TEXIO
Test and Measurement Solutions

INSTRUCTION MANUAL

GP-IB ADAPTER
GP-600B

B71-0092-01

CONTENTS

USING THE PRODUCT SAFELY

■ Preface

To use the product safely, read this manual to the end. Before using this product, understand how to correctly use it.
If you read this manual but you do not understand how to use it, call the company that is indicated on the back cover of this manual. After you read this manual, keep it so that you can read it anytime as required.

■ Notes on reading this manual

The contents of this manual include technical terms in part of their explanation.
If you do not understand those terms, do not hesitate to ask the company or our distributor.

■ Pictorial indication and warning character indication

This manual and product show the warning and caution items required to safely use the product. The following pictorial indication and warning character indication are provided.

<Pictorial Indication> 	Some part of this product or the manual may show this pictorial indication. In this case, if the product is incorrectly used in that part, a serious danger may be brought about on the user's body or the product. To use the part with this pictorial indication, be sure to refer to this manual.
<Warning character Indication>  **WARNING**	If you use the product, ignoring this indication, you may get killed or seriously injured. This indication shows that the warning item to avoid the danger is provided.
 **CAUTION**	If you incorrectly use the product, ignoring this indication, you may get slightly injured or the product may be damaged. This indication shows that the caution item to avoid the danger is provided.

Please acknowledge beforehand that our company does not assume the responsibility for the user or the third person's misuse, abuse, neglect, unauthorized product modification or failure to follow this manual, and other troubles, or any damages caused by use of this product.

USING THE PRODUCT SAFELY

WARNING

■ Do not remove covers and panels from the product.

Never remove the product's covers and panels for any purpose. Otherwise, electric shock to the users or a fire may be incurred.

■ Warning on using the product

The warning items given below are to avoid danger to the user's body and life and avoid the damage and deterioration of the product. Use the product, observing the following warning and caution items.

■ Warning about Power Source

●Source voltage

Use the product on the rated source voltage marked on the product. Using the product on other voltage may result in a fire. The rated voltage range of the product is the marked voltage ±10%. Use the product in this range.

●Power Cable

IMPORTANT: The power cable set supplied with the GP-600B is unusable for any other products.

Disuse the power cable and contact our distributor if the supplied power cable becomes defective. Using the product with the defective power cable may result in electric shocks, electrocution, or a fire.

●The fuse for protection

The product will not run if its input power protection fuse flows out. The protection fuse is built in the product, and the user cannot replace it. When the fuse blows out, contact our distributor without opening the casing. The user must not open the casing or replace the fuse arbitrarily. Disobedience to this instruction may result in electric shocks, electrocution, or a fire.

●Changing the source voltage rating

The user cannot change the source voltage of the product. Contact our distributor, if it is necessary to change the source voltage rating marked on the product. The user must not open the casing or change the source voltage rating. Disobedience to this instruction may result in electric shocks, electrocution, or a fire.

USING THE PRODUCT SAFELY

⚠ WARNING

■ Warning item on grounding

The product has the GND terminal on the panel surface to protect the user from electric shock and protect the product. Be sure to ground the product to safely use it.

■ Warning item on installation environment

●Operating temperature

Use the product within the operating temperature indicated in the rating column. If the product is used with the vents of the product blocked or in high ambient temperatures, a fire may occur.

●Operating humidity

Use the product within the operating humidity indicated in the rating column. Watch out for condensation by a sharp humidity change such as transfer to a room with a different humidity. Also, do not operate the product with wet hands. Otherwise, an electric shock or fire may occur.

●Use in a gas

Use in and around a place where an inflammable or explosive gas or steam is generated or stored may result in an explosion and fire. Do not operate the product in such an environment.

Also, use in and around a place where a corrosive gas is generated or spreading causes a serious damage to the product. Do not use the product in such an environment.

●Do not let foreign matter in

Do not insert metal and flammable materials into the product from its vent and spill water on it. Otherwise, an electric shock and fire may occur.

■ Warning item on abnormality while in use

If smoke or fire is generated from the product while in use, stop using the product, turn off the switch, and remove the power cord plug from the outlet. After confirming that no other devices catch fire, call the company or our distributor.

USING THE PRODUCT SAFELY

CAUTION

■ Input/output terminal

Maximum input to the input terminals is specified to prevent the product from being damaged.
Do not supply input, exceeding the specifications that are indicated in the "Rating" or "Caution on use" column in this manual of the product. Otherwise, a product failure is caused.
Also, do not supply power to the output terminals from the outside. Otherwise, a product failure is caused.

■ When the product is left unused for a long time

Be sure to remove the power plug from the outlet.

〈Calibration〉

Although the performance and specifications of the product are checked under strict quality control during shipment from the factory, they may slightly change because of secular changes in its parts. It is recommended to periodically calibrate the product so that it is used with its performance and specifications stable. For consultation about the product calibration, call the distributor or the company where you bought the product.

〈Daily maintenance〉

When you clean off the dirt of the product covers, panels, and knobs, avoid solvents such as thinner and benzene. Otherwise, paint may peel off or the resin surface may be affected.
To wipe off the covers, panels, and knobs, use a soft cloth with neutral detergent in it.
During cleaning, be careful that water, detergents, and other foreign matters do not get into the product.
If a liquid or metal gets into the product, an electric shock and fire are caused. During cleaning, remove the power cord plug from the outlet.

Use the product correctly and safely, observing the above warning and caution items.
Because this manual indicates caution items even in individual items, observe those caution items to correctly use the product.
If you have questions or comments about the content of this manual, call the company or our distributor.

1. GENERAL

The GP-600B adapter is designed to set the constant voltage and constant current and control the OUTPUT switches and power relays of the regulated DC power supply units, PS, PA-B, PD-A and PT series from a computer through the GP-IB bus (in conformity to the IEEE488-1978).

- The GP-600B has an interface function in conformity to the IEEE488-1978.
  The GP-600B also has an SRQ function to detect errors in the power supply units for safety system control.
- The GP-600B converts digital signals through the GP-IB bus into two channels (four references) of analog signals.
  The GP-600B has two references per channel and can control the voltage and current of the power supply units through a single channel. Each channel of the GP-600B is isolated. A D/A converter with 12-bit resolution is used for each reference, allowing high-precision setting.

2. SPECIFICATIONS

【GP-IB】

Electrical specifications: In conformity to the IEEE488-1978.

Mechanical specifications: In conformity to the IEEE488-1978.

Interface functions	: SH1,AH1,T6,L3,SR1,RL2,PP0,DC1,DT0,C0
Address setting	: Set addresses 0 to 30 optionally with the address switches.
Listen-only mode	: Set with the L-ONLY switch.
Delimiter	: Set with the EOI/CR.LF switch.
Output Off function	: Turn off output with the OUTPUT OFF key.
Service request functions	: GP-IB command errors GP-IB parameter errors OVP operation and alarm (OCP, OTP and power off) operations CV operation, CC operation and OUTPUT OFF key

【Analog Outputs】

	Outputs A & B (CH1)	Outputs C & D (CH2)
Output voltage range	: 0V to10V	0V to 10V
Full-scale voltage range	: 10V±15%	10V±15%
Max. output current	: 3mA	3mA
D/A converter resolution	: 12bit,0.025%(2.4mV)	12bit,0.025%(2.4mV)
Output ripple noises(r.m.s) (10Hz to 1MHz)	: 500μV	500μV
Input power fluctuation (±10% variance)	: 1.5mV	1.5mV
Temperature coefficient (Typical)	: 50ppm/℃	50ppm/℃
Rise time (10% to 90%,10kΩ load)	: 100μs or less	100μs or less

【Digital I/O】

Control signals	OUTPUT ON/OFF	TTL level	Low(ON)/High(OFF)
POWER relay ON/OFF		TTL level	Low(ON)/High(OFF)
Status signals	CV operation (SRQ)	TTL level	Low(CV)/High(indefinite)
	CC operation (SRQ)	TTL level	Low(CC)/High(indefinite)
	Alarm ON(SRQ)	TTL level	Low(ON)/High
	Power ON/OFF		Low(ON)
	OVP ON(SRQ)		Low(ON)

【Operation Conditions】

Guaranteed operating temp. range : 0℃ to 40℃

Guaranteed humid. range : 80% or less

【Dielectric Strength】

GP-IB connector - analog output : AC500V for 1 minute

Between analog outputs : AC500V for 1 minute
(A-C, D, and B-C, D)

Analog output - casing : AC500V for 1 minute

Input power source - casing : AC1.5kV for 1 minute

Input power source - analog output : AC1.5kV for 1 minute

【Insulation Resistance】

Input power source - casing : DC500V 30MΩ or more

Analog output - casing : DC500V 30MΩ or more

【Power Source & Power Consumption】

: AC100V±10%,50Hz/60Hz
AC120V, 200V, 220V and 240V are
selectable with an internal switch 7W

【Dimensions (max.) & Weight】

(W)70mm x (H)134mm x (D)363.1mm,
approx. 2.5 kg

【Accessories】

CD-ROM (Instruction manual)	1
20-pin connectors	2
Power cable	1

3. INSTRUCTIONS ON USE

●Checking the power source

-Use the GP-600B on the source voltage rating.

