CERTIFICATION

iDRC certifies that this product was thoroughly tested, inspected and found to meet published specifications when it is shipped out of the factory. iDRC further certifies that its calibration measurements are traceable to the ITRI (Industrial Technology Research Institute/Center for Measurement Standards), and to the extent allowed by ITRI's calibration facility.

WARRANTY PERIOD - ONE YEAR

This product is warranted for the defects in materials and workmanship for a period of ONE YEAR from date of shipment. During the warranty period, iDRC will at its option, either repair or replace the products, which are proved to be defective. iDRC is not liable for incidental/consequential damages and errors caused by improper use.

WARRANTY SERVICE

iDRC will repair or replace the product during the warranty period and it should be returned to your nearest iDRC authorized service center. Buyer shall prepay shipment charges to service center. After reparation, the service center will pay shipment charges and return the product to the buyer. Buyer should prepay the freight if the product is returned to iDRC International Sale Dept. The RMA (Return Material Authorization Number) must be obtained directly from the iDRC for warranty repairs. No liability will be accepted if the returned product is without such permission.

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to any defect that is resulted from improper or inadequate maintenance by the buyer. iDRC does not warrant supplied products or interfaces that are unauthorized modification, misused, operated outside of the specification, repaired, or maintained at the improper site. No other warranty is expressed or implied. iDRC specifically disclaims the implied warranties of merchantability and fitness for a particular purpose.

ALL RIGHTS RESERVED

No part of this publication may be produced, stored in a retrieval system, or transmitted in any form, or by means, electronic, mechanical photocopying, recording or otherwise without prior permission of iDRC.

TRADEMARK INFORMATION

DSP-WR^{TM} power supply is a trademark of iDRC.

CAUTION

The following safety precautions must be observed during all phases of operation, service and repair of this equipment. Failure to comply with the safety precautions or warnings in this document violates safety standards of design, manufacture and intended use of this equipment and may impair the built-in protections within. iDRC shall not be liable for user's failure to comply with these requirements.

GROUNDING

To minimize shock hazard, the product chassis must be connected to an electrical ground. The product must be connected to the AC power supply mains through a three-conductor power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet.

For instruments designed to be hard-wired to the supply mains, the protective earth terminal must be connected to the safety electrical ground before another connection is made. Any interruption of the protective ground conductor or disconnection of the protective earth terminal will cause a potential shock hazard that might cause a personal injury.

OUTPUT TERMINALS GROUNDING

There is a potential shock hazard at the LAN ports when power supplies are used with rated or combined voltage that is greater than 400V and the Positive Output of the Power Supply is grounded. Do not connect the Positive Output to ground when the LAN is used. The output terminal can be connected by external conductor, be aware that only 105 deg. C conductor can be used.

FUSES

Authorized iDRC service personnel must change fuses only. For continued protection against risk of fire, replace only with the same type and rating of fuse.

CONDENSATION

If the environment temperature of the power supply is changed suddenly (for example the unit is moved from a cold place to a warm place or using a heater in winter) the water droplet may form inside the power supply. Condensation may also occur if the power supply is exposed to the direct wind from an air-conditioner.
To avoid the harmfulness due to condensation, please let the power supply stand at room temperature for one or two hours without connecting to the input mains power.

INPUT RATINGS

The specification described in this document is specified with the input voltage range of 200VAC~415VAC 50/60Hz, the performance with input voltage 180VAC~200VAC or 415VAC~460VAC is not guaranteed.

LIVE CIRCUITS

Operating personnel must not remove the cover of the product. Non-iDRC qualified personnel allow no internal adjustment or component replacement. Never replace components with power cable connected. To avoid injuries, always disconnect power, discharge circuits and remove external voltage source before touching components.

PARTS SUBSTITUTIONS & MODIFICATIONS

Only authorized iDRC service personnel is allowed to make parts substitutions and modifications. For repairs or modifications, the instrument must be returned to an authorized iDRC service facility.

IMAGES
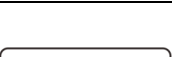
For the purpose of clear printing, the images in this manual may differ from actual product.

SAFETY INSTRUCTIONS

Environmental Conditions
The safety approval of DSP-WR^{TM} power supply series applies to the following operating conditions：
(1) Indoors Use
(2) Ambient temperature：0°C to 45°C
(3) Maximum Relative Humidity：80% (no condensation)
(4) Altitude：Up to 2000m

Symbol	Description
⚠	CAUTION： REFER TO REFERENCED PROCEDURE
⚡	WARNING! RISK OF ELECTRIC SHOCK!
⚡	HAZARDOUS VOLTAGE
⏚	FRAME OR CHASIS TERMINAL
⏚	PROTECTIVE GROUND CONDUCTOR TERMINAL
○	OFF (Supply)
I	ON (Supply)
---	DIRECTIVE CURRENT (DC)
3~	THREE-PHASE ALTERNATING CURRENT
WARNING	The WARNING sign denotes a hazard. An attention to a procedure is called. Not following procedure correctly could result in personal injury. A WARNING sign should not be skipped and all indicated conditions must be fully understood and met.
CAUTION	The CAUTION sign denotes a hazard. An attention to a procedure is called. Not following procedure correctly could result in damage to the equipment. Do not proceed beyond a CAUTION sign until all indicated conditions are fully understood and met.

INDEX

INDEX

CHAPTER 1 PRELIMINARY ACCESSORIES CHECK

1-1. Accessories Check

To ensure that you are receiving what you ordered, check the boxes bellow, if there is discovered damaged or missing item, please do not hesitate to contact us or our distributors.

　　DSP-WR Power Supply x1
　　Input protective cover and screws x1 set
　　Power cable strain relief x1
　　Output protective cover and screws x1 set
　　Pluggable terminal blocks (4P) x1
　　D-sub connector (9P) x1
　　1.5 m Ethernet Cable x1
　　Operational Manual

1-2. Installation

Grounding：
To minimize shock hazard, the chassis of DC power supply must be connected to an electrical ground.

1-3. Input Voltage

| WARNING | It is required to arrange proper wiring and appropriate input voltage to protect DC Power Supply from unstable or damaged. Make sure the input voltage and wire comply with DC Power Supply's specification. |

1-4. Install Conditions and Location

▲ Environmental Temperature
Operating： Ambient temperature range 0ºC ~ 45ºC.
Storage： Ambient temperature range -20ºC ~ 70ºC

▲ Humidity

| CAUTION | Operating and storage：10%~90% (no condensation). Outdoor use is not allowed. |

▲ Location
　Tilted or unsteady surfaces：
　Even if the equipment is installed on a flat floor, lock the front wheels and use the stopper to fix the equipment to the floor surface.

▲ Do not install in the environments below
　• Dusty areas.
　• Areas with corrosive gases and inflammable materials.
　• Exposed to strong magnetic areas or electric fields.
　• Highly sensitive measuring instruments or receivers are installed area.

▲ Place in which the equipment's air intake or exhaust port will be blocked

| CAUTION | At least provide 45cm or more clearance between the air intake and exhaust port and the wall (or interference). |

CHAPTER 2   GENERAL INFORMATION

2-1. Features

2-1-1. Input & Output
● Wide range output, programmable voltage, current and power.
● 3U height, output voltage from 0~80V up to 0~1500V, output current from 0~30A up to 0~540A. Output power 5kW, 10kW, 15kW, in total 18 models available for selection.
● Simply construct 10 units to become a 150kW power supply by using the optional pre-assembled rack cabinet.
● Maximum output current up to 5400A.
● Three phase UNIVERSAL input, 3ø 180~460VAC (47~63Hz).
● Active power factor correction PF > 0.95.
● Efficiency > 95%

2-1-2. Electrical
● User definable output priority, Constant Voltage, Constant Current or Constant Power.
● Internal resistance, Solar Array Simulation functions.
● Programmable output ramp up and ramp down protecting the device under test.
● Programmable OVP, OCP and OTP.
● Output ripple and noise are extremely low.
● User definable power ON mode (LAST/OFF).
● 16Bit DAC for setting and 24Bit ADC for measurement.

2-1-3. Functions
● Non-gap stacking, no ventilation holes at the cover and bottom plate of the power supply.
● Uses speed controlled fan (12cm), dissipates the heat efficiently.
● Upgrading firmware without opening the case, the unit will never become a brick even failed of upgrade.
● Safely operation with Inter-lock function.
● Large-size touchscreen, various operating modes, independent V & A knobs for quick adjustment.
● 5 digits of voltage & current display, resolution 1mV / 1mA.
● Three sets of memories can be stored and recalled in the front panel.
● Up to 8000 sets of programmed memories those combined by V/A/W/Time can be stored, min. time 10mS.

2-1-4. Interface
● USB host port for load or save the programmed sequence.
● LAN (LXI) interface built-in.
● LAN interface response time 10mS.
● Provide IVI-COM driver, support SCPI commands.
● Optional interfaces Isolated Analog.

2-2. Introduction of wide range output

DSP-WR is a wide range output programmable DC power supply which has extended operational range comparing with the conventional DC power supplies. User will obtain more flexibility on usage and lower down the procurement of power supplies. All combinations (V x A) within the rated output power are applicable.

Different output power ranges illustrated below:

The left diagram demonstrates the output power range of conventional power supplies, the power range is limited within the rectangle formed by V x A. When lower the output voltage, the maximum output current remains the same therefor the output power goes lower.

The left diagram demonstrates the output power range of wide range power supplies, the power range is flexible. When lower the output voltage, the output current may extend for 3 times to remain the output power within rated value.

Conventional 80V/15kW power output range

Wide range 80V/15kW power output range
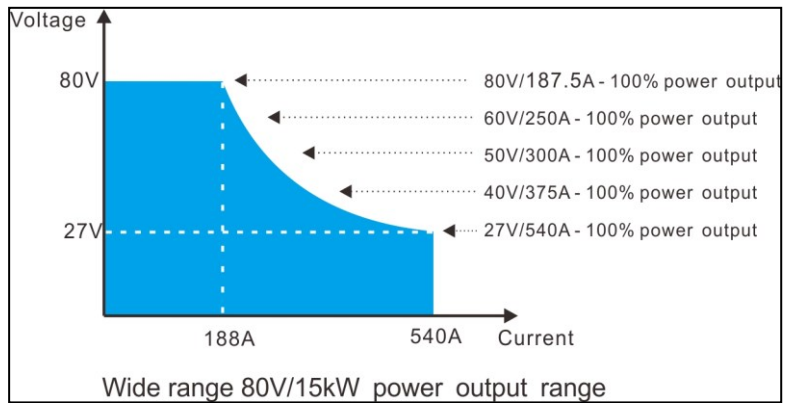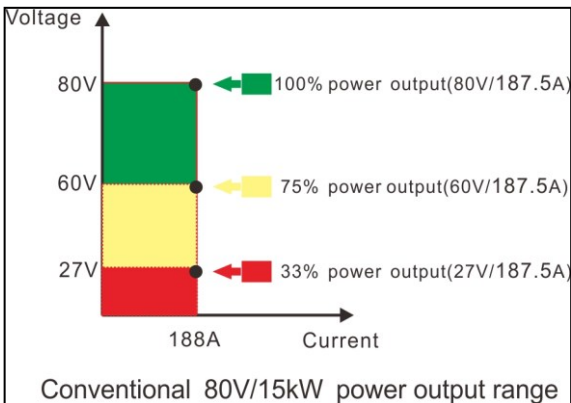
2-3. Models and Rating table
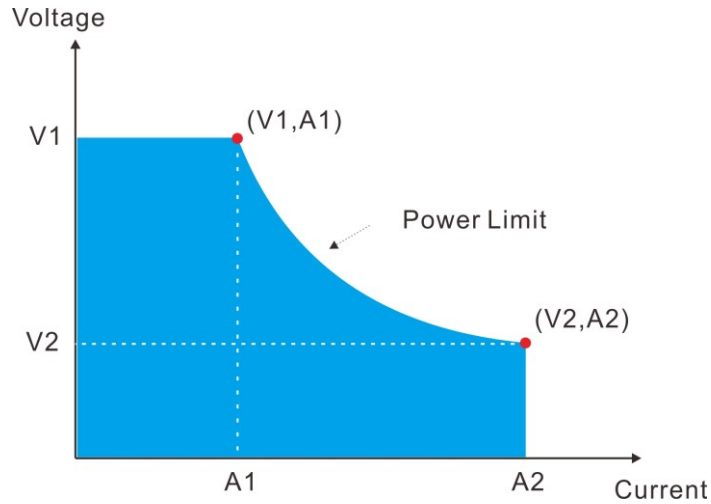
Output Power	Model	V1 Max. Voltage	A1 Current @Max. Voltage	V2 Voltage @Max. Current	A2 Max. Current
5kW	DSP 80-180WR	80	62.5	27.78	180
	DSP 250-60WR	250	20	83.33	60
	DSP 350-42WR	350	14.28	119.05	42
	DSP 500-30WR	500	10	166.67	30
	DSP 650-23WR	650	7.69	217.39	23
10kW	DSP 80-360WR	80	125	27.78	360
	DSP 250-120WR	250	40	83.33	120
	DSP 350-84WR	350	28.56	119.05	84
	DSP 500-60WR	500	20	166.67	60
	DSP 650-46WR	650	15.38	217.39	46
	DSP 1000-30WR	1000	10	333.33	30
15kW	DSP 80-540WR	80	187.5	27.78	540
	DSP 250-180WR	250	60	83.33	180
	DSP 350-126WR	350	42.84	119.05	126
	DSP 500-90WR	500	30	166.67	90
	DSP 650-69WR	650	23.07	217.39	69
	DSP 1050-42WR	1050	14.29	357.14	42
	DSP 1500-30WR	1500	10	500	30

2-4. Dimension Diagrams
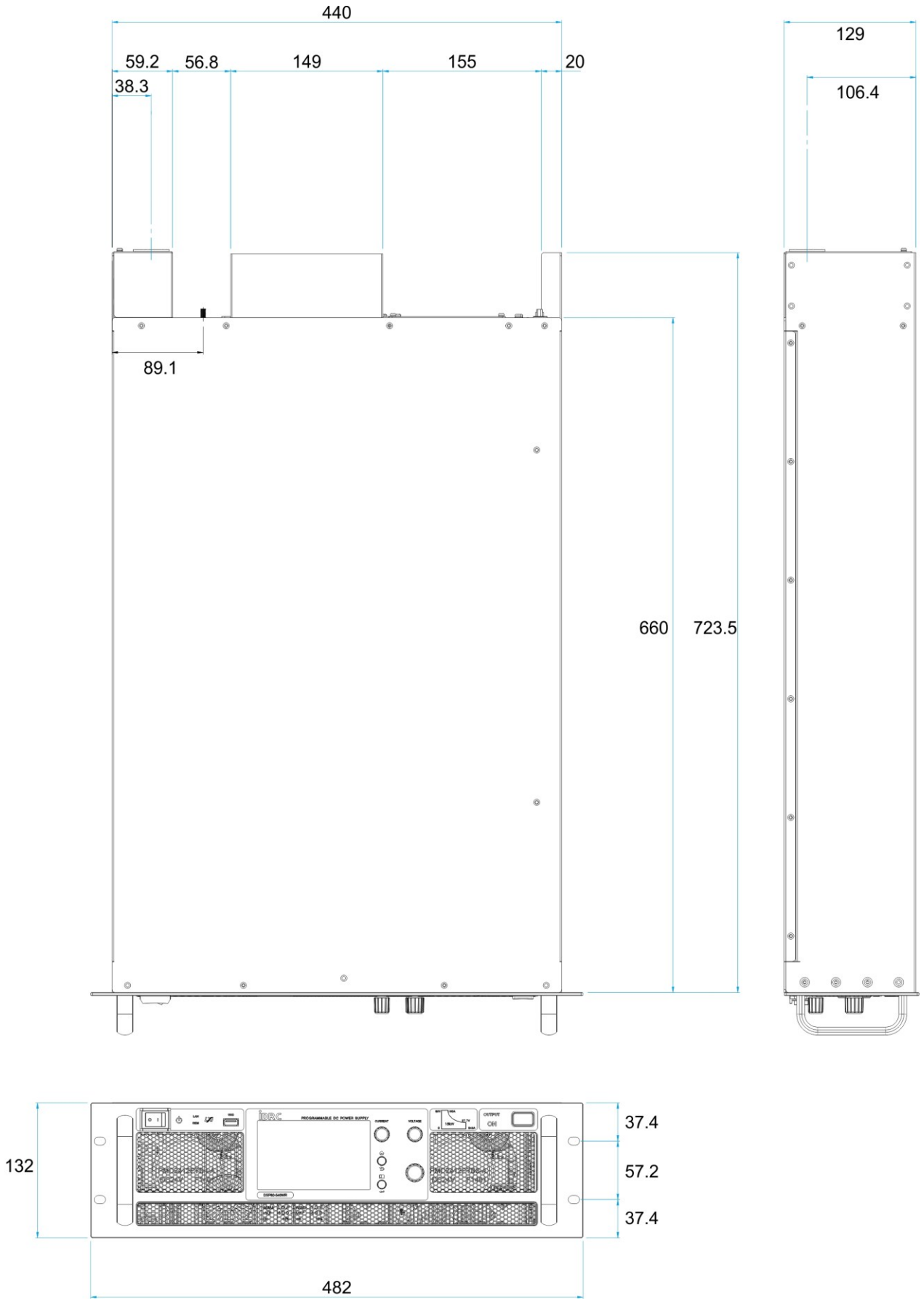
CHAPTER 3 INSTALLATION

3-1. Input Wiring

!!WARNING!!
SHOCK HAZARD To minimize shock hazard, the product chassis must be connected to an earth ground. AC mains connections must be made by a qualified electrician.
Any interruption of the earth ground conductor or disconnection of the protective earth terminal will cause a potential shock hazard that might cause a personal injury.

1. All of the DSP-WR series 5kW/10kW/15kW models are input with 3-phase AC mains power. Identical phase current keeps the AC mains system balanced. Workable input range 180VAC~460VAC meets almost all the AC mains around the world, not worrying which country the power supply will be used.

2. The specification described in this document is specified with the input voltage range of 200VAC~415VAC, the performance with input voltage 180VAC~200VAC or 415VAC~460VAC is not guaranteed.

3. AC mains power cable is not provided with the power supply. The recommended cross sectional area of the conductors are listed in below table.
It is also required to install a circuit breaker between the AC mains and the unit. Refer to the following table for current ratings.
Keep the AC mains cables as short as possible. The longer cable has greater impedance which may cause the voltage drop.

