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SAFETY TERMS AND SYMBOLS

These terms may appear in this manual or on the product:

WARNING. Warning statements identify conditions or practices that could result in injury or loss of life.

CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

The following symbols may appear in this manual or on the product:

DANGER High Voltage

ATTENTION refer to Manual

Protective Conductor Terminal

Earth (ground) Terminal

Frame or Chassis Terminal

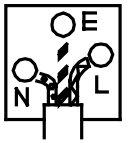
FOR UNITED KINGDOM ONLY

NOTE: This lead/appliance must only be wired by competent persons.

WARNING: THIS APPLIANCE MUST BE EARTHED

IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow:	**Earth**
Blue:	**Neutral**
Brown:	**Live (Phase)**



As the colours of the wires in main leads may not correspond with the colours marking identified in your plug/appliance, proceed as follows:

The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with the letter E or by the earth symbol ⏚ or coloured Green or Green & Yellow.

The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Blue or Black.

The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier or a competent elctrician.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information on the equipment and/or user instructions for details. As a guide, cable of 0.75mm^2 should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any moulded mains connector that requires removal /replacement must be destroyed by removal of any fuse & fuse carrier and disposed of immediately, as a plug with bared wires is hazardous if a engaged in live socket. Any re-wiring must be carried out in accordance with these instructions and local regulations.

1. Product Introduction

The IPS series are programmable switched-mode power supplies with backlit liquid crystal displays, built to the latest technological standards. Construction is in accordance with VDE 0411 (equal to EN 61010). Moreover, the IPS series has been EMC tested and fulfils the requirements of the applicable European and national directives.

Note: This is a Class A device which can cause RF interference within the home.

This equipment is supplied in safe condition. To maintain this condition and to guarantee safe operation, the user must comply with the operating and safety instructions contained within this manual.

Application Note

- The current consumption of a connected load must not exceed the rated output current.
- The IPS Power Supply series is suitable for connection to 115 or 230 V 50/60 Hz AC.
- Operation must not take place under unfavorable ambient conditions including:
  -Moisture or excessive air humidity.
  -Dust, combustible gases, fumes or solvents.
  -Thunderstorms or storm conditions such as strong electrostatic fields, etc.

Any use other than as described above may lead to damage to the unit; or cause danger such as short-circuit, fire, electric shock, etc. No part of this equipment may be modified or converted.

2. Safety Information

Note: Damage caused by failure to observe the operating instructions will invalidate the guarantee.

The supplier accepts no liability for consequential damage and accepts no responsibility for damage to property, or injury to persons caused by improper operation or failure to observe the safety instructions. Such cases will invalidate the guarantee.

a) Installation and handling safety instructions

Observe the following rules when installing the instrument:

a1. Do not use the instrument in extremely cold or hot locations or directly adjacent to a heating fan.

a2. Do not switch the instrument on immediately when it is brought from a cold environment into a warm room. Wait until the instrument comes to room temperature, as under the adverse conditions, the resultant condensation may destroy the instrument.

a3. Ensure there is proper ventilation for the vents in the case (front left side and cooling fan on the rear). Blocking the ventilation will allow the instrument to overheat and cause damage.

a4. Never operate the instrument near hot soldering irons.

a5. Do not place the Power Supply with its front panel down, as this will damage the operating controls.

a6. Do not use the instrument if it appears damaged, is wet, or you suspect it is not operating correctly.

b) General safety requirements

The instrument is constructed to Protection Class I. It is equipped with

a VDE-approved power supply with safety cable and may only be used with and connected to AC supplies with a protective earth.
Ensure the (yellow/green) earth wire in the instrument, in its power cable and in the AC supply remains properly connected. A damaged earth wire may endanger life.

Ensure all appropriate health and safety requirements are observed and use only as provided for by local regulations for this type of equipment. Ensure adequate supervision as required.

Make sure that only the fuses of the given types and current ratings are used as replacements. Do not use a repaired fuse or bridge the fuse holder with wire.

Do not operate the instrument with the cover removed or insecurely fitted.

When using the power supplies, the wearing of metal or other conducting jewelry such as chains, bracelets, rings, etc. is not recommended, as accidentally short-circuiting the output terminals may cause severe burns.

Note: These power supplies are not intended for use with/on people or animals, or with Life Support Systems.

When connecting the outputs of more than one power supply in series, the voltages may be hazardous (> 35 VDC). Only power supplies with

an identical output (current and voltage) specification may be placed in series or in parallel, otherwise the weaker of the two will be damaged.

The instrument is to be placed onto a hard, non-flammable base, so that cooling air can enter unhindered. The cooling of the unit occurs predominantly through convection.

Note: Power supply ventilation holes should not be covered.

Power supplies and their connected loads should not be left operating unattended. Loads under test may fail and draw excessive current, thereby causing overheating and consequent fire hazards.

Faulty power supplies can produce voltages in excess of 50 V DC, which can be hazardous even when the indicated normal output voltages of the units are lower than this.

Note: When working on equipment powered by hazardous voltages, only use insulated tools with a suitable rating.

The power supply outputs and connecting leads, sockets and terminals must be protected from being touched directly. In addition, the leads used must be sufficiently insulated and the contact points safe from being touched (safety sockets).

