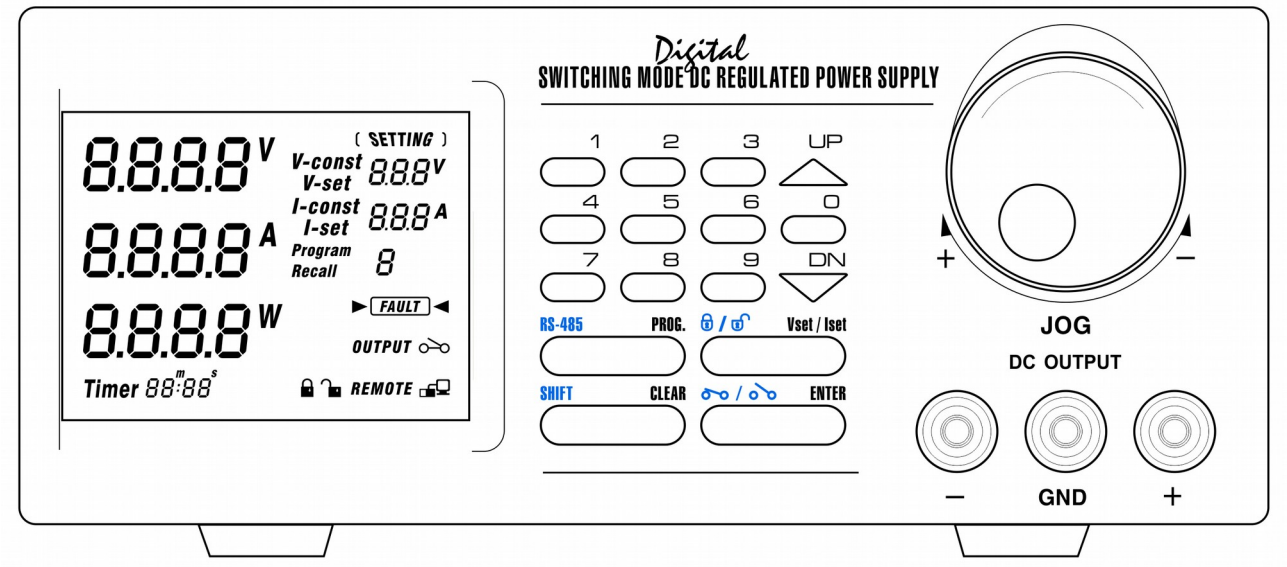
LABORATORY GRADE

REMOTE PROGRAMMING SWITCHING MODE DC regulated Power Supplies

SDP Series

SDP – 2210 / 2405 / 2603

User Manual



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1. Important Safety Instructions and Precaution For Use

General Safety Instructions

- Do not use the unit near water.
- Do not install unit near heating sources and heating emitting devices.
- Clean only with dry cloth.
- Do not block the fan ventilation.
- Prevent the power cord from being walked and/or pinched.
- Unplug this unit when not use.
- Unplug this unit during lighting and storms.
- Do not open the cover of the unit during operation.
- Never replace components when the power cable is connected.
- Always disconnect power, discharge circuit and remove external voltage before touching components.
- Only use optional accessories with this unit.
- Please contact qualified service personnel for repair.

Supply Input Range

- The unit is of universal input : 100 - 240 VAC, 50Hz / 60Hz .

Fuses

- For protection of the unit, replace the fuse only with same type and rating of fuse.

Operating environment

The unit is advised be used within the following environment conditions:

- Use this unit within the specified ambient temperature range listed in the specification table.
- Because the unit is cooled by FAN, do not place objects at the back of unit to block the convection. Also, user must not to place the unit on or rear any heat emitting devices or use multiple units in stacked configuration. For best result, use the unit in an environment that is as well cross-ventilated as possible.
- At 1KV of fast transient burst environment, the captioned model may have trouble in operation and require user reset.
- At 3V/m radiated immunity environment, the voltmeter may take a reading error +/-2V max. of the captioned model and back to normal operation without the interference.
- Altitude up to 2000M
- Installation category : CAT **II**
- Pollution degree : 2
- Indoor use only

Precautions For Use

1. The unit has a built-in Tracking O.V.P (Over voltage Protection) features. In the event of output voltage becoming 10% greater than the set value, the O.V.P. will be triggered and the output power will be cut off and >**FAULT**< warning appears.
   When you get this warning , switch off the unit and remove all loading, switch the unit back on again and it should resume normal operation.
   In the event this problem persists, the unit must be investigated by your agent.

