User's Manual

GP-IB Adapter

ZS-6120C Series

ZS-6120CP

ZS-6120CH

Zenisu Keisoku

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Introduction

Thank you for purchasing our product.

Before using the product, please read carefully and use it correctly.

If you have any questions, unclear points, requests for specification change according to the specific application, please contact below.

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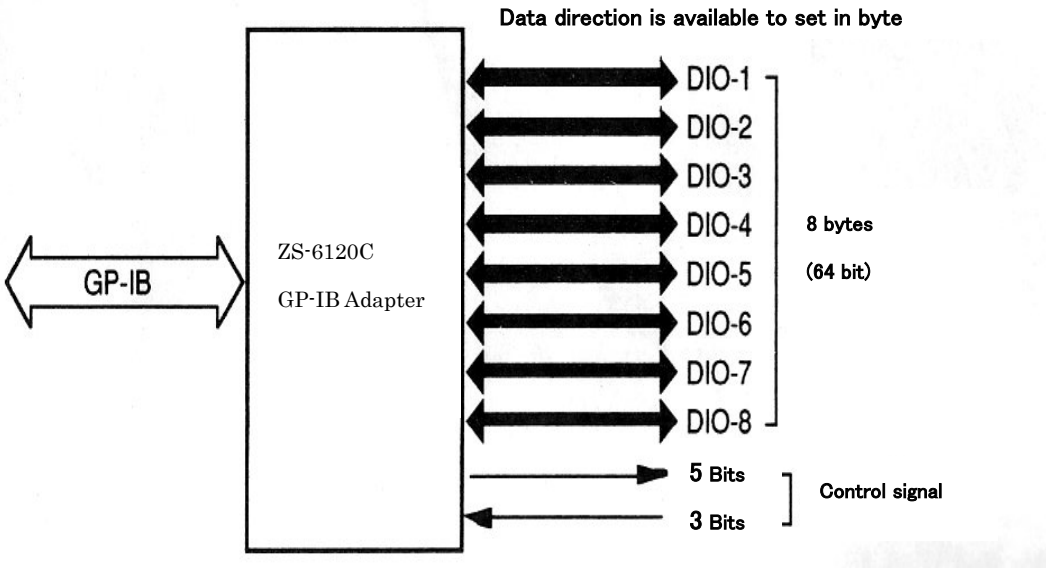
Outline

ZS-6120C is available to convert up to 8 bytes(64bits) of parallel input/output signals to GP-IB interface. Using this product, GP-IB function can be provided even for measuring instruments without GP-IB function.



There are two types of products as follows.

1. ZS-6120CP
2. ZS-6120CH

Features

1. This product has both input and output functions.
2. This product is available to connect up to 8 bytes of input/output data (16digits in BCD)
3. This product is available to correspond to BCD, HEX, and binary.
4. Data transfer is available to be processing in units of bit, 4 bits, byte.
5. This product is available to switch positive and negative logic of I/O signal by DIP switch.
6. In 3 types of operation mode, it is available to transfer and control various data.
7. Using control signal, it is available to synchronize with input/output devices.
8. The setting of delimiter is available to be seven different combinations with the DIP switch.

Warning!

1. This product has two types of input power outlet which are DC 5V and AC 85 to 132V. Be sure to read user's manual carefully before connecting with power outlet.
2. Product specifications and appearance may be changed without notice for improvement.
3. We are not responsible for any damage or secondary damage resulting from the use of our product caused by not written on the document.
4. Nopart or whole of this manual may be reproduced without permission. The contens of this manual are subject to change without notice.

Contents

1. Preparation

1-1 Packing contents

ZS-6120CP

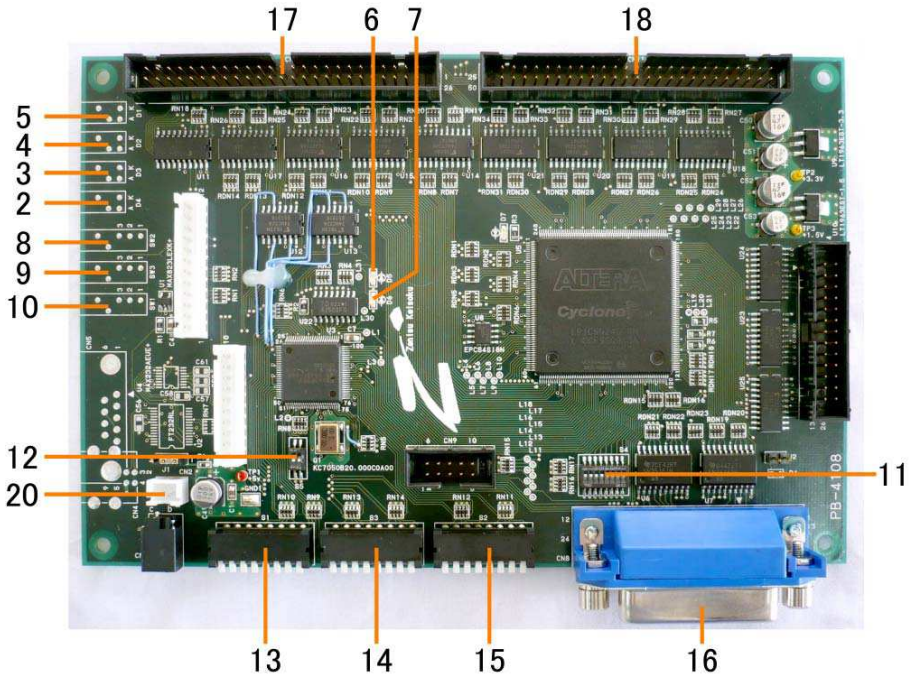
Main unit (printed circuit board type) :1
Data input/output connector (FAS-5001-2101-0BF) :2
Power cable 60cm :1
Rubber foot for mounting :4
User's manual CD :1
Warranty :1

