ZS-6222A Series
USB/DIO Adapter

instruction manual

2nd edition

◆ Contents ◆

1. Overview

The ZS-6222A is a unit that communicates digital I/O signals and USB.

By connecting to a Windows PC with a USB interface, various measuring instruments with BCD output or User-specific device control and data collection can be performed.
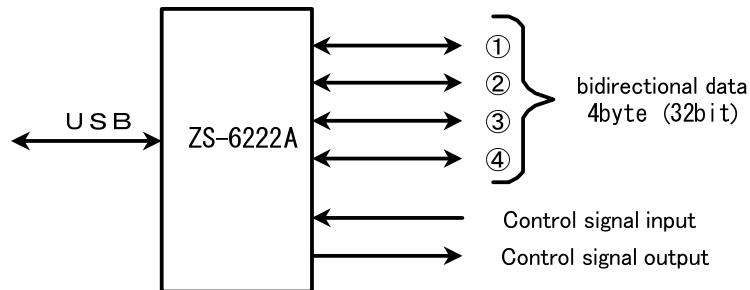
2. Features

① Measurement control can be easily performed from the USB port of a personal computer.
② There are 4 ports (8 bits/port) for digital I/O signals, each with input/output selection for each port.
③ In addition to data, a control line is provided to synchronize with an external device.

3. Specifications

3.1. Operating environment

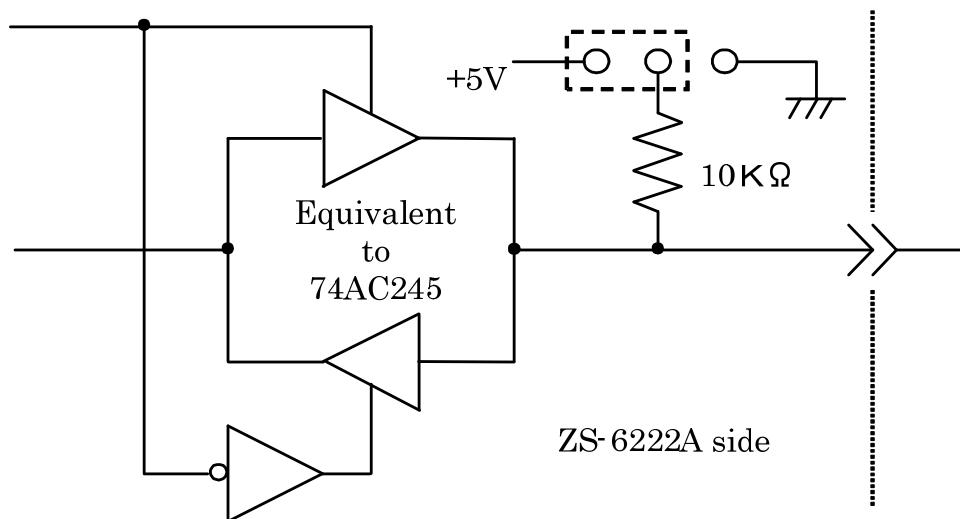➢ PC ：IBM PC/AT compatible machine (USB port required)
➢ OS ：Microsoft Windows 2000, XP, Vista, 7 , 8, 10, 11
　　　　：Linux
　　　　：Mac
　　　　* We have not confirmed the operation of Linux and Mac.

3.2. USB

USB 2.0 compliant (full speed compatible)

3.3. Digital I/O Port

➢ Number of ports : 4 ports (8 bits/port)
➢ Input/output level : Fan-in = 1
Fan-out = 10
Pull-up resistor 10KΩ (factory setting) Can also be set to pull-down

3.4. Product specifications

| Model	ZS-6222AP	ZS-6222AS
Features	Printed circuit board, embedded, low price	Small case, low price
Data connector	50-core flat cable	50-core flat cable
Power supply	DC4.75V to 5.25V 100mA or less	DC4.75V to 5.25V 100mA or less
Usage environment	Temperature 0°C to 50°C Humidity 85% max.	Temperature 0°C to 50°C Humidity 85% max.
Storage temperature	-20°C to 80°C	-20°C to 80°C
External dimensions	74 x 100 x about 20 (H)	80 x 110 x about 30 (H)
Accessories	data connector FAS-5001-2101-0BF (Yamaichi) DC power cable	data connector FAS-5001-2101-0BF (Yamaichi)

3.5. Appearance and dimensional drawing

・ZS-6222AP (PC board type)

