



# **AD-4411-EIP/PRT/ECT Weighing Indicator**

## **INSTRUCTION MANUAL**



## WARNING DEFINITIONS

The warnings described in this manual have the following meanings:

 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 or damage to the instrument.

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# 1. Introduction

The AD-4411 is a weighing indicator that converts signals from strain gauge load cells and connects them to an Industrial Ethernet network. It contributes to an efficient system by connecting weighing instruments to industrial control systems in plants and factories.

- Two communication ports enable daisy-chain connection without a switching hub.
- 7-segment green LED display with a character height of 10 mm and display resolution of  $\pm 999999$ .
- High-speed AD conversion of 1200 times/second and a digital filter enable high speed and accurate weighing.
- The panel mount type has a cutout of 96x48mm and a front panel protection rating of IP65.
- Settings can be updated with a PC via a USB port.

## 1.1. Safety precautions

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Please read the following precautions carefully before using this product.

### WARNING

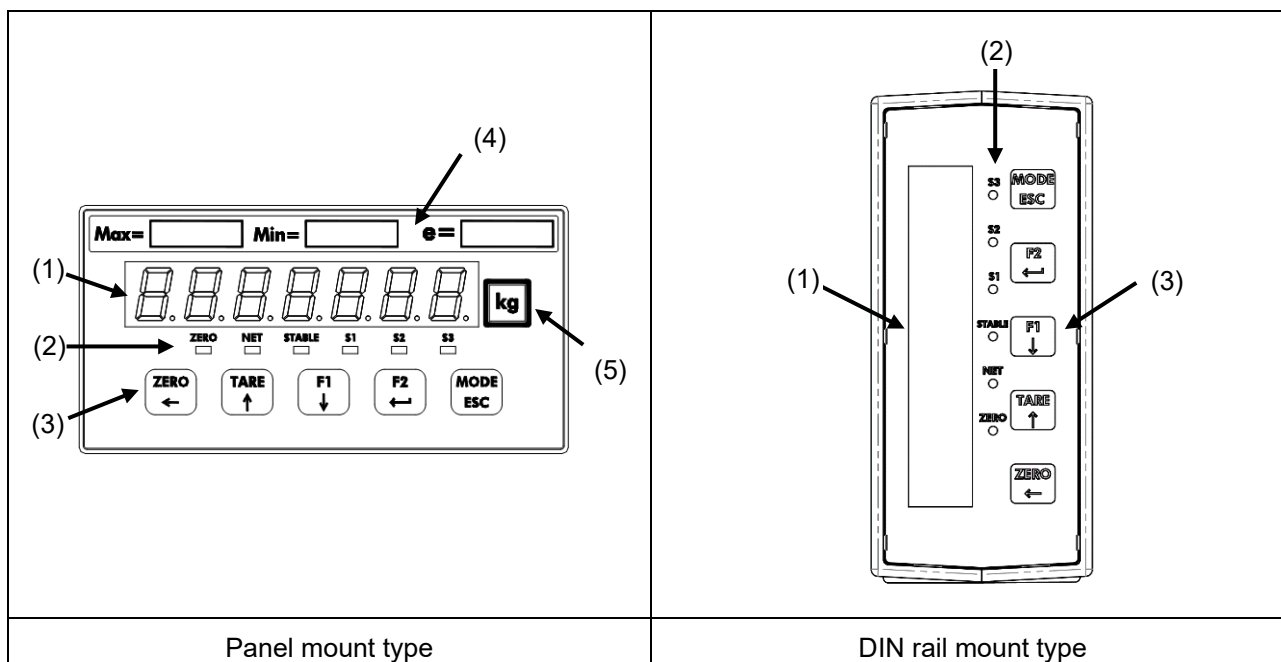
- Provide an external safety circuit for the indicator so that the safety of the whole system can be secured even if errors occur in the external power supply or the indicator.
- This indicator must be used indoors. DIN rail mount type must be used inside the control panel. Do not use the indicator in the following environments:
  - where the temperature and the humidity exceed the specifications
  - where there are corrosive or flammable gases
  - where the indicator could be subjected to oil, chemicals, or waterPlease note that securing the panel mount type to the control panel provides IP65 protection to the outside of the control panel.
- Turn off all external power supplies when installing or removing the indicator.
- Turn off all external power supplies when wiring the indicator.
- Be sure to ground the indicator.

### CAUTION

- Do not clamp control wires or communication cables with power lines, and do not position them close to power lines.
- Position the load cell cable a sufficient distance away from high frequency circuits such as high voltage power lines or inverter load circuits.
- When the front cover has dirt, wipe them with wet soft cloth. Do not use organic solvent such like benzene, thinner and alcohol. Doing so may result in deformation or discoloration of the unit.
- Suitable for use at pollution degree of 2 or less.
- Use within an altitude of 0 to 2000m.
- This equipment shall be supplied from a 24V dc power source that meets the limited energy circuit requirements or LPS or NEC/CEC Class 2 (US/Canada), isolated from mains by reinforced or double insulation.

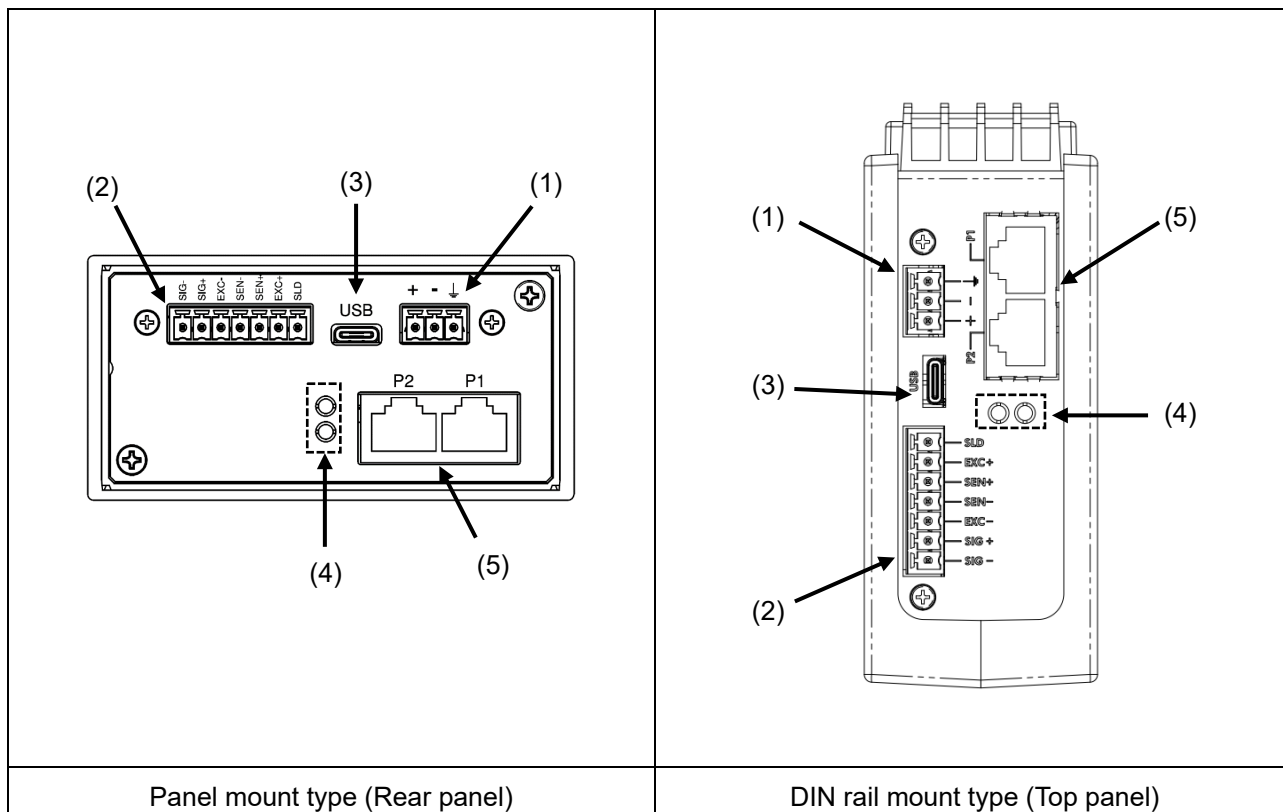
## 2. Part names

### 2.1. Front panel



No.	Name	Description
(1)	Main display	Displays the measured value and various settings.
(2)	Status LEDS	ZERO
		NET
		STABLE
		S1
		S2
		S3
(3)	Key switches	ZERO/←
		TARE/↑
		F1/↓
		F2/ENTER
		MODE/ESC
(4)	Capacity label	Attach the included capacity label if necessary.
(5)	Unit label	Attach the included unit label if necessary.

## 2.2. Rear panel, Top panel



No.	Name	Description
(1)	DC power input terminals	Terminal for connecting the DC24V power supply
(2)	Load cell input terminals	Terminal for connecting the load cell.
(3)	USB connector	Connector for connecting the setup PC (Type-C).
(4)	Industrial Ethernet status LEDs	Indicate Industrial Ethernet status.
(5)	Industrial Ethernet connector	Ethernet port for PLC connection. Daisy-chaining is possible with dual ports (RJ-45).

## 2.3. Accessories

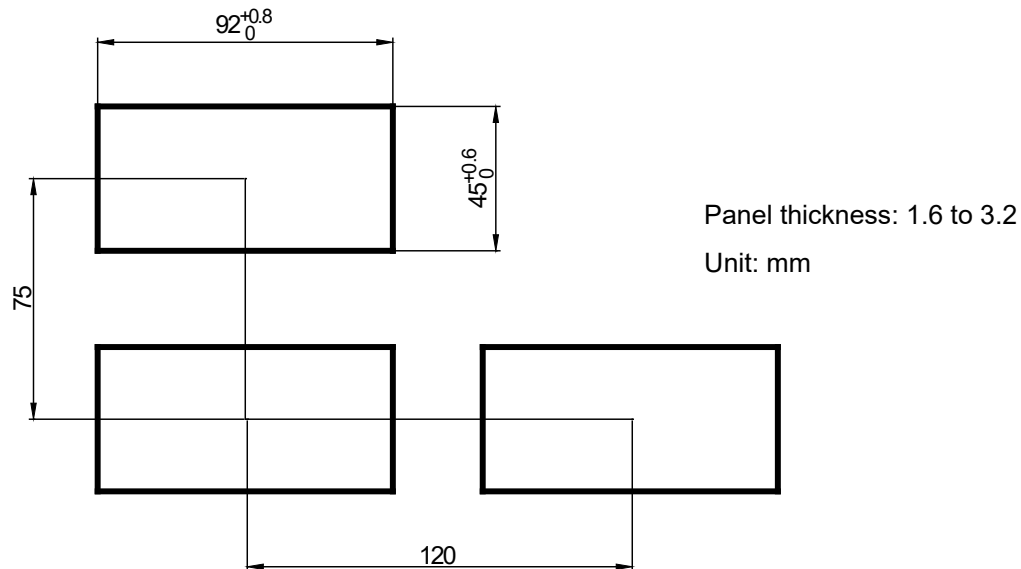
Name	A&D Part Number	Qty.	Remarks
Waterproof packing	1064053659	1	Only panel mount type
Panel mounting bracket	1073035116	2	
Capacity label	1084054808	1	
Unit label	1084023456A	1	
Power connector	1JIMC1.5/3-ST	1	
Load cell connector	1JIMC1.5/7-ST	1	

## 3. Installing to the control panel

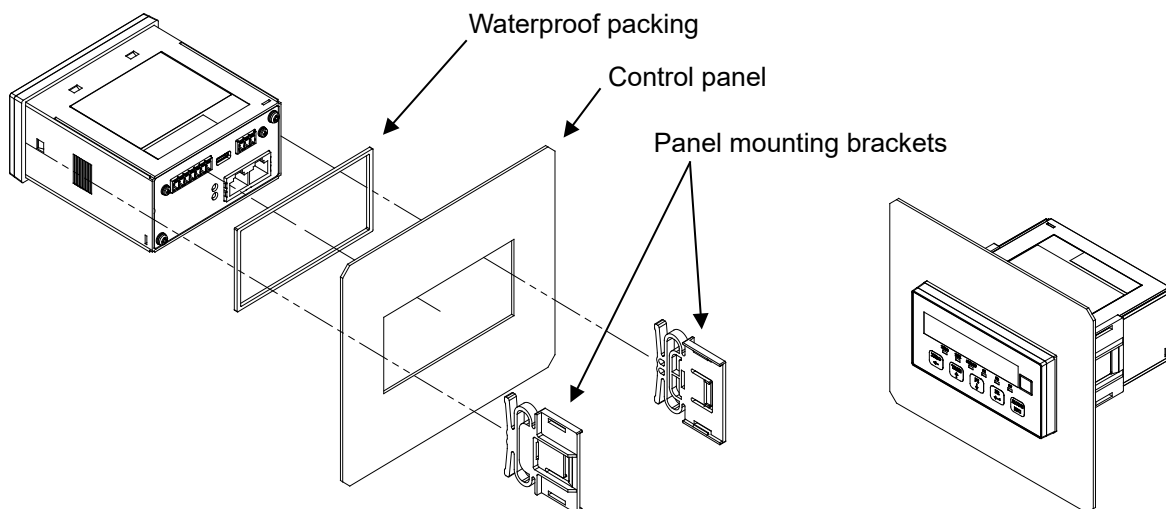
### 3.1. Panel mount type

#### 3.1.1. Installing the indicator to the control panel

Make a hole in the control panel of the dimensions shown in the figure below. When installing more than one indicator, make sure there is sufficient space around each unit for heat dissipation.