●Replacing the fuse, and changing the source voltage rating

-Contact our distributor if it is necessary to replace the fuse or change the source voltage rating.

●Ambient temperature and installation site

-Do not use the GP-600B in a place whose temperature and/or humidity exceeds the rating.

-Do not use the GP-600B in a place with much dust or vibrations.

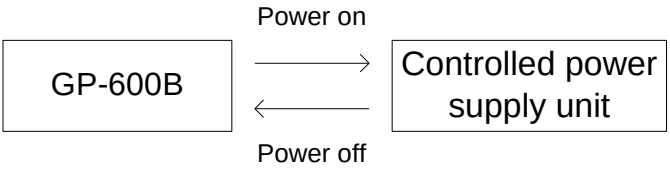
-Take noise reducing measures properly if there is a large noise source around the GP-600B.

●Before turning on the GP-600B

-Complete all connections and make sure that connections are done properly before turning on the GP-600B.

-Turn on or off power in the order shown in the drawing below.

-Do not plug or unplug any connector in the power on condition.

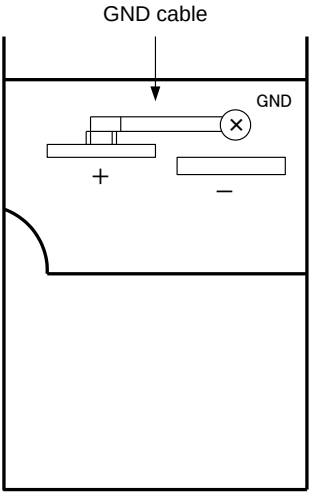


●Precautions for connecting the GND cable and shorting bar

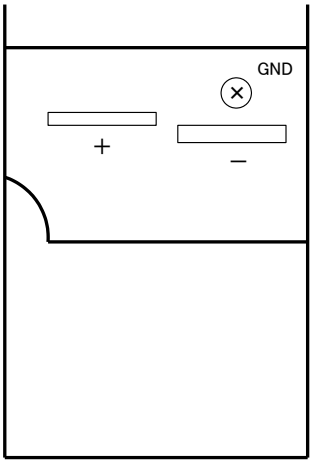
-Be sure to connect the GND cable and shorting bar of the power supply unit as shown below when the GP-600B is combined with floating circuit type power supply units.

PS series power supply unit

Rear panel of the PS series



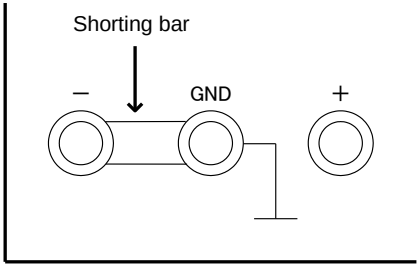
Connect the GND cable between the + and GND terminals, or disconnect the GND cable as shown on the right.



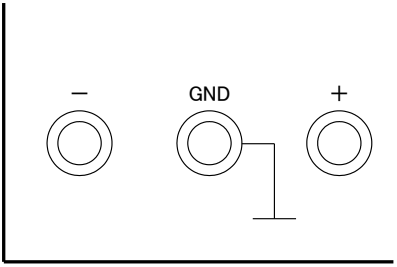
Be sure to disconnect the GND cable when it is not used.

PA-B series

Precautions for connecting the GND cable and shorting bar



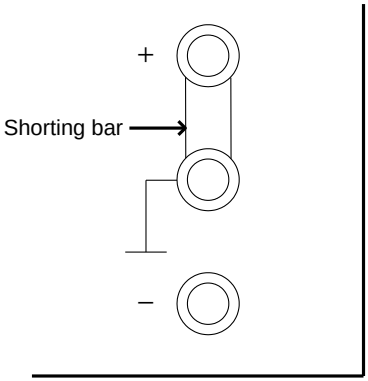
Connect the shorting bar between the - and GND terminals, or disconnect the GND cable as shown on the right.



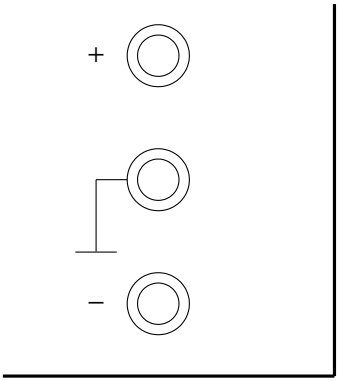
Disconnect the shorting bar.

PD-A series

Precautions for connecting the GND cable and shorting bar



Connect the shorting bar between the + and GND terminals, or disconnect the GND cable as shown on the right.



Disconnect the shorting bar.

●System interface

-Be sure to use control software applicable to the service requests when the GP-600B is used with the service requests enabled.

-Give listen-only specification from the controller when the GP-600B is used in the listen-only mode.

●Output ripple noises

-When the GP-600B is connected with the regulated DC power supply units, the DC power supply units may output more ripple noises than those in individual operation. This is because the cables lead to bad influences upon noises or the regulated DC power supply units amplify ripple noises output from the GP-600B.

●Precautions for connection

-The GP-600B converts digital signals through the GP-IB bus into analog signals with two D/A converters in two isolated channels and outputs individual four-channel analog signals. However, do not use the reference channels B and D in the floating condition. Such operation does not guarantee the proper performances. Be sure to connect the negative (-) output of the channel B with the negative (-) output of the channel A and the negative (-) output of the channel D with the negative (-) output of the channel C, when the channel B and D are used individually.

4. SYSTEM CONFIGURATION

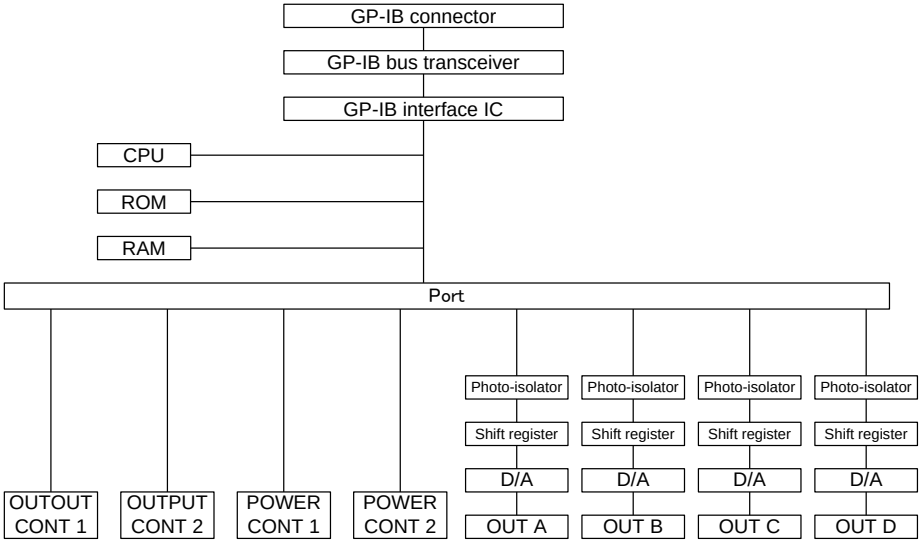
4-1. Principle of Operation

Digital signals through the GP-IB connector are supplied to the GP-IB interface IC through the bus transceiver.

The handshaking timing of this GP-IB interface conforms to theIEEE488-1978. Codes received by the GP-IB interface are decoded by the CPU then. The CPU converts the data into binary data and outputs to the D/A converters through serial output ports. Those data pass through photo-isolators and are isolated. The shift registers convert them into parallel data, which are input to the D/A converters. The CPU also executes controls of the control connectors and SRQ processing.

The block diagram of the GP-600B is as shown below.

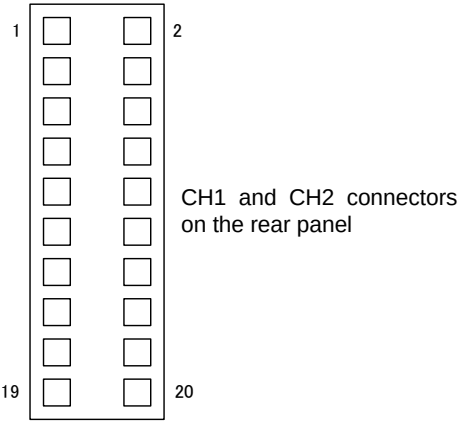
Block diagram



4-2. System Configuration

Check the specifications of the GP-600B and power supply units to configure the most appropriate system.