・ZS-6222AS (small case type)

・Dimensional drawing

ZS-6222AP

ZS-6222AS
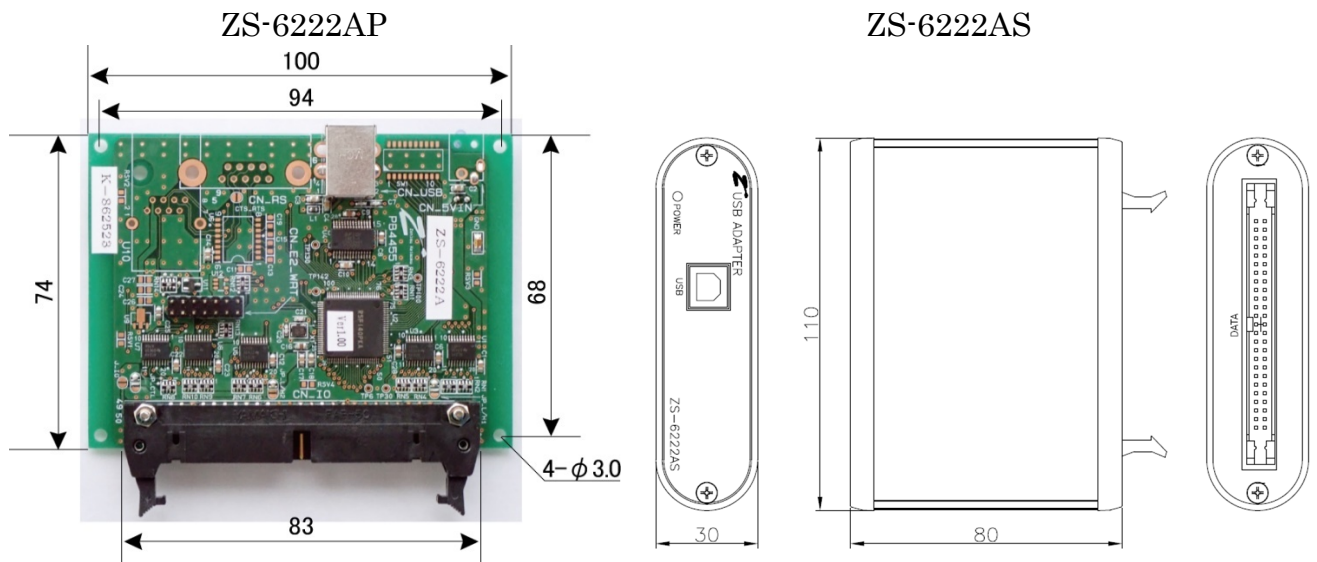
4. How to install

4.1.Installation on Windows 10/11

If you have Windows 10 / 11 installed and are connected to the Internet, the driver will be automatically downloaded and installed by simply connecting the instrument to your PC.

If the driver is not installed automatically, download the driver from our website and install it manually.

Please refer to "4.2. Installation on Windows 7 / 8" for the manual procedure.

Although some screens may be different, the overall process is the same.

4. 2 .Installation on Windows 7/8

To use this instrument in a Windows 7 / 8 environment, it is necessary to first install the hardware and device drivers according to the following procedure.

 ① Install the device driver on your PC

 ② Connect the instrument and the computer with a USB cable.

 ③ Installation completed (reboot in some cases)

The following is an explanation of how to install the device driver for the ①.

The following screenshots may differ in text display, etc., depending on the PC configuration and Windows version, but they are basically the same.

The following is an example on Windows 7.

When you start the device driver setup program "CDM212364_Setup.exe" downloaded from our website, the following screen will appear.

If the User Account Control screen appears, click "Yes" to proceed.
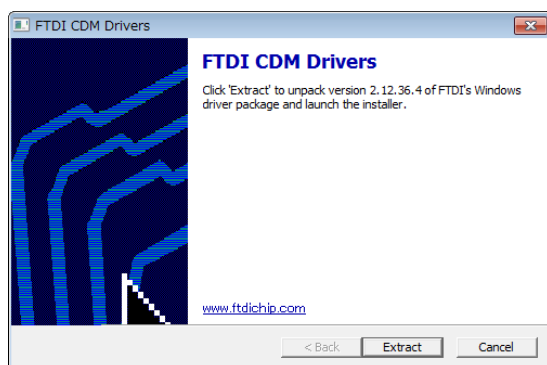
" Extract " button. ※The following screenshots are from the Japanese version.

