



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

Instruction Manual

Minebea Co., Ltd.
Measuring Components Business Unit

EN294-1425

Forwards

Thanks you very much for your purchasing MINEBEA's Graphic Digital Indicator with PROFIBUS interface CSD-912-70. This manual explains the operating procedures and also the check points in operation. We would like you to read through this instruction manual with much care for the best use of our product to avoid malfunctions.

We also would like you to deliver the manual to end user surely to keep it at hand.

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.

Marks and references described in this manual.

The following marks are placed for the matter that indicates "Don't do this", "Caution" and "For reference".

Please read following descriptions with mark.

Warning

This is a hazard alert mark. In the case of a malfunction occurred, there is a possibility of lethal accidents of serious injury to operators. To prevent possible hazard, please avoid operations described here.

Caution

Descriptions that may cause injury or physical damage to operators and such as occurrences of physical damage.



When you are operating the instrument, you have to pay cautions or restrictions related with this description. Be sure to read to prevent from malfunction.

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-912 is explained.

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

Instruction manual CSD-912 Drawing No.EN294-1404*

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 the Home pages of Minebea.

(<http://www.minebea-mcd.com/>)

- PROFIBUS is registered trade mark of PROFIBUS international.

History of Revision

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1. Outlines

This is a slave device of PROFIBUS DP-1.

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

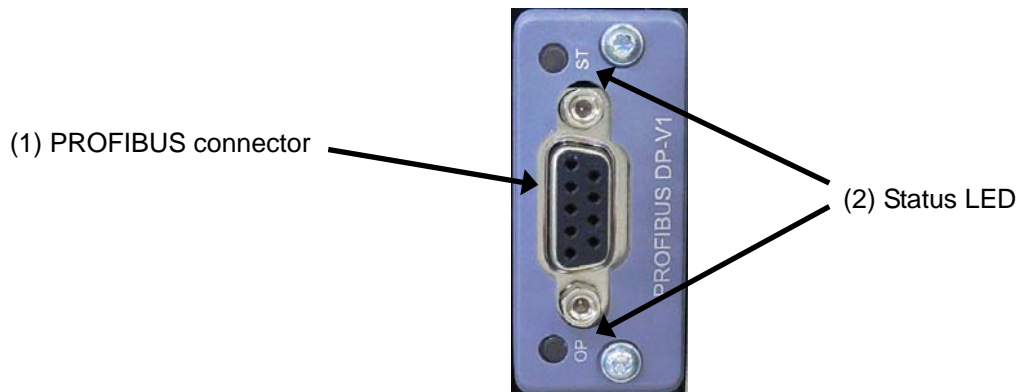
1-1. Feature

The main feature of CSD-912-70 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.

1-2. Name and function

1-3. PROFIBUS I/F section in the rear panel



(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 attached. 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	No power or not initialised	Off-line/ No power
Green ON	Normal operation	On-line, normal communication
Green flashing	Initialised, diagnostic event(s) present	On-line, No communication
Red ON	Hardware is abnormal	-
Red flashing	-	Communication error

2. Wiring

2-1. Pin arrangement of the communication connector

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

2-2. Cable length

Maximum cable length according to transmission speed 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

2-3. Notes in connections

- Turn off the power in proceeding any connections.
- Do not supply the power until the finish of installation. There is no switch for the power in this indicator.
- Please keep the connecting cable from the noise source such as the power supply line and the control I/O as far as possible.
- Please make sure to connect a ground. The ground should be the D-class with single earth. Do not share with the ground for the power supply line.



- Turn on the terminator 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/>)

3. PROFIBUS communication data

Set the following items before using PROFIBUS interface.

3-1. Change to setting display of PROFIBUS

Change to setting display by a following procedures from measurement display.

- (1) Press [MENU] key.
- (2) Press [NEXT] key.
- (3) Press [OPTION] key.
- (4) Press [PROFIBUS] key.

3-2. Set items for PROFIBUS

- (1) Station address

Execute a setting of station address.

