Instruction Manual

MODEL RK-400/800/1200/REk Series Digital Interface
Standard Digital Interface
LGob Option
LUs1 Option

MATSUSADA Precision Inc.

Rev. 0.3

CONTENTS

1 Introduction

1—1 Introduction

Thank you very much for your purchase of our product.
We have done our best for our quality control of out products. Please handle this unit properly according to this instruction manual so that you can use the full capacity of this unit and operate it safely and smoothly in high efficiency for long.
If you find any doubtful or unknown point or omission in this instruction manual, please kindly contact us immediately.

1—2 Unpacking the unit

When unpacking the unit, please check the following accessories are enclosed with the unit main body.

Accessories

- Instruction manual
- Install manual (for LUs1 option)
- USB driver disc (for LUs1 option)
- CO-M Cable (option nothing)
- CO-Optical fiber cable (for LGob option)

1—3 Environmental requirements

⚠ Warning

- Install the unit horizontally when use.
- Never place any object on the power supply.
- Use the power supply where the ventilation condition is good.
- Do not operate the power supply in a dusty area or in corrosive gas environment.

1—4 Notes

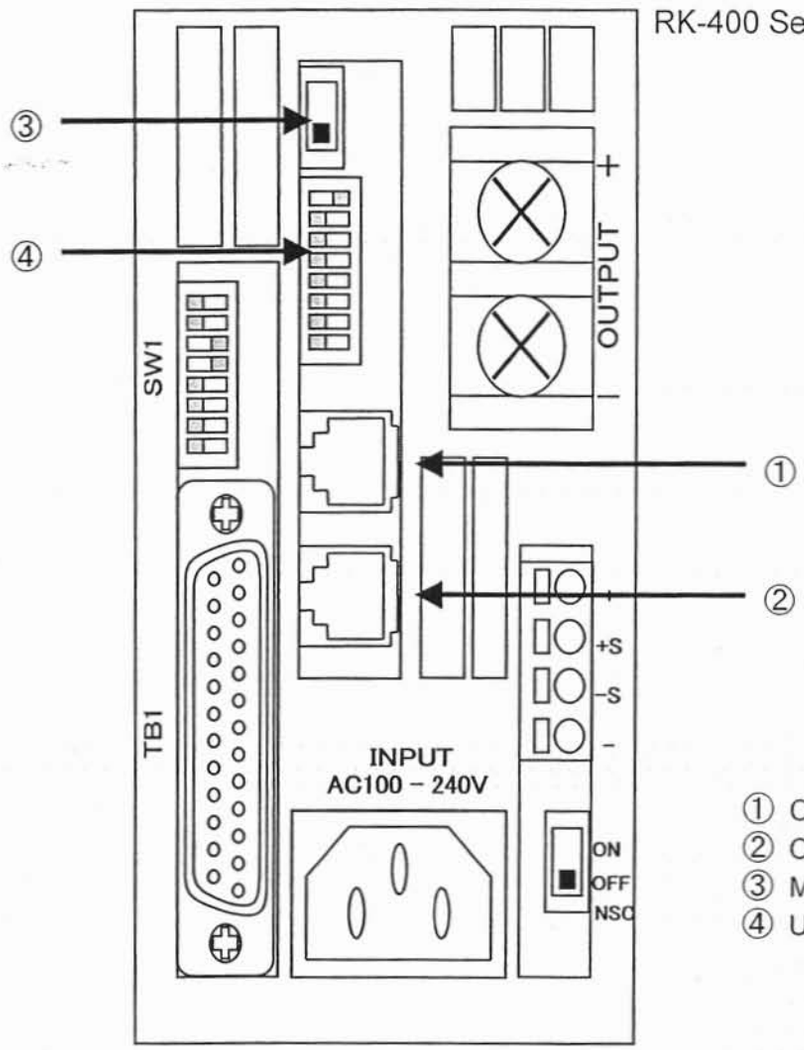
⚠ Warning

- When system has high voltage power supply, equipments connected might receive damage due to high voltage.
- When operate with GPIB interface, connect only cables required for system operation.
- The power supply has protection for intermittent short circuit, however operation with repeatable short circuit with arc should be avoided.
- The power supply has enough protection for noise, however if hung-up or voltage output, which is not programmed, are observed, turn of the power supply and reset the but, then resend the command again from controller.
- Any system change shall be done while the power of all the equipments of system is turned off. Sometimes it prevents the unit to function properly that causing of high voltage.

2 Exterior view diagram

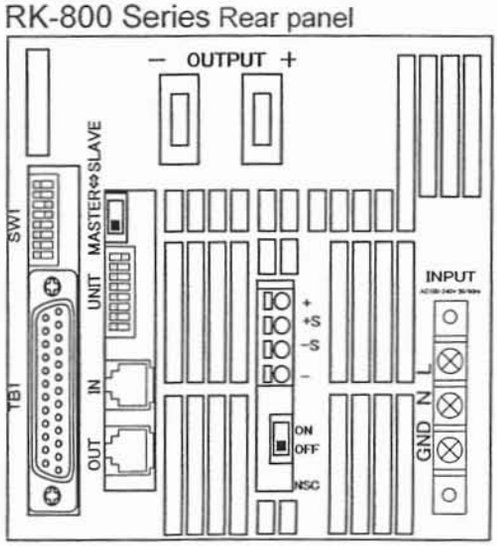
2－1 Standard Digital Interface

RK-400 Series Rear panel

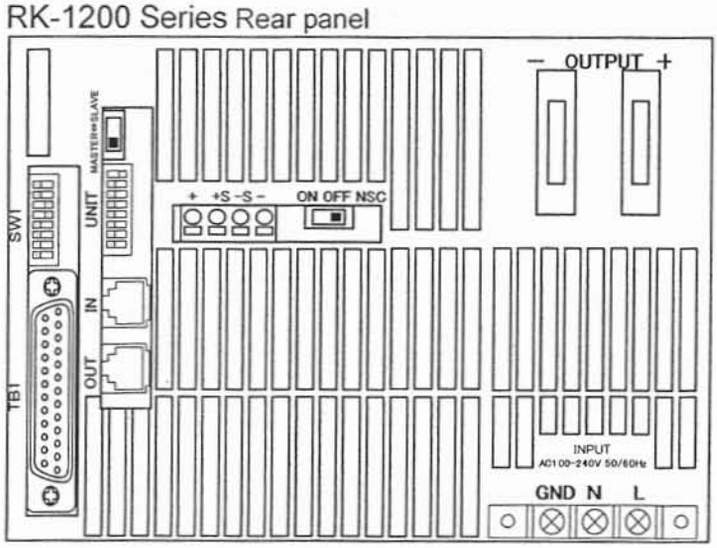


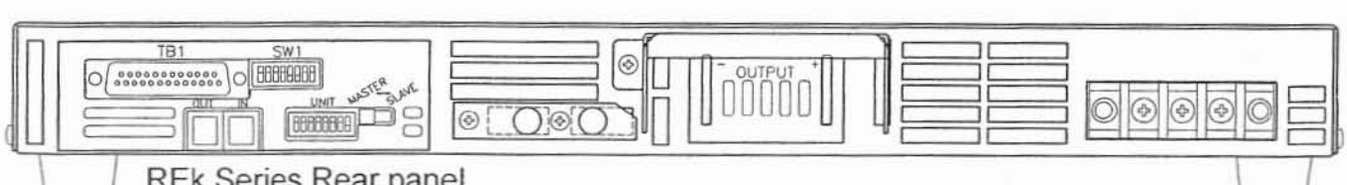
① CO-M cable connector (IN)
② CO-M cable connector (OUT)
③ Master/Slave setting switch
④ UNIT number setting switch