Click the "Next" button.
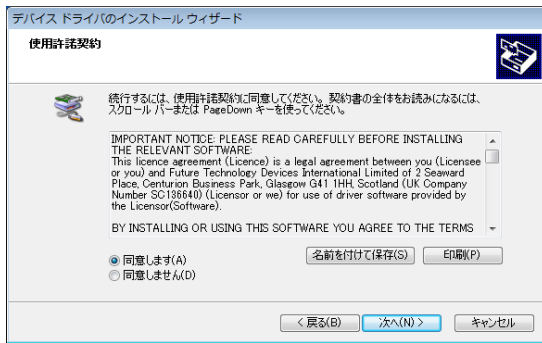
Check "I agree" and click the "Next" button.
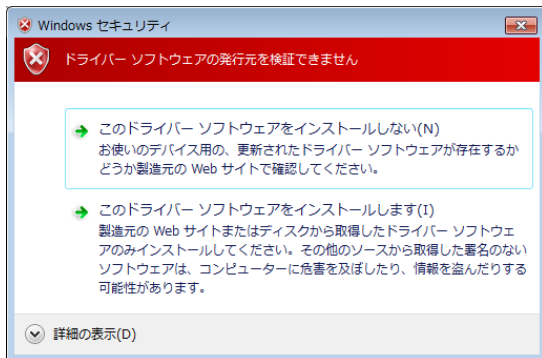
Depending on the version of Windows, this screen may be displayed, but click " Install this driver software anyway ".
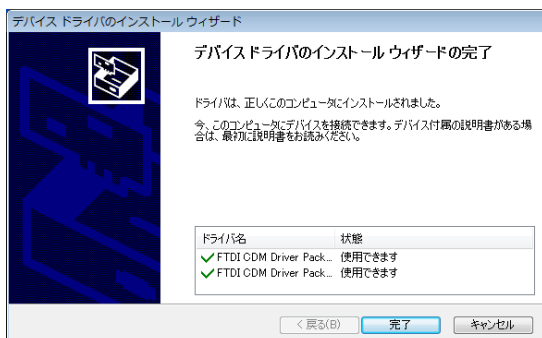
Device driver installation is complete. Click "Finish".

the installation method of the device driver, and when you connect the instrument and the computer with a USB cable, the setup will be completed automatically, and the COM port connection will be possible.
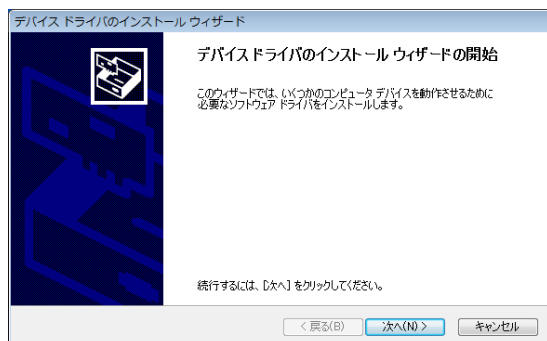
Depending on the configuration of your computer, you may be asked to restart. In that case, follow the on-screen instructions. Please reboot.

4. 3 .Installation on Windows Vista/ XP /2000

Windows Vista / XP / 2000 is installed, it is necessary to obtain an older version of the driver from FTDI 's HP and install it.

https://ftdichip.com/drivers/vcp-drivers/

the link " setup executable " in " comments " from the column of the target OS and download it.

Please refer to " 4.2.Installation on Windows 7/8 " for the procedure after downloading .

5. Operation

5.1.Transfer data method

① The ZS-6222A communicates via COM port. After installing the device driver, "USB Serial Port (COM x)" will appear in the "Ports (COM and LPT)" column of the device manager of each OS.

USB Serial Port (COM x)" in the "Port (COM and LPT)" column of the device manager of each OS. (x is a number. The value varies depending on the connection environment.)

When creating a program, open it according to the COM number displayed.

② Data code assignment table

ASCII code is used for data transfer, and one character is converted to 4-bit binary code.

| 4-bit binary					USB data
8	4	2	1		HEX
0	0	0	0		0
0	0	0	1		1
0	0	1	0		2
0	0	1	1		3
0	1	0	0		4
0	1	0	1		5
0	1	1	0		6
0	1	1	1		7
1	0	0	0		8
1	0	0	1		9
1	0	1	0		A
1	0	1	1		B
1	1	0	0		C
1	1	0	1		D
1	1	1	0		E
1	1	1	1		F

③ Data sent from a personal computer is transferred sequentially from the smallest port number set for output.