1) I/O specifications of the GP-600B



Pin No.	Functions	Remarks
1	Analog output, 0V - 10V: Voltage control	
2	GND for voltage control terminals	
7	Analog output, 0V- 10V: Current control	
8	GND for current control terminals	
3 to 6	NC	
9	Digital output: Output On/Off (+)	Photo-coupler
10	Digital output: Output On/Off (-)	Photo-coupler
11	Digital input: Alarm signal	HC14
12	Digital GND	
13	Digital input: CV mode signal	HC14
14	Digital input: CC mode signal	HC14
15	Digital input: Power On signal	HC14
16	Digital input: OVP signal	HC14
17	Digital output: Output On/Off	HC07
18	Digital output: Power On/Off	HC07
19	Digital power supply, +5V	
20	Digital GND	

∗ Both the CH1 and CH2 connectors have the same specifications.

2) Connectable series

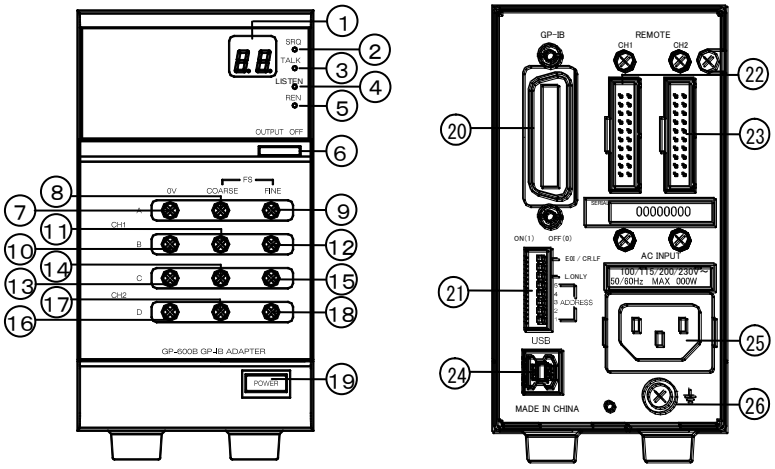
The GP-600B may control the following series.

PS series, PA-B series, PD-A series, and PT series

4-3. Output Status when GP-600B is Turned On

CH1 voltage control output (Reference A)	0V
CH1 current control output (Reference B)	0V
CH1 output control	5V (Off)
CH1 power relay control	5V (Off)
CH2 voltage control output (Reference C)	0V
CH2 current control output (Reference D)	0V
CH2 output control	5V (Off)
CH2 power relay control	5V (Off)

5. FRONT AND REAR PANELS



① ADDRESS

Normally, the address set with the address switches on the rear panel is displayed here.

No data is displayed in the listen-only mode.

② SRQ

This LED indicates the service request status.

It is lit while an SRQ resides on the GP-IB bus.

③ TALK

This LED indicates the talk status.

It is lit when the talker status is specified on the GP-IB bus.

④ LISTEN

This LED indicates the listen status.

Normally, it is lit when the listener status is specified on the GP-IB bus.

It is always lit, in the listen-only mode.

⑤ REN

This LED indicates the remote status.

It is lit during the remote status (where the power supply units are controlled through the GP-IB bus).

It is always lit, in the listen-only mode.

⑥ OUTPUT OFF(Non lock)

This switch nulls the reference output and turns off output when one of reference outputs A to D or channel 1 and 2 outputs is set. A service request is also output in this condition.

See the description enclosed in the rectangular frame on page 32 for the procedures of resetting this status to the previous status.

⑦ CH1 A 0V

This semi-fixed (one-turn) resistor is used to adjust the output offset of channel 1, A.

⑧ CH1 A FS COARSE

This semi-fixed (four-turn) resistor is used to adjust the output voltage of channel 1, A coarsely.

⑨ CH1 A FS FINE

This semi-fixed (one-turn) resistor is used to adjust the output voltage of channel 1, A finely.

⑩ CH1 B 0V

This semi-fixed (one-turn) resistor is used to adjust the output offset of channel 1, B.

⑪ CH1 B FS COARSE

This semi-fixed (four-turn) resistor is used to adjust the output voltage of channel 1, B coarsely.

⑫ CH1 B FS FINE

This semi-fixed (one-turn) resistor is used to adjust the output voltage of channel 1, B finely.

⑬ CH2 C 0V

This semi-fixed (one-turn) resistor is used to adjust the output offset of channel 2, C.

⑭ CH2 C FS COARSE

This semi-fixed (four-turn) resistor is used to adjust the output voltage of channel 2, C coarsely.

⑮ CH2 C FS FINE

This semi-fixed (one-turn) resistor is used to adjust the output voltage of channel 2, C finely.

⑯ CH2 D 0V

This semi-fixed (one-turn) resistor is used to adjust the output offset of channel 2, D.

⑰ CH2 D FS COARSE

This semi-fixed (four-turn) resistor is used to adjust the output voltage of channel 2, D coarsely.

⑱ CH2 D FS FINE

This semi-fixed (one-turn) resistor is used to adjust the output voltage of channel 2, D finely.

⑲ POWER

Press this power switch to turn on the GP600-B. When the GP600B is turned on, the ADDRESS 7-segment LED goes on (normally) or the LISTEN LED goes on (in the listen-only mode).

⑳ GP-IB connector

This is a 24-pin Amphenol connector in conformity to the GP-IB Standards (IEEE488-1978). Connect the GP-IB bus cable to this connector.

㉑ Address switches

Use these switches to set the address of the GP-600B on the GP-IB bus, listen-only mode, and send delimiter. (See page 15.)

㉒ CH1 connector

Connect a cable between this connector and a power supply unit to be controlled. Analog outputs A and B and digital control signals of channel 1 are input and output through this connector.

㉓ CH2 connector

Connect a cable between this connector and a power supply unit to be controlled. Analog outputs C and D and digital control signals of channel 2 are input and output through this connector.

㉔ USB connector

A simple USB (virtual COM) port. Connect a USB cable.

㉕ AC inlet

Connect the AC power cable supplied with the GP-600B to this inlet.

㉖ GND terminal screw

Be sure to connect a grounding wire to this terminal in order to ensure safety and to avoid malfunctioning caused by external noises.

6. OPERATION PROCEDURES

6-1. Setting and Connection

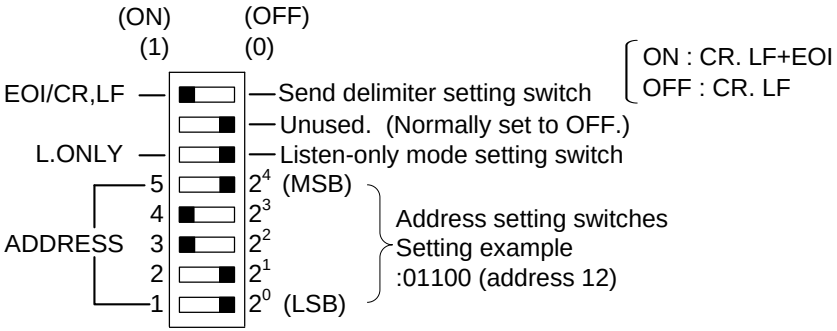
1) Connecting the GP-IB bus cable

-Connect the GP-IB bus cable between the GP-IB connector receptacle of the GP-600B and the controller.

> NOTE: Never plug or unplug the connector while the GP-600B is electrified. Disobedience to this instruction may result in malfunctioning or troubles.
> Fix the GP-IB bus cable to the GP-IB connector receptacle of the GP-600B firmly with the screws.

2) Setting the address, listen-only mode, and send delimiter

-Use the address switches (8-bit DIP switches) on the rear panel of the GP-600B to set the address of the GP-600B on the GP-IB bus, listen-only mode, and send delimiter.



-Set the address in binary with the address switches (1 to 5). It may be freely set in the range from 0 to 30. It is prohibited to set all switches to ON (i.e., address 31). Do not attempt such setting.

-Set the L.ONLY switch to ON to set the listen-only mode.

-Set the EOI/CR.LF switch to ON to select the "CR.LF + EOI" delimiter. Set the switch to OFF to select the "CR.LF" delimiter.

NOTE: Setting of the address switches is read in when the GP-600B is turned on. Be sure to carry out setting before turning on the GP-600B.

3) Output Off function

-The reference outputs A, B, C and D are reset to zero (i.e., outputs are turned off) when the OUTPUT OFF key on the panel of the GP-600B is pressed. The outputs may be restored with the command with no parameter (shown in the frame on page 32). The connected power supply units stay in the remote state. Bring each unit individually into the local state.