RK-800 Series Rear panel



RK-1200 Series Rear panel

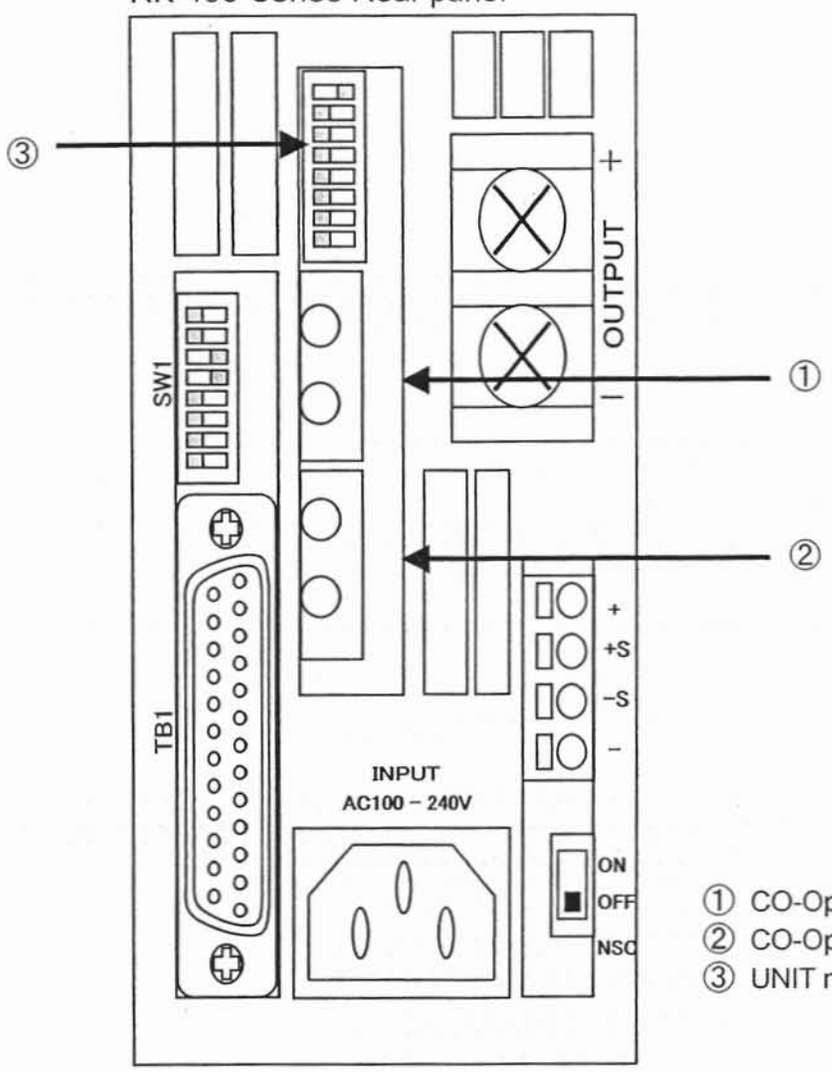




REk Series Rear panel

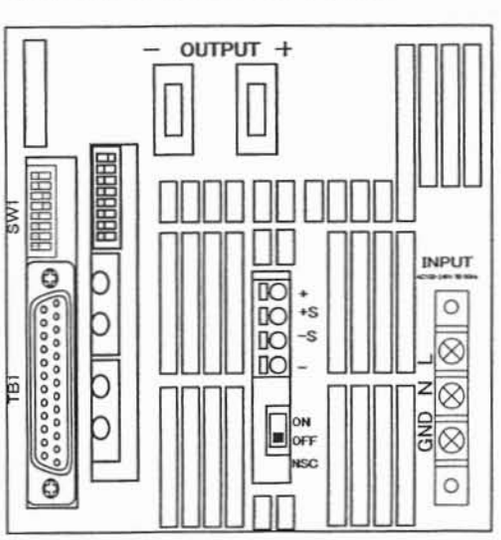
2－2 LGob Option

RK-400 Series Rear panel

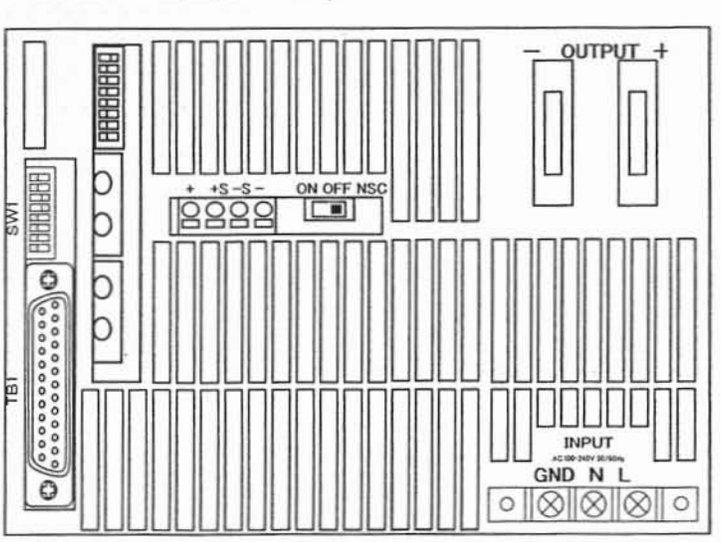


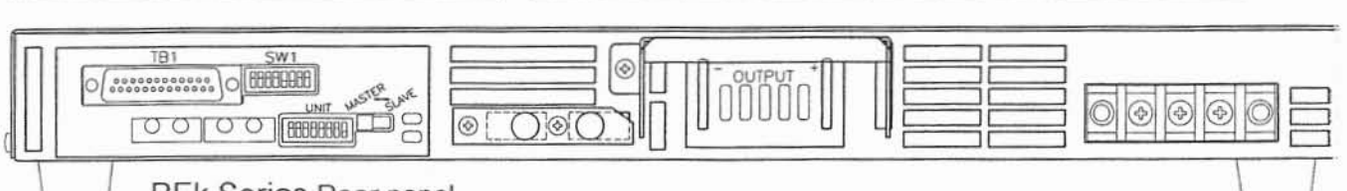
① CO-Optical fiber cable connector (IN)
② CO-Optical fiber cable connector (OUT)
③ UNIT number setting switch