ZS-6120CH

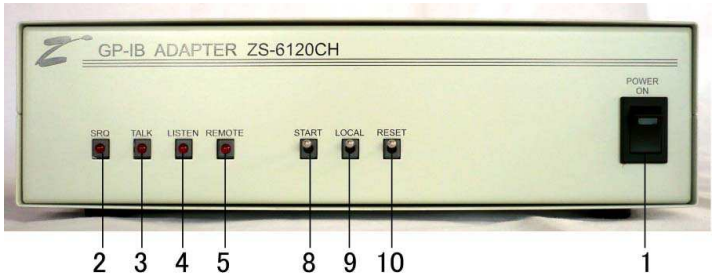
Main unit :1
Power cable :1
Data input/output connector (model: 57-30500) :2
3P-2P AC conversion plug :1
User's manual CD:1
Warranty :1

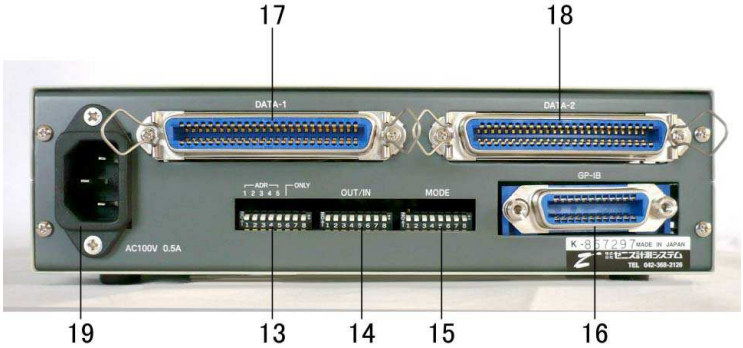
1-2 Name of each part and function

ZS-6120CP



ZS-6120CH





1. POWER switch

Power ON/OFF switch

the switch lamp lit on when the power is on.

2. SRQ lamp

The lamp lit on when a service request signal is generated and lit off after the serial poling of the controller is completed.

3. TALK lamp

The lamp lit on when it is specified as talker or talk only.

4. LISTEN lamp

The lamp lit on when it is specified as listener or listen only.

5. REMOTE lamp

The lamp lit on when it is remote status.

6. ERROR lamp 1

The lamp lit on when it receives a command not defined by GP-IB.

7. ERROR lamp 2

When the adapter becomes a talker and transmits data, it lit on when there is no equipment specified as a listener.

8. START switch

Depend on the operation mode, operations are performed as follow.

MODE O: SRQ signal generate

MODE 1: Talker's GP-IB handshake starts

MODE 2: SRQ signal generate

9. LOCAL switch

Switch is ON, the remote signal will be local state. This switch is disabled in the state of local lockout.

10. RESET switch

Set the ZS-6120C to initial state.

Capture the data of the DIP switch.

Subsequent operation is performed according to the data of the DIP switch that was acquired at this time.

Set all data of output port to "H" or "L" level.

Positive logic output: "L" level

Negative logic output: "H" level

It is disable to the mode by the control command.

11. DSW-1 switch

Set the positive/negative logic of control signal.

12. DSW-2 switch

It is used to extend the function.

13. ADR switch

Set the GP-IB address.

14. OUT/IN switch

Set the input and output of the I/O port(8bytes) in byte units.

15. MODE switch

Set the type of delimiter, 4/8mode, input and output of positive/negative logic, type of operation mode.

16. GP-IB connector

It is connector for GP-IB cable.

17. DATA-1 connector

It is a connector to parallel input/output equipment.

18. DATA-2 connector

It is a connector to parallel input/output equipment.

19. Power connector

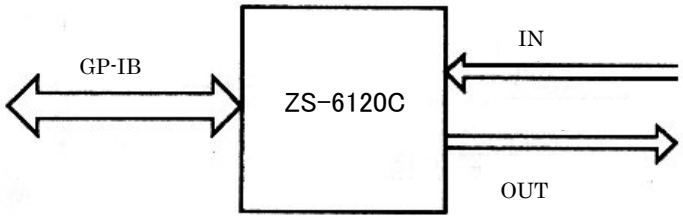
Input voltage AC85 to 132V

20. Power connector

Input voltage DC5V 1.3A

1-3 Specifications

The input(IN) and output(OUT) in this manual are as shown below.

