AD-4408A

Weighing Indicator for PROFIBUS Interface

AX-ABCC-PROFI

INSTRUCTION MANUAL

A&D Company, Limited

1WMPD4001974

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.
	This symbol indicates caution against electrical shock. Do not touch the part where the symbol is placed.
	This symbol indicates the ground terminal.
	This symbol indicates that an operation is prohibited.
NOTE	Information or cautions to use the device correctly.

The contents of this manual and the specifications of the instrument covered by this manual are subject to change for improvement without notice.

Contents

1. About This Manual

- This manual is intended for those who have a sufficient knowledge about weighing instruments and PROFIBUS.
- For general information regarding PROFIBUS, specifications, wiring, installation and operation, refer to PROFIBUS-related technical books.
- For information on PROFIBUS or PROFIBUS products, contact your local PROFIBUS Organization or PROFIBUS distributor.
- When configuring a network, use cables and connectors designed for PROFIBUS products.
- When configuring PROFIBUS, a GSD file with device information specific to the slave device is required. The GSD file is available on our website. Download it as necessary.

2. Introduction

- The AD-4408A functions as a slave device of PROFIBUS when the PROFIBUS interface module (AX-ABCC-PROFI) is installed.

- Using this interface, a PLC can control the AD-4408A and read the indicated values from the AD-4408A.

- Two methods of controling the AD-4408A by the PLC memory are available; handling bits directly and using commands.

NOTE: The PROFIBUS interface module, when installed into the AD-4408A, uses 12 bytes (OUT) and 20 bytes (IN) of the PLC memory. So, use much care when assigning areas, not to overlap with other slave devices.

Except during weighing or when weighing is possible, all of the IN data should be zero.

Memory map and check modes vary with the interface module installed. This manual describes performances when the PROFIBUS interface module is installed.

When other modules are installed, refer to the relevant instruction manual. Instruction manuals for each interface module are available on our website.

3. Description of Each Part

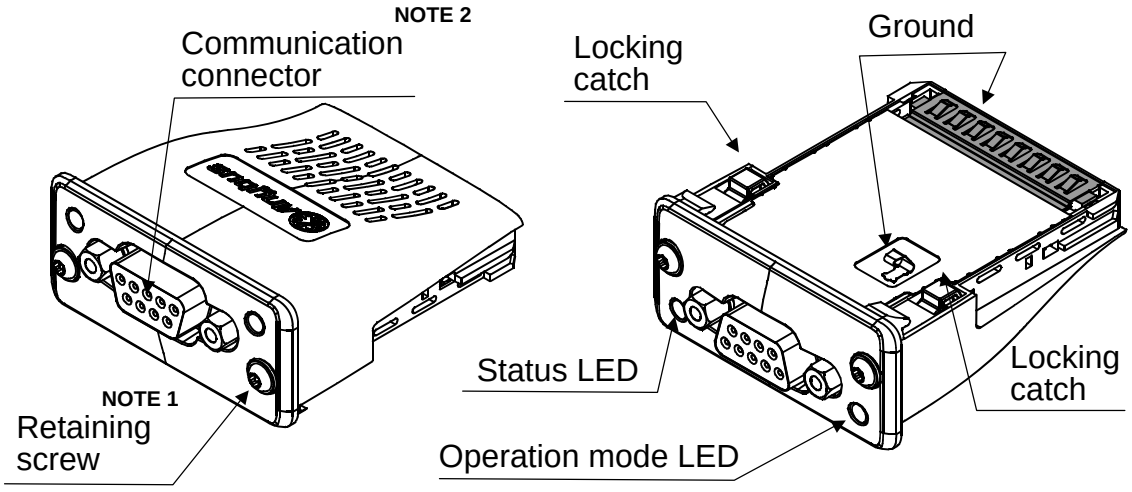


Fig.1 Interface module part names

NOTE: 1. A TORX® driver (size T9) to fasten the retaining screws is not provided with the interface module.

2. A connector for the cable side (D-Sub 9-pin male) is not provided with the interface module.

3.1. Status LEDs

NOTE: The illustration below shows how the interface module is positioned when installed to the AD-4408A.

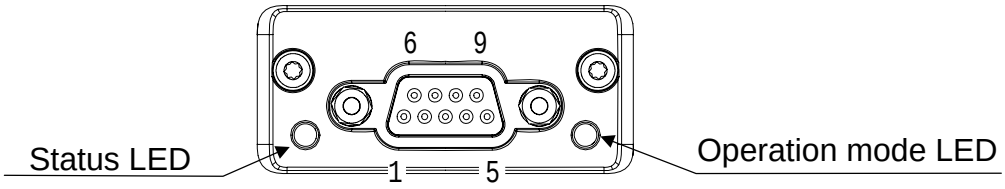


Fig.2 Position of status LEDs

Table 1 Status LED (ST)

LED state	Description
OFF	Not initialized / No power
Green ON	Normal
Green, flashing	Diagnostic event in progress
Red ON	Recoverable error

Table 2 Operation mode LED (OP)

LED state	Description
OFF	Offline / No power
Green ON	Online (Normal)
Green, flashing	Online (Clear)
Red, single flash	Paremeter setting error
Red, double flash	PROFIBUS configuration error

3.2. Communication Connector

NOTE: The illustration below shows how the interface module is positioned when installed to the AD-4408A.