RK-800 Series Rear panel



RK-1200 Series Rear panel

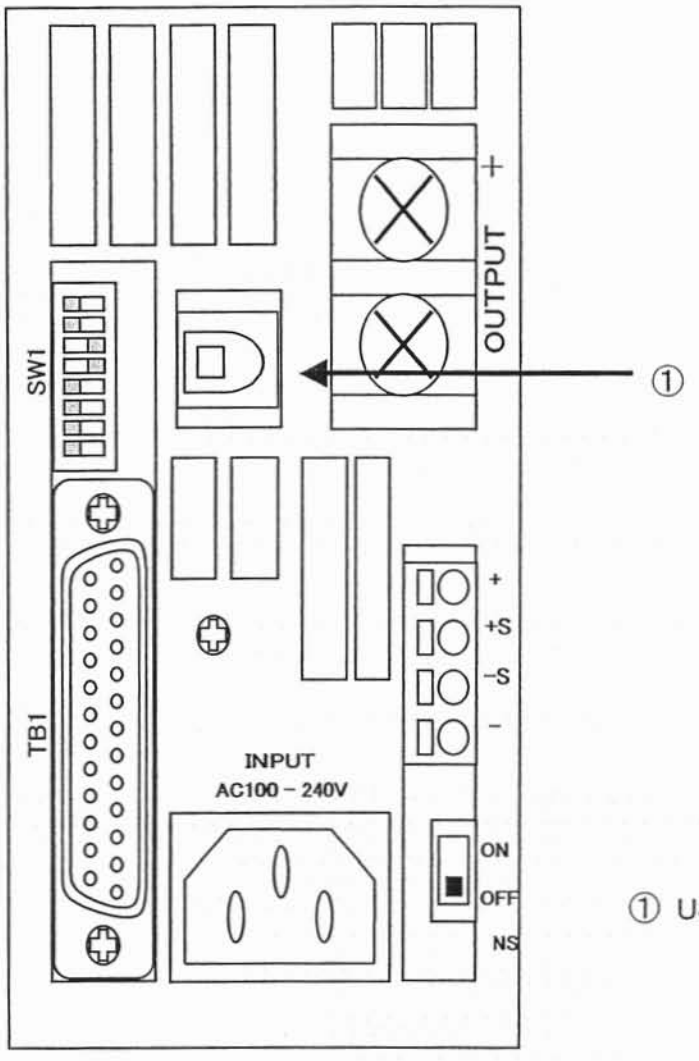




REk Series Rear panel

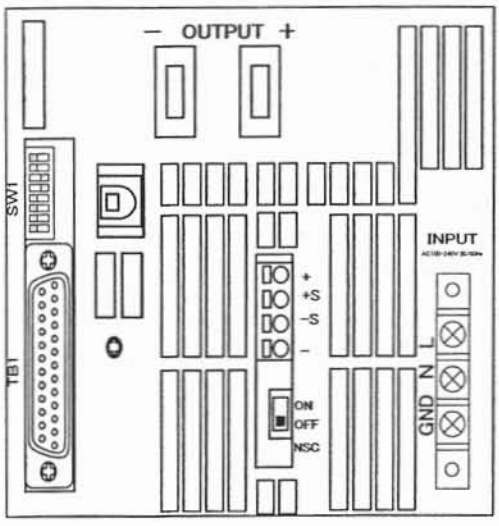
2−3 LUs1 Option

RK-400 Series Rear panel

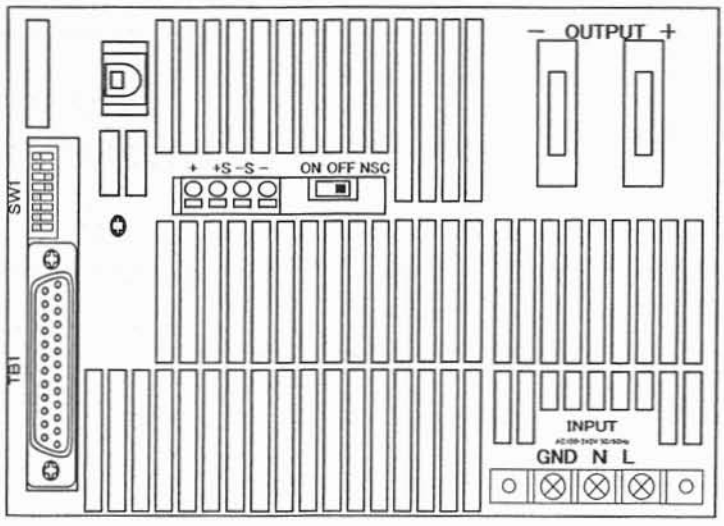


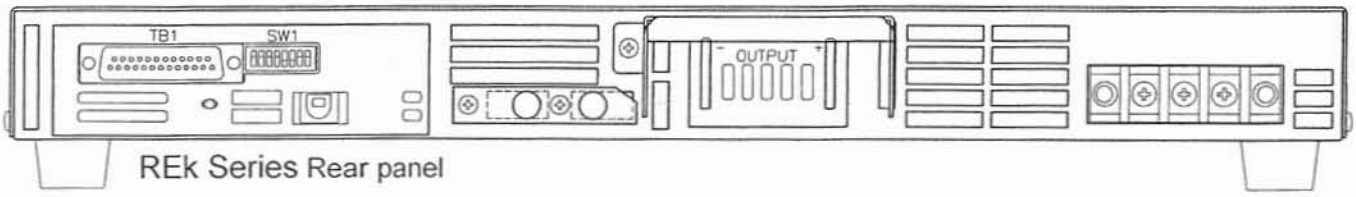
① USB connector

RK-800 Series Rear panel



RK-1200 Series Rear panel

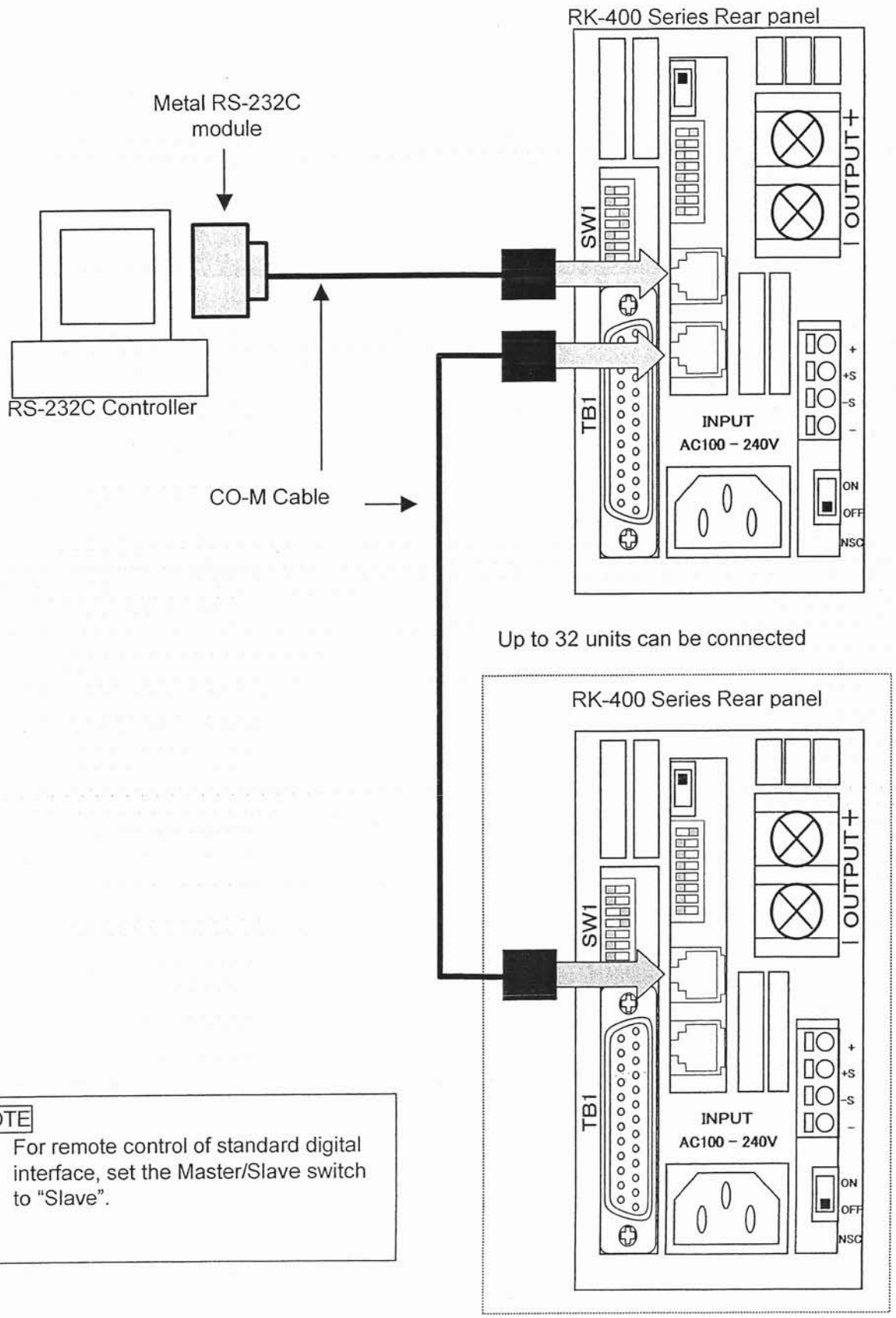




REk Series Rear panel

3 Connection diagram

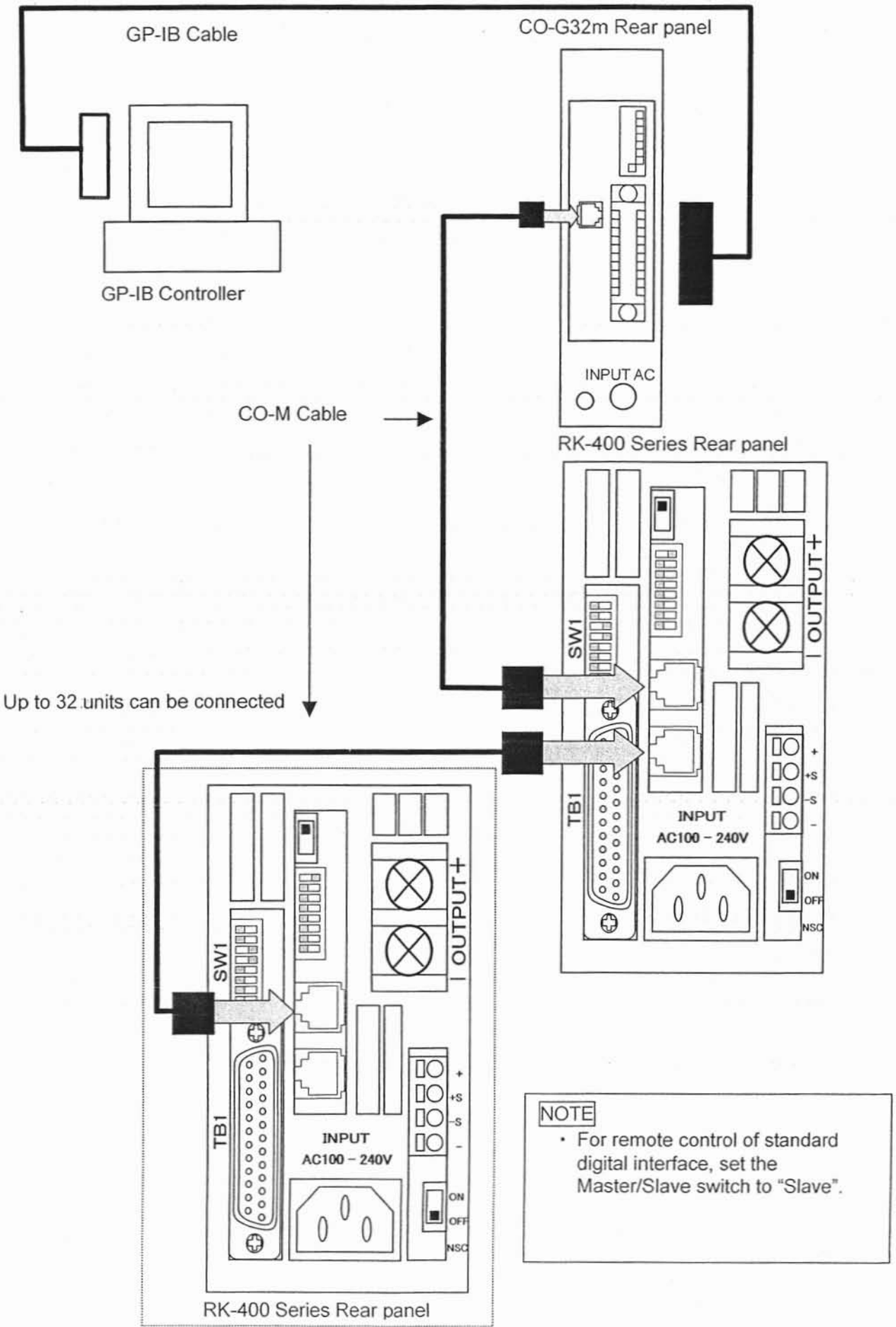
3－1 RK-400/800/1200/REk Series (Standard Digital Interface), Metal RS-232C module



NOTE

- For remote control of standard digital interface, set the Master/Slave switch to "Slave".

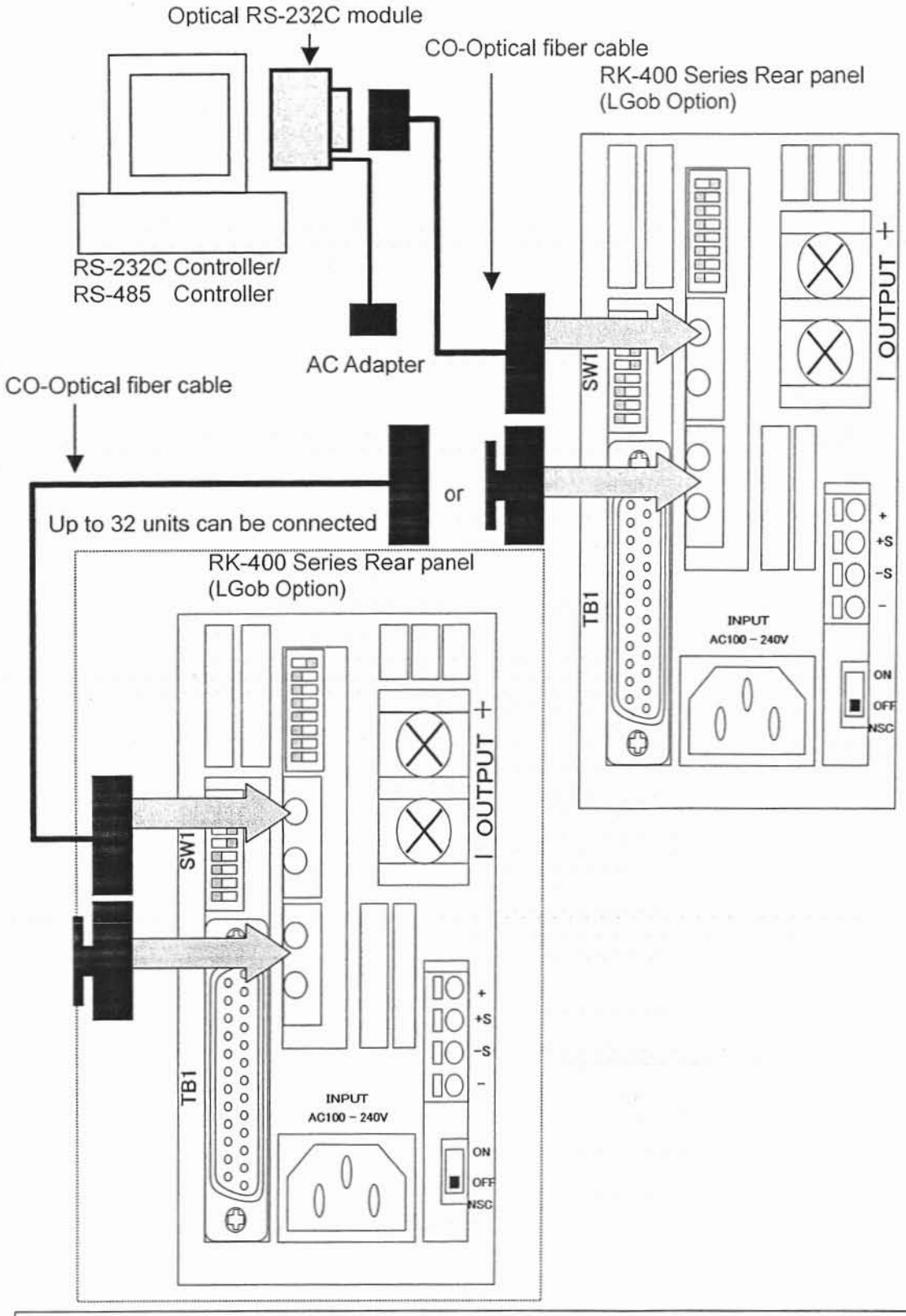
3−2 RK-400/800/1200/REk Series (Standard Digital Interface), CO-G32m



NOTE

- For remote control of standard digital interface, set the Master/Slave switch to "Slave".

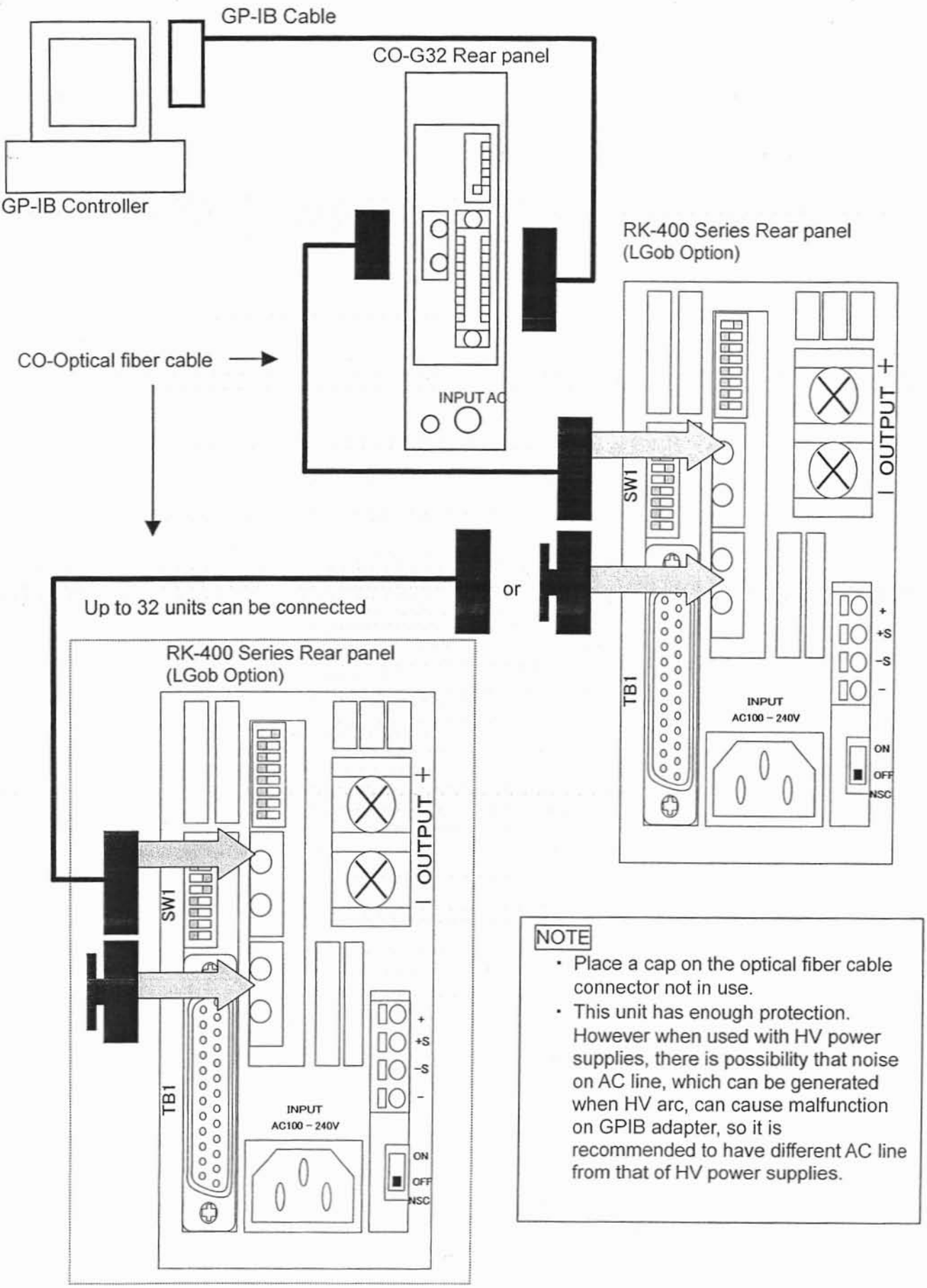
3－3 RK-400/800/1200/REk Series (LGob Option), Optical RS-232C module



NOTE

- Place a cap on the optical fiber cable connector not in use.
- This unit has enough protection. However when used with HV power supplies, there is possibility that noise on AC line, which can be generated when HV arc, can cause malfunction on GPIB adapter, so it is recommended to have different AC line from that of HV power supplies.

