Simple RFID
8/10-Bit Read System

ID reader unit
Z5-CA01N-PU_ _/ Z5-CA01P-PU_ _
Z5-DA01N-PU_ _/ Z5-DA01P-PU_ _

Manual

8bit 10bit

B&Plus 8 / 10-bit system
ID reader unit

B&PLUS

■ Index ■

Safety Considerations

(Read this section thoroughly before installation.)
Before using this processor,read this manual carefully and operate properly, paying attention to the safety aspects.

Notes for designing :
◆ Reader together with data carrier which are specified by ISO15693 standard comprise the identification system and may only be used for this purpose inindustrial applications.
◆ Please design the system to work safely in case of the unit malfunction or external power supply failure.
◆ Power supply / condition of use, design the system not to exceed the specifications of the unit as indicated in the user's guide or manuals.

Precautions :
◆ Use a regulated power supply, e.g.switch-model type.
   Do not exceed the specified rated voltage as it may cause overheating or ignition.
◆ When wiring the processor, follow the chapters containing the wiring diagrams closely, and wire all connections
   properly. Mis-wiring or wrong connection may cause unexpected malfunction and breakdown of the unit.
◆ Please turn off the Remote System before any performances such as mounting, maintenance or breakdown.
◆ Do not disassemble or modify the processor.
   Which may cause failure,malfunction, injury or fire.
◆ To avoid malfunction caused by induction noise, cable should be kept apart from motor or other power cable.
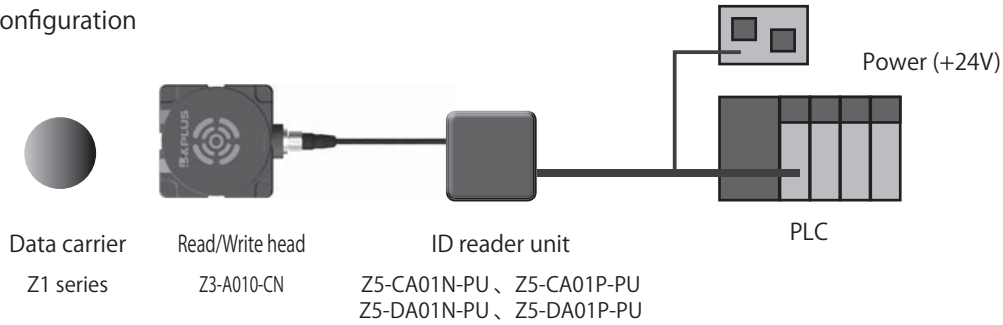◆ When disposing the product, please treat it as industrial waste.

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1． Description

1．1 Description

This ID reader is connected to the ID antenna Z3 - A010 - CN and can easily read 8 - bit or 10 - bit data without any special program.

When the Data carrier enters the communicable area of the ID antenna, it automatically reads the data and outputs it in parallel as it is.

It is ideal for pallet numbering and easy identifying system of equipment etc. It is also easy to replace from conventional contact type such as mechanical flag.

For writing data, ID antenna of 8/10 bit system is available.

IData carrier conforming to ISO 15693 can be used for the 8/10-bit system.

1．2 System configuration

Power (+24V)

Data carrier	Read/Write head	ID reader unit	PLC
Z1 series	Z3-A010-CN	Z5-CA01N-PU 、 Z5-CA01P-PU
		Z5-DA01N-PU 、 Z5-DA01P-PU

- Reader start reading Reading as soon as a Data carrier comes into its communication area .
- Reader outputs the read data in 8 / 10-bits parallel.
     Used frequency / 13.56MHz

1． 3 Tag format for 8/10bit read system

The data carrier format of the 8/10-bit read system is the same specification as our 8-bit system (Z5-AA01-PU). The ID reader unit compares each data when reading.

The comparison result is positive ⇒ Data of 00H address and 03H address is output as read data and data valid output is turned ON.

The comparison result is erroneous ⇒ The LED flashes as a data check error. Also, the output does not change.

For comparison, compare the first 3 bytes for 8 bits and the first 6 bytes for 10 bits.

