFF	**ON**	OFF	OFF	
	Third or later	OFF	OFF	**ON**	OFF	OFF	
Restart from emergency stop	First	OFF	**ON**	**ON**	OFF	OFF	
	Second	OFF	OFF	**ON**	OFF	OFF	
	Third or later	OFF	OFF	**ON**	OFF	OFF	
Emergency stop during flowing		OFF	OFF	OFF	OFF	**ON**	
Stop after comparison (Normally finished)		OFF	OFF	OFF	**ON**	OFF	

❑ Weighing end means weighing sequence end.
❑ Weighing error means weighing sequence error.

5.5.1. Sequential Weighing

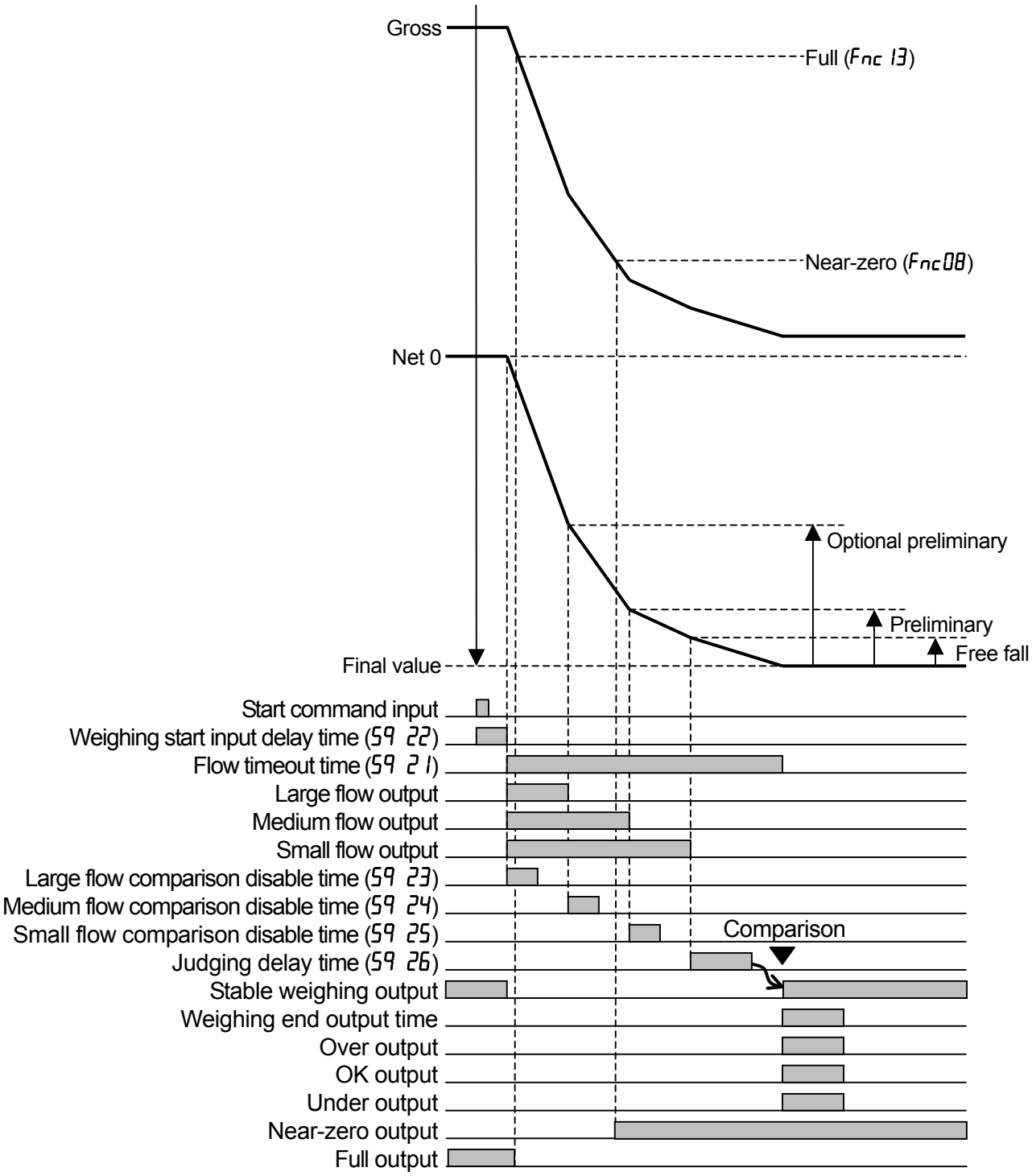
■ **Normal batch sequence**

Output terminal	Output conditions	Reference
Near-zero	Gross ≦ Near-zero	Comparison weight can be changed to net weight with Fnc09
Full	Gross ≧ Full	
Large flow off	Net ≧ Final value – Optional preliminary	
Medium flow off	Net ≧ Final value – Preliminary	
Small flow off	Net ≧ Final value – Free fall	
Over	Net > Final value + Over	
OK	Final value + Over ≧ Net ≧ Final value – Under	
Under	Net < Final value – Under	



■ **Loss-in-weight sequence**

Output terminal	Output conditions	Reference
Near-zero	Gross ≦ Near-zero	Comparison weight can be changed to net weight with **Fnc09**
Full	Gross ≧ Full	
Large flow off	−Net ≧ Final value − Optional preliminary	
Medium flow off	−Net ≧ Final value − Preliminary	
Small flow off	−Net ≧ Final value − Free fall	
Over	−Net > Final value + Over	
OK	−Final value + Over ≧ Net ≧ Final value − Under	
Under	−Net < Final value − Under	



5.5.2. Weighing Sequence Error (Output)

A weighing sequence error will occur in the following conditions.

- Weighing start has been input when: Gross + Final value ≧ Weighing capacity.
- Weighing start has been input when it is over capacity including negative over capacity.
- The tare fails when tare condition (tare when unstable (**C-F10**) and tare when the gross weight is negative (**C-F11**)) have been selected and automatic tare at weighing start (**Sq 13**) has been enabled (1).
- When the time in weighing sequence reaches the flow timeout time.
- When pause has been input during the weighing sequence.
- When an emergency stop has been input during the weighing sequence.

5.5.3. Error Reset (Input)

- When the error reset is input, the weighing sequence error output turns OFF.
- When the error reset is input during in weighing sequence, the weighing sequence will be initialized.

The initialization of the weighing sequence turns OFF all the outputs that are related to weighing sequence such as follows.

Large, medium and small flow output
OK / over / under output
In weighing sequence output
Weighing end output
Weighing sequence error output

5.5.4. One Shot Small Flow (Input)

When the one shot small flow is input, the small flow output turns ON for the duration that is set for the one-shot time for small flow rate (**Sq 28**).

The small flow output time will be extended if the one shot small flow is input again while the small flow output has been on.

Example: **Sq 28** = 2.00 seconds and one-shot small flow is input three times repeatedly.
The small flow is output 2.00 seconds × 3 times = 6.00 seconds

The one shot small flow is available during "in weighing sequence".

5.5.5. Full Open (Output)

When full open is input while weighing sequence is not active, the large, medium and small flow output is on.

By level input, the large, medium and small flow output remains ON while the full open is input.

5.5.6. Actual Free Fall Input

It updates the parameters of **Sq 02** (Free fall) and **Sq 10** (Free fall coefficient) using the latest weighing results. "Active free fall compensation (Updated coefficient)(3)" of **Sq 08** (Automatic free fall compensation) is not updated. It is used when adjusting the weighing module and changing weighing materials.

5.5.7. Automatic Free Fall Compensation

The automatic free fall compensation function reduces weighing errors during batch weighing. The weighing value may increase between closing the dribble gate and finishing weighing of a hopper scale and etc. This increased value is called "free fall". To minimize weighing errors, a free fall parameter and a real free fall value should be the same. As a way to do so, there is the "moving average of the last four real free fall", with which the next free fall setting is updated automatically.

The formula of batch error and real free fall are as follows:

Batch error = Net value when the batch is finished − Preliminary
Real free fall = Net value when the batch is finished − Net value when the dribble flow gate is OFF

When the weighing value passes Preliminary − Final value, the dribble flow gate is off.

When a batch error exceeds the effective range of the automatic free fall, the batch weighing is regarded as an error and excluded from the "moving average of the last four real free fall".

5.5.8. Active Free Fall Compensation

The active free fall compensation function modifies the free fall compensation in relation to the velocity passing through the gate (flow rate).
Example: When discharging a liquid (water, cement, tar) in the hopper, the flow rate decreases as the remaining amount becomes smaller. In this case, the weighing results always become too small with the conventional free fall compensation. The same problem occurs with materials like honey with a viscosity that changes according to temperature.

Free fall coefficient = Actual free fall / Flow rate (when the dribble flow gate is OFF)
Free fall = Free fall coefficient x Flow rate

When "Active free fall compensation (fixed coefficient) (2)" is set to **Sq 08** (Automatic free fall compensation), the free fall is calculated with the parameter of **Sq 10** (Active free fall coefficient). When "Active free fall compensation (updated coefficient) (3)" is set to **Sq 08**, the free fall is calculated with the average of the last four weighing values. When a batch error exceeds an effective range of the automatic free fall, the batch weighing is regarded as an error and excluded from the "moving average of the last four real free fall".

5.5.9. Sequence Numbers

The status of batch weighing can be checked from the holding register of the CC-Link

Sequence number	Description
0	Waiting for the weighing start input.
1	Automatic tare
2	Confirming the start condition.
3	During the weighing start input delay, the large, medium and small flow turn ON after checking.
4	Waiting for the large flow comparison disable time.
5	During the large flow, turns OFF the large flow under the large flow off output conditions.
6	Waiting for the medium flow comparison disable time.
7	During the medium flow, turns OFF the medium flow under the medium flow off output conditions.
8	Waiting for the small flow comparison disable time.
9	During the small flow, turns OFF the small flow under the small flow off output conditions.
10	Waiting for the judging delay
11	Wait for the stable weighing value.
12	The comparison result is output. Weighing end is output.

5.6. Setpoint（Comparator value）

These parameters of the **SP1** to **SP8** (setpoint) store items of fundamental setpoint for the weighing sequence. The **SP11** to **SP18** (parameter of the setpoint) store setpoint values of the **SP1** to **SP8** (setpoint). These function can be selected with **SP1** to **SP8** (setpoint). The remote registers of 4 stations are occupied in the initial settings for the CC-Link. Change it if needed. To keep the original settings, set "not used (0)".