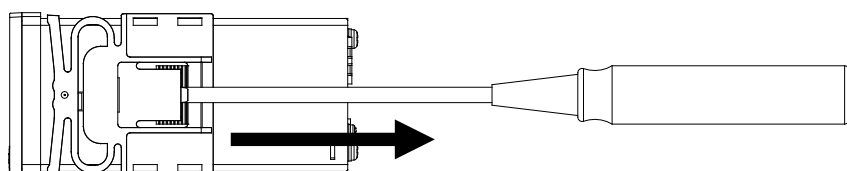


Attach the waterproof packing to the main body, then insert the main body into the control panel from the front. Fit the left and right mounting brackets into the grooves of the case and slide them all the way into the panel.



#### 3.1.2. Removing the indicator from the control panel

While pushing up the tabs of the panel mount bracket from the case with a flathead screwdriver, and slide the bracket towards the rear of the case.

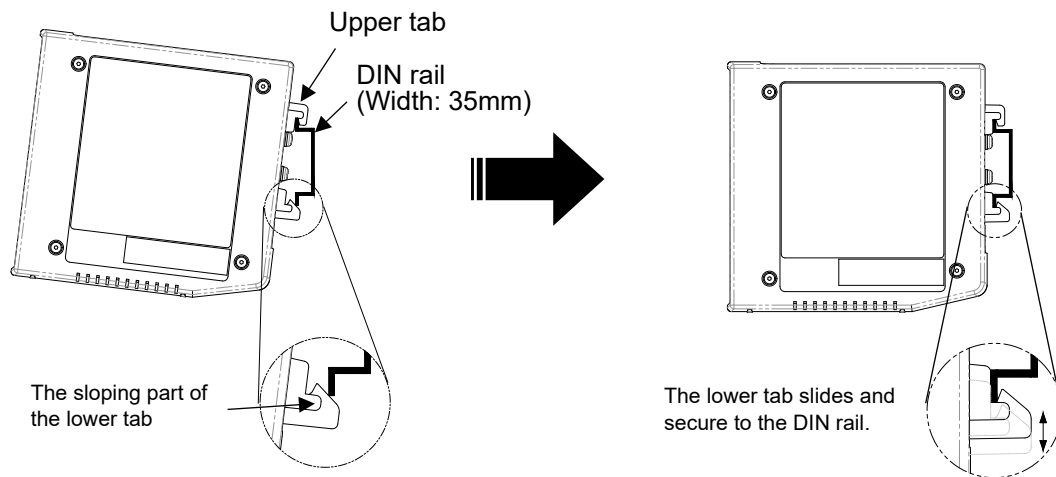




## 3.2. DIN rail mount type

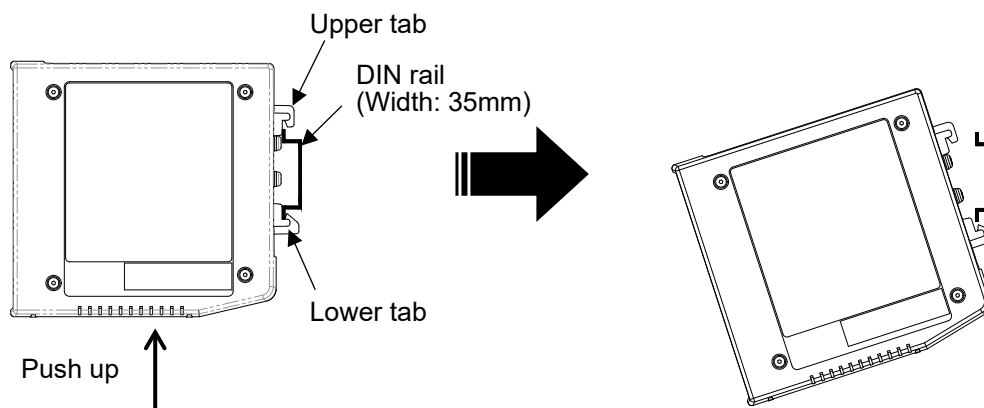
### 3.2.1. Installing the indicator to the control panel

Hook the upper tab of the DIN rail mount onto the DIN rail and press the sloped part of the lower tab against the DIN rail. Push the main unit toward the DIN rail then slide the lower tab to secure the unit to the DIN rail.




### 3.2.2. Removing the indicator from the control panel

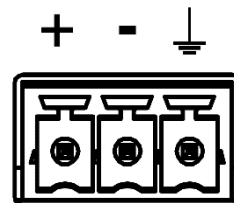
Push up the bottom of the main unit to detach the upper tab from the DIN rail. Then, detach the lower tab from the DIN rail as well.



## 4. Connection to power supply

### 4.1. DC power supply assignment

Symbol	Description
+	DC power input + (24 V)
-	DC power input - (0 V)
	Functional ground

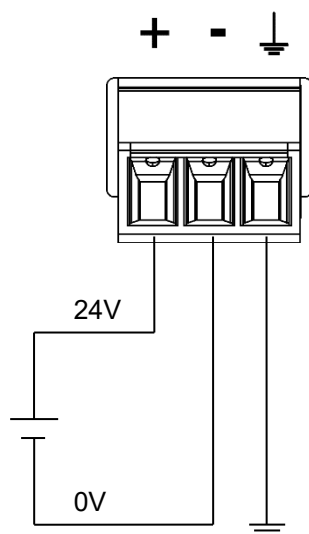


Applicable wire

Item	Specifications
Wire size	0.14 to 1.5 mm <sup>2</sup> (AWG 26 to 16)
Wire strip length	7 mm
Tightening torque	0.22 to 0.25 Nm

### 4.2. Connection diagram

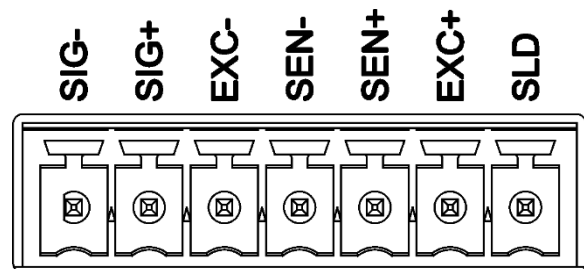
Attach the included power connector accessory and wire them as shown below.



## 5. Connection to load cell

### 5.1. Load cell input terminal assignment

Symbol	Description
SIG-	Load cell signal input -
SIG+	Load cell signal input +
EXC-	Load cell excitation voltage -
SEN-	Sensing input-
SEN+	Sensing input+
EXC+	Load cell excitation voltage +
SLD	Shield



#### Applicable wire

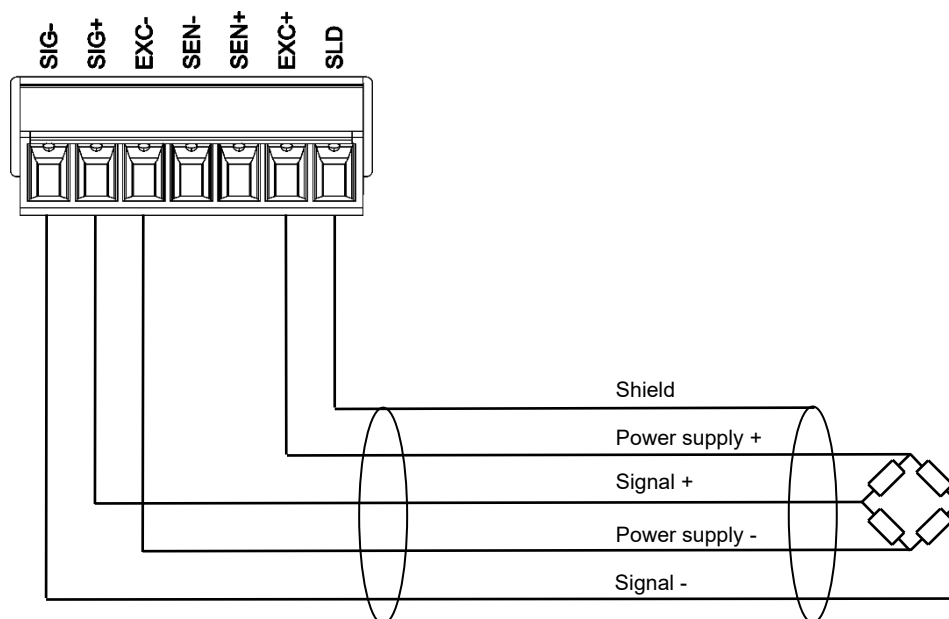
Item	Specifications
Wire size	0.14 to 1.5 mm <sup>2</sup> (AWG 26 to 16)
Wire strip length	7 mm
Tightening torque	0.22 to 0.25 Nm

### 5.2. Connection diagram

Attach the included load cell connector accessory and wire them as shown below.

#### 4-Wire type

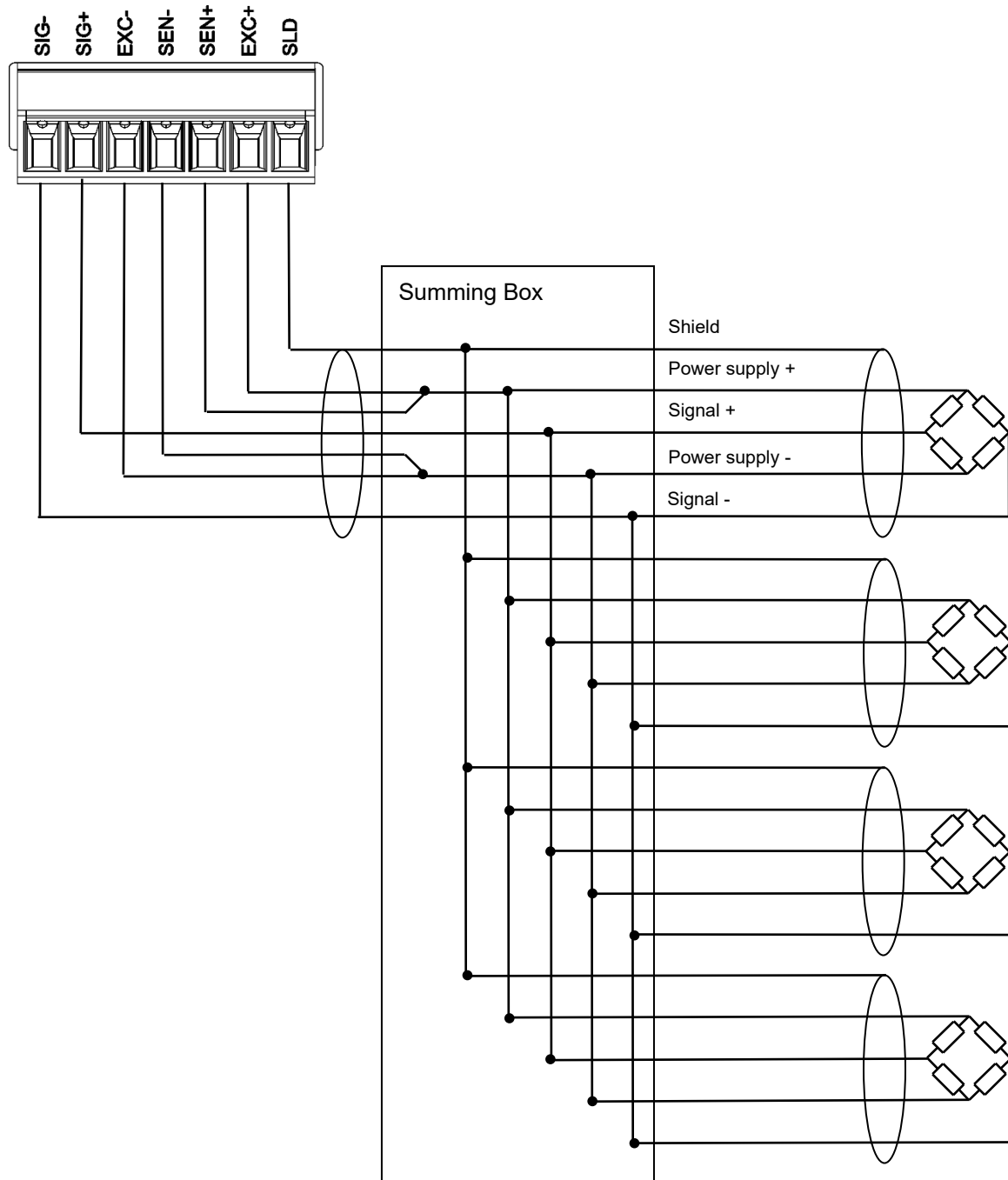
Set load cell connection type (CALF17) to 0: 4 wire type (default = 1: 6 wire type).