2. This unit has a buzzer built inside. The buzzer will sound when over temperature/ overload/ over voltage has been triggered.
   When you get this warning sound , switch off the unit and remove all loading.
   Check your load and output settings.
   Allow the unit to cool down for 30 minutes.
   If you switch on the unit again, it should resume the normal operation.
   In the event of this problem persists, the unit must be investigate by your agent.

Warning!

For Model SDP-2603, the maximum output voltage up to 60Vdc.
It may be hazards to touch metal part of the output terminals.
User must avoid touch live metal part of the output terminals.

2. Technical Specifications of SDP Series Power Supplies

Specifications

Models	SDP-2210	SDP-2405	SDP-2603
Output Voltage:	1-20VDC	1-40VDC	1-60VDC
Output Current:	0-10A	0-5A	0-3.3A
Rated Output Power:	200W		
Ripple & Noise (p-p):	30mVp-p		
Load Regulation:	300mV	200mV	150mV
Line Regulation:	10mV		
Input Voltage:	100 - 240 VAC, 50Hz / 60Hz		
Maximum Input Power:	285W		
Power Factor:	≥0.9		
Display Meter:	4 digits - display LCD Ammeter, Voltmeter and Power meter		
Meter's Accuracy:	(±1% + 5 counts for range V < 5V, I < 0.5A), (±1% + 2 counts for range V ≥ 5V, I ≥ 0.5A).		
LCD Dimension:	48 x 66 (mm)		
Cooling System:	Thermostatic Control Fan		
Operating Temperature:	0- 40°C		
Protection:	- Tracking OVP (Over Voltage Protection), - Current Limiting, - Over Temperature Protection.		
Approvals:	CE EMC -- EN 55011, CE LVD -- EN 61010		
Dimension (WxHxD):	193 x 98 x 215 (mm)		
Weight:	3kg		
Accessory:	- User's Manual, - PC software, LabView ® Driver, - USB cable - 120ohm resistor		
Remarks:	- Adjustable Upper Voltage limit, - Adjustable Upper Current limit, - Power Factor Correction.		

Remote Programming Specifications

Communications Interface:	USB and RS-485
Remote Programming Functionality:	Full control of power supply functions and data read back.
Data Logging:	Yes, with supplied software
Baud Rate:	9600

3. Introduction

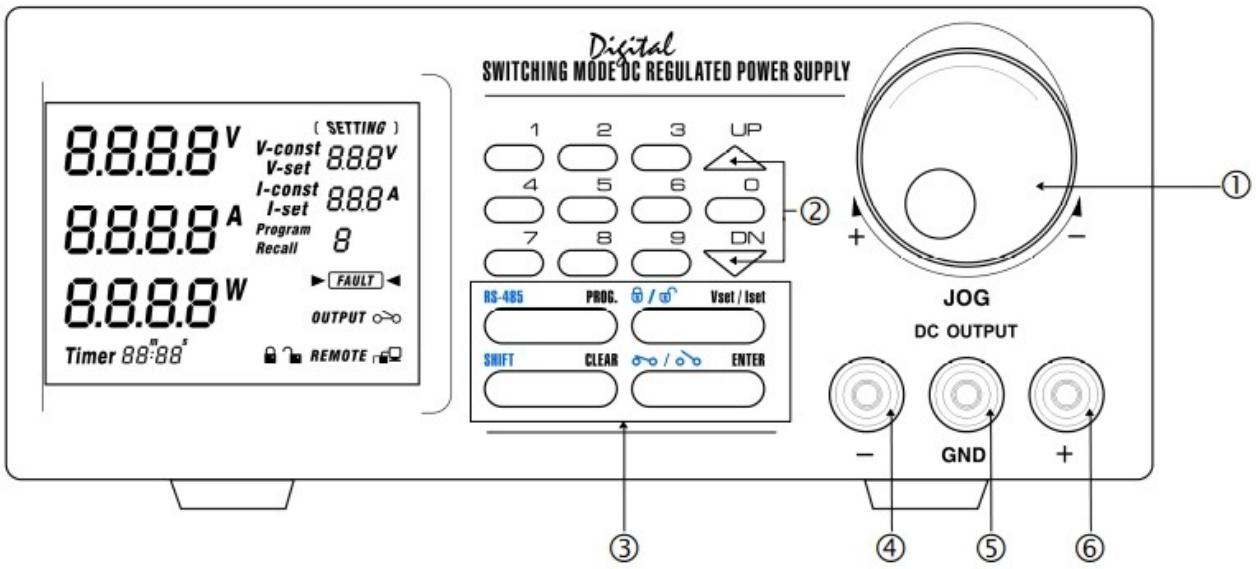
The SDP series of Programmable Switching Mode Power Supplies are designed for full remote programming with data logging functionality. Up to 31 power supplies can be connected via RS-485. It is ideal for applications which require various groups of output settings and running periods for repetitive tests especially with multiple power supplies.
The front panel allows users to do all programming and output settings as a stand alone laboratory power supply.

