Minebea

PROFI ® PROCESS FIELD BUS **BUS**

GRAPHIC DIGITAL INDICATOR with PROFIBUS Interface CSD-912B-70

Instruction Manual

Introduction

Thanks you very much for your purchasing the Graphic Digital Indicator with PROFIBUS interface CSD-912B-70. This instruction manual describes how to operate the device as well as noteworthy points. Note that handling or operating the device incorrectly may result in malfunctions. Read this manual thoroughly before use for safety and optimal results.

Keep this instruction manual in a location where it is readily accessible to end users.

This manual is intended for the technical experts to read.

In reading this manual, a basic knowledge of the sequencer program and PROFIBUS interface is required for proper understanding of this manual.

Pictograms and conventions used in this manual

This manual uses the following pictograms to indicate actions to avoid at all times, aspects requiring caution, and other noteworthy matters.

Be sure to read the descriptions provided alongside these pictograms.

 WARNING

This indicates circumstances in which incorrect handling may result in death or serious injury to users. Avoid the actions described here at all times.

 CAUTION

This indicates circumstances in which incorrect handling may result in injury to users or damage to property.

This indicates operating or procedural precautions or restrictions.
Always read the details included here to avoid malfunctioning.

About the view of this manual

In this instruction manual, a connection method and operation method in the specification of PROFIBUS interface as an optional parts for CSD-912B is explained.

Please refer the instruction manual of CSD-912B as to the other functions, basic operation methods and Notes.

Instruction manual CSD-912B (Drawing No.EN294-1764*)

Knowledge of a sequencer program and PROFIBUS is required for the proper understanding of this instruction manual. Refer to the special references for sequencer and PROFIBUS interface of sequencer.

In the case of setting the construction of network of PROFIBUS, the GSD file where environmental set data have written previously is required.

As necessity requires, please download it from our Home pages.

(http://www.minebea-mcd.com/en/product/i-amp/csd912b.html)

- PROFIBUS is registered trade mark of PROFIBUS international.

II

History of Revision

Date	Management NO.	Details of revision (Contents)
Oct. 2017	DRW. NO.EN294-1796	First release ROM Ver.1.000

Contents

1. Outlines

This is a slave device of PROFIBUS DP-V1.

This can connect with a master device of PROFIBUS DP-V0 or DP-V1.

1-1. Feature

The main feature of CSD-912B-70 is shown as follows:

(1) The indicator is used as a slave device in PROFIBUS, and the program volume of a sequencer can be reduced because I/O control and reading a load data can be executed by the operation of PLC's (Programmable Logic Controller) memory.

(2) Wiring with a PLC (Programmable Logic Controller) can be reduced by using authorized cables and connectors for PROFIBUS.

2. Name and function

2-1. PROFIBUS I/F section in the rear panel

(1) PROFIBUS connector

(2) Status LED
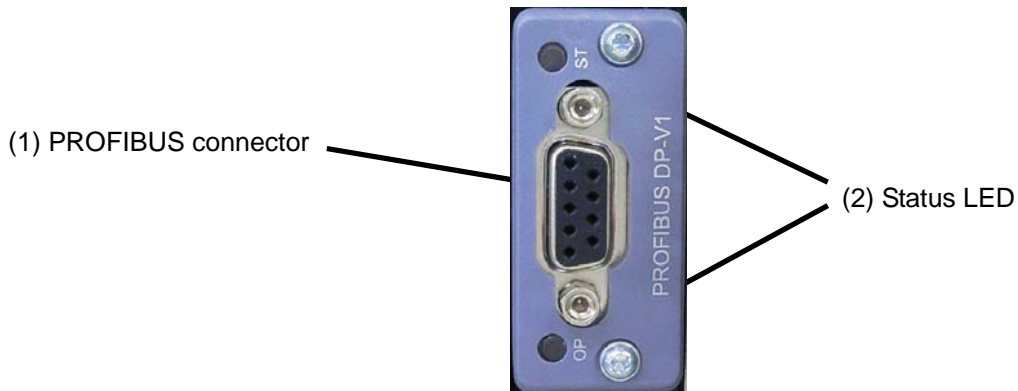
(1) Connector

Connector is for PROFIBUS I/F.