	Unit Rating	5KW		10kW		15kW	
	Input Power	200V	400V	200V	400V	200V	400V
L1	Max current	17A	8.5A	34A	17A	52A	26A
L2	Max current	17A	8.5A	34A	17A	52A	26A
L3	Max current	17A	8.5A	34A	17A	52A	26A
L1、L2 L3、GND	Wire size	3.5 mm^2	2.0 mm^2	8.0 mm^2	3.5 mm^2	14 mm^2	5.5 mm^2

3-1-1. Input terminals and wiring description
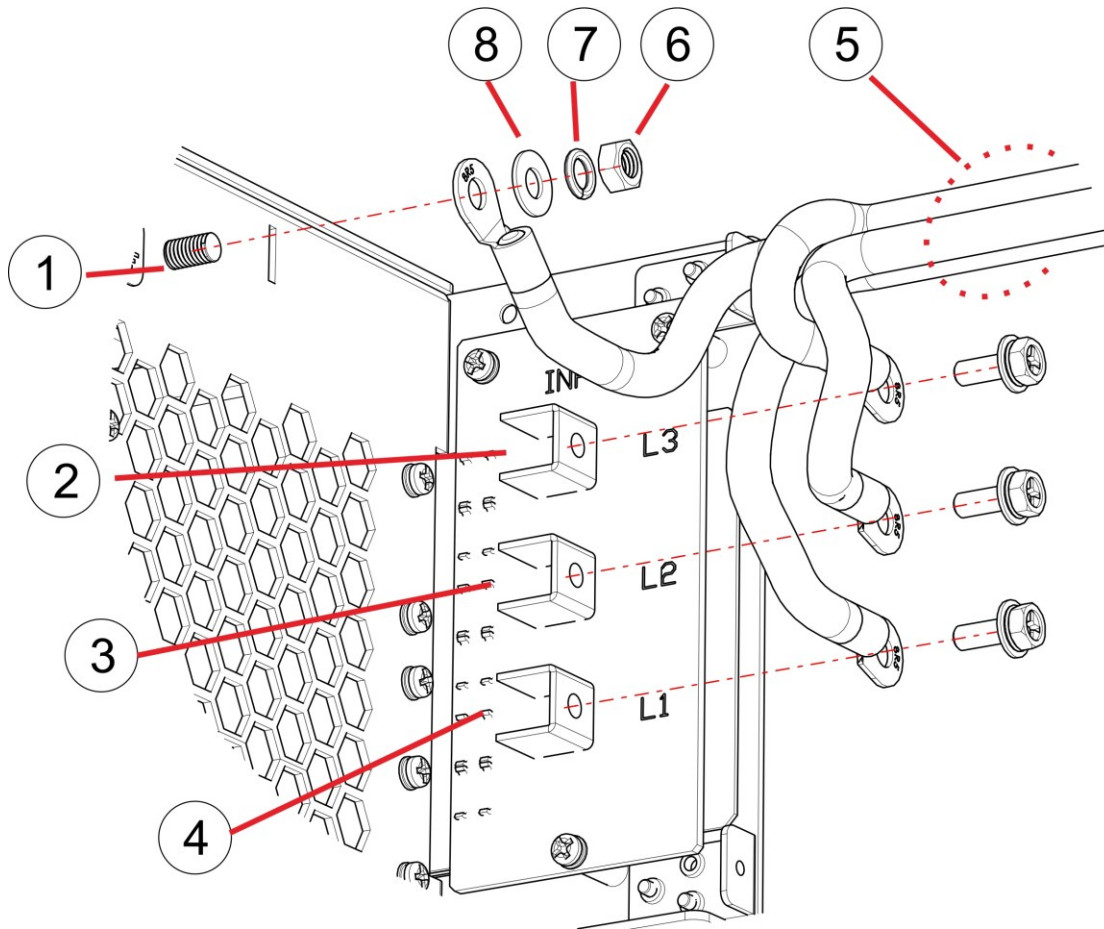
The input terminals:

1. Protective earth
2. L3 M5x12L+WS phillips hex head screws
3. L2 M5x12L+WS phillips hex head screws
4. L1 M5x12L+WS phillips hex head screws
5. Input cables
6. M5 hex nut
7. One spring washer at nut side.
8. Washers.

3-1-2. Installation of input protective cover
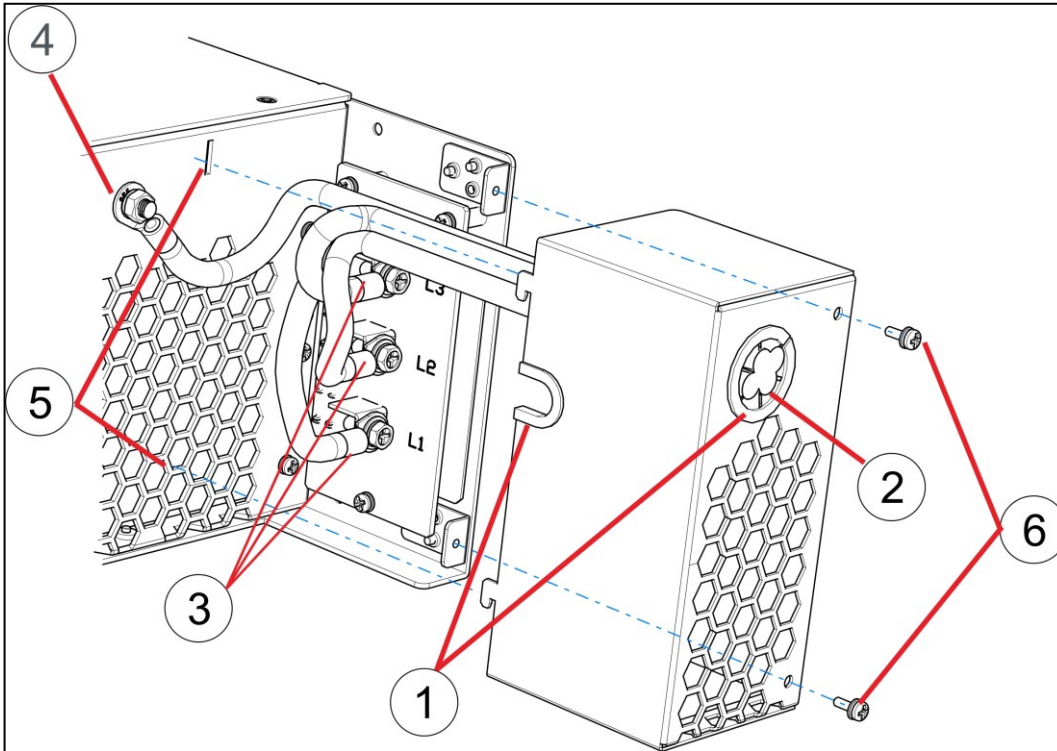
Procedures:
1. Ensure the cable bushings are attached firmly.
2. Pass the cables through the bushings.
3. Fix the cables according to the description in 3-1-1. Input terminals and wiring description.
4. Pass the earth grounding wire through the bushing and outer of the protective cover.
5. Insert the hooks into the slots and press the cover downward to fasten the cover.
6. Use two M3*8 screws to fix the cover.
7. The cover fixed as below illustration.
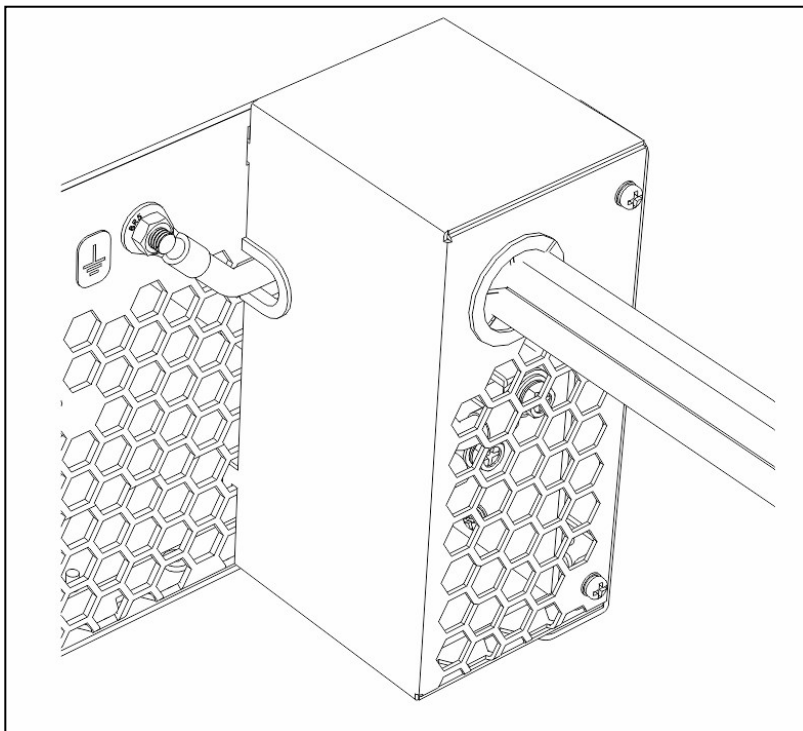
3-2. Output Wiring

> **!!WARNING!!**
> Power off the unit, it is better to switch off the circuit breaker before proceed the output wiring.
>
> The output voltage of this series may from 80VDC ~ 1500VDC. Ensure that all terminals (connectors), load wiring, and load terminals are either insulated or covered so that no accidental contact can occur.
>
> All output connections must be made with the unit powered off, and must be performed by qualified personnel who are aware of the hazards involved. Improper actions can cause fatal injury as well as equipment damage.
>
> The output terminals (including the cables if connected) may remain hazardous voltage for around 10 seconds (or more depending on the models) after turning off the output. So do not touch output cables or terminals immediately after turning off the output.
>
> The output of the unit is floating, either positive or negative can be connected to ground if required. Always use two wires to connect between output terminal and the load.
> Ensure the load is grounded before grounding one of the output terminals.
> Maximum isolation of positive/negative terminal to PE is +/- 1500V from ground and varies by model.

The recommended cable gauge and resistance by length:

AWG	Diameter	Area	Resistance/length	Maximum amps for power transmission	
		(mm^2)	(mΩ/m)	60 °C	75 °C
0000	11.684	107	0.1608	195A	230A
000	10.405	85.0	0.2028	165A	200A
00	9.266	67.4	0.2557	145A	175A
0	8.251	53.5	0.3224	125A	150A
2	6.544	33.6	0.5127	95A	115A
4	5.189	21.2	0.8152	70A	85A
6	4.115	13.3	1.296	55A	65A
8	3.264	8.37	2.061	40A	50A
10	2.588	5.26	3.277	30A	35A
12	2.053	6.53	5.211	20A	25A
14	1.628	2.08	8.286	15A	20A

The table below assumes DC, or AC frequencies equal to or less than 60 Hz, and does not take skin effect into account. Turns of wire is an upper limit for wire with no insulation.

3-3. Output terminals and wiring description (output 80V 5kW、250V and higher)

3-3-1. Output terminals
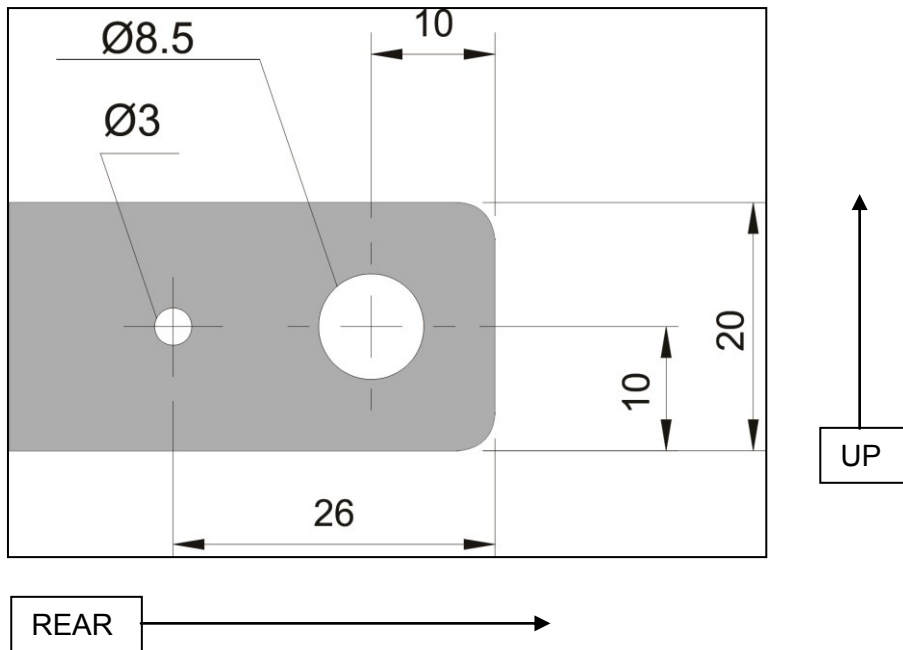
3-3-2. Output connection
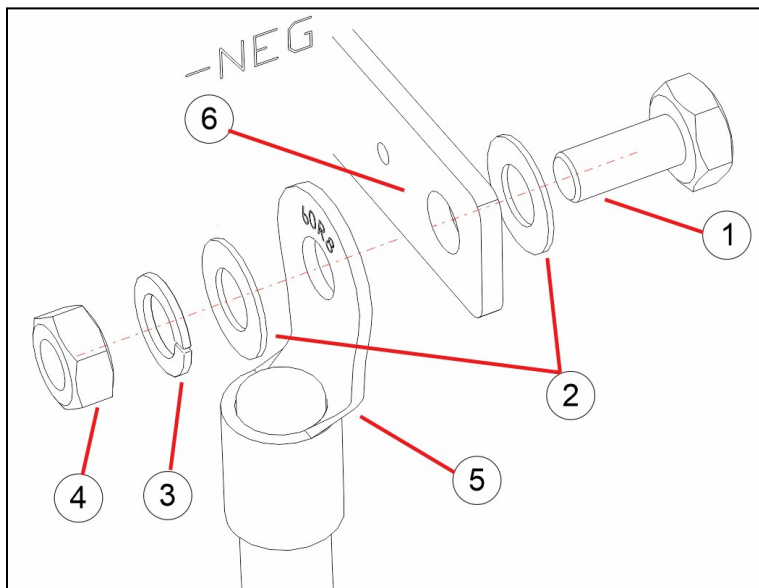
Procedures:
1. It is recommended to use M8x16L hex head cap screws.
2. Two washers at both sides.
3. One spring washer at nut side.
4. A M8 hex nut.
5. Place the flat side of terminal to the copper bar, hang down the cable to leave more clearance for the protective cover.
6. DSP-WR output copper bar.

3-3-3. Illustration of completion
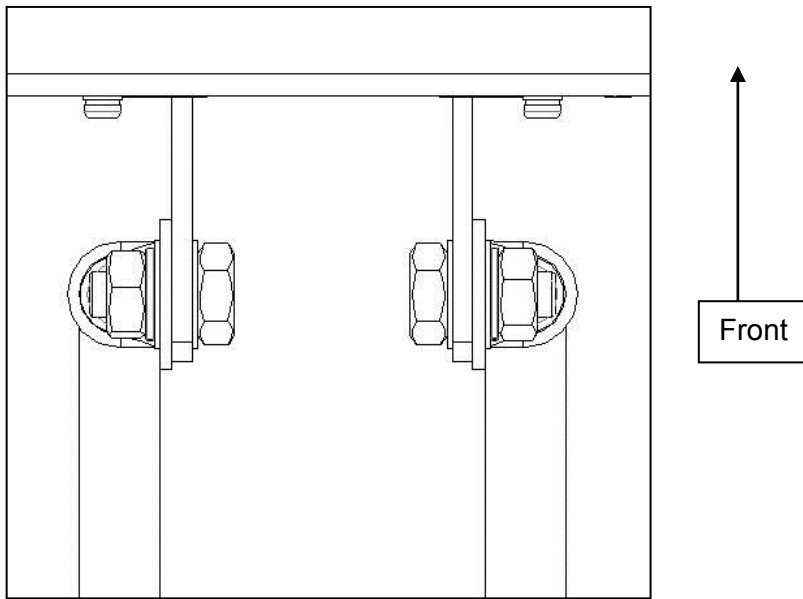
3-3-4. Installation of output protective cover
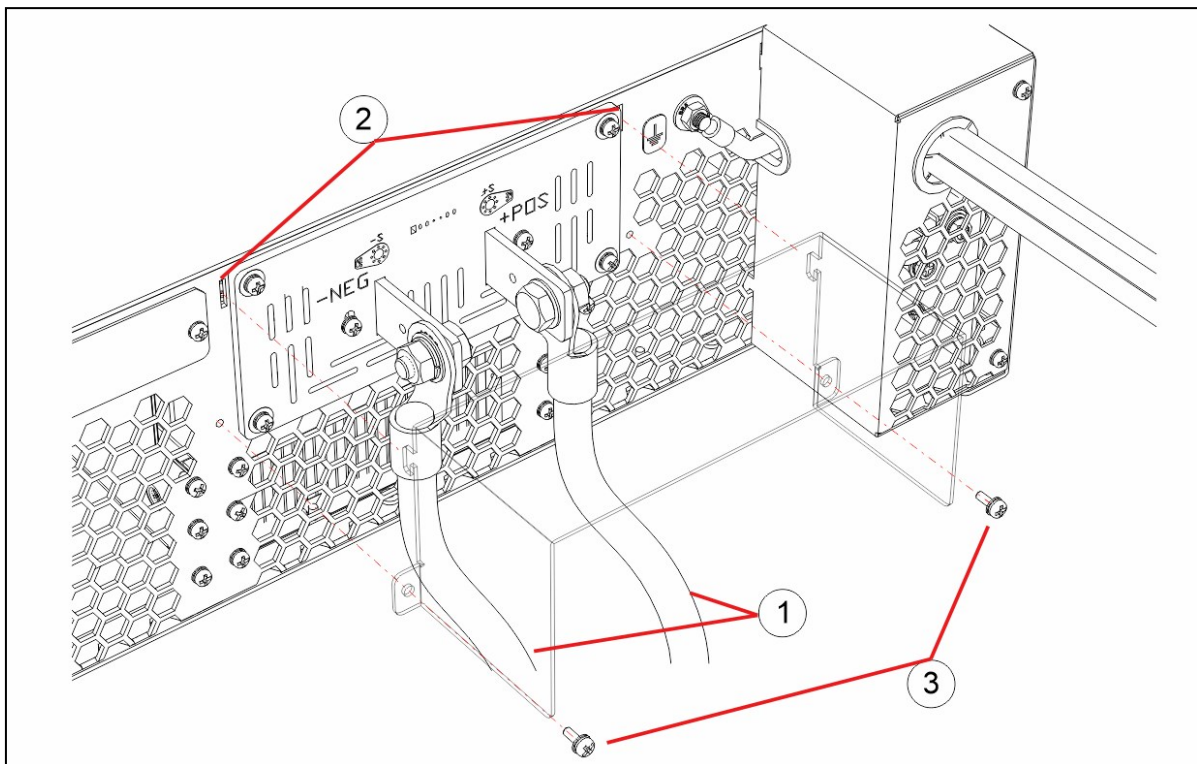
Procedures:
1. Fasten the output cables.
2. Insert the hooks into the slots and press the cover downward to fasten the cover.
3. Use two M3*8 screws to fix the cover.