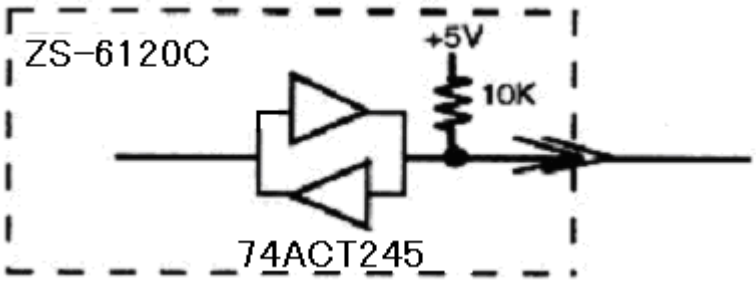


(1) GP-IB Standard: Compliant with IEEE-STD 488-1978

(2) Interface function : SH1、AH1、T5、TE0、L3、LE0、SR1、DT1、RL1、PP0、DC1、C0

(3) Input and output data: MAX 8 byte (64 bit)

(4) Input/output interface circuit



Fan-out TTL 10

Fan-in TTL 1

(5) The input adapter as a talker reads the parallel signal of the input/output device and transfers the data to listener of other GP-IB equipment or controller.
MAX data: 8byte

(6) The output adapter as a listener outputs the data received from the GP-IB equipment as a parallel signal to input/output device.
MAX data: (8byte) - (input data byte)

(7) Input power source
ZS-6120CP: DC5V 0.3A
ZS-6120CH: AC85 to 132V、20VA、50/60Hz

(8) Operation temperature: 0℃ to 45℃

(9) Dimensions
ZS-6120CP 120mm(W) x 180mm(H) x 30mm(D) or less (H)
ZS-6120CH 215mm(W) x 60mm(H) x 252mm(D)

Note) Without protrusions of switch and connectors.

1-4 Connecting for data input/output connector pin

1-4-1 ZS-6120CP ADAPTER

Connector Model: FAP-5001-1204-0BF

DATA1 (Connector J1)

OUT/IN	SIGNAL	PIN		SIGNAL	OUT/IN
	D1	1	2	D1	
	D2	3	4	D2	
	D3	5	6	D3	
OUT/IN	D4	7	8	D4	OUT/IN
①	D5	9	10	D5	②
	D6	11	12	D6	
	D7	13	14	D7	
	D8	15	16	D8	
	D1	17	18	D1	
	D2	19	20	D2	
	D3	21	22	D3	
OUT/IN	D4	23	24	D4	OUT/IN
③	D5	25	26	D5	④
	D6	27	28	D6	
	D7	29	30	D7	
	D8	31	32	D8	
IN	LOCAL	33	34	+V5	OUT
OUT	REMOTE	35	36	+V5	OUT
OUT	IN READY	37	38	+V5	OUT
IN	OUT READY	39	40	+V5	OUT
OUT	OUT STROBE	41	42	GND	
IN	START	43	44	GND	
OUT	TRIGGER	45	46	GND	
OUT	CLEAR	47	48	GND	
	NC	49	50	GND	

DATA2 (Connector J2)

OUT/IN	SIGNAL	PIN		SIGNAL	OUT/IN
	D1	1	2	D1	
	D2	3	4	D2	
	D3	5	6	D3	
OUT/IN	D4	7	8	D4	OUT/IN
⑤	D5	9	10	D5	⑥
	D6	11	12	D6	
	D7	13	14	D7	
	D8	15	16	D8	
	D1	17	18	D1	
	D2	19	20	D2	
	D3	21	22	D3	
OUT/IN	D4	23	24	D4	OUT/IN
⑦	D5	25	26	D5	⑧
	D6	27	28	D6	
	D7	29	30	D7	
	D8	31	32	D8	
IN	LOCAL	33	34	+V5	OUT
OUT	REMOTE	35	36	+V5	OUT
OUT	IN READY	37	38	+V5	OUT
IN	OUT READY	39	40	+V5	OUT
OUT	OUT STROBE	41	42	GND	
IN	START	43	44	GND	
OUT	TRIGGER	45	46	GND	
OUT	CLEAR	47	48	GND	
	NC	49	50	GND	

Note) The control signals are the same for DATA1 and DATA2. Multi-wiring is done internally.

Note) The OUT/IN line indicates the direction of the signal between the adapter and the input/output device.

Note) In the OUT/IN line, the numbers in the circle represent their I/O port numbers.