Parameter & Item	Relation item
0: Not used	Not related
1: Final value	**Sq 01**
2: Optional preliminary	**Sq 04**
3: Preliminary	**Sq 03**
4: Free fall	**Sq 02**
5: Over	**Sq 05**

Parameter & Item	Relation item
6: Under	**Sq 06**
7: Full	**Fnc13**
8: Near-zero	**Fnc08**
9: Free fall coefficient	**Sq 10**
10: Upper limit	**Fnc10**
11: Under limit	**Fnc11**

6. Interface

6.1. Control I/O

- Using a control input from peripherals, data can be monitored and be output.
- Using a control output, the weighing status and weighing result can be output.
- The input and output circuit is isolated from the DC power supply terminals and load cell terminals.
- DC +24 V is supplied between the power supply input terminal (I/O PWR +24V) and COM terminal.

Part of input (IN1 ~ IN6)

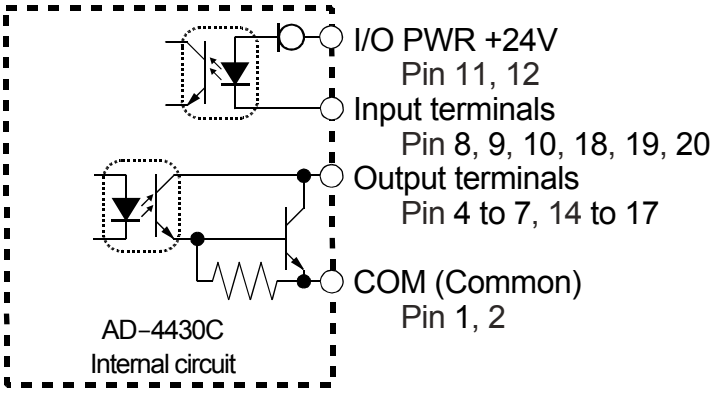
Input circuit type	No-voltage contact input (Photo coupler)
Input open voltage	According to use
OFF current	0.1 mA max.
ON current	2.7 mA min.
Input threshold voltage	2 V

Part of output (OUT1 ~ OUT8)

Output circuit type	Open collector
Isolation	Photo coupler
Output voltage	DC 35 V max.
Output current	50 mA max.
Output saturation voltage	1.1 V max.

Control I/O

IN 6	20	10	IN 5	
IN 4	19	9	IN 3	
IN 2	18	8	IN 1	
OUT8	17	7	OUT7	
OUT6	16	6	OUT5	
OUT4	15	5	OUT3	
OUT2	14	4	OUT1	
C.L.	13	3	C.L.	
I/O PWR +24V	12	2	COM	
	11	1		

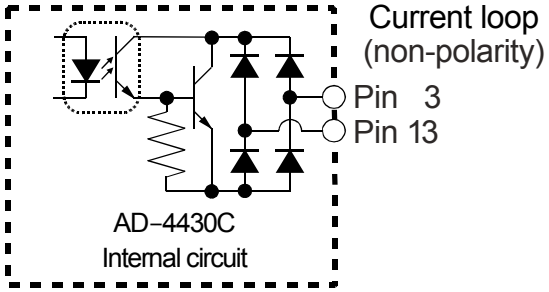


- **Assigning functions to terminals**
  - Assign functions to these input terminals : **io 01** (IN1 function) to **io 06** (IN6 function)
  - Assign functions to these output terminals : **io 11** (OUT1 function) to **io 18** (OUT8 function)
  - Assign logic to these output terminals : **io 21** (OUT1 logic) to **io 28** (OUT8 logic)

6.2. Serial Output (Current Loop)

- The current loop (C.L.) circuit is isolated from all terminals.
- The standard serial output can connect to the A&D external display and printer.
- The current loop output needs to supply DC current from an external DC power source.
- The current loop terminals of the AD-4430C have non-polarity.
- The current loop terminals are pin 3 and 13 of the control I/O connector.

Transmission	0 – 20 mA, Current loop
Data length	7 bits
Start bit	1 bit
Parity bit	Even
Stop bit	1 bit
Baud rate	600 bps, 2400 bps
Code	ASCII



6.2.1. Data format of Serial Output

❑ The "A&D standard format" is used to the output format for communication with the A&D printer, and external display and consists of dual headers, data, unit and terminator.

A&D standard format

Header 1			Header 2			Data (Polarity, 8 digits including decimal point)								Unit		Terminator	
S	T	,	G	S	,	+	0	1	2	3	.	4	5	k	g	CR	LF

Item	ASCII code	Hexadecimal	Description
Header 1	ST	[53 54]	**St**able
	US	[55 53]	**Un**stable
	OL	[4F 4C]	**O**verload
Header 2	GS	[47 53]	**G**ro**s**s
	NT	[4E 54]	**Net**
	TR	[54 52]	**T**a**r**e
Punctuation	**,**	[2C]	Comma
Data (ASCII code)	0 to 9	[30 to 39]	Numerical number
	+	[2B]	Positive sign
	−	[2D]	Negative sign
	SP	[20]	Space
	.	[2E]	Dot
Unit (4 types)	SP SP	[20 20]	Not used
	SP g	[20 67]	g (gram)
	kg	[6B 67]	kg (kilogram)
	SP t	[20 74]	t (ton)

Examples of the A&D standard format

	Header 1		Header 2			Data (Polarity, 8 digits including decimal point)								Unit		Terminator		
Gross	S	T	,	G	S	,	+	0	0	1	2	3	4	5	k	g	CR	LF	Header 2 [GS]
Net	S	T	,	N	T	,	+	0	0	1	0	0	0	0	k	g	CR	LF	Header 2 [NT]
Tare	S	T	,	T	R	,	+	0	0	0	2	3	4	5	k	g	CR	LF	Header 2 [TR]
Including "."	S	T	,	G	S	,	+	0	1	2	3	.	4	5	k	g	CR	LF	Numerical part [.]
+Over	O	L	,	G	S	,	+	SP	SP	SP	SP	.	SP	SP	k	g	CR	LF	Header 1 [OL]
−Over	O	L	,	G	S	,	−	SP	SP	SP	SP	.	SP	SP	k	g	CR	LF	Header 1 [OL], Polarity [−]
Unstable	U	S	,	G	S	,	+	0	1	2	3	.	4	5	k	g	CR	LF	Header 1 [US]
Output data	O	L	,	G	S	,	+	SP	SP	SP	SP	.	SP	SP	k	g	CR	LF	Same as +Over

The position of decimal point is fixed even if data is out of range.

6.2.2. Transfer Mode of Serial Output

The type of the standard serial output is 3 types of "stream", "automatic print" and "manual print".

Stream	The data is output at each display rewrite. If the data cannot be output completely due to a slow baud rate, the data is output at the next rewrite. The output data uses a displayed data. Therefore, hidden data is not output.
Automatic printing	❑Automatic printing depends on the weighing mode setting. 1. Weighing mode (**Sq 07**) = 0 When a weighing value is 5d or more and is stable, the data is output only once. To output again, data is required to become less than 5d. Select "Normal hold (1)" in **Fnc07** Hold function for the setting. Note: When "stability detection time" (**C-F08**) and "stability detection width"(**C-F09**) are set to “0” (stability detection is not performed), the data is output only once when it becomes 5d or more. 2. Weighing mode (**Sq 07**) = 1 or more (When batch weighing is used) Output once when the weighing sequence finished.
Manual printing	When "manual printing" is selected, receiving a printing command from the CC-Link or pressing the assigned print key, data is output.

6.3. The CC-Link

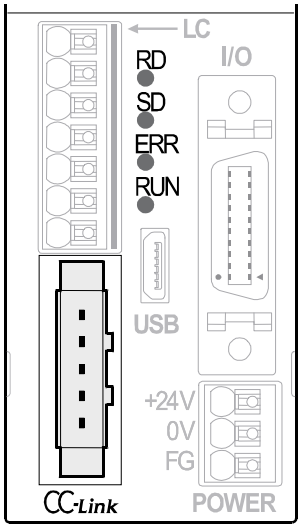
The AD-4430C is the remote device station of the CC-Link interface version 1.10. When using the CC-Link, the AD4430C can be controlled on remote I/O and remote register, so the program may be simplified.

- Use the connector authorized by the CC-Link.

Station number	1 to 64
Number of the remote register occupied	1 station, 2 stations, 4 stations
Baud rate	156 kbps, 625 kbps, 2.5 Mbps, 5 Mbps、10 Mbps

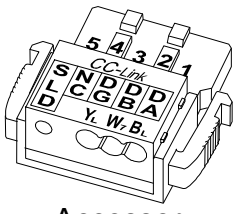
Status LED of the CC-Link

LED	Indication	Turning off	Blinking
RUN	Normal	Resetting, No signal	–
SD	Sending	–	–
RD	Receiving	–	–
ERR	Parameter error CRC error Station trouble	Normal	Changing parameters

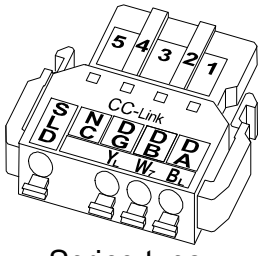


The CC-Link connector

DA	Signal line DA
DB	Signal line DB
DG	Signal ground
NC	Open terminal
SLD	Shield terminal



Accessory
3M 35505-6000-B0M GF



Spring type
3M 35A05-60S0-B0M GF

Illustration 11 The CC-Link connector

6.3.1. Address Map

Remote register (4 stations occupied) In case of setting address to 1.

	AD-4430C ⇒ Master			Master ⇒ AD-4430C		
Station No.	Remote register	Buffer	Description	Remote register	Buffer	Description
1	RWr0000	2E0	Net	RWw0000	1E0	SP1: Final
	RWr0001	2E1		RWw0001	1E1	
	RWr0002	2E2	Gross	RWw0002	1E2	SP2: Optional preliminary
	RWr0003	2E3		RWw0003	1E3	
2	RWr0004	2E4	Total weight (Net when finishing)	RWw0004	1E4	SP3: Preliminary
	RWr0005	2E5		RWw0005	1E5	SP4: Free fall
	RWr0006	2E6	Error code	RWw0006	1E6	SP5: Over
	RWr0007	2E7	Error sub code	RWw0007	1E7	SP6: Under
3	RWr0008	2E8	Weighing information 1	RWw0008	1E8	SP7: Full
	RWr0009	2E9		RWw0009	1E9	
	RWr000A	2EA	Weighing information 2	RWw000A	1EA	SP8: Near-zero
	RWr000B	2EB		RWw000B	1EB	
4	RWr000C	2EC	Command data reply	RWw000C	1EC	Command data
	RWr000D	2ED		RWw000D	1ED	
	RWr000E	2EE	Command No. reply	RWw000E	1EE	Command No.
	RWr000F	2EF	Not used (Reserved by inside)	RWw000F	1EF	Not used (Reserved by inside)

Remote register (2 stations occupied) In case of setting address to 1.