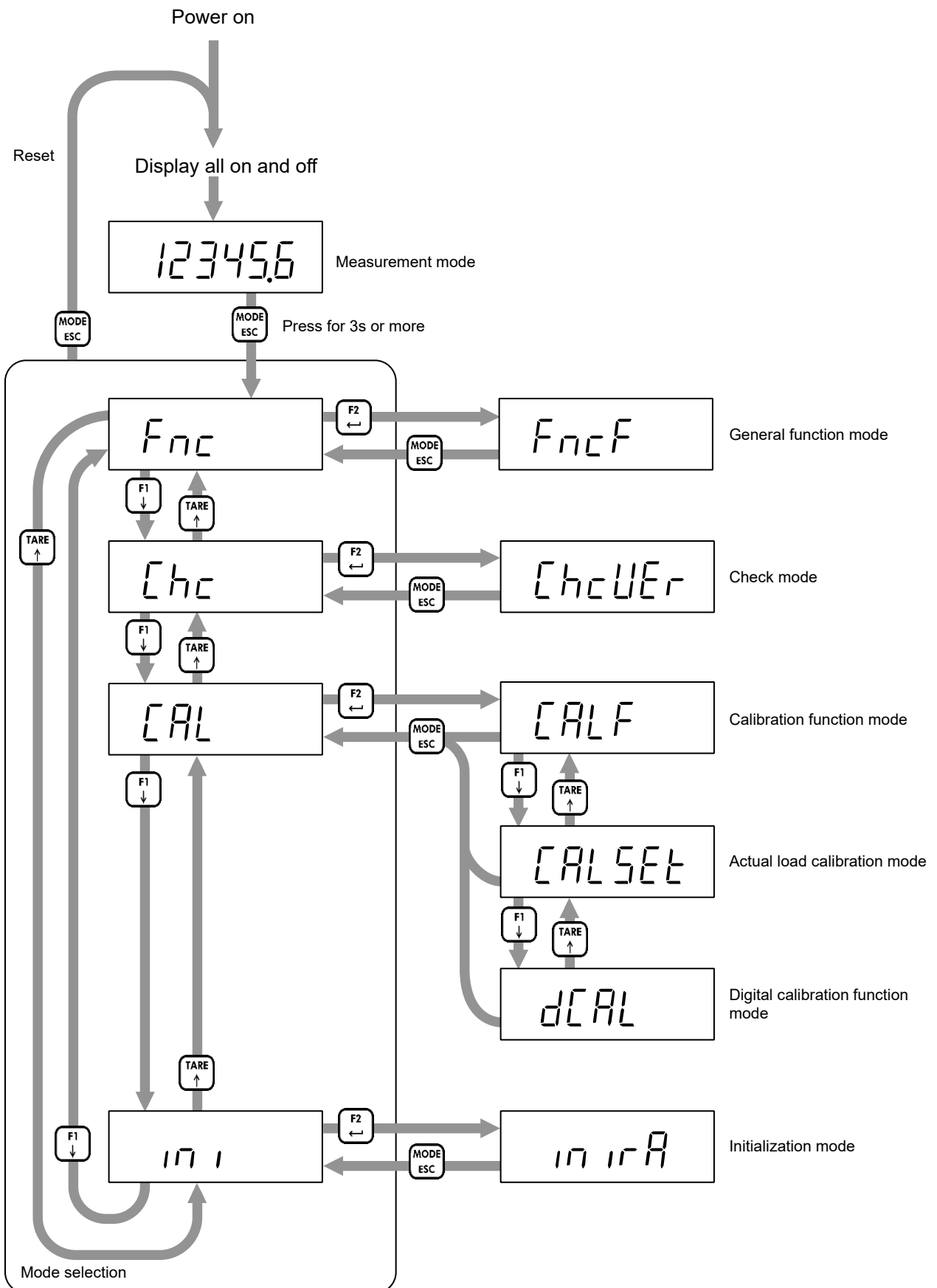
## 6-wire connection

Set load cell connection type (CALF17) to 1: 6 wire type (default).

When you connect the load cells in parallel, use a summing box. Connecting AD-4411 to four load cells is as shown below.



## 6. Operation mode



# 7. Calibration

Calibrate the AD-4411 so that it can properly convert the signal from the load cell to a load value.

## 7.1. Settings required before calibration

Before calibration, the following settings are required.

- Select the measurement unit (CALF01).  
The set unit is only used for external communication. Attach the unit label to the main display.  
0: None / 1: g / 2: kg (default) / 3: t
- Select decimal point position (CALF02).  
0: 0 (None) (default)  
1: 0.0  
2: 0.00  
3: 0.000  
4: 0.0000  
5: 0.00000
- Set the minimum division (CALF03).  
1: 1d (default) / 2: 2d / 3: 5d / 4: 10d / 5: 20d / 6: 50d
- Set the maximum capacity (CALF04). (Default=999999)

## 7.2. Digital calibration

After calibration using calibration weights is completed, digital calibration function settings are automatically updated.

Be sure to make a note of the updated settings so you can re-calibrate without applying actual load if the AD-4411 is replaced.

- Load cell input signal at zero calibration (dCAL01)
- "Load cell input signal at span calibration"- "Load cell input signal at zero calibration" (dCAL02)
- The calibration weights at span calibration (dCAL03)

## 7.3. Actual load calibration

Refer "6 Operation mode" to move to actual load calibration mode, then press the [F2/ENTER] key.

### 7.3.1. Zero calibration

Press the [F2/ENTER] key.

If the [F1/↓] key is pressed, the indicator skips zero calibration and enters span calibration.

The current load cell input signal (mV/V) is displayed.

Check that the STABLE status is ON.

Press the [F2/ENTER] key to execute zero calibration.

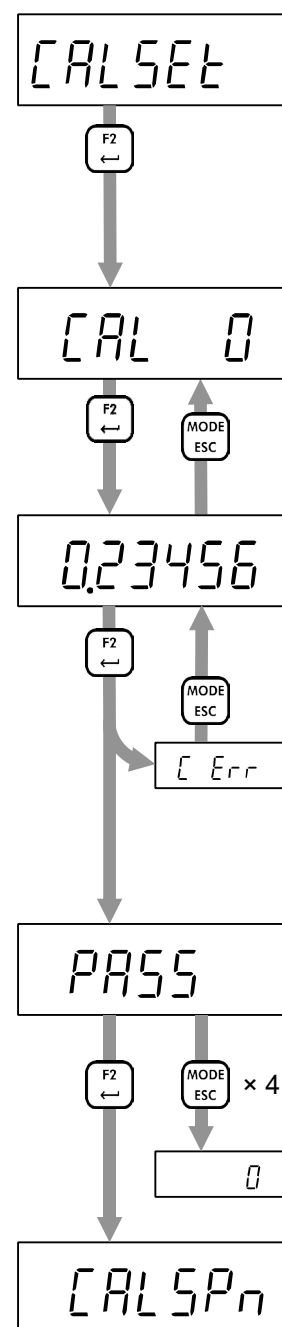
If zero calibration fails, "C ErrX" is displayed.

Refer "7.3.3 Error in actual load calibration" for error details.

If zero calibration is successful, "PASS" is displayed, and zero calibration is completed.

Press the [F2/ENTER] key to enter span calibration.

Or press the [MODE/ESC] key four times to return to measurement mode.



### 7.3.2. Span calibration

Press the [F2/ENTER] key.

If the [F1/↓] key is pressed, the indicator skips span calibration and enters zero calibration.

Set a calibration weight value by the following key operations

[ZERO/←] key: Moves the blinking digit to the left.

[TARE/↑] key: Increases the blinking digit by one.

[F1/↓] key: Decreases the blinking digit by one

[F2/ENTER] key: Confirm the setting value.

The current load cell input signal (mV/V) is displayed.

Place the calibration weight or apply load to the load cell.

Check that STABLE status is ON.

Press the [F2/ENTER] to execute span calibration

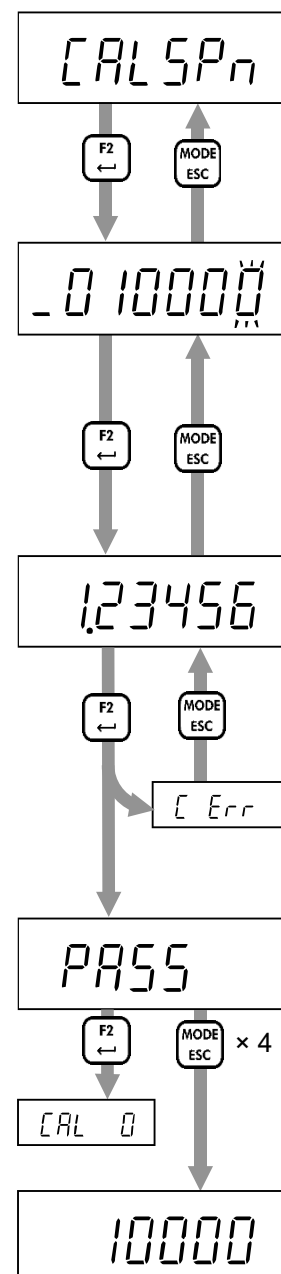
If span calibration fails, "C ErrX" is displayed.

Refer "[7.3.3 Error in actual load calibration](#)" for error details.

If span calibration is successful, "PASS" is displayed, and span calibration is completed.

Press the [MODE/ESC] key four times to return to measurement mode.

Or press the [F2/ENTER] to enter zero calibration again.





### 7.3.3. Error in actual load calibration

Error code	Description
[ Err2	The load cell signal voltage at zero calibration exceeds 7.0 mV/V. Check that the load cell is connected correctly.
[ Err3	The load cell signal voltage at zero calibration is less than -7.0 mV/V. Check that the load cell is connected correctly.
[ Err4	The calibration weight value for span calibration exceeds the maximum capacity. Set the calibration weight value to the maximum capacity or less.
[ Err5	The calibration weight value for span calibration is below the scale interval. Set the calibration weight value to the scale interval or more.
[ Err7	The load cell input signal at span calibration is smaller one at zero calibration. Check that the load cell is connected correctly.
[ Err8	The load cell signal voltage at span calibration exceeds 7.0 mV/V. Check that the load cell is connected correctly.

## 8. Basic functions

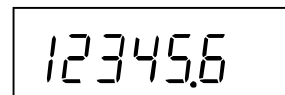
After AD-4411 is turned on, all segments of the display turn on / off to check the display. Then AD-4411 enters measurement mode and starts measuring.

Refer "[14 Function Settings](#)" for function setting methods.

### 8.1. Main display

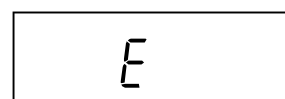
The following content is displayed in measurement mode.

- Measurement value.



- Positive overload.

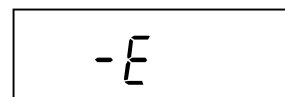
The gross value exceeds the maximum capacity by +8d.



- Negative overload.

The gross value meets the negative overload condition (CALF15).

(Default = 0: Gross < - maximum capacity + 8d)



### 8.2. Power-on zero

After power-on, the gross value is set to zero automatically when the gross value is within the maximum capacity  $\pm 10\%$  and stable.

Set power-on zero (CALF14) to 1: Enable (default = 0: Disable) to use this function.

If the condition is not met, "-----" is displayed until the condition is met.

Press the [MODE/EXC] key to skip power-on zero and enter measurement mode.

## 8.3. Zero-setting

### Executing zero-setting

When the measurement value is within the zero-setting range (CALF05), press the [ZERO] key or send a request externally to save the gross value as the zero-setting value and set to zero.

Set the following to use this function.

- Set the zero-setting range (CALF05) to a value other than 0 (default = 100%).
- Select the zero-setting at unstable (CALF10) from 0: Disable / 1: Enable (default).

### Zero clear

Press a key to which zero clear function is assigned or request externally to clear the zero-setting value.

Set the following to use this function.

- Set the function of [F1] / [F2] key (FncF05 / Fnc06) to 2: zero clear (default = 0: None).
- Set zero clear (CALF13) to 1: Enable (default).

## 8.4. Zero-tracking

The gross value is set to zero automatically when the tracking time has passed while the gross value is maintained within the zero-tracking width.

Set the following to use this function.

- Set the zero-tracking time (CALF06) to a value other than 0.0s (default).
- Set the zero-tracking width (CALF07) to a value other than 0: Disable (default).

## 8.5. Tare

### Executing tare

Press the [TARE] key or request externally, to save the gross value as the tare value and set the net value to zero.

Set the following to use this function.

- Select taring at unstable (CALF11) from 0: Disable / 1: Enable (default).
- Select taring at the negative gross (CALF12) from 0: Disable / 1: Enable (default).

### Tare clear

Press a key to which tare clear function is assigned or request externally to clear the tare value.

Set the following to use this function.

- Set the function of [F1] / [F2] key (FncF05 / Fnc06) to 1: tare clear (default = 0: None).

## 8.6. Gross / Net display selection

Press a key to which Gross / Net display selection function is assigned or request externally to switch the displayed value between gross and net. Net status is ON when the net value is displayed.

Set the following to use this function.

- Set the function of [F1] / [F2] key (FncF05 / Fnc06) to 3: Gross / Net display selection (default = 0: None).

## 8.7. Center-zero detection

The center of zero is detected and ZERO status turns ON when the gross value is within 1/4 of the minimum division.

## 8.8. Stability detection

Stability is detected and the stable status is ON when the stability detection time has passed while the measured value is maintained within the stability detection width.