3-4. Output terminals and wiring description (Output 80V 10kW/15kW model)

3-4-1. Output terminals
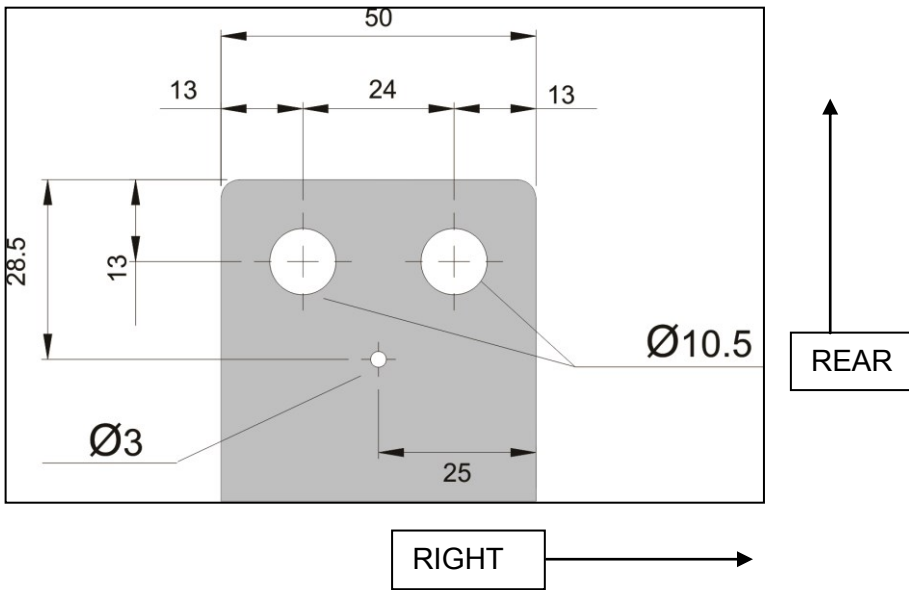
3-4-2. Output connection

Procedures:
1. It is recommended to use M10x20L hex head cap screws.
2. Washers at both sides.
3. Spring washers at nut sides.
4. M10 hex nuts.
5. Place the flat side of terminal to the copper bar, hang down the cable to leave more clearance for the protective cover.
6. DSP-WR output copper bar.
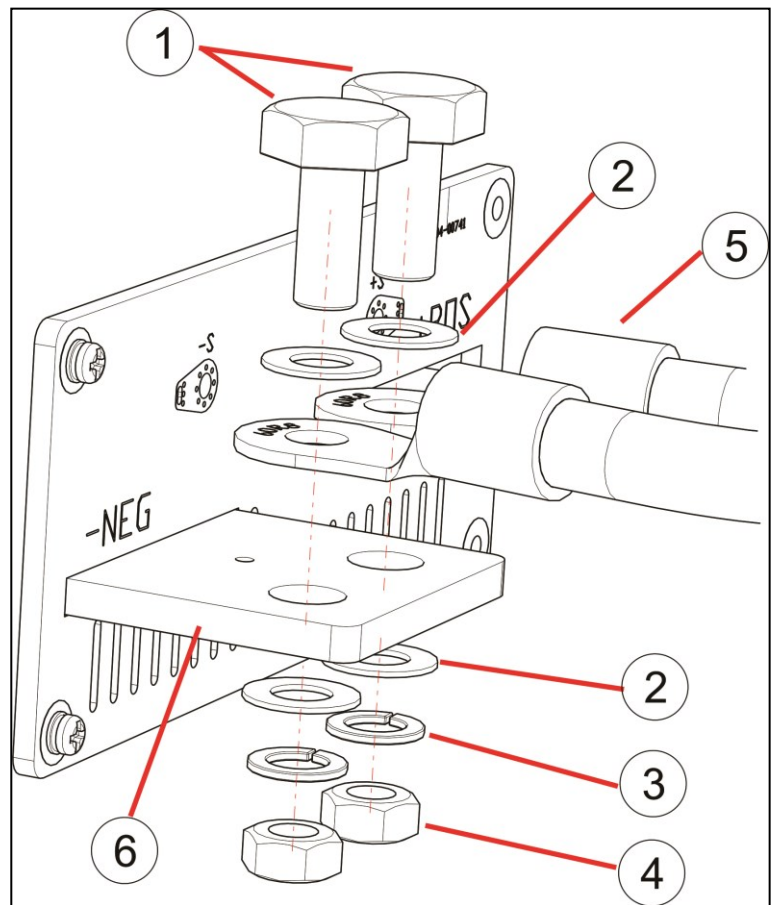
3-4-3. Installation of output protective cover
Please see 3-3-4 Installation of output protective cover.

3-4-4. Fix the parallel bus bar-1
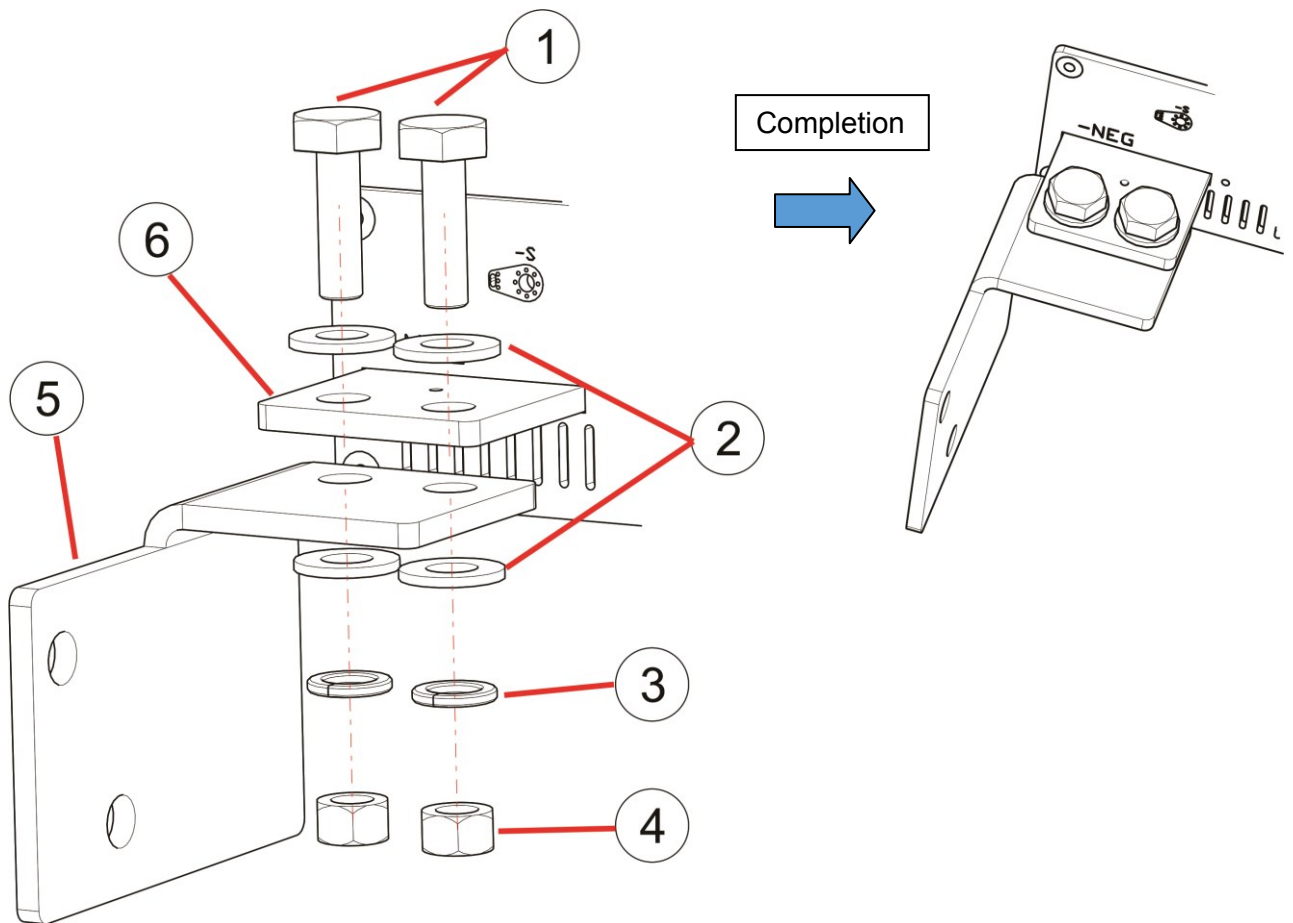
Procedures:
1. It is recommended to use M10x30L hex head cap screws.
2. Washers at both sides.
3. Spring washers at nut sides.
4. M10 hex nuts.
5. L-type bracket, please aware of the direction.
6. DSP-WR output copper bar.

3-4-5. Fix the parallel bus bar-2
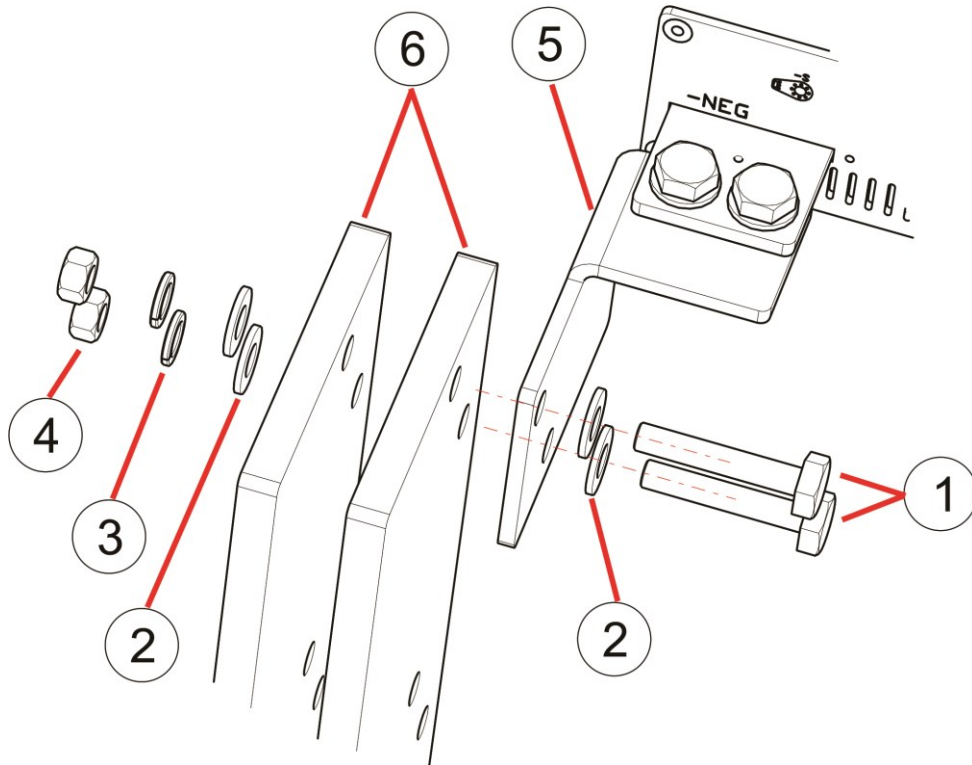
Procedure:
1. It is recommended to use M10x50L hex head cap screws.
2. Washers at both sides.
3. Spring washers at nut sides.
4. M10 hex nuts.
5. L-type bracket
6. Parallel bus bar, the recommended cross sectional area of the copper bar is,
   Total output current /2 = Cross sectional area.

3-5. Load connection

3-5-1. Single load and multiple loads

The figures in 3-5-2 demonstrate the proper wiring of connecting single or multiple loads to the output terminal. To minimize the impedance of wiring, use the wires as short as possible and the diameter as large as possible.

Twist the Positive and Negative load wires may reduce the inductance and chance to pick up noise from the environment.

When connecting multiple loads to the output terminals, use the separate load wires (as shown in 3-5-2) instead of distribute from the other load (as shown in 3-5-3).

3-5-2. Proper load connection
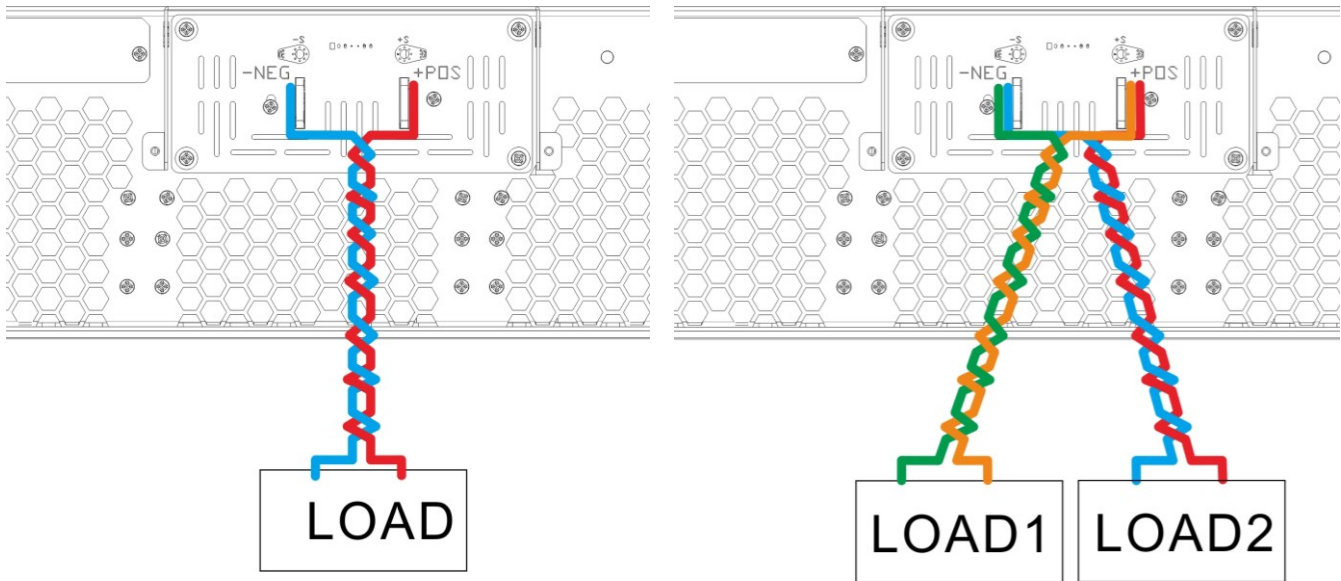
3-5-3. Improper connection

Do not distribute power from one of the device under test to the others.
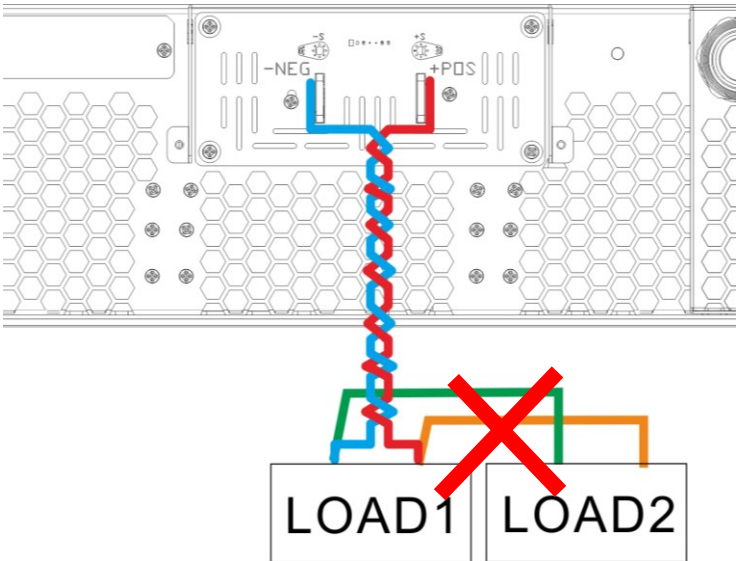
3-5-5. Remote Sense Connections

To avoid the voltage drop in the output cables, please use the cables per the recommended table in **3-2 Output Wiring** and make it as short as possible. If an appropriate cable is not obtainable, the remote sensing function is useful to compensate the voltage drop and make the voltage at the load input terminal the same as set value. The display voltage in the front panel will add up the value that drops in the output cable.

It is recommended to twist the output cables and sense cables separately. But please note, do not bundle the twisted output cables and sense cables together.

Although the sense cables carrying only few milli-amperes of current, but an appropriate gauge of cable is required. A 20AWG cable is recommended (use thicker cable if length is longer than 10m).

!!WARNING!!
Please ensure the insulation rating of sense cables higher than the output voltage rating.
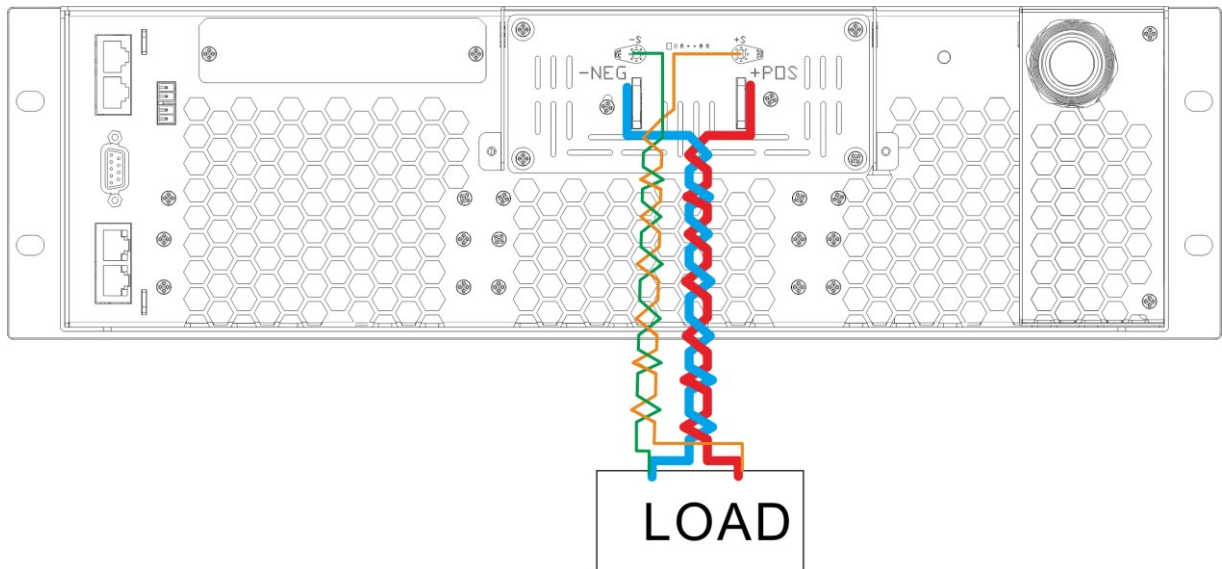
!!CAUTION!!
Please ensure the connection of polarities, the wrong connection may cause the damage.
Always Connect +sense to + terminal of load input, -sense to –terminal of load input.