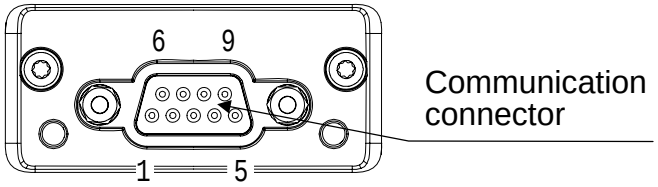


Fig.3 Connector pin assignment

Functions for each pin are as follows.

Table 3 Communication connector

Pin No.	Signal	Description
1	—	—
2	—	—
3	B (+)	B line (Positive side)
4	RTS	RTS
5	GND	Power (GND side)
6	+5V	Power (+5V side)
7	—	—
8	A (-)	A line (Negative side)
9	—	—
Housing	SHIELD	Shield (Connected to the AD-4408A FG terminal)

4. Installation

4.1. Interface Module Installation

> ⚠CAUTION
>
> **Be sure to disconnect the AD-4408A from the power source before installing the interface module.**

Install the interface module as follows:

Step 1 Using a Phillips screwdriver, loosen the screws that secure the blank panel to the AD-4408A rear panel, and remove the blank panel.

Step 2 Insert the interface module into the option slot as shown to the right.

Step 3 Insert the interface module until it mates with the terminals of the PC board connector located in the option slot.

Step 4 Using a TORX® driver (size T9), fasten the retaining screws with a tightening torque of 0.25 Nm in the clockwise direction to secure the interface module.

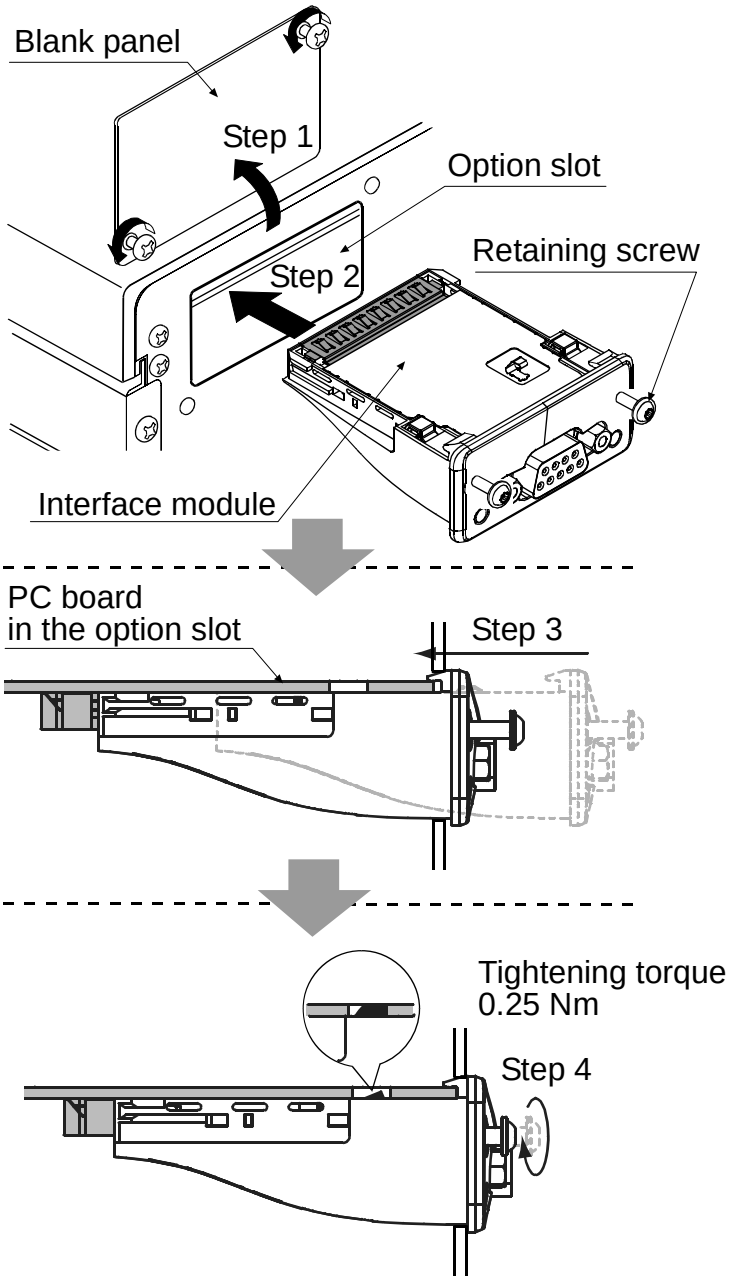


Fig.4 Interface module installation

NOTE: A TORX® driver is not provided with the interface module.

4.2. Network Configuration

Turn ON the terminators at both ends of the network.