【In the case of 8bit】
It occupies the first three bytes as the data area.

	Data bit No.								User's ID data	Check data
bit	D7	D6	D5	D4	D3	D2	D1	D0		
Cable color	Gray	Violet	Blue	Green	Yellow	Orange	Red	Brown		
00H address	0	0	0	0	0	1	0	0	0 4 H	-
0 1 H address	1	1	1	1	1	0	1	1	-	F B H
0 2 Haddress	1	1	1	1	1	0	1	1	-	F B H

【In the case of 10-bit】
It occupies the first 6 bytes as the data area.

	Data bit No.								User's ID data	Check data
bit	D7	D6	D5	D4	D3	D2	D1	D0		
Cable color	Gray	Violet	Blue	Green	Yellow	Orange	Red	Brown		
00H address	0	0	0	0	0	1	0	0	0 4 H	-
0 1 H address	1	1	1	1	1	0	1	1	-	F B H
0 2 H address	1	1	1	1	1	0	1	1	-	F B H

	Data bit No.								User's ID data	Check data
bit	D15	D14	D13	D12	D11	D10	D9	D8		
Cable color	---	---	---	---	---	---	red/black ·	brown/black ·		
0 3 H address	0	0	0	0	0	0	1	1	0 3 H	-
0 4 H address	1	1	1	1	1	1	0	0	-	FCH
0 5 H address	1	1	1	1	1	1	0	0	-	FCH

2. Equipment specification

■ General specification

Type code		Z5-CA01N-PU_ _	Z5-CA01P-PU_ _	Z5-DA01N-PU_ _	Z5-DA01P-PU_ _
Number of bits		8-bit		10-bit	
Output specification		NPN	PNP	NPN	PNP
Power supply		24V DC ± 10%			
Current consumption		max.200mA（includes read/write head）			
Use ambient temperature		0...+50℃			
Operating humidity		35...90%RH			
Protective class		IP 67			
Vibration rating		10…55Hz,amplitude 1.5mm,to each axis X-Y-Z for 2 hrs.			
Shock rating		50G, 3 times to each axis X-Y-Z,total 18 times			
Housing material		ABS			
Cable	R/W head side	PU sheath φ 7 （8x24AWG）		PU sheath φ 7 （8x24AWG）	
	PLC side	PU sheath φ 7.7 （2x21AWG+9x25AWG）		PU sheath φ 8.6 （2x21AWG+16*x25AWG）	
Weight		350G（cable length 2m）		400G（cable length 2m）	

Actually used lines are 11 out of 16 (see page 6).

■ Correspondence RFID chip

Supports the communication protocol of the ID chip shown on the right chart.

Please confirm the processing time, communication distance and quality when using anything other than Data carrier (the Z1 series)

chip	Manufacturer	Capacity
MB89R118	Fujitsu	2000byte(FRAM)
I-CODE SLI,SLIX	NXP	112byte
Tag-it HF-I plus	TI	256byte
my-d(SRF55V02P)	Infineon	224byte
my-d(SRF55V10P)	Infineon	992byte
Tag-it HF-I standard	TI	32byte
Tag-it HF-I pro	TI	32byte

I - CODE SLI, SLIX is NXP semiconductor, FRAM is Ramtron International, Tag - it is Texas Instruments Incorporated, my - d is a registered trademark of Infineon Technologies AG.