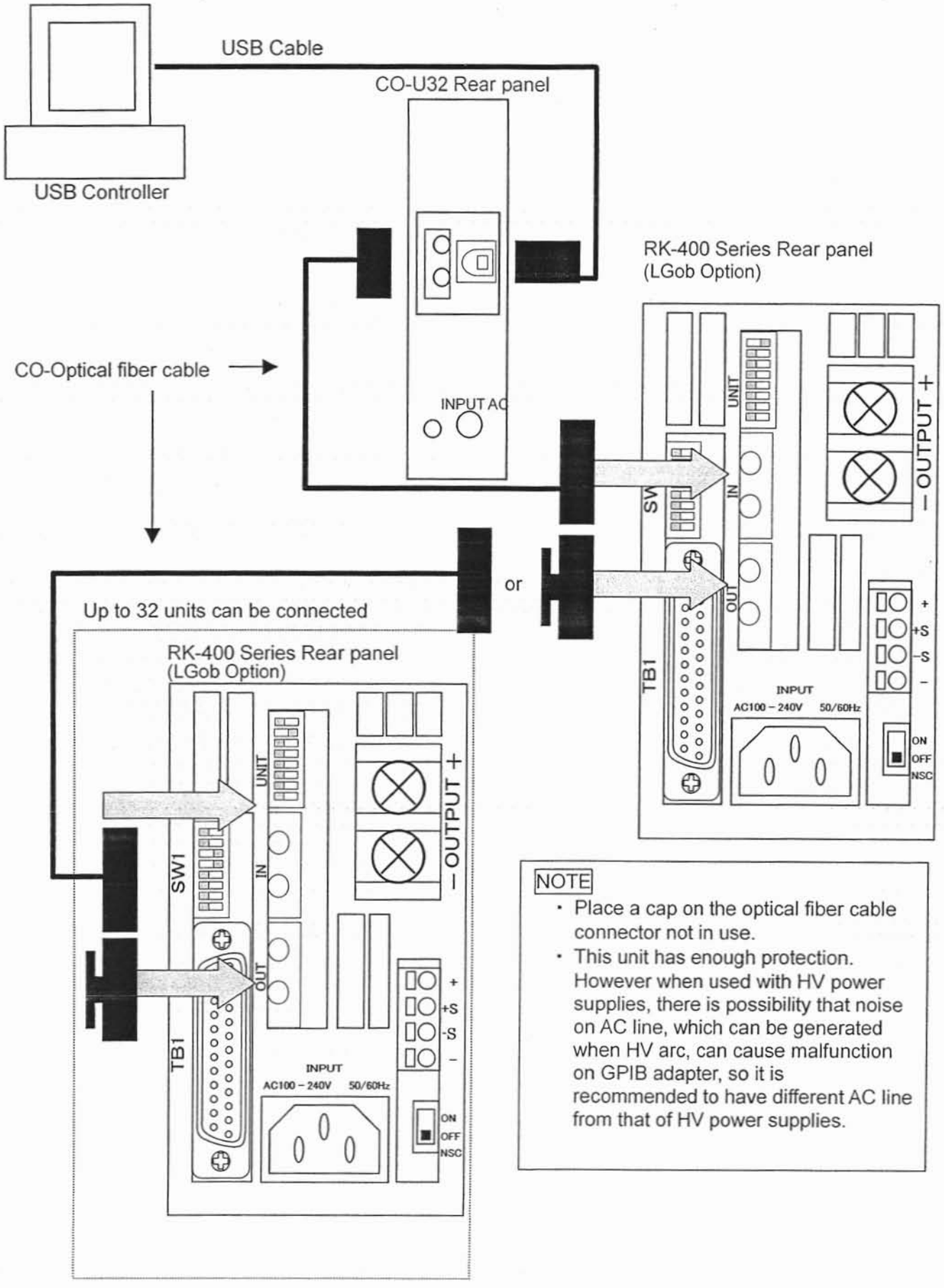
3－4 RK-400/800/1200/REk Series (LGob Option), CO-G32



NOTE

- Place a cap on the optical fiber cable connector not in use.
- This unit has enough protection. However when used with HV power supplies, there is possibility that noise on AC line, which can be generated when HV arc, can cause malfunction on GPIB adapter, so it is recommended to have different AC line from that of HV power supplies.

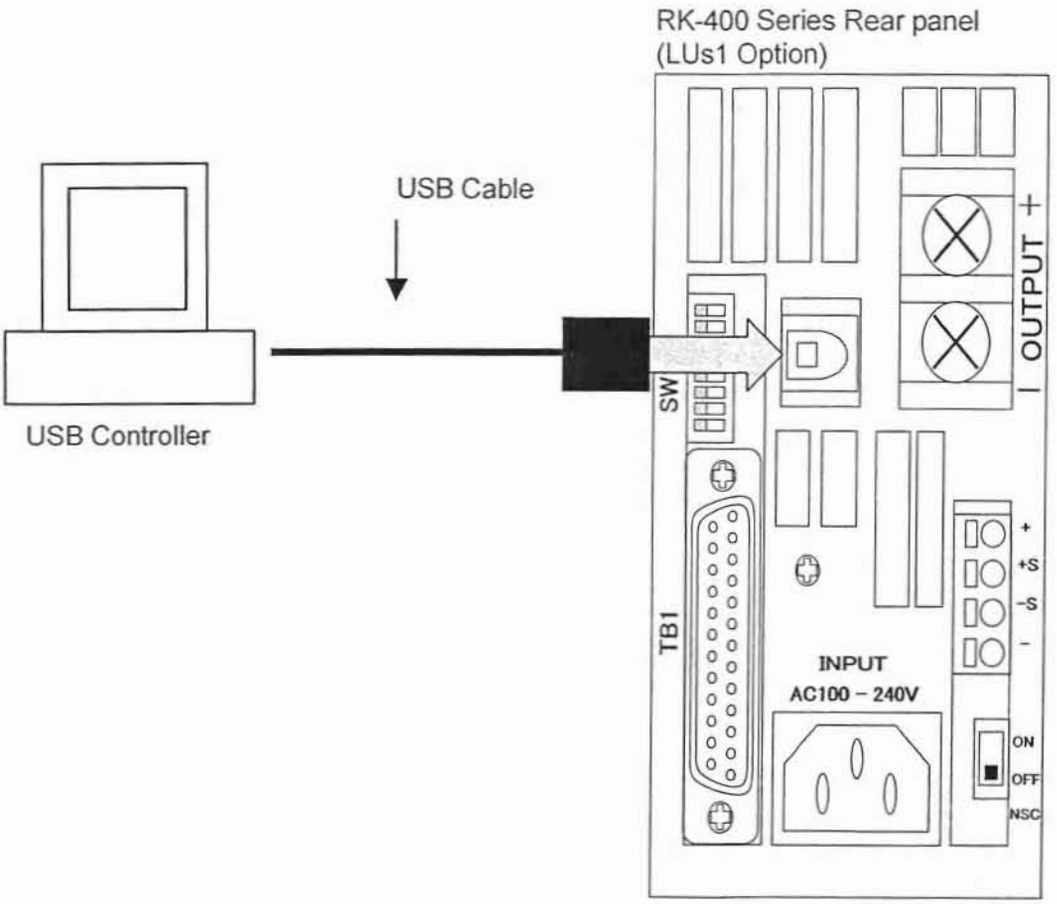
3−5 RK-400/800/1200/REk Series (LGob Option), CO-U32



NOTE

- Place a cap on the optical fiber cable connector not in use.
- This unit has enough protection. However when used with HV power supplies, there is possibility that noise on AC line, which can be generated when HV arc, can cause malfunction on GPIB adapter, so it is recommended to have different AC line from that of HV power supplies.

3－6 RK-400/800/1200/REk Series (LUs1 Option)



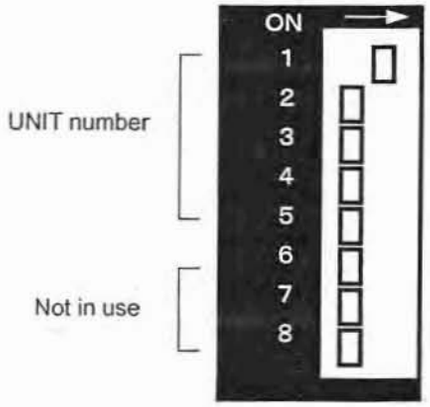
4 Functions

4－1 Summary

① Program output voltage and current(16Bit)
② Program output ON/OFF
③ Measuring output voltage and current(12Bit)
④ Setting of delay trigger(ON delay/OFF delay individually,0.0 to 99.9sec)
⑤ Control of up to 32 units with one GP-IB address

4－2 Setting of UNIT number (unit with Standard Digital Interface)

With the switch labeled UNIT on the rear of RK-400/800/1200/REk series, set unit number.
Unit number is to be set binary format using the switch1(LSB) to switch5(MSB). ON indicate logic 1 for each switch. Any number can be used from 0 to 31 as UNIT number, but be careful not to use the same number with another unit.
The factory setting of UNIT is number 1.



Example

・UNIT number ・・・・・・ 1

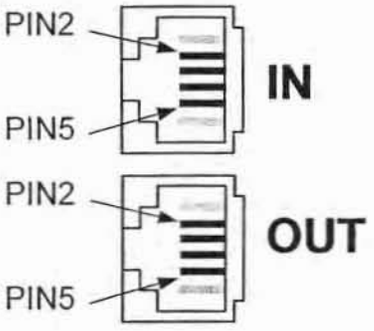
Note

These setting is identified when turning on the power of the unit, so setting shall be done while the power is off.

4－3 CO-M cable connector Interface terminal details (Standard Digital Interface)

RK-400/800/1200/REk series uses 3 signals of TxD, RxD and GND of RS-232C signal for external interface control of digital communication.
Our 「Metal RS-232C module / CO-G32m」,connect using.
Properly to controller(such as personal computer)

Connector pin assignment power supply side (RJ-11, 6 polar 4 pin female)



RK Series Rear panel
CO-M cable connector

Pin #	In/ out direction	Data direction
CO-M cable connector (IN)		
1	-	-
2	-	NC
3	Output	TxD0
4	-	GND
5	Input	Rxd0
6	-	-
CO-M cable connector (OUT)		
1	-	-
2	-	NC
3	Input	RxD1
4	-	GND
5	Output	TxD1
6	-	-

Communication Method

Baud Rate	:	asynchronous 9600[bps] (fixed)
Data Length	:	8[bit]
Stop Bit	:	1[bit]
Parity	:	None
Flow control	:	None

4－4. Settings address and delimiter for GPIB(CO-G32/CO-G32m)

On the rear panel of CO-G32 there is an eight DIL switch labeled "ADDRESS". The desired address is set with this DIL switch from S1 to S5 in the binary format. (S1 is LSB.) "ON" (turn to left or up) stands for logic 1.The address is valid for the Listener and the Talker function. Take care that the same address is not set on different device. Each value from 0 to 30 can be assigned to the device address.
It is used for the termination mark that the delimiter shows end of the command string in the communication between CO Series and the controller. The rest of the three from S5 to S8 make character of delimiter as following.

- S6 · · · · · · LF($0A_H$)
- S7 · · · · · · CR($0D_H$)
- S8 · · · · · · EOI

The factory setting of address is number 1,and delimiter is EOI.