This series of power supplies have obtained the safety approval EN-61010 and EN-55011 EMC approval for scientific , industrial equipment of the CE directives.

Please keep this manual in a safe place

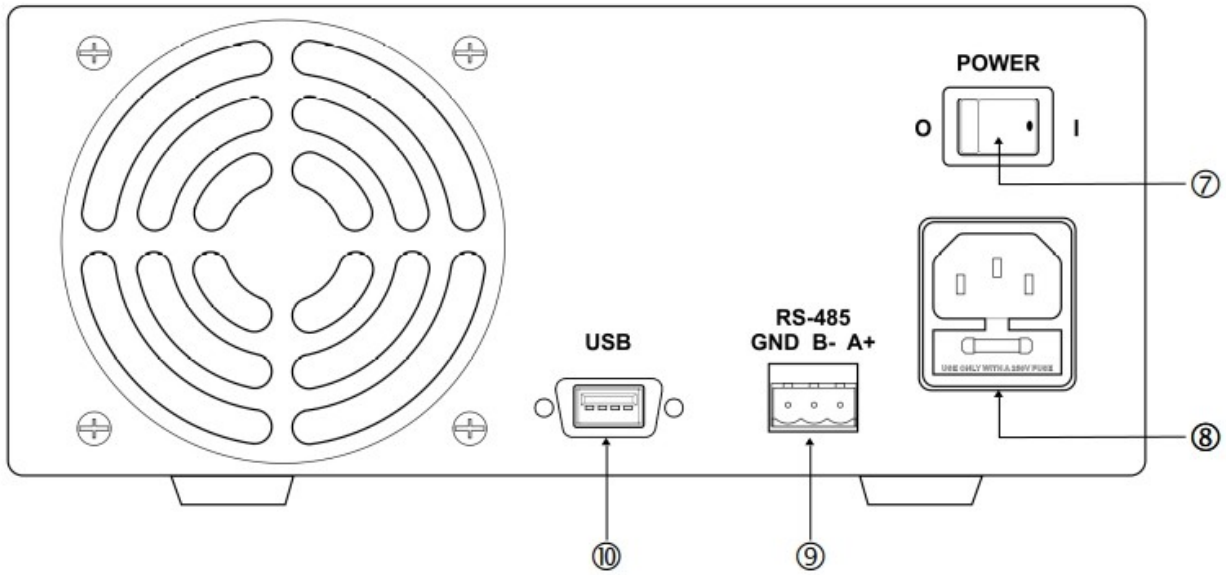
4. Controls and Indicators

Front Panel



① **JOG DIAL**
② **UP & DOWN KEY**
③ **DUAL FUNCTION CONTROL KEY**
④ **BLACK COLOR NEGATIVE POLARITY OUTPUT TERMINAL**
⑤ **GREEN COLOR GROUND TERMINAL (connected to chassis)**
⑥ **RED COLOR POSITIVE POLARITY OUTPUT TERMINAL**

Rear Panel



⑦ **POWER SWITCH**
⑧ **AC 100-240VAC POWER SOCKET WITH INPUT POWER FUSE**
⑨ **RS-485 PORT**
⑩ **USB PORT**

5. General Operation Principle

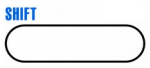
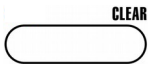
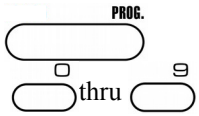
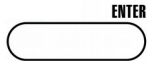
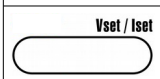
NOTE: This section contains a condensed overview of the unit.
Read this section to quickly get started.