3-6. Parallel Wiring

Notice when operating in parallel:
1. The air follows from the front panel to rear panel, no ventilation holes at the cover and chassis. The power supplies can stack directly.
2. The DC power supplies should be stacked but not placed side by side.
3. The average weight of DSP-WR is around 45kg, to prevent the unsteady or fall, please not stacking the DSP-WR with the other equipment.
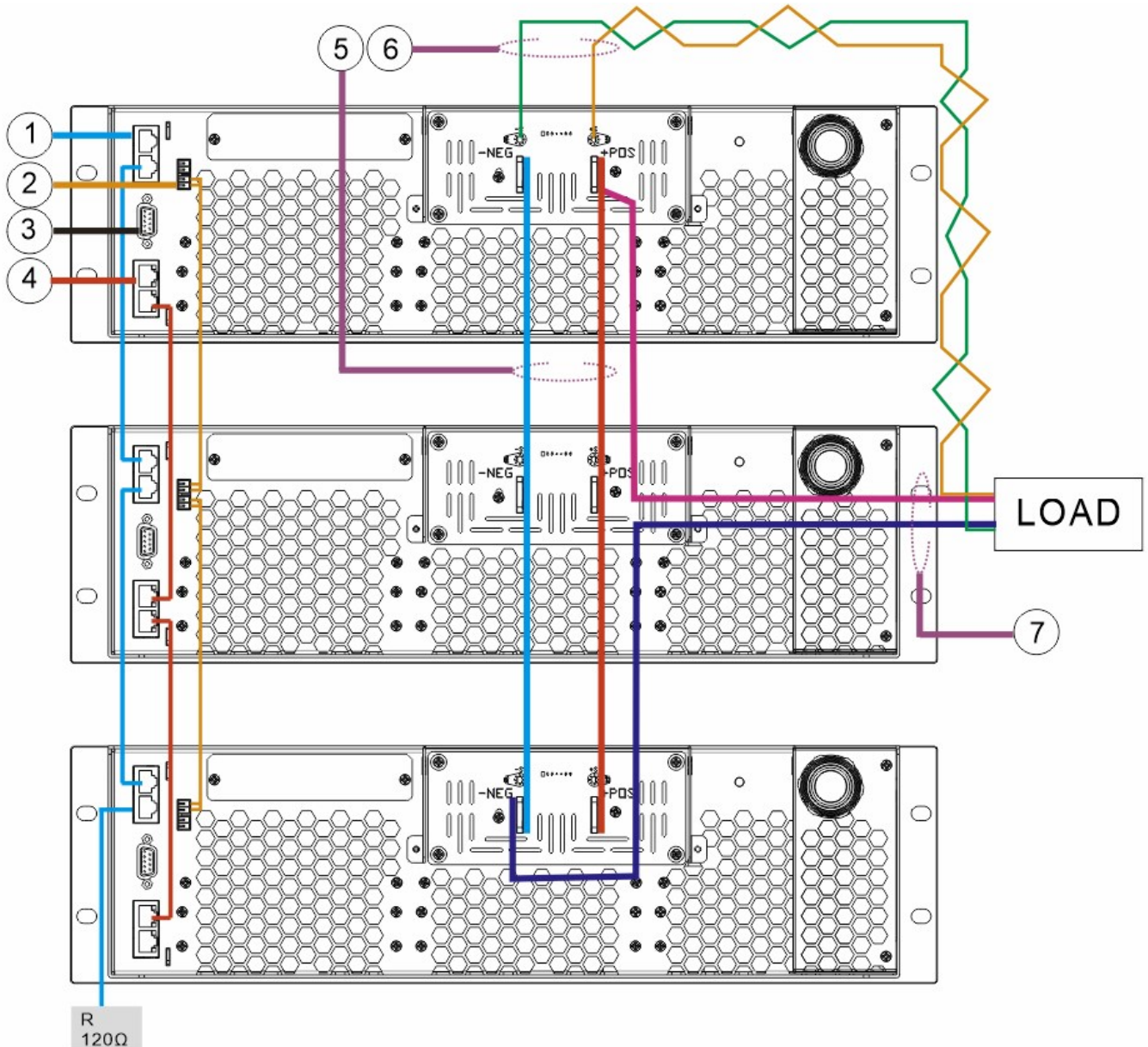
3-6-1. System IN/OUT port (Synchronization between units).
Connect the System IN/OUT connectors by using the 25cm Ethernet cable (and terminal resistor) containing in the accessories shipped along with this unit. Please see "**4-2-1. System IN/OUT**" for detail

3-6-2. P1/P2 Current sharing connector.
Connect the Current Sharing connectors according to the description in "**4-2-2. Current sharing**".

3-6-3. I/O (Auxiliary control) connector.

Use the I/O connector of Master unit when connecting the units in parallel and requires the auxiliary controls.

3-6-4. LAN port (LXI compliance).

1.All of the remote control only through the Master unit.
2.Connect the LAN connectors by using the 25cm Ethernet cable which containing in the accessories. Please see **4-2-7. LAN IN/OUT** for detail.

> **!!CAUTION!!**
> Data collision in the network is sometimes not avoidable, to prevent such situation, it is recommended,
> 1. Create an isolated network and connect as less device as possible in the isolated network.
> 2. Not connect a mass transmission device such as DVR in the isolated network.
> 3. Do not connect any device to LAN OUT of the last Slave unit when using multi-units in parallel.

3-6-5. Output bus bar

Bus bar is recommended to connect the units in parallel.

> **!!CAUTION!!**
> To result a similar impedance between Positive and Negative wiring, for example when connecting three units in parallel, please connect the Positive to the 1st unit and Negative to the 3rd unit (shown as the following diagram).

3-6-6. Remote Sense

1. Only connect the Remote Sense cables from the Master to load.
2. Twisted Remote Sense cables.

3-6-7. Load cables

1. Connect with proper diameter of cables between output bus bar and load.
2. Twisted Load cables

3-7. Procedure of setting Master/Slave units

1. Power on the unit on top and set this unit to Master by following the description in **CHAPTER 5 B-5. Master Slave Mode**.
2. Power on the other units and set them to Slave units by following the description in **CHAPTER 5 B-5. Master Slave Mode**.
3. Power off the units after the above setting.
4. Re-start the units and then the Master unit will detect and take control of all the Slave units utomatically.

3-8. Energy conservation

When the required power is less than the total amount of paralleled capacity, it is possible to turn off some of the Slave units to reduce the consumption without disassembling the units. The following notices should be acknowledged,
1. The input cables and output copper bars of those switched off units are still electrified.
2. Power off the Slave units during outputting will cause the Master unit to shut off the output and an error code will be generated.
3. If the required power can be satisfied by the Master unit its self, it is possible to power off all the Slave units but the Master unit should be set to **"Independent"** by following the description in **CHAPTER 5 B-5. Master Slave Mode**.
4. The priority for powering off the Slave units is the last Slave unit in the group.

3-9. Series Wiring

!!CAUTION!!
1. The DSP-WR series is not supporting Master/Slave control when use in series.
2. Part of the features and performances are not guaranteed when operating in series.
3. Maximum isolated voltage of output terminals to PE is 1500V (varies by model), due to safety reason please not use higher voltage than the specified isolation of each single unit.
4. Maximum two units with same model number can be used in series.

However please take the consideration of above CAUTION and the following notes if it is necessary to obtain a higher voltage than the voltage rating of the units on hand,

1. It is not recommended to control the units (connected in series) by remote control.
2. Both of the units are operating under independent mode, set half of desired voltage to each unit.
3. Set the output to off before adjusting the voltage.
4. Connect an appropriate diode to the Positive in series.
5. Connect the Negative of 1st unit to Positive of 2nd unit, and then connect Positive of 1st unit to + terminal of load, the Negative of 2nd unit to – terminal of load.
6. Power off the unit, it is better to switch off the circuit breaker before proceed the output wiring.

3-10. Mount the DSP-WR in a rack

Perform the following steps to mount the DSP-WR series DC power supply in a Rack.

1. Install the L-shaped support brackets.
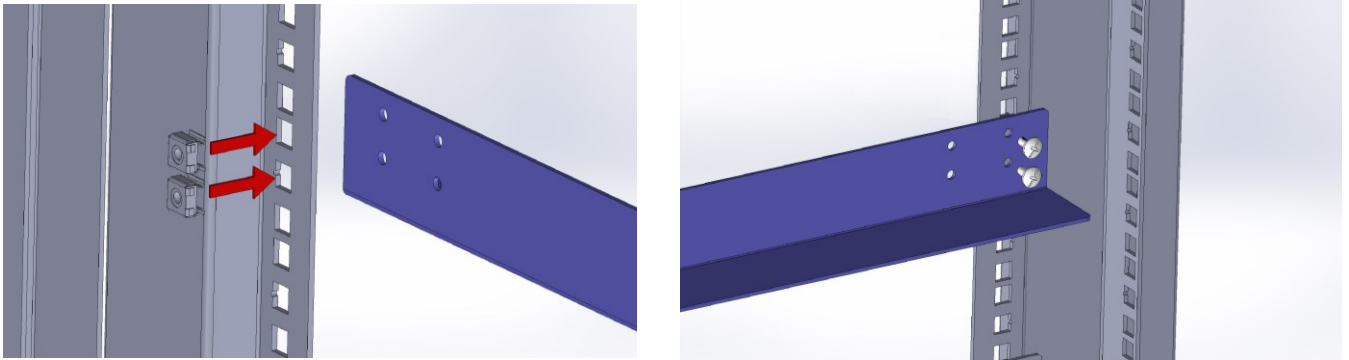
2. Mount the DSP-WR series DC power supply on to the L-shaped support brackets.
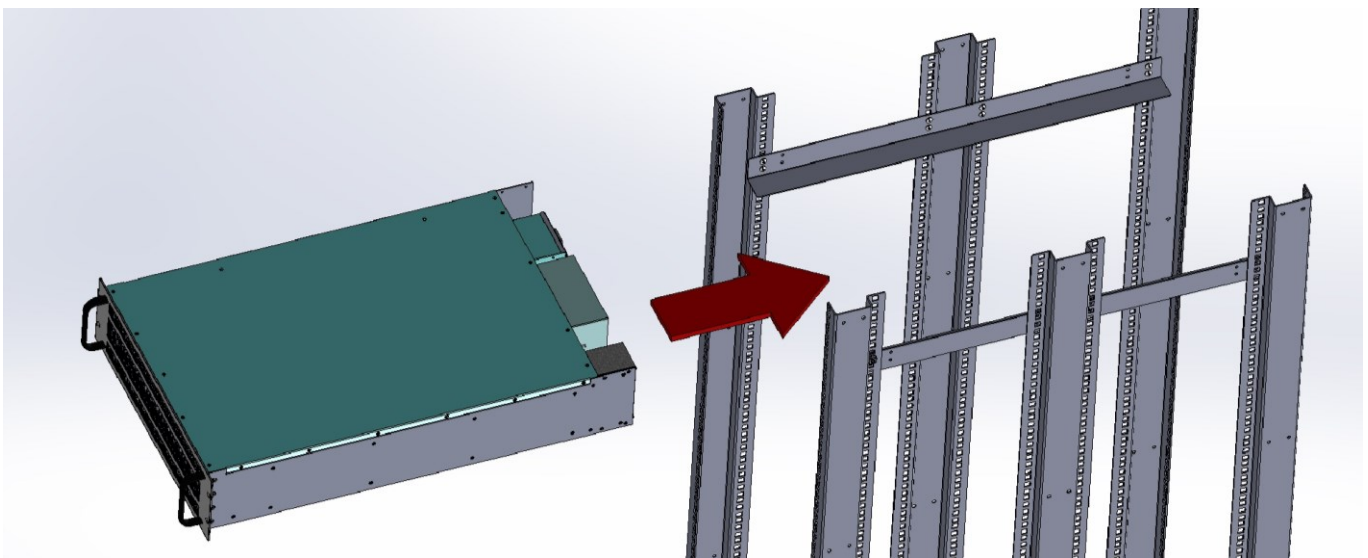
!!WARNING!!
The weight of DSP-WR series DC power supplies may heavier than 40kg, it is required two persons to handle it while installing.
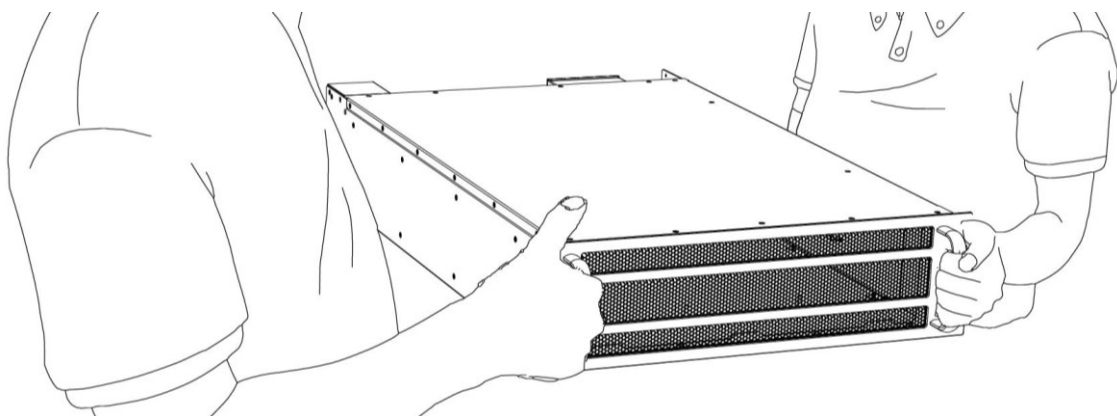
3. Fasten the DSP-WR series DC power supply to the rack spacers using the flat head screw with flat washer through the four holes in the DSP-WR series DC power supply front mounting brackets. (Rack mounting screws must be supplied by the rack manufacturer)
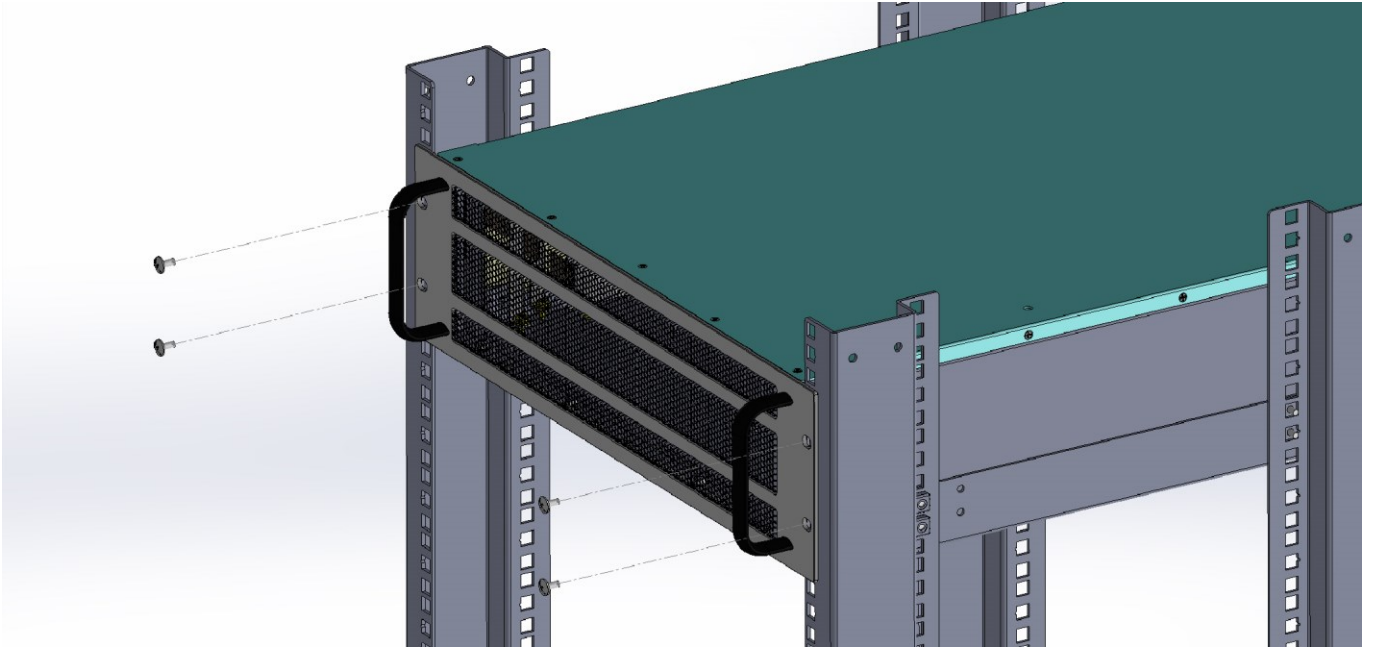
CHAPTER 4   FRONT / REAR PANEL DESCRIPTION

4-1 Front Panel
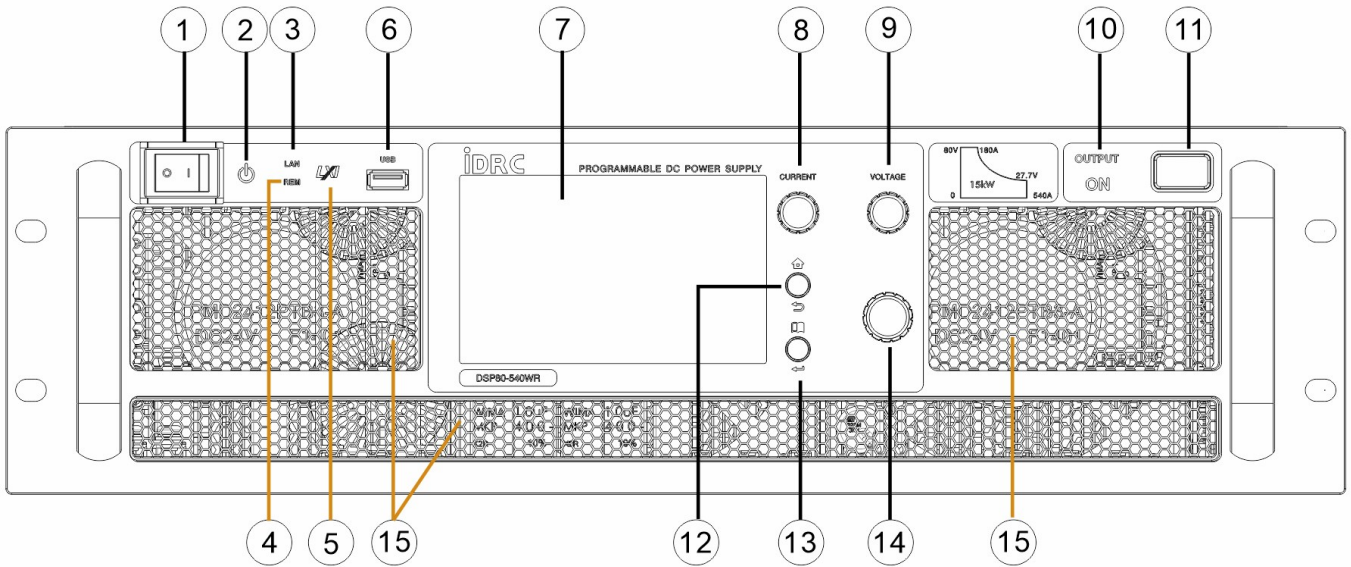
4-1-1. Power switch:
O → OFF   **I** → ON

4-1-2. Power indicator
Lights when powered on.