Table 4 Baud rate and distance

Baud rate		Single line length of cable type A
9.6	kbps	1200 m or less
19.2	kbps	1200 m or less
45.45	kbps	1200 m or less
93.75	kbps	1200 m or less
187.5	kbps	1000 m or less
500	kbps	400 m or less
1.5	Mbps	200 m or less
3	Mbps	100 m or less
6	Mbps	100 m or less
12	Mbps	100 m or less

NOTE: Baud rate is set to the master baud rate automatically

When configuring a network, use cables and connectors designed for PROFIBUS products.

Table 5 Example manufacturer of cables and connectors

PROFIBUS cables	Siemens Energy and Automation, Inc.
PROFIBUS connectors	Siemens Energy and Automation, Inc.

4.3. Setting the Functions

The functions described here are general functions.

General functions are divided into groups per function and are indicated by the group name followed with the function number, FXX.

NOTE: General functions determine the AD-4408A performance and all of the settings are stored in the FRAM.

Setting Procedure

Step 1 While pressing and holding the ENTER key, press the F key.
`Fnc` is displayed to indicate that the indicator will enter the general function mode.

Step 2 Press the ENTER key. The indicator enters the general function mode.
To go back to the weighing mode without entering the general function mode, press the ESC key.

Step 3 Press the △ or ▽ key to select the function group to be set.

Display	Group name
PF F	PROFIBUS-related functions

Press the ENTER key. The function number will be displayed.

Function No.	Function	Description	Default value
PF F01	Station No.	0 to 125: Station No.	3

Step 4 Press the △ or ▽ key to select the function number to be set.
Press the ENTER key. The current setting value will be displayed.

Step 5 Change the setting value using either one of the methods below.

Method	Description
Selecting a parameter	Only the parameter number to be selected is displayed and blinks. Press the △ or ▽ key to select a parameter.
Inputting the value	All the digits are displayed and a digit to be changed blinks. Press the ◁ or ▷ key to select a digit and press the △ or ▽ key to change the value.

After setting, press the ENTER key. The next function number is displayed.
When the parameter is not to be changed, press the ESC key to return to the function number display.

Step 6 Press the ESC key. The function number disappears and the indicator returns to the state of step 3.
Press the ESC key to store the setting values in the FRAM and go back to the weighing mode.

NOTE: The blinking decimal point indicates that the current value is not the weight value.

If a value exceeding the settable range is entered, Err dt is displayed and the input is canceled.

5. PLC Memory

5.1. Address Map

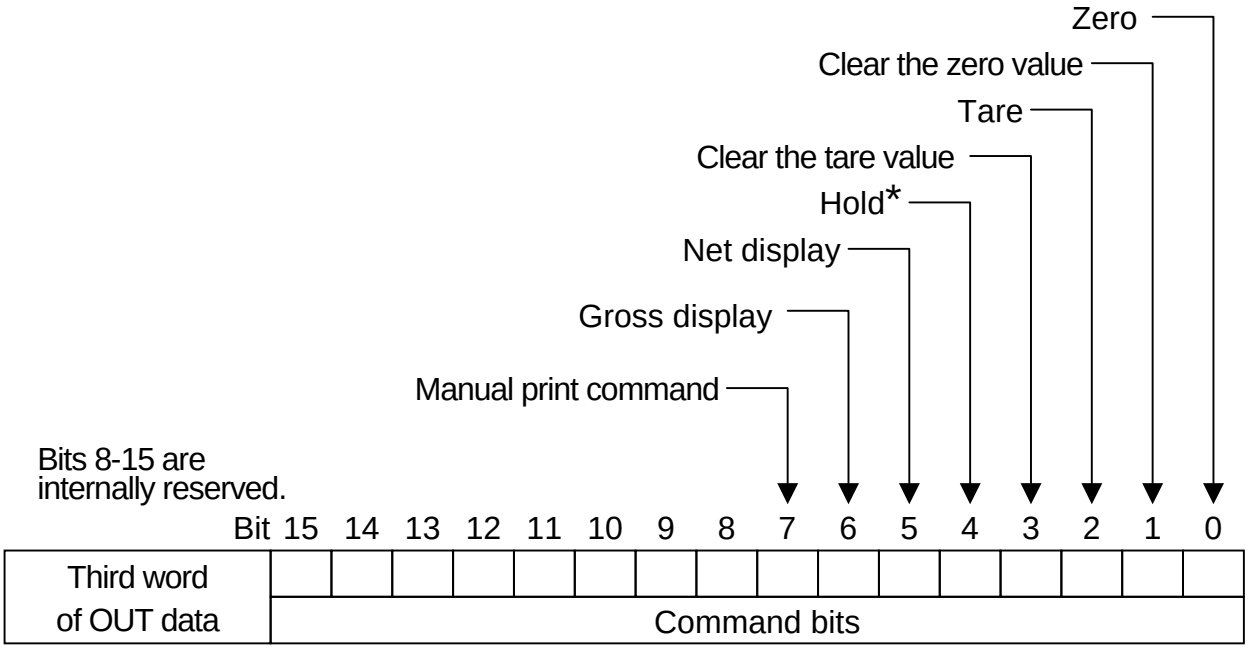
- Commands to operate the AD-4408A and operating parameters are written into the PLC memory OUT data (6 words) and are executed.
- Response data from the AD-4408A is read to the PLC memory IN data (10 words).
- Data used such as Write data is in hexadecimal format.