5.1 Quick Reference of Keypad Functions

The front Keypad is organised as follow:
(1) Number Keys, UP/DOWN Keys and Jog Wheel
(2) 4 Dual Function Control Keys

The front panel functions are summarized as follow:

Keypad	Function	Section
Number Keys, UP/DOWN Keys and Jog Wheel		
0 thru 9	Press to select numerical values	6.2.2
UP	Press to ascend the numerical values	6.2.1
DN	Press to descend the numerical values	6.2.1
Jog Wheel	Rotate to adjust the voltage and current settings	6.2.1

Keypad	Function	Section
Dual Function Control Keys		
	Press to access second function of the control keys	
	Press to terminate any input process and the unit will exit to normal operation	
	Press to use recall preset program features. Use 0 to exit the use of any preset program Use 1 thru 9 to specify the location of preset program to be used Use ENTER to confirm	6.3.1 6.3.3
	Press SHIFT and RS-485 to enter RS-485 set menu	6.1.3
	Press SHIFT and to Lock/Unlock the Keypad and Jog Wheel	6.1.2
	Press to confirm the new settings	
	Press SHIFT and to Enable/Disable the output	6.1.1
	Press to Enable the output at power up	6.1.5
	Press to Disable the output at power up	6.1.5
SPECIAL Function		
	Press to get to the Upper Voltage Limit Setting Use 0 thru 9 to input the numerical values Use ENTER to confirm	6.1.4
	Switch between set output Voltage and output Current	

6. Operating Instructions

NOTE: This section shows how to perform power supply functions using the front panel.

Operations that you can perform are:

6.1 Setting of Operating Modes

6.1.1 Enable/Disable Output

	Action	*LCD Display*	*Description*
1.	Press SHIFT Then ⊶ / ⊸	OUTPUT ⊶	Output **ENABLE**
2.	Press SHIFT Then ⊶ / ⊸	OUTPUT ⊸	Output **DISABLE**

6.1.2 Lock/ Unlock the Keypad and Jog Dial

	Action	*LCD Display*	*Description*
1.	Press SHIFT Then 🔒 / 🔓	🔒	Keypad and Jog Dial Locked
2.	Press SHIFT Then 🔒 / 🔓	🔓	Keypad and Jog Dial UnLocked

6.1.3 RS-485 address setting

	Action	*LCD Display*	*Description*
1.	Press SHIFT Then RS-485	485 001	This will enter into RS-485 address set menu.
2.	0 to 9		Use numbering keypad to key in address from 1 to 255 for RS-485 connection
3.	Press ENTER		Press this key to confirm

6.1.4 Upper Voltage Limit Setting

	Action	*LCD Display*	*Description*
1.	Press SHIFT Then 0	OVEr V 25.6	This will enter into Upper Voltage Limit Adjustment. e.g. 25.6V present upper voltage limit.

	Action	*LCD Display*	*Description*
2.	0 to 9		Use the number key to input your desired voltage
3.	Press ENTER		Press this key to confirm

Note : Whenever to terminate the Upper Voltage Limit Setting, press "CLEAR" to return to normal operation.

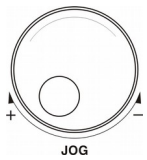
6.1.5 Output Enable/Disable at Power Up

	Action	**LCD Display**	**Description**
1.	Press SHIFT Then UP	PrUP ON	This will enable the output at power up. i.e. When you switch on the power supply, the output is also ON automatically with last set voltage value.
2.	Press SHIFT Then DN	PrUP OFF	This will disable the output at power up. i.e. The output will be OFF at next power up. This is the default setting for safety reason !!

6.1.6 Adjust LCD brightness

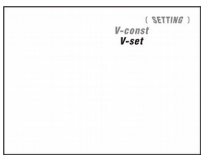
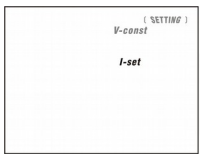
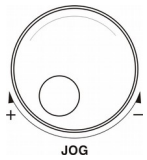
	Action	**LCD Display**	**Description**
1.	Press SHIFT Then 3	bL 6	Press SHIFT and 3 to enter into brightness set menu.
2.	Rotate JOG		Use JOG adjust LCD brightness. It has 10 level of brightness. 0 means LCD brightness off. 9 means the most brightest.
3.	Press ENTER		Press this key to confirm

6.1.7 Enable/Disable SCPI

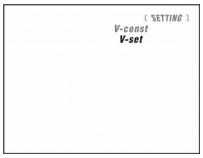
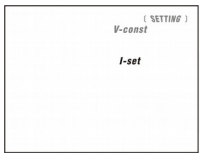
	Action	LCD Display	Description
1.	Press SHIFT Then 4		Press SHIFT and 4 to enter into SCPI enable/disable menu
2.	Rotate 		Use JOG select between Y and N
3.	Press ENTER		Press this key to confirm

6.2 Basic Operation

6.2.1 Setting of Voltage and Current by Jog Dial and UP & DOWN Key

	Action	LCD Display	Description
1.	Press Vset / Iset	 	Press Vset / Iset to switch between V-set and I-set.
2.	Rotate  or Press UP and DN		Rotate JOG or Press UP & DN Key to set the voltage/current level. Press Rotate JOG to switch between digit to be adjust.