1-4-2 ZS-6120CH ADPTER

Connecter Model: 57-40500

DATA1

OUT/IN	SIGNAL	PIN		SIGNAL	OUT/IN
	D1	1	26	D1	
	D2	2	27	D2	
	D3	3	28	D3	
OUT/IN	D4	4	29	D4	OUT/IN
①	D5	5	30	D5	②
	D6	6	31	D6	
	D7	7	32	D7	
	D8	8	33	D8	
	D1	9	34	D1	
	D2	10	35	D2	
	D3	11	36	D3	
OUT/IN	D4	12	37	D4	OUT/IN
③	D5	13	38	D5	④
	D6	14	39	D6	
	D7	15	40	D7	
	D8	16	41	D8	
IN	LOCAL	17	42	+V5	OUT
OUT	REMOTE	18	43	+V5	OUT
OUT	IN READY	19	44	+V5	OUT
IN	OUT READY	20	45	+V5	OUT
OUT	OUT STROBE	21	46	GND	
IN	START	22	47	GND	
OUT	TRIGGER	23	48	GND	
OUT	CLEAR	24	49	GND	
	NC	25	50	GND	

DATA2

OUT/IN	SIGNAL	PIN		SIGNAL	OUT/IN
	D1	1	26	D1	
	D2	2	27	D2	
	D3	3	28	D3	
OUT/IN	D4	4	29	D4	OUT/IN
⑤	D5	5	30	D5	⑥
	D6	6	31	D6	
	D7	7	32	D7	
	D8	8	33	D8	
	D1	9	34	D1	
	D2	10	35	D2	
	D3	11	36	D3	
OUT/IN	D4	12	37	D4	OUT/IN
⑦	D5	13	38	D5	⑧
	D6	14	39	D6	
	D7	15	40	D7	
	D8	16	41	D8	
IN	LOCAL	17	42	+V5	OUT
OUT	REMOTE	18	43	+V5	OUT
OUT	IN READY	19	44	+V5	OUT
IN	OUT READY	20	45	+V5	OUT
OUT	OUT STROBE	21	46	GND	
IN	START	22	47	GND	
OUT	TRIGGER	23	48	GND	
OUT	CLEAR	24	49	GND	
	NC	25	50	GND	

Caution: When supplying +5V power supply from the adapter to built-in expansion unit or external additional circuit, its current capacity should be 0.5A or less.

Note) The control signals are the same for DATA1 and DATA2. Multi-wiring is done internally.

Note) The OUT/IN line indicates the direction of the signal between the adapter and the input/output device.

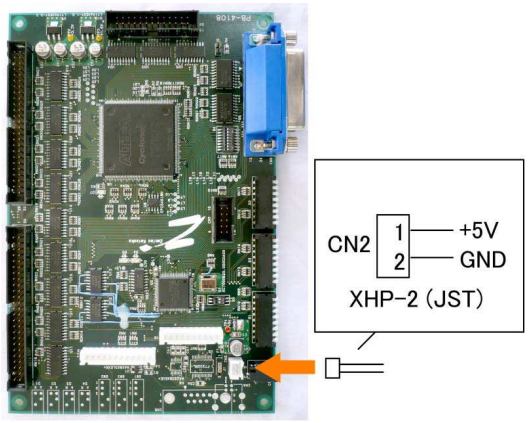
Note) In the OUT/IN line, the numbers in the circle represent their I/O port numbers.

1-5 Connecting input power source

Caution: Be sure to turn off the power switch before connecting power source.

1-5-1 ZS-6120CP

Caution: Please use DC 5V power supply voltage and 0.3A or more current capacity for this device.



1-5-2 ZS-6120CH

Caution: Please use AC85 to 132 V power supply voltage for this device.

Connecting the power cable
(AC85 to 132V)

2.Setting for functions

2-1 Setting DIP SWITCH

2-1-1 Connecting input/output equipment

Depending on the setting of DIP switch, ZS-6120C is available to connect with various input/output equipment.

Depending on the input/output device to be connected, please fill in the number and mark in the check items based on the following table and confirm.

No	Subjects	Check	Setting switch	Page of reference
1	Input data unit (input/output device → GP-IB)	( )byte	OUT/IN Switch (MODE 2 ≦ 7byte)	14
2	Output data unit (GP-IB → input/output device)	( )byte		
3	Input data + output data ≦ byte	YES / NO		
4	Positive/Negative logic For input data	P / N	MODE Switch 5	15
5	Positive / Negative logic For output data	P / N	MODE Switch 6	15
6	Data unit (4bit /8bit mode)	4 / 8	MODE Switch 4	15
7	Data code(BCD/HEX)	BCD / HEX	ADR Switch 8	14
8	Delimiter	CR LF EOI	MODE Switch 1 to 3	15
9	Operation mode	0 1 2	MODE Switch 7,8	15
10	Addressing method	ONLY / ADR	ADR Switch 6	14
11	Only talk or Only listen	Talk / Listen	ADR Switch 5	14
12	Setting address (In case of ADR method)	ADR No( )	ADR Switch 1 to 5	14
13	Positive/Negative logic Of control signal	P / N	DSW-1 Switch 1 to 7	16

2-1-2 How to set DIP switch

Caution: Be sure to turn off the power switch before connecting power source.