Use of bare metal leads and contacts should be avoided. All such items are to be covered by suitable, non-flammable insulating material or other measures taken and therefore protected from being touched directly. The electrically conducting parts of the connected load must also be appropriately protected from being touched directly.

If it is suspected that the instrument is not safe to operate through one or more of the following reasons, the unit must be switched off and

precautions taken against unintentional operation:

- the unit shows visible signs of damage,
- the unit no longer functions,
- after prolonged storage under unfavourable conditions or
- after severe transportation stress.

Do switch on the instrument immediately if it has been brought from a cold environment into a warm room. Wait until it has reached room temperature, as under adverse conditions the resultant condensation may destroy the unit.

3. Technical Specifications

Model	IPS-603	IPS-405	IPS-2010
Operating voltage	115/230 VAC ±15%		
Power frequency	50/60 Hz		
Power consumption	approx. 420VA max.		
Power output	200W max.		
Output voltage	0~60VDC, 20mV resolution	0~40VDC, 10mV resolution	0~20VDC, 10mV resolution
Program Accuracy	±0.05%±4 digits	±0.05%±3 digits	±0.05%±3 digits
Output Current	0~3.5A 2mA resolution	0~5A 2mA resolution	0~10A 5mA resolution
Program Accuracy	±0.1%±5 digits	±0.1%±5 digits	±0.3%±10 digits
Voltage Load Regulation	≦ 10 mV		
Current Load Regulation	≦ 5 mA		
Voltage Line Regulation.	≦ 0.05%		
Current Line Regulation	≦ 0.05%		
Ripple Voltage	≦ 20 mV rms		
Ripple Current	≦ 10 mArms		
Readback Resolution (Meter)	20mV 2mA	10mV 2mA	10mV 5mA
Readback Accuracy (Meter)			
Voltage	±0.05%±4 digits	±0.05%±3 digits	±0.05%±3 digits
Current	±0.1%±5 digits	±0.1%±5 digits	±0.3%±10 digits
Digital Display	Multi-line LCD with background lighting		
AC fuse	Anti-Surge, HBC, 20x5 mm, T6.3A/250V for 115V, T3.15A/250V for 230V		
Weight	Approx. 4 kgs		
Dimensions (W × H × L)	Approx. 225×100×305 m/m (without stand and power cable)		

Environmental Conditions	
Operating Environment	Indoor use, altitude up to 2000m. Ambient Temperature 0℃ to 40℃. Relative Humidity 80%(Maximum). Installation Category II, 300V Pollution Degree 2
Operating temperature & Humidity	0°C to +40°C 80% (Maximum), non-condensing
Storage temperature range	-10°C to +70°C
Accessories	Power cord…..……. 1 Instruction manual…… 1 Test Lead…….…… 1

4. Panel Controls & Indicator

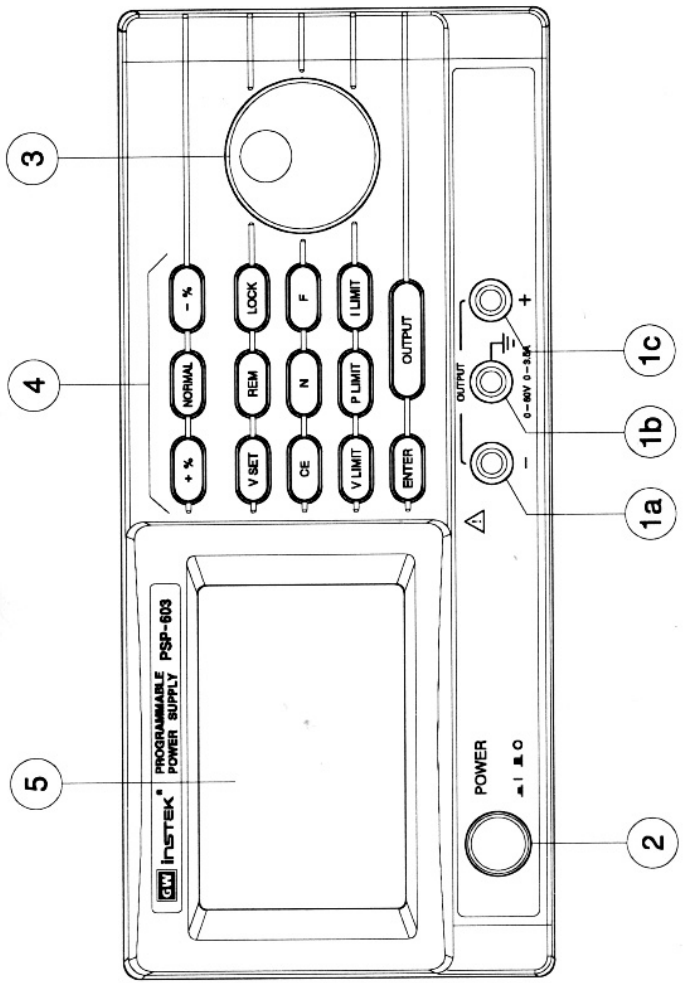
Front Panel

1) 4 mm safety sockets: 1a negative connection "-", 1b positive connection "+" and 1c earth connection.
2) "POWER" AC switch for switching the power supply on ("1") and off ("0").
3) Encoder wheel for changing the V SET, V LIMIT, I LIMIT, P LIMIT, +%, and -% parameter settings.
4) Keypad for operation of the Power Supply.
5) Backlit LCD Display with indication of the output voltage, current, power settings and indication of the V, I and P limits. Additionally, indication of OUTPUT On or Off and keypad locked or unlocked.