A pin arrangement of the connector is as follows;

Pin No.	Signal	Description
1	N.C.	Not connected
2	N.C.	Not connected
3	RXD/TXD-P	Receive / send data, (Positive)
4	CNTR-P	RTS (Request to send)
5	DGND	Data ground
6	VP	Power supply （+）
7	N.C.	Not connected
8	RXD/TXD-N	Receive / send data, (Negative)
9	N.C.	Not connected
Housing	SHIELD	Shield

* Connector is not provided. Applied plug : Authorized connector designed for PROFIBUS.
  Please refer the product catalog in the homepage of PROFIBUS & PROFINET international.
  (http://www.profibus.com/)

* Don't connect with N.C. pin.

* "DGND" and "SHIELD" is insulated.
* The internal circuit is insulated with photo coupler.

(2) Status LED

Two LEDs indicate the status of the interface.

Status	ST LED	OP LED
Light off	-	Off-line/ No power
Green ON	Normal operation	On-line, normal communication
Green flashing	-	On-line, No communication
Red ON	Hardware is abnormal	-
Red flashing	-	Communication error

3. Wiring

3-1. Pin arrangement of the communication connector

Please refer to "2-1. PROFIBUS interface section in the rear panel, (1) Connector".

3-2. Cable length

Maximum cable length according to transmission speed is as follows;

Transmission speed	Maximum cable length
9.6 kbps	1 200 m or less
19.2 kbps	1 200 m or less
93.75 kbps	1 000 m or less
187.5 kbps	1 000 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

3-3. Notes in connections

- Always turn off the power before making connections.
- Do not supply the AC power until the finish of installation. There is no switch that switches ON/OFF of the power supply in the main body.
- Please separate the cable connected to the main body from noise source, such as the power supply line, I/O for the control as much as possible.
- Always connect a grounding cable. Ground using Class-D independent ground.
  Do not share it with other ground wires for the power supply system.

・ **Turn on the terminating resistance of PROFIBUS connector that is the furthest from PLC.**
・ **Connected cable must use the authorized cable designed only for PROFIBUS.**
・ **Please refer the product catalog in the homepage of PROFIBUS & PROFINET international.
　(http://www.profibus.com/)**

4. Set of PROFIBUS communication

Set the following items before using PROFIBUS interface.

4-1. Change to setting screen of PROFIBUS

Change to setting screen by following procedures from measurement screen.

(1) Tap [MENU].
(2) Tap [NEXT].
(3) Tap [OPTION].
(4) Tap [PROFIBUS].

4-2. Set items for PROFIBUS

(1) Station address

Set the station address.
Input the setting with ten keys in the range from [0] to [125] with the interval of [1].
[0] is set as default.

(2) Baud rate

There is not a setting of communication speed.
It is set automatically from 9.6 kbps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps or 12 Mbps.

- **A set value becomes effective when the power is started again. Please restart the power again when you change the setting.**
- **In the case of setting the construction of network of PROFIBUS, the GSD file where environmental set data have written previously is required.**
  As necessity requires, please download it from our Home pages.
  (http://www.minebea-mcd.com/en/product/i-amp/csd912b.html)

5. PLC memory

5-1. Address map

5-1-1. OUT DATA (6 words) Host (PLC)→CSD-912B

Save the operating command of this instrument to OUT DATA of PLC memory, and execute.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT DATA 1st word								Output data (Low order word)								

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT DATA 2nd word								Output data (High order word)								

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT DATA 3rd word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
								Command bit								

a : Zero
b : Zero clear
c : Tare
d : Tare clear
e : Batch start
f : Recipe start
g : Discharge start
h : Mixing start

i : Manual free fall compensation
j : Total command
k : Former accumulation data clear
l : Not used, Fixed to 0.
m : Pause
n : Restart
o : Clear accumulation of brand code
p : Clear accumulation of all brand code

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT DATA 4th word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
								Command bit								

a : Clear accumulation of recipe code
b : Clear accumulation of all recipe code
c : Forced batch finish.
d : Forced recipe finish
e : Forced discharge finish
f : Error reset
g : Hold
h : Manual print command

from i to p : Not used, Fixed to 0.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT DATA 5th word								Command No.								

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
OUT DATA 6th word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a

a : Flag for read and write 0: write, 1: read
b : Command request flag 0 no request, 1: request
from c to p : Not used, Fixed to 0.

5-1-2. IN data (10 words） CSD-912B→Host (PLC)

Return data of OUT data is read from the IN data.