	AD-4430C ⇒ Master			Master ⇒ AD-4430C		
Station No.	Remote register	Buffer	Description	Remote register	Buffer	Description
1	RWr0000	2E0	Value (Net / Gross)	RWw0000	1E0	SP1: Final
	RWr0001	2E1		RWw0001	1E1	
	RWr0002	2E2	Error code	RWw0002	1E2	SP2: Optional preliminary
	RWr0003	2E3	Error sub code	RWw0003	1E3	
2	RWr0004	2E4	Command data response	RWw0004	1E4	Command data
	RWr0005	2E5		RWw0005	1E5	
	RWr0006	2E6	Command No. response	RWw0006	1E6	Command No.
	RWr0007	2E7	Not used (Reserved by inside)	RWw0007	1E7	Not used (Reserved by inside)

Remote register (1 station occupied) In case of setting address to 1.

	AD-4430C ⇒ Master			Master ⇒ AD-4430C		
Station No.	Remote register	Buffer	Description	Remote register	Buffer	Description
1	RWr0000	2E0	Value (Net / Gross)	RWw0000	1E0	Not used (Reserved by inside)
	RWr0001	2E1		RWw0001	1E1	
	RWr0002	2E2	Error code	RWw0002	1E2	
	RWr0003	2E3	Error sub code	RWw0003	1E3	

Remote I/O (4 stations occupied) In case of setting address to 1.

	AD-4430C ⇒ Master				Master ⇒ AD-4430C			
Station No.	Remote input	Buffer	Description		Remote output	Buffer	Description	
1	RX0000	0E0	Setpoints writing response flag		RY0000	160	Setpoints, request flag	
	RX0001		Not used (Reserved by inside)		RY0001		Not used (Reserved by inside)	
	RX0002		Command response flag		RY0002		Command request flag	
	RX0003		Wirte / Read response flag		RY0003		Wirte / Read selection flag	
	RX0004		Not used (Reserved by inside)		RY0004		Not used (Reserved by inside)	
	RX0005				RY0005			
	RX0006		CPU normal operation		RY0006			
	RX0007		Not used (Reserved by inside)		RY0007			
	RX0008		Decimal point 2^0	3 bits Binary	RY0008			
	RX0009		Decimal point 2^1		RY0009			
	RX000A		Decimal point 2^2		RY000A			
	RX000B		Not used (Reserved by inside)		RY000B			
	RX000C				RY000C			
	RX000D				RY000D			
	RX000E				RY000E			
	RX000F				RY000F			
	RX0010	0E1	Near-zero		RY0010	161	Zero	
	RX0011		Large flow		RY0011		Zero clear	
	RX0012		Medium flow		RY0012		Tare	
	RX0013		Small flow		RY0013		Tare clear	
	RX0014		Over		RY0014		Hold	
	RX0015		Final		RY0015		Net display	
	RX0016		Under		RY0016		Gross display	
	RX0017		Stable		RY0017		Printing command	
	RX0018		Weighing end		RY0018		Actual free fall input	
	RX0019		Capacity over		RY0019		One shot, Small flow	
	RX001A		Holding		RY001A		Error rest	
	RX001B		Full		RY001B		Restart	
	RX001C		In weighing sequence		RY001C		Weighing start	
	RX001D		Normal batch / Discharge		RY001D		Normal batch / Discharge	
	RX001E		weighing sequence error		RY001E		Pause	
	RX001F		Weighing failure		RY001F		Emergency stop	

	AD-4430C ⇒ Master			Master ⇒ AD-4430C		
Station No.	Remote input	Buffer	Description	Remote output	Buffer	Description
2	RX0020 to RX003F	0E2 to 0E3	Not used (Reserved by inside)	RY0020 to RY003F	162 to 163	Not used (Reserved by inside)
3	RX0040	0E4	Not used (Reserved by inside)	RY0040	164	Not used (Reserved by inside)
	RX0041			RY0041		
	RX0042			RY0042		
	RX0043			RY0043		
	RX0044			RY0044		
	RX0045			RY0045		
	RX0046			RY0046		
	RX0047			RY0047		
	RX0048			RY0048		
	RX0049			RY0049		
	RX004A			RY004A		
	RX004B			RY004B		
	RX004C			RY004C		
	RX004D			RY004D		
	RX004E			RY004E		
	RX004F			RY004F		
	RX0050	0E5	User output 1	RY0050	165	User output 1
	RX0051		User output 2	RY0051		User output 2
	RX0052		User output 3	RY0052		User output 3
	RX0053		User output 4	RY0053		User output 4
	RX0054		User output 5	RY0054		User output 5
	RX0055		User output 6	RY0055		User output 6
	RX0056		User output 7	RY0056		User output 7
	RX0057		User output 8	RY0057		User output 8
	RX0058		User input 1	RY0058		Not used (Reserved by inside)
	RX0059		User input 2	RY0059		
	RX005A		User input 3	RY005A		
	RX005B		User input 4	RY005B		
	RX005C		User input 5	RY005C		
	RX005D		User input 6	RY005D		
	RX005E		Not used (Reserved by inside)	RY005E		
	RX005F			RY005F		

	AD-4430C ⇒ Master			Master ⇒ AD-4430C		
Station No.	Remote input	Buffer	Description	Remote output	Buffer	Description
4	RX0060	0E6	Net over	RY0060	166	Not used (Reserved by inside)
	RX0061		Net under	RY0061		
	RX0062		Gross over	RY0062		
	RX0063		Gross under	RY0063		
	RX0064		A/D over	RY0064		
	RX0065		A/D under	RY0065		
	RX0066		Center zero of net	RY0066		
	RX0067		Center zero of gross	RY0067		
	RX0068		In displaying net	RY0068		
	RX0069		In displaying gross	RY0069		
	RX006A		During tare	RY006A		
	RX006B		CAL operation error	RY006B		
	RX006C		Zero compensation error	RY006C		
	RX006D		Tare error	RY006D		
	RX006E		Error of displaying net	RY006E		
	RX006F		Linkage of display x	RY006F		
	RX0070	0E7	Not used (Reserved by inside)	RY0070	167	Not used (Reserved by inside)
	RX0071			RY0071		
	RX0072			RY0072		
	RX0073			RY0073		
	RX0074			RY0074		
	RX0075			RY0075		
	RX0076			RY0076		
	RX0077			RY0077		
	RX0078		Initial process request flag	RY0078		Initial process finish flag
	RX0079		Initial data processing completion flag	RY0079		Initial data setting request flag
	RX007A		Error status flag	RY007A		Error reset request flag
	RX007B		Remote station READY flag	RY007B		Not used (Reserved by inside)
	RX007C		Not used (Reserved by inside)	RY007C		
	RX007D			RY007D		
	RX007E			RY007E		
	RX007F			RY007F		

Remote I/O (2 stations occupied) In case of setting address to 1.

	AD-4430C ⇒ Master				Master ⇒ AD-4430C			
Station No.	Remote input	Buffer	Description		Remote output	Buffer	Description	
1	RX0000	0E0	Setpoints writing response flag		RY0000	160	Setpoints request flag	
	RX0001		Not used (Reserved by inside)		RY0001		Not used (Reserved by inside)	
	RX0002		Command response flag		RY0002		Command request flag	
	RX0003		Wirte / Read response flag		RY0003		Wirte / Read selection flag	
	RX0004		Not used (Reserved by inside)		RY0004		Not used (Reserved by inside)	
	RX0005				RY0005			
	RX0006		CPU normal operation		RY0006			
	RX0007		Not used (Reserved by inside)		RY0007			
	RX0008		Decimal point 2^0	3bits Binary	RY0008			
	RX0009		Decimal point 2^1		RY0009			
	RX000A		Decimal point 2^2		RY000A			
	RX000B		Not used (Reserved by inside)		RY000B			
	RX000C				RY000C			
	RX000D				RY000D			
	RX000E				RY000E			
	RX000F				RY000F			
	RX0010	0E1	Near-zero		RY0010	161	Zero	
	RX0011		Large flow		RY0011		Zero clear	
	RX0012		Medium flow		RY0012		Tare	
	RX0013		Small flow		RY0013		Tare clear	
	RX0014		Over		RY0014		Hold	
	RX0015		Final		RY0015		Net display	
	RX0016		Under		RY0016		Gross display	
	RX0017		Stable		RY0017		Printing command	
	RX0018		Weighing end		RY0018		Actual free fall input	
	RX0019		Capacity over		RY0019		One shot, Small flow	
	RX001A		Holding		RY001A		Error rest	
	RX001B		Full		RY001B		Restart	
	RX001C		In weighing sequence		RY001C		Weighing start	
	RX001D		Normal batch / Discharge		RY001D		Normal batch / Discharge	
	RX001E		weighing sequence error		RY001E		Pause	
	RX001F		Weighing failure		RY001F		Emergency stop	

	AD-4430C ⇒ Master			Master ⇒ AD-4430C		
Station No.	Remote input	Buffer	Description	Remote output	Buffer	Description
2	RX0020	0E2	Net over	RY0020	162	Not used (Reserved by inside)
	RX0021		Net under	RY0021		
	RX0022		Gross over	RY0022		
	RX0023		Gross under	RY0023		
	RX0024		A/D over	RY0024		
	RX0025		A/D under	RY0025		
	RX0026		Center zero of net	RY0026		
	RX0027		Center zero of gross	RY0027		
	RX0028		In displaying net	RY0028		
	RX0029		In displaying gross	RY0029		
	RX002A		During tare	RY002A		
	RX002B		CAL operation error	RY002B		
	RX002C		Zero compensation error	RY002C		
	RX002D		Tare error	RY002D		
	RX002E		Error of displaying net	RY002E		
	RX002F		Linkage of display x	RY002F		
	RX0030	0E2	Not used (Reserved by inside)	RY0030	163	Not used (Reserved by inside)
	RX0031			RY0031		
	RX0032			RY0032		
	RX0033			RY0033		
	RX0034			RY0034		
	RX0035			RY0035		
	RX0036			RY0036		
	RX0037			RY0037		
	RX0038		Initial process request flag	RY0038		Initial process finish flag
	RX0039		Initial process finish flag	RY0039		Initial process request flag
	RX003A		Error status flag	RY003A		Error reset request flag
	RX003B		Remote station READY	RY003B		Not used (Reserved by inside)
	RX003C		Not used (Reserved by inside)	RY003C		
	RX003D			RY003D		
	RX003E			RY003E		
	RX003F			RY003F		

Remote I/O (1 station occupied) In case of setting address to 1.