Rear Panel

6) AC rear power inlet socket.
7) RS-232 interface (opto-isolated) for connection to PC.
8) Cooling fan.

- **Front Panel**



PLEASE REMOVE ALL MANUFACTURER'S MARKINGS FROM THIS DIAGRAM

Figure 4-1

- **Rear Panel**

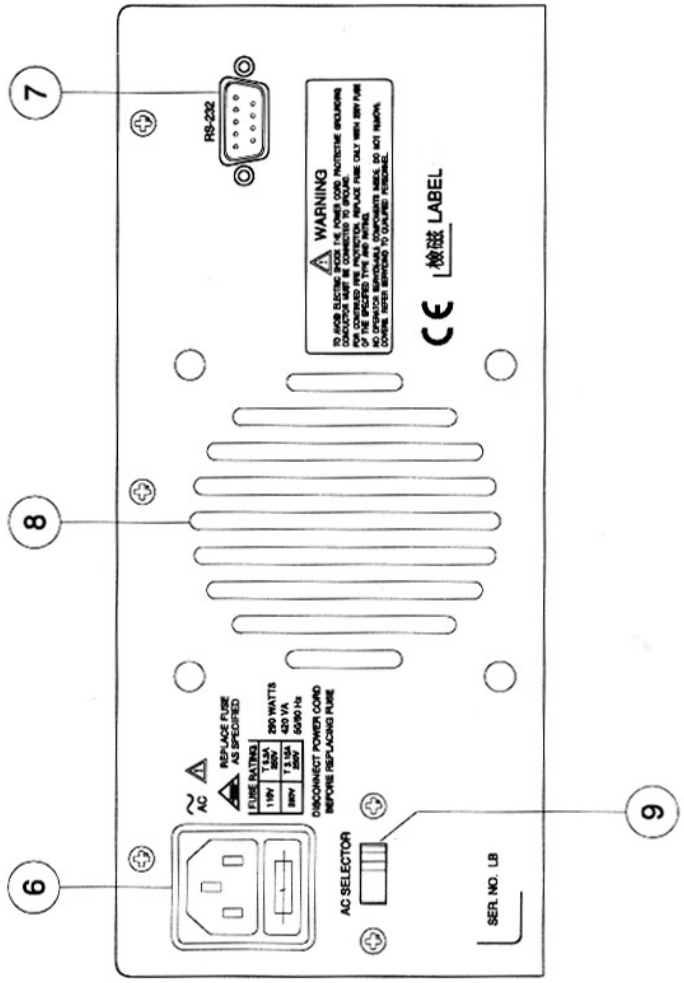


Figure 4-2

5. Functional Description of Operating Elements

With its continuously adjustable voltage and current settings, this power supply can be used universally in school, work, hobby, and other applications. An electronic current limiter protects the power supply from overload and short-circuits at its output; a fan controlled by a temperature circuit protects the power supply (its electronics) from thermal overload.

When an overload occurs (short circuit or over-current), the output voltage is reduced, i.e. the voltage folds back to a low level. Only when the overload has been removed does the output return to its preset value.

The set values can be read via the illuminated multiple-line LCD display. The voltage, current or power setting is adjusted by means of an encoder wheel in 10mV, 20mV, 1mA, 2mA, 10mA and 1 W steps respectively. Therefore the exact adjustment of the output voltage and the current limit and maximum output power is possible.

6. Operating Instructions with keypad input

A) Basic setting

a) Connect the AC power cable to the AC power socket on the rear of the power supply and ensure that it is firmly seated, then plug the earthed power plug into an earthed AC power socket.

Attention: The continuity of the protective earth conductor must be unbroken within the instrument, within the AC power cable and within the AC power socket to ensure safety of the operator.

b) Press the AC power On/Off switch

Attention: The functional earth terminal on the front of the instrument and the RS-232 interface connector earth are connected directly to the protective earth conductor of the AC power input socket and of the connected AC power socket.

B) Setting the limits

On applying power to the instrument, the voltage, current and power output values are each preset to their maximum values. This upper limit can be reduced by means of the "V LIMIT" "I LIMIT" "P LIMIT" keys as follows:

V LIMIT Voltage limit

Press the "V LIMIT" key in the "LIMITS" field until the symbol "U-const" flashes. The voltage limit can now be adjusted to 1V steps by using the encoder wheel. If the "V LIMIT " key is now pressed for longer than 2s, the voltage upper limit will again be set at "rated

voltage". To complete the input, press the "ENTER" key. An incorrectly set limit can be erased/reset with the " CE " key. As a result of this, the previous set value will be restored and the setting menu cancelled. The "U-const" will no longer flash.

During operation (output On), the voltage output can also be adjusted up to the set limit.

I LIMIT Current limit

Press the " I LIMIT" key in the "LIMITS" field until the symbol "I-const" flashes. The current limit can now be adjusted in 1mA, 2mA, 10mA ("fine") or 100mA ("norm", coarse) steps by using the encoder wheel. If the "I LIMIT" key is now pressed for longer than 2s, the current upper limit will again be set at "rated current". To complete the input, press the "ENTER" key. An incorrectly set limit can be erased/reset with the " CE " key. As a result of this, the previous set value will be restored and the setting menu cancelled. The "I-const" will no longer flash.