The setting is proceeded by 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 the Home pages of Minebea.
(<http://www.minebea-mcd.com/>)

4. PLC memory

4-1. Address map

4-1-1. OUT DATA (6 words) Host(PLC)→CSD-912

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 | i : Manual free fall compensation |
| b : Zero clear | j : Total command |
| c : Tare | k : Fomer accumulation data clear |
| d : Tare clear | l : No use, Fixed to 0. |
| e : Batch start | m : Pause |
| f : Recipe start | n : Restart |
| g : Discharge start | o : Clear accumulation of brand code |
| h : Mixing start | 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 3rd 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 | from i to p : No use, Fixed to 0. |
| 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 | |

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 : No use, Fixed to 0. |

4-1-2. IN data (10 words) CSD-912→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 (Low 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 | i : Under |
| b : Zero band | j : No use, Fixed to 0 |
| c : Full | k : No use, Fixed to 0 |
| d : Full flow | l : Mixing |
| e : Medium flow | m : Discharge gate |
| f : Dribble flow | n : Batch finish |
| g : Over | o : Recipe finish |
| h : OK | 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 | i : Error |
| b : Nozzle down | j : No use, Fixed to 0 |
| c : On line(Toggle output every 0.5 s) | k : During tare weight cancellation |
| d : During weighing sequence | l : During fixed tare weight cancellation |
| e : Internal reservation | m : Center of zero |
| f : Sequence error | n : Gross display |
| g : Weighing error | o : Net display |
| h : Zero error | 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 and writing

b : Reply flag of command request

c : Command number error

d : Error in writing specified value

e : Writing error

f : Flag during writing

from g to p: No use, Fixed to zero

[1] = ON, [0] = OFF

4-2. Command bit

4-2-1. 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) Total command
	bit10	(11) Fomer accumulation data clear
	bit11	No use. 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	No use. 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) Total command
 - Execute totalization.
 - ON : When totalization is required.
 - OFF : Normal
- (11) Fomer accumulation data clear
 - Execute to fomer accumulation data clear.
 - ON : When a fomer 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.
OFF : Normal
- (23) Print
Input a print command.
ON : When a printing is required.
OFF : Normal

4-2-2. 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.

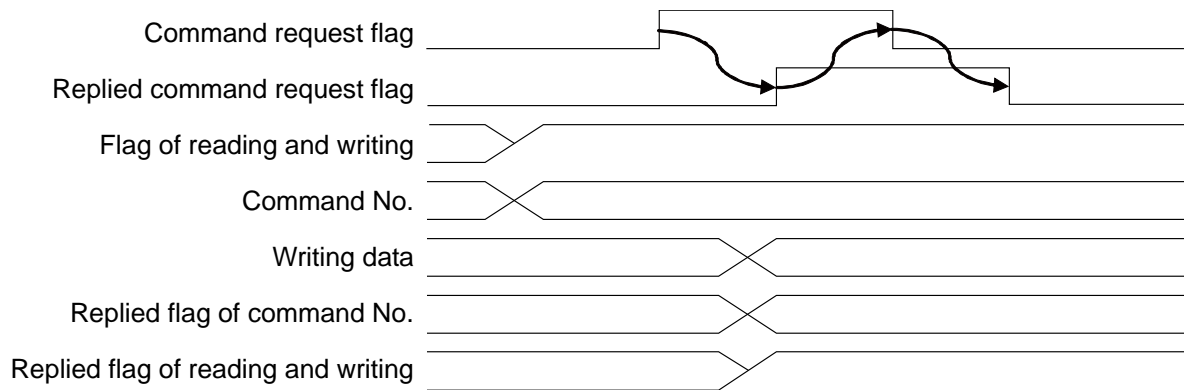
4-3. Operation method by a command

4-3-1. How to execute a command

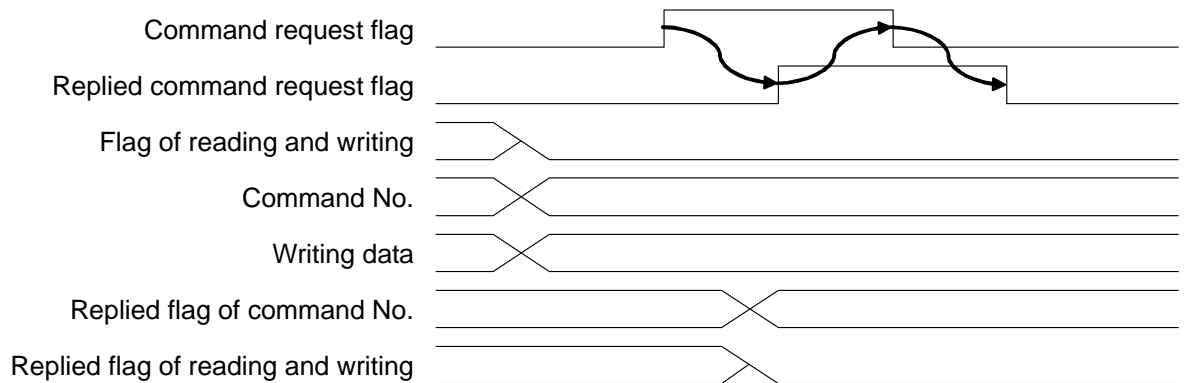
Please operate the command bit according to the following procedures:

- 1) Confirm to turn off the the "Flag during writing" turns OFF.
- 2) Confirm to turn off the "Command request flag".
- 3) Specify the flag "Reading and writing".
0: Write command
1: Read command
- 4) Specify a command to be executed for "Command No."
- 5) Trun 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 and writing" and "Command No. reply".
- 7) If it is a read command, data is input into "Input data (Command reply data)".
- 8) Trun OFF the "Command request flag".