4-1-3. LAN indicator
Lights when LAN connected successfully.

4-1-4. Remote control indicator
Lights when remote controlled.

4-1-5. LXI indicator
Identification for LXI compliant instrument.

4-1-6. USB HOST
For connection of USB sticks, use for Sequence upload or save.

!!CAUTION!!
The USB HOST port supplying for mass storage purpose only, portable devices or power charging are not supported.

4-1-7. Operating and displaying area

5" WVGA full color resistive touch screen.
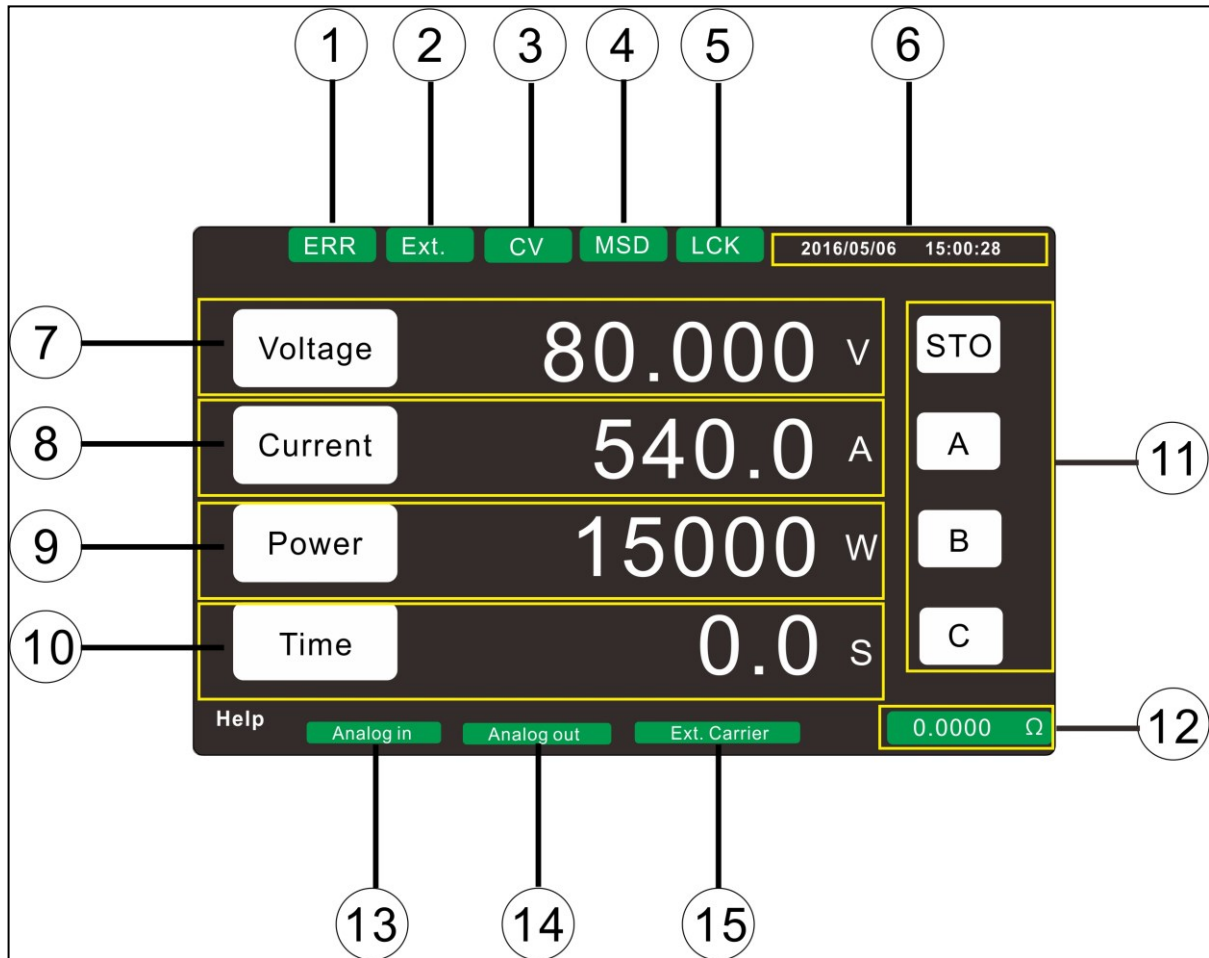
1. Error indicator
2. External output ON/OFF controlled indicator.
3. Output status   CV -> Constant Voltage
                     CC -> Constant Current
                     CP -> Constant Power
4. Flash disk indicator, displays when connected.
5. Front panel lock, please see detail in 4-1-14. EDIT/POWER ADJUST and front panel lock multifunction knob.
6. Date and time.
7. Output voltage setting and display.
8. Output current setting and display.
9. Output power setting and display.
10. Output time setting and display. The output will continuous if set to 0.0 sec.
11. Store / Recall
12. Internal resistance display.
13. Analog programming.
14. Analog monitoring.
15. Synchronization.

4-1-8. Independent current setting knob with push button function

Adjusting current value by rotating, push to shift the adjustable digit, the output current varies depending the setting of "**5-4. MENU - B-8. Output Vary – Adjust**". Besides the rotary knob, the output current is also adjustable by entering the desired value on the touchscreen, for detail please refer to "**4-1.Voltage/Current/Power setting**".

4-1-9. Independent voltage setting knob with push button function

Adjusting voltage value by rotating, push to shift the adjustable digit, the output voltage varies depending the setting of "**5-4. MENU - B-8. Output Vary – Adjust**". Besides the rotary knob, the output voltage is also adjustable by entering the desired value on the touchscreen, for detail please refer to "**4-1.Voltage/Current/Power setting**".

4-1-10. Output indicator

Indicates the output status, lights when output ON.

4-1-11. Output enable/disable key

Patented output control key, two tact switches inside.
Output enabled when both switches are forced.
Output disabled when anyone of the switches is forced.

> !!CAUTION!!
> The output behavior may affected by following settings,
> MENU Item **5-4. MENU B-6. Power ON Mode**.
> MENU Item **5-4. MENU B-7. Output ON Priority**.
> MENU Item **5-4. MENU B-8. Output Vary – Adjust**.
> MENU Item **5-4. MENU B-11. Output ON Ramp Time**.
> MENU Item **5-4. MENU B-12. Output OFF Ramp Time**.

4-1-12. HOME/RETURN multifunction key

Patented multifunction key,
1. Press the key shortly the display will return to the previous page,
2. Press and hold the key for 1.5 seconds the display will return to home screen.
3. To terminate the remote control, press and hold the key for 1.5 seconds.

4-1-13. MENU/ENTER multifunction key

Press to access to setting MENU when displaying home screen, it can also be used as a ENTER key when editing the setting MENU or adjusting V/A/W.

4-1-14. EDIT/POWER ADJUST and front panel lock multifunction knob

Push to adjust power when displaying home screen, the process is the same as Independent Voltage / Independent Current knob. Besides the rotary knob, the output power is also adjustable by entering the desired value on the touchscreen, for detail information please see "**5-1.Voltage/Current/Power setting**". Rotate to select the desired item and push to enter the selected item when editing the setting MENU, for detail information please see "**5-2. SETTING MENU**".
Press and hold for 1.5 seconds the touchscreen, 3 knobs and 2 keys in the front panel will be locked. Press and hold for 1.5 seconds to retrieve.

4-1-15. Air intake

Keep the front/rear panels with a clearance above 45cm away from the wall or other objects.
Also, clean the dust on the panel regularly to avoid having difficulty of heat radiating and causing overheated problem.

4-2 Rear Panel
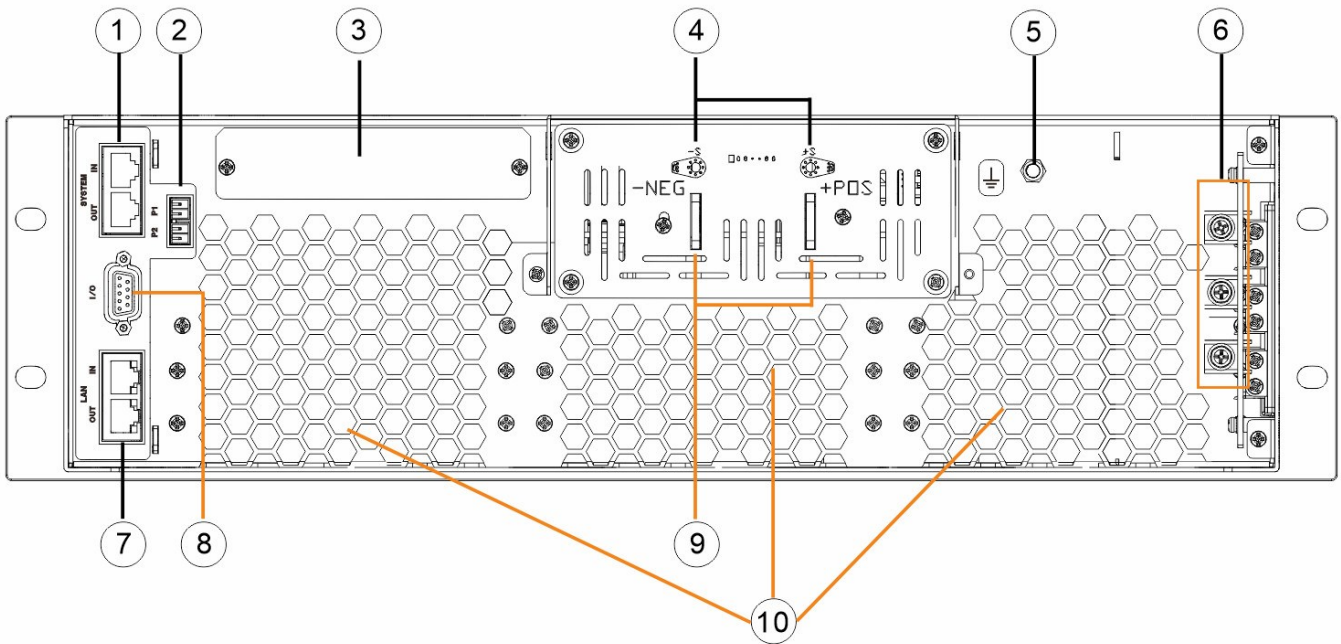
4-2-1. System IN/OUT (Upper/Lower) and Firmware Upgrade (upper)

When using two or more units in parallel (One Master + Multi Slave), connect the system OUT of Master unit to system IN of 1st Slave unit, connect the system OUT of 1st Slave unit to system IN of 2nd Slave unit and so forth.

Either system IN/OUT can be used for upgrading the firmware of DSP-WR, it is required to use IDRC's OPT-USB for upgrade the firmware.

> !!CAUTION!!
> These two RJ-45 connectors cannot be used as Local Area Network communication.

4-2-2. Current sharing (P1 input, P2 output)

Used when operating two or more units in parallel.

Two positions in P1 are connected together internally, as well as P2.

Connect the P2 of Master unit to P1 of 1st Slave unit, P2 of 1st Slave unit to P1 of 2nd Slave unit and so forth.

4-2-3.Optional

Slot for optional interfaces,

WR-OPT-ANA   Analog Programming

> **!!WARING!!**
> The device must be switched off and disconnected from the mains power supply when installing the Optional module. The interface module may be damaged by electrostatic discharge. ESDS handling guidelines must be adhered to. Do not touch electrical contacts or components.

4-2-4. Remote Sense/Compensation terminal
This terminal is used to measure the voltage of load side. Please ensure to connect to the correct polarity. The maximum compensated voltage is 5VDC (the sum of two wires, i.e. 2.5VDC for each).

4-2-5. Ground Terminal (earth terminal)
Grounding terminal.

4-2-6. AC input
Mains Power input terminals, input range 3 phase 200 ~ 400V 50/60Hz. For detail information see "**3-1. Input Wiring**".

4-2-7. LAN IN/OUT (Upper/Lower)
Built-in 2 ports HUB, not requires an extra HUB when using two or more units in parallel.

The LAN IN port is connecting to the PC or external switch HUB for remote controlling the unit via Local Area Network.
When using two or more units in parallel (One Master + Multi Slave), the LAN OUT port of Master unit is connecting to the LAN IN port of 1st Slave unit, the LAN OUT of 1st Slave unit is connecting to the LAN IN of 2nd Slave unit and so forth.
One 120 ohm resistor is required to connect to the "LAN OUT" port of the last Slave unit.

4-2-8. J1 (Auxiliary control)
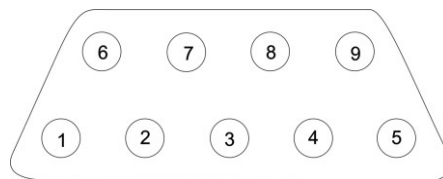
PIN	NAME	FUNCTION
1	Interlock	When shorted to PIN6~PIN9, interlock is closed, the unit can operate normally. When opened, the unit alarm (error code 81) and not operate. This function requires to be enabled in the setting MENU. *[Note 1]
2	External output ON/OFF	When shorted to PIN6~PIN9, the output will be enabled. When opened, the output will be disabled. *[Note 1]
3	Shut OFF	The output will be shut off when shorted to PIN6~PIN9. Error code 82 will be generated.. *[Note 1]
4	Alarm signal	Open collector, short when the unit alarmed. *[Note 1]
5	Output voltage downward signal	Open collector, short when the output voltage been adjusted downward (more than 1% of present value). This is useful for the user to add their own discharge circuit to the output which speed-up the fall time of output voltage.. *[Note 1]
6~9	Common	Common pin
Note 1: Open collector output: Maximum voltage 30 V and maximum current 8 mA.		

4-2-9.Output bus bars

Output copper bars, different models may have different copper bars. For detail information see "**3-2. Output Wiring**".

4-2-10. Air Vents

In order to assure adequate cooling of the device, the outlet vents for the integrated fans may not be covered. Keep the front/rear panels with a clearance above 45cm away from the wall or other objects. Also, clean the dust on the panel regularly to avoid having difficulty of heat radiating and causing overheated problem.

4-2-11. Optional Analog Programming
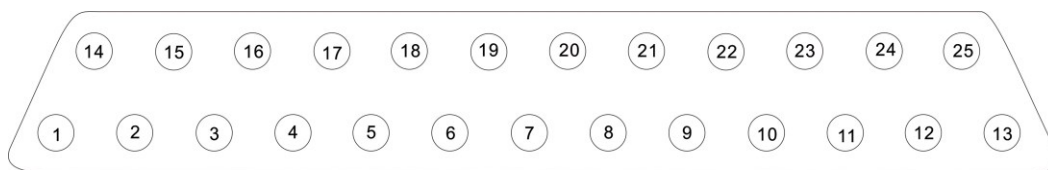
PIN	NAME	FUNCTION
1	CV State	Pin 1- Pin 14 short during CV operation (open collector controlled by a photo coupler). *Note 1
2	CC State	Pin 2- Pin 15 short during CC operation (open collector controlled by a photo coupler). *Note 1
3	CP State	Pin 3- Pin 16 short during CP operation (open collector controlled by a photo coupler). *Note 1
4	CR State	Pin 4- Pin 17 short during Internal Resistance Simulation (open collector controlled by a photo coupler). *Note 1
5	ON/OFF State	Pin 5- Pin 18 short when the output is on (open collector controlled by a photo coupler). *Note 1
6	Not used	
7	EXT CV+	"+" of Analog programming 0~5V or 0~10Vdc, for proportional output voltage setting.
8	EXT CC+	"+" of Analog programming 0~5V or 0~10Vdc, for proportional output current setting.
9	EXT CP+	"+" of Analog programming 0~5V or 0~10Vdc, for proportional output power setting.
10	EVREF+	"+" Output 0~5VDC or 0~10VDC(select in MENU) (max=5mA), use with Pin 22.
11	V MONITOR	Analog monitor, use with Pin 23, 0~5V or 0~10Vdc for proportional output voltage measurement，
12	A MONITOR	Analog monitor, use with Pin 24, 0~5V or 0~10Vdc for proportional output current measurement.
13	P MONITOR	Analog monitor, use with Pin 25, 0~5V or 0~10Vdc for proportional output power measurement.
14~18	State common	Common for status signals
19	EXT CV-	"-" of Analog programming 0~5V or 0~10Vdc, for proportional output voltage setting.
20	EXT CC-	"-" of Analog programming 0~5V or 0~10Vdc, for proportional output current setting.
21	EXT CP-	"-" of Analog programming 0~5V or 0~10Vdc, for proportional output power setting.
22	EVREF-	"-" Output 0~5VDC or 0~10VDC(select in MENU) (max=5mA), use with Pin 10.
23~25	AGND1	Analog programming signal ground
Note 1: Open collector output: Maximum voltage 30 V and maximum current 8 mA.		