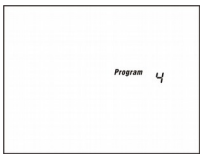
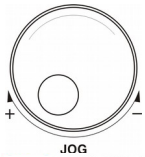
6.2.2 Setting of Voltage and Current Using Keypad

	Action	LCD Display	Description
1.	Press Vset / Iset	 	Press Vset / Iset to switch between V-set and I-set.
2.	0 to 9		Setting voltage/current by pressing numbers on Keypad.
3.	Press ENTER		Press this key to confirm

Note : whenever to terminate the settings of voltage and current, press “CLEAR” to return to the normal operation.

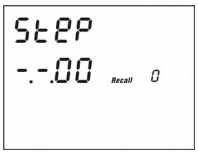
6.3 Using the Programming Features

6.3.1 Preset Program

	Action	LCD Display	Description
1.	Press PROG. Then 1 thru 9		Press PROG. and then 1 thru 9 to select Preset program. e.g. PROG. + 4 to select preset program 4
2.	Use  and Vset / Iset		Use JOG and V-set/I-set adjust Voltage an d Current setting if you want to adjust the preset value.
3.	Press ENTER		Press this key to confirm
4.	Press PROG. Then 0		Press PROG. and 0 to exit preset program.

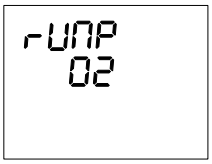
Note : whenever to terminate the Timed Program, press “CLEAR” to return to the normal operation.

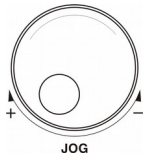
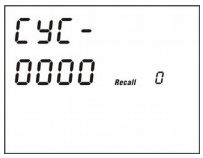
6.3.2 Setting of Timed Program

	Action	LCD Display	Description
1.	Press SHIFT Then 1		Press SHIFT and 1 to enter into timed program step setting.
2.	Use JOG or 0 thru 9		Use JOG or numbering Keypad to select step to be review.
3.	Press UP and DN		Use UP/DOWN key to move around voltage, current and time setting of step. The select part will flash to indicate it is under modification.
4.	Use JOG or 0 thru 9		Use JOG or numbering keypad to modify the voltage, current and time.
5.	Press ENTER		Press this key to confirm

Note : whenever to terminate the Timed Program, press "CLEAR" to return to the normal operation.

6.3.3 Run Timed Programming

	Action	LCD Display	Description
1.	Press SHIFT Then 2		Press SHIFT and 2 to enter in run menu.
2.	Use JOG or 0 thru 9		Use JOG or numbering keypad select number of steps to be run start from step 0. The minimum steps to be run is 2.
3.	Press ENTER		Press this key next to set number of cycle to be run.

	Action	LCD Display	Description
4.	Use  or 0 thru 9		Use JOG or numbering keypad select number of cycle to be run.
5.	Press ENTER		Press this key to start running
6.	CLEAR		Press this key terminate the program running anytime.

Note : whenever to terminate the Preset Program, press "CLEAR" to return to the normal operation.

7. PC connection

SDP series power supply support remote control from PC. It can be controlled by using Manson PC software for Windows or your own program using command set in Appendix A.

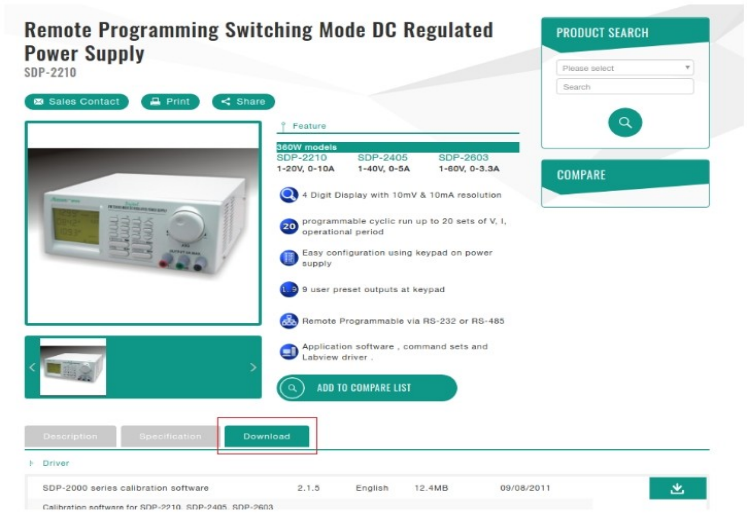
SDP series power supply come with USB and RS-485 port on the rear. You can use either one of these connections to connect power supply to PC. The power supply will automatically select between USB and RS-485 while cable is connected.
*Please do not connect both USB and RS-485 at the same time.