	AD-4430C ⇒ Master			Master ⇒ AD-4430C		
Station No.	Remote input	Buffer	Description	Remote output	Buffer	Description
1	RX0000	0E0	Near-zero	RY0000	160	Zero
	RX0001		Large flow	RY0001		Zero clear
	RX0002		Medium flow	RY0002		Tare
	RX0003		Small flow	RY0003		Tare clear
	RX0004		Over	RY0004		Hold
	RX0005		Final	RY0005		Net display
	RX0006		Under	RY0006		Gross display
	RX0007		Stable	RY0007		Printing command
	RX0008		Weighing end	RY0008		Actual free fall input
	RX0009		Capacity over	RY0009		One shot, Small flow
	RX000A		Holding	RY000A		Error rest
	RX000B		Full	RY000B		Restart
	RX000C		In weighing sequence	RY000C		Weighing start
	RX000D		Normal batch / Discharge	RY000D		Normal batch / Discharge
	RX000E		weighing sequence error	RY000E		Pause
	RX000F		Weighing failure	RY000F		Emergency stop
	RX0010	0E1	Not used (Reserved by inside)	RY0010	161	Not used (Reserved by inside)
	RX0011			RY0011		
	RX0012			RY0012		
	RX0013			RY0013		
	RX0014			RY0014		
	RX0015			RY0015		
	RX0016			RY0016		
	RX0017			RY0017		
	RX0018		Initial process request flag	RY0018		Initial process finish flag
	RX0019		Initial process finish flag	RY0019		Initial process request flag
	RX001A		Error status flag	RY001A		Error reset request flag
	RX001B		Remote station READY	RY001B		Not used (Reserved by inside)
	RX001C		Not used (Reserved by inside)	RY001C		
	RX001D			RY001D		
	RX001E			RY001E		
	RX001F			RY001F		

Numerical Form of Remote Register

Numerical number is hexadecimal. Negative numbers are indicated with 2's complement numbers.

Decimal	Hexadecimal (16 bits)	Hexadecimal (24 bits)	Hexadecimal (32 bits)
-10	FFF6	FFFFF6	FFFFFFF6
-1	FFFF	FFFFFF	FFFFFFFF
0	0000	000000	00000000
1	0001	000001	00000001
10	000A	00000A	0000000A

Writing Prohibition of Internal Reservation Area

The item "Not used (Reserved by inside)" on tables of the remote register and remote I/O is internal reservation. Writing this item is inhibited. When inputting anything into the remote output (RY) and remote register (RWw), a malfunction may occur. Values of the internal reservation remote input (RY) and remote register (RWw) are indefinite.

Error Codes

Error Code	Error flag	(Instrument error)
0	no error	
1	A/D error	(Module error)
2	EEPROM error	(Writing error)
3	RAM error	(Reading & Writing error)
4	Calibration error	(Calibration data error)
5	Weighing error	(Mode error)
6	Self-check error	(Performing self-check)

- Error code and Error status flag (RX007A) are not reset automatically. Reset the "Error flag (RX007A)" of "**6.3.3. Timing Chart**".

Weighing Errors

Net over
Net under
Gross over
Gross under
A/D over
A/D under
Zero compensation error
Tare error
Net display error
CAL operation error

- Weighing failure will turn ON when either over, under or operation error occur.
- Operation error is cleared when operation is performed normally.

6.3.2. Commands

Command No.	Command data	Description	Writing	Reading
0	1	Zero	○	×
	2	Zero clear	○	×
	3	Tare	○	×
	4	Tare clear	○	×
	5	Hold	○	×
	6	Net display	○	×
	7	Gross display	○	×
	8	Printing command	○	×
	9	F key	○	×
	21	Normal batch weighing	○	×
	22	Loss in weight	○	×
	23	Weighing start	○	×
	24	Pause	○	×
	25	Restart	○	×
	26	Error reset	○	×
	27	Actual free fall input	○	×
	28	One shot, Small flow	○	×
	81	Self check, start	○	×
	82	Self check, stop	○	×
	91	CAL zero mode	○	×
	92	CAL span mode	○	×
	93	CAL end	○	×
	94	CAL zero setting	○	×
	95	CAL span setting	○	×
101	–	Program version	×	○
102	–	Serial No.(lower 5 digits)	×	○
103	–	Program checksum	×	○
104	–	FRAM checksum	×	○
201	–	Gross count	×	○
202	–	Net count	×	○
203	–	Tare count	×	○
204	–	Load cell output. Scale : 1 nV/V	×	○
205	–	Load cell output. Scale : 10 nV/V	×	○
206	–	Flow rate (per second)	×	○
301	–	Sequence No.	×	○
302	–	Batch weighing error	×	○
303	–	Actual free fall	×	○
304	–	Free fall (average)	×	○
305	–	Free fall coefficient (average)	×	○
306	–	Flow rate (when small flow is OFF)	×	○
307	–	Result of batch weighing	×	○
Function code	parameter	Function	○	○

6.3.3. Timing Chart

Example assumes that station No. is 1 and remote registers are occupied 4 stations.

1. Turning on the Display

1. Turn on the AD-4430C. When the CC-Link can communicate, the "Initial process request flag (RX0078)" is turned on.
2. At the master station, checks, initialize and turn on the "Initial process finish flag (RY0078)".
3. The AD-4430C turns off the "Initial process request flag (RX0078)" and turns on the "Remote station READY flag (RX007B)".
4. Turn off the "Initial process finish flag (RY0078)" at the master station.

❑ When "0 : not needed" is set to "**CC 04** initial process" of "**5.4.8. The CC-Link Function** ", the initial process is skipped and "Remote station READY (RX007B)" turns on.

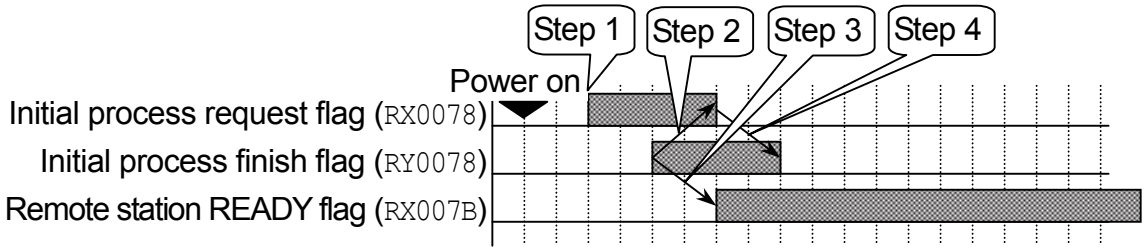


Illustration 12 Turning on the display

2. Resuming Weighing Mode from Suspended Modes

Because the weighing stops and a correct weighing value is not gotten, the remote station READY flag (RX007B) is turned off in the calibration mode and in off mode (OFF state, standby). The way to resume weighing mode is the same as the process to turn on the AD-4430C.

Example 3. Requesting Initialization from Master Station

1. In case of requesting the "Initial setting request of the AD-4430C from the master station, while turning on the "Remote station READY flag (RX007B)", turn on the "Initial process request flag (RY0079)".
2. The AD-4430C turns off the "Remote station READY flag (RX007B)" and performs initial settings.
3. When finishing the initial setting, the AD-4430C turns on the "Initial data processing completion flag (RX0079)".
4. Turn off the "Initial data setting request flag (RY0079)" by the master station.

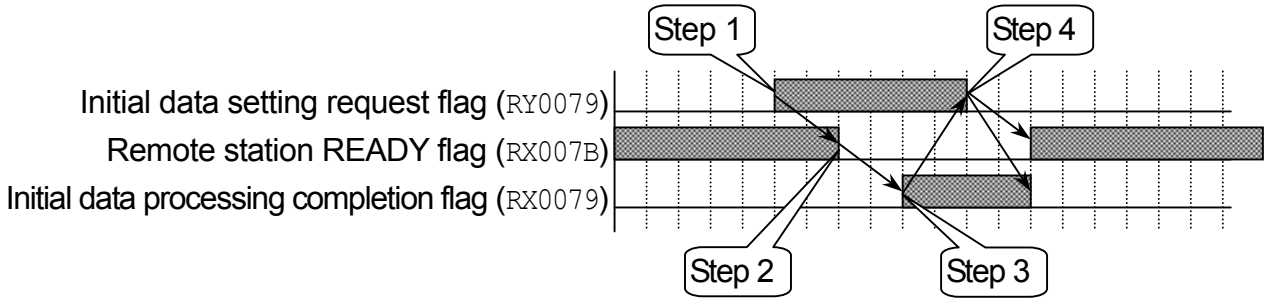


Illustration 13 Requesting initialization from master station

4. Inputting Setpoints (Basic Comparator Parameter)

- Setpoints (Basic comparator parameters) can be input into the AD-4430C using the remote register (RWw0000 to RWw000B) collectively.

1. Store setpoints to the remote register (RWw0000 to RWw000B).
   Turn on the "Setpoint request flag (RY0000)".
2. Turn off the "Setpoint request flag (RY0000)" after turning on the "Setpoint writing flag (RX0000)".

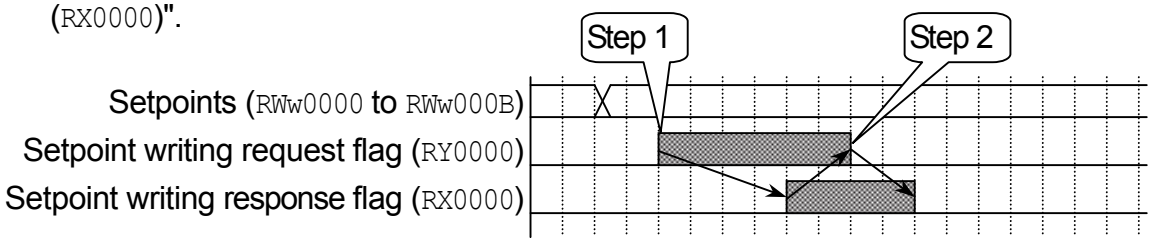


Illustration 14 Inputting setpoints (Basic comparator parameters)

5. Reading Command

1. Select the type of data at the command No. (RWw000E) of remote register.
2. The output data is stored at the command data (RWw000C to RWw000D) of remote register.