Set the following to use this function.

- Set the stability detection time (CALF08) to a value other than 0.0s (default = 1.0s).
- Set the stability detection width (CALF09) to a value other than 0: Disable (default = 2d).

## 8.9. High resolution display selection

Press a key to which the high-resolution display selection function is assigned to switch the displayed value between high resolution display (10 times higher) and normal display.

Set the following to use this function.

- Set the function of [F1] / [F2] key (FncF05 / Fnc06) to 4: high resolution display selection (default = 0: None).

## 8.10. Comparator

The comparison value and the measured value are compared, and then Hi / OK / Lo is detected when the following conditions are met.

Hi            Measured value  $>$  Upper limit value

OK           Upper limit value  $\geq$  Measured value  $\geq$  Lower limit value

Lo            Lower limit value  $>$  Measured value

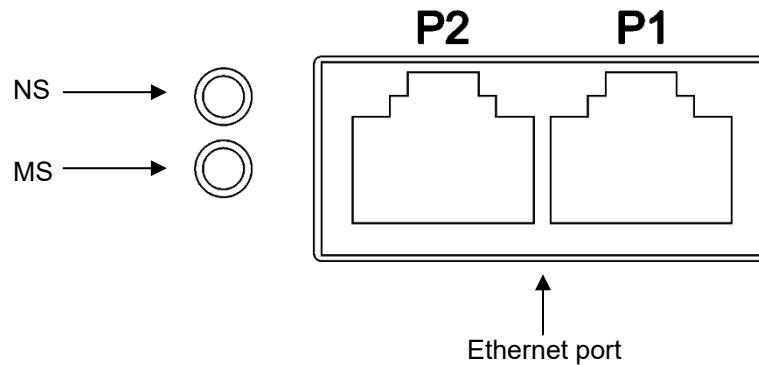
Set the following to use this function.

- Upper limit value (FncF11). (Default = 10)
- Lower limit value (FncF12). (Default = -10)
- Select the target for comparison (FncF13) from 1: Gross (default) / 2: Net.

## 9. Industrial Ethernet

### 9.1. EtherNet/IP (AD-4411-EIP)

#### 9.1.1. Part names



Name	Function	Description
NS	Network status LED	OFF No power or no IP address assigned
		Green, ON Operating properly
		Green, blinking No connection established
		Red, ON IP address duplication
		Red, blinking Communication timeout
MS	Module status LED	OFF No power
		Green, ON Operating properly
		Green, blinking Scanner in idle state
		Red, ON Unrecoverable fault
		Red, blinking Recoverable fault

#### 9.1.2. Communication specifications

Communication is performed according to the following communication specifications.

Note that communication is possible only in measurement mode.

Communication protocol	EtherNet/IP (DLR supported)
Transmission speed	10/100 Mbps
Connector	RJ-45
Cable specifications	Shielded twisted pair (STP) cable, straight / crossover, CAT 5e or above
Configuration file	EDS file (Please download the configuration file from A&D's website.)

### 9.1.3. Communication settings

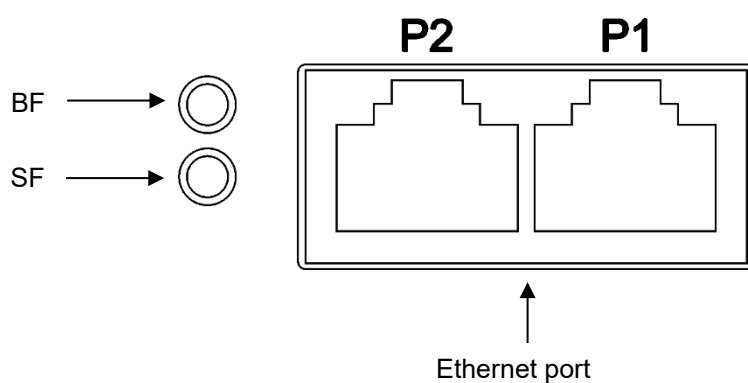
Consult with the network administrator for the IP address, subnet mask, and default gateway settings.

DHCP is not supported.

IP F	Setting item	Setting value	Default
01	IP address XXX. XXX. XXX. XXX		
		0~255	192
		0~255	168
		0~255	0
02		0~255	2
03			
04			
05	Subnet mask XXX. XXX. XXX. XXX		
		0~255	255
		0~255	255
		0~255	255
06		0~255	0
07			
08			
09	Default gateway setting XXX. XXX. XXX. XXX		
		0~255	0
		0~255	0
		0~255	0
10		0~255	0
11			
12		0~255	0

## 9.2. PROFINET (AD-4411-PRT)

### 9.2.1. Part names



Name	Function	Description
BF	Bus failure LED	OFF      Operating properly
		Red, ON      Station name not set No connection established
SF	System failure LED	OFF      Operating properly
		Red, ON      Watchdog timeout System error

### 9.2.2. Communication specifications

Communication is performed according to the following communication specifications.

Note that communication is possible only in measurement mode.

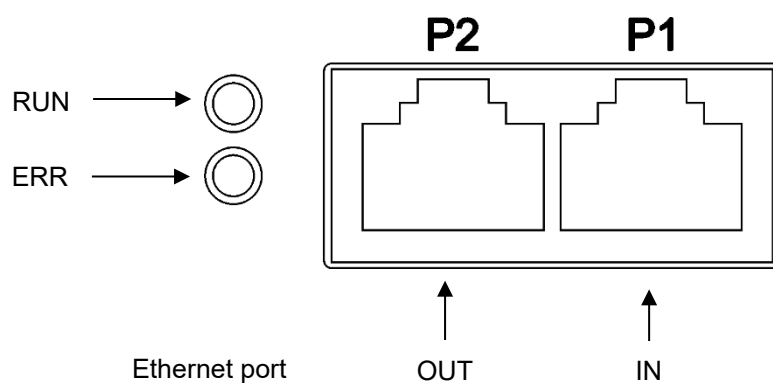
Communication standard	PROFINET IO RT
Transmission speed	100 Mbps
Connector	RJ-45
Cable specifications	Shielded twisted pair (STP) cable, straight / crossover, CAT 5e or above
Configuration file	GSDML file (Please download the configuration file from A&D's website.)

### 9.2.3. Communication settings

Set the station name and IP address using the PLC setting tool.

## 9.3. EtherCAT (AD-4411-ECT)

### 9.3.1. Part names



Name	Function	Description
RUN	Communication status LED	OFF Power-Off or Init state
		Green, ON Operational state
		Green, blinking Pre-Operational state
		Green, single blink Safe-Operational state
ERR	Error status LED	OFF Power-Off or no error
		Red, blinking Communication setting error
		Red, single blink Communication data error
		Red, double blinks Watchdog timeout

### 9.3.2. Communication specifications

Communication is performed according to the following communication specifications.

Note that communication is possible only in measurement mode.

Communication standard	EtherCAT (Sync mode is supported only for Free Run.)
Transmission speed	100 Mbps
Connector	RJ-45 (P1 = IN, P2 = OUT)
Cable specifications	Shielded twisted pair (STP) cable, straight / crossover, CAT 5e or above
Configuration file	ESI file (Please download the configuration file from A&D's website.)

### 9.3.3. Communication settings

When using the Explicit Device ID, set it with the Ect function.

If "0: Not used (default)", the PLC settings are valid.

Ect F	Setting item	Setting value	Default
01	Explicit Device ID	0: Not used 1~65535	0

## 9.4. Cyclic data layout

Once the Industrial Ethernet connection is established between the AD-4411 and PLC, cyclic data exchanges are performed periodically. The cyclic data consists of the Write data area for sending data from the PLC to the AD-4411 and the Read data for sending data from AD-4411 to the PLC.

The contents of cyclic data transfer are common to EtherNet/IP, PROFINET, and EtherCAT.



### 9.4.1. Data layout

Write data (PLC -> AD-4411)

Word No.	Data area name	Data type	Description
Word 0-1	Command value	Int32	This area is used to send various commands to AD-4411.
Word 2	Command	UInt16	

Read data (AD-4411 -> PLC)

Word No.	Data area name	Data type	Description	
Word 0-1	Response value	Int32	This area is used to receive the response for a command from AD-4411.	
Word 2	Response	UInt16		
Word 3-4	Net value	Int32	Net value	
Word 5-6	Gross value	Int32	Gross value	
Word 7-8	Status	UInt32	Bits.0-10	-
			Bit.11	Hi
			Bit.12	OK
			Bit.13	Lo
			Bit.14	-
			Bit.15	Stability
			Bit.16	Net value display
			Bits.17-18	-
			Bit.19	Overload
			Bit.20	Zero-setting failed
			Bit.21	Tare failed
			Bits.22-31	-

The status bit is "1" while the condition is met.

## 9.4.2. Command and response

Using the "Command", "Command value", "Response" and "Response value" areas, functions can be executed and setting values can be written / read. The procedure differs depending on the type of command.

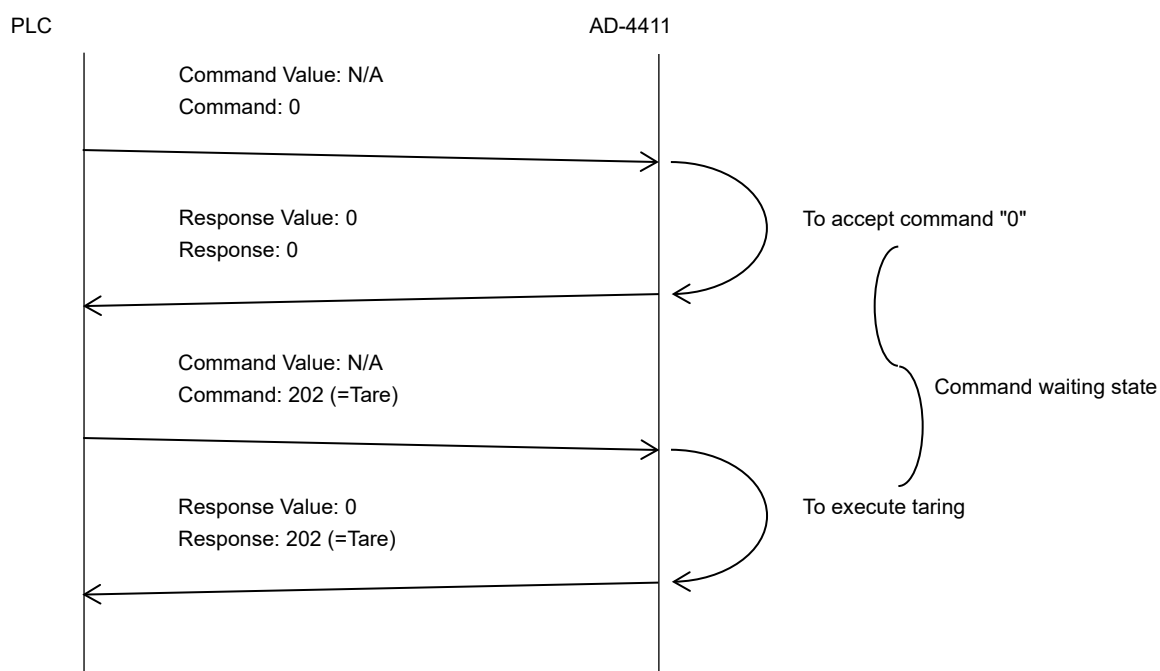
### 9.4.2.1. Command to execute functions

The following functions can be executed.

Command	Description
0	The AD-4411 will enter a command-waiting state. Any commands issued outside of this state will be ignored.
201	Zero setting
202	Tare
207	Tare clear
212	Zero clear
401	Zero calibration
402	Span calibration

Use the following procedure to execute a function such as tare.

1. Set the command "0" in the "Command" area on PLC.
2. When AD-4411 accepts the command "0", it echoes back "0" in the "Response" area and waits for a command.
3. Set a valid command (e.g. 202: Tare) in the "Command" area on PLC.
4. If AD-4411 successfully executes the command, it echoes back the command (e.g. 202: Tare) in the "Response" area. If it fails, the "Response" area is updated to 65535: Error.



#### 9.4.2.2. Read command

Refer "[15 Function setting lists](#)" for commands for read setting values.

The following are commands for reading measured values.