The port set for input also takes data sequentially from the smallest number and sends it to the personal computer.

Data for each port is set or read in 4-bit increments.

➢ Example: When ports 1 and 2 are set to input and ports 3 and 4 are set to output

Send to PC order to do	port data		Order of output to ZS-6222A ports	port data
1	D7 to D4 of port 1		1	D7 to D4 of port 3
2	D3 to D0 of port 1		2	D3 to D0 of port 3
3	D7 to D4 of port 2		3	D7 to D4 of port 4
4	D3 to D0 of port 2		4	D3 to D0 of port 4
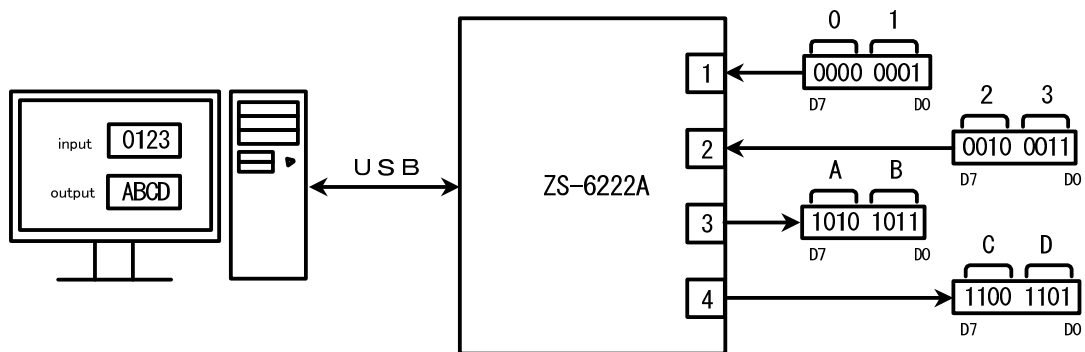
5.2. Control Signals

A control signal is provided to synchronize with the connected device.

Signal name	signal direction	explanation
STB	OUT	The adapter completes receiving all data from the PC and outputs a pulse signal after output to the port. External devices can use this signal for Latch-Clock or other purposes as needed.
TRG	OUT	Pulse signals are output to external devices by the "T" command.
CLR	OUT	Pulse signals are output to external devices by the "C" command. This can be used to reset external devices.
LAH	IN	When the latch circuit is enabled (set by "L" command), input data is latched with this signal. Input a signal with a pulse width of 500us or more.

Note) Output pulse width can be set by command.

The pulse widths that can be set are 10µs, 100µs, 1ms, 10ms, and 100ms.

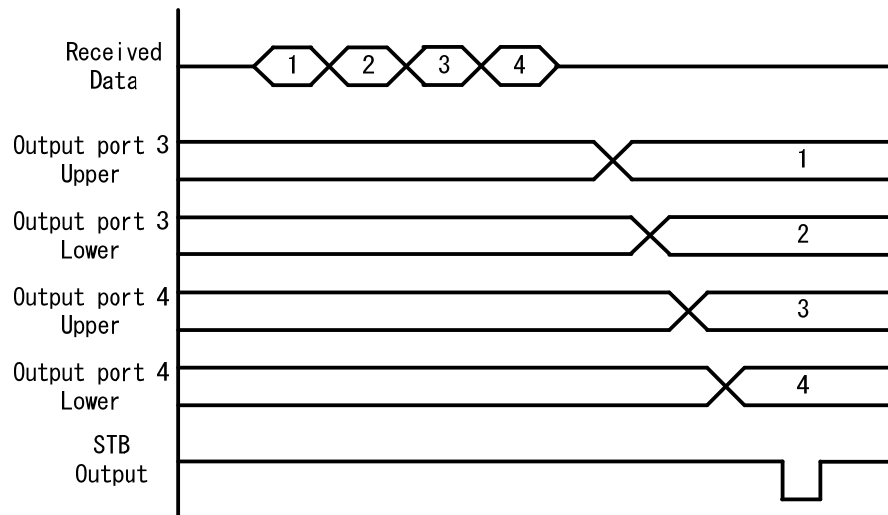## 5.3. Input/output operation
① Output data from PC to port
  ➢ continuous output

  After receiving the data from the PC, send the data to the port set for output.