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 1st word	Gross weight data (Low order word)															

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 2nd word	Gross weight data (High order word)															

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 3rd word	Net weight data (Low order word)															

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 4th word	Net weight data (High order word)															

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 5th word	Input data (Low order word)															

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 6th word	Input data (High order word)															

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 7th word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
	Status area															

a : Stable
b : Zero band
c : Full
d : Full flow
e : Medium flow
f : Dribble flow
g : Over
h : OK
i : Under
j : Not used, Fixed to 0
k : Not used, Fixed to 0
l : Mixing
m : Discharge gate
n : Batch finish
o : Recipe finish
p : Discharge finish
[1] = ON, [0] = OFF

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 8th word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a
	Status area															

a : Mixing finish
b : Nozzle down
c : On line(Toggle output every 0.5 s)
d : During weighing sequence
e : Internal reservation
f : Sequence error
g : Weighing error
h : Zero error
i : Error
j : Not used, Fixed to 0
k : During tare weight cancellation
l : During preset tare weight cancellation
m : Center of zero
n : Gross display
o : Net display
p : During hold
[1] = ON, [0] = OFF

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 9th word						Response of command No.										

bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
IN DATA 10th word	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a

a : Reply flag of reading out and writing l : Not used, fixed to 0
b : Reply flag of command request j : Not used, fixed to 0
c : Command number error k : Not used, fixed to 0
d : Error in writing specified value l : Not used, fixed to 0
e : Writing error m : Not used, fixed to 0
f : Flag during writing n : Not used, fixed to 0
g : Not used, fixed to 0 o : Not used, fixed to 0
h : Not used, fixed to 0 p : Not used, fixed to 0

[1] = ON, [0] = OFF

5-2. Command bit

5-2-1. How to use command bit

Command bits can be stored in 3rd and 4th word. When executing the function assigned to a bit, turn on the bit.

OUT data 3rd word	bit0	(1) Zero	
	bit1	(2) Zero clear	
	bit2	(3) Tare	
	bit3	(4) Tare clear	
	bit4	(5) Batch start	
	bit5	(6) Recipe start	
	bit6	(7) Discharge start	
	bit7	(8) Mixing start	
	bit8	(9) Manual free fall compensation	
	bit9	(10) Accumulation command	
	bit10	(11) Former accumulation data clear	
	bit11	Not used. Fixed to 0.	
	bit12	(12) Pause	
	bit13	(13) Restart	
	bit14	(14) Clear accumulation of brand code	
	bit15	(15) Clear accumulation of all brand code	
OUT data 4th word	bit0	(16) Clear accumulation of recipe code.	
	bit1	(17) Clear accumulation of all recipe code	
	bit2	(18) Forced batch finish	
	bit3	(19) Forced recipe finish	
	bit4	(20) Forced discharge finish	
	bit5	(21) Error reset	
	bit6	(22) Hold	
	bit7	(23) Manual print command	
	bit 8 to bit 15	Not used. Fixed to 0.	

(1) Zero

Execute zero set.
ON　　: When zero set is required.
.　OFF　: Normal

(2) Zero clear

Execute zero clear.
ON　　: When zero clear is required.
OFF　: Normal

(3) Tare

Execute tare weight cancellation
ON　　: When tare weight cancellation is required.
OFF　: Normal

(4) Tare clear

Execute to clear the tare.
ON　　: When clear tare is required.
OFF　: Normal

(5) Batch start

Execute to start batch.
ON　　: When batch start is required.
OFF　: Normal

(6) Recipe start

Execute to start recipe.
    ON   : When recipe start is required.
    OFF : Normal

(7) Discharge start

Execute to start discharge
    ON   : When discharge start is required.
    OFF : Normal

(8) Mixing start

Execute to start mixing.
    ON   : When mixing start is required.
    OFF : Normal

(9) Manual free fall compensation

Execute manual free fall compensation.
    ON   : When manual free fall compensation is required.
    OFF : Normal

(10) Accumulation command

Execute accumulation.
    ON   : When accumulation is required.
    OFF : Normal

(11) Former accumulation data clear

Execute to former accumulation data clear.
    ON   : When a former accumulation data clear is required.
    OFF : Normal

(12) Pause

Execute to pause a measuring.
    ON   : When a pause is required.
    OFF : Normal

(13) Restart

Execute to restart measuring.
    ON   : When restart is required.
    OFF : Normal

(14) Clear accumulation of brand code

Execute to clear accumulation of brand code.
    ON   : When a clear accumulation of brand code is required.
    OFF : Normal

(15) Clear accumulation of all brand code

Execute to clear accumulation of all brand code.
    ON   : When clear accumulation of all brand code is required.
    OFF : Normal