Command	Description
1001	Read displayed value
1003	Read gross value
1005	Read net value
1007	Read tare value
1095	Read load cell input voltage (1nV/V)

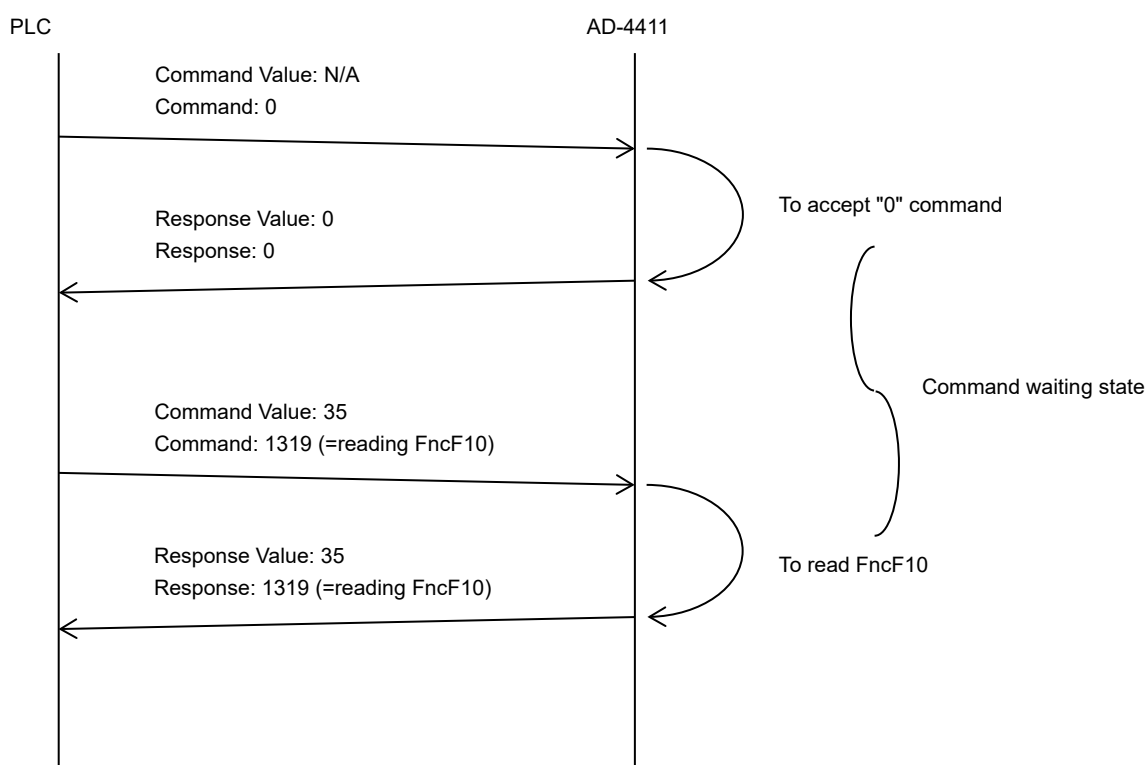
The decimal point position is ignored when the setting value / measured value is read.

For example, the displayed value "123.4" is read as "1234".

Use the following procedure to read a setting value.

1. Set the command "0" in the "Command" area on PLC.
2. When AD-4411 accepts the command "0", it echoes back "0" in the "Response" area and waits for a command from PLC.
3. Set a valid read command in the "Command" area on PLC.
4. If AD-4411 successfully reads the data, it echoes back the command in the "Response" area and updates the read data in the "Response value" area. If it fails, the "Response" area is updated to 65535: Error.

The following is an example of reading FncF10 and setting value "35".



### 9.4.2.3. Write command

Refer "[15 Function setting lists](#)" for commands for writing setting values.

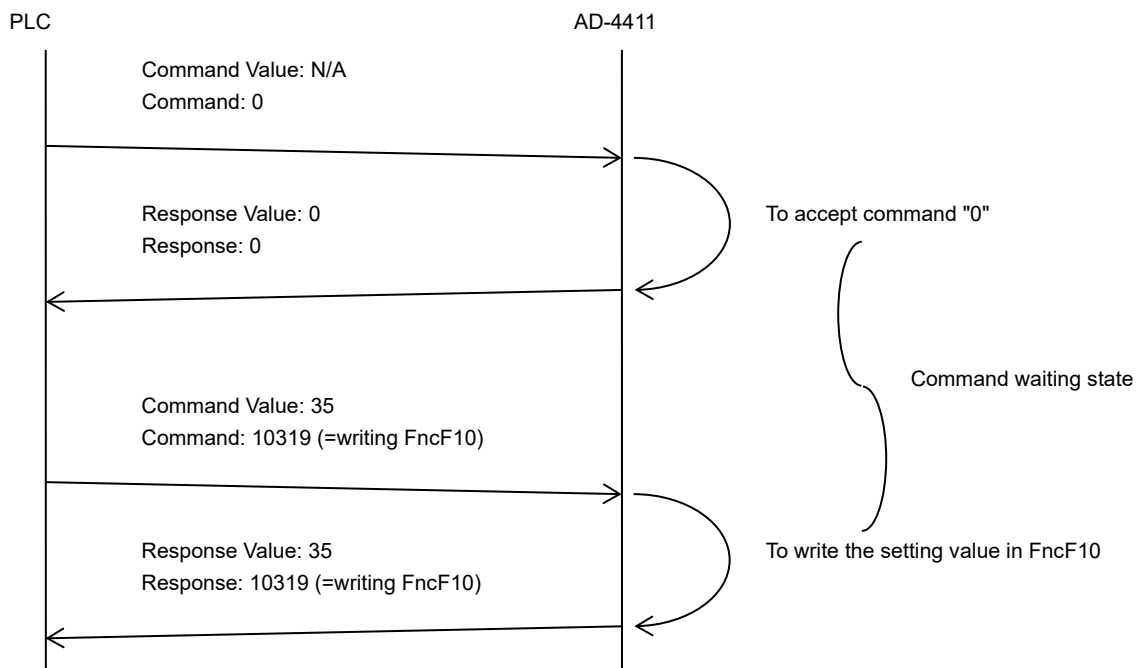
The decimal point position is ignored when writing setting values.

For example, the value to be written is "12" when the value set is "1.2".

Use the following procedure to write a setting value.

1. Set the command "0" in the "Command" area on the PLC.
2. When AD-4411 accepts the command "0", it echoes back "0" in the "Response" area and waits for a command from PLC.
3. Set valid write data in the "Command value" area on PLC.
4. Set a valid write command in the "Command" area on PLC.
5. If AD-4411 successfully writes the data, it echoes back the command in the "Response" area and the write data in the "Response Value". If it fails, the "Response" area is updated to 65535: Error.

The following is an example of writing FncF10 and setting value "35".



## 10. USB

A PC can be used to read measured values and write setting values via USB (virtual COM port).

AD-4411 can be operated via USB bus power, but the USB circuit is not isolated, so noisy environments may affect measurement performance. For normal operation, use the 24 V power supply port.

### 10.1. Communication specification

USB function is available in measurement mode.

USB Specification	Connector	Type-C
	Communication	USB 2.0 (Full-speed) virtual COM port
	Power	5V 3.0A at using bus power
Communication protocol		Modbus RTU
Slave address		1
Baud rate		115200 bps
Data length / Parity / Stop bit		8bits / None / 1 bit

Function code and maximum quantity

Code	Function name	Maximum qty.
01	Read coils	100
03	Read holding registers	100
05	Write single coil	1
06	Write single register	1
15	Write multiple coils	1
16	Write multiple registers	100

## 10.2. Coil data address

Data address	R/W	Item name
000001-000011	R	-
000012		Hi
000013		OK
000014		Lo
000015		-
000016		Stable
000017		Gross "0" / Net"1"
000018-000019		-
000020		Overload
000021		When zero-setting fails
000022		When tare fails
000023 - 000200		-
000201	W *1	Zero-setting
000202		Tare
000203-000206		-
000207		Tare clear
000208-000211		-
000212		Zero clear
000213		Switch gross on the display
000214		Switch net on the display
000215-000300		-
000301-000400	R/W	-
000401	W *1	Zero calibration
000402		Span calibration
000403-000500		-

\*1: When "1" is written, the operation is executed.

### 10.3. Holding register data address

All holding registers are DWORD. The first word is the low word of a 32-bit value.

The decimal point position is ignored when the setting value is read.

For example, the displayed value "123.4" is read as "1234".

Data address	R/W	Item name
400001-400002	R	Displayed value
400003-400004		Gross value
400005-400006		Net value
400007-400008		Tare value
400009-400010		Status (See the next page for details)
400011-400094		-
400095-400096		Load cell input signal (1 count means 1 nV/V)
400097-400100		-
400101-400134	R/W	Calibration function *1
400135-400300		-
400301-400326		Basic function *1
400327-401500		-
401501-401506		Digital calibration function *1
401507-401600		-
401601-401624		IP function *1, *2
401625-402000		-

\*1: Refer "[14 Function Settings](#)".

\*2: The new IP function settings take effect after restart.

Bits address details for status (40009—40010)

Data address	Item name
400009.15-05	-
400009.04	Lo
400009.03	OK
400009.02	Hi
400009.01	-
400009.00	-
400010.15-10	-
400010.09	S3 status is ON.
400010.08	S2 status is ON.
400010.07	S1 status is ON.
400010.06	ZERO status is ON.
400010.05	STABLE status is ON.
400010.04	Displaying gross weight value.
400010.03	Displaying net weight value.
400010.02	-
400010.01	-
400010.00	-



### 10.3.1. Example message for coil

The following is an example of executing a tare (data address 000202).

Master -> Slave	0x01 05 00 C9 FF 00 5C 04	
Slave address	0x01	Set 0x0A (=rS F-09: Slave address 10).
Function code	0x05	Set 0x05, which is a request to write the data address 000001~065535 (coil).
Data address	0x00 C9	The Modbus protocol specifies that the starting data address be set to the value of the coil data address minus 000001, so set 0x00C9 (= 000202 – 000001).
Write data	0xFF 00	Set 0xFF 00 (= ON).
CRC	0x5C 04	An error-checking field is based on a CRC method.

Slave -> Master	0x01 05 00 C9 FF 00 5C 04	
Slave address	0x01	In this example, the sent message is echoed back as is.
Function code	0x05	
Data address	0x00 C9	
Write data	0xFF 00	
CRC	0x5C 04	

### 10.3.2. Example message for holding register

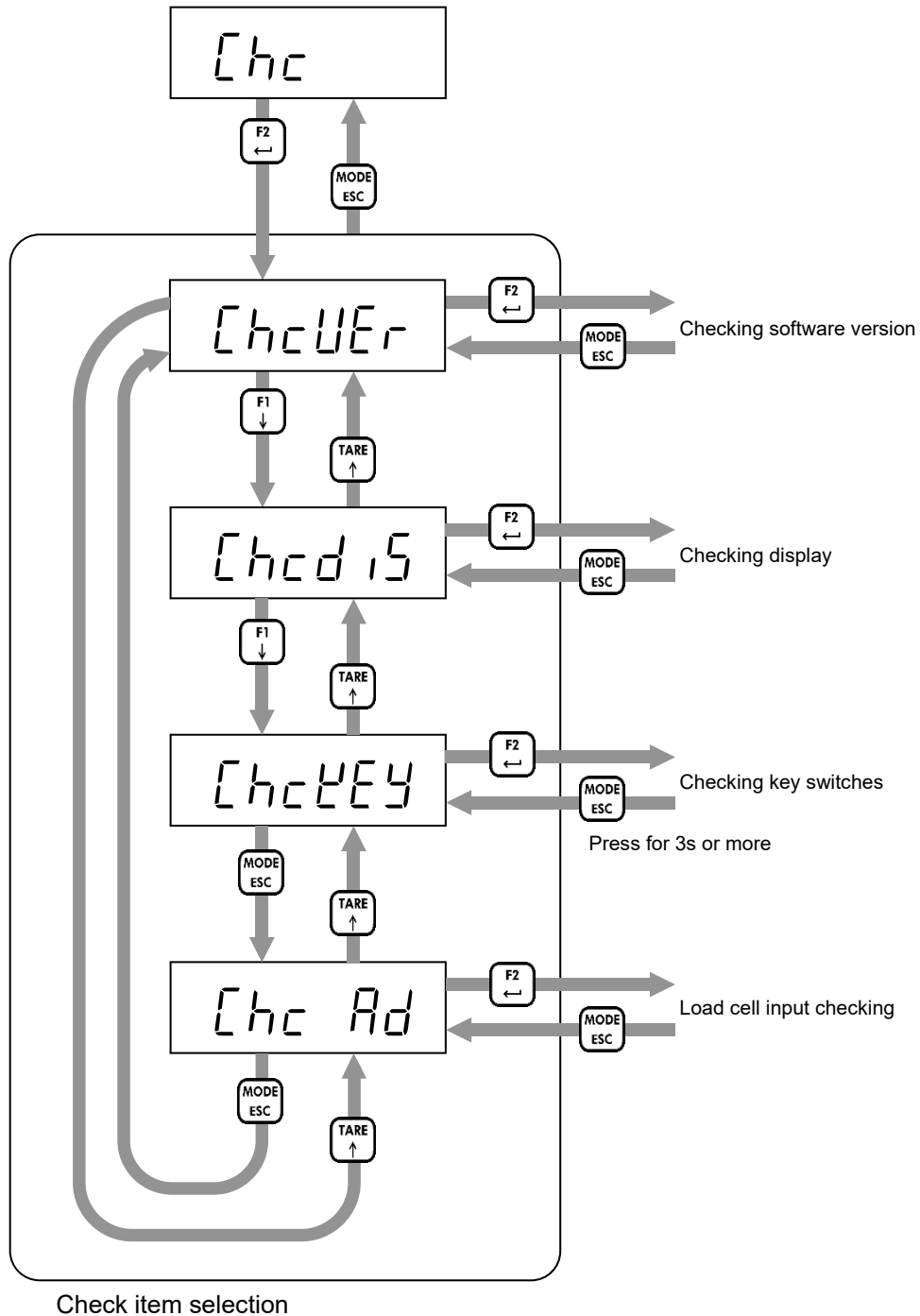
The following is an example reading contiguous data of the Gross value (data address 400003~400004) and Net value (data address 400005~400006).