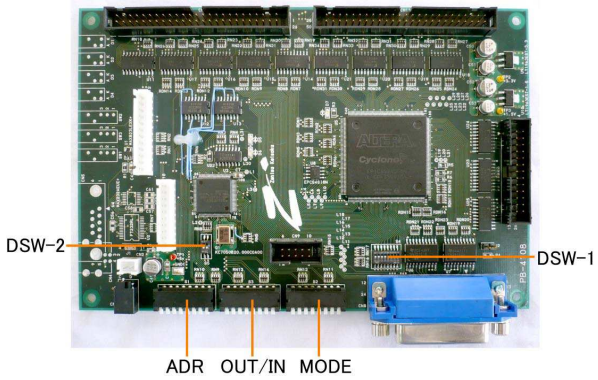
(1) Make sure to set each DIP switch according to the specifications of input/output equipment. Please confirm the function of each switch after 2-1-3.

(2) After changing the setting of DIP switch, be sure to press the REST switch or turn on the power again.

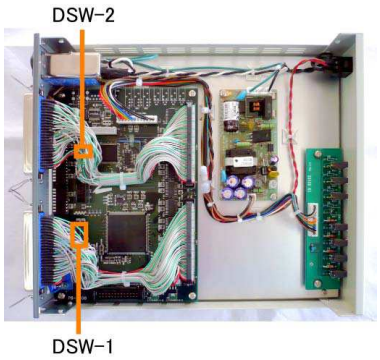
In case of setting DSW-1 and DSW-2 switches, follow the procedure below.

●ZS-6120CP

Each DIP switch is installed as shown below.



●ZS-6120CH



(1) Remove 4 left and right screws fastening the top cover.

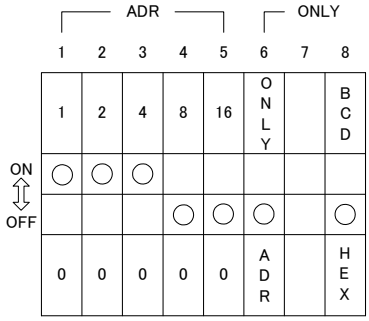
(2) Lift the top cover and remove it.

(3) Set the DIP switches DSW-1 and DSW-2.

Note) Be careful that ZS-6120CH has a switch under the cable.

2-1-3 Function of the DIP switch

2-1-3-1 ADR SWITCH



Initial setting

Switch No	Name	Function
1 2 3 4 5	ADR-1 ADR-2 ADR-3 ADR-4 ADR-5	Set the GP-IB address. Address 31 is prohibited. When switch No.6 is ON the function of ADR-5 is as follows. ON: Talk only, OFF: Listen only
6	ONLY/ADR	Set whether to only mode or address mode.
7		Option (corresponds to custom specification)
8	BCD/HEX	Set the data code. This switch is disable when the 4/8 mode of the MODE switch is set to 8bit mode. Please confirm " 3-3 switch between BCD and HEX" in "Data transfer method".

Caution) In the only mode, in a system that does not include a controller(computer), the data sending side(talker) and the data receiving side(listener) are fixed and used in a one-to-one connection.

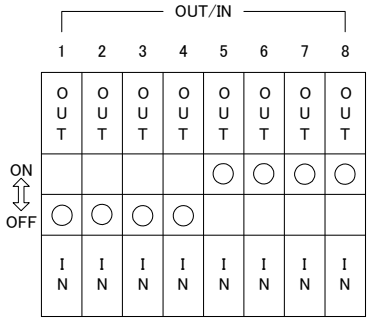
2-1-3-2 OUT/IN SWITCH

This switch sets 8bytes of I/O port as input or output in bytes units.

In case of DIP switch ON (upper side) is output port.

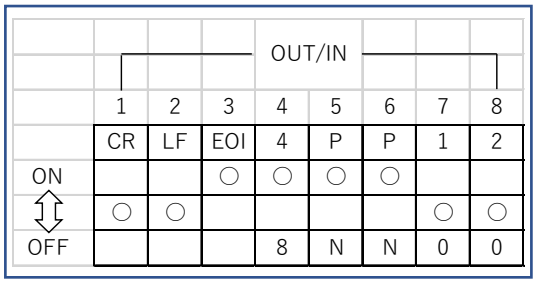
In case of DIP switch OFF (down side) is input port.

Note) When using mode2, #8 must be OFF (down side).