Driver and PC control software download

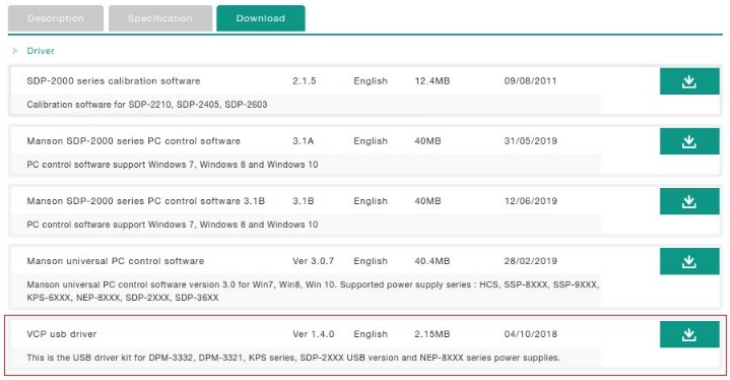
For Windows 7 and Windows 8, it need to install additional USB driver when using USB connection for remote control. For Windows 10, it use the driver come with OS itself.

The USB driver, PC control software and software user manual can be downloaded under Download tab in SDP product web page.

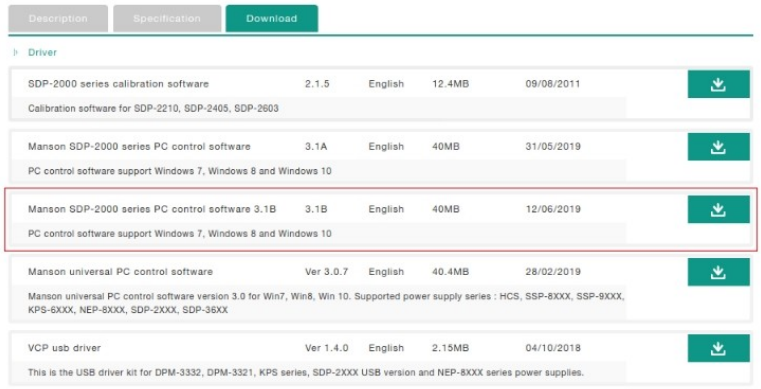
SDP product web page:
http://www.manson.com.hk/product/sdp-2210/



USB driver download



PC control software download



Software user manual download

Connect Multiple Power Supplies to PC via RS-485

For multiple power supplies, use the RS-485 Interface through the RS-485 port at rear panel of the power supply. Up to 31 power supplies can be connected via RS-485.
You will need a USB to RS-485 Adapter and the connection shown in Figure 6a & 6b.