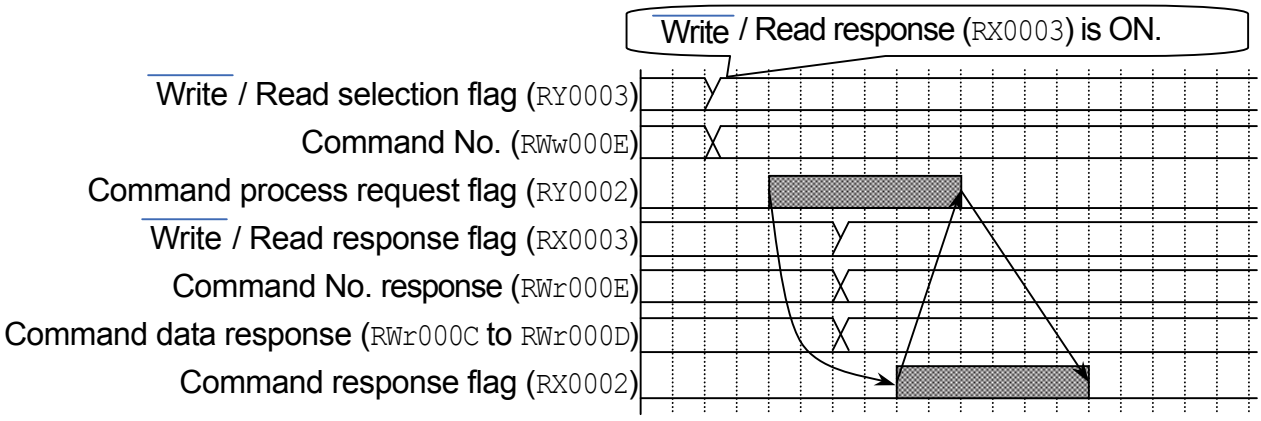


Illustration 15 Reading command

6. Writing Command

1. Select the type of data at the command No. (RWw000E) of remote register.
2. Place the writing data at the command data (RWw000C to RWw000D) of remote register.

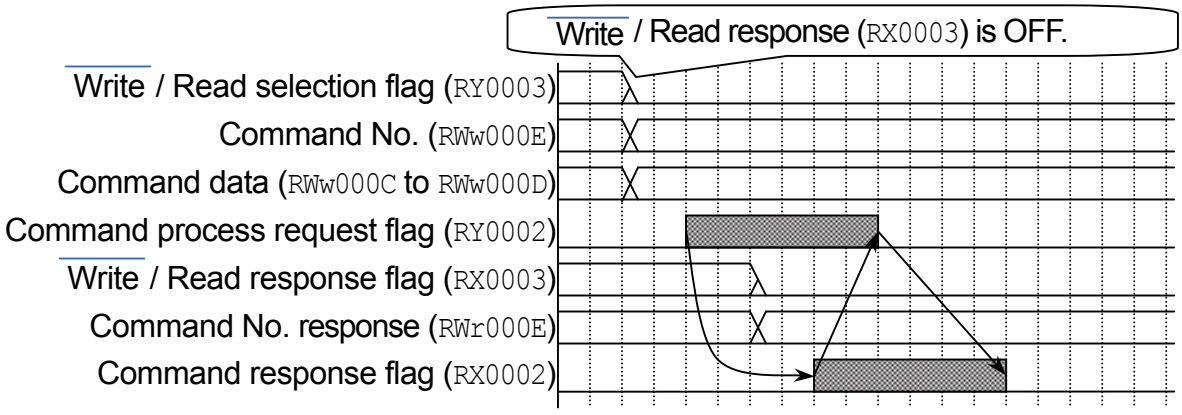


Illustration 16 Writing command

7. Monitoring the CPU Signal at Normal Operation

When the AD-4430C indicator status is normal, the following CPU normal operation flag (RX0006) is output. It alternates in a period between 0.5 second and 1 second.

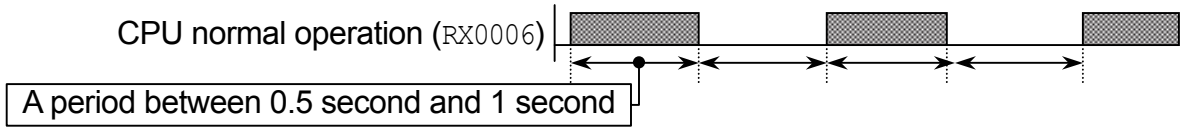


Illustration 17 Monitoring the CPU signal

8. Resetting Error Status Flag

1. When an error is detected, the remote station READY flag (RX007B) is turned off, the error status (RX007A) turns on, and the error status is informed to the master station.
2. The master station requests to reset the error status flag (RX007A) using the error reset request flag (RY007A).

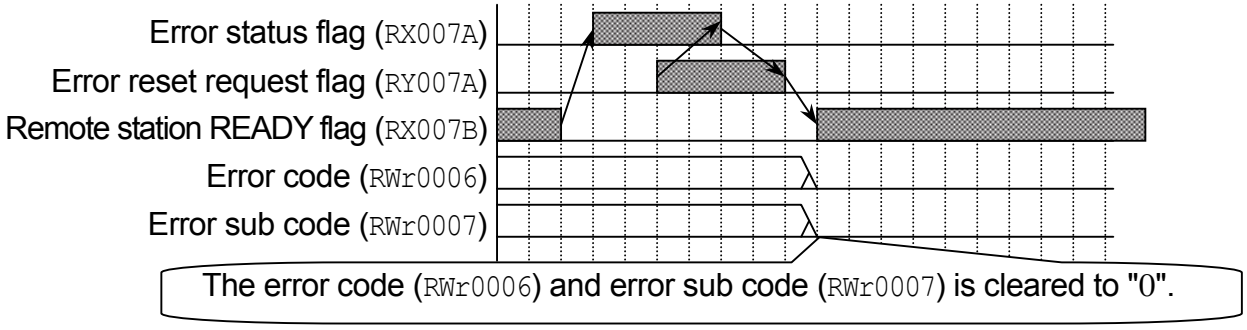


Illustration 18 Resetting error status flag

6.3.4. The Calibration

The AD-4430C can perform the calibration using the CC-Link commands (that consists of command data (RWw000C to RWw000D) and command No.(RWw000E) of the remote register). Refer to section "**6.3.2. Commands**" for the detail of these commands of the CC-Link. In the following steps, all command No. (RWw000E) of the remote register is 0.

Step 1 CAL zero mode Command data (RWw000C to RWw000D): 91
The AD-4430C displays [CAL 0] and enters the CAL zero input mode.

Step 2 CAL zero setting Command data (RWw000C to RWw000D): 94
The input voltage at zero point (**C-F17**) is updated when a command is received.
The AD-4430C proceeds to CAL span input mode.

Step 3 CAL span mode Command data (RWw000C to RWw000D): 92
The AD-4430C displays [C-SPn] and enters the CAL span input mode.

Step 4 CAL span setting Command data (RWw000C to RWw000D): 95
The span input voltage (**C-F18**) is updated when a command is received.
The AD-4430C returns to weighing mode.

Step 5 CAL end Command data (RWw000C to RWw000D): 93
The AD-4430C displays [C-End] and returns to weighing mode.

- Specify the weight against span Input voltage (**C-F19**) on the function related to the calibration (C-Fnc).

6.3.5. Self-Check

The connections of the load cell can be verified using the CC-Link command.
Refer to section "**6.3.2. Commands**" for the detail of these commands of the CC-Link. In the following steps, all command No. (RWw000E) of the remote register is 0.

Step 1 Input the command to start self check. Command data (RWw000C to RWw000D): 81
The AD-4430C enters the self check mode and start the scan. (self check error)

Step 2 Input the command to stop self check Command data (RWw000C to RWw000D): 82
The AD-4430C stops the self check mode and returns to weighing mode.

Step 3 Input error reset request flag. Error reset request flag
The AD-4430C resets self check error flag.

The AD-4430C sums up the result of the self check and outputs it to error sub code (RWr0007). There is no error, the error sub code is 0. (The undiagnosed item is regarded as error.) Refer to "**7.4.1. Guideline to Verify the Load Cell Connections**" for the details of diagnostic point and check criteria. Refer to "**7.4.5. Display and Output of Verification**" for display and output of self check.

Self Check Item	Error code
Power supply voltage for load cell	1
SEN+ voltage	2
SEN− voltage	4
Output voltage of load cell	8
Output value of load cell	16
SIG+ voltage	32
SIG− voltage	64
Internal temperature	128

6.3.6. Function Settings

- The monitoring and changing of the function settings uses the "**5. Reading Command**" and "**6. Writing Command**" in the "**6.3.3. Timing Chart**".

Monitoring the Function Settings

Set the function code to command No. (RWw000E) using the "**5. Reading Command**".
Read data of the command data response (RWr000C to RWr000D)

Changing the Function Settings

Set the function code to command No. (RWw000E) using the "**6. Writing Command**".
Write data into the command data (RWw000C to RWw000D)

- Refer to the following sections for the function code.
  "**5.3.6. The Calibration Function** (C-Fnc)",
  "**5.3.7. The Linearization Function** (L-Fnc)",
  "**5.4.2. The Basics Function** (Fnc F)" to
  "**5.4.8. The CC-Link Function** (CC F)"

6.4. USB

- The function settings can be input and output form a device that is connected to the Micro-B USB connector.
- When the USB is connected to a personal computer (PC), the PC recognizes the USB as a virtual COM port. The setting of virtual COM port is shown below.
  Baud rate: 9600 bps, Data bits: 7 bits, Parity: even, Stop bit: 1
- The communication tool can be downloaded at A&D website. Communication parameters are fixed.
- While weighing, do not perform cable connections. It may be easily influenced by environmental noise.
- Use the standard Micro-B USB connector.
- Reading is available whenever the power is on.
- Writing of the function from the USB is valid except weighing mode.

6.4.1. Format

Monitoring Command

Function code (4 figures) Terminator

Example of the near-zero

Command	1	2	0	8	CR	LF							

Function code (4 figures) Data (7 figures) Terminator

Response	1	2	0	8	,	+	0	0	0	0	1	0	CR	LF

Storing Command and Response

Function code (4 figures) Data (7 figures) Terminator

Example of the near-zero

Command	1	2	0	8	,	+	0	0	0	0	1	0	CR	LF

Function code (4 figures) Data (7 figures) Terminator

Response	1	2	0	8	,	+	0	0	0	0	1	0	CR	LF

- The response of the monitoring command is the same as the storing command.
- "+999999" means an irregular response. Ex.: In case that the function code is not correct and the command is not perform.

6.4.2. Monitoring the Function Setting

It specifies a function code in the command code and monitors the data.

Command	N	N	N	N	CR	LF							

Response	N	N	N	N	,	±	X	X	X	X	X	X	CR	LF

NNNN is code, ±XXXXXX is numerical number.

6.4.3. Storing the Function Setting

It specifies a function code in the command code and stores the data.

Command	N	N	N	N	,	±	X	X	X	X	X	X	CR	LF
Response	N	N	N	N	,	±	X	X	X	X	X	X	CR	LF

NNNN is code, ±XXXXXX is numerical number.

- In case of parameter type, store branch number.
- **Fnc01** (Key switch disable) is a decimal.

6.4.4. Monitoring the Whole Function Settings

Functions of all can be monitored at once. It can make a list of functions.

Command	N	N	N	N	CR	LF

NNNN is command.

Command code	Description
0999	All functions
1000	Calibration
1100	Linearity
1200	Basic
1300	Hold
1400	Weighing sequence
1500	Setpoint
1600	Control I/O
1700	Standard serial output
1800	CC-Link

6.4.5. Monitoring Each Piece of Data

Each function can be monitored.