Initial setting

2-1-3-3 MODE SWITCH



* Table 1

D8	D7	D6	D5	D4	D3	D2	D1
0	0	1	1	1	0	0	1

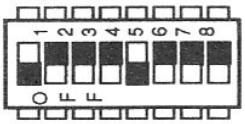
Initial setting

Switch No	Name	Function
1	Delimiter CR	It is possible to be seven combinations by ON/OFF of 3bit switch.
2	Delimiter LF	
3	Delimiter EOI	When the adapter is in talker operation, it adds the delimiter code set at the end of the transmission data and transfers data to another GP-IB device. In the listener operation of the adapter, receive data is set to output port as the end of the data string when the delimiter code is received. In operation mode 0 to 2, the received delimiter code is not output. Ex) When No1 and No2 are ON, it becomes CR,FL.
4	4/8 mode	4bit mode is used when the data format of input/output device is BCD or HEX code. When the adapter is in talker, the input BCD or HEX code is converted to the ASCII code which is corresponding to the 4bit arrangement and transferred to the GP-IB device. Please confirm “3-3 Switch between BCD and HEX”. When the adapter is listener, it converts the ASCII code of BCD or HEX from the GP-IB device into the 4bit bit array and outputs it to the output port. In 8bit mode, the data received from GP-IB is directly set to the output port and the data of input port is transferred to GP-IB as it is. Example) When “9” is received as ASCII code, it is set to output port like a “Table 1” above. Note) When the data is binary code, use it in 8bit mode and set the delimiter to EOI.
5	Input P/N	Set the positive/negative logic of the input signal.
6	Output P/N	Set the positive/negative logic of the output signal.
7 8	Mode switch 1 Mode switch 2	It is possible to set three type of operation mode by turning ON/OFF of 2bit switch. Please confirm “2-2 Setting the operation mode”. Note) Both switch “ON” setting is prohibited.

2-1-3-4 DSW-1 SWITCH

This switch is possible to switch positive/negative logic of the control signal.

For each explanation of each signal, please confirm “2-2 setting for operation mode” and “3-4 control signal”.



■ is SW position

DSW-1 Switch No	Signal name	Direction	Signal type	DSW-1 switch		Initial setting
				ON	OFF	
1	OUT READY	IN	Level	LOW ACTIVE	HIGH ACTIVE	OFF
2	OUT STROBE	OUT	100μs	LOW ACTIVE	HIGH ACTIVE	ON
3	REMOTE	OUT	Level	LOW ACTIVE	HIGH ACTIVE	ON
4	CLEAR	OUT	100μs	LOW ACTIVE	HIGH ACTIVE	ON
5	IN READY	OUT	Level	LOW ACTIVE	HIGH ACTIVE	OFF
6	TRIGGER	OUT	100μs	LOW ACTIVE	HIGH ACTIVE	ON
7	START	IN	>30μs	LOW ACTIVE	HIGH ACTIVE	ON
8		-	-	-	-	-

Note) Signal type indicates the type of I/O signal whether it is “pulse or level”.

Level: input and output by level signal

100μs : output by pulse signal about 100μs width

>30μs : input by pulse signal 30μs width or more

Note) ”DSW-1 switch ON/OFF” indicates the logic when the signal is valid.

2-2 Setting for operation mode

It is possible to set three type of operation mode by 7and 8 of MODE switch.

Note) Both switch “ON” setting is prohibited.

Operation List

MODE	MODE switch		MLA	MTA	ONLY		START signal		OUT STROBE
	7	8			LISTEN	TALK	SRQ	IN START	
0	OFF	OFF	○	○	○	x	○	x	○
1	ON	OFF	○	○	x	○	x	○	○
2	OFF	ON	○	○	x	x	○	x	○

Note) MLA: My Listen Address which is specified as a listener.

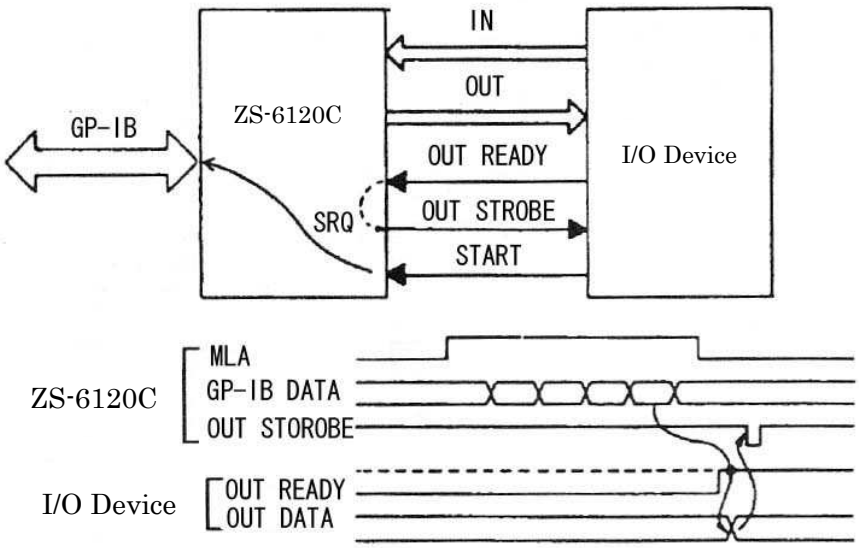
Note) MTA: My Talk Address which is specified as a talker.