6-2. External Control Functions

Following connector for external control is supplied with the product.

1. XG5M-2635-N (manufactured by OMRON Corporation)

This section describes how to assemble the external control connector.

6-2-1 To assemble the connector XG5M-2635-N

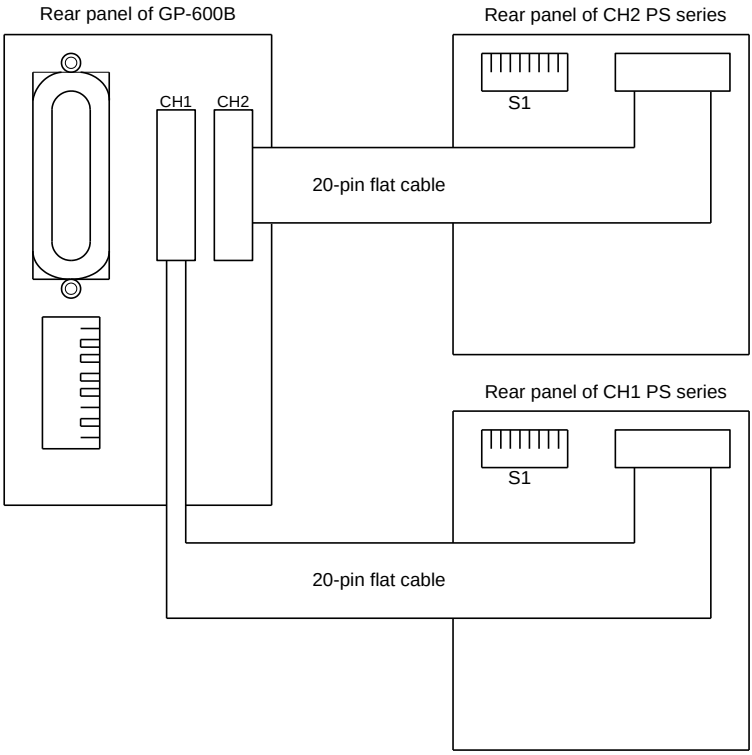
The mounting of the wire to the contact, in order to improve the reliability, please use the (OMRON) special tool XY2B-7006. In addition, the application wire rod is twist line AWG28 - AWG26, external form Φ1.1-Φ1.3.

Specifically, please review an instruction manual of XY2B-7006. For details, please confirm the operation manual of XY2B-7006.

In the case of faulty wiring or wiring change, please use the (OMRON) special tool XY2E-0001 that is withdrawn from the housing contact. For details, please confirm the operation manual of XY2E-0001.

6-3. Connection with Power Supply Unit to be Controlled

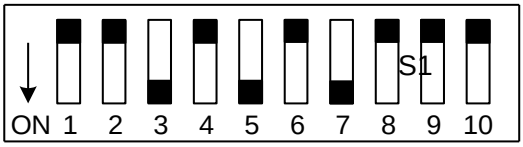
6-3-1 Connection with the PS series



-Use the OP-18-PS to connect the PS series with the GP-600B.

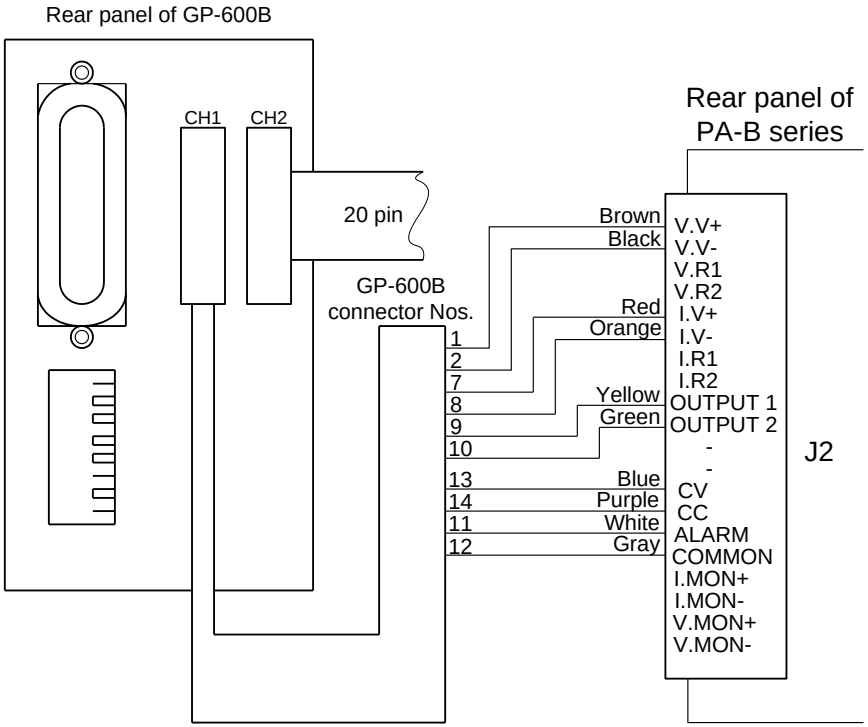
-Setting of the DIP switch cluster S1

Set the DIP switches of the PS power supply units as shown below when connecting them with the GP-600B.



Switches 3, 5 and 7: ON

6-3-2 Connection with PA-B series



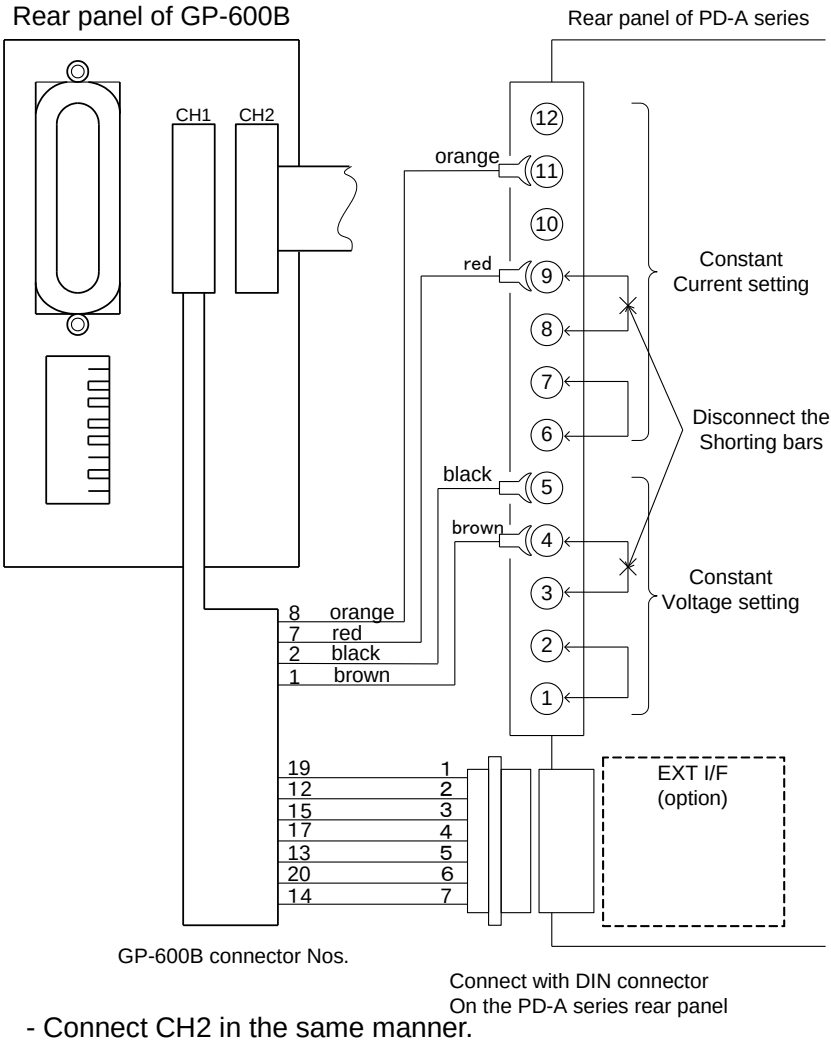
-Connect CH2 in the same manner.

-Carry out wiring as shown above using the connectors supplied with the GP-600B, or use the OP-18-PAB to connect with the GP-600B.

-Set the Vext. V, lext. V and OUTPUT switches on the front panel of the PA-B series to the upper positions.

-Connect the voltage control wires even if current control is only used.