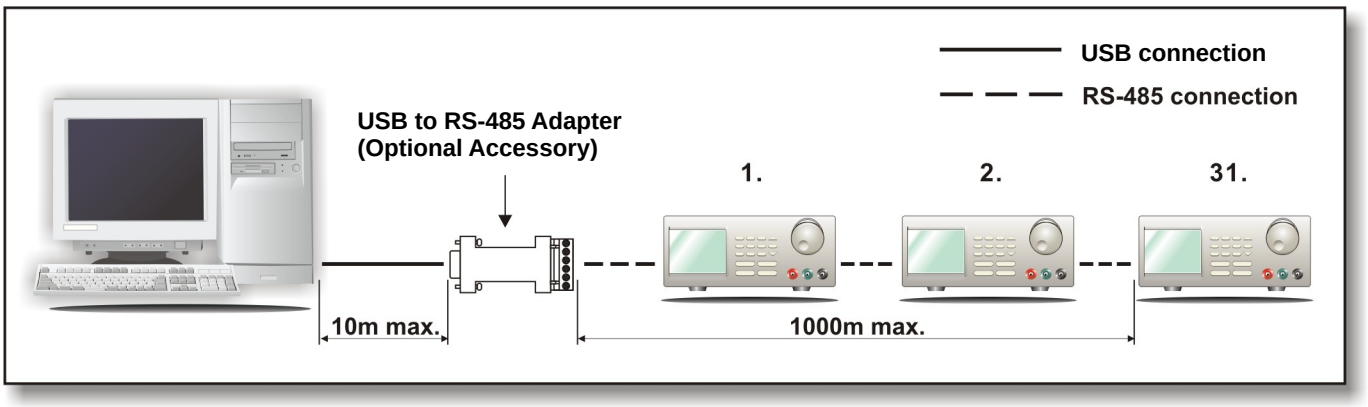


Figure 7a. Connection diagram for multiple power supply

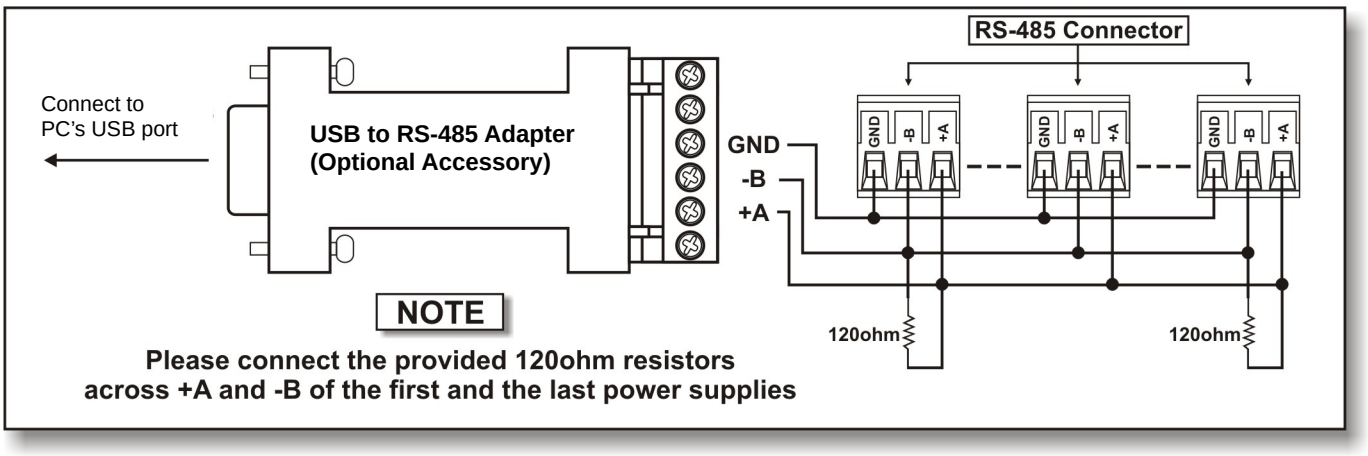


Figure 7b. Connection diagram between USB Adapter and RS-485 Connectors.

APPENDIX A

SDP COMMMAND SET

Remarks in using the Remote Programming Mode The USB/485 interface is always ready for connection to PC for remote programming operation .

SDP Command Set

{ }- command data, [ ] - return data, [OK] = "OK", [CR] = 0dh
???? = 30h, 30h, 30h, 30h - 39h, 39h, 39h, 39h (4 bytes data)
??? = 30h, 30h, 30h - 39h, 39h, 39h (3 bytes data)
?? = 30h, 30h – 39h, 39h (2 bytes data)

<address> 30h, 30h - 3fh, 3fh (2 bytes data).

Bold – Input Command

Italic – Return Data from Power Supply

PS = Power Supply

Command Code & Return Data	**Description**
Input Command: **SESS <address> <CR>** Return Data from Power Supply: *[OK] [CR]*	Disable front panel keypad and make PS to Remote Mode
Input Command: **ENDS <address> <CR>** Return Data from Power Supply: *[OK] [CR]*	Enable front panel keypad and make PS to exit Remote Mode
Input Command: **CCOM <address> <RS> {000-256} <CR>** Return Data from Power Supply: *[OK] [CR]*	Change RS485 <RS> = 0 -> RS-232 <RS> = 1 -> RS-485
Input Command: **GCOM <address> <CR>** Return Data from Power Supply: *[RS] RS485 Address [??] [CR]* *[OK] [CR]*	Get the RS-485 address
Input Command: **GMAX <address> <CR>** Return Data from Power Supply: *Voltage [???] Current [???] [CR]* *[OK] [CR]*	Get maximum voltage and current of PS