  Set data in 4-bit units (in the order of high order and low order).

  After setting the data to the output port, the STB pulse is output.

  Note) If more data than the output port setting is sent, the extra data will be discarded.

  If less data than the output port setting is sent, the previously sent data will remain in the missing area.

```
Received
Data        < 1 >< 2 >< 3 >< 4 >

Output port 3
Upper                              X        1

Output port 3
Lower                               X        2

Output port 4
Upper                                X        3

Output port 4
Lower                                 X        4

STB
Output                                    |_|
```

  ➢ pulse output

  After receiving the data from the PC, send the data to the port set for output.

  Set data in 4-bit units (in the order of high order and low order).

  Output port data is output only for the specified pulse width.

② Send data input from port to PC
  ➢ No latch

  When the ZS-6222A receives an "R" command from the PC, it takes data from the input port at that time (in the order of upper and lower) and sends it to the PC.

  ➢ with latch

  Data from the input port is captured when the LAH input is Low.

  When the ZS-6222A receives the "R" command from the PC, it sends the data to the PC when it is captured as described above.

```
Input Port        < ABCD >

LAH Input    ‾‾‾‾|_|‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾‾
                 500us or
                  more

Recived Data               < R >

Send Data                      < A >< B >< C >< D >
```
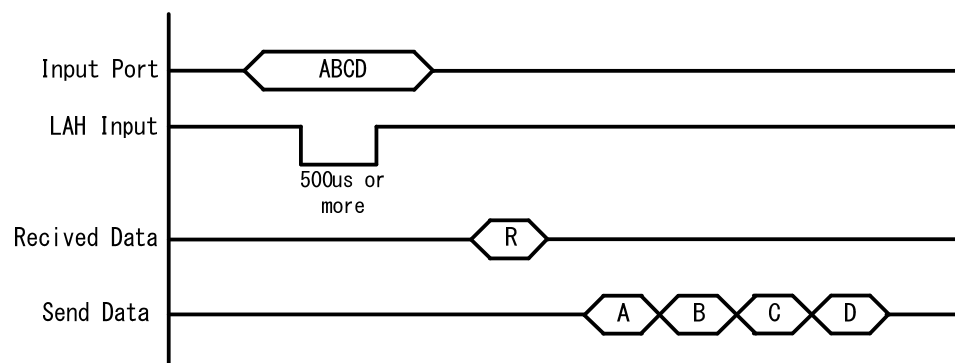
5.4. Command list

The ZS-6222A recognizes the first byte of data as a control command and controls it.

Also, be sure to add a delimiter (CR+LF) at the end of the data string before sending.

If there is a character string other than the command at the beginning of the data, NG will be sent as the return value.

The commands are as follows.

command	function
R	Reads data from all ports set as inputs
W	Writes data to a port set to output
T	Output pulse from TRG signal
C	Output pulse from CLR signal
D	Configure port input/output settings
P	Sets the pulse width of the control signal
L	Sets the presence or absence of the latch circuit
U	Set the output signal
B	Sets the positive/negative logic of the port
I	Reads data from all ports regardless of input/output settings

※ The I command was added in Ver. 2.00.

5.4.1. R command

➢ function

Data is read from all ports that are set as inputs. For example, if 4 input ports are set, the "R" command will send 8 bytes of data from the ZS-6222A.

➢ format

R CR LF

➢ return value

xxxx･･･CR LF : The number of data set in the input port is sent.

x is an ASCII code from 0 to F

NG CR LF : No input port

5.4.2. W command

➢ function

Data is written to the ports set for output.

For example, if four output ports are set, the "W" command is followed by 8 bytes of data to be sent to the ZS-6222A.

If less than 8 bytes of data is sent, the amount of data sent will be newly changed, and the previous data will be retained in the missing parts.

➢ format

Wxxxx･･･CR LF : Write the data to be output to the output port after "W"

x is an ASCII code from 0 to F

➢ return value

OK CR LF : Completion of data output to the output port

NG CR LF : No output port, wrong data character error

5.4.3. T command

➢ function

Output a pulse to the control signal "TRG"

➢ format

T CR LF

➢ return value

OK CR LF　　　　：Pulse output complete

NG CR LF　　　　：Pulse output error

5.4.4. C command

➢ function

Output a pulse to the control signal "CLR"

➢ format

C CR LF

➢ return value

OK CR LF　　　　：Pulse output complete

NG CR LF　　　　：Pulse output error

5.4.5. D command

➢ function

Input/output settings for the four ports.