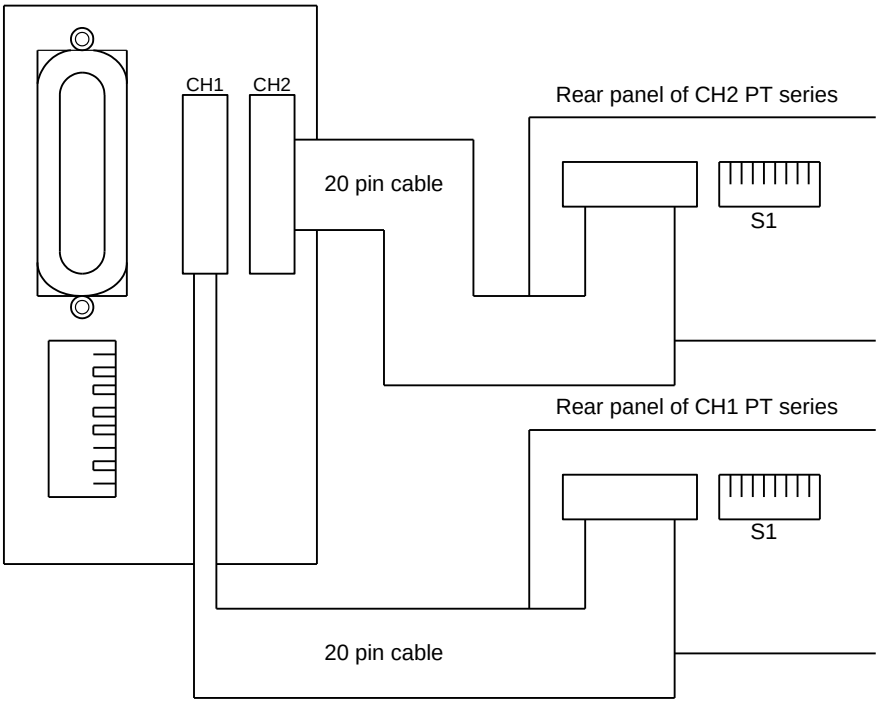
6-3-3 Connection with PD-A series



- Connect CH2 in the same manner.
- Carry out wiring as shown above using the connectors supplied with the GP-600B, or use the OP-18-PDA to connect with the GP-600B.
- The optional device is required for output On/Off control and status signal control.

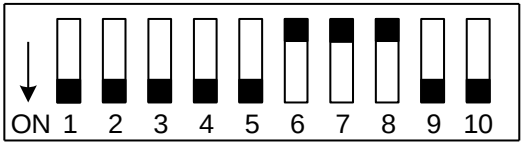
6-3-4 Connection with the PT series

Rear panel of GP-600B



Use the OP-18-PT to connect the PT series with the GP-600B. Connect the 20-pin connector with the GP-600B and 26-pin connector with the PT series.

- Setting of the DIP switch cluster S1



Switches 6, 7 and 8: ON

6-4. GP-IB

1) Interface

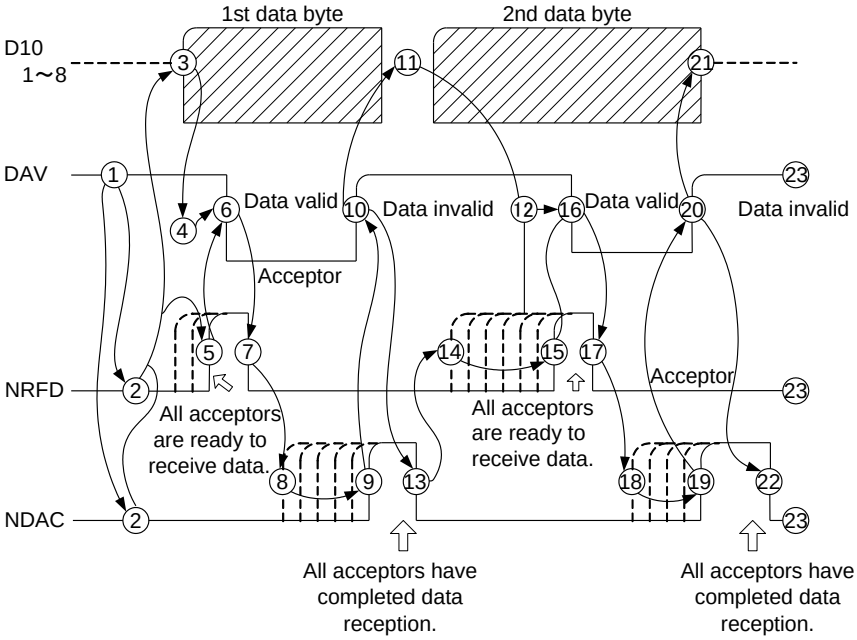
The general-purpose interface bus GP-IB is an internationally standardized interface bus for measuring instruments. It is a byte-serial, bit-parallel interface bus specified in the interface standards. It allows measuring system configuration that consists of a maximum of fifteen devices, including the controller and measuring instruments, with the total maximum cable length of 20 meters (provided the maximum length of each cable is four meters) at the maximum transmission rate of 1Mb/s or less.

It features a three-wired asynchronous handshaking method, and devices of different transmission rates may reside in a single system. Piggyback connection allows the devices to be connected by plugging a connector on another one.

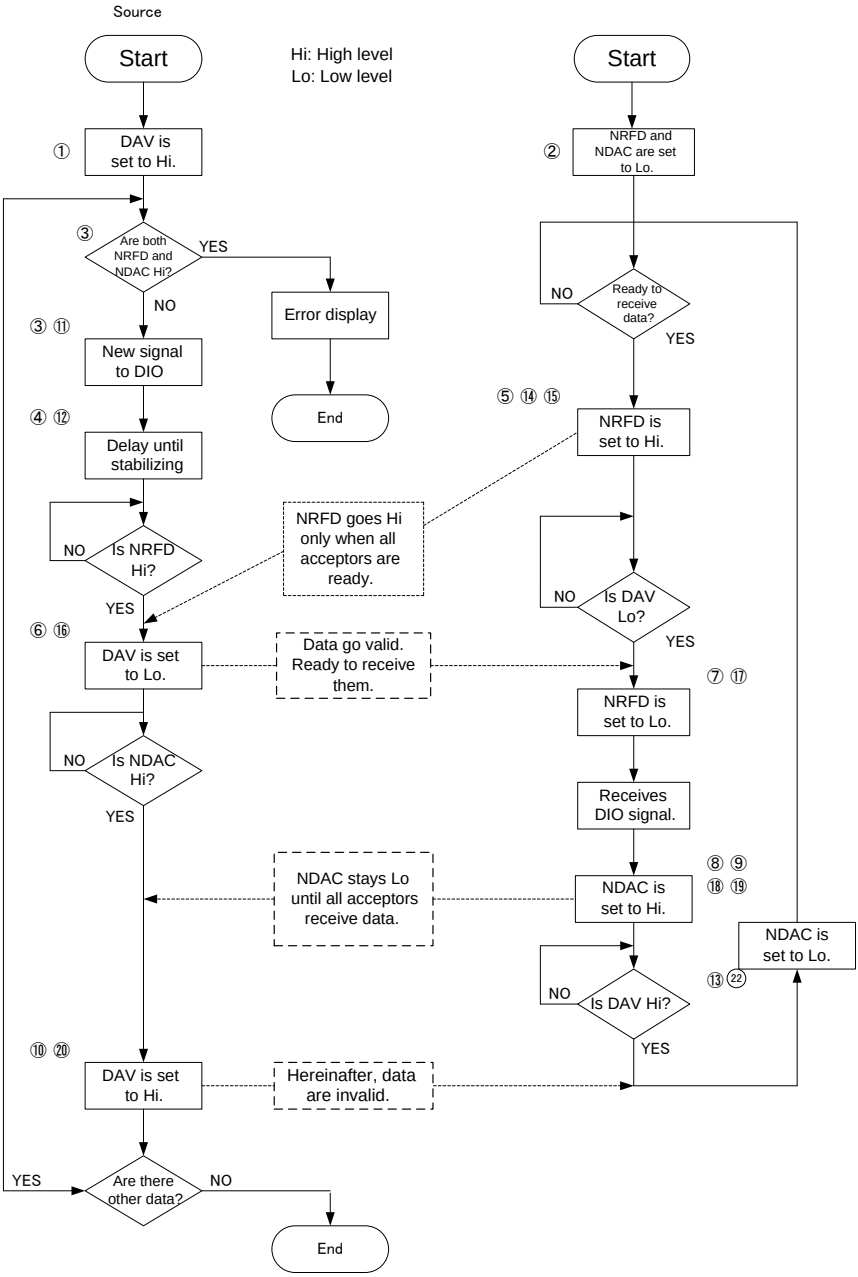
Fig. 1 shows the timing chart of the hand shaking sequence.

Fig. 2 shows the flow chart.