(1) Reading



(2) Writing



4-3-2. Read command list

Command No	Command name	Note	
1	Brand name 1 (1st to 4th character)	This data is stored in each brand code. Specify the brand material code No. before the input	
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	Brand hopper No.		
6	Final / S1		
7	Free fall / S4		
8	Preliminary1 / S3		
9	Preliminary2 / S2		
10	Over		
11	Under		
12	Zero band		
13	Full		
14	Preset tare		
15	Supplementary flow timer		
16	Judgement after supplementary flow timer		
17	Automatic free fall compensation		
18	Initial full flow		
19	Initial medium flow		
20	Accumulation value of brand		
21	Accumulation times of brand		
32	Current Brand code No.		
40	Recipe name 1 (1st to 4th character)		This data is stored in each recipe code. Specify a recipe code No. before the input.
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		
51	Measurement 8		
52	Measurement 9		
53	Measurement 10		
54	Accumulation value of recipe		
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		
70	Error information		
71	Decimal point		
74	Current tare		

4-3-3. Write command list

Command No.	Command name	Note	
0	Control command	Refer to control command list.	
1	Brand name 1 (1st to 4th character)	This data is stored in each brand code. Specify the brand code No. before the input.	
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	Brand hopper No.		
6	Final / S1		
7	Free fall / S4		
8	Preliminary1 / S3		
9	Preliminary2 / S2		
10	Over		
11	Under		
12	Zero band		
13	Full		
14	Preset tare		
15	Supplementary flow timer		
16	Judgement after supplementary flow timer		
17	Automatic free fall compensation		
18	Initial full flow		
19	Initial medium flow		
20	Accumulation value of brand		
21	Accumulation times of brand		
32	Current Brand code No.		
40	Recipe name 1 (1st to 4th character)		This data is stored in each recipe code. Specify the recipe code No. before the input.
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		
51	Measurement 8		
52	Measurement 9		
53	Measurement 10		
54	Accumulation value of recipe		
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 and 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	Total command	
0	11	Fomer 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	

4-4. Error information

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

IN DATA 5th word	bit 0	(1) Weighing sequence error No.	
	bit 1		
	bit 2		
	bit 3		
	bit 4		
	bit 5	No use.	
	bit 6		
	bit 7		
	bit 8	(2) Zero error No.	
	bit 9		
	bit 10		
	bit 11		
	IN DATA 6th word	bit 12	No use.
		bit 13	
		bit 14	
bit 15			
IN DATA 6th word	bit 0 to bit15	No use.	

(1) Weighing sequence error No.

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

Error No.	Cause	Treatment
1	The pause command is input during a weighing sequence, and stop compulsorily.	Cope with cause of pause, and restart the sequence.
2	When the safety check can not be completed.	Check the safety.
3	When there is Under weight after a supplementary flow	Restart after changing a supplementary flow time and supplementary flow count.
4	When there is a conflict in a comparison setpoint.	Confirm the setpoint value and clear a conflict in a comparison value.
5	When a batch weighing time is over the limited time	Check the gate and hopper remains.
6	When a discharge time is over the limited time.	Check the discharge gate.
7	When gross is smaller than final in discharge operation.	Add the material.
8	When net is bigger than (final – fall) in starting.	Remove the material from a hopper.
9	When a nozzle is touching the hopper in operating a nozzle.	Check the nozzle position.
10	When there is no tare (vessel) on the weighing pan in starting a weighing with effective condition of “Start over zero band”.	Check the tare (vessel) on the weighing pan.

(1) Zero error No.

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

Error No.	Cause	Treatment
1	When a weighing value is out of zero band.	Reset the error.
2	When a weighing value is out of tare condition.	Reset the error.



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

5. Specifications of interface

5-1. Specification of PROFIBUS interface

Specification	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 or 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"	

5-2. Accessories

Instruction manual for PROFIBUS	1 pad
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- The contents of this manual may subject to change without notice.

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