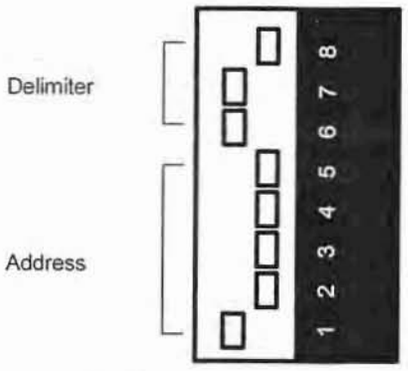


Fig. Example of setting

·GPIB address···1

·Delimiter·····CR+LF

CO-G32/CO-G32m

Note

These settings must be done when power turns to off. So CO Series read these setting only when power turns to on.

4－5 Settings unit number and upper connection(LGob Option)

On the rear panel of RK-400/800/1200/REk Series –LGob option there is an eight DIL switch labeled "UNIT". The desired unit number is set with this DIL switch from S1 to S5 in the binary format. (S1 is LSB.) "ON" stands for logic 1.Take care that the same unit number is not set on different device. Each value from 0 to 31 can be assigned to the unit number.
And S8 selects the upper connection, what unit connects to optical fiber cable connector (IN). The selection is following.

- OFF ・・・・・・CO-G32 or CO-RG or CO-HV or CO-U32 or –LGob option for each model
- ON ・・・・・・RS-232C or RS-485 with optical RS-232C module

The factory setting of unit number is 1, and upper connection is "CO-G32 or CO-RG or CO-HV or CO-U32 or –LGob option for each model".

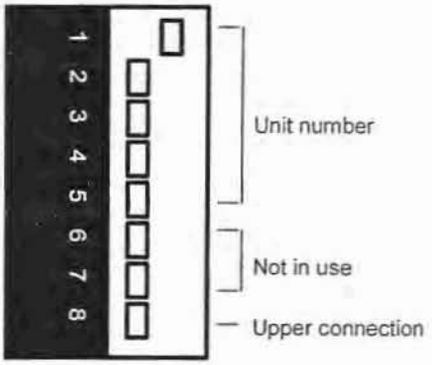


Fig. Example setting

- UNIT number・・・・・・・1
- Upper connection・・・・CO-G32/CO-RG/CO-HV/CO-U32
  –LGob option for each model

RK-400/800/1200/REk Series –LGob option

Note

These settings must be done when power turns to off. So CO Series read these setting only when power turns to on.

4−6 Settings of Metal RS-232C module (Standard Digital Interface)

Metal RS-232C module connection uses 3 RS-232C signals of TxD, RxD and GND for communication.
Referring to the following diagram, properly connect the Metal RS-232C module with controller to be used(e.g. PC).

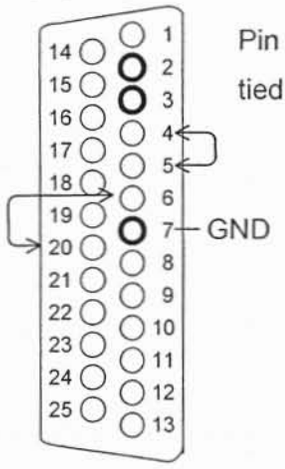


Fig. Metal RS-232C module pin assignment
(D-Sub 25 pin MALE)

Pin #	Data direction
2	RxD(input)
3	TxD(output)
7	GND

Pin 4 - 6 and 7 - 8 are tied together inside.

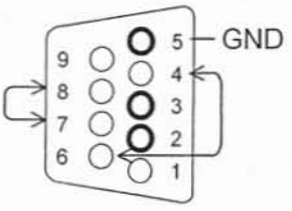


Fig. Metal RS-232C module pin assignment
(D-Sub 9 pin FEMALE)

Pin #	Data direction
2	TxD(output)
3	RxD(input)
5	GND

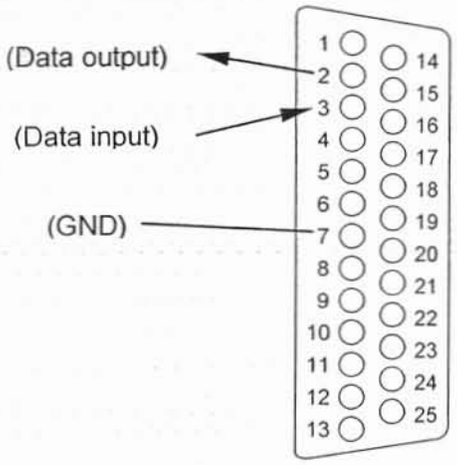


Fig. controller to be used(e.g. PC)
pin assignment
(D-Sub 25 pin FEMALE)

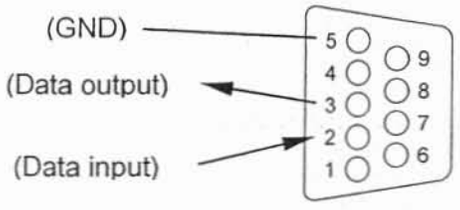


Fig. controller to be used(e.g. PC)
pin assignment
(D-Sub 9 pin MALE)

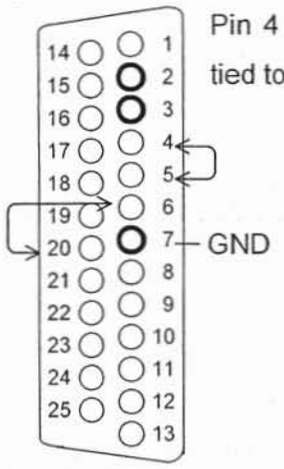
Communication Method

Baud Rate	:	asynchronous 9600 [bps] (fixed)
Data Length	:	8 [bit]
Stop Bit	:	1 [bit]
Parity	:	None
Flow control	:	None

Delimiter is CR($0D_H$) fixed

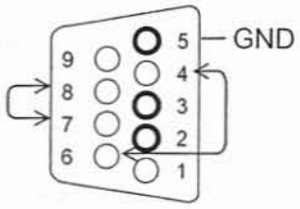
4−7 Settings of Optical RS-232C module (LGob Option)

With this module connection, 3 RS-232C signals of TxD, RxD and GND is used for communication. Referring to the following sketches, properly connect the RS-232C module with controller(e.g. PC).



Optical RS-232C module
(D-Sub25 pin MALE)

Pin 4 – 6 and 7 - 8 are tied together inside.



Optical RS-232C module
(D-Sub9 pin FEMALE)

Pin # \ Data Direction	Change Switch	
	DTE	DCE
2	RxD(input)	TxD(output)
3	TxD(output)	RxD(input)
7	GND	

Pin # \ Data Direction	Change Switch	
	DTE	DCE
2	TxD(output)	RxD(input)
3	RxD(input)	TxD(output)
5	GND	

The setting of DTE/DCE change switch should be done in accordance with the pin assignment of RS-232C port of controller to be used. So make sure the pin assignment before setting. Incorrect setting will result malfunction.

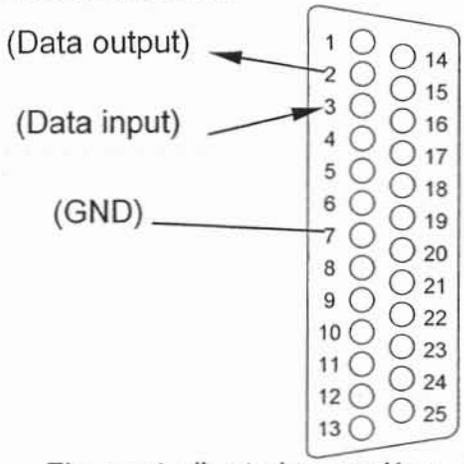


Fig. controller to be used(e.g. PC) pin assignment
(D-Sub 25 pin FEMALE)

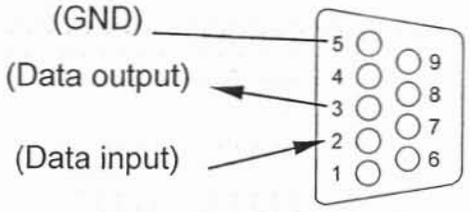


Fig. controller to be used(e.g. PC) pin assignment
(D-Sub 9 pin MALE)

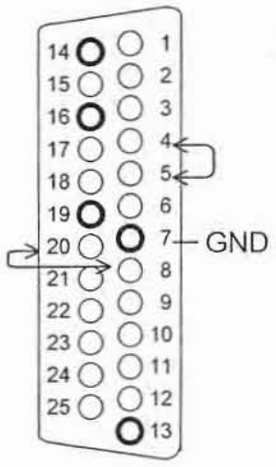
Communication Method

Baud Rate	:	asynchronous 9600 [bps] (fixed)
Data Length	:	8 [bit]
Stop Bit	:	1 [bit]
Parity	:	None
Flow control	:	None

Delimiter
Delimiter is CR($0D_H$) fixed.

4－8 Settings of Metal / Optical RS-485C module

With this module connection, 5 RS-485 signals of TxD+, TxD-, RxD+, RxD- and GND are used for communication.
Referring to the following sketches, properly connect the Metal / Optical RS-485 module with controller(e.g. PC).



Metal / Optical RS-485 module
(D-Sub 25 pin MALE)

Pin 4 and 5, 8 and 20 are tied together inside.

Pin #	Data direction
13	TxD+ (output)
14	TxD- (output)
15	RxD+ (input)
19	RxD- (input)
7	GND

Communication Method

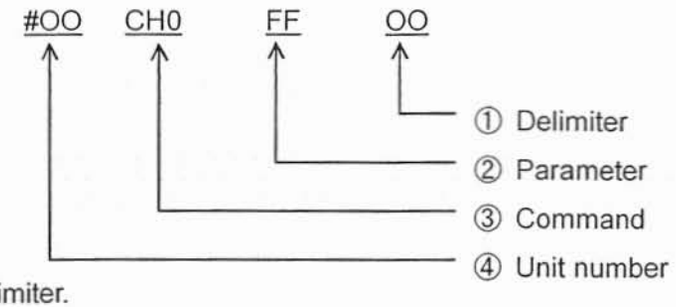
Baud Rate	:	asynchronous 9600 [bps] (fixed)
Data Length	:	8 [bit]
Stop Bit	:	1 [bit]
Parity	:	None
Flow control	:	None

Delimiter
Delimiter is CR($0D_H$) fixed.

5 Program

5−1 Summary of Syntax

For example, following programming set the output voltage of the unit to rated maximum voltage.



① Input delimiter.
- GP-IB connection ····· ▶ GP-IB delimiter
  (See Section "4−4 Settings address and delimiter for GPIB(CO-G32/CO-G32m)")
- RS-232C ····· ▶ CR($0D_H$)
- USB connection(Lus1 Option) ····· ▶ CR($0D_H$)

② Some commands require a parameter.

③ Wrong commands are to be ignored.

④ Specify the UNIT number.
- Standard Digital Interface ····· ▶ #0 to #31, or #AL
- LGob Option ····· ▶ #0 to #31, or #AL
- LUs1 Option ····· ▶ Do not specify

Caution

Number of letters for one command shall be maximum 20 excluding delimiter.
If the number of letter exceed 20, then letters of multiple of 20, for example 20th, 40th, 60th, ··· letter from the top shall be ignored and rest of the letters are input.

(Syntax) #1␣VCN␣12.3456789012345␣CR($0D_H$) Total 25 letters.

↓

345␣CR($0D_H$) 20 letters are to be ignored, and balance 5 letters are to be input.

(Description) In the above case "345 CR($0D_H$)" is considered as invalid command, and input shall be ignored.

5−2 Multiple command

By using "AL" for UNIT number, command is sent to all the unit connected.

(Syntax)
① #AL CH0 FFFF All units set to a maximum of rated voltage.
② #AL SW1 All units enables to output.