Master -> Slave	0x01 03 00 02 00 04 E5 C9	
Slave address	0x01	Set 0x01 (Slave address 01) in this example.
Function code	0x03	Set 0x03, which is a request to read the data address 400001~465535 (holding registers).
Starting data address	0x00 02	The Modbus protocol specifies that the starting data address be set to the value of the holding register data address minus 400001, so in this example set 0x0002 (= 400003 – 400001)
Read data points	0x00 04	In this example, set 0x04 to read 4 data from 400003 to 400006.
CRC	0x E5 C9	An error-checking field is based on a CRC method.

Slave -> Master	0x01 03 08 86 9F 00 01 C3 4F 00 00 42 C7		
Slave address	0x01	The slave address is echoed back as is.	
Function code	0x03	The function code is echoed back as is.	
Number of read data bytes	0x08	The number of read data bytes is set.	
Data 1	0x86 9F	The data in 400003	The master can read the first 16-bit data as the low data of 32-bit value.  In this example, the current gross value is 99999 (= 0x00 01 86 9F).
Data 2	0x00 01	The data in 400004	
Data 3	0xC3 4F	The data in 400005	In this example, the current net value is 49999 (= 0x00 00 C3 4F)
Data 4	0x00 00	The data in 400006	
CRC	0x42 C7	An error-checking field is based on a CRC method.	

# 11. Checking software version / hardware

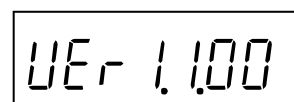
You can check the software version and make sure the hardware is operating properly in check mode.  
Refer "6 Operation mode" to enter check mode. See below for check mode procedures.



### 11.1. Checking software version

Software version is displayed.

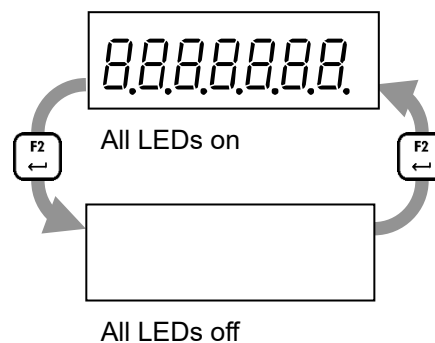
Press [MODE/ESC] key to return to check item selection.



### 11.2. Checking display

Press [F2/ENTER] to switch between all LEDs on and off.

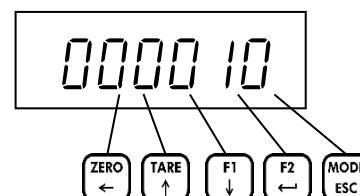
Press [MODE/ESC] key to return to check item selection.



### 11.3. Checking key switches

Press any key to change from "0" to "1" in the corresponding digit.

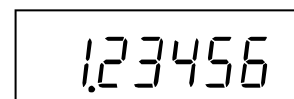
Press [MODE/ESC] key for 3s or more to return to check item selection.



### 11.4. Checking load cell input

The current load cell input signal (mV/V) is displayed.

Press [MODE/ESC] key to return to check item selection.



## 12. Troubleshooting

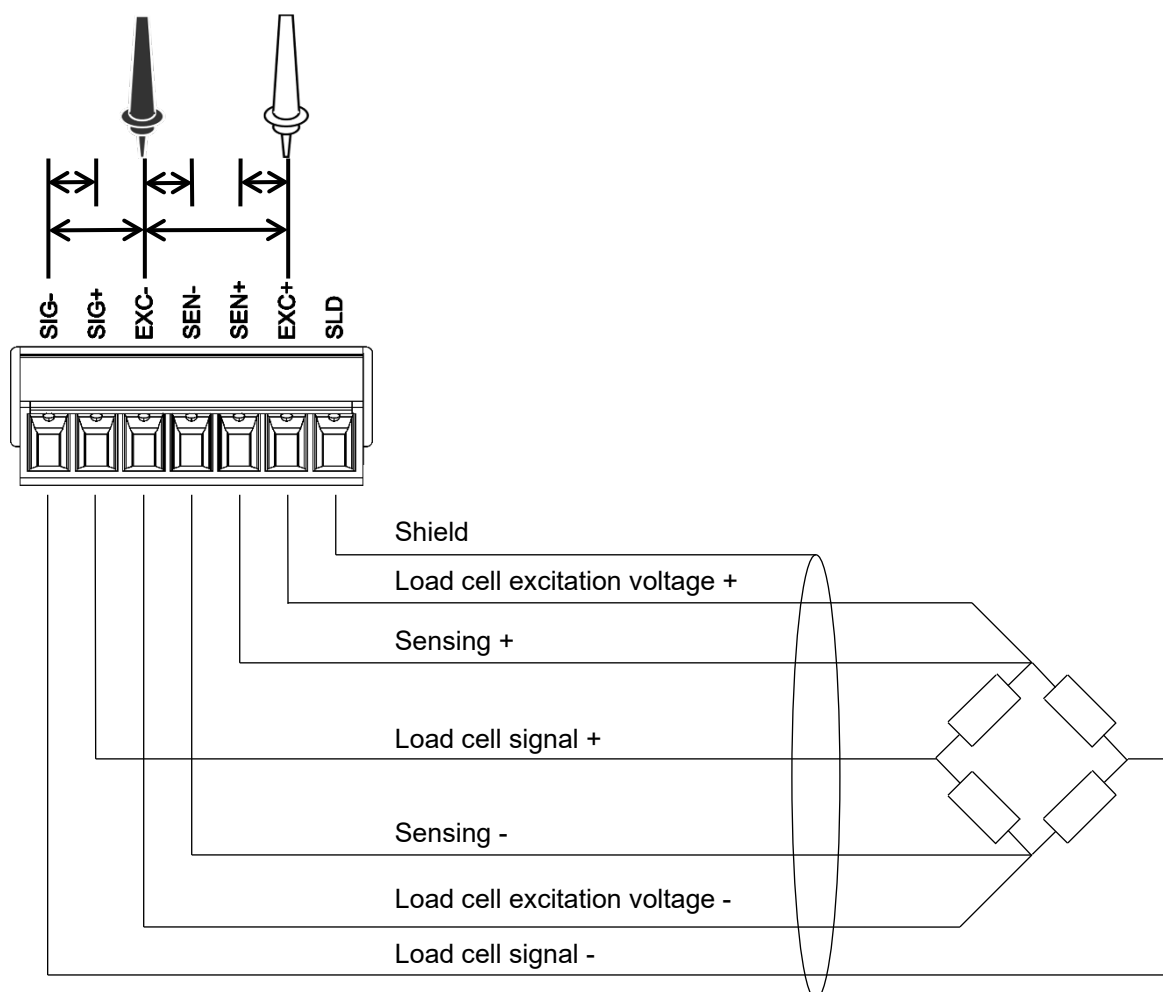
### 12.1. Hardware error

If the following error messages are displayed after power-on, the product may have failed. Please consult your local A&D representative.

Error code	Error description
<i>ErrH01</i>	A problem is detected in the memory (FRAM) on the main board.
<i>ErrH02</i>	A problem is detected in the AD converter on the main board.
<i>ErrH03</i>	A problem is detected in the network module on the Industrial Ethernet board.

## 12.2. Checking the connection to load cell with using a multimeter

If the load cell signal is not converted correctly, measure and check the voltage between the following points with a digital multimeter.



Measurement point		Item to be measured	Judging
EXC+	EXC-	Load cell power supply voltage	Normally $5 \pm 0.25$ V.
SIG+	SIG-	Load cell signal voltage	Normally 100 mV or less.
EXC+	SEN+	EXC+ voltage drop by load cell cable	Normally 0.2 V or less. The value may exceed 2 V when a long cable is used. For the 4-wire connection, it is 0 V.
EXC-	SEN-	EXC- voltage drop by load cell cable	Normally 0.2 V or less. The value may exceed 2 V when a long cable is used. For the 4-wire connection, it is 0 V.
SIG-	EXC-	Load cell middle point voltage	Normally 2.5 V, half of the load cell excitation voltage.

## 12.3. Check list

If AD-4411 does not operate properly, please fill in the following table and consult your local A&D representative.

Check item		Example
Serial No.		S/N 3C9700101
Weighed product		plastic pellet, livestock feed
Capacity of the instrument		20.00 kg
Minimum division of the instrument		0.01 kg
Initial load on the instrument		30 kg
Load cell connection type	6-wire / 4-wire	6-wire
Length of the extension load cell cable	m	Approx. 100 m
Cross section of the load cell cable	mm <sup>2</sup>	0.5 mm <sup>2</sup>
Number of load cells connected		3 units
Summing box	Used / Not used	Used
Load cell model number and manufacturer		LC4221-K050 (A&D)
Load cell rated capacity		50.99 kg
Load cell rated output	mV/V	2.0394 mV/V
Load cell input resistance	Ω	400 Ω
Load cell output resistance	Ω	350 Ω
Load cell output at initial load *1	mV	approx. 4.0 mV
Load cell output at capacity or any load. *1	at mV	at 20.00 kg approx. 6.8 mV
Industrial Ethernet	Connected to	PLC

\*1 Please refer "[12.2 Checking the connection to load cell with using a multimeter](#)".

### Digital multimeter measurement value

Measurement points		Measurement value	
EXC+	EXC-		V
SIG+	SIG-		mV
EXC+	SEN+		V
EXC-	SEN-		V
SIG-	EXC-		V

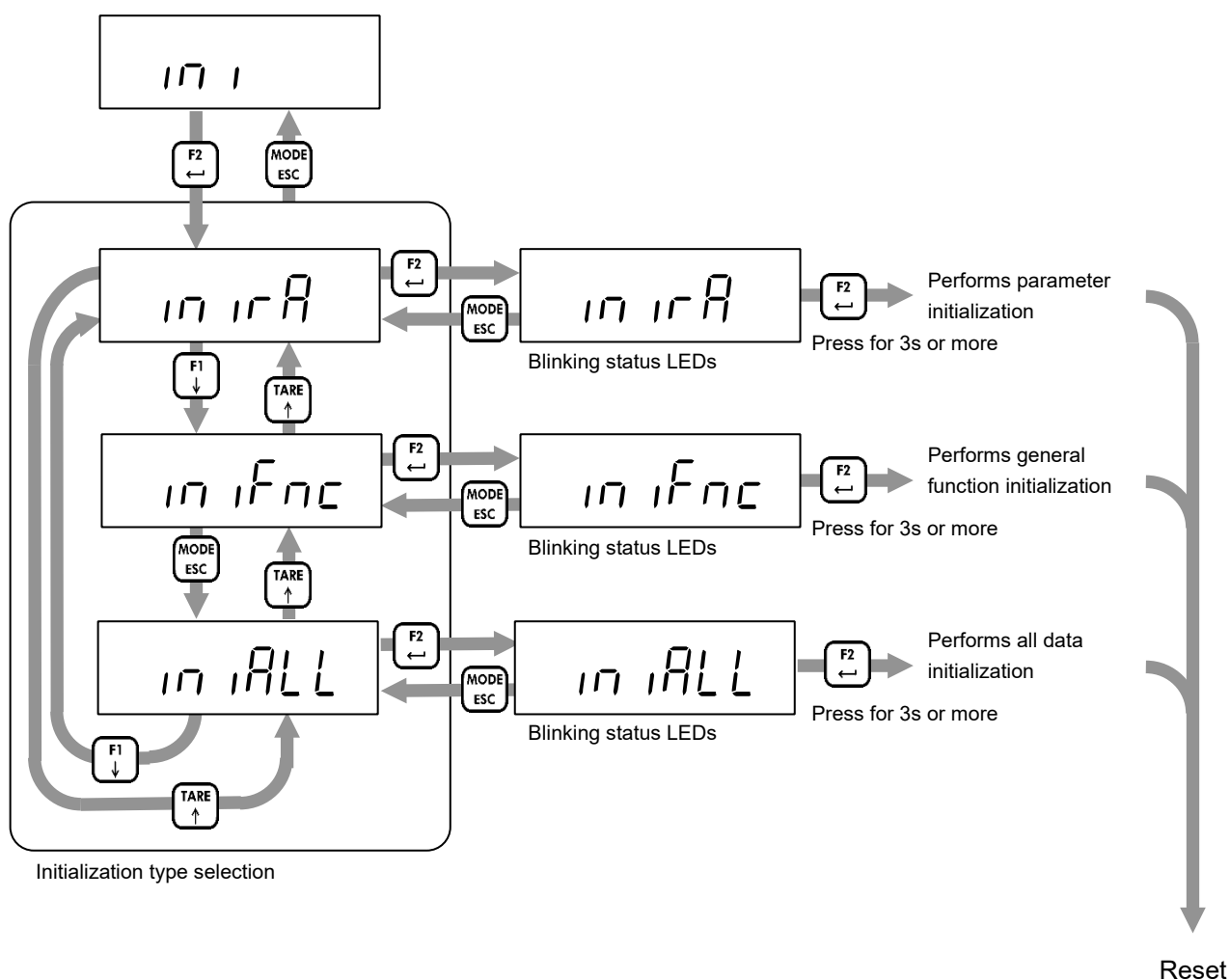
# 13. Initialization

You can initialize the internal values to their factory defaults in initialization mode if necessary.