P LIMIT Power limit

Press the "P LIMIT" key in the "LIMITS" field until the symbol "P-const" flashes. The power limit can now be adjusted to 1 W steps by using the encoder wheel. If the "P LIMIT" key is now pressed for longer than 2s, the power upper limit will again be set at "200 W". To complete the input, press the "ENTER" key. An

incorrectly set limit setting can be erased/reset with the "CE" key. As a result of this, the previous set value will be restored and the setting menu cancelled. The "P-const" will no longer flash.

Attention: The current "I LIMIT" is adjusted independently of its setting by the maximum output power setting. The voltage upper limit does not change.

C)"KEY INPUT" field settings

V SET Using the "V SET" key, the output voltage can be adjusted up to the preset upper limit directly. For this the "V SET" key must be pressed and held and the voltage changed with the encoder wheel. If the "fine" F key is selected, the changes occur in 10 mV, and 20mV steps. If "norm" N key is selected, the changes occur in 1V steps.

ENTER Each input via the "LIMITS" keypad is completed with the "ENTER" key.

CE Any values incorrectly entered via the "LIMITS" keypad can be reset with the "CE" key.

N The increment of each setting step can be changed by using the "N" ("Normal") key. In connection with the "F" key, so-called mutual locking is achieved.

F If the "N" key is pressed, the "fine" symbol disappears from the display. If the "F" key is pressed again, the symbol "fine" appears on the display.

LOCK Pressing the "LOCK" key disables all keys and the encoder

wheel against inadvertent adjustment. Only the "Power" switch remains active. Locking is indicated by the "locked" symbol in the bottom line of the display. If the "LOCK" key is pressed again (> approx. 2s), then the operating elements are released again (unlocked).

D) Adjusting the output

OUTPUT The output of the power supply is switched on or off via a relay with the "OUTPUT" key. In the process, the status "On" or "Off" is indicated at the bottom right of the display. On switching the power supply on, the output is always in switched-off status.

E) +%, -% settings

+% Under output off status, press +% key once, the LCD display will indicate xxx (the value of the original stored data), now set the +% value by using the knob and press the enter key to save it. Afterward, when the output is in the “ON” state, press the +% key, the output will be changed according to the saved value.

-% Under output off status, press -% key once, the LCD display will indicate xxx (the value of the original stored data), now set the -% value by using the knob and press enter key to save it. Afterward, when the output is in the “ON” state, press the -% key, the output will be changed according to the saved value.

For example:

Set the output voltage as 10.00V, the saved value of +% is 105,

and the saved value of -% is 95. When the +% key is pressed, output voltage will be changed to 10.00V × 1.05 = 10.50V, while the -% key is pressed, the output voltage will be changed to 10.00V × 0.95 = 9.50V. The output voltage will return to normal by pressing the normal key.

F) "REM" key

A serial RS-232 interface is incorporated on the rear of the case. With the appropriate interface cable and optional software, communication with an IBM-compatible PC is therefore possible. The interface is electrically isolated via an optocoupler.

REM When the Remote Control mode is selected, all the controls on the front panel are inhibited (except POWER) and locked against direct input.

7. Disposal

Dispose of an unusable, irreparable Switching Power Supply PSP series in accordance with applicable local statutory regulations.

8. Rectification of faults

With this ISO-TECH series power supply, you have acquired a new generation instrument constructed to the latest technological standards. However, faults can occur. Because of this, the following describes how some of these problems can be resolved by the user relatively easily:

Problem	**Possible solution**
No display	Is the instrument switched on? Is the AC power plug making good contact both in the instrument and in the AC power socket? Is the AC fuse OK?
No input possible	"REM" or "LOCK" key pressed; see under section C or F

Attention: The opening of covers or removal of parts can expose components carrying hazardous voltages. Connection points may also be live. Before any adjustment, maintenance, repair or exchange of parts or assemblies requiring opening of the instrument, the unit must be disconnected from all voltage sources and measurement circuits. If the adjustment maintenance or repair is subsequently required on the open unit, these must only be performed by a competent person familiar with the associated hazards and relevant regulations (VDE-0100, VDE-0701, VDE0683).

Capacitors within the instrument can remain charged for a considerable time, even after the unit has been disconnected from all voltage sources and external circuits.

9. Maintenance

The following instructions are intended for the guidance of qualified personnel only. To avoid electrical shock, do not perform any servicing other than the operating instructions unless you are qualified to do so.

9-1.Fuse Replacement

If the fuse blown, the CV or CC indicators will not light and the power supply will not operate. The fuse should not normally blow unless a fault has developed in the unit. Try to determine and correct cause of the blown fuse, then replace only with a fuse of the correct rating and type. The fuse is located on the rear panel (see Fig. 4-2).

WARNING: For continued fire protection. Replace with 250V fuse of the specified type and rating, and disconnect the power cord before replacing fuse.

9-2.Line Voltage conversion

The primary winding of the power transformer is tapped to permit operation from 115/230 VAC, 50/60 Hz line voltage. Conversion from one line voltage to another is performed by changing the AC selector switch as shown in Fig. 4-2.