Timing chart of the hand shaking sequence



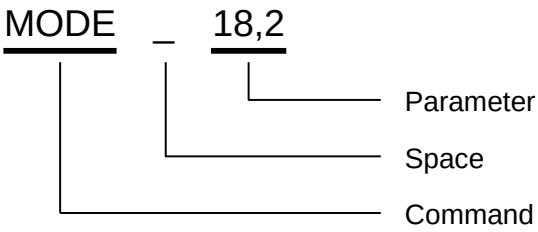
Flow chart


Source
Start
Hi: High level
Lo: Low level
Start
① DAV is set to Hi.
② NRFD and NDAC are set to Lo.
③ Are both NRFD and NDAC Hi?
YES
NO
Error display
End
③ ⑪ New signal to DIO
④ ⑫ Delay until stabilizing
NO Is NRFD Hi?
YES
NRFD goes Hi only when all acceptors are ready.
⑥ ⑯ DAV is set to Lo.
Data go valid. Ready to receive them.
NO Is NDAC Hi?
YES
NDAC stays Lo until all acceptors receive data.
⑩ ⑳ DAV is set to Hi.
Hereinafter, data are invalid.
YES Are there other data? NO
End
NO Ready to receive data?
YES
⑤ ⑭ ⑮ NRFD is set to Hi.
NO Is DAV Lo?
YES
⑦ ⑰ NRFD is set to Lo.
Receives DIO signal.
⑧ ⑨ ⑱ ⑲ NDAC is set to Hi.
NO Is DAV Hi?
YES
⑬ ㉒ NDAC is set to Lo.

2) Command format

A command consists of an alphabetic command operand, which shows the contents, and an alphabetic or numeric parameter, which follows the command operand. The command operand and parameter must be separated with one or more spaces. A space in the command operand or parameter causes a command or parameter error.

Example: Mode setting PA18-2B



It is possible to write several commands on a single line if they are separated with separators ":" or ";". (Multi-statement) However, among data request commands, the last one is only valid. If a command contains an error, that command causes a GP-IB error SRQ and the following command is executed. A delimiter is added to the end of a command. Any of the following may be used as the delimiter.

CR.LF
CR
LF
CR.LF+EOI
CR+EOI
LF+EOI
EOI

It is possible to select CR.LF or CR.LF + EOI as the send delimiter with the address switches on the rear panel.

Control Command List

	Type	Function name	Command name (Parameter)	Default value
Common command	C	Resets the value to the default.	*RST	–––
Common command	C	Clears the status byte.	*CLS	–––
Common command	Q	Reads the equipment ID.	*IDN?	–––
Data setting command 1	CQ	Sets a channel.	SELECT X1	–––
Data setting command 2	CQ	Sets a voltage/current mode.	MODE X1,X2	–––
Data setting command 3	CQ	Sets the voltage.	VOLT X1	–––
Data setting command 4	CQ	Sets the current.	AMP X1	–––
Data setting command 5	CQ	Output control	OUT X1	–––
Data setting command 6	CQ	Power relay control	POWER X1	–––
Data setting command 7	CQ	Sets SRQ masking.	MASK X1	1111111111
Data setting command 8	CQ	Sets an output Off channel.	OFFCH X1	1
Data setting command 9	CQ	Sets the maximum value of the reference A.	MODEA X1	–––
Data setting command 10	CQ	Sets the maximum value of the reference B.	MODEB X1	–––
Data setting command 11	CQ	Sets the maximum value of the reference C.	MODEC X1	–––
Data setting command 12	CQ	Sets the maximum value of the reference D.	MODED X1	–––
Data setting command 13	CQ	Sets the output value of the reference A.	SETA X1	–––
Data setting command 14	CQ	Sets the output value of the reference B.	SETB X1	–––
Data setting command 15	CQ	Sets the output value of the reference C.	SETC X1	–––
Data setting command 16	CQ	Sets the output value of the reference D.	SETD X1	–––
Data setting command 17	CQ	Sets the SRQ masking time.	MTIME X1	10
Data setting command 18	CQ	Sets the listen-only mode.	LISTEN X1	0
Data request command	CQ	Inquires about the status data.	STATUS?	–––

NOTES: 1. “C” means a command function and “Q” means a query function in “Type” above.
2. “X1” and “X2” in commands are parameters. (See the command list.)

3) Common commands

Command: *RST

Function: Resets the followings to the default values.

Clear the communication buffer.

Clear each command parameter.

Clear the status byte.

However, the REN status is unchanged to ensure the command operation.

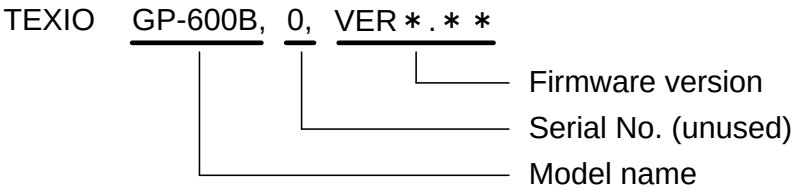
(The REN and LISTEN LEDs go on.)

Command: *CLS

Function: Clear the status byte.

Command: *IDN?

Function: Read the device ID.



4) Data setting commands (Listener operation)

1. Channel setting

Command: SELECT X1

Function: Specify a channel whose power supply unit model, voltage and power mode, output voltage, output current, output, and power relay are to be set. When the GP-600B is turned on first, no channel has been set yet. Thus, the MODE, VOLT, AMP, OUT or POWER command causes a GP-IB run error if it is executed without setting a channel. Once a channel is specified, it is stored.

Parameter: X1: 0: Select both channels 1 and 2.
1: Select channel 1.
2: Select channel 2.

2. Voltage and current mode setting

Command: MODE X1, X2

Function: Function: Set the rated voltage and current of the power supply unit connected to a selected channel. The reference output of the channel set with this command may only be set with the VOLT and AMP commands. If this command is received while outputting the reference, the reference output of the selected channel is reset to zero.

Parameter: X1: X1: Rated voltage (0.01 to 9999.99)
X2: Rated current (0.01 to 9999.99)
The format of the numeral is XXXX.XX.

3. Voltage setting

Command: VOLT X1

Function: Function: Set the output voltage of the power supply unit in the selected channel. This command is available only when the rated voltage and rated current of the selected channel are set with the MODE command. Otherwise, this command causes a GP-IB run error. If the output voltage is greater than the rated voltage, a parameter error occurs. The output voltage is set to zero when the GP-600B is turned on.

Parameter: X1: Output voltage (0 to rated voltage)

The format of the numeral is XXXX.XX.

The relationship between the reference output(s) and selected channel(s) is as shown below:

SELECT 0: References A and C
SELECT 1: Reference A
SELECT 2: Reference C

4. Current setting

Command: AMP X1

Function: Set the output current of the power supply unit in the selected channel. This command is available only when the rated voltage and rated current of the selected channel are set with the MODE command. Otherwise, this command causes a GP-IB run error. If the output current is greater than the rated current, a parameter error occurs. The output current is set to zero when the GP-600B is turned on.

Parameter: X1: Output current (0 to rated current)

The format of the numeral is XXXX.XX.

The relationship between the reference output(s) and selected channel(s) is as shown below:

SELECT 0: References B and D
SELECT 1: Reference B
SELECT 2: Reference D

5. Output control

Command: OUT X1

Function: Turn on or off the output of the selected channel (power supply unit). The output is off when the GP-600B is turned on.

Parameter: X1 : 0－Turns off output
1－Turns on output

6. Power relay control

Command: POWER X1

Function: Turn on or off the power relay of the selected channel (power supply unit). The power relay is off when the GP-600B is turned on.

Parameter: X1: 0－Turn off the power relay.
1－Turn on the power relay.

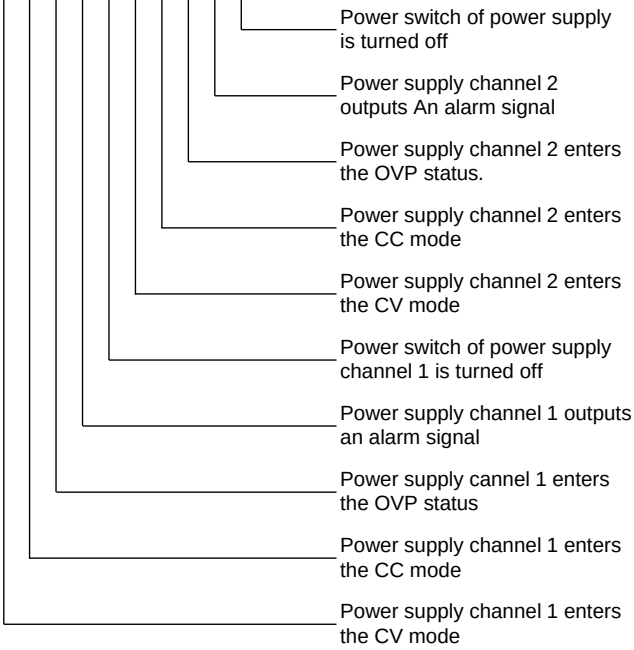
※ This command is not functional for the PA-B and PT series.