NOTE: The PROFIBUS interface module, when installed into the AD-4408A, uses 12 bytes (OUT) and 20 bytes (IN) of the PLC memory. So, use much care when assigning areas, not to overlap with other slave devices.

5.1.1. OUT Data (6 words), PLC → AD-4408A

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
First word of OUT data																
	Write data (Low order word)															

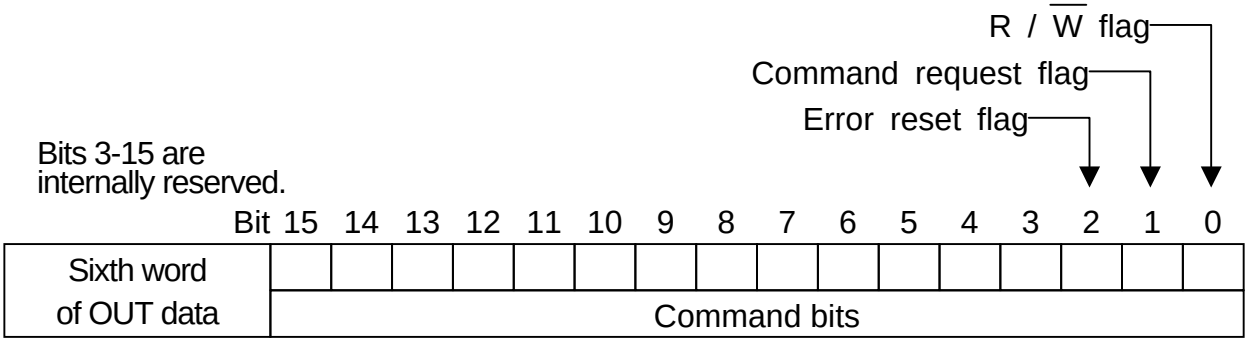
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Second word of OUT data																
	Write data (High order word)															



*Hold at the rising edge, release at the falling edge

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Fourth word of OUT data																
	Reserved internally															

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Fifth word of OUT data																
	Command No.															



Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Sixth word of OUT data																
	Command bits															

About OUT Data

Write data ----------Used by the write command.

Command bits----------Assigns a function to execute to each bit.

Command No.----------Specifies a command number to execute.

R / $\overline{W}$ flag----------Specifies a command type, read or write.

Internally reserved ----------Do not write anything other than 0 (zero).

5.1.2. IN Data (10 words), AD-4408A → PLC

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
First word of IN data	Net weight															
	Weight value (Low order word)															

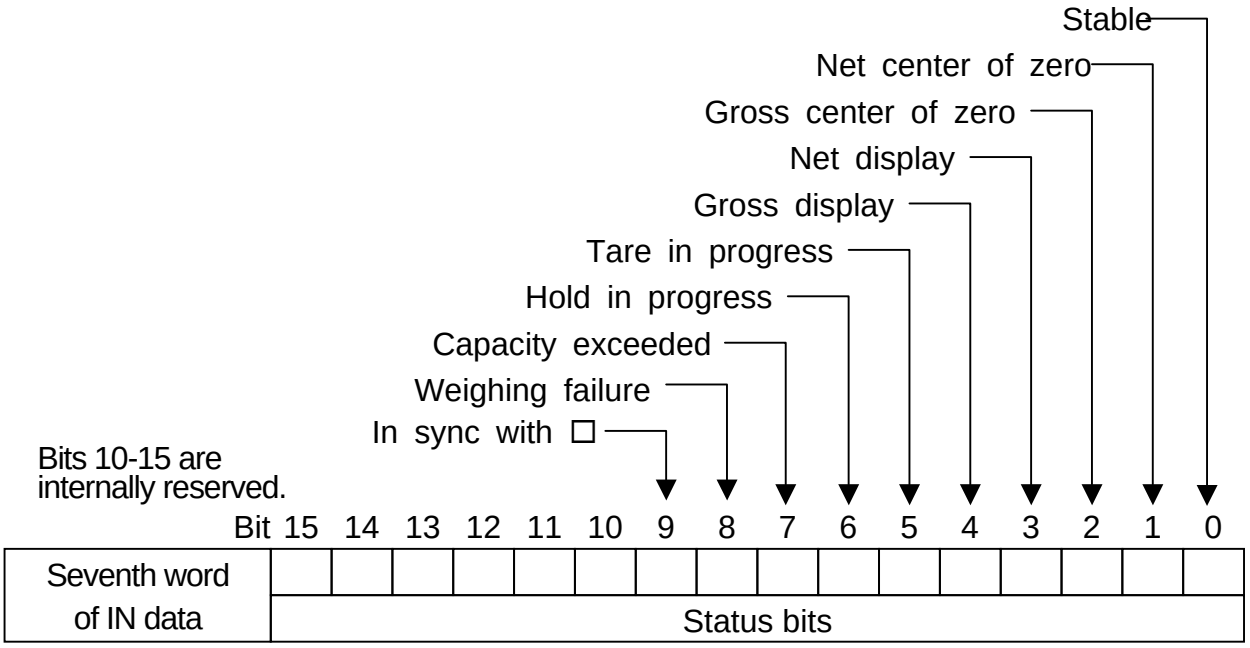
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Second word of IN data	Net weight															
	Weight value (High order word)															