Command	N	N	N	N	CR	LF

NNNN is command.

Command code	Description
0101	Program version
0102	Serial No.(lower 5 digits)
0103	Program checksum
0104	FRAM checksum
0201	Gross count
0202	Net count
0203	Tare count
0204	Load cell output. Scale : 1 nV/V
0205	Load cell output. Scale : 10 nV/V
0206	Flow rate (per second)

7. Maintenance

7.1. Error Messages

If an error message is displayed, use the following countermeasure.

Error message	Cause	Countermeasure
CS Er	Program checksum error	Repairer is required.
Ad Er	Data can not be acquired from the A/D converter.	Repairer is required.
FrAEr	Correct data can not be read from the nonvolatile memory (FRAM).	Initialize the module. If not be resolved, repairer is required.
C Err	Calibration data is incorrect.	Perform the calibration
C Er x	Calibration error.	Refer to "**5.3.8. Error Codes for the Calibration**". x: numerical.
Errdt	The setting value is out of range.	Check the setting value.

7.2. Check Mode

The check mode can be used to check the performance of the display, key switches and external I/O.

7.2.1. Entering Check Mode

Step 1 Press the **F** key while holding the **ENT** key (**ENT** + **F**) to display Fnc.
To return to weighing mode, press the **ESC** key.

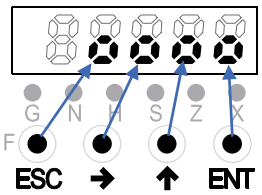
Step 2 Press the **ENT** key while holding the **➔** key (**➔** + **ENT**) to display CHc in check mode. Press the **ENT** key to display the check item.

Step 3 Select the checked item using the **↑** key. Press the **ENT** key to enter it.
Press the **ESC** key to exit.

Display symbol	Item
CHKEY	Key check
CH io	Control I/O check
CH CL	Standard serial output check
CH CC	CC-Link check
CH Ad	A/D converter output check (Load cell check)
CH in	Internal count check
CHPrG	Program version
CH Sn	Serial number
CSPrG	Program checksum
CSFrA	Memory checksum
CF dt	**C-Fnc** check (**C-F01** to **C-F28**)

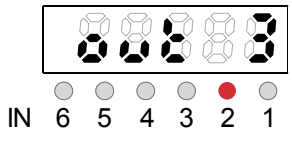
7.2.2. Verifying the Switch Operation

When pressing the key, the corresponding segment moves. "⊟" & "⊡".
To stop the current check mode, press the ESC key twice.



7.2.3. Checking the Control I/O

When pressing the ↑ key when the terminal number of the control I/O is displayed, the output turns on sequentially (out 0 is all OFF). When turning on the input of the control I/O, the LED illuminates.



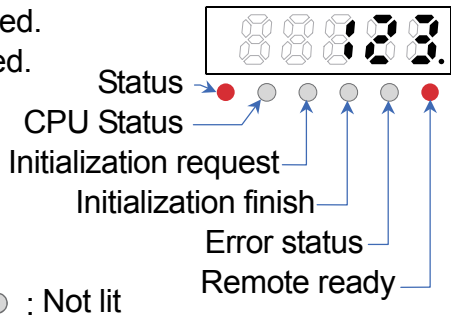
● : Lit, ○ : Not lit

7.2.4. Checking the Standard Serial Output

Test data "ST,GS,+00000.0kg<CR><LF>" is output using a preset baud rate every time the ENT key is pressed.

7.2.5. Checking the CC-Link

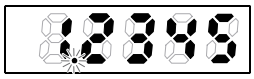
The status of the CC-Link communication can be monitored.
The remote register (RWw0000 to RWw0001) can be monitored.
When 4 stations are used, net value is displayed.
When 2 stations or 1 station are used, the display accords with data output (**CC 05**).
The initialization request can be sent to the master station with the ENT key.



● : Lit, ○ : Not lit

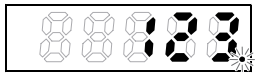
7.2.6. Monitoring the A/D Converter (for Load Cell Output)

The voltage output rate of the load cell is displayed in units of mV/V.
Example: When the internal count is 1.2345 mV/V and the output rate is above ±7 mV/V, a load cell damage or connection error may occur. Refer to **"7.5. Verifying Load Cell Connections Using Multimeter"**.



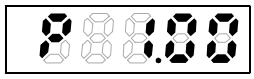
7.2.7. Monitoring the Internal Value

The current internal count (10 times of weighing value) is displayed.
When the internal count is 123, the example display is as follows:



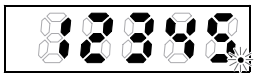
7.2.8. Monitoring the Program Version

The program version is displayed.
Example: Version 1.00 is as follows:



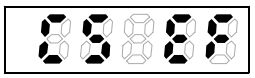
7.2.9. Monitoring the Serial Number

The last five digits of the serial number is displayed.



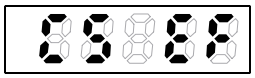
7.2.10. Monitoring the Checksum of the Program

The checksum of the program is displayed.
Example: Checksum is EF.



7.2.11. Monitoring the Checksum of an Internal FRAM

The checksum of FRAM is displayed. Memory of the general function is not checked.
Example: Checksum is EF.



7.2.12. Displaying Function Parameters for the Calibration

The function related to the calibration can be displayed.

- Refer to "**5.3.6. The Calibration Function**" for operation and details.
- Parameters can not be changed here.

7.3. Initializing Parameters

The initialization mode restores the parameters to the default values in the FRAM.
Three types of initialization mode are available as shown below.

Initialization mode	Display	Description
RAM initialization	ini r	RAM memory is initialized. The center of zero and tare value will be restored to 0.
General function initialization	ini F	Data of the general functions stored in the FRAM and the RAM are reset to factory settings.
All data initialization	ini A	All data stored in the FRAM, general functions and RAM are initialized. Data related to calibration is also initialized, so calibration must be performed again.

7.3.1. Initializing Mode for RAM and Function Parameters

Step 1 Press the F key while holding the ENT key (ENT + F) to display Fnc for general functions mode. To return to weighing mode, press the ESC key.

Step 2 Press the ENT key while holding the → key (→ + ENT) to display CHc for check mode.

Step 3 Select initialization mode ini using the ↑ key. Press the ENT key.

Step 4 Select an item to be initialized using the ↑ key. Press the ENT key.

Step 5 Check that all LED status are blinking.
To perform the initialization, hold the ENT key for 3 seconds or more.
After initialization, all segments will illuminate and return to weighing mode.
To cancel the initialization, press the ESC key to return to weighing mode.

7.3.2. Initializing All Data

Step 1 In OFF mode (Standby: While turning off the module), press F + ENT keys to display CAL for calibration mode.
To return to weighing mode, press the ESC key.

Step 2 Press the ENT key to enter into calibration mode.

Step 3 Press the ↑ key four times to select initialization all data mode and press the ENT key.

Step 4 Check that all LED status lights are blinking.
To initialize, hold the ENT key for 3 seconds or more.
After initialization, all segments illuminate and return to weighing mode.
To cancel the initialization, press the ESC key to return to weighing mode.

7.4. Verifying Load Cell Connections (DIAGNOS)

7.4.1. Guideline to Verify Load Cell Connections

Faulty wiring or disconnection of the load cell can be checked using the AD-4430C. This verification is useful for new settings, pre-measurement inspections and periodic inspections.

No.	Diagnostic item	Diagnostic point	Judgment Criteria (General)	Error code
1	Load cell input voltage	Between SEN+ ⇔ SEN−	3 V or more	1
2	SEN+ voltage	Between SEN+ ⇔ AGND	4 V or more	2
3	SEN− voltage	Between SEN− ⇔ AGND	1 V or less	4
4	Load cell output voltage	Between SIG+ ⇔ SIG−	Within ±35 mV	8
5	Load cell output rate	Between SIG+ ⇔ SIG−	Within ±7 mV/V	16
6	SIG+ voltage	Between SIG+ ⇔ AGND	1 V to 4 V	32
7	SIG− voltage	Between SIG− ⇔ AGND	1 V to 4 V	64
8	Internal temperature		−20 °C to +60 °C	128

AGND : Internal analog circuit ground
EXC− : Load cell excitation voltage (−)
EXC+ : Load cell excitation voltage (+)
SIG− : Load cell output (−)
SIG+ : Load cell output (+)

SHLD : Shield. Frame ground.
SEN− : Sensing input (−)
SEN+ : Sensing input (+)

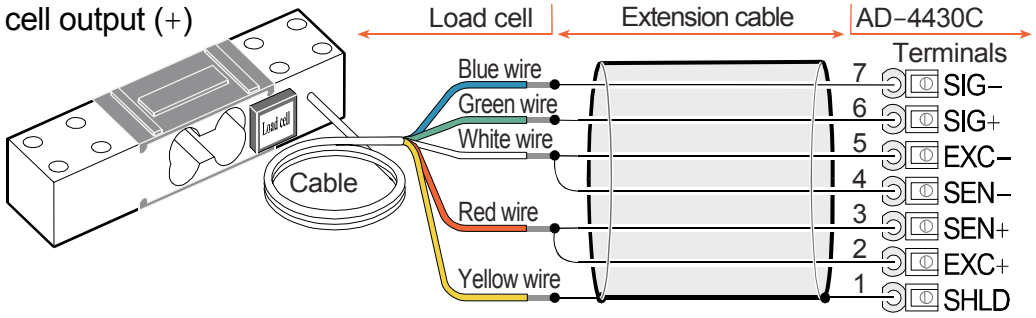


Illustration 19 Checking the load cell connection

7.4.2. Verifying Load Cell Connections with Switch Operation

Step 1 Press the F key while holding the ENT key (ENT + F) to display FnC for general functions mode. Press the ENT key to enter general functions mode.
To return to weighing mode, press the ESC key.

Step 2 Press the ENT key while holding the → key (→ + ENT) to display check mode CHc. To display the check item, press the ENT key.

Step 3 Press the ↑ key twice to select load cell connections diagnosis diAG and then press the ENT key to enter it. Each item is automatically diagnosed. After approx.16 seconds, the diagnosis is displayed. Also, each diagnosis is checked by selecting items pressing the ↑ key.
Press the ESC key to return to the display diAG.

7.4.3. Verifying Load Cell Connections with the CC-Link

The connections of the load cell can be verified using the CC-Link command.
Refer to section "**6.3.2. Commands**" for the detail of these commands of the CC-Link. In the following steps, all command No. (RWw000E) of the remote register is 0.

Step 1 Input the command to start the self check. Command data (RWw000C to RWw000D): 81
The AD-4430C enters to the self check mode and start the scan. (self check error)
The result is stored in the error sub code (RWr0007).