7. SRQ masking

Command: MASK X1

Function: Mask SRQ factors produced by the controlled power supply units. All are enabled when the GP-600B is turned on.

Parameter: X1: * * * * * * * * * *



0: Masks the factors.

1: Enables the factors.

8. Output Off channel setting

Command: OFFCH X1

Function: Specify channel(s) to which the GP-600B turns off output (i.e., it resets the output voltage and current to zero and turns off output) in the case where an OVP, alarm, or power switch Off condition occurs in the power supply units. It is set to 1 when the GP-600B is turned on.

Parameter: X1: 0- Do not turn off output.
1- Turn off output of only the channel where an OVP, alarm, or power switch Off condition occurs.
2- Turn off outputs of both channels 1 and 2.

9. Maximum value setting of reference A

Command: MODEA X1

Function: If the maximum value of the reference A is set with this command, the reference output may be only changed with the SETA command. The reference output is reset to zero if this command is sent while the reference is being output.

Parameter: X1: Maximum output (0.01 to 9999.99)
The format of the numeral is XXXX.XX.

10. Maximum value setting of reference B

Command: MODEB X1

Function: If the maximum value of the reference B is set with this command, the reference output may be only changed with the SETB command. The reference output is reset to zero if this command is sent while the reference is being output.

Parameter: X1: Maximum output (0.01 to 9999.99)
The format of the numeral is XXXX.XX.

11. Maximum value setting of reference C

Command: MODEC X1

Function: If the maximum value of the reference C is set with this command, the reference output may be only changed with the SETC command. The reference output is reset to zero if this command is sent while the reference is being output.

Parameter: X1: Maximum output (0.01 to 9999.99)

The format of the numeral is XXXX.XX.

12. Maximum value setting of reference D

Command: MODED X1

Function: If the maximum value of the reference D is set with this command, the reference output may be only changed with the SETD command. The reference output is reset to zero if this command is sent while the reference is being output.

Parameter: X1: Maximum output (0.01 to 9999.99)

The format of the numeral is XXXX.XX.

13. Output setting of reference A

Command: SETA

Function: Set the output of the reference A. This command is available only when the maximum value of the reference A is set with the MODEA command. In other condition, this command causes a GP-IB run error. The reference output is set to zero when the GP-600B is turned on.

Parameter: X1: Output value

(0 to maximum set value of the reference A)

The format of the numeral is XXXX.XX.

14. Output setting of reference B

Command: SETB X1

Function: Set the output of the reference B. This command is available only when the maximum value of the reference B is set with the MODEB command. In other condition, this command causes a GP-IB run error. The reference output is set to zero when the GP-600B is turned on.

Parameter: X1: Output value

(0 to maximum set value of the reference B)

The format of the numeral is XXXX.XX.

15. Output setting of reference C

Command: SETC X1

Function: Set the output of the reference C. This command is available only when the maximum value of the reference C is set with the MODEC command. In other condition, this command causes a GP-IB run error. The reference output is set to zero when the GP-600B is turned on.

Parameter: X1: Output value

(0 to maximum set value of the reference C)

The format of the numeral is XXXX.XX.

16. Output setting of reference D

Command: SETD X1

Function: Set the output of the reference D. This command is available only when the maximum value of the reference D is set with the MODED command. In other condition, this command causes a GP-IB run error. The reference output is set to zero when the GP-600B is turned on.

Parameter: X1: Output value

(0 to maximum set value of the reference D)

The format of the numeral is XXXX.XX.

If the parameter of the AMP, VOLT, OUT, SETA, SETB, SETC or SETD command is omitted, the parameter is automatically set to the value used previously. This function allows the previous setting to be restored even when the OUTPUT OFF key is pressed and each output is turned off.

Example: When the rated values (references A and B) of channel 1 are set with the MODE command and the rated values (maximum values) of the references C and D are set with the MODEC and MODED commands

```
SELECT 1 :VOLT :AMP :OUT
SETC :SETD :SELECT 2 :OUT
```

17. SRQ masking time setting

Command: MTIME X1

Function: Specify the time of masking service request output in CV or CC operation when the output is turned on (with the OUT 1 command).
The time is set in 10 ms multiplied by the parameter value. (10 ms x parameter value)
This command only masks the service requests caused in CV and CC operations of a channel whose output is turned on. Service requests due to other causes are issued. The parameter of this command is always set to 10 (i.e., 100 ms) when the GP-600B is turned on.

Parameter: X1: 2 to 100
The format of the numeral is XXXX.XX.

NOTE: The GP-600B checks the status of the power supply units at the 100ms interval. Thus, it may issue a service request in CV or CC operation after turning on output a maximum of 100 ms later than the preset masking time.

18. Listen-only mode setting

Command: LISTEN X1

Function: Bring the GP-600B into the listen-only mode while it is not in the listen-only mode, and changes the listen-only mode into the normal mode.

In the listen-only mode, the GP-600B cannot issue service requests or send data, and accordingly the controller cannot check the conditions of the power supply units. Please note this.

When several GP-600B units are connected with the GP-IB bus, it is necessary to bring each unit into the listen-only mode by specifying its address. However, all units return to the normal mode, regardless of the addresses, when the command is issued once.

Parameter: X1: 0－Returns to the normal mode.

1－Brings the GP-600B into the listen-only mode.

5) Data request commands

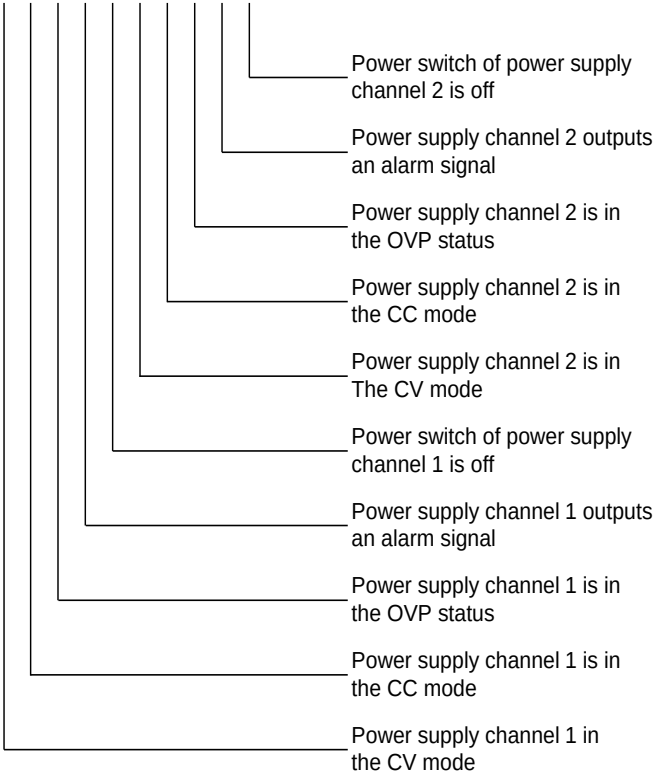
1. Inquiry about CC, CV, OVP, alarm and power switch status

Command: STATUS?

Function: Inquire about the CC, CV, OVP, alarm and power switch status.

Response: STATUS X1

Parameter: X1: ＊＊＊＊＊＊＊＊＊＊＊＊



0: Inactive status 1: Active status

Non-control power supply		CV	CC	OVP	Alarm	Power off
PA-B		○	○	○	○	×
PD-A	With option	×	×	×	×	×
PD-AD	Without option	○	○	×	×	×
PS		○	○	○	○	○
PT		○	○	○	○	×

O: Functions provided, x: functions not provided

2. Inquiry about set value of data setting command

The data setting commands 1 to 18 shown above also serve as set value inquiry commands if question marks "?" are added to the end of the commands. (The output may be in the off status actually, depending on pressing the OUTPUT OFF key or an error in the power supply unit.)

The format of the response is the same as that of the setting command and parameter. However, the command (with no parameter) is only returned if the parameter is not set in that command. When SELECT 0 is specified for commands 2 to 7, the returned command has no parameter. Specify SELECT 1 or SELECT 2 and make an inquiry for each channel.

NOTE: If data is requested (by specifying the talker) without executing a data request command, the GP-600B sends characters "ERROR".

6) Service requests

A service request is issued when either of the following conditions takes place in a mode other than the listen-only mode.