To convert to different line voltage, perform the following procedure:

(1) Disconnect the power cord.
(2) Set the AC switch to the desired line voltage position.
(3) Reconnect the power cord.

9-3. Cleaning

To clean the power supply, use a soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument, since it may leak into the cabinet and cause damage. Do not use chemicals containing benzine, benzene, toluene, xylene, acetone, or similar solvents. Do not use abrasive cleaners on any portion of the instrument.

9-4. Fan Control

1) The fan of the power supply will not work upon power on until the temperature or load current reaches the condition as follows:

- Temperature dependent:
  When the temperature of the power supply reaches to range of 45℃±5℃ for 5 to 6 seconds, the fan starts to work, while the temperature is less than 40℃±5℃, the fan stops.
- Load current dependent:
  Depending on the model of power supply, the fan will operate at different load currents. When the load current reaches the value shown below, the fan will run.

Model	Load Current	Fan	Load Current	Fan
IPS-405	2.10A±50mA	On	1.80A±50mA	Off
IPS-603	1.40A±50mA	On	1.20A±50mA	Off
IPS-2010	2.10A±50mA	On	1.80A±50mA	Off

2) To avoid damaging the power supply, if the fan fails to work when the temperature or current has reached the appropriate value, turn off the instrument and investigate the cause.

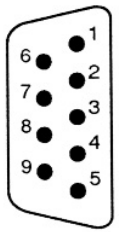
3) 10. APPENDIX: Connecting the Programmable Power Supply via RS232 Interface

The RS232 interface capabilities:
The RS232 interface provides a point-to-point connection between two items of equipment such as a computer and the power supply. There are some parameters you need to set on the both sides. Once you have set these parameters, you can control the power supply through the RS232 interface.

- Baud rate: 2400 baud.
- Parity bit: none.
- Data bit: 8 bits.
- Stop bit: 1 stop bit.
- Data flow control: none.

Notes for RS232 installation
The power supply is a DTE device with a 9-pin D-type shell RS232 connector located on the rear panel. Figure 1 shows the equipment of 9-pin connector (Male) with its pin number assignments. Figure 2 shows the wiring configuration for DB9 to DB9. When the programmable power supply is set up with a RS232 interface, please check the following points:

- *Do not connect the output line of one DTE device to the output line of the other.*
- *Many devices require a constant high signal on one or more input pins for handshaking.*
- *Ensure that the signal ground of the equipment is connected to the signal ground of the external device.*
- *Ensure that the chassis ground of the equipment is connected to the chassis ground of the external device.*
- *Do not use more than 15m of cable to connect devices to a PC.*
- *Ensure the same baud rate is used on the device as the one used on PC terminal.*



1. No connection
2. Receive Data(RxD) (input)
3. Transmit Data(TxD) (output)
4. +12V Input(*) (input)
5. Signal Ground(GND)
6. No connection
7. No connection
8. No connection
9. No connection

***Note: This pin needs a constant high signal (+12V).**

Figure 1 Pin assignments of the RS232 connector on the rear panel for DB-9-D

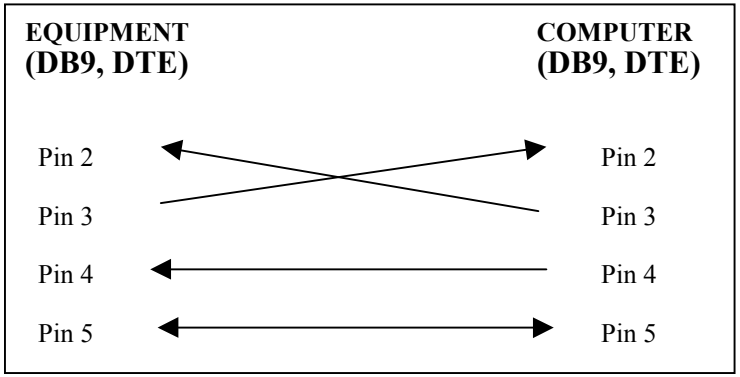


Figure 2 Wiring configuration for DB9 to DB9

Computer's Connection

A personal computer with a COM port is essential in order to operate the programmable power supply via RS232 interface.
The connections between power supply and computer are as follows:

I. Connect one end of a RS232 cable to the computer.
II. Connect the other end of the cable to the RS232 port on the programmable power supply.
III. Turn on the programmable power supply.
IV. Turn on the computer.

RS232 message terminator

The power supply has 25 commands available. Every command is end up with <cr> (ASCII 0Dh or ACSCII 0D 0A acceptable). The return message <cr>of the power supply is CR/LF (ASCII 0D 0A).

★L

Function:
To obtain all the status values of the power supply.

Syntax:

L<cr> HEX = 4C 0D

Explain:

When the message L<cr>is sent to the power supply from computer, the power supply will return the message as follows immediately:

Vvv.vvAa.aaaWwww.wUuuIi.iiPpppFffffff<cr> 37 characters totally

The contents consist of the uppercase V,A,W,U,I,P,F, the numeral from 0 to 9 and decimal. Further details is described as follows:

vv.vv = The present output voltage, the unit: V.

a.aaa = The present output current, the unit: A.

www.w = The present output load, the unit: W.

uu = The maximum voltage limit at present, the unit: V.

i.ii = The maximum current limit at present, the unit: A.

ppp = The maximum load limit at present, the unit: W.

ffffff = The status of power supply at present.