Step 2 Input the command to stop the self check Command data (RWw000C to RWw000D): 82
The AD-4430C stops the self check mode and returns to weighing mode.
The CC-Link outputs the diagnose result of self check error directly.

Step 3 Input error reset request flag. Error reset request flag
The AD-4430C resets self check error flag.

❑ The status of the CC-link is the same as the status of "Verifying Load Cell Connections with the CC-Link". Request an error reset and reset error.

7.4.4. Verifying Using Control I/O

Step 1 When the input terminal of the control I/O is set to "diagnose" and remains "ON" for 1 second or more, the display shows diAG and checks each item automatically. After approx. 16 seconds, the diagnosis is displayed.

❑ When the control I/O is set to "OFF", the diagnosis ends. Keep "ON" until the diagnosis is displayed.

Step 2 Turn off the input terminal of the control I/O set to "diagnose" and AD-4430C returns to weighing mode.

7.4.5. Display and Output of Verification

Total value of error codes is output to the error sub code (RWr0003) in the CC-Link. Items that have not been diagnosed are also totaled as errors. Refer to "**7.4.1. Guideline to Verify the Load Cell Connections**" concerning the detail of the diagnose point and judgment criteria.

When scanning and changing items, [dIAG] is displayed and [99999] is output.

The diagnostic result of the scanning are displayed and output as a code XXX in which error codes are accumulated.

If there are no errors, [Good] is displayed and [00000] is output.

If there is an error, [ErXXX] is displayed and [00XXX] is output.

The resistance of the load cell cable is calculated with the following formula :

(Resistance of Load cell) x (SEN− voltage) / (Load cell input voltage)

No.	Check item	Status LED G N H S Z X	Display Range	Error Code
1	Load cell excitation voltage	● ● ○ ○ ○ ●	0.001 V	1
2	SEN+ voltage	● ● ○ ○ ● ○	0.001 V	2
3	SEN− voltage	● ● ○ ○ ● ●	0.001 V	4
4	Load cell output voltage	● ● ○ ● ○ ○	0.001 mV	8
5	Load cell output rate	● ● ○ ● ○ ●	0.0001 mV/V	16
6	SIG+ voltage	● ● ○ ● ● ○	0.001 V	32
7	SIG− voltage	● ● ○ ● ● ●	0.001 V	64
8	Internal temperature	● ● ● ○ ○ ○	0.1 °C	128

● : Lit, ○ : Not lit

7.5. Verifying Load Cell Connections Using Multimeter

The load cell connection can be checked easily using a digital multimeter.
The measurement points of the load cell connection are shown below:
When a summing box is used, the same measurement points inside the summing box must be measured.

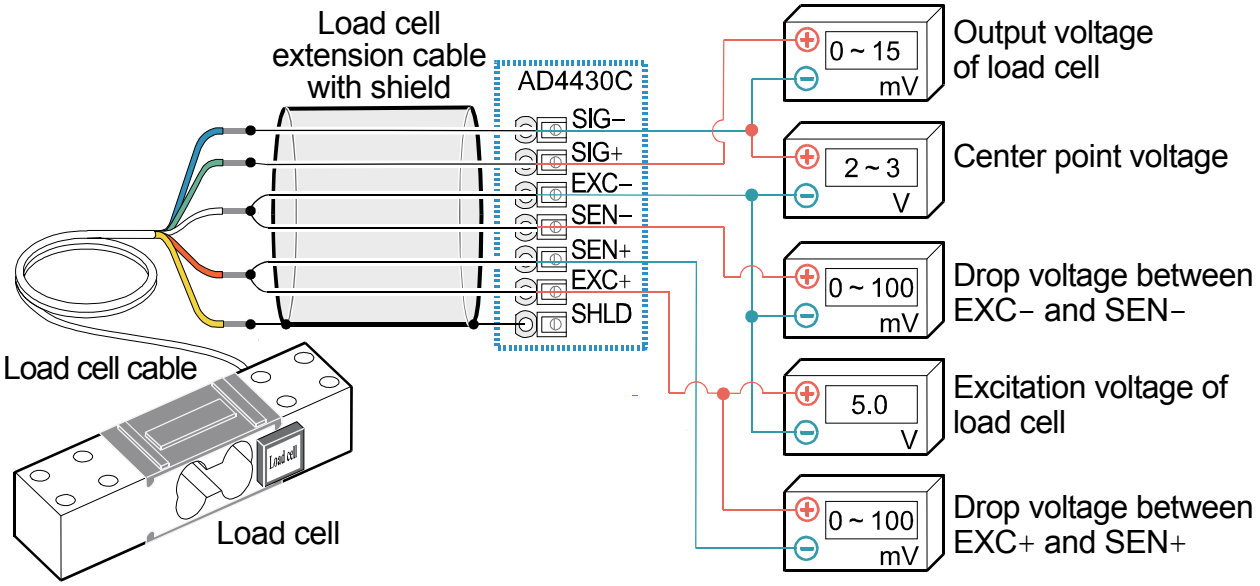


Illustration 20 Load cell connection check

7.5.1. Check List for load cell connections

Measurement points		Description	Conditions
EXC+	SEN+	Drop voltage of cable on EXC+ side.	Normally it is 100 mV or less. However, it may exceed 1V when an extremely long load cell cable is used. For the 4−wire connection, it must be 0 V.
EXC+	EXC−	Input voltage	Normal range is between 4.75 V to 5.25 V.
SIG−	EXC−	Center point voltage	Approximately 2.5 V, about a half of excitation voltage.
SIG+	SIG−	Output voltage	Generally, it is within 0 V to 15 mV. The theoretical value is calculated from the load cell rated capacity, actual load and excitation voltage.

When the module does not operate properly, write the required items in the table below and contact your local A&D dealer.

Item	Usage circumstances, model number, rated, measurement value etc.	Note
Connection method	❑ 4−wire connection ❑ 6−wire connection	When using the 4−wire connection, connect between EXC+ and SEN+ and between EXC− and SIG−.
Model name & number		
Rated capacity	[Unit]	
Rated output	[mV/V]	
Allowable overload	[%]	
The number of load cells used	[pieces]	
Use of summing box		
Length of the extension cable	[m]	Length between the module and the summing box.
Initial load of weighing module	[Unit]	
Minimum division of weighing module	[Unit]	All digits including decimal figures. Ex: 0.002kg
Capacity of weighing module	[Unit]	All digits including decimal figures. Ex: 10.000kg
Output of load cell using initial load	[mV/V]	Between −0.1mV/V and rated sensitivity of load cell (using initial load)
Output of load cell using capacity or arbitrary load.	Load cell output at Load [Unit] [mV/V]	When loaded to capacity, the output value of the initial load + the rated output value of the load cell. (It must be within allowable overload.)

Measurement points		Measurement contents	Measurement result
EXC+	SEN+	A drop voltage of cable on EXC+ side.	[mV]
EXC+	EXC−	Input voltage	[V]
SEN−	EXC−	A drop voltage of cable on EXC− side.	[mV]
SIG−	EXC−	Center point voltage	[V]
SIG+	SIG−	Output voltage	[mV]

7.6. The Parameter List For The Function

When performing maintenance, use the following list as a memorandum.
When making inquiries about the product, inform your local A&D dealer of the user settings.

7.6.1. The Calibration Function (C-Fnc)

Item Name / Function code	Description, Range and Default value	User setting
C-F01 1001 Unit	0 : Not used 1 : g [2]: kg 3 : t 4 : N 5 : kN	
C-F02 1002 Decimal point position	[0]: 0 1 : 0.0 2 : 0.00 3 : 0.000 4 : 0.0000	
C-F03 1003 Minimum division	[1]: 1 2 : 2 3 : 5 4 : 10 5 : 20 6 : 50	
C-F04 1004 Maximum capacity	1 to [70000] to 99999	
C-F05 1005 Zero range	0 to [2] to 100	
C-F06 1006 Zero tracking time	[0.0] to 5.0	
C-F07 1007 Zero tracking width	[0.0] to 9.9	
C-F08 1008 Stability detection time	0.0 to [1.0] to 9.9	
C-F09 1009 Stability detection width	0 to [2] to 9	
C-F10 1010 Tare and zero at unstable weight value	0 : Disables both functions. [1]: Enables both functions.	
C-F11 1011 Tare when the gross weight is negative	0 : Disables tare. [1]: Enables tare.	
C-F12 1012 Output when out of range and unstable	0 : Disables output. [1]: Enables output.	
C-F13 1013 Exceeding negative gross weight	[1]: Gross weight < -99999 2 : Gross weight < Negative maximum capacity 3 : Gross weight < -19d	
C-F14 1014 Exceeding negative net weight	[1]: Net weight < -99999 2 : Net weight < Negative maximum capacity	
C-F15 1015 Clear the zero value	0 : Disables. [1]: Enables.	
C-F16 1016 Zero setting when power is turned on	[0] : Not used. 1 : Use.	

Item Name / Function code	Description, Range and Default value	User setting
C-F17 1017 Input voltage at zero	−7.0000 to [0.0000] to 7.0000	
C-F18 1018 Span input voltage	0.0100 to [3.2000] to 9.9999	
C-F19 1019 Weight against span input voltage	1 to [32000] to 99999	
C-F26 1026 Gravity acceleration of the calibration place	9.7500 to [9.8000] to 9.8500	
C-F27 1027 Gravity acceleration of use place	9.7500 to [9.8000] to 9.8500	
C-F28 1028 Suppression of the hold function	[0]: Permission. 1 : Prohibition.	