■ Demension

・8-bit Specification
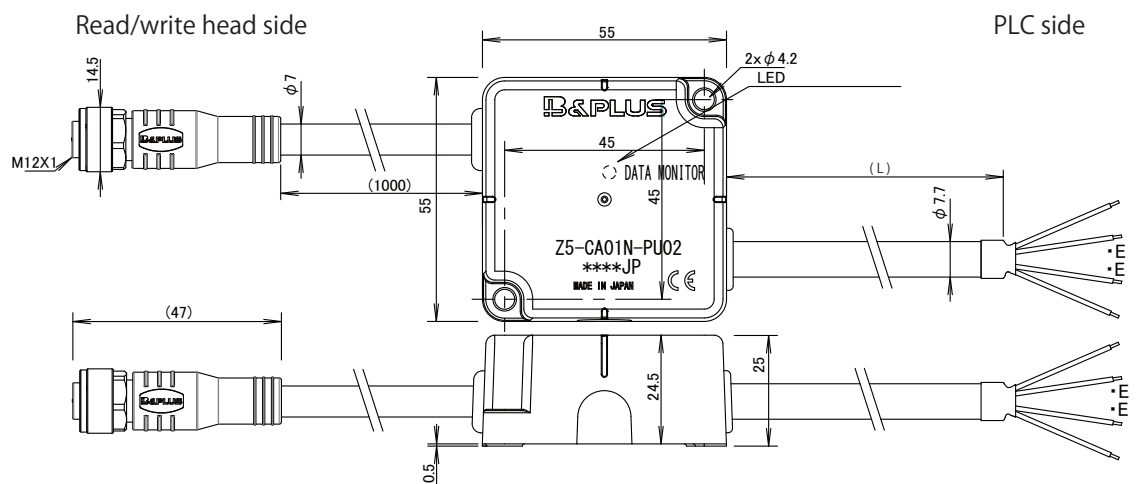Z5-CA01N-PU_ _
Z5-CA01P-PU_ _

・10-bit Specification
Z5-DA01N-PU_ _
Z5-DA01P-PU_ _

Read/write head side

PLC side

L = Cable length

Standard : 2m（Max 10m）

■ LED status

Color	LED status			Description of the functions
Yellow	ON	---		Data carrier present and data are valid It is in normal condition.
	OFF	---		The Data carrier is not in the communication range.
	Blink	1 s interval		An error has occurred in the data check.
		100 ms		Any of those "ON" output signals that indicate Read data or Data valid is short circuit.
		4 s interval		The ID antenna is not connected. Please connect the ID antenna or check the wiring.
		2 s interval		Communication between read/write head and ID reader unit is abnormal.

The blinking interval is the interval of lighting / extinguishing time.

For 1s interval, repeat 0.5 seconds lighting / 0.5 seconds off.
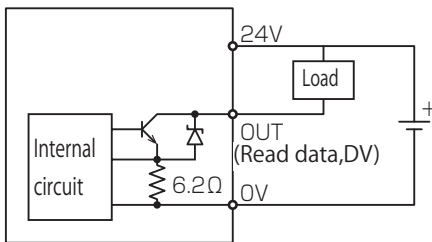
■ Output specification

Load voltage	30 V DC (max.)
Load current	50mA (max.)
Residual voltage	$\leqq$ 1.5V
Load current	$\leqq$ 0.08mA

■ Output circuit

NPN type   Z5-CA01N-PU_ _   PNP type   Z5-CA01P-PU_ _
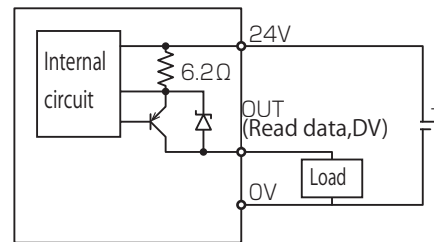
                   Z5-DA01N-PU_ _   Z5-DA01P-PU_ _