(16) Clear accumulation of recipe code

Execute to clear accumulation of recipe code.
    ON   : When clear accumulation of recipe code is required.
    OFF : Normal

(17) Clear accumulation of all recipe code

Execute to clear accumulation total of all recipe code.
    ON   : When clear accumulation of all recipe code is required.
    OFF : Normal

(18) Forced batch finish

Finish the batch compulsorily.
ON : When forced batch finish is required.
OFF : Normal

(19) Forced recipe finish

Finish the recipe compulsorily.
ON : When forced recipe finish is required.
OFF : Normal

(20) Forced discharge finish

Finish the discharge compulsorily.
ON : When forced discharge finish is required.
OFF : Normal

(21) Error reset

Release error display.
ON : When error reset is required.
OFF : Normal

(22) Hold

Input a hold signal.
ON : When a hold signal is required. (It has effect at the leading edge of flag OFF to ON.)
OFF : Normal (It has effect at the trailing edge of flag ON to OFF with Hold ON.)

(23) Print

Input a print command.
ON : When a printing is required.
OFF : Normal

5-2-2. Operation process of command bit

Please operate the command bit according to the following procedures.

1) Turn off all bits of the "Command bit" in the PLC memory. (Confirm that they are turned off.)
2) Turn on the bit in the PLC memory to execute the function.
3) Then this instrument executes the function.
4) Turn off all bits of the "Command bit" in the PLC memory as a termination process.

5-3. Operation method by a command

5-3-1. Command execution procedure

Please operate the command bit according to the following procedures:

1) Confirm to turn off the "Flag during writing" turns OFF.
2) Confirm to turn off the "Command request flag".
3) Specify the flag "Reading out and writing".
   0: Write command
   1: Read out command
4) Specify a command to be executed for "Command No."
5) Turn on "Command request flag". It has effect at the leading edge.
6) This indicator replies.
   The result is input into "Command reply flag", flag of "reading out and writing" and "Command No. reply".
7) If it is a read command, data is input into "Input data (Command reply data)".
8) Turn off the "Command request flag".

(2) Reading out

Command request flag

Command reply flag

Reading out and writing flag

Command No.

Writing data

Command No. reply flag

Reading out and writing reply flag

(3) Writing

Command request flag

Command reply flag

Reading out and writing flag

Command No.

Writing data

Command No. reply flag
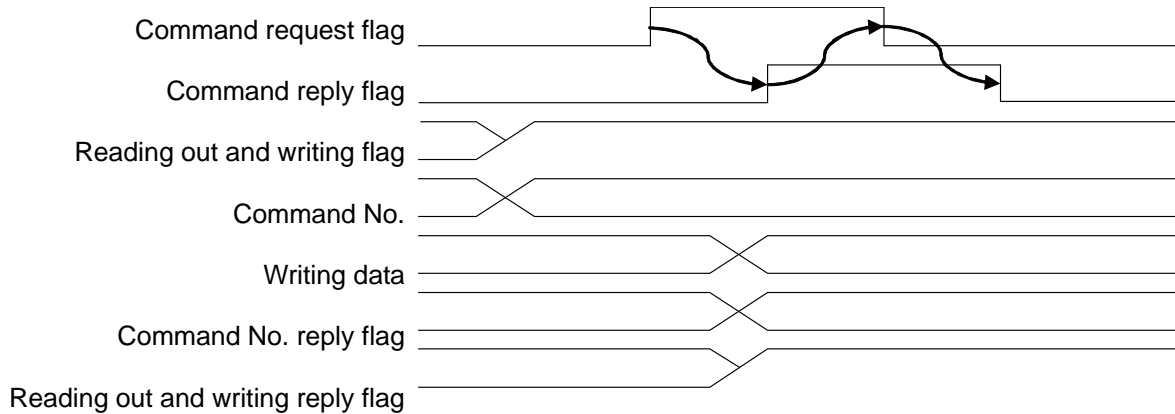
Reading out and writing reply flag
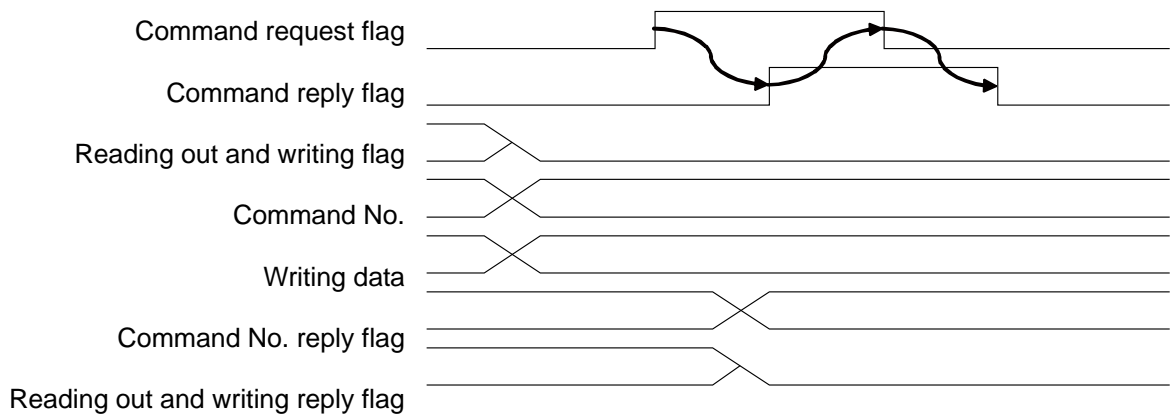
5-3-2. Read out command list