4-2-12. Connecting schematic of optional analog programming
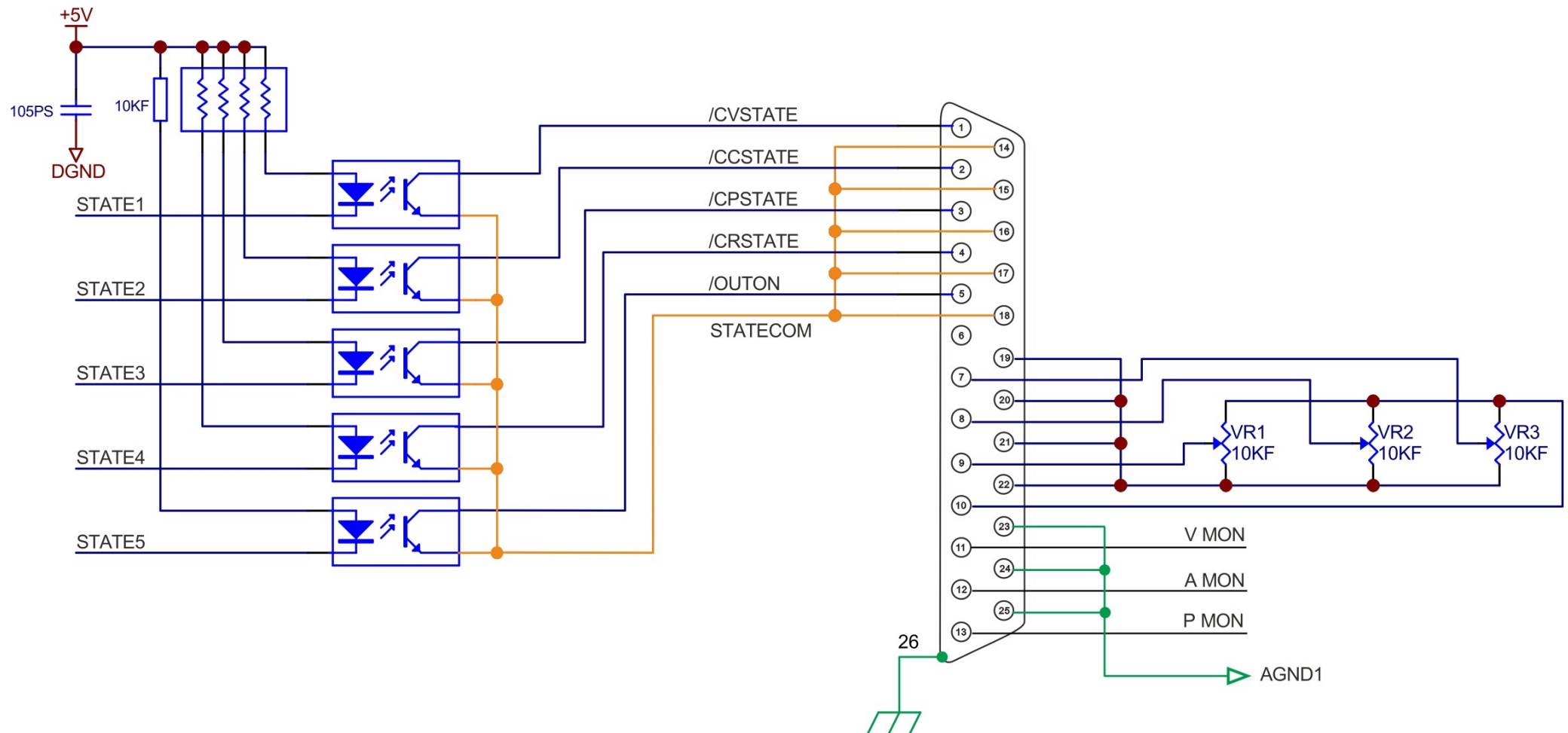
CHAPTER 5   MENU CONTENT AND DESCRIPTION

DSP-WR brings you a most up to date operation experience, the operation is similar to the modern IT products those you are using every day. Simplified control panel but completed and easy to read information. Operating with full colored touchscreen, the operational manual is nearly unnecessary even for a trainee engineer.

Besides the touchscreen, you can operate complete functions of DSP-WR even only using the 2 keys and 3 knobs in the front panel. For detail information please see "**5-4. MENU - B-1. Operating Mode**".

5-1. Voltage/Current/Power adjusting

DSP-WR provides two ways for the adjustment of V/A/W
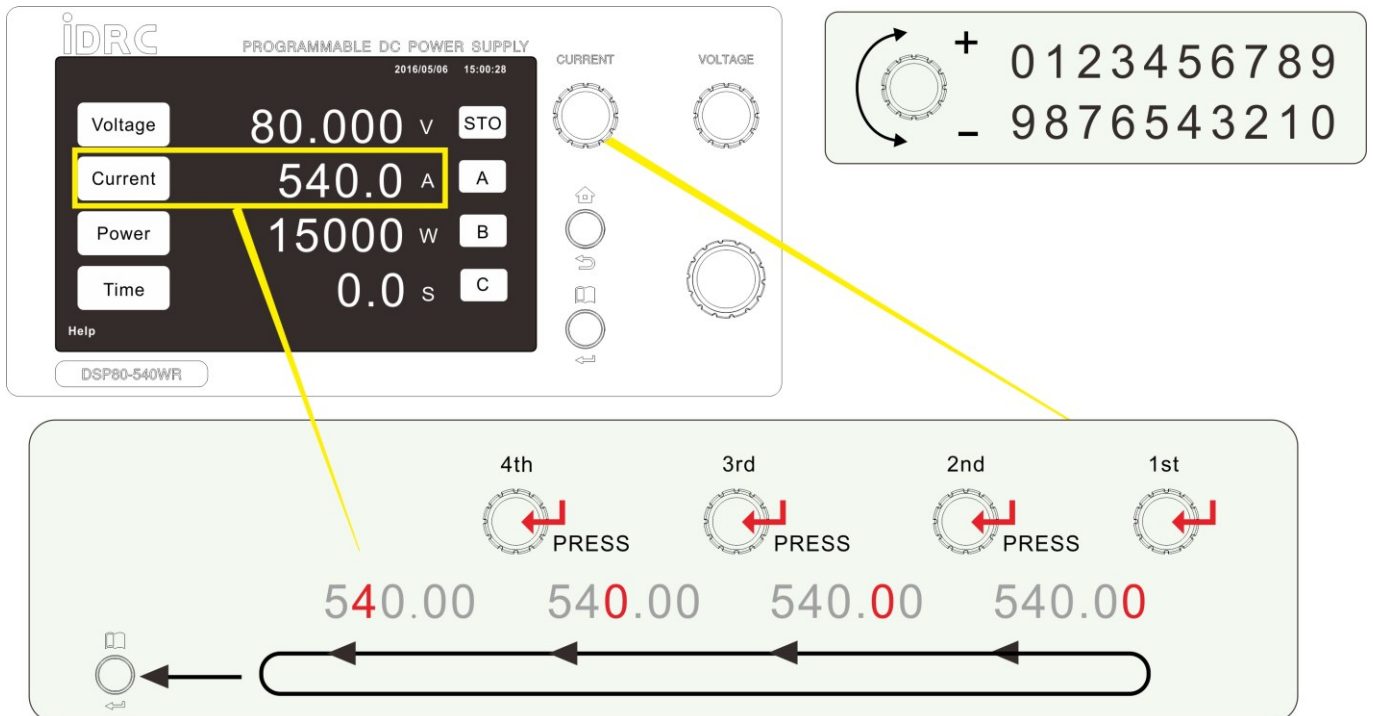
5-1-1. By knobs
Make the display to show the home screen by press the home key   and hold for 1.5 seconds.

5-1-1-1 Voltage Setting

Push   knob, the last digit of voltage value will blinking, rotate the knob to change the value or

push the knob again to shift the blinking digit to the next adjustable digit. Press   to confirm.

Or press   to cancel the adjustment.

5-1-1-2 Current Setting

CURRENT

Push ⊙ knob, the last digit of current value will blinking, rotate the knob to change the value or

push the knob again to shift the blinking digit to the next adjustable digit. Press ⊙ to confirm.

Or press ⊙ to cancel the adjustment.

+ 0 1 2 3 4 5 6 7 8 9

− 9 8 7 6 5 4 3 2 1 0

iDRC   PROGRAMMABLE DC POWER SUPPLY

2016/05/06   15:00:28

Voltage	80.000 V	STO
Current	540.0 A	A
Power	15000 W	B
Time	0.0 S	C

Help

DSP80-540WR

CURRENT   VOLTAGE

4th	3rd	2nd	1st
PRESS	PRESS	PRESS	PRESS
80.000	80.000	80.000	80.000
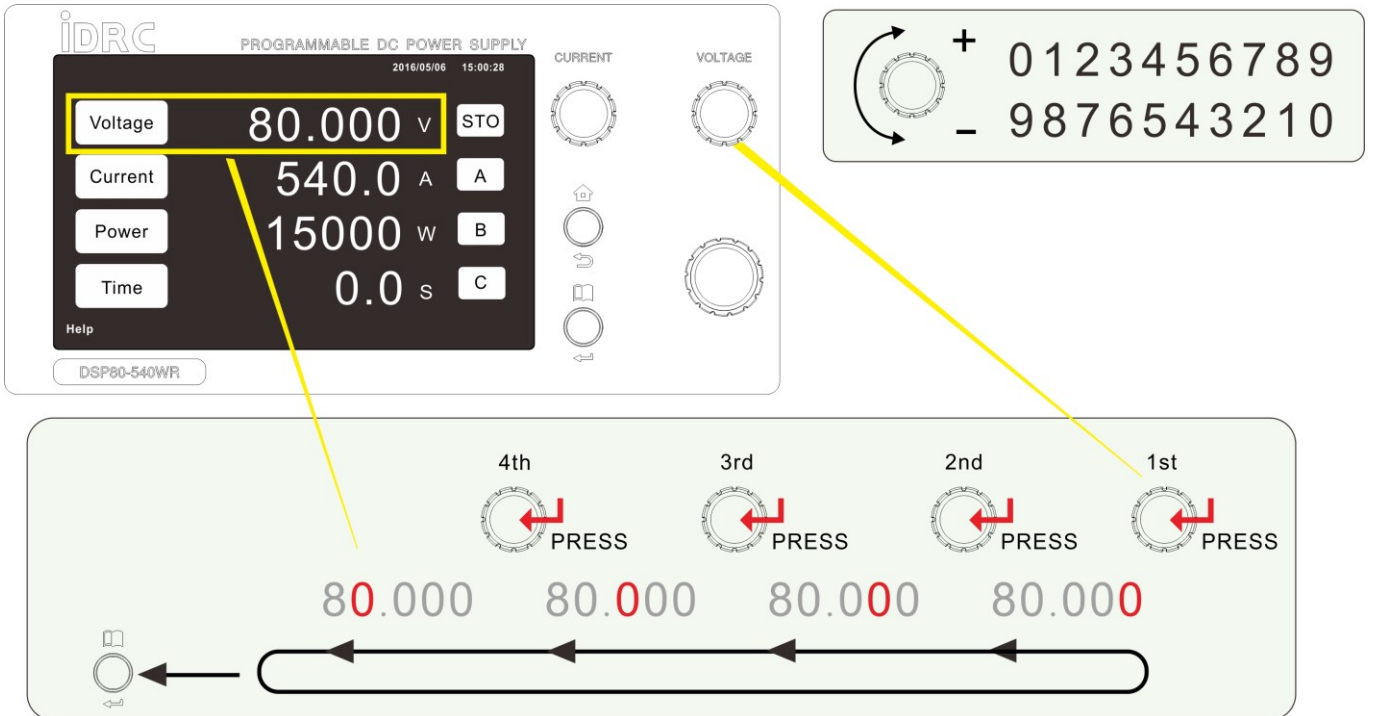
5-1-1-3 Power Setting

Push the larger knob ⊙ (w/o symbol), the last digit of power value will blinking, rotate the knob to change the value or push the knob again to shift the blinking digit to the next adjustable digit. Press ⊙ to confirm. Or press ⊙ to cancel the adjustment.
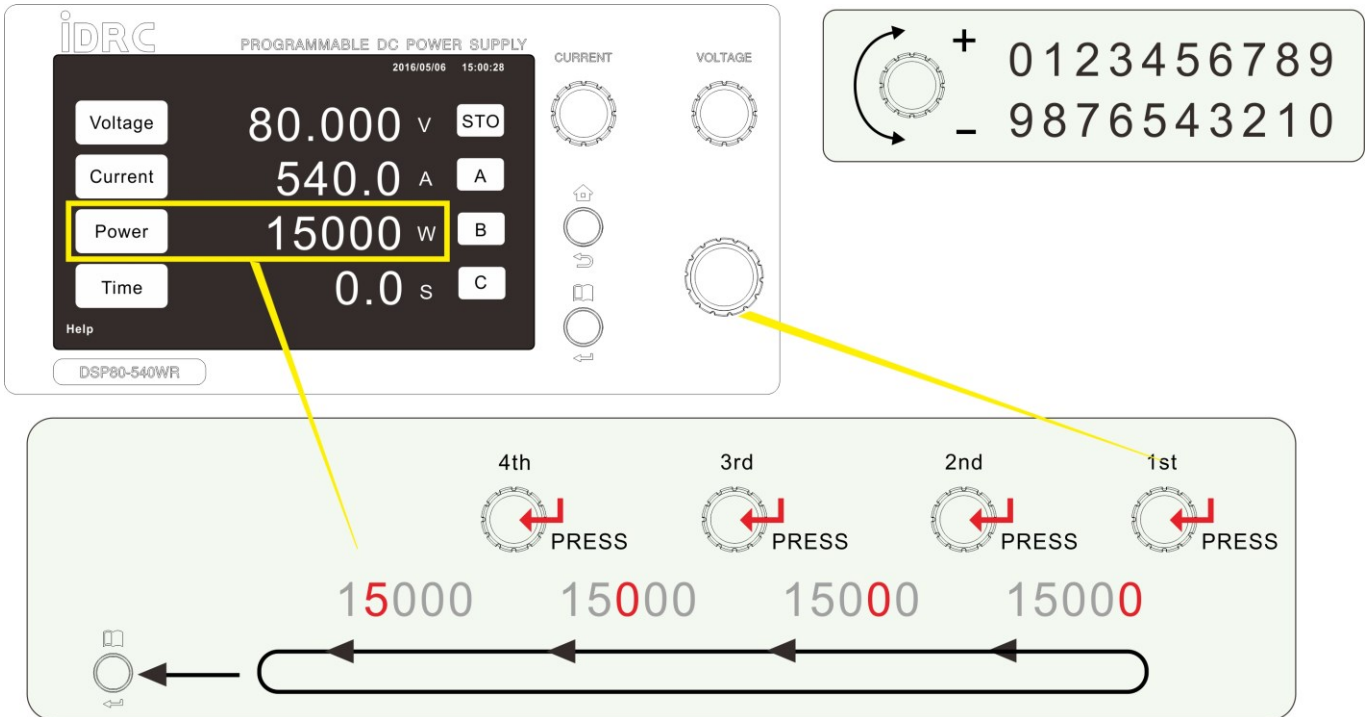
5-1-2. By Touchscreen

Tap the parameter icon (or the numbers) which you want to adjust, the display will show the setting screen.

Key-in the desired value and tap ENT on the setting screen or press ◯ to confirm.

Tap the ESC or press ◯ and hold for 1.5 seconds to cancel the adjustment and go to home screen.

When adjusting the V/A/W by touchscreen, the "**5-4. MENU -B-8. Output Vary – Adjust**" will be forced to ENTER mode.

5-1-2-1 Voltage setting

Tap the Voltage icon or the existing numbers of voltage value, the display will show the setting screen. The following parameters can be adjusted by tapping the icons,

CV For adjusting the Constant Voltage value.

OVP For adjusting the Over Voltage Protection value.

UVP For adjusting the Under Voltage Protection value.
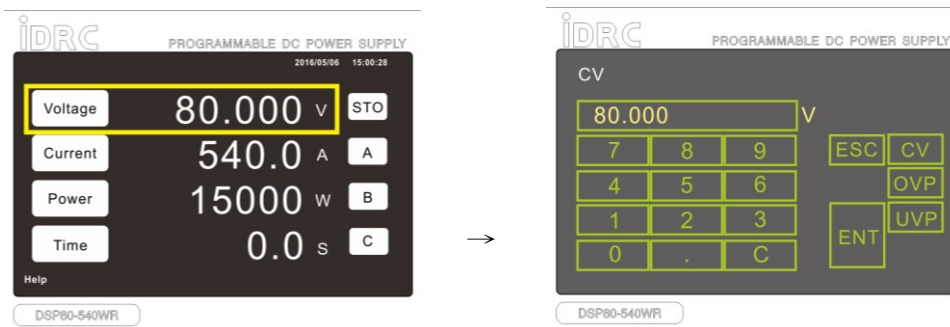
5-1-2-2 Current Setting

Tap the Current icon or the existing numbers of current value, the display will show the setting screen. The following parameters can be adjusted by tapping the icons,

CC For adjusting the Constant Current value.

OCP For adjusting the Over Current Protection value.

UCP For adjusting the Under Current Protection value.
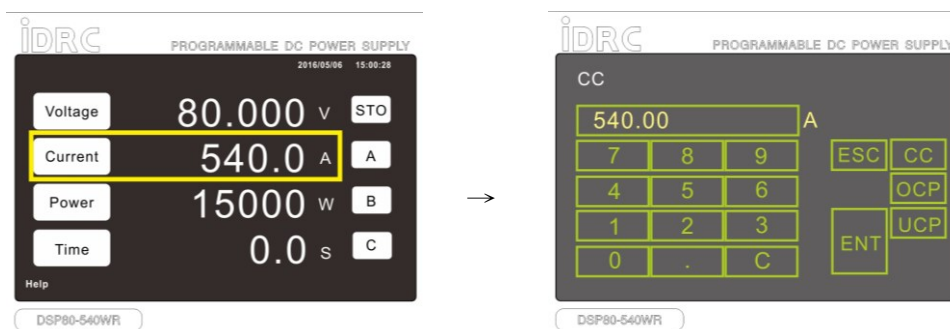
5-1-2-3 Power Setting

Tap the Power icon or the existing numbers of wattage value, the display show the setting screen, key-in the desired value.
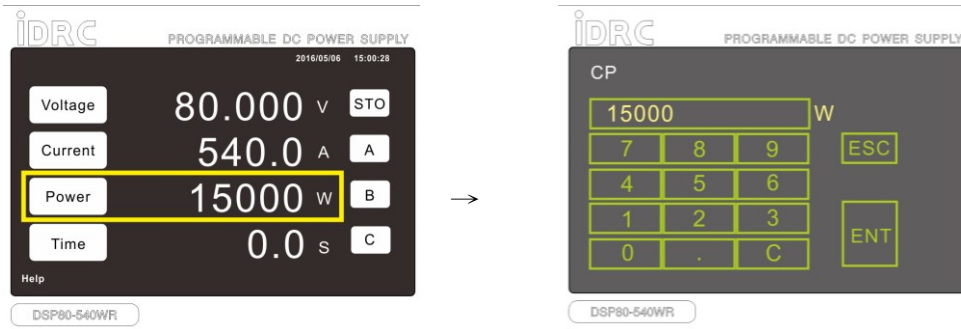
5-1-2-4 Time Setting

Tap the Time icon, the display show the setting screen, key-in the desired value.
Once the output enabled, the power supply will execute the settings for the defined time.
If the time been set to 0.0, the output will continuously till set the output to off.
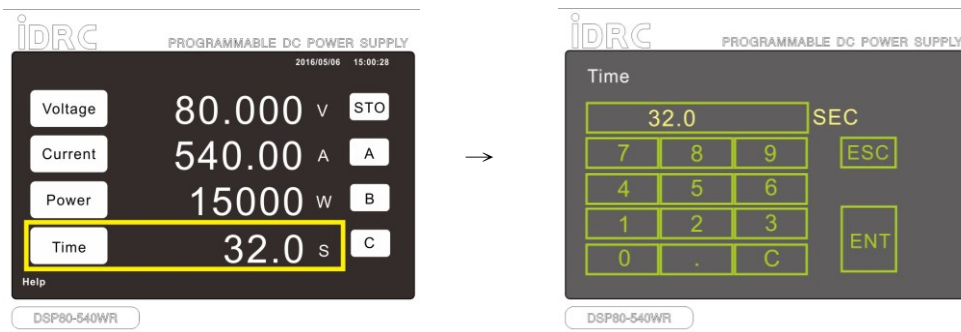
5-2. SETTING MENU

Make the display to show the home screen by press the home key ⊙ and hold for 1.5 seconds.