ID reader unit   ID reader unit

■ Output signal

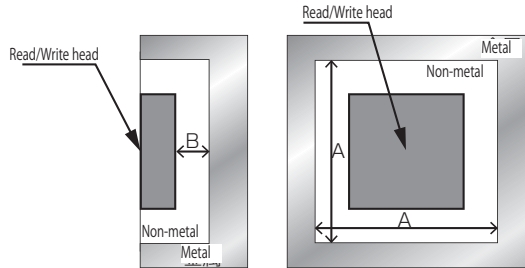| Signal	I/O	Cable color	Contents
Power supply 24V	-	White	Connect (+) side of the 24V DC Power supply
Power supply 0 V	-	Pale Blue	Connect (-) side of the DC24V Power supply
Reading Data D0	Out	Brown	Output data read from Bit address [0]
Read data D1	Out	Red	Output data read from Bit address [1]
Read data D2	Out	Orange	Output data read from Bit address [2]
Read data D3	Out	Yellow	Output data read from Bit address [3]
Read data D4	Out	Green	Output data read from Bit address [4]
Read data D5	Out	Blue	Output data read from Bit address [5]
Read data D6	Out	Violet	Output data read from Bit address [6]
Read data D7	Out	Gray	Output data read from Bit address [7]
Read data D8	Out	brown/black・	Output data read from Bit address [8]
Read data D9	Out	red/black・	Output data read from Bit address [9]
Data valid DV	Out	Black	Output signal that indicates the read data is valid

The read data D8 and D9 are valid only for the 10-bit specification.
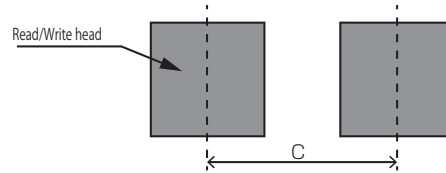
3. Installation and Wiring

■ Installation

When attach the ID reader writer, communications distance may shorten. To avoid influence of the metal and interference, please install the greater value mentioned in the diagram below. Also, note that Data carrier can not be metal installed.
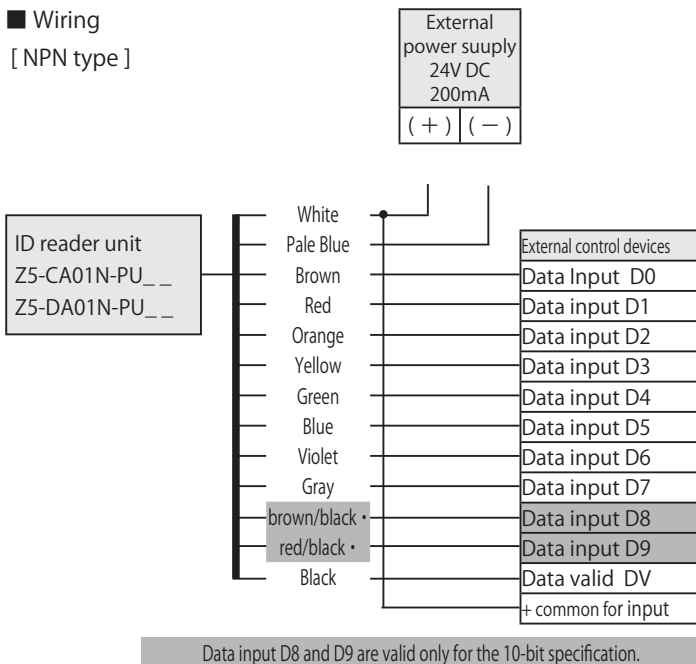
■ Metal installation

Read/Write head

Read/Write head

Metal

Non-metal

B

Non-metal

Metal

A

A

■ Parallel Setting

Read/Write head

C

Mounting	Type code	Non-metallic area (mm)		Mutual interference(mm)
		A	B	C
Metal mounting	Z3-A010-CN	200	0	500
Non-metal mounting	Z3-A010-CN	200	40	500

Metal installation means to install directly on top of the metal. Circumference (A) is non-metal region.