Command No	Command name	Note
1	Brand name 1 (1st to 4th character)	
2	Brand name 2 (5th to 8th character)	
3	Brand name 3 (9th to 12th character)	
4	Brand name 4 (13th to 15th character)	
5	Hopper No.	
6	Final / S1	
7	Free fall / S4	
8	Preliminary1 / S3	
9	Preliminary2 / S2	
10	Over	
11	Under	This data is stored in each brand code.
12	Zero band	
13	Full	
14	Preset tare	Specify the brand material code No. before the input
15	Supplementary flow timer	
16	Judgement timer after supplementary flow	
17	Automatic free fall compensation	
18	Initial full flow	
19	Initial medium flow	
20	Accumulation value of brand (8 digits)	
21	Accumulation times of brand	
22	Accumulation value of brand Lower 4byte (8 digits)	
23	Accumulation value of brand Upper 4byte (8 digits)	
32	Current Brand code No.	
40	Recipe name 1 (1st to 4th character)	
41	Recipe name 2 (5th to 8th character)	
42	Recipe name 3 (9th to 12th character)	
43	Recipe name 4 (13th to 15th character)	
44	Measurement 1	
45	Measurement 2	
46	Measurement 3	This data is stored in each recipe code.
47	Measurement 4	
48	Measurement 5	
49	Measurement 6	Specify a recipe code No. before the input.
50	Measurement 7	
51	Measurement 8	
52	Measurement 9	
53	Measurement 10	
54	Accumulation value of recipe (8 digits)	
55	Accumulation times of recipe	
56	Current recipe code No.	
57	Accumulation value of recipe Lower 4byte (8 digits)	
58	Accumulation value of recipe Upper 4byte (8 digits)	
60	Target of S1 operation.	
61	Target of S2 operation.	
62	Target of S3 operation.	
63	Target of S4 operation.	
65	S1 operation	
66	S2 operation	
67	S3 operation	
68	S4 operation	
70	Error information	
71	Decimal point	
74	Current tare	

5-3-3. Write command list

Command No.	Command name	Note
0	Control command	Refer to control command list.
1	Brand name 1 (1st to 4th character)	
2	Brand name 2 (5th to 8th character)	
3	Brand name 3 (9th to 12th character)	
4	Brand name 4 (13th to 15th character)	
5	Hopper No.	
6	Final / S1	
7	Free fall / S4	
8	Preliminary1 / S3	
9	Preliminary2 / S2	
10	Over	This data is stored in each brand code.
11	Under	
12	Zero band	Specify the brand code No. before the
13	Full	input.
14	Preset tare	
15	Supplementary flow timer	
16	Judgement timer after supplementary flow	
17	Automatic free fall compensation	
18	Initial full flow	
19	Initial medium flow	
20	Accumulation value of brand (8 digits)	
21	Accumulation times of brand	
32	Current Brand code No.	
40	Recipe name 1 (1st to 4th character)	
41	Recipe name 2 (5th to 8th character)	
42	Recipe name 3 (9th to 12th character)	
43	Recipe name 4 (13th to 15th character)	
44	Measurement 1	
45	Measurement 2	
46	Measurement 3	
47	Measurement 4	
48	Measurement 5	
49	Measurement 6	
50	Measurement 7	This data is stored in each recipe code.
51	Measurement 8	
52	Measurement 9	Specify the recipe code No. before the
53	Measurement 10	input.
54	Accumulation value of recipe (8 digits)	
55	Accumulation times of recipe	
56	Current recipe code No.	
60	Target of S1 operation.	
61	Target of S2 operation.	
62	Target of S3 operation.	
63	Target of S4 operation.	
65	S1 operation	
66	S2 operation	
67	S3 operation	
68	S4 operation	

An alphabetic capital letter and a numeric letter can be used for the material name and recipe name.
Please input it by ASCII code or JIS 8 bit code.
Please specify it by space (20H) when neither the material name nor the recipe name is used.