And then press the ⊙ key access to setting MENU.

Rotate the larger knob ⊙ (w/o symbol) to select to the item and push it again or press ⊙ key

entering to selected item for edit. Press ⊙ to abort and return to previous screen.
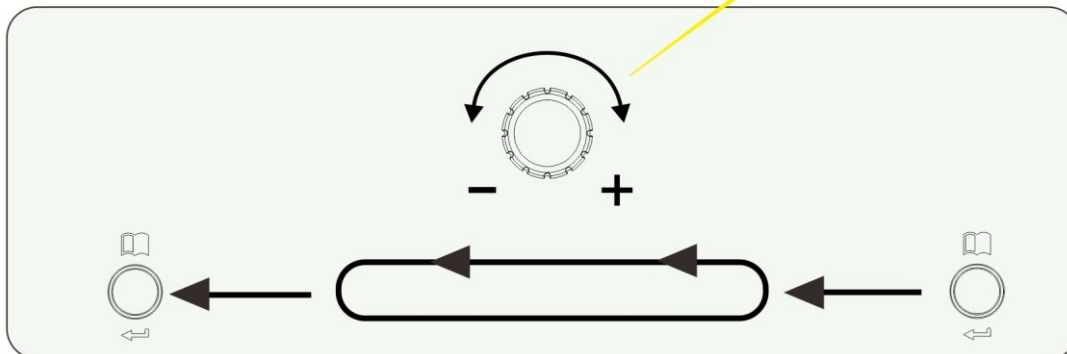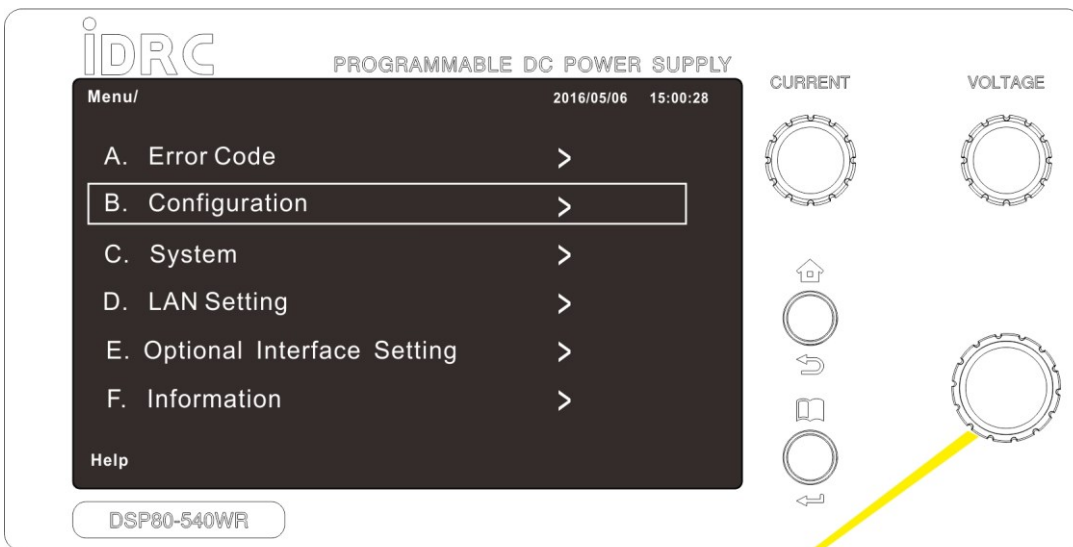
There are two kinds of items in the setting MENU, Function Selecting and Value Adjusting.
Following examples demonstrate the operation of these two kinds of items,

5-2-1. Function Selecting

Example : "**5-4. MENU - B-1. Operating Mode"** ,
There are three operating mode for selection, 1.Simple Mode, 2.Complele Mode

Make the display to show the home screen by press the home key ⌂ ◯ and hold for 1.5 seconds.

And then press the ◯ key access to setting MENU.

Rotate the larger knob ◯ (w/o symbol) to select to item B. Configuration, push the knob again or press ◯ key enter to next screen and select to 1. Operating mode and enter to next screen.

Rotate the larger knob select to the desired mode.

Push the larger knob ◯ (w/o symbol) or press ◯ key to confirm the selection.

Press ◯ key to abort and back to previous screen, the setting will not be changed.

The GRAY items are not applicable (optional or not available yet),
Such as the 4. SAS Table in below screen.
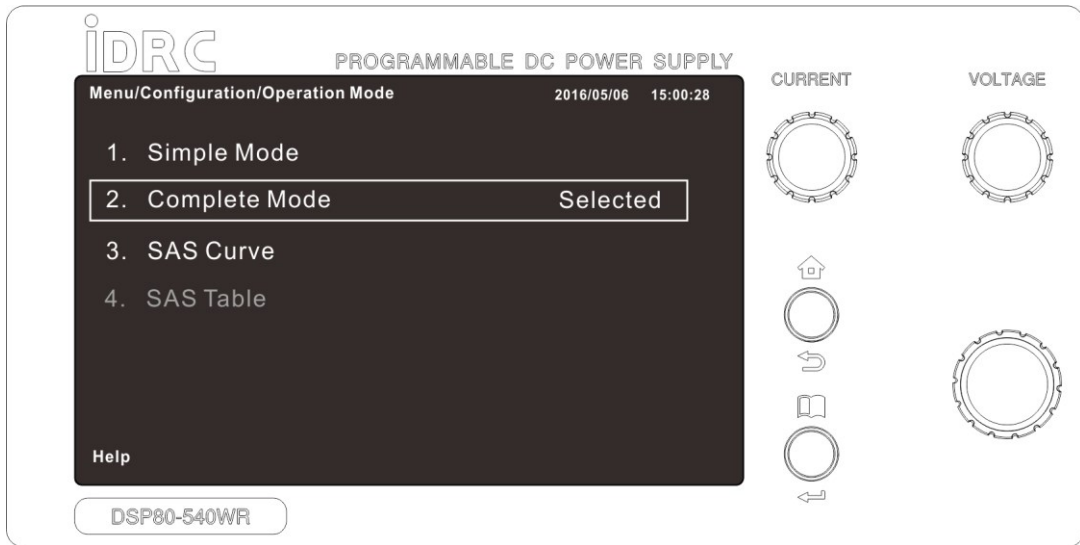
5-2-2. Value Adjusting

Example : **"5-4. MENU - B-11. Output ON Ramp Time"**

The adjustable range of Output ON Ramp Time is 00.00 sec ~ 99.99 sec.

Make the display to show the home screen by press the home key ⬡ and hold for 1.5 seconds.

And then press the ⬡ key access to setting MENU.

Rotate the larger knob ⬡ (w/o symbol) to select to item B. Configuration, push the knob again or press ⬡ key enter to next screen and select to 11. Output ON Ramp Time.

Push the larger knob ⬡ (w/o symbol), the last digit of time value will turn to green, rotate the knob to change the value or push the knob again to shift the digit to the next adjustable digit. Press ⬡ key to confirm. Or press ⬡ to cancel the adjustment.

5-3. Content

```
MENU ─┬─ A.Error Code

      └─ B.Configuration ─┬─ 01.Operating Mode ─┬─ 1.Simple Mode
                          │                      ├─ 2.Complete Mode
                          │                      ├─ 3.Sequence
                          │                      ├─ 4.Insertion Mode
                          │                      ├─ 5.SAS Curve
                          │                      └─ 6.SAS Table
                          │
                          └─ 02.Sequence List ─┬─ 1.List1
                                               ├─ 2.List2
                                               ├─ 3.List3
                                               ├─ 4.List4
                                               ├─ 5.List5
                                               ├─ 6.List6
                                               ├─ 7.List7
                                               ├─ 8.List8
                                               ├─ 9.List9
                                               └─ 10.List10
```

MENU	B.Configuration	02.Sequence List	11.List11
			12.List12
			13.List13
			14.List14
			15.List15
			16.List16
		03.SAS Curve Parameter	1.Voc
			2.Vmp
			3.Isc
			4.Imp
			5.SAVE
		04.SAS Scale	1.Voltage Scale
			2.Current Scale
		05.Master Slave Mode	1.Independent
			2.Master
			3.Slave
		06.Power ON Mode	1.Off
			2.Last

MENU	B.Configuration		07.Output ON Priority		1.CV
					2.CC
					3.CP
			08.Output Vary - Adjust		1.Enter
					2.Direct
			09.Output Vary – Recall		1.Enter
					2.Direct
			10.Internal Resistance		
			11.Output ON Ramp Time		
			12.Output OFF Ramp Time		
			13.Voltage Slew Rate		
			14.Current Slew Rate		
			15.Power Slew Rate		
			16.I/O		01.External On/Off
					02.Interlock

| MENU |—| C.System |———| 01.Alarm Buzzer |

| 02.Key Beep |

| 03.LCD Brightness |

| 04.Touch Screen |———| 1.Black |

| 2.White |

| 3.Green |

| 04.Touch Screen |

| 05.Network Time Sync |

| 06.Calender Setting |———| 1.Year |

| 2.Month |

| 3.Day |

| 4.Hour |

| 5.Minute |

| 6.Second |

| 07.Time Zone Setting |———| 1.UTC-11:00 |

| 2.UTC-10:00 |

| ⎰ |

| 36.UTC+14:00 |

| 08.Calibration |

```
MENU ─┬─ D.LAN Setting ─┬─ 01.IP Information
      │                 │
      │                 ├─ 02.Auto IP ─┬─ 1.Enable
      │                 │              └─ 2.Disable
      │                 │
      │                 ├─ 03.Manual IP ─┬─ 1.IP Address 1
      │                 │                ├─ 2.IP Address 2
      │                 │                ├─ 3.IP Address 3
      │                 │                ├─ 4.IP Address 4
      │                 │                ├─ 5.Subnet Mask 1
      │                 │                ├─ 6.Subnet Mask 2
      │                 │                ├─ 7.Subnet Mask 3
      │                 │                ├─ 8.Subnet Mask 4
      │                 │                ├─ 9.Gateway Address 1
      │                 │                ├─ 10.Gateway Address 2
      │                 │                ├─ 11.Gateway Address 3
      │                 │                ├─ 12.Gateway Address 4
      │                 │                └─ 13.Setting Done
      │                 │
      │                 ├─ 04.SCPI-RAW Port
      │                 │
      │                 └─ 05.Message Terminator ─┬─ 1.Cr
      │                                           ├─ 2.Lf
                                                  └─ 3.Cr+Lf
```

```
MENU ─┬─ D.LAN Setting ───────── 06.Reset LAN ───────┬─ 1.Esc
      │                                               └─ 2.Reset
      │
      ├─ E.Optional Interface Setting ─┬─ 01.Analog ──┬─ 1.Voltage Level ──┬─ 1.5V
      │                                │              │                    └─ 2.10V
      │                                │              │
      │                                │              ├─ 2.Voltage Programming
      │                                │              ├─ 3.Current Programming
      │                                │              ├─ 4.Power Programming
      │                                │              └─ 5.Monitor Output
      │                                │
      │                                ├─ 02.RS-485
      │                                ├─ 03.IEEE-488
      │                                └─ 04.USB
      │
      ├─ F.Information ─┬─ 1.System Information
      │                 ├─ 2.Contact Us
      │                 └─ 3.System Log
      │
      └─ G.Load Default ─┬─ 1.Esc
                         └─ 2.Load
```

5-4. MENU

A. ERROR-CODE
It is used to check error codes. The error code will be eliminated after it's been reviewed.

B. Configuration
B-1. Operating Mode
B-1-1 Simple Mode:
When entered the Simple Mode, the display shows the following screen.
The Constant Power will be forced to the rated maximum value under the Simple Mode.
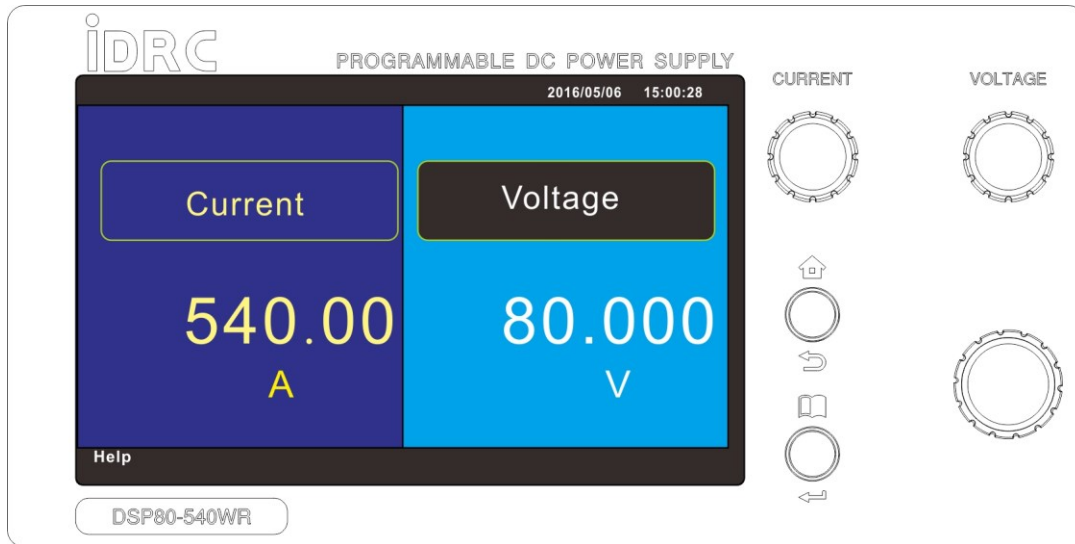
B-1-2 Complete Mode:
When entered the Complete Mode, the display shows the following screen.
The values of Voltage/Current/Power/Time are adjustable under this mode.
The Complete Mode also provides three sets of memories.
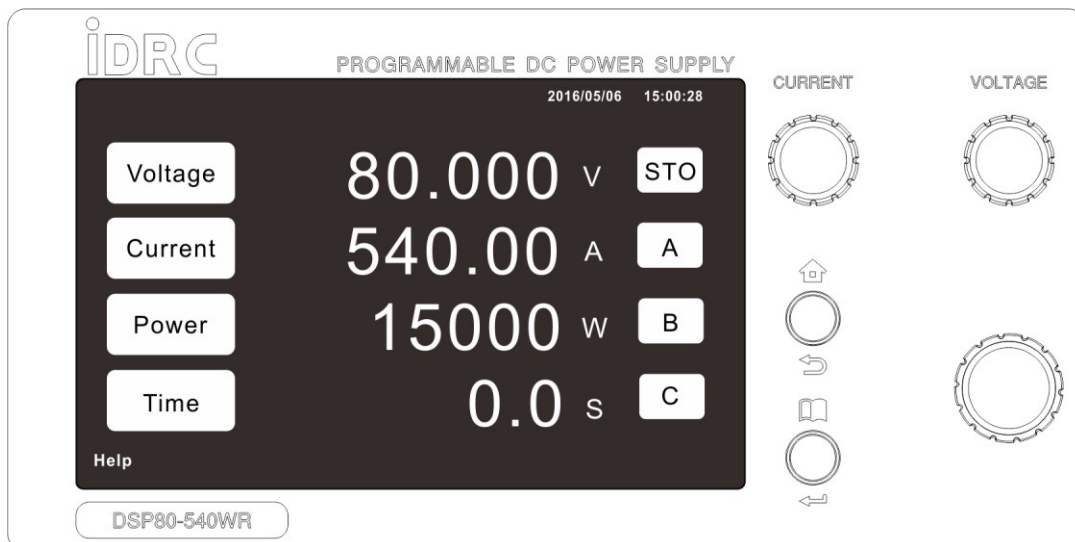
Store and Recall the three sets memories

1. Store : Set the desired values of Voltage/Current/Power/Time, tap $\boxed{\text{STO}}$ on the screen, the icon will

    turn to blue $\boxed{\text{STO}}$. And then tap $\boxed{\text{A}}$ or $\boxed{\text{B}}$ or $\boxed{\text{C}}$ to store the settings to memory A/B/C.

2. Recall : When the icon is white $\boxed{\text{STO}}$, tap $\boxed{\text{A}}$ or $\boxed{\text{B}}$ or $\boxed{\text{C}}$ will recall the settings of memory A/B/C.

    The output behavior may affected by the setting of **"B-8. Output Vary – Recall"**.

B-1-3 Sequence Mode

There are four methods to edit the Sequences in PC, the Sequences can be stored to the flash disk and then loaded to DSP-WR for executing.

Maximum 16 Sequences, each Sequence may content up to 500 STEPs. 8000 STEPs in total.

1. **Editing with DSP-WR application software**

    For installation please see the detail in **"6-3. Application Software"**.

    The editing procedures are described in GUI user manual.

Main screen of Application Software

2. Editing with spreadsheet

Use Microsoft Excel, LibreOffice CALC or other substitute software and edit the Sequence in CSV file format. "Space", "TAB", "Semicolon", "Comma" or "Colon" can be used to separate fields.