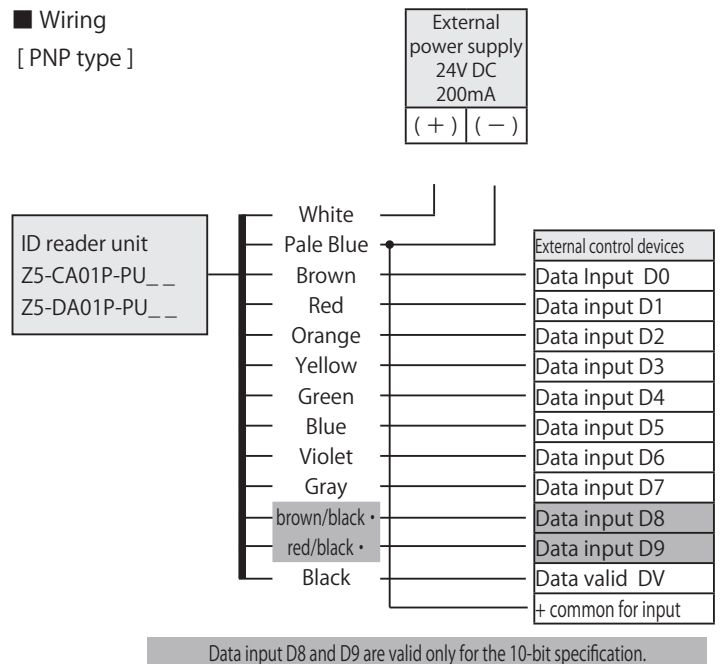・Non-metal installation is to have an area (A) metal and reader write, then also back(B) has the non-metal area.

■ Wiring
[NPN type]

External power suuply
24V DC
200mA
(+) (−)

ID reader unit
Z5-CA01N-PU_ _
Z5-DA01N-PU_ _

White
Pale Blue
Brown
Red
Orange
Yellow
Green
Blue
Violet
Gray
brown/black ・
red/black ・
Black

External control devices
Data Input D0
Data input D1
Data input D2
Data input D3
Data input D4
Data input D5
Data input D6
Data input D7
Data input D8
Data input D9
Data valid DV
+ common for input

Data input D8 and D9 are valid only for the 10-bit specification.

■ Wiring
[PNP type]

External power supply
24V DC
200mA
(+) (−)

ID reader unit
Z5-CA01P-PU_ _
Z5-DA01P-PU_ _

White
Pale Blue
Brown
Red
Orange
Yellow
Green
Blue
Violet
Gray
brown/black ・
red/black ・
Black

External control devices
Data Input D0
Data input D1
Data input D2
Data input D3
Data input D4
Data input D5
Data input D6
Data input D7
Data input D8
Data input D9
Data valid DV
+ common for input

Data input D8 and D9 are valid only for the 10-bit specification.

■ Data input D8 and D9 are valid only for the 10-bit specification.

At factory shipment, Z5-DA01N-PU_ _ and Z5-DA01P-PU_ _ are cutting unused cables.
If you shorten the cable due to wiring reasons etc., unused cables will be exposed, so please handle so as not to short-circuit.
The unused cables are "Orange / Black Dot", "Yellow / Black Dot", "Green / Black Dot", "Blue / Black Dot", "Purple / Black Dot".

■ About cable length
● PLC (external control equipment) side ... standard is 2 m. It can extend up to 10 m.
The end of type name "02" means a cable length of 2 m. It is "... PU - 01" when requesting 1 m.
- When connecting user's cable to Reader, be sure to use the cable of which conductors are bigger than 0.5 mm2 for power supply line (white, pale blue) and 0.2 mm2 for signal line (brown ... black).