There are three types of initializations, each affecting a different area. Please note that if all data is initialized, you must calibrate AD-4411 again.

Initialization type	Initialization area		
	Zero-setting value, Tare value, Gross / Net display state	General function	Calibration function, Digital calibration function
Parameter initialization	✓		
General function initialization	✓	✓	
All data initialization	✓	✓	✓

Refer "6 Operation mode" to enter initialization mode. See below for the procedure in initialization mode.





## 14. Function Settings

Functions for AD-4411 are classified as follows.

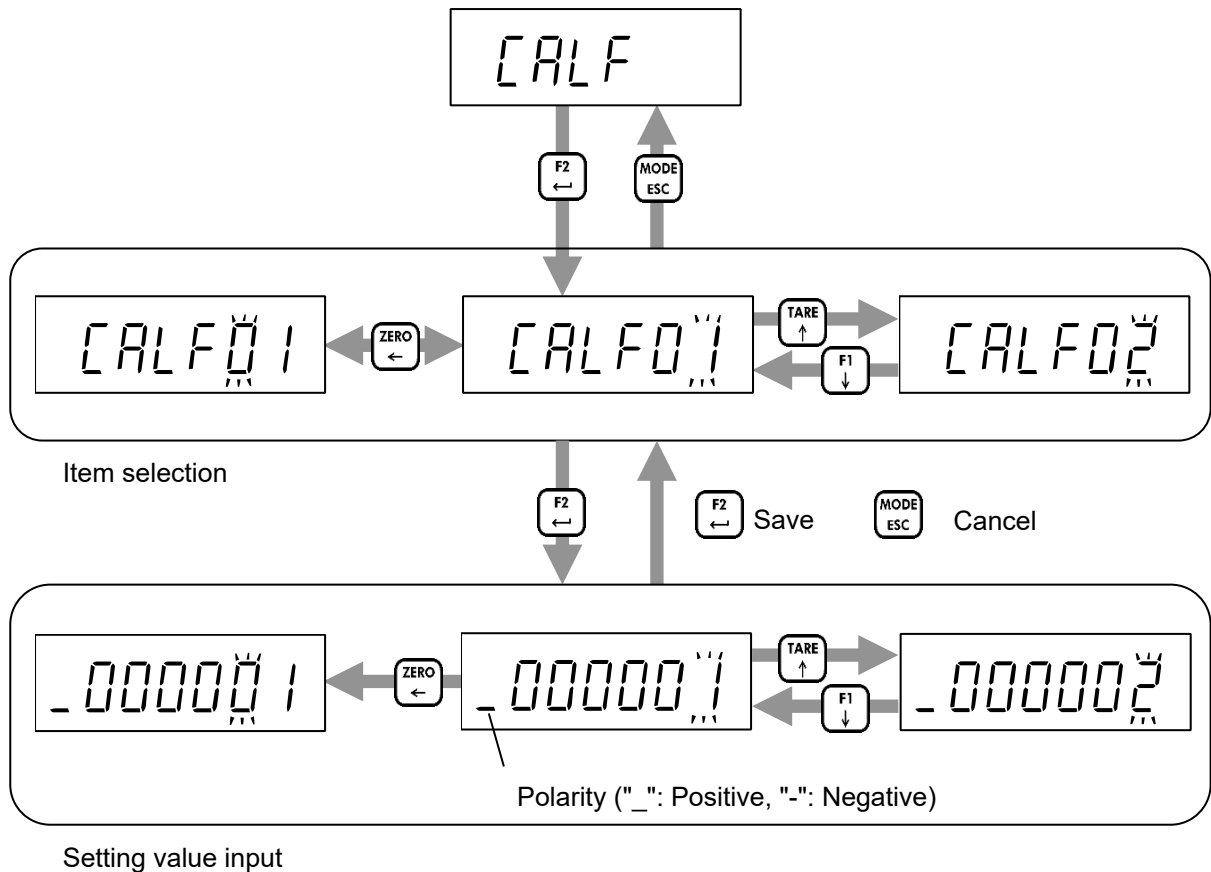
To change a setting value, go to the classification where that setting value is found.

Function name		Description
Calibration function		The setting values related to legally relevant parameters when AD-4411 is used for such purposes.
Digital calibration function		The setting values related to calibration that depends on the individual instrument.
General function	Basic function	The setting values related to measurement functions.
	IP function	The setting values related to communication.
	EtherCAT function	

### 14.1. Calibration function setting

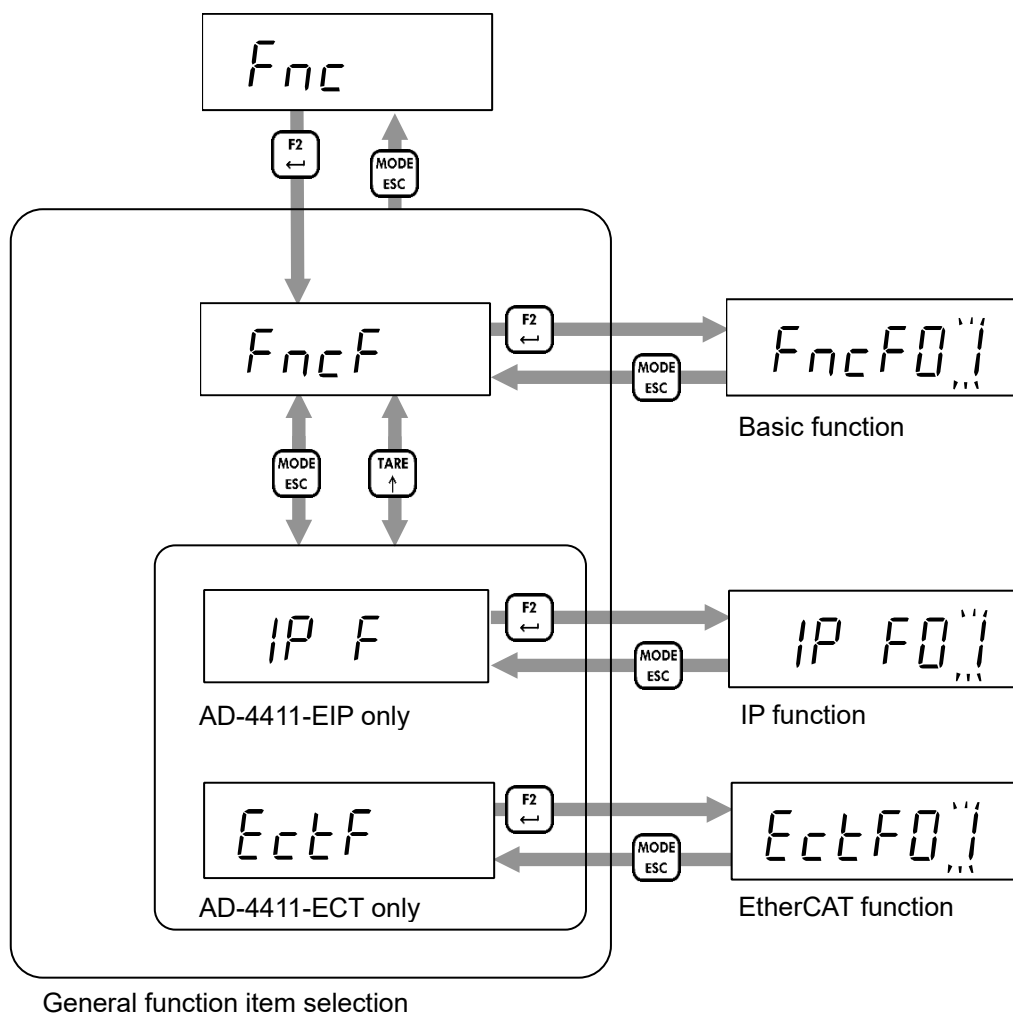
Refer "6 Operation mode" to enter calibration function mode. The following explains how to change setting values.

Item selection	
[ZERO/←] key	Shifts the blinking digit to the left.
[TARE/↑] key	Increases the blinking digit by one.
[F1/↓] key	Decreases the blinking digit by one.
[F2/ENTER] key	Selects the displayed item and inputs the setting value.
[MODE/ESC] key	Return to mode selection.
Setting value input	
[ZERO/←] key	Shifts the blinking digit to the left.
[TARE/↑] key	Increases the blinking digit by one. Use the leftmost digit to change the polarity. An underscore ( _ ) indicates a positive value and a hyphen ( - ) indicates a negative value.
[F1/↓] key	Decreases the blinking digit by one. Use the leftmost digit to change the polarity. An underscore ( _ ) indicates a positive value and a hyphen ( - ) indicates a negative value.
[F2/ENTER] key	Saves the input setting value and returns to item selection.
[MODE/ESC] key	Cancels the input setting value and returns to item selection.



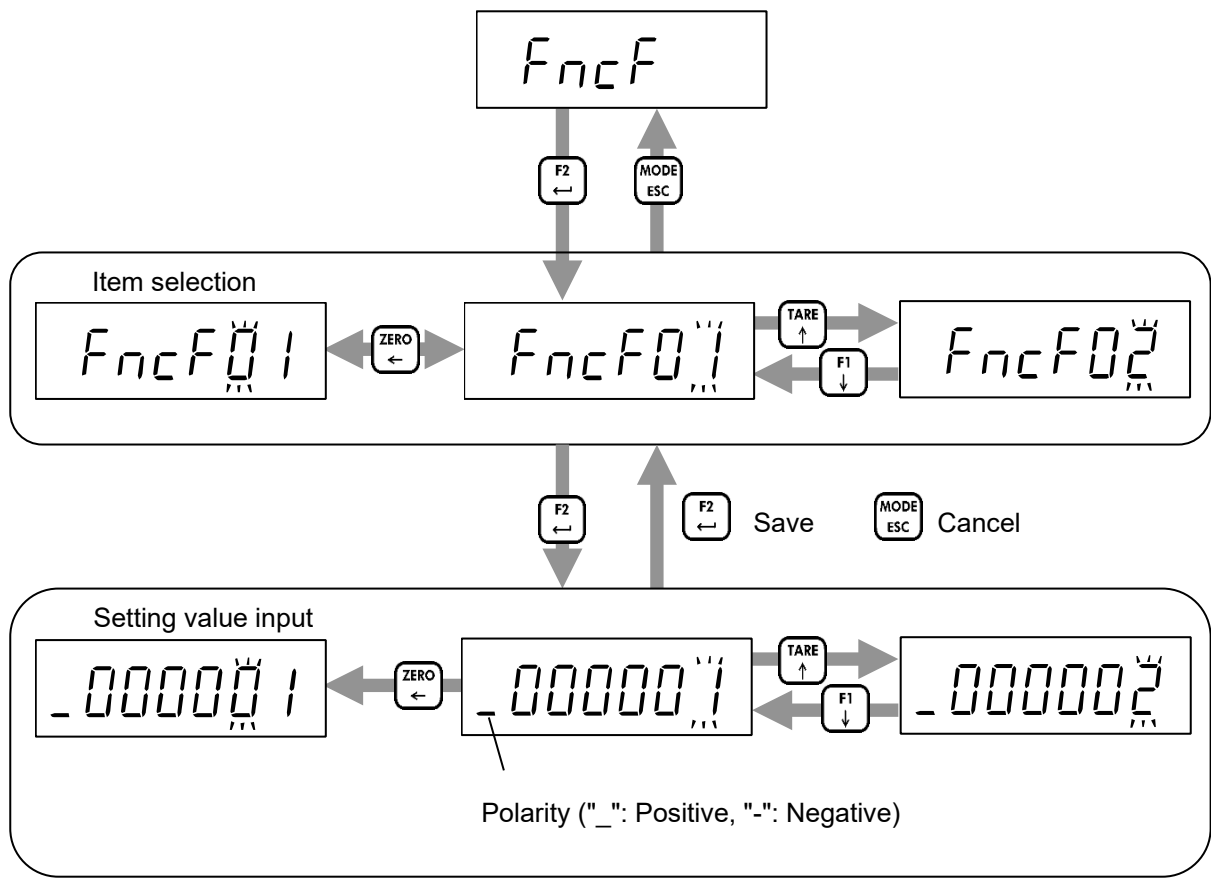
## 14.2. General function settings

Refer "6 Operation mode" to enter general function mode. The general functions are grouped according to their functions. The following explains how to select a group.



The following explains how to change setting values.

Item selection	
[ZERO/←] key	Shifts the blinking digit to the left.
[TARE/↑] key	Increases the blinking digit by one.
[F1/↓] key	Decreases the blinking digit by one.
[F2/ENTER] key	Selects the displayed item and inputs the setting value.
[MODE/ESC] key	Returns to mode selection.
Setting value input	
[ZERO/←] key	Shifts the blinking digit to the left.
[TARE/↑] key	Increases the blinking digit by one. Use the leftmost digit to change the polarity. An underscore ( _ ) indicates a positive value, while a hyphen ( - ) indicates a negative value.
[F1/↓] key	Decreases the blinking digit by one. Use the leftmost digit to change the polarity. An underscore ( _ ) indicates a positive value, while a hyphen ( - ) indicates a negative value.
[F2/ENTER] key	Saves the input setting value and returns to item selection.
[MODE/ESC] key	Cancels the input setting value and returns to item selection.