1st f = the relay status 0: OFF 1:ON

2nd f = the temperature status 0: Normal 1: Overheat

3rd f = the wheel knob status 0: Normal 1: Fine

4th f = the wheel knob status 0: Lock 1: Unlock

5th f = the remote status 0: Normal 1: Remote(*)

6th f = the lock status 0: Unlock 1: Lock

***Note: The setting is workable through computer only when the remote is at 1.**

All the data above is in the range from 0 to 9.

When the uppercase U becoming the lowercase u means that the status is in the setting of the voltage limit mode.

When the uppercase I becoming the lowercase i means that the status is in the setting of the current limit mode.

When the uppercase P becoming the lowercase p means that the status is in the setting of the load limit mode.

Example:

The return message from power supply is:

V20.00A2.500W050.0U40I5.00P200F101000<cr>

V20.00 means that the present output voltage is at 20.00V.

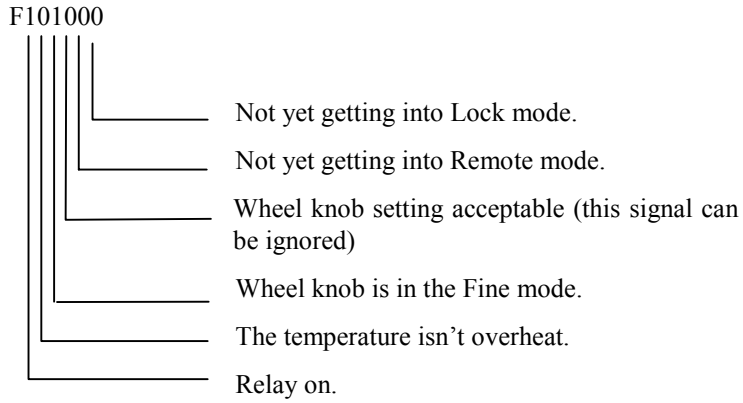
A2.500 means that the present output current is at 2.500A.

W050.0 means that the present output load is at 050.0W.

U40 means that the present voltage limit is at 40V.

15.00 means that the present current limit is at 5.00A.

P200 means that the present load limit is at 200W.



•V

Function:

The present output voltage, the unit is V.

Syntax:

V<cr> HEX = 56 0D

Explain:

When the message of V<cr>is sent to the power supply from computer, the power supply will return the following message immediately:

Vvv.vv<cr> 6 characters totally + CR/LF

The contents consist of the uppercase V, the numeral from 0 to 9 and decimal. Further details is described as follows:

vv.vv = The present output voltage, the unit: V

***A**

Function:

The present output current, the unit is A.

Syntax:

A<cr> HEX = 41 0D

Explain:

When the message of A<cr>is sent to the power supply from computer, the power supply will return the following message immediately:

Aa.aaa<cr> 6 characters totally + CR/LF

The contents consist of the uppercase A, the numeral from 0 to 9 and decimal. Further details is described as follows:

a.aaa = The present output current, the unit: A

***W**

Function:

The present output load, the unit is W.

Syntax:

W<cr> HEX = 57 0D

Explain:

When the message of W<cr>is sent to the power supply from computer, the power supply will return the following message immediately:

Wwww.w<cr> 6 characters totally + CR/LF

The contents consist of the uppercase W, the numeral from 0 to 9 and decimal. Further details is described as follows:

www.w = The present output load, the unit: W

***U**

Function:

The maximum voltage limit at present, the unit is V.

Syntax:

U<cr> HEX = 55 0D

Explain:

When the message of U<cr> is sent to the power supply from computer, the power supply will return the following message immediately:

Uuu<cr> 3 characters totally + CR/LF

The contents consist of the uppercase U and the numeral from 0 to 9. Further details is described as follows:

uu = The maximum voltage limit at present, the unit: V

When the uppercase U becoming the lowercase u means that the power supply is in the setting status of voltage limit mode.

***I**

Function:

The maximum current limit at present, the unit is A.

Syntax:

I<cr> HEX = 49 0D

Explain:

When the message of I<cr>is sent to the power supply from computer, the power supply will return the following message immediately:

Ii.iii<cr> 5 characters totally + CR/LF

The contents consist of the uppercase I, the numeral from 0 to 9 and decimal. Further details is described as follows:

i.ii = The maximum current limit at present, the unit: A

When the uppercase U becoming the lowercase u means that the power supply is in the setting status of current limit mode.

***P**

Function:

The maximum output load limit at present, the unit is W.

Syntax:

L<cr> HEX = 50 0D

Explain:

When the message of L<cr>is sent to the power supply from computer, the power supply will return the following message immediately:

Pppp<cr> 4 characters totally + CR/LF

The contents consist of the uppercase P and the numeral from 0 to 9. Further details is described as follows:

ppp = The maximum load limit at present, the unit: W

When the uppercase P becoming the lowercase p means that the power supply is in the setting status of output load limit mode.

***F**

Function:

The present status of the power supply.