(Description) Commands applicable to Multiple command are :
CH0, CH1, CH2, CH7, VCN, ICN, OVP, OCP, VSET, ISET, OVPSET, OCPSET, SW, REN, GTL, DELAY, TON, TOFF, SLAVE

5−3 Character set for the command

- Do not use the characters(codes) of section [ ] in the following ASICII code table.
- Use the LF ($0A_H$) and CR ($0D_H$) only for delimiter.
- Command string is not case sensitive.
- Use space (20_H) to punctuate unit number, command and parameter in the command strings.

table 1 ASCII code

Upper / Lower	0_H	1_H	2_H	3_H	4_H	5_H	6_H	7_H
0_H	NUL	DLE	SP	0	@	P	`	p
1_H	SOH	DC1	!	1	A	Q	a	q
2_H	STX	DC2	"	2	B	R	b	r
3_H	ETX	DC3	#	3	C	S	c	s
4_H	EOT	DC4	$	4	D	T	d	t
5_H	ENQ	NAK	%	5	E	U	e	u
6_H	ACK	SYN	&	6	F	V	f	v
7_H	BEL	ETB	'	7	G	W	g	w
8_H	BS	CAN	(	8	H	X	h	x
9_H	HT	EM	)	9	I	Y	i	y
A_H	LF	SUB	*	:	J	Z	j	z
B_H	VT	ESC	+	;	K	[	k	{
C_H	FF	FS	,	<	L	¥	l	|
D_H	CR	GS	-	=	M	]	m	}
E_H	SO	RS	.	>	N	^	n	~
F_H	SI	US	/	?	O	_	o	

6 Getting started

6－1 Metal RS-232C module, Standard Digital Interface

Control a RK-400/800/1200/REk series power supply connected to Metal RS-232C module via RS-232C

CAUTION

- Voltage is output actually.
- Do not connect any load to power supply before this procedure is completed.

① Set UNIT number
Set the UNIT number to "1" with UNIT number setting switch on the rear of the unit.
(See Section "4－2 Setting of UNIT number (unit with Standard Digital Interface)")

② Connect Metal RS-232C module
Connect Metal RS-232C module to RS-232C controller(e.g. PC)

③ Connect Metal RS-232C module to RK-400/800/1200/REk series power supply
Connect Metal RS-232C module to modular cable connector(IN) of RK-400/800/1200/REk series with modular cable enclosed together with power supply.

④ Turn on the power
Turn on POWER ON/OFF switch.

⑤ Enable remote control
Send a command of "#1 REN" from RS-232C controller.
REN LED shall light on.

⑥ Enable the output
Send a command of "#1 ICN 100", "#1 OVP 100", "#1 SW1" from RS-232C controller.
OUTPUT LED shall light on.

⑦ Set output voltage and output
Send a command of "#1 VCN xxxx" from RS-232C controller. Enter numbers of 0 to 100 for xxxx.
Refer to Command list for details.

⑧ Stop the output
Send a command of "#1 SW0" from RS-232C controller.
OUTPUT LED shall turn off.

⑨ Ending the operation
Turn off POWER ON/OFF switch

6－2 CO-G32m, Standard Digital Interface

Control a RK-400/800/1200/REk series power supply connected to CO-G32m via GP-IB

CAUTION

- Voltage is output actually.
- Do not connect any load to power supply before this procedure is completed.

① Set GP-IB address and delimiter
Set GP-IB address and delimiter with Address setting switch on rear panel of CO-G32m.
(See Section "4－4 Settings address and delimiter for GPIB(CO-G32/CO-G32m)")

② Set UNIT number
Set the UNIT number to "1" with UNIT number setting switch on the rear of the unit.
(See Section "4－2 Setting of UNIT number (unit with Standard Digital Interface)")

③ Connect to GP-IB
Connect IEEE-488 connector of CO-G32m to GP-IB controller(e.g. PC) with GP-IB cable(available at stores).

④ Connect RK-400/800/1200/REk series power supply to CO-G32m
Connect CO-M cable connector(OUT) of CO-G32m to CO-M cable connecting connector(IN) with CO-M cable enclosed together with power supply.

⑤ Turn on the power of CO-G32m
Turn on POWER ON/OFF switch of CO-G32m.

⑥ Turn on the power of RK-400/800/1200/REk series power supply
Turn on POWER ON/OFF switch.

⑦ Enable remote control
Send a command of "#1 REN" from GP-IB controller.
REN LED shall light on.

⑧ Enable the output
Send a command of "#1 ICN 100", "#1 OVP 100" ,"#1 SW1" from GP-IB controller.
OUTPUT LED shall light on.

⑨ Set output voltage and output
Send a command of "#1 VCN xxxx" from GP-IB controller. Enter numbers of 0 to 100 for xxxx.
Refer to Command list for details.

⑩ Stop the output
Send a command of "#1 SW0" from GP-IB controller.
OUTPUT LED shall turn off.

⑪ Ending the operation
Turn off POWER ON/OFF switch of RK-400/800/1200/REk series power supply

⑫ Stop remote control
Turn off POWER ON/OFF switch of CO-G32m

6－3 Optical RS-232C module, LGob option

Control a RK-400/800/1200/REk series power supply connected with Optical RS-232C module via RS-232C

CAUTION

- Voltage is output actually.
- Do not connect any load to power supply before this procedure is completed.

① Set unit number and Upper connection
With the switch labeled UNIT on the rear of RK-400/800/1200/REk series, set unit number and upper connection. (See Section "4－5 Settings unit number and upper connection(LGob Option)".)

② Connect Optical RS-232C module with a controller
Connect Optical RS-232C module to a controller(e.g.PC). Connect AC adapter to Optical RS-232C module.

③ Connect Optical RS-232C module
Connect Optical RS-232C module to CO-Optical fiber cable connector (IN) of RK-400/800/1200/REk series with CO-Optical fiber cable enclosed together with power supply. Place a cap on the optical fiber cable connector not in use.

④ Turn on the power of RK-400/800/1200/REk series power supply
Turn on POWER ON/OFF switch.

⑤ Set RK-400/800/1200/REk series power supply to be ready for operation
Turn on OUTPUT ON/OFF switch.

⑥ Enable remote control
Send a command of "#1 REN" from GP-IB controller.
REN LED shall light on.

⑦ Enable the output
Send a command of "#1 ICN 100", "#1 OVP100" ,"#1 SW1" from RS-232C controller.
OUTPUT LED shall light on.

⑧ Set output voltage and output
Send a command of "#1 VCN xxxx" from RS-232C controller. Enter numbers of 0 to 100 for xxxx. Refer to Command list for details.

⑨ Stop the output
Send a command of "#1 SW0" from RS-232C controller.
OUTPUT LED shall turn off.

⑩ Ending the operation
Turn off POWER ON/OFF switch of RK-400/800/1200/REk series power supply

NOTE
When use Optical RS-232C module, RS-232C controller sometime read improper letter when RK-400/800/1200/REk Series main SW is ON and OFF. In this case execute read command again, or turn on the power of RS-232C controller after turn on the main SW of RK-400/800/1200/REk Series to on in order to clear the read letter.

6－4 CO-G32, LGob Option

Control a RK-400/800/1200/REk series power supply connected to CO-G32 via GP-IB

CAUTION

- Voltage is output actually.
- Do not connect any load to power supply before this procedure is completed.

① Set GPIB address and delimiter
With the switch labeled ADDRESS on the rear of CO-G32, set GPIB address and delimiter.
(See Section "4－4 Settings address and delimiter for GPIB(CO-G32/CO-G32m)".)

② Set unit number and Upper connection
With the switch labeled UNIT on the rear of RK-400/800/1200/REk series, set unit number and upper connection.
(See Section "4－5 Settings unit number and upper connection(LGob Option)".)

③ Connect to GPIB
Connect IEEE-488 connector of CO-G32 and GPIB controller(e.g.PC) with GPIB cable(available at stores).

④ Connect RK-400/800/1200/REk series power supply to CO-G32
Connect CO-Optical fiber cable connector(OUT) of CO-G32 to CO-Optical fiber cable connecting connector(IN) with CO-Optical fiber cable enclosed together with power supply.
Place a cap on the optical fiber cable connector not in use.

⑤ Turn on the power of CO-G32
Turn on POWER ON/OFF switch of CO-G32.

⑥ Turn on the power of RK-400/800/1200/REk series power supply
Turn on POWER ON/OFF switch.

⑦ Set RK-400/800/1200/REk series power supply to be ready for operation
Turn on OUTPUT ON/OFF switch.

⑧ Enable remote control
Send a command of "#1 REN" from GP-IB controller.
REN LED shall light on.

⑨ Enable the output
Send a command of "#1 ICN 100", "#1 OVP100" ,"#1 SW1" from GP-IB controller.
OUTPUT LED shall light on.

⑩ Set output voltage and output
Send a command of "#1 VCN xxxx" from GP-IB controller. Enter numbers of 0 to 100 for xxxx.
Refer to Command list for details.

⑪ Stop the output
Send a command of "#1 SW0" from GP-IB controller.
OUTPUT LED shall turn off.

⑫ Ending the operation
Turn off POWER ON/OFF switch of RK-400/800/1200/REk series power supply

⑬ Stop remote control
Turn off POWER ON/OFF switch of CO-G32

6－5 CO-U32, LGob Option

Control a RK-400/800/1200/REk series power supply connected to CO-U32 via USB

CAUTION

- Voltage is output actually.
- Do not connect any load to power supply before this procedure is completed.

① Set unit number and Upper connection
With the switch labeled UNIT on the rear of RK-400/800/1200/REk series, set unit number and upper connection.
(See Section "4－5 Settings unit number and upper connection(LGob Option)".)

② Connect to USB
Connect USB connector of CO-U32 and USB controller(e.g.PC) with USB cable(available at stores).

③ Connect RK-400/800/1200/REk series power supply to CO-U32
Connect CO-Optical fiber cable connector(OUT) of CO-U32 to CO-Optical fiber cable connecting connector(IN) with CO-Optical fiber cable enclosed together with power supply.
Place a cap on the optical fiber cable connector not in use.

④ Turn on the power of CO-U32
Turn on POWER ON/OFF switch of CO-U32.

⑤ Turn on the power of RK-400/800/1200/REk series power supply
Turn on POWER ON/OFF switch.

⑥ Set RK-400/800/1200/REk series power supply to be ready for operation
Turn on OUTPUT ON/OFF switch.

⑦ Enable remote control
Send a command of "#1 REN" from USB controller.
REN LED shall light on.

⑧ Enable the output
Send a command of "#1 ICN 100", "#1 OVP100" ,"#1 SW1" from USB controller.
OUTPUT LED shall light on.

⑨ Set output voltage and output
Send a command of "#1 VCN xxxx" from USB controller. Enter numbers of 0 to 100 for xxxx.
Refer to Command list for details.

⑩ Stop the output
Send a command of "#1 SW0" from USB controller.
OUTPUT LED shall turn off.

⑪ Ending the operation
Turn off POWER ON/OFF switch of RK-400/800/1200/REk series power supply

⑫ Stop remote control
Turn off POWER ON/OFF switch of CO-U32

6－6 LUs1 option

Control a RK-400/800/1200/REk series power supply via USB

CAUTION

- Voltage is output actually.
- Do not connect any load to power supply before this procedure is completed.

① Connect RK-400/800/1200/REk series power supply to USB controller

Connect RK-400/800/1200/REk series power supply to USB controller(e.g. PC) with USB cable.

② Turn on the power

Turn on POWER ON/OFF switch.

③ Enable remote control

Send a command of "REN" from USB controller.

④ Enable the output

Send a command of "ICN 100", "OVP 100", "SW1" from USB controller.
OUTPUT LED shall light on.

⑤ Set output voltage and output

Send a command of "VCN xxxx". Enter numbers of 0 to 100 for xxxx. Refer to Command list for details.

⑥ Stop the output

Send a command of "SW0" from USB controller.
OUTPUT LED shall turn off.