Control command list

Command No.	Output data	Command name	Note
0	1	Zero	
0	2	Zero clear	
0	3	Tare	
0	4	Tare clear	
0	5	Batch start	
0	6	Recipe start	
0	7	Discharge start	
0	8	Mixing start	
0	9	Manual free fall compensation	
0	10	Accumulation command	
0	11	Former accumulation data clear	
0	12	Pause	
0	13	Restart	
0	14	Clear accumulation of brand code	Specify brand code No.
0	15	Clear accumulation of all brand code	
0	16	Clear accumulation of recipe code	Specify recipe code No.
0	17	Clear accumulation of all recipe code	
0	18	Forced batch finish	
0	19	Forced recipe finish	
0	20	Forced discharge finish	
0	21	Error reset	
0	22	Manual print command	
0	23	Net display	
0	24	Gross display	

5-4. Error information

When an error occurs, the error information from this instrument can be read out with "Command No.70" of the "Read command".

	bit 0	
	bit 1	
	bit 2	(1) Weighing sequence error No.
	bit 3	
	bit 4	
	bit 5	
	bit 6	Not used.
IN DATA 5th word	bit 7	
	bit 8	
	bit 9	(2) Zero error No.
	bit 10	
	bit 11	
	bit 12	
	bit 13	
	bit 14	Not used.
	bit 15	
IN DATA 6th word	bit 0 to bit15	Not used.

(1) Weighing sequence error No.

When a weighing sequence error occurs, the following No. can be read out.

Error No.	Cause	Treatment
1	Stop compulsorily by inputting the temporary stop while weighing.	Execute the restart after checking the source of the temporary stop.
2	When the condition of SAFETY CHECK is not satisfied.	Check the input of SAFETY CHECK.
3	When the load value is under even if the supplementary flow is executed.	Execute the restart after changing the supplementary flow time and numbers.
4	When there is contradiction in the amount of the comparison value.	Solve the contradiction of amount after checking the setting value.
5	When the batching time exceeds the limited time.	Check the blocking at the batching gate
6	When the discharging time exceed the limited time..	Check the blocking at the discharging gate.
7	When the gross value is smaller than the final value in discharge control.	Add the material.
8	When the net value > (final value – free fall) in the start.	Remove the contents in the container.
9	In controlling the nozzle, when the change of the load value exceeds ZERO BAND.	Check the position of nozzle.
10	The measurement begins in the condition that [START ABOVE ZERO BAND] is [VALID], however the container is not put on the measuring section.	Check that whether the container is put.

(2) Number of Zero error

When a zero error occurs, the following No. can be read out.

Error No.	Cause	Treatment
1	Zero set is executed while a weighing value is out of zero band.	Reset the error.
2	Tare weight cancellation is executed while a weighing value is out of tare condition.	Reset the error.

・ **Please refer to a instruction manual of CSD-912B for a guidance of a error display and a error No.**

6. Specifications of interface

6-1. Specification of PROFIBUS interface

Specifications	Details
Baud rate	Automatically set from 9.6 kbps, 19.2 kbps, 93.75 kbps, 187.5 kbps, 500 kbps, 1.5 Mbps, 3 Mbps, 6 Mbps and 12 Mbps.
Communication type	RS-485 bus
Station address	Select one from 0 to 125.
Cable length	Baud rate (bps) Total length (m) 9.6 k 1 200 or less 19.2 k 1 200 or less 93.75 k 1 000 or less 187.5 k 1 000 or less 500 k 400 or less 1.5 M 200 or less 3 M 100 or less 6 M 100 or less 12 M 100 or less
Cable	Use authorized cable for PROFIBUS.
Connector	Use authorized connector for PROFIBUS.
Termination	Use a connector with built-in terminator.
Status LED	"OP", "ST"

6-2. Accessories

Instruction manual for PROFIBUS	1 pad

●The contents of this manual may subject to change without notice.

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