Syntax:

F<cr> HEX = 46 0D

Explain:

When the message of F<cr> is sent to the power supply from computer, the power supply will return the following message immediately:

Ffffff<cr> 7 characters totally + CR/LF

□□□□□□

123446

The contents consist of the uppercase F and the numeral from 0 to 9. Further details is described as follows:

1st f = the relay status 0:OFF 1:ON

2nd f = the temperature status 0: Normal 1: Overheat

3rd f = the wheel knob status 0: Normal 1: Fine

4th f = the wheel knob status 0: Lock 1: Unlock

5th f = the remote status 0: Normal 1: Remote(*)

6th f = the lock status 0: Unlock 1: Lock

***Note: The setting is workable through computer only when the remote is at 1.**

***SV+**

Function:

Add one unit to the present voltage setting.

Syntax:

SV+<cr> HEX = 53 56 2B 0D

Explain:

When the message of SV+<cr> is sent to the power supply from computer, the power supply will add one unit to the present voltage setting immediately.

Example:

The present output voltage is at 20.00V, and the wheel knob status is at normal, the SV+<cr> message is sent to the power supply, the voltage of which will become 21.00V.

***SV-**

Function:

Subtract one unit from the present voltage setting.

Syntax:

`SV-<cr>` HEX = 53 56 2D 0D

Explain:

When the message of SV-<cr> is sent to the power supply from computer, the power supply will subtract one unit from the present voltage setting immediately.

Example:

The present output voltage is at 20.00V, and the wheel knob status is at normal, the SV-<cr> message is sent to the power supply, the voltage of which will become 19.00V.

***SU+**

Function:

Add one unit to the present voltage limit setting.

Syntax:

`SU+<cr>` HEX = 53 55 2B 0D

Explain:

When the message of SU+<cr> is sent to the power supply from computer, the power supply will add one unit to the present voltage limit setting immediately.

Example:

The present voltage limit is at 30V, and the wheel knob status is at normal, the SV+<cr> message is sent to the power supply, the voltage limit of which will become 31V.

***SU-**

Function:

Subtract one unit from the present voltage limit setting.

Syntax:

`SU-<cr>` HEX = 53 55 2D 0D

Explain:

When the message of SU-<cr> is sent to the power supply from computer, the power supply will subtract one unit from the present voltage limit setting immediately.

Example:

The present voltage limit is at 30V, and the wheel knob status is at normal, the SU-<cr> message is sent to the power supply, the voltage limit of which will become 29V.

***SI+**

Function:

Add one unit to the present current limit setting.

Syntax:

SI+<cr> HEX = 53 49 2B 0D

Explain:

When the message of SI+<cr> is sent to the power supply from computer, the power supply will add one unit to the present current limit setting immediately.

Example:

The present current limit is at 3.00A, and the wheel knob status is at normal, the SI+<cr> message is sent to the power supply, the current limit of which will become 3.10A.

***SI-**

Function:

Subtract one unit from the present current limit setting.

Syntax:

SI-<cr> HEX = 53 49 2D 0D

Explain:

When the message of SI-<cr> is sent to the power supply from computer, the power supply will subtract one unit from the present current limit setting immediately.

Example:

The present current limit is at 3.00A, and the wheel knob status is at normal, the SI-<cr> message is sent to the power supply, the current limit of which will become 2.90A.

***SP+**

Function:

Add one unit to the present load limit setting.

Syntax:

SP+<cr> HEX = 53 50 2B 0D

Explain:

When the message of SP+<cr> is sent to the power supply from computer, the power supply will add one unit to the present load limit setting immediately.

Example:

The present load limit is at 100W, and the wheel knob status is at normal, the SP+<cr> message is sent to the power supply, the load limit of which will become 101W.

***SP-**

Function:

Subtract one unit from the present load limit setting.

Syntax:

SP-<cr> HEX = 53 50 2D 0D

Explain:

When the message of SP-<cr> is sent to the power supply from

computer, the power supply will subtract one unit from the present load limit setting immediately.

Example:

The present load limit is at 100W, and the wheel knob status is at normal, the SP-<cr> message is sent to the power supply, the load limit of which will become 099W.

***SUM**

Function:

Set the maximum voltage limit value.

Syntax:

SUM<cr> HEX = 53 55 4D 0D

Explain:

When the message of SUM<cr> is sent to the power supply from computer, the power supply will set the voltage limit to the maximum immediately.

Example:

The present voltage limit is at 20V, the SUM<cr> message is sent to the power supply, the voltage limit of which will become 40V.

***SIM**

Function:

Set the maximum current limit value.

Syntax:

SIM<cr> HEX = 53 49 4D 0D

Explain:

When the message of SIM<cr> is sent to the power supply from computer, the power supply will set the current limit to the maximum immediately.

Example:

The present current limit is at 2.50A, the SIM<cr> message is sent to the power supply, the current limit of which will become 5.00A.

***SPM**

Function:

Set the maximum load limit value.

Syntax:

SPM<cr> HEX = 53 50 4D 0D

Explain:

When the message of SPM<cr> is sent to the power supply from computer, the power supply will set the load limit to the maximum immediately.

Example:

The present load limit is at 100W, the SPM<cr> message is sent to the power supply, the load limit of which will become 200W.

***KF**

Function:

Set the wheel knob to Fine status.

Syntax:

KF<cr> HEX = 4B 46 0D

Explain:

When the message of KF<cr> is sent to the power supply from computer, the power supply will set the wheel knob to Fine status immediately.

Example:

The present wheel knob status is at Normal, the KF<cr> message is sent to the power supply, the wheel knob status will become Fine.

***KN**

Function:

Set the wheel knob to Normal status.