⑦ Ending the operation

Turn off POWER ON/OFF switch.

7 Command reference

7－1 Command list

table 2 Command list

Mode		Command	Function	page
Write	Output	CH0	Set output voltage(HEX mode)	27
		CH1	Set output current(HEX mode)	27
		CH2	Set over voltage protection (HEX mode)	28
		CH7	Set over current protection (HEX mode)	28
		VCN	Set output voltage (percent mode)	29
		ICN	Set output current (percent mode)	29
		OVP	Set over voltage protection (percent mode)	30
		OCP	Set over current protection (percent mode)	30
		VSET	Set output voltage (voltage value)	31
		ISET	Set output current (current value)	31
		OVPSET	Set over voltage protection (voltage value)	32
		OCPSET	Set over voltage protection (current value)	32
	Status	SW1/0	Enable/Disable to output	33
		REN	Enable remote control	33
		GTL	Disable remote control	33
	Delay Setting	DELAY	ON/OFF delay trigger function	34
		TON	Set ON delay time (0.0 to 99.9 sec)	34
		TOFF	Set OFF delay time (0.0 to 99.9 sec)	34
		SLAVE	Set Local / Remote of slave unit	34
Read	Output	MN1	Measuring output voltage (HEX mode)	35
		MN2	Measuring output current (HEX mode)	35
		VM	Measuring output voltage (percent mode)	35
		IM	Measuring output current (percent mode)	35
		VGET	Measuring output voltage (voltage value)	35
		IGET	Measuring output current (current value)	35
	Status	STS	Query the status of the power supply	36
	Setting	CH0?	Read the setting of output voltage (HEX mode)	37
		CH1?	Read the setting of output current (HEX mode)	37
		CH2?	Read the setting of over voltage protection (HEX mode)	37
		CH7?	Read the setting of over current protection (HEX mode)	37
		VCN?	Read the setting of output voltage (percent mode)	38
		ICN?	Read the setting of output current (percent mode)	38
		OVP?	Read the setting of over voltage protection (percent mode)	38
		OCP?	Read the setting of over current protection (percent mode)	38
		VSET?	Read the setting of output voltage (voltage value)	39
		ISET?	Read the setting of output current (current value)	39
		OVPSET?	Read the setting of over voltage protection (voltage value)	39
		OCPSET?	Read the setting of over current protection (current value)	39
		SW?	Read the setting of output ON/OFF	40
		DELAY?	Read the status of ON/OFF of delay trigger function	40
		TON?	Read the setting of ON delay time	40
		TOFF?	Read the setting of OFF delay time	40
		SLAVE?	Read the Local / Remote setting of slave unit	40

7－2 Reference

CH0 Command

This command programs output voltage of power supply with hexadecimal format.

(Syntax) ① CH0 FFFF ←—— A maximum of rated output voltage
② CH0 7FFF ←—— A half of rated output voltage
③ CH0 F0 ←—— Same as "CH0 00F0"
④ CH0 12345 ←—— Output voltage is not changed

(Default) CH0 0000

(Description) It ignores as a parameter of a number over 4 digit (e.g. ④)
Parameter requires hexadecimal format from 0000_H to $FFFF_H$
Featuring multiple command

CH1 Command

This command programs output current of power supply with hexadecimal format.

(Syntax) ① CH1 FFFF ←—— A maximum of rated output current
② CH1 7FFF ←—— A half of rated output current
③ CH1 F0 ←—— Same as "CH1 00F0"
④ CH1 12345 ←—— Output current is not changed

(Default) CH1 0000

(Description) It ignores as a parameter of a number over 4 digit (e.g. ④)
Parameter requires hexadecimal format from 0000_H to $FFFF_H$
Featuring multiple command

CH2 Command

This command programs over voltage protection with 00_H to FF_H (8bit)

Maximum over voltage protection value = maximum rated voltage x 110%

(Syntax) ① CH2 FF ←— (Over voltage protection value) = (maximum over voltage protection value)

② CH2 7F ←— (Over voltage protection value) = (half of maximum over voltage protection value)

③ CH2 F ←— Same as "CH2 0F"

④ CH2 123 ←— Over voltage protection value does not change

(Default) CH2 00

(Description) It ignores as a parameter of a number over 2 digits (Syntax ④)

Over voltage protection does not work when setting is under 03_H

Featuring multiple command

CH7 Command

This command programs over current protection with 00_H to FF_H (8bit)

Maximum over current protection value = maximum rated current x 110%

(Syntax) ① CH7 FF ←— (Over current protection value) = (maximum over current protection value)

② CH7 7F ←— (Over current protection value) = (half of maximum over current protection value)

③ CH7 F ←— Same as "CH7 0F"

④ CH7 123 ←— Over current protection value does not change

(Default) CH7 00

(Description) It ignores as a parameter of a number over 2 digits (Syntax ④)

Over voltage protection does not work when setting is under 03_H

Featuring multiple command

VCN Command

This command programs output voltage of power supply with percentage of the rated.
(increment of 0.01%)

(Syntax) ① VCN 100 ←——— A maximum of rated output voltage
② VCN 12.34 ←——— 12.34% of rated output voltage
③ VCN 123.4 ←——— Output voltage is not changed
④ VCN 12.345 ←——— Same as "VCN 12.34"

(Default) VCN 0

(Description) It ignores as a parameter of integer over 3 digit (e.g.③)
It ignores as a parameter under 2 decimal (e.g. ④)
Parameter requires from 0.0 to 100.0
Featuring multiple command

ICN Command

This command programs output current of power supply with percentage of the rated.
(increment of 0.01%)

(Syntax) ① ICN 100 ←——— A maximum of rated output current
② ICN 12.34 ←——— 12.34% of rated output current
③ ICN 123.4 ←——— Output current is not changed
④ ICN 12.345 ←——— Same as "ICN12.34"

(Default) ICN 0

(Description) It ignores as a parameter of integer over 3 digit (e.g.③)
It ignores as a parameter under 2 decimal (e.g. ④)
Parameter requires from 0.0 to 100.0
Featuring multiple command

OVP Command

This command programs over voltage of power supply with percentage of the rated.
(increment of 0.1%)

Maximum over voltage protection value = maximum rated voltage x 110%

(Syntax) ① OVP 100 ←—— A maximum of rated over voltage
② OVP 12.3 ←—— 12.3% of rated over voltage
③ OVP 123.4 ←—— Over voltage is not changed
④ OVP 12.34 ←—— Same as "OVP 12.3"

(Default) OVP 0

(Description) It ignores as a parameter of integer over 3 digit (e.g.③)
It ignores as a parameter under 1 decimal (e.g. ④)
Parameter requires from 0.0 to 100.0
Featuring multiple command

OCP Command

This command programs over current of power supply with percentage of the rated.
(increment of 0.1%)

Maximum over current protection value = maximum rated current x 110%

(Syntax) ① OCP 100 ←—— A maximum of rated over current
② OCP 12.3 ←—— 12.3% of rated over current
③ OCP 123.4 ←—— Over current is not changed
④ OCP 12.34 ←—— Same as "OCP 12.3"

(Default) OCP 0

(Description) It ignores as a parameter of integer over 3 digit (e.g.③)
It ignores as a parameter under 1 decimal (e.g. ④)
Parameter requires from 0.0 to 100.0
Featuring multiple command

VSET Command

This command programs output voltage with 0.0 to rated voltage(V)

(Syntax) In case of range 20V/20A(increment of 0.01V)

① VSET 20 ←—— (output voltage) = (20V)

② VSET 12.34 ←—— (output voltage) = (12.34V)

③ VSET 123.4 ←—— output voltage does not change

④ VSET 12.345 ←—— (output voltage) = (12.34V)

(Default) VSET 0

(Description) It ignores as a parameter of integer over rated voltage (Syntax ③)

It ignores as a parameter under 2 decimal (Syntax ④)

Featuring multiple command

* Minimum setting value of VSET command is different for each model ,RK-400/800/1200/REk.

(See Section "7—3 Minimum setting / return value for each command".)

ISET Command

This command programs output current with 0.0 to rated current(A)

(Syntax) In case of range 20V/20A (increment of 0.01A)

① ISET 20 ←—— (output current) = (20A)

② ISET 12.34 ←—— (output current) = (12.34A)

③ ISET 123.4 ←—— output current does not change

④ ISET 12.345 ←—— (output current) = (12.34A)

(Default) ISET 0

(Description) It ignores as a parameter of integer over rated current (Syntax ③)

It ignores as a parameter under 2 decimal (Syntax ④)

Featuring multiple command

* Minimum setting value of ISET command is different for each model ,RK-400/800/1200/REk.

(See Section "7—3 Minimum setting / return value for each command".)

OVPSET Command

This command programs over voltage protection valuet with 0.0 to rated over voltage protection setting value.(increment of 0.01V)

Maximum over voltage protection value = Maximum rated voltage x 110%

(Syntax) In case of range 20V/20A

① OVPSET 22.5 ⟵ (over voltage protection setting) = (22.5V)

② OVPSET 12.34 ⟵ (over voltage protection setting) = (12.34V)

③ OVPSET 123.4 ⟵ over voltage protection setting does not change

④ OVPSET 12.345 ⟵ (over voltage protection setting) = (12.34V)

(Default) OVPSET 0

(Description) It ignores as a parameter of integer over maximum over voltage protection setting value. (Syntax ③)

It ignores as a parameter under 2 decimal (Syntax ④)

Over voltage protection does not work when setting is below 0.2V.

Featuring multiple command

OCPSET Command

This command programs over current protection valuet with 0.0 to rated over current protection setting value.(increment of 0.01A)

Maximum over current protection value = Maximum rated current x 110%

(Syntax) In case of range 20V/20A

① OCPSET 22.5 ⟵ (over current protection setting) = (22.5A)

② OCPSET 12.34 ⟵ (over current protection setting) = (12.34A)

③ OCPSET 123.4 ⟵ over current protection setting does not change

④ OCPSET 12.345 ⟵ (over current protection setting) = (12.34A)

(Default) OCPSET 0

(Description) It ignores as a parameter of integer over maximum over current protection setting value.(Syntax ③)

It ignores as a parameter under 2 decimal (Syntax ④)

Over current protection does not work when setting is below 0.2A.

Featuring multiple command

SW Command

This command programs output ON/OFF.

(Syntax) ① SW0 ←—— Disable the output

② SW1 ←—— Enable the output

(Default) SW0

(Description) In case the power supply has blackout protection, this command might not enable to output.
Refer to the instruction manual of power supply for details of how to reset blackout protection.
Featuring multiple command
* When an error is displayed, it is reset by the SW0 command in a similar fashion to the OUTPUT ON/OFF switch.
* If the SW1 Command is used for OUTPUT ON, the LS(Remote Switch) [See Instruction Manual 6-4 Turning Output ON/OFF with the remote switch] is OFF (Open) when the OUTPUT LED is flashing.

REN Command

This command enable power supply remote control.

(Syntax) ① REN

(Description) This command enable power supply to use all the command after turning on the power of power supply. (even not receiving this command STS command always available to use)
REN LED shall light on.
Featuring multiple command

(Default) GTL

GTL Command

This command disable power supply remote control.

(Syntax) ① GTL

(Description) After receiving this command any other command other than REN and STS shall be ignored.
Until receiving REN command power supply maintain the same setting of before receiving this command.
REN LED shall turn off.
Featuring multiple command

(Default) GTL

DELAY Command

This command programs ON/OFF of delay trigger function.