2-2-1 Mode 0

Use this mode when you do not need to synchronize data transfer between adapter and I/O device. Ex) Relay ON/OFF control, indicator light control, reading switch status etc...

There is a function to generate the SRQ signal and handle it. However, the status byte is fixed as follows.

D8	D7	D6	D5	D4	D3	D2	D1
0	RQS	0	0	0	0	0	0



OUT STROBE : In case of LOW ACTIVE

OUT READY : In case of HIGH ACTIVE

2-2-1-1 Talker operation

When the adapter is specified as a talker, it reads the data of the port set as input and transfers the data to listener of another GP-IB device or controller.

2-2-1-2 Listener operation

When the adapter is specified as a listener and the OUT READY signal is active after receiving all data (receiving the delimiter signal), it outputs the received data and the OUT STROBE signal.

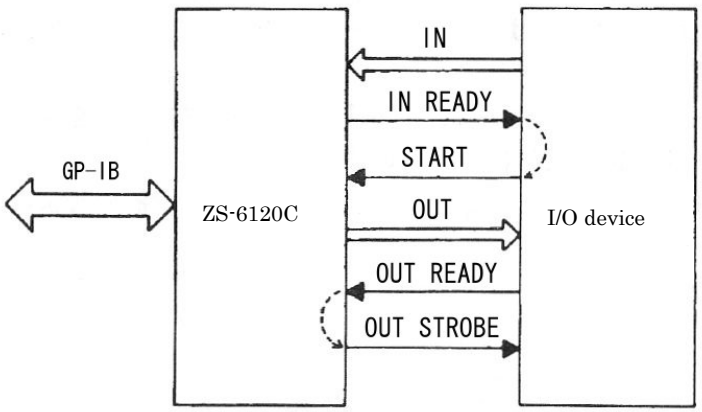
Data is set to the output port based on the transfer method. Please confirm “3-2 data transfer method”.

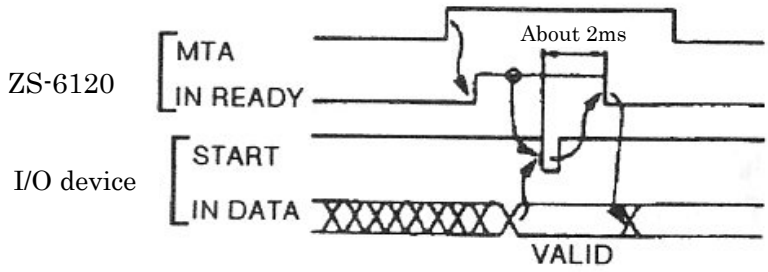
If the No1 switch of DSW-1 is turned off and it is not connected, the OUT READY signal becomes active and received data is immediately set to the output port.

In case of receiving data more than output port, the data on the delimiter side will be lost.

2-2-2 Mode 1

The data transfer between the adapter and the I/O device is operated in synchronism with each other.





IN READY : In case of HIGH ACTIVE
START : In case of LOW ACTIVE

2-2-2-1 Talker operation

When the adapter is designated as talker, "IN READY" signal will be active.

The input/output device should send a "START" puls signal to the adapter when it is received the "IN READY" signal.

The adapter reads the data of I/O device by the "START" signal and transfers the data to listener or controller of another GP-IB device.

When the adapter is in talk-only operation, it will immediately transfer data to listen-only GP-IB device by receiving "START" signal.

2-2-2-2 Listener operation

It is the same as the listener operation mode 2-2-1-2 in mode 0.

2-2-3 Mode 2

There are functions to generate SRQ signal and to perform processing serial poll.

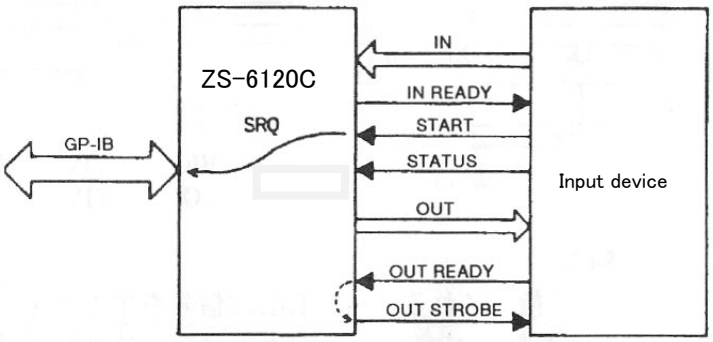
The SRQ signal is generated by the START signal from the input/output device.

The GP-IB controller performs serial polling and checks the device that sent SRQ signal and its status.

Since the D7 bit is SRQ signal, please use 7bits except the D7 bit for status (S1 to S7).

Note) In this mode, 8 of the OUT/IN switch must be set to IN.