Command Code & Return Data	**Description**
Input Command: **GOVP <address> <CR>** Return Data from Power Supply: *Voltage [???] [CR]* *[OK] [CR]*	Get Upper Voltage Limit of PS
Input Command: **GETD <address> <CR>** Return Data from Power Supply: *Voltage [????] Current [????] [0] [CR]* *[OK] [CR]* *Voltage [????] Current [????] [1] [CR]* *[OK] [CR]*	Get Voltage & Current reading from PS PS in CV mode PS in CC mode
Input Command: **GETS <address> <CR>** Return Data from Power Supply: *Voltage [???] Current [???] [CR]* *[OK] [CR]*	Get Voltage & Current Set Value from PS
Input Command: **GETM <address> <CR>** Return Data from Power Supply: *Memory 1 Voltage [???] Current [???] [CR]* *Memory 2 Voltage [???] Current [???] [CR]* . . . . *Memory 9 Voltage [???] Current [???] [CR]* *[OK] [CR]*	Get All Preset Memory Values from PS
Input Command: **GETM <address> location {1-9} <CR>** Return Data from Power Supply: *Voltage [???] Current [???] [CR]* *[OK] [CR]*	Get Memory from Specific Preset of PS
Input Command: **GETP <address> <CR>** Return Data from Power Supply: *Program 00 Voltage [???] Current [???] Minute [??] Second [??] [CR]* *Program 01 Voltage [???] Current [???] Minute [??] Second [??] [CR]* . . . . *Program 19 Voltage [???] Current [???] Minute [??] Second [??] [CR]* *[OK] [CR]*	Get all the Timed Program Memory of PS

Command Code & Return Data	**Description**
Input Command: **GETP <address> program {00-19} <CR>** Return Data from Power Supply: *Voltage [???] Current [???] Minute [??] Second [??] [CR]* *[OK] [CR]*	Get Timed Program Memory from Specific Program of PS
Input Command: **GPAL <address> [CR]** Return Data from Power Supply: *Reading voltage [####] V [ON]* *Reading current [####] A [ON]* *Reading watt [####] W [ON]* *Timer minute [####] second [##] timer [ON] colon [ON] m [ON] s [ON]* *Setting voltage [###] V-const [ON] V-bar [ON] V [ON]* *Setting current [###] I-Const [ON] I-bar [ON] A [ON]* *Program [#] Program [ON] P-bar [ON]* *SETTING [ON] Key lock [ON] Key open [ON] FAULT [ON] Output on [ON]* *Output off [ON] Remote [ON] [CR]* *[OK] [CR]*	Get LCD Display Information
Input Command: **VOLT <address> voltage {000-XXX} <CR>** Return Data from Power Supply: *[OK] [CR]*	Set Voltage Level XXX-Max. Output Rating Voltage = XX.X V Current = X.XX V
Input Command: **CURR <address> current {000-XXX} <CR>** Return Data from Power Supply: *[OK] [CR]*	Set Current Level
Input Command: **SOVP <address> voltage {000-XXX} <CR>** Return Data from Power Supply: *[OK] [CR]*	Set Upper Voltage Limit of PS
Input Command: **SOUT <address> 1 <CR>** Return Data from Power Supply: *[OK] [CR]*	Disable Output of PS

Command Code & Return Data	**Description**
Input Command: **SOUT <address> 0 <CR>** *Return Data from Power Supply:* *[OK] [CR]*	Enable Output of PS
Input Command: **POWW <address> location {1-9}0 <CR>** Return Data from Power Supply: *[OK] [CR]*	Enable the output when switch on the power supply.
Input Command: **POWW <address> location {1-9}1 <CR>** Return Data from Power Supply: *[OK] [CR]*	Disable the output when switch on the power supply.
Input Command: **PROM <address> location {1-9} Voltage {000-XXX} Current {000-XXX} <CR>** Return Data from Power Supply: *[OK] [CR]*	Set Voltage and Current values of Preset Memory
Input Command: **PROP <address> location {00-19} Voltage {000-XXX} Current {000-XXX} Minute {00-99} Second {00-59} <CR>** Return Data from Power Supply: *[OK] [CR]*	Set Voltage, Current and Time period of Timed Program
Input Command: **RUNM <address> location {1-9} <CR>** *Return Data from Power Supply:* *[OK] [CR]*	Recall Preset Memory 1-9
Input Command: **RUNP <address> times {000-256} <CR>** Return Data from Power Supply: *[OK] [CR]*	Run Timed Program (000 = run infinite times)
Input Command: **STOP <address> <CR>** Return Data from Power Supply: *[OK] [CR]*	Stop Timed Program