7.6.2. The Linearization Function (L-Fnc)

Item Name / Function code	Description, Range and Default value	User setting
L-F01 1101 Number of input points	[0] to 5	
L-F02 1102 Linear−zero	−7.0000 to [0.0000] to 7.0000	
L-F03 1103 Setting value for linear 1	[0] to 99999	
L-F04 1104 Span at linear 1	[0.0000] to 9.9999	
L-F05 1105 Setting value for linear 2	[0] to 99999	
L-F06 1106 Span at linear 2	[0.0000] to 9.9999	
L-F07 1107 Setting value for linear 3	[0] to 99999	
L-F08 1108 Span at linear 3	[0.0000] to 9.9999	
L-F09 1109 Setting value for linear 4	[0] to 99999	
L-F10 1110 Span at linear 4	[0.0000] to 9.9999	

7.6.3. The Basics Function (Fnc F)

Item Name / Function code	Description, Range and Default value	User setting
Fnc01 1201 Key switch disable	0: Permission, 1: Prohibition 0000 to 1111	
Fnc02 1202 F key function	0: None 1: Manual print command 2: Hold 3: Alternative switch (Active F key) 4: Momentary switch (Active F key) 5: Display exchange 6: Tare clear 7: Zero clear 8: Weighing start / Pause / Re-start 9: Actual free fall input 10: One shot, Small flow 11: Sequence flow rate monitor 12: mV/V monitor 13: Digital filter 2	
Fnc03 1203 Display refresh rate	1: 20 times/sec. 2: 10 times/sec. 3: 5 times/sec.	
Fnc04 1204 x display	0: None 1: Zero tracking in progress 2: Alarm (Zero range setting error, over) 3: Active F key 4: Near-zero 5: HI output (Over the upper limit value) 6: OK output (Between upper and lower limit values) 7: LO output (Below the lower limit value) 8: Large flow 9: Medium flow 10: Small flow 11: Over 12: OK 13: Under 14: Full value 15: Weighing end 16: Weighing sequence, in processing 17: Weighing sequence, error 18: Normal batch/Loss-in-weight, Identification 19 to 24: User input1 to 6 25 to 32: User output 1 to 8	

Item Name	Function code	Description, Range and Default value	User setting
Fnc05 Digital filter 1	1205	0: None 1: 100.0 Hz 2: 70.0 Hz 3: 56.0 Hz 4: 40.0 Hz 5: 28.0 Hz 6: 20.0 Hz 7: 14.0 Hz 8: 10.0 Hz 9: 7.0 Hz 10: 5.6 Hz 11: 4.0 Hz 12: 2.8 Hz 13: 2.0 Hz 14: 1.4 Hz **15**: 1.0 Hz	
Fnc06 Digital filter 2	1206	0: None 1: 100.0 Hz 2: 70.0 Hz 3: 56.0 Hz 4: 40.0 Hz 5: 28.0 Hz 6: 20.0 Hz 7: 14.0 Hz 8: 10.0 Hz 9: 7.0 Hz 10: 5.6 Hz 11: 4.0 Hz 12: 2.8 Hz 13: 2.0 Hz 14: 1.4 Hz **15**: 1.0 Hz 16: 0.70 Hz 17: 0.56 Hz 18: 0.40 Hz 19: 0.28 Hz 20: 0.20 Hz 21: 0.14 Hz 22: 0.10 Hz 23: 0.07 Hz	
Fnc07 Hold function	1207	**1**: Normal hold 2: Peak hold 3: Averaging hold	
Fnc08 Near-zero	1208	−99999 to **10** to 99999	
Fnc09 Comparison target at near-zero	1209	**1**: Gross weight 2: Net weight	
Fnc10 Upper limit value	1210	−99999 to **10** to 99999	
Fnc11 Lower limit value	1211	−99999 to **−10** to 99999	
Fnc12 Comparison target of upper and lower limit	1212	**1**: Gross weight 2: Net weight	
Fnc13 Full value	1213	−99999 to **99999**	

7.6.4. The Hold Function (HLd F)

Item Name	Function code	Description, Range and Default value	User setting
HLd01 Averaging time	1301	0.00 to 9.99	
HLd02 Start wait time	1302	0.00 to 9.99	
HLd03 Condition of automatic start	1303	0: Not used 2: Above the near-zero 1: Above the near-zero, and stable	
HLd04 Release using control input	1304	0: Do not release 1: Release	
HLd05 Release time	1305	0.00 to 9.99	
HLd06 Release using fluctuation range	1306	0 to 99999	
HLd07 Release at the near-zero	1307	0: Do not release 1: Release	

7.6.5. The Weighing Sequence Program Function (59 F)

Item Name	Function code	Description, Range and Default value	User setting
Sq 01 Final value	1401	−99999 to [0] to 99999	
Sq 02 Free fall	1402	−99999 to [0] to 99999	
Sq 03 Preliminary	1403	−99999 to [0] to 99999	
Sq 04 Optional preliminary	1404	−99999 to [0] to 99999	
Sq 05 Over	1405	−99999 to [0] to 99999	
Sq 06 Under	1406	−99999 to [0] to 99999	
Sq 07 Weighing mode	1407	0: Not used [1]: Normal batch sequence 2: Discharge sequence 3: Specifying with control input 4: Specifying with CC-Link	
Sq 08 Automatic free fall correction	1408	[0]: Not used 1: Moving average of last four times 2: Real time free fall compensation(fixed coefficient) 3: Real time free fall compensation (updated coefficient)	
Sq 09 Automatic free fall band	1409	[0] to 99999	
Sq 10 Active free fall coefficient	1410	−99.999 to [0.000] to 99.999	
Sq 11 OK/Over/Under output timing	1411	1: Always [2]: In synchronization with weighing end	
Sq 12 Stability at judgment	1412	0: Disable [1]: Enable	
Sq 13 Automatic tare at weighing start	1413	[0]: Disable 1: Enable	
Sq 21 Flow timeout time	1421	[0] to 600	
Sq 22 Weighing start input delay time	1422	[0.0] to 60.0	
Sq 23 Large flow comparison disable time	1423	[0.0] to 60.0	
Sq 24 Medium flow comparison disable time	1424	[0.0] to 60.0	
Sq 25 Small flow comparison disable time	1425	[0.0] to 60.0	
Sq 26 Judging delay time	1426	0.0 to [0.1] to 60.0	
Sq 27 Weighing end output time	1427	[0.0] to 60.0	
Sq 28 One-shot time for small flow rate	1428	[0.00] to 6.00	

7.6.6. The Setpoint Function (SP F)

Item Name / Function code	Description, Range and Default value		User setting
SP 01 1501 Object of SP1	0: Not used 1: Final value 2: Optional preliminary 3: Preliminary 4: Free fall 5: Over 6: Under 7: Full 8: Near-zero 9: Free fall coefficient 10: Upper limit 11: Under limit	0 to [1] to 11	
SP 02 1502 Object of SP2		0 to [2] to 11	
SP 03 1503 Object of SP3		0 to [3] to 11	
SP 04 1504 Object of SP4		0 to [4] to 11	
SP 05 1505 Object of SP5		0 to [5] to 11	
SP 06 1506 Object of SP6		0 to [6] to 11	
SP 07 1507 Object of SP7		0 to [7] to 11	
SP 08 1508 Object of SP8		0 to [8] to 11	
SP 11 1511 Parameter of SP1	−99999 to [0] to 99999		
SP 12 1512 Parameter of SP2	−99999 to [0] to 99999		
SP 13 1513 Parameter of SP3	−99999 to [0] to 99999		
SP 14 1514 Parameter of SP4	−99999 to [0] to 99999		
SP 15 1515 Parameter of SP5	−99999 to [0] to 99999		
SP 16 1516 Parameter of SP6	−99999 to [0] to 99999		
SP 17 1517 Parameter of SP7	−99999 to [99999]		
SP 18 1518 Parameter of SP8	−99999 to [10] to 99999		

7.6.7. The Control I/O Function (io F)

Item Name / Function code	Description, Range and Default value		User setting
io 01 1601 Function of IN1	0 : Not used 1 to 6 : User input 1 to 6 7 : Zero 8 : Tare 9 : Hold 10 : Gross / Net exchange 11 : Diagnose 12 : Print command 13 : Weighing start 14 : Pause 15 : Restart 16 : Emergency stop (Level input) 17 : Error reset 18 : Normal batch/Loss-in-weight exchange 19 : Actual free fall input 20 : One shot, Small flow 21 : Full open (Level input) 22 : Zero clear 23 : Tare clear 24 : Operation same as a F key	0 to 1 to 24	
io 02 1602 Function of IN2		0 to 2 to 24	
io 03 1603 Function of IN3		0 to 3 to 24	
io 04 1604 Function of IN4		0 to 4 to 24	
io 05 1605 Function of IN5		0 to 5 to 24	
io 06 1606 Function of IN6		0 to 6 to 24	
io 11 1611 Function of OUT1	0 : Not used 1 to 8 : User output 1 to 8 9 : Stability 10 : Over capacity 11 : Net display 12 : During tare 13 : Hold 14 : Hold busy 15 : HI output (Over the upper limit value) 16 : OK output (Between upper and lower limit values) 17 : LO output (Below the lower limit value) 18 : Near-zero 19 : Full 20 : Over 21 : OK 22 : Under 23 : Large flow 24 : Medium flow 25 : Small flow 26 : Normal batch/Loss-in-weight, Identification 27 : In weighing sequence 28 : Weighing end 29 : Weighing sequence error 30 : In weighing (ON) 31 : In weighing (1 Hz) 32 : In weighing (50 Hz) 33 : Alarm 34 : Active F key	0 to 1 to 34	
io 12 1612 Function of OUT2		0 to 2 to 34	
io 13 1613 Function of OUT3		0 to 3 to 34	
io 14 1614 Function of OUT4		0 to 4 to 34	
io 15 1615 Function of OUT5		0 to 5 to 34	
io 16 1616 Function of OUT6		0 to 6 to 34	
io 17 1617 Function of OUT7		0 to 7 to 34	
io 18 1618 Function of OUT8		0 to 8 to 34	

Item Name / Function code	Description, Range and Default value	User setting
io 21 1621 OUT1 Logic	1: Inverting output If data is "0" level, the output transistor conducts (ON). 2: Non inverting output If data is "1" level, the output transistor conducts (ON).	
io 22 1622 OUT2 Logic		
io 23 1623 OUT3 Logic		
io 24 1624 OUT4 Logic		
io 25 1625 OUT5 Logic		
io 26 1626 OUT6 Logic		
io 27 1627 OUT7 Logic		
io 28 1628 OUT8 Logic		

7.6.8. The Standard Serial Output Function (CL F)

Item Name / Function code	Description, Range and Default value	User setting
CL 01 1701 Serial data	1: Weighing display 2: Gross 3: Net 4: Tare 5: Gross / Net / Tare	
CL 02 1702 Communication mode	1: Stream 2: Automatic print 3: Manual print	
CL 03 1703 Baud rate	1: 600 bps 2: 2400 bps	

7.6.9. The CC-Link Function (CC F)

Item Name	Function code	Description, Range and Default value	User setting
CC 01 Station number	1801	1 to 64	
CC 02 Number of remote register occupied	1802	0: 1 stations 1: 2 stations 2: 4 stations	
CC 03 Baud rate	1803	0: 156 kbps 1: 625 kbps 2: 2.5 Mbps 3: 5 Mbps 4: 10 Mbps	
CC 04 Initial process	1804	0: Not needed 1: Necessary	
CC 05 Output data	1805	0: Weighing display 1: Net 2: Gross	
CC 06 Weighing information 1	1806	0: Not used 1 : Sequence number 2 : Batch weighing error 3 : Actual free fall 4 : Free fall (Averaging) 5 : Free fall coefficient (Averaging) 6 : Sequence flow rate (In small flow OFF) 7: Sequence flow rate (Real time) 8 : Load cell output. Scale : 1 nV/V 9 : Net (Digital filter 2) 10 : Gross (Digital filter 2)	
CC 07 Weighing information 2	1807		

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