When the ZS-6222A is powered on, all are set to input.

➢ format

I CR LF

➢ return value

OK CR LF　　　　：Setting completed

NG CR LF　　　　：Input/output setting error, setting character error

5.4.6. P command

➢ function

The pulse widths of the control signals "STB," "TRG," and "CLR" and the pulse width
at data output can be set from one of five types: 10μs, 100μs, 1ms, 10ms, and 100ms.
When the ZS-6222A is powered on, it is set to 10μs.

➢ format

Px CR LF　　　　：x is a number. The number assignment is as follows.

0...10 μs, 1...100 μs, 2...1 ms

3...10ms, 4...100ms

➢ return value

OK CR LF　　　　：Setting complete

NG CR LF　　　　：Setting error, wrong setting error

5.4.7. L command

➢ function

It can be set with or without latch circuit at the time of data input.

When the ZS-6222A is powered on, it is set to no latch circuit.

➢ format

Lx CR LF ：x is a number, "0" if no, "1" if yes.

➢ return value

OK CR LF ：Setting complete

NG CR LF ：Setting error, wrong setting error

5.4.8. U command

➢ function

This is used to set the signal setting for data output.

When the ZS-6222A is turned on, it is set to continuous output.

The pulse width at the time of pulse output is set by the P command.

➢ format

Ux CR LF ：x is a number, "0" for continuous output and "1" for pulse output.

➢ return value

OK CR LF ：Setting complete

NG CR LF ：Setting error, wrong setting error

5.4.9. B Command

➢ function

Positive and negative logic settings for the four ports.

When the ZS-6222A is powered on, all are set to positive logic.

This command should be performed when the ports are set to input.

➢ format

Bx CR LF ：x is a number, "0" for positive logic and "1" for negative logic.

➢ return value

OK CR LF ：Setting complete

NG CR LF ：Setting error, wrong setting error

5.4.10. I Command

➢ function

Data is read from all ports regardless of input/output settings.

Data is read from ports that are set to output, regardless of the input/output settings.

When the "I" command is issued, 8 bytes of data are sent from the ZS-6222A.

➢ format

I CR LF

➢ return value

xxxxxxxxCR LF ：Data (8 bytes) for all 4 ports is sent.

x is an ASCII code from 0 to F

6. Connector table

Data connector (used connector FAP-5001-1202-0BF (Yamaichi))

DATA (CN1)

I/O	SIGNAL	PIN		SIGNAL	I/O
PORT ①	D0	1	2	D0	PORT ②
	D1	3	4	D1	
	D2	5	6	D2	
	D3	7	8	D3	
	D4	9	10	D4	
	D5	11	12	D5	
	D6	13	14	D6	
	D7	15	16	D7	
PORT ③	D0	17	18	D0	PORT ④
	D1	19	20	D1	
	D2	21	22	D2	
	D3	23	24	D3	
	D4	25	26	D4	
	D5	27	28	D5	
	D6	29	30	D6	
	D7	31	32	D7	
IN	LAH	33	34	+5V	
OUT	STBs	35	36	+5V	
OUT	TRG	37	38	+5V	
OUT	CLR	39	40	+5V	
	(NC)	41	42	GND	
	(NC)	43	44	GND	
	(NC)	45	46	GND	
	(NC)	47	48	GND	
	(NC)	49	50	GND	

Note) PIN 34, 36, 38, and 40 are (NC) in the former model ZS-6222 and +5V in the ZS-6222A.

Note) I/O indicates the direction between signals between the ZS-6222A adapter and the digital I/O signal input/output device.

    IN   : ZS-6222A ← External device

    OUT : ZS-6222A → external device

    PORT : Bi-directional data bus.

        You can switch IN/OUT by D command setting

7. Warranty

① Although Minebea's products are delivered under strict quality control and inspection, in the unlikely event of a malfunction, we will repair the product free of charge only under the following conditions.

➢ If the product malfunctions during the warranty period (one year from the date of purchase) under normal conditions of use in accordance with the instruction manual and other notes.

② In the following cases, the product will be repaired for a fee even during the warranty period.

➢ Malfunction or damage caused by improper use or carelessness
➢ Malfunction or damage caused by improper repair or modification
➢ Malfunction or damage caused by fire, earthquake, other natural disasters, earthquakes, or external factors such as abnormal voltage damage
➢ Replacement of consumable parts
➢ Change of power supply or voltage