# 15. Function setting lists

The columns of the function setting lists in this chapter indicate the following information.

FUNCTION	Modbus	Command		Setting item	Setting value	Default	User setting
		Read	Write				
01	400101	1101	10101	Unit	0: None / 1: g / 2: kg / 3: t	2	
(1)	(2)	(3)		(4)	(5)	(6)	(7)

- (1) The function number in function mode item selection.
- (2) The first data address to be accessed via Modbus. All data types are DWORD. Refer "[10.3 Holding register data address](#)".
- (3) The command to be accessed via Industrial Ethernet. The left side shows the read command, and the right side shows the write command. Refer "[9.4.2 Command and response](#)".
- (4) The setting item name.
- (5) The setting values and their meanings.
- (6) The factory default value. It returns to this value after initialization.
- (7) A note column for when the setting value is changed by the user.

## 15.1. Calibration function list

CALF	Modbus	Command		Setting item	Setting value	Default	User setting
		Read	Write				
01	400101	1101	10101	Unit	0: None / 1: g / 2: kg / 3: t	2	
02	400103	1103	10103	Decimal point position	0: 0 (No decimal point) 1: 0.0 2: 0.00 3: 0.000 4: 0.0000 5: 0.00000	0	
03	400105	1105	10105	Minimum division	1: 1 d 2: 2 d 3: 5 d 4: 10 d 5: 20 d 6: 50 d	1	
04	400107	1107	10107	Maximum capacity	1 to 999999	999999	
05	400109	1109	10109	Zero setting range	0 to 100 %	100	
06	400111	1111	10111	Zero tracking time	0.0 to 5.0 s *	0.0	
07	400113	1113	10113	Zero tracking width	0: Disable 4: 2.0 d 8: 4.0 d 1: 0.5 d 5: 2.5 d 9: 4.5 d 2: 1.0 d 6: 3.0 d 3: 1.5 d 7: 3.5 d	0	
08	400115	1115	10115	Stability detection time	0.0 to 9.9 s *	1.0	
09	400117	1117	10117	Stability detection width	0 to 100 d	2	
10	400119	1119	10119	Zero-setting at unstable	0: Disable / 1: Enable	1	
11	400121	1121	10121	Taring at unstable	0: Disable / 1: Enable	1	
12	400123	1123	10123	Taring at the negative gross	0: Disable / 1: Enable	1	
13	400125	1125	10125	Zero clear	0: Disable / 1: Enable	1	
14	400127	1127	10127	Power on zero	0: Disable / 1: Enable	0	
15	400129	1129	10129	Condition of negative overload	0: Gross < -(Maximum capacity + 8d) 1: Gross < -19d	0	
16	400131	1131	10131	NTEP	0: Disable / 1: Enable	0	
17	400133	1133	10133	Load cell connection type	0: 4-wire / 1: 6-wire	1	

\* When accessed via Ethernet/Modbus, the decimal point position is ignored.

## 15.2. Digital calibration function list

dCAL	Modbus	Command		Setting item	Setting value	Default	User setting
		Read	Write				
01	401501	2501	11501	Load cell input signal at zero calibration	-7.00000 to 7.00000 mV/V *	0.00000	
02	401503	2503	11503	Load cell input signal (at span calibration – at zero calibration)	0.00001 to 7.00000 mV/V *	2.00000	
03	401505	2505	11505	Load value at span calibration	1 to 999999	20000	

\* When accessed via Ethernet/ Modbus, the decimal point position is ignored.

## 15.3. Basic function list

FnCF	Modbus	Command		Setting item	Setting value	Default	User setting
		Read	Write				
01	400301	1301	10301	[ZERO/←] key lock	0: Disable / 1 : Enable	0	
02	400303	1303	10303	[TARE/↑] key lock	0: Disable / 1 : Enable	0	
03	400305	1305	10305	[F1/↓] key lock	0: Disable / 1 : Enable	0	
04	400307	1307	10307	[F2/ENTER] key lock	0: Disable / 1 : Enable	0	
05	400309	1309	10309	Function of [F1/↓] key	0: None	0	
06	400311	1311	10311	Function of [F2/ENTER] key	1: Tare clear 2: Zero clear 3: Gross / Net display selection 4: High resolution display selection	0	
07	400313	1313	10313	Condition to turn S1 status ON	0: None	0	
08	400315	1315	10315	Condition to turn S2 status ON	1: Hi	0	
09	400317	1317	10317	Condition to turn S3 status ON	2: OK 3: Lo 4: Zero setting error 5: Taring error 6: High resolution display selection	0	
10	400319	1319	10319	Digital filter cut-off frequency [Hz]	0: 273.0    17: 8.4    31: 0.84 1: 120.0    18: 7.0    32: 0.70 2: 100.0    19: 6.8    33: 0.68 3: 84.0    20: 5.6    34: 0.56 4: 70.0    21: 4.8    35: 0.48 5: 68.0    22: 4.0    36: 0.40 6: 56.0    23: 3.4    37: 0.34 7: 48.0    24: 2.8    38: 0.28 8: 40.0    25: 2.4    39: 0.24 9: 34.0    26: 2.0    40: 0.20 10: 28.0    27: 1.7    41: 0.17 11: 24.0    28: 1.4    42: 0.14 12: 20.0    29: 1.2    43: 0.12 13: 17.0    30: 1.0    44: 0.10 14: 14.0            45: 0.08 15: 12.0            46: 0.07 16: 10.0	30	
11	400321	1321	10321	Upper limit value	-999999 ~ 999999	10	
12	400323	1323	10323	Lower limit value	-999999 ~ 999999	-10	
13	400325	1325	10325	Comparison target for upper / lower limit value	1: Gross / 2: Net	1	

## 15.4. IP function list

The following functions are valid only for AD-4411-EIP.

IP F	Modbus	Command		Setting item	Setting value	Default	User setting
		Read	Write				
				IP Address      XXX.    XXX.    XXX.    XXX			
01	401601	2601	11601		0 to 255	192	
02	401603	2603	11603		0 to 255	168	
03	401605	2605	11605		0 to 255	0	
04	401607	2607	11607		0 to 255	2	
				Subnet mask      XXX.    XXX.    XXX.    XXX			
05	401609	2609	11609		0 to 255	255	
06	401611	2611	11611		0 to 255	255	
07	401613	2613	11613		0 to 255	255	
08	401615	2615	11615		0 to 255	0	
				Default gateway      XXX.    XXX.    XXX.    XXX			
09	401617	2617	11617		0 to 255	0	
10	401619	2619	11619		0 to 255	0	
11	401621	2621	11621		0 to 255	0	
12	401623	2623	11623		0 to 255	0	

## 15.5. EtherCAT function

The following functions are valid only for AD-4411-ECT.

FnCF	Modbus	Command		Setting item	Setting value	Default	User setting
		Read	Write				
01	400701	1701	10701	Explicit Device ID	0: Disable 1 to 65535	0	



# 16. Specifications

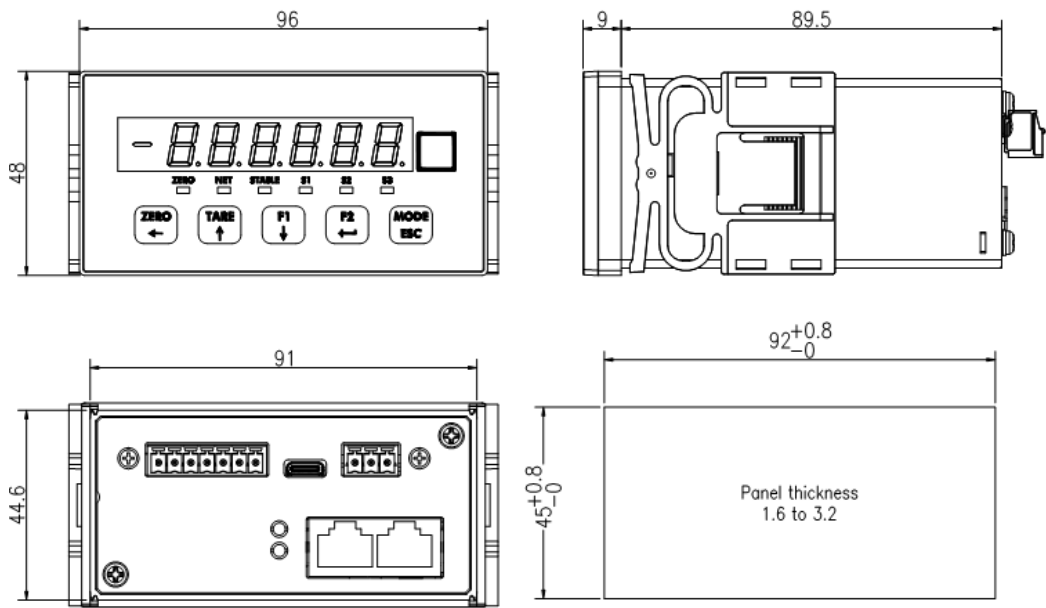
## Model Identification

Model designation																
A D - 4 4 1 1						- E I P			- D I N							
															Installation method	
															None	: Panel mount
															-DIN	: DIN rail mount
															Interface	
															-EIP	: EtherNet/IP
															-PRT	: PROFINET
															-ECT	: EtherCAT

Dimension	Panel mount type		96(W) x 48(H) x 98.5(D) mm
	DIN rail mount type		45(W) x 100(H) x 113(D) mm
Installation method		Panel mount, DIN rail mount	
Operating temperature and humidity range		-10°C to +40°C	
		Less than 85% RH, non-condensing	
IP rating (Only Panel mount type)		When the indicator is installed to the control panel:	
		Outside of the control panel: IP65	
		Inside of the control panel: IP2X	
Power supply			
	Power supply voltage	DC24V -15% to +10%	
	Power consumption	4.5W max	
Load cell input			
	Excitation voltage	DC5V ±5% 90 mA Up to six 350 Ω load cells can be connected in parallel. 6-wire type with remote sensing	
	Signal input range	-7.0 mV/V to 7.0 mV/V	
	Minimum input sensitivity	0.15 μV/d or more (d=minimum division)	
	Nonlinearity	0.005% of F.S. max.	
	Temperature coefficient	Zero drift: ±0.02 μV/°C Typ. ±0.1 μV/°C max. Span drift: ±3 ppm/°C Typ. ±15 ppm/°C max.	
	Sampling rate	1200 times/s	
Display			
	Main display	7-digit LED (green) with character height of 10 mm	
	Status display	LED (red) x 6	
	Unit (Only Panel mount type)	Attach the g / kg / t label	
Key switches		x 5	
External interface			
Interface	-EIP	EtherNet/IP	
	-PRT	PROFINET	
	-ECT	EtherCAT	
USB		Type-C connector, USB 2.0 (Full-speed)	

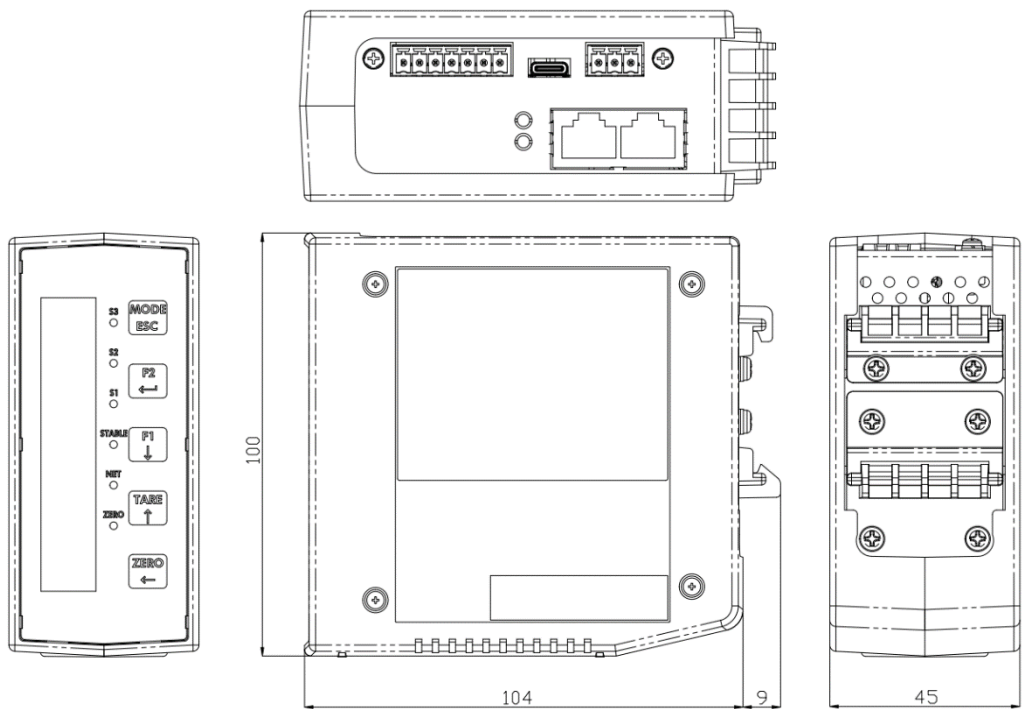
External dimensions

Panel mount type



Unit: mm

DIN rail mount type



Unit: mm

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