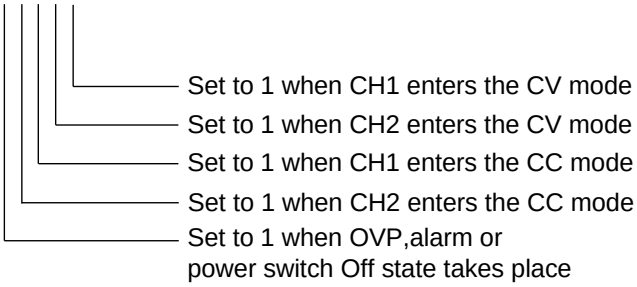
However, the service requests in CV or CC operation after output is turned on are not issued for the period specified with the MTIME command.

1: OVP, alarm or power switch Off status takes place in the power supply unit.
2: The CH1 power supply unit enters the CV operation state. (May be ignored if the CV state is shorter than 100 ms.)
3: The CH2 power supply unit enters the CV operation state. (May be ignored if the CV state is shorter than 100 ms.)
4: The CH1 power supply unit enters the CC operation state. (May be ignored if the CV state is shorter than 100 ms.)
5: The CH2 power supply unit enters the CC operation state. (May be ignored if the CV state is shorter than 100 ms.)
6: GP-IB command error
(This error occurs when an unauthorized command or a misspelled command is issued.)
7: GP-IB command error
(This error occurs when the command has an invalid parameter or format.) *1
8: GP-IB run error
(This error occurs when a command that cannot be executed is specified.)
9: The OUTPUT OFF key is pressed.
(Only when either the output voltage, current or output is set)

※1 The third and lower decimal places of the parameter are rounded up. Therefore, no parameter error occurs even if the third and lower decimal places are input.

Status Byte

1 to 5: 40H to 5FH(010XXXXXB)



6: 61H (01100001B)
7: 62H (01100010B)
8: 68H (01101000B)
9: 78H (01111000B)

It is possible to check the operation status using the STATUS? command in the condition of 1.

Non-control power supply		CV	CC	OVP	Alarm	Power off
PA-B		○	○	○	○	×
PD-A	With option	×	×	×	×	×
PD-AD	Without option	○	○	×	×	×
PS		○	○	○	○	○
PT		○	○	○	○	×

7) Device clear

The GP-600B clears the communication buffer when it receives a device clear command. Note that it does not clear the command parameters or status byte in other cases.

8) Listen-only mode

The GP-600B enters the listen-only mode when the address switches are set or the LISTEN command is sent after it is turned on. In the listen-only mode, the GP-600B executes all commands, regardless of the address, and accordingly control of several units is enabled. However, service request issuing and data transmission are disabled. Thus, the controller cannot check the command errors or the status of the power supply units.

6-5. Simple USB (Virtual COM Port)

With a built-in USB - serial converter (FT232BM made by FTDI), the GP-600B may utilize existing RS232C communication software using the USB port of the PC as a virtual COM port. It is necessary to install the device driver in the PC for using the RS232C communication software.

Download the virtual port driver for the FT232BM (VPC Driver) from the FTDI homepage (http://www.ftdichip.com/) according to the PC in use, store it in an appropriate folder, and unfreeze it. When the GP-600B is connected with the PC, the PC detects it as a new device and the driver install wizard activates. Specify the frozen folder. For details, refer to the FTDI homepage. The installation procedures may be downloaded.

Port setting

Baud rate : 9600bps
Data bit : 8
Parity : None
Stop bit : 1
Flow control : None

NOTES:
- Note that the SRQ, TALK, LISTEN and REN status indicator LEDs on the panel are not lit while the simple USB port is being used.
- We are not support the FTDI device driver.

6-6. Total System Adjustment

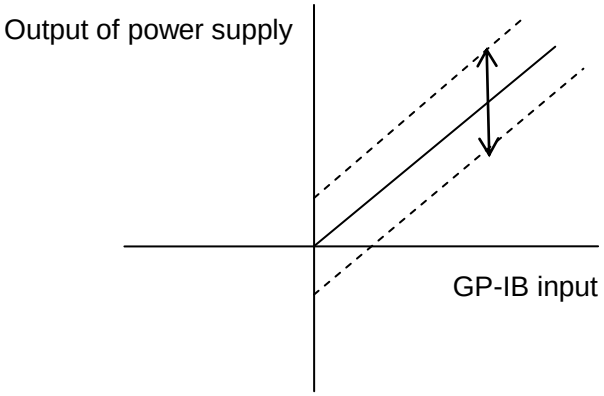
Adjustment

For controlling the power supply units using the GP-600B, preliminary adjustment is needed to obtain necessary accuracy.

- Aging

Before starting adjustment, connect the GP-600B with the power supply units to be controlled for aging, which should be done for 30 minutes or more.

- Offset adjustment

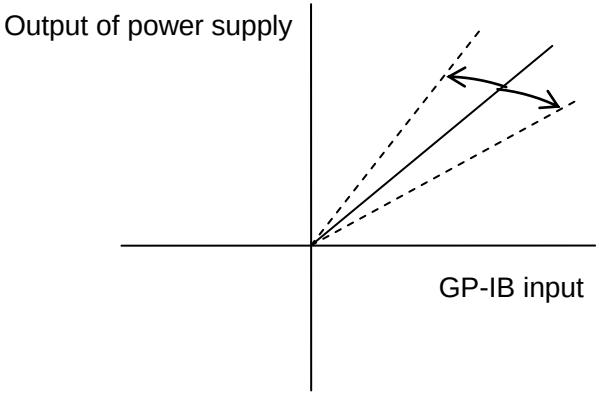


Set 1% output of the FS voltage (current) through the GP-IB bus, and adjust the offset so that output of the controlled power supply becomes 1% of the FS voltage (current) with the semi-fixed 0V control of each channel on the GP-600B panel.

Use the variable resistor 7 on the panel to adjust the voltage offset of CH1 A.
Use the variable resistor 10 on the panel to adjust the voltage offset of CH1 B.
Use the variable resistor 13 on the panel to adjust the voltage offset of CH2 C.
Use the variable resistor 16 on the panel to adjust the voltage

offset of CH2 D.

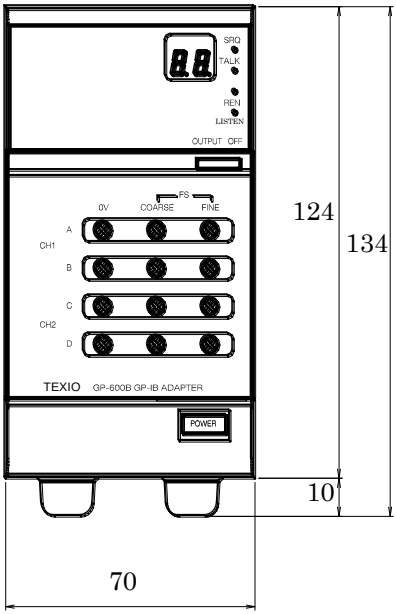
- Full scale (FS) adjustment

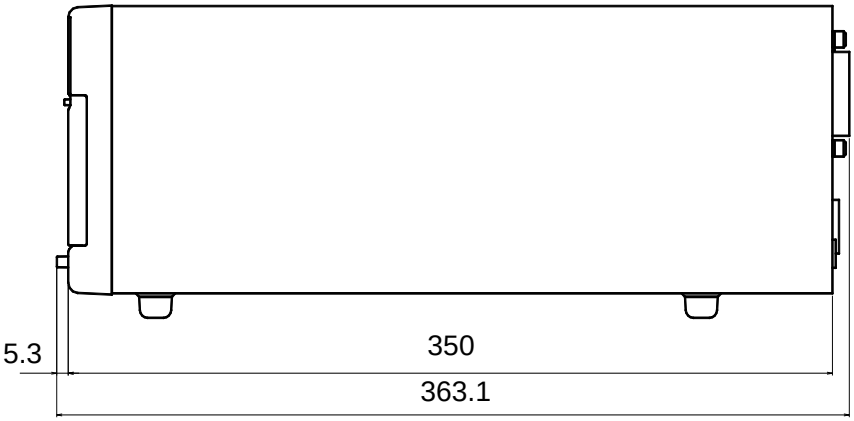


Set the FS output voltage (current) of the power supply units to be controlled through the GP-IB bus, and adjust the FS values with the semi-fixed variable resistors on the GP-600B panel. The FS variable resistor of each output has COARSE and FINE controls.

Use the variable resistors 8 and 9 on the panel to adjust the FS voltage of CH1 A.
Use the variable resistors 11 and 12 on the panel to adjust the FS voltage of CH1 B.
Use the variable resistors 14 and 15 on the panel to adjust the FS voltage of CH2 C.
Use the variable resistors 17 and 18 on the panel to adjust the FS voltage of CH2 D.

7. OUTSIDE DIMENSIONS





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