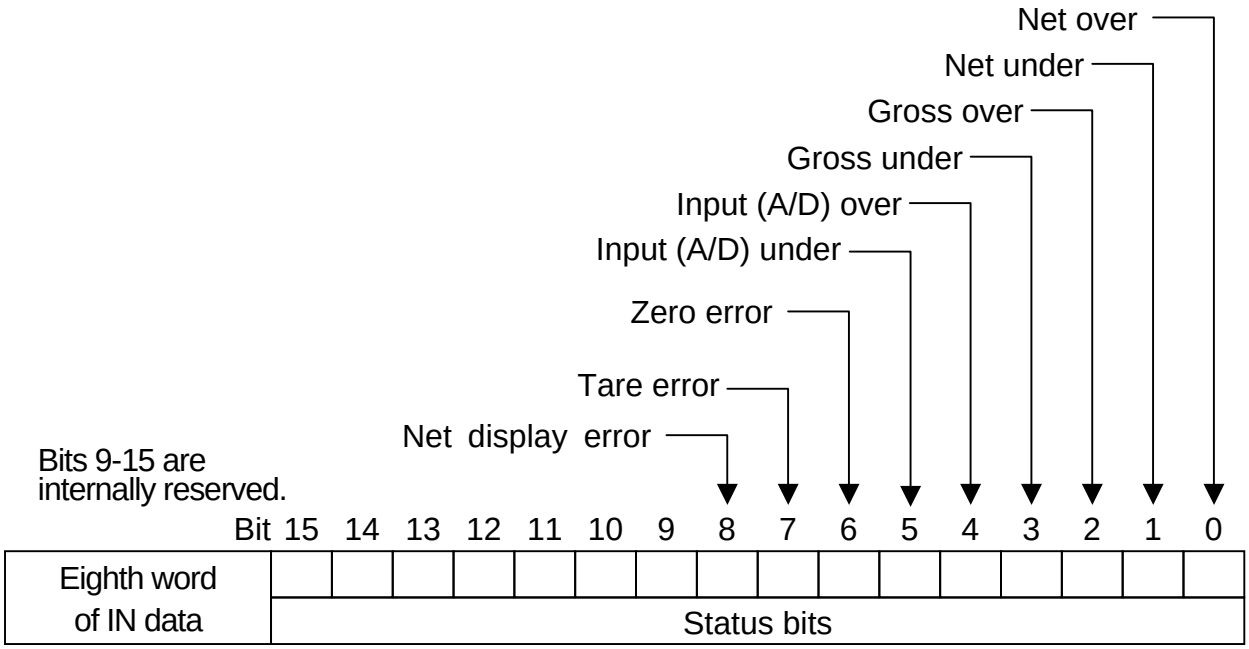
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Third word of IN data	Gross weight															
	Weight value (Low order word)															

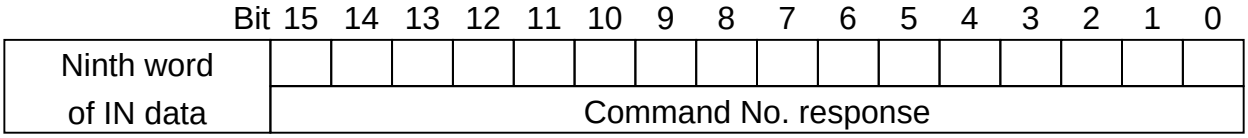
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Fourth word of IN data	Gross weight															
	Weight value (High order word)															