D8	D7	D6	D5	D4	D3	D2	D1
S7	SRQ	S6	S5	S4	S3	S2	S1



2-2-3-1 Talker operation

When the adapter designated as a talker, it reads the data of input/output device and transfers the data to the listener or controller of another GP-IB device. At this time, the data of input/output device should be held while the “IN READY” signal is active.

2-2-3-2 Listener operation

It is the same as the listener operation (2-2-1-2) in mode 0.

3.Data transfer method

3-1 Input/Output data control command

There are seven kinds of control commands for transferring input/output data arbitrarily. These control commands are valid when the mode switch of the DIP switch is set to 4bits of the 4/8 mode.

Command	Function	Format
S	The bit of the specified output port number is set.	Spb, ...
R	The bit of the specified output port number is reset.	Rpb, ...
H	The data of the upper 4bits (D5 to D8) of the specified output port number is rewrote.	Hpm, ...
L	The data of the lower 4bits (D1 to D4) of specified output port number is rewrote.	Lpn, ...
P	The data is set of the upper 4bits and lower of specified output port number.	Ppmn, . . .
I	Specify the port number to read data. You can also read the data set with this command on a port that is set to OUT with the OUT/IN switch. In talker operation, only data of the port set by this command is output to the personal computer.	Ip, p, . . .
N	The input port specification with the command is cleared. The OUT/IN switch setting of DIP switch becomes effective.	N

Description of parameter

, : Separator

p : Port Number (1 to 8)

b : Bit rank (1 to 8)

m : Upper 4bits number (0 to 9, A to F)

n : Lower 4bits number (0 to 9, A to F)

Example: When setting(1) and resetting(0) the 4th bit of the 2 port and the 7th bit of the 5 port, use the “S command” and “R command” to output by ASCII code from the personal computer.

Setting by “S command”: S24,57

Resetting by “R command”: R24,57

3-2 Data transfer method

When not using control command, data I/O operation, each port and transfer order are as follow.

In talker operation, all data of the port set as input is transferred in ascending order of port number and then add delimiter and output to GP-IB controller such as personal computer.

In listener operation, the data from personal computer, device and etc, outputs data received from the smaller port number to the port set as output.

Transfer order	8bit mode	4bit mode
1	Port 1	D5 to D8 of port 1
2	Port 2	D1 to D4 of Port 1
3	Port 3	D5 to D8 of Port 2
4	Port 4	D1 to D4 of Port 2
↓	↓	↓

3-3 Switch between BCD to HEX

When No. 4 of the MODE switch is set to 4bit mode, please select BCD and HEX with No. 8 of the ADR switch.

I/O port data				GP-IB data (ASCII code)	
D8/D4	D7/D3	D6/D2	D5/Dl	BCD	HEX
0	0	0	0	0	0
0	0	0	1	1	1
0	0	1	0	2	2
0	0	1	1	3	3
0	1	0	0	4	4
0	1	0	1	5	5
0	1	1	0	6	6
0	1	1	1	7	7
1	O	0	0	8	8
1	0	0	1	9	9
1	0	1	0	*	A
1	0	1	1	/	B
1	1	0	0	.	C
1	1	0	1	E	D
1	1	1	0	-	E
1	1	1	1	+	F

Example: In case of BCD code is set in 4bit mode,parallel signal is output as 1010 when "*" is received in ASCII code from PC.

3-4 Control signal

In addition to the data signal, there are control signals as follow.

Signal	IN or OUT	Puls or Level	Operation
LOCAL	IN	Puls	Switch remote state to local state. Invalid for local lockout. LOW signal with pulse width of 1 ms or more
REMOTE	OUT	Level	It becomes ACTIVE when remote state.
IN READY	OUT	Level	It becomes ACTIVE when START signal can be received.
OUT READY	IN	Level	It becomes ACTIVE when the I/O device can receive data.
OUT STROBE	OUT	Puls	Please refer to the operating mode section.
START	IN	Puls	Please refer to the operating mode section.
TREGGER	OUT	Puls	It is output signal by GET command.
CLEAR	OUT	Puls	It is clear signal by DCL, SDC command.

Note) Please refer to “2-1-3-4 DSW-1 switch” about the positive / negative logical and pulse width.

4 Reference

4-1Troubleshooting

When the adapter occurs an operation error, it displays an error as following.

Display	Error detail	How to solve this problem
All indications light up	Memory check error	Since the product is broken, it should be repaired. Please contact your agent or our company.
Error lump 2 lights up	Absence error of GP-IB listener	Please confirm that the GP-IB address number on the computer program matches the address number setting of ZS-6120C.
Error lump 1 lights up	Command error	There is an unrecognized command, please check the computer program.
Power indicator does not light up	Power connection error	Please refer to “Connection input power source” section1-5. Since the product is broken, it should be repaired. Please contact your agent or our company.

4-2 Option

An expansion unit is available as an option product.

In addition to expansion unit, we will design products according to your request.

ZS-7200P: This product isolates 64-bit I/O signals.

ZS-7211P: This product converts 24-bit TTL signal to make contact.

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