(Syntax) ① DELAY0 ←——— delay trigger function OFF

② DELAY1 ←——— delay trigger function ON

(Default) DELAY0

(Description) Featuring multiple command

TON Command

This command programs ON delay time (0.0 to 99.9 sec)

(Syntax) ① TON 99.9 ←——— (ON delay time) = (99.9sec)

② TON 12.3 ←——— (ON delay time) = (12.3sec)

③ TON 123.4 ←——— No change of ON delay time

④ TON 12.34 ←——— TON is set to be 12.3

(Default) TON 0

(Description) It ignores as a parameter of integer over maximum over 99.9 setting value. (Syntax ③)

It ignores as a parameter under 1 decimal (Syntax ④)

Featuring multiple command

TOFF Command

This command programs OFF delay time (0.0 to 99.9 sec)

(Syntax) ① TOFF 99.9 ←——— (OFF delay time) = (99.9sec)

② TOFF 12.3 ←——— (OFF delay time) = (12.3sec)

③ TOFF 123.4 ←——— No change of OFF delay time

④ TOFF 12.34 ←——— TOFF is set to be 12.3

(Default) TOFF 0

(Description) It ignores as a parameter of integer over maximum over 99.9 setting value. (Syntax ③)

It ignores as a parameter under 1 decimal (Syntax ④)

Featuring multiple command

SLAVE Command

This command programs Local / Remote setting of slave unit

(Syntax) ① SLAVE0 ←——— slave function Local

② SLAVE1 ←——— slave function Remote

(Default) SLAVE0

(Description) Featuring multiple command

MN1 Command

This command allows receiving the output voltage monitor with 000_H to FFF_H h(12 bit)

(Syntax) MN1

(Return) ① MONI1=FFFH ←——(Monitor value) = (maximum rated voltage)

② MONI1=7FFH ←——(Monitor value) = (half of maximum rated voltage)

MN2 Command

This command allows receiving the output current monitor with 000_H to FFF_H (12 bit).

(Syntax) MN2

(Return) ① MONI2=FFFH ←——(Monitor value) = (maximum rated current)

② MONI2=7FFH ←——(Monitor value) = (half of maximum rated current)

VM Command

This command allows receiving output voltage monitor with 0.0 to 100.0%(increment of 0.01%)

(Syntax) VM

(Return) ① VM=100.0 ←——(Monitor value) = (maximum rated voltage)

② VM=12.34 ←——(Monitor value) = (12.34% of maximum rated voltage)

③ VM=25.0 ←——Output voltage is a quarter of the rated

(Description) 0 value of 2 decimal point is not displayed(Return ③)

IM Command

This command allows receiving output current monitor with 0.0 to 100.0%(increment of 0.01%)

(Syntax) IM

(Return) ① IM=100.0 ←——Output current is a maximum of the rated

② IM=12.34 ←——(Monitor value) = (12.3% of maximum rated current)

③ IM=25.0 ←——Output current is a quarter of the rated

(Description) 0 value of 2 decimal point is not displayed(Return ③)

VGET Command

This command allows receiving output voltage monitor with 0.0 to rated voltage(V)

(Syntax) VGET In case of range 20V/20A (increment of 0.01V)

(Return) ① VGET=20.0 ←——(Monitor value) = (20V)

② VGET=12.34 ←——(Monitor value) = (12.34V)

(Description) 0 value of 2 decimal point is not displayed(Return ①)

* Minimum setting value of VGET command is different for each model ,RK-400/800/1200/REk.

(See Section "7－3 Minimum setting / return value for each command".)

IGET Command

This command allows receiving output current monitor with 0.0 to rated current(A)

(Syntax) IGET In case of range 20V/20A (increment of 0.01A)

(Return) ① IGET=20.0 ←——(Monitor value) = (20A)

② IGET=12.34 ←——(Monitor value) = (12.34A)

(Description) 0 value of 2 decimal point is not displayed(Return ①)

* Minimum setting value of IGET command is different for each model ,RK-400/800/1200/REk.

(See Section "7－3 Minimum setting / return value for each command".)

STS Command

This command allows to receive the character string of the power supply's output status and setting status.

(Syntax) STS

(Return) #[UNIT number] [Status]

↓ The number of 0 to 31

↓

Status	Description
CF	Output cut off status
CO	Output enable status
LO	Local mode
RM	Remote mode
CC	Constant current mode
CV	Constant voltage mode
OVP	Over voltage protection
OCP	Over current protection
OT	Over temperature protection
ACF	AC input fault
RS	Sense reverse connect
LD	Interlock switch off

(Return) ①#1 CO RM CV← The unit number 1 is in the status of Output enable, Remote mode and Constant voltage mode
(Standard Digital Interface/LGob Option)

②CO RM CV ← The unit is in the status of Output enable, Remote mode and Constant voltage mode(LUs1 Option)

CH0? Command

This command allows receiving the setting value of output voltage with hexadecimal format.

(Syntax) CH0?

(Return) ① CH0=FFFFH ←——— Output voltage is set to a maximum of the rated

② CH0=7FFFH ←——— Output voltage is set to a half of the rated

CH1? Command

This command allows receiving the setting value of output current with hexadecimal format.

(Syntax) CH1?

(Return) ① CH1=FFFFH ←——— Output voltage is set to a maximum of the rated

② CH1=7FFFH ←——— Output voltage is set to a half of the rated

CH2? Command

This command allows receiving the setting value of over voltage protection setting value with 00_H to FF_H (8bit).

Maximum over voltage protection value = maximum rated voltage x 110%

(Syntax) CH2?

(Return) ① CH2=FFH ←——— Set to a maximum over voltage protection value

② CH2=7FH ←——— Set to a half of maximum over voltage protection value

CH7? Command

This command allows receiving the setting value of over current protection setting value with 00_H to FF_H (8bit).

Maximum over current protection value = maximum rated current x 110%

(Syntax) CH7?

(Return) ① CH7=FFH ←——— Set to a maximum over current protection value

② CH7=7FH ←——— Set to a half of maximum over current protection value

VCN? Command

This command allows receiving the setting value of output voltage with 0.0 to 100.0% (increment of 0.01%)

(Syntax) VCN?

(Return) ① VCN=100.0 ←— Output voltage is set to a maximum rated voltage

② VCN=12.34 ←— Output voltage is set to 12.34% of maximum rated voltage

③ VCN=25.0 ←— Output voltage is set to 25% of maximum rated voltage

ICN? Command

This command allows receiving the setting value of output current with 0.0 to 100.0% (increment of 0.01%)

(Syntax) ICN?

(Return) ① ICN=100.0 ←— Output current is set to a maximum rated current

② ICN=12.34 ←— Output current is set to 12.34% of maximum rated current

③ ICN=25.0 ←— Output current is set to 25% of maximum rated current

OVP? Command

This command allows receiving the setting value of over voltage protection setting value with 0.0 to 100.0%(increment of 0.1%)

Maximum over voltage protection value = maximum rated voltage x 110%

(Syntax) OVP?

(Return) ① OVP=100.0 ←— Set to a maximum over voltage protection value

② OVP=12.3 ←— Set to 12.3% of maximum over voltage protection value

③ OVP=25.0 ←— Set to 25% of maximum over voltage protection value

OCP? Command

This command allows receiving the setting value of over current protection setting value with 0.0 to 100.0%(increment of 0.1%)

Maximum over current protection value = maximum rated current x 110%

(Syntax) OCP?

(Return) ① OCP=100.0 ←— Set to a maximum over current protection value

② OCP=12.3 ←— Set to 12.3% of maximum over current protection value

③ OCP=25.0 ←— Set to 25% of maximum over current protection value

VSET? Command

This command allows receiving the setting value of output voltage with 0.0 to rated voltage (increment of 0.01V)

(Syntax) VSET? (in case of 20V/20A)

(Return) ① VSET=20.0 ←—— Set to 20.0V

② VSET=12.34 ←—— Set to 12.34V

③ VSET=0.8 ←—— Set to 0.8V

(Description) 0 value of 2 decimal point is not displayed(Return ③)

※ Minimum setting value of VSET? command is different for each model ,RK-400/800/1200/REk.

(See Section "7－3 Minimum setting / return value for each command".)

ISET? Command

This command allows receiving the setting value of output current with 0.0 to rated voltage (increment of 0.01A)

(Syntax) ISET? (in case of 20V/20A)

(Return) ① ISET=20.0 ←—— Set to 20.0A

② ISET=12.34 ←—— Set to 12.34A

③ ISET=2.5 ←—— Set to 2.5A

(Description) 0 value of 2 decimal point is not displayed(Return ③)

※ Minimum setting value of ISET? command is different for each model ,RK-400/800/1200/REk.

(See Section "7－3 Minimum setting / return value for each command".)

OVPSET? Command

This command allows receiving the setting value of over voltage protection value with 0.0 to rated voltage (increment of 0.01V)

Maximum over voltage protection value = maximum rated voltage x 110%

(Syntax) OVPSET? (in case of 20V/20A)

① OVPSET=22.5 ←—— Set to 22.5V

② OVPSET=12.34 ←—— Set to 12.34V

③ OVPSET=2.3 ←—— Set to 2.3V

(Description) 0 value of 2 decimal point is not displayed(Return ③)

OCPSET? Command

This command allows receiving the setting value of over current protection value with 0.0 to rated current (increment of 0.01A)

Maximum over current protection value = maximum rated current x 110%

(Syntax) OCPSET? (in case of 20V/20A)

① OCPSET=22.5 ←—— Set to 22.5A

② OCPSET=12.34 ←—— Set to 12.34A

③ OCPSET=2.3 ←—— Set to 2.3A

(Description) 0 value of 2 decimal point is not displayed(Return ③)

SW? Command

This command allows receiving the setting output status with 0 or 1(OFF/ON)

(Syntax) SW?

(Return) ① SW0 ←——— Disable the output

② SW1 ←——— Enable the output

DELAY? Command

This command allows receiving the status of delay trigger function.

(Syntax) DELAY?

(Return) ① DELAY0 ←——— delay trigger function OFF

② DELAY1 ←——— delay trigger function ON

TON? Command

This command allows receiving the setting of ON delay time 0.0 to 99.9(sec)

(Syntax) TON?

(Return) ① TON=0.1s ←——— Set to 0.1sec

② TON=12.3s ←——— Set to 12.3sec

③ TON=2.3s ←——— Set to 2.3sec

TOFF? Command

This command allows receiving the setting of OFF delay time 0.0 to 99.9(sec)

(Syntax) TOFF?

(Return) ① TOFF=0.1s ←——— Set to 0.1sec

② TOFF=12.3s ←——— Set to 12.3sec

③ TOFF=2.3s ←——— Set to 2.3sec

SLAVE? Command

This command allows receiving the Local / Remote status of slave setting.

(Syntax) SLAVE?

(Return) ① SLAVE0 ←——— slave setting is Local

② SLAVE1 ←——— slave setting is Remote

7－3 Minimum setting / return value list

Minimum setting / return value for each command

Command	RK-400/800/1200/REk Series Model		increment
VSET, VGET, VSET?	RK400	Models below 10V	0.001V
		Over 10V Below 100V	0.01V
		Models over 100V	0.1V
	RK800	Models below 10V	0.001V
		Over 10V Below 100V	0.01V
		Models over 100V	0.1V
	RK1200	Models below 10V	0.001V
		Over 10V Below 100V	0.01V
		Models over 100V	0.1V
	REk	Models below 10V	0.001V
		Over 10V Below 100V	0.01V
		Models over 100V	0.1V
ISET, IGET, ISET?	RK400	Models over 10A	0.01A
		Below 10A Over 1A	0.001A
		Models below 1A	0.1mA
	RK800	Models over 100A	0.1A
		Below 100A Over 10A	0.01A
		Models below 10A	0.001A
	RK1200	Models over 100A	01A
		Below 100A Over 10A	0.1A
		Models below 10A	0.1A
	REk	Models over 100A	01A
		Below 100A Over 10A	0.1A
		Models below 10A	0.1A

* Minimum value of each mode is same as minimum display digit on display.

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