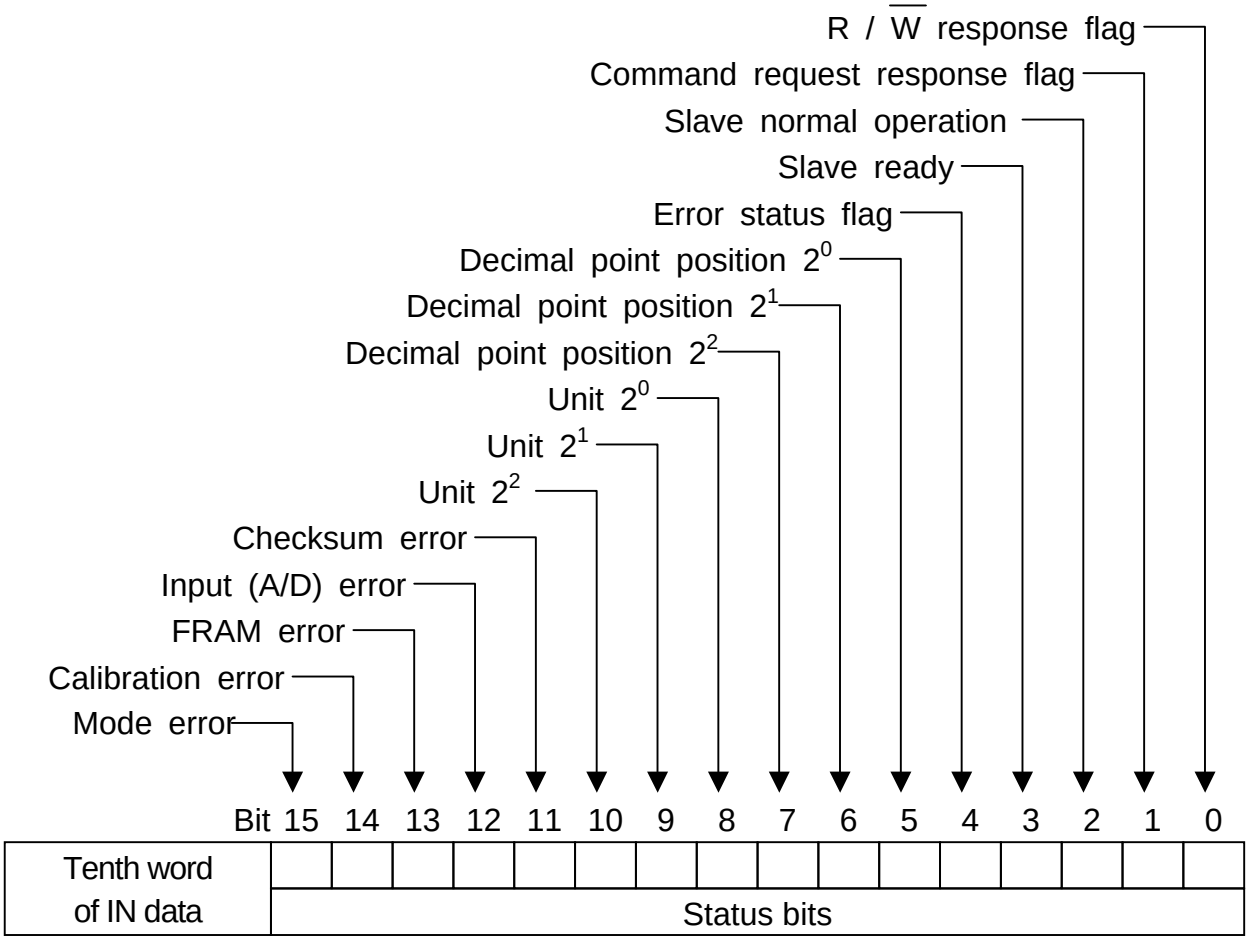
Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Fifth word of IN data																
	Read data (Low order word)															

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Sixth word of IN data																
	Read data (High order word)															




Net over
Net under
Gross over
Gross under
Input (A/D) over
Input (A/D) under
Zero error
Tare error
Net display error
Bits 9-15 are internally reserved.
Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Eighth word of IN data
Status bits


Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Ninth word of IN data
Command No. response


R / W response flag
Command request response flag
Slave normal operation
Slave ready
Error status flag
Decimal point position 2^0
Decimal point position 2^1
Decimal point position 2^2
Unit 2^0
Unit 2^1
Unit 2^2
Checksum error
Input (A/D) error
FRAM error
Calibration error
Mode error
Bit 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Tenth word of IN data
Status bits

Unit	Decimal point position
0: None 1: g 2: kg 3: t 4: lb (USA version)	0: None 123456 1: 10^1 12345.6 2: 10^2 1234.56 3: 10^3 123.456 4: 10^4 12.3456 5: 10^5 1.23456

About IN Data

Slave ready ----------Bit to turn ON when the AD-4408A is in the weighing mode.

Command No. response ---Response data to a command number.

Read data ----------Response data to a command.

R / $\overline{W}$ response flag----------Response to the OUT data R / $\overline{W}$ flag.

Reserved internally ----------Not used.

Status area ----------The weighing status of the AD-4408A is output.

NOTE: For further information, refer to “5.3. Operation by Commands”.

5.2. Handling Bits Directly

5.2.1. Handling Command Bits

- A command bit is in the third word of OUT data.
- To execute, turn the corresponding command bit ON.
- The command bit will be effective at the rising edge.
  The signal level must be maintained for 30 msec minimum.

Table 7 Command bits

	Command bit and action	
Third word of OUT data	Bit 0	Zero
	Bit 1	Clear the zero value
	Bit 2	Tare
	Bit 3	Clear the tare value
	Bit 4	Hold
	Bit 5	Net display
	Bit 6	Gross display
	Bit 7	Manual print command

5.2.2. Command bit execution procedure

Step 1 Turn OFF all the PLC memory command bits.

Step 2 Turn ON the PLC memory command bit to be executed.

Step 3 The AD-4408A executes the command.

Step 4 Turn OFF all the PLC memory command bits.

5.3. Operation by Commands

5.3.1. Handling Commands

- Specify the R / $\overline{W}$ flag either to the read command or the write command.
  R / $\overline{W}$ flag: 0: Write command 1: Read command
- Specify a command to execute to the command No.
- Specify the command data to be written to Write data.
- The command will be effective at the rising edge of the command request flag.
  The signal level must be maintained for 30 msec minimum.
- The response result to the command request is output as the command request response flag.
- The command response result is output as the command No. response.
- The response result of the read command is output as the read data.