4. Communication with the External Unit

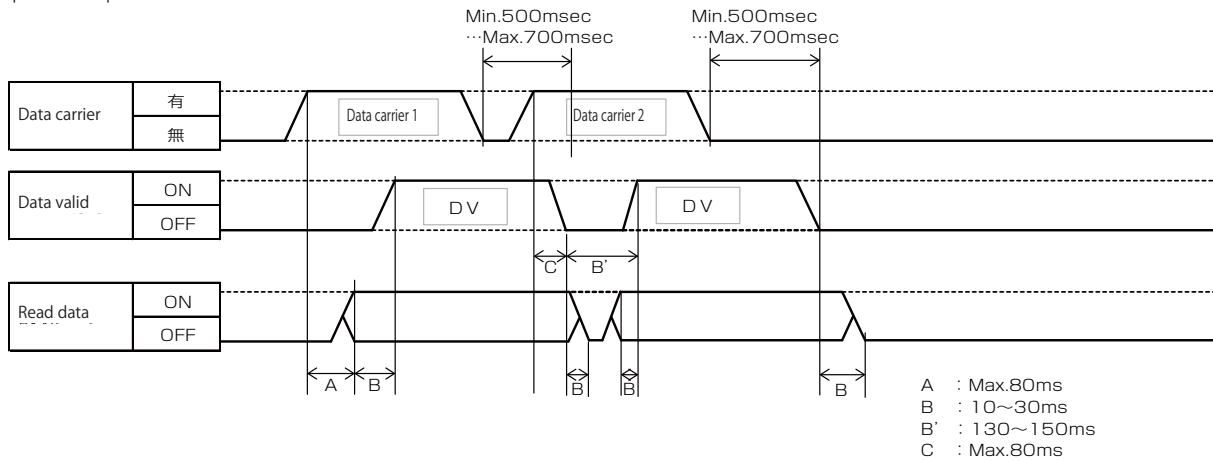### ■ Data Reading

[Timing chart 1]

Min.500msec···Max.700msec   Min.500msec···Max.700msec

A : Max. 80ms
B : 10～30ms
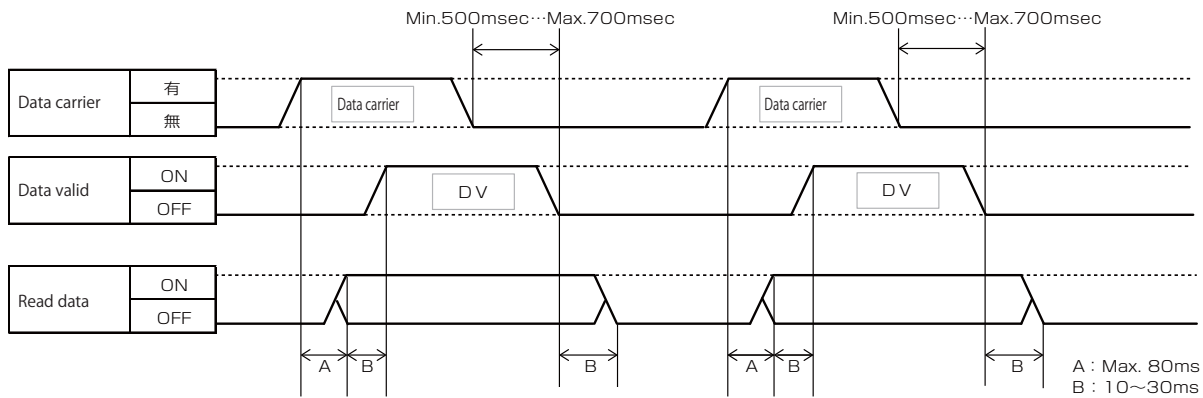
[Timing chart 2]
The reader unit outputs data of tag 2 as shown below when the Data carrier 2 enters the communicable area during the output data preservation period of the Data carrier 1.

Min.500msec ···Max.700msec   Min.500msec ···Max.700msec

A : Max.80ms
B : 10～30ms
B' : 130～150ms
C : Max.80ms

[Procedure for Communication]

(1)Reader reads the data of the Datacarrier Reading as soon as the Data carrere comes into the communication area of the reader and set the read data.

(2)The host computer should start reading from D0 to D7 of Reader after checking the data valid signal turns ON.

≪ Note ≫

If multiple Data carriers exist in the communication area of the ID antenna, data validity will not be turned ON.
When a data check error occurs, data valid (DV) remains OFF, and read data is not output.
In this condition,LED of data valid would be blinking (slow).

5. Error detection method

LED status		Description of the functions	Output signal
OFF	---	The Data carrier is not in the communication range.	Data valid：OFF
Blink	1 s interval	An error has occurred in the data check.	Data valid：OFF
	100 s interval	Any of those "ON" output signals that indicate Read data or Data valid is short circuit.	---
	4 s interval	The ID antenna is not connected. Please connect the ID antenna or check the wiring.	Data valid：OFF
	2 s interval	Communication between read/write head and ID reader unit is abnormal.	Data valid：OFF

The blinking interval is the interval of lighting / extinguishing time.
For 1 s interval, repeat 0.5 seconds lighting / 0.5 seconds off.