Syntax:

`KF<cr>` HEX = 4B 4E 0D

Explain:

When the message of KN<cr> is sent to the power supply from computer, the power supply will set the wheel knob to Normal status immediately.

Example:

The present wheel knob status is at Fine, the KN<cr> message is sent to the power supply, the wheel knob status will become Normal.

***KO**

Function:

Set the Relay status to Invert.

Syntax:

`KO<cr>` HEX = 4B 4F 0D

Explain:

When the message of KO<cr> is sent to the power supply from computer, the power supply will invert the relay status immediately.

Example:

The present relay status is at OFF, the KO<cr> message is sent to the power supply, the relay status will become ON, send the message again will become OFF.

***KOE**

Function:

Set the Relay status to ON.

Syntax:

KOE<cr> HEX = 4B 4F 45 0D

Explain:

When the message of KOE<cr> is sent to the power supply from computer, whatever the relay status is, the relay of power supply will be set to ON immediately.

***KOD**

Function:

Set the Relay status to OFF.

Syntax:

KOD<cr> HEX = 4B 4F 44 0D

Explain:

When the message of KOD<cr> is sent to the power supply from computer, whatever the relay status is, the relay of power supply will be set to OFF immediately.

***EEP**

Function:

Save the present status to the EEPROM.

Syntax:

EEP<cr> HEX = 45 45 50 0D

Explain:

When the message of EEP<cr> is sent to the power supply from

computer, the power supply will be save the present setting value to EEPROM immediately.

***B**

Function:

To obtain +% value.

Syntax:

B<cr> HEX = 42 0D

Explain:

When the message of B<cr> is sent to the power supply from computer, the power supply will return the following message immediately

Bbbb<cr> 4 characters totally +CR/LF

The contents consist of the uppercase B, and the numeral from 0 to 9. Further details is described as follows:

bbb = The present +% value, the unit: %

When the uppercase B becoming the lowercase b means that the status is in the setting of the +% mode.

***D**

Function:

To obtain -% value.

Syntax:

D<cr> HEX = 44 0D

Explain:

When the message of D<cr> is sent to the power supply from computer, the power supply will return the following message immediately

`Dddd<cr>` 4 characters totally +CR/LF

The contents consist of the uppercase D, and the numeral from 0 to 9. Further details is described as follows:

ddd = The present -% value, the unit: %

When the uppercase D becoming the lowercase d means that the status is in the setting of the -% mode.

Function:

Display the present value at +% or -% mode.

Syntax:

`Q<cr>` HEX = 51 0D

Explain:

When the message of Q<cr> is sent to the power supply from computer, the power supply will return the following message immediately

`Qqqqqqq<cr>` 7 characters totally +CR/LF

The contents consist of the uppercase B, and the numeral 0 or 1. Further details is described as follows:

Whether the first q is at % mode? 0: No 1:Yes

Whether the second q is at +% mode? 0: No 1: Yes

★SB+

Function:

To add one unit to the present setting of +%.

Syntax:

SB+<cr> HEX = 53 42 2B 0D

Explain:

When the message of SB+<cr> is sent to the power supply from computer, the power supply will add one unit to the present setting of +% immediately

Example:

The present +% value is at 105, after the command is sent from computer, the +% value is at 106.

★SB-

Function:

To decrease one unit from the present setting of +%.

Syntax:

SB-<cr> HEX = 53 42 2D 0D

Explain:

When the message of SD-<cr> is sent to the power supply from computer, the power supply will decrease one unit from the present setting of +% immediately

Example:

The present +% value is at 105, after the command is sent from computer, the +% value is at 104.

***SD+**

Function:

To add one unit to the present setting of -%.

Syntax:

SD+<cr> HEX = 53 44 2B 0D

Explain:

When the message of SD+<cr> is sent to the power supply from computer, the power supply will add one unit to the present setting of -% immediately

Example:

The present -% value is at 90, after the command is sent from computer, the -% value is at 91.

***SD-**

Function:

To decrease one unit from the present setting of -%.

Syntax:

SD-<cr> HEX = 53 44 2D 0D

Explain:

When the message of SD-<cr> is sent to the power supply from computer, the power supply will decrease one unit from the present setting of -% immediately

Example:

The present -% value is at 90, after the command is sent from computer, the -% value is at 89.

***SV**

Function:

Set the output voltage value.

Syntax:

SV xx.xx

x is a number between 0 and 9.

Explain:

The power supply will set the desired value of output voltage when the command is received.

Example:

SV 12.34

Set output voltage to 12.34V

***SU**

Function:

Set voltage limit.

Syntax:

`SU xx`

x is a number between 0 and 9.

Explain:

The power supply will set desired up-limit value of the voltage when the command is received.

Example:

SU 20

Set voltage limit to 20V

***SI**

Function:

Set current limit.

Syntax:

`SI x.xx`

x is a number between 0 and 9.

Explain:

The power supply will set desired up-limit value of the current when the command is received.

Example:

SU 1.25

Set current limit to 1.25A

***SP**

Function:

Set power limit.

Syntax:

`SP xxx`

x is a number between 0 and 9.

Explain:

The power supply will set desired up-limit value of the power when the command is received.

Example:

SP 100

Set power limit to 100W

****The power setting changes the current limit only, the voltage limit will remain unchanged.****