5.3.2. Command execution procedure

Before execution

Step 1 Confirm that the command request flag is turned OFF.

Step 2 Specify the R / $\overline{W}$ flag either to the read command or the write command.
R / $\overline{W}$ flag: 0: Write command 1: Read command

Step 3 Specify the command to execute to the command No.

Step 4 Specify the command data to be written to Write data when necessary.

Execution

Step 5 Confirm that the slave ready bit is turned ON.

Step 6 Turn the command request flag ON. The command will be executed at the rising edge.

Step 7 The AD-4408A responses. The response results are output as the command request response flag, R / $\overline{W}$ response flag and command No. response.

Step 8 When the read command is specified by the R / $\overline{W}$ flag, a response will be output as the read data.

After execution

Step 9 Turn the command request flag OFF.

5.4. Commands

The master device uses the write command to convey instructions to the AD-4408A.
For details, refer to “6.2. Write Command” of “6. Timing Chart”.

Table 7 Commands

Command No.	Command data	Command
0	1	Zero
0	2	Clear the zero value
0	3	Tare
0	4	Clear the tare value
0	5	Hold
0	6	Net display
0	7	Gross display
0	8	Manual print command

6. Timing Chart

6.1. Read Command

Specify the data type to read to the command No. The read data is output to the read data area.

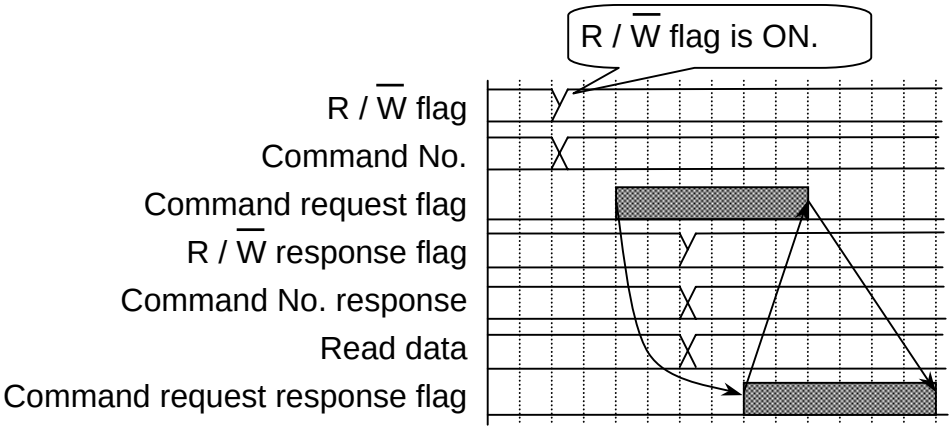


Fig.5 Read command

6.2. Write Command

Write Command

Specify the data type to write to the command No. Place the data to be written to Write data.

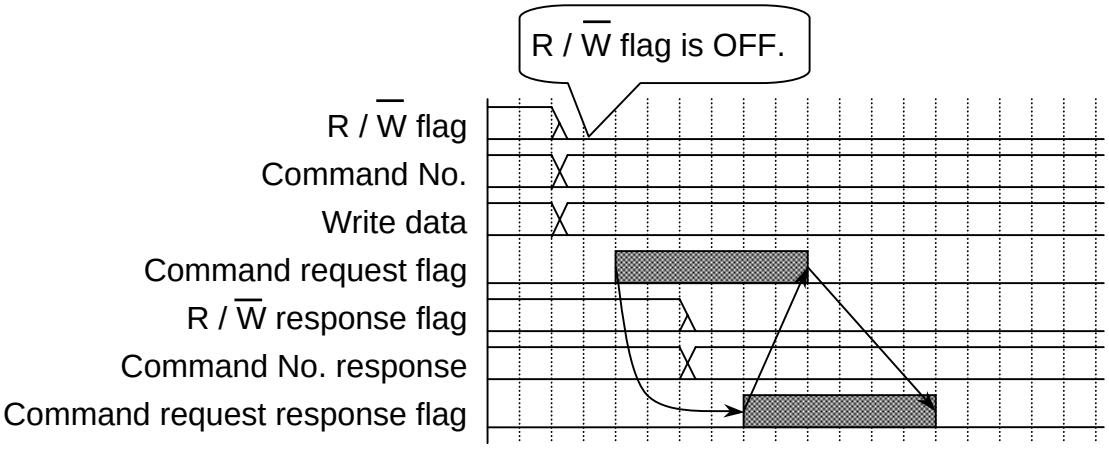


Fig.6 Write command

Slave Normal Operation

Slave normal operation is a signal to confirm that the AD-4408A is connected to the power and is in normal operating conditions. During normal operation, the signal is reversed at a 0.5 to 1 second interval.