6. Input Signal (Device) Appropriate Data carrier and Read distance of bit Reader

Metal

C | B

A

Data carrier | Read/Write head
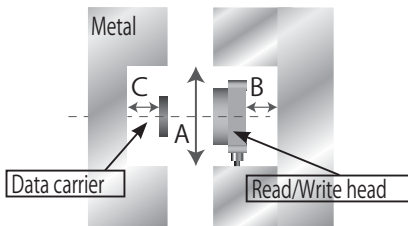
A distance of 200 mm or more is required between the tag and its surrounding A. (See below)

Nonmetallic attachment refers to a state in which the metal and the tag are installed with securing a certain distance (C) or more on the back side.

*If the surrounding metal specifications are not satisfied, the communication distance may be shortened. Please note that the degree of influence varies depending on the usage environment.

Metal mounting conditions of Z3 - A010 - CN are A ≧ 200 mm and B = 0 mm..

· Nonmetallic mounting conditions of Z3 - A010 - CN are A ≧ 200 mm and B ≧ 40 mm.

・Communication distance, axis offset value are all reference values.

Type code：Z1-CB16-112
size：φ 16 x 0.76 mm

Read/write head mounting condition		Non-metal mounting	Metal mounting
ID tag mounting condition		Non-metal mounting (A:200mm, B:60mm)	
Communication distance(mm)		0...44	0...40
Center offset (mm)	distance 0mm	± 26	± 25
	10mm	± 28	± 27
	20mm	± 30	± 28
	30mm	± 30	± 24
	40mm	± 25	± 10
	44mm	± 10	―

Type code：Z1-CB27-112
size：φ 27 x 0.76 mm

Read/write head mounting condition		Non-metal mounting	Metal mounting
ID tag mounting condition		Non-metal mounting (A:200mm, B:60mm)	
Communication distance(mm)		0...64	0...50
Center offset (mm)	distance 0mm	± 25	± 25
	10mm	± 28	± 27
	20mm	± 32	± 29
	30mm	± 36	± 29
	40mm	± 38	± 23
	50mm	± 36	± 10
	60mm	± 28	
	64mm	± 10	

Type code：Z1-CB45-112
size：φ 45 x 0.76 mm

Read/write head mounting condition		Non-metal mounting	Metal mounting
ID tag mounting condition		Non-metal mounting (A:200mm, B:60mm)	
Communication distance(mm)		0...88	0...80
Center offset (mm)	distance 0mm	± 32	± 32
	10mm	± 32	± 32
	20mm	± 37	± 37
	30mm	± 42	± 40
	40mm	± 47	± 42
	50mm	± 48	± 42
	60mm	± 47	± 39
	70mm	± 42	± 27
	80mm	± 30	± 10
	88mm	± 10	

Type name：Z1-AA04-02K
Size：30 x 30 x 6mm

Mounting conditions of Read/Write head		Non-metal mounting	Metal mounting
Mounting conditions of Data carrier		Non-metal mounting (C:60mm)	Non-metal mounting (C:60mm)
Communication distance (mm)		0 ～ 34	5 ～ 22
Center offset (mm)	Distance 0mm	± 26	-
	5mm	± 26	± 20
	10mm	± 26	± 20
	15mm	± 26	± 15
	20mm	± 24	± 5
	25mm	± 20	-
	30mm	± 10	-
	34mm	± 0	-

Type name：Z1-B011-128
Size：φ 50 x 8.3 mm

Mounting conditions of Read/Write head		Non-metal mounting	Metal mounting
Mounting Condition of Data carrier		Non-metal mounting (C:30mm)	Non-metal mounting (C:30mm)
Communication distance (mm)		0 ～ 54	0 ～ 45
Center offset (mm)	Distance 0mm	± 31	± 23
	10mm	± 36	± 25
	20mm	± 38	± 27
	30mm	± 36	± 25
	40mm	± 31	± 17
	50mm	± 20	-
	54mm	± 0	-