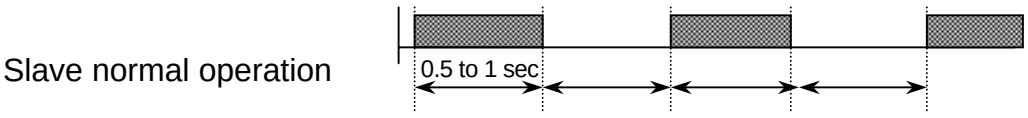


Fig.7 Slave normal operation signal

Error status flag

If an AD-4408A error has occurred, the slave ready bit will be turned OFF and the error status flag will be turned ON to convey to the master device that an error has occurred. The master device will turn the error reset flag ON to request resetting the error status flag.

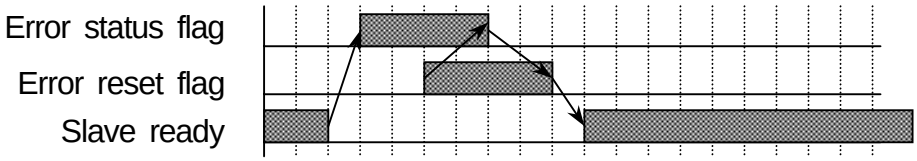


Fig.8 Resetting the error status flag

Table 8 Command bits / Status bits

Memory		Description
Sixth word of OUT data	Bit 2	Error reset flag
Tenth word of IN data	Bit 2	Slave normal operation
	Bit 3	Slave ready
	Bit 4	Error status flag

7. Errors

7.1. Error Types

Error Status Flag

This conveys to the master device that an error has occurred.

Turn the error reset flag ON to request resetting the error status flag.

Table 9 Error status flag

Error type	Causes
Checksum error	Program checksum does not match.
Input (A/D) error	Data can not be acquired from the A/D converter.
FRAM error	Data can not be written into the FRAM.
Calibration error	Calibration data is not correct.
Mode error	Moved to a mode other than the weighing mode.

Weighing Failure

This conveys a weighing failure to the master device.

This will be reset when normal weighing has resumed.

Table 10 Weighing failure

Error type	Causes
Zero error	Zero adjustment is not performed.
Tare error	Tare is not performed.
Net display error	A net value is not displayed.
Capacity exceeded	The weighing capacity has been exceeded.

Capacity Exceeded

This conveys to the master device that the weighing capacity has been exceeded.

This will be reset when all the errors are cleared.

Table 11 Capacity exceeded

Error type	Causes
Net over	The net weight is over the net weight range.
Net under	The net weight is below the net weight range.
Gross over	The gross weight is over the gross weight range.
Gross under	The gross weight is below the gross weight range.
A/D over	A/D value is over the A/D value range.
A/D under	A/D value is below the A/D value range.

8. Check Mode

8.1. Checking the PROFIBUS Communication Status

8.1.1. Entering the Check Mode

Step 1 While pressing and holding the ENTER key, press the F key.
[Fnc] is displayed to indicate that the indicator will enter the general function mode.
To go back to the weighing mode, press the ESC key.

Step 2 While pressing and holding the ZERO key, press the ENTER key.
[Chc] is displayed to indicate that the indicator will enter the check mode.
Press the ENTER key again to display an item to be checked.

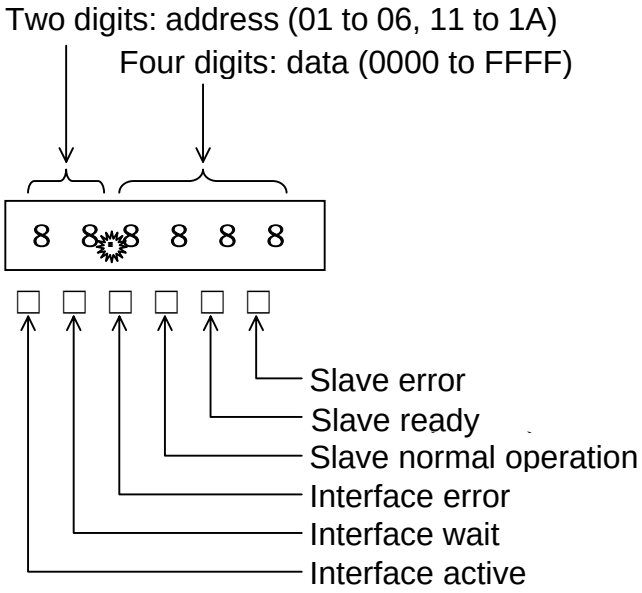
Step 3 Press the [^] or [v] key to select [Chc PF] (PROFIBUS check mode) and press the ENTER key to enter the PROFIBUS check mode.
To exit from the check mode, press the ESC key.

Table 12 Check mode list

Display	Checking item
ChcKEY	Key switches
Chc CL	Standard serial output
Chc*** Chc PF Chc***	Interfaces PROFIBUS
Chc rS	Testing terminal
Chc Ad	A/D (Load cell)
Chc in	Internal count
ChcPrg	Program version
Chc Sn	Serial number
CS Prg	Program checksum
CS FrA	Memory (FRAM) checksum
CALFdt	Calibration-related functions

8.1.2. Checking the Communication Status

Press the ∧ or ∨ key to change addresses.



Address	Data type	Word
01 to 06	OUT data	1 to 6
11 to 1A	IN data	1 to 10