	A	B	C	D
1	name	end step	loop number	
2	sequence01	4	3	
3	voltage	current	power	time
4	50	600	15000	0.001
5	50	600	15000	0.049

```
1   name,end step,loop number,
2   sequence01,4,3,
3   voltage,current,power,time
4   50,600,15000,0.001
5   50,600,15000,0.049
```
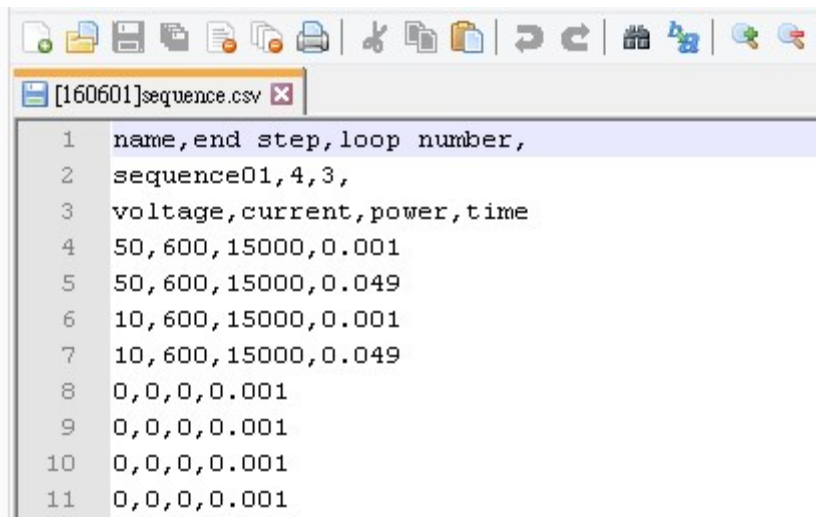
a. Fill the titles to the cells A1, B1 and C1 in the order of "name", "end step" and "loop number".
b. Fill the cells A2,B2 and C2 with desired texts/numbers in accordance with the titles and order in raw 1, for example "sequence01", "4" and "3", this represents name the sequence as "sequence01" and the end step at step "4" and repeat the sequence01 by 3 times.
c. Fill the cells A3, B3, C3 and D3 in the order of "voltage", "current", "power" and "time".
d. Fill the cells A4,B4,C4 and D4 with desired values in accordance with the titles and order in raw 3, for example "50", "600", "15000" and "0.001", this represents set the STEP1 50V, 600A, 15000W for 0.001 second.
e. The parameters in row 4 represent the settings of STEP1 and so forth.
f. If there is another sequence, please name it as sequence02 and repeat the procedure from a. above. Fill the titles of sequence02 following the last row of sequence01.
g. It is possible to link multiple sequences as a LIST. Fill "link list" to the column A of the row following the last sequence. And then specify the order of the desired sequences by filling the sequence number into the cells as below example. The output will turn to off after executed entire LIST.

	A	B
8048	0	0
8049	link list	
8050	1	
8051	10	
8052	11	
8053	0	

h. Save the file with CSV format, the file name can only in English and not exceeds 16 letters.

3. Editing with text edit software
Use Notepad++ or other substitute software and edit the Sequence in CSV file format. "Space", "TAB", "Semicolon", "Comma" or "Colon" can be used to separate fields. Please refer to the procedures of editing with spreadsheet.

4. Editing by using SCPI commands
   Please see the detail in **"7-11. SCPI COMMAND–Sequence commands",**

5. Procedure to load sequences to power supply
   (1) Plug the flash disk to the USB host port in the front panel.
   (2) Press the MENU key and select to "B-1-3 Sequence Mode", DSP-WR will load the sequences automatically.
   (3) It is required to load the sequences again after restart the DC power supply.
   (4) If the sequence order in a LIST need to be changed, it can be proceeded in the front panel, please see the detail in **"B-2. Sequence List".**
(5) Press HOME key and hold for 1.5 seconds to return to the home screen after loaded the sequences.
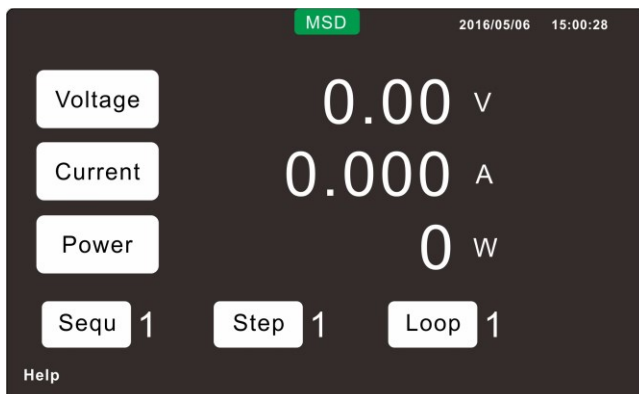
(6) The sequences will be executed after pressed the output ON key, A [Pause] icon will show up in the touchscreen for user to pause the execution, a [Run] icon will show up in the touchscreen after paused for user to re-execute the sequences.
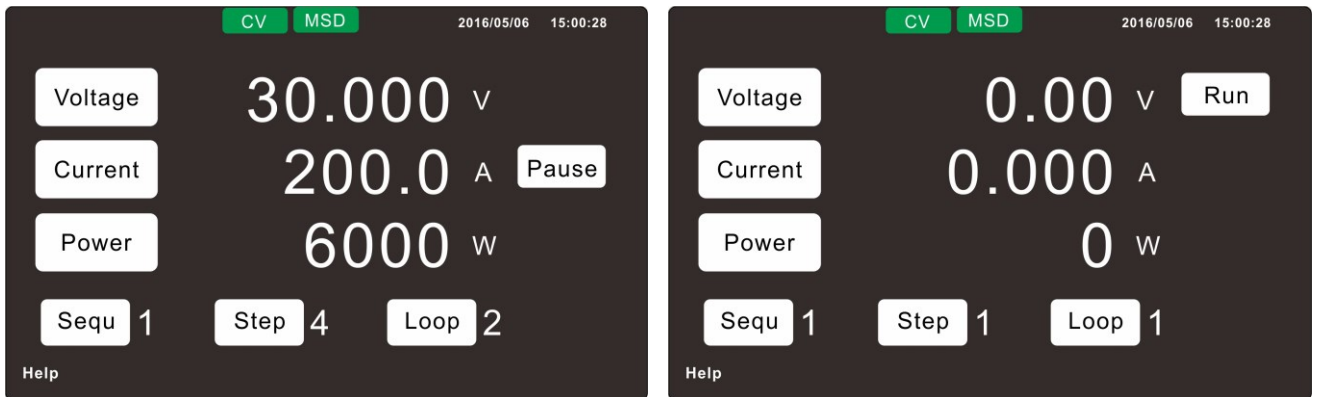
(7) The output will turns to OFF after the Sequences are completed.

B-1-4 Insertion Mode

The touchscreen will show up the [Run], [Pause] and [Stop] icons after Insetion Mode is selected. Set the desired values and enable the output by pressing the ON/OFF key.
The Insertion Mode allows the user to insert a single sequence or LIST (linked by multiple sequences) while the DC power supply is outputting the set values. The output will retain the previous condition after the sequence/LIST is completed.
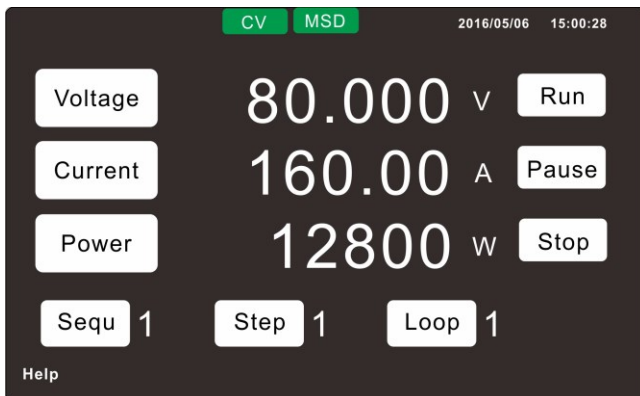
B-1-5 SAS Curve
Only available for DSP-WS series.

B-1-6 SAS Table:
Only available for DSP-WS series.

B-2. Sequence List
Only available for DSP-WS series.

B-3 SAS Curve Parameter
Only available for DSP-WS series.

B-4 SAS Scale
Only available for DSP-WS series.

B-4-1 Voltage Scale
Only available for DSP-WS series.

B-4-2 Current Scale
Only available for DSP-WS series.

B-5. Master Slave Mode
Set the power supply to be the Master unit or Slave unit when using a group of power Supplies in parallel
B-5-1 Independent
Set the power supply to be used independently.

B-5-2 Master
Set the DC power supply to be Master unit, please refer to the **5-3. Parallel Wiring** for connection. All the setting, control and read back through the Master unit.

B-5-3 Slave
Set the DC power supply to be Slave unit, please refer to the **5-3. Parallel Wiring** for connection. All the setting, control and read back through the Master unit.
The Slave unit will display SLAVE on its screen.

B-6. Power ON Mode
When restarting the power supply or recovering mains supply, the output status is：
B-6-1 OFF
The output status will always be off upon power supply restart.

B-6-2 LAST
The output status will be sustained the status before turning off the power unit or mains supply is interrupted
※*Please consider the risk of instantaneous impact and it is recommended to use the "RAMP UP" function simultaneously when select to LAST.*

B-7. Output ON Priority
Set the operating priority to CV or CC or CP when output is set to ON.

B-8. Output Vary - Adjust
Use to set the output variation when adjusting voltage during the output is ON.
B-8-1 Enter
   The output voltage will only be changed after pressing the ENTER key.

B-8-2 Direct
   The output voltage value will be changed immediately by rotating the encoder.

B-9. Output Vary – Recall
Use to set the output variation when recalling the memories during the output is ON.
B-9-1 Direct
The recalled output voltage/current value will be changed immediately.

B-9-2 Enter
The recalled output voltage/current will only be changed after pressing the ENTER key.

B-10. Internal Resistance

Internal resistance simulation, below table is the different adjustable resistance ranges for the models,

5kW models	Internal R range		10kW models	Internal R range
DSP80-180WR	0~0.444Ω		DSP80-360WR	0~0.222Ω
DSP250-60WR	0~4.170Ω		DSP250-120WR	0~2.080Ω
DSP350-42WR	0~8.330Ω		DSP350-84WR	0~4.170Ω
DSP500-30WR	0~16.70Ω		DSP500-60WR	0~8.330Ω
DSP650-23WR	0~28.30Ω		DSP650-46WR	0~14.10Ω
			DSP1000-30WR	0~33.30Ω

15kW models	Internal R range
DSP80-540WR	0~0.148Ω
DSP250-180WR	0~1.390Ω
DSP350-126WR	0~2.780Ω
DSP500-90WR	0~5.560Ω
DSP650-69WR	0~9.420Ω
DSP1050-42WR	0~25.00Ω
DSP1500-30WR	0~50.00Ω

B-11. Output ON Ramp Time

Set the output ramp up time when output is enabled, Ramp-up time can be set from 00.0 ~ 99.9s. The time setting will affect the slope of the output.
The setting of "B-7. Output ON Priority" determines the slope of output Voltage, Current or Power once the output is enabled.
When set the output ON priority to CV, the ramp time determines the slope of Voltage.
When set the output ON priority to CC, the ramp time determines the slope of Current.
When set the output ON priority to CP, the ramp time determines the slope of Power.

> !!CAUTION!!
> Time for output voltage ramp up from 5% to 95% of set value. The set time should not shorter than the "Full load up time" of each model which specified in the output response time.

B-12. Output OFF Ramp Time

Set the output ramp down time when output is disabled, Ramp-down time can be set from 00.0 ~ 99.9s. The time setting will affect the slope of the output.
The setting of "B-7. Output ON Priority" determines the slope of output Voltage, Current or Power once the output is disabled.
When set the output ON priority to CV, the ramp time determines the slope of Voltage.
When set the output ON priority to CC, the ramp time determines the slope of Current.
When set the output ON priority to CP, the ramp time determines the slope of Power.

> !!CAUTION!!
> No load : Please refer to the "No load down" time in the specification table. The set time should not shorter than the "No Load down time" of specific model which specified in the output response time.
> Full load : Time for output ramp down from 95% to 5% of set value.

B-13. Voltage Slew Rate

Setting the output voltage slew rate, the setting range depends on the rated voltage. Unit is V/ms.

B-14. Current Slew Rate

Setting the output current slew rate, the setting range depends on the rated current. Unit is A/ms.

B-15. Power Slew Rate

Setting the output power slew rate, the setting range depends on the rated power. Unit is W/ms.

B-16. I/O

B-16-1 External ON/OFF

Enable or Disable the external ON/OFF control.

B-16-2 Interlock

Enable or Disable the Interlock function (Normal close).

C. System

C-1. Alarm Buzzer
Enable or disable the buzzer when an alarm is occurred.

C-2. Key Beep
Enable or disable the beep sound when press the encoder or keys on the front panel.

C-3. LCD Brightness
Adjust the back light brightness, adjustable 1~9.

C-4. Network Time Correction
Enable or disable the NTP clock synchronization, it is required to connect the DC power supplier to internet and ensure the PORT123 for NTP is not blocked by firewall.

C-5.Calendar Setting
Check or set the time manually.

C-6.Time Zone Setting
Time zone setting.

C-7. Calibration
Contact us for the pass code for entering the calibration operation.
.

D.LAN Interface Setting

D-1. IP Information
Displays the IP address and MAC address

D-2. Auto IP
Enabling the DC power to obtain the IP address from the DHCP server automatically.

D-3. Manual IP
Entering the IP address manually, this manual setting is not applicable when 3-4-D-02. Auto IP been set to Enable.

D-4. SCPI-RAW Port
Set the connecting port number, default is 5052

D-5. Message Terminator
Selection for the line ending Cr / Lf / Cr+Lf, default is Cr+Lf

D-6. Reset LAN
Reset the LAN settings in D. LAN Interface Setting.

E. Optional Interface Setting

E-1. Analog

The pin assignment of analog programming port, please see "**4-2-11. Optional Analog Programming**"

E-1-1 Voltage Input

Enable or disable the voltage setting through analog programming port.

E-1-2 Current Input

Enable or disable the current setting through analog programming port.

E-1-3 Power Input

Enable or disable the power setting through analog programming port.

E-1-4 Monitor Output

Enable or disable monitoring signal of V/A/W.

E-1-5 Reference Output

Set the external input of **E-1-1** 、 **E-1-2** 、 **E-1-3** to 0~5V or 0~10V.

F. Information
F-1 System Information
Information of the DC power supply, Manufacturer/ Model/ Serial Number and Firmware Version.

F-2 Contact Us
Our contact information.

F-3 System Log
Records the events those occurred during operate this DC power supply.
F-4 Product Patents
List of all the patents obtained and applied to this DC power supply..

G. Load Default
G-1 1.ESC
Not to load default settings.

G-2 2.LOAD
Load the default settings, the settings in below table will be set to the default condition.

	Item	Default
B-5.	**Master Slave Mode**	Independent
B-6	**Power ON Mode**	OFF
B-7	**Output ON Priority**	CV
B-8	**Output Vary - Adjust**	Direct
B-11	**Output ON Ramp Time**	0.1
B-12	**Output OFF Ramp Time**	0
B-13	**Voltage Slew rate**	1
B-14	**Current Slew rate**	1
B-15	**Power Slew rate**	1
B-16	**External On/Off**	Disable
C-1	**ALARM Buzzer**	Enable
C-2	**Key Beep**	Enable
C-3	**LCD Brightness**	9

	Item	Default
	Voltage Setting	0V
	Power Setting	0W
	OVP	110% of rated
	UVP	10% of rated
	OPP	110% of rated
	UPP	10% of rated
	OCP	110% of rated
	UCP	10% of rated

G. Load Default
G-1 1.ESC

CHAPTER 6   INTERFACE CONNECTION

6-1. ETHERNET CONNECTION

(1) Please use CAT 5 or higher grade cable.
(2) When connecting to the LAN with DHCP server and DNS, the DC power supply will obtain an IP automatically, this will take around 1 minute.
(3) The obtained IP can be read from the front panel, please refer to the "**CHAPTER 4 D.LAN Interface Setting**" for detail, or it can also be read from the application software
(4) Please refer to the Chapter 10. for the SCPI commands.
(5) Ethernet connection:

6-1-1. Direct Connection
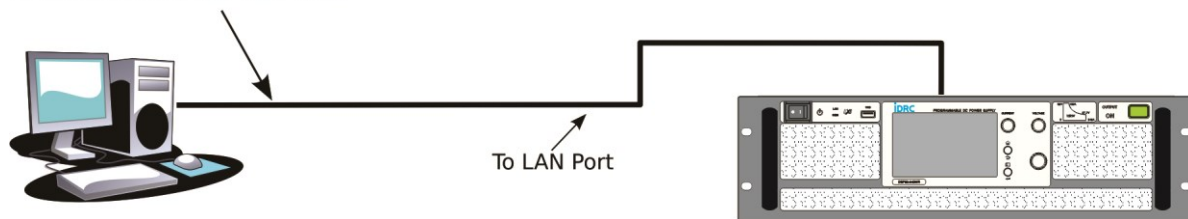
6-1-2. Connection through HUB
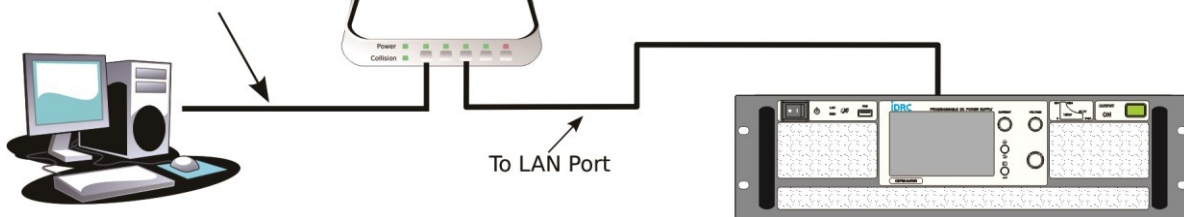
6-1-3. Through Internet or VPN
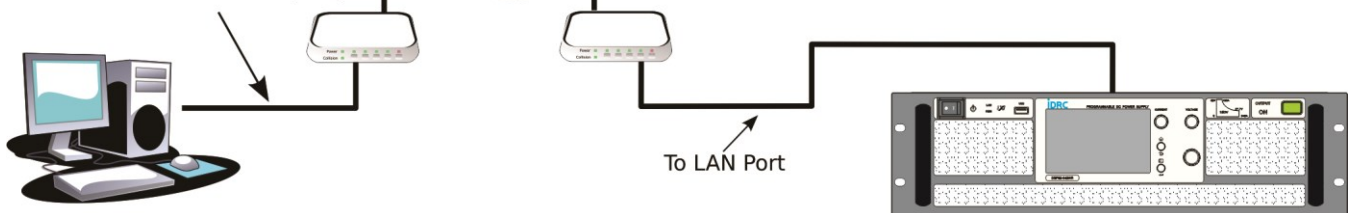
6-1-4. Enter the IP address

Enter the IP address of the DC power, you can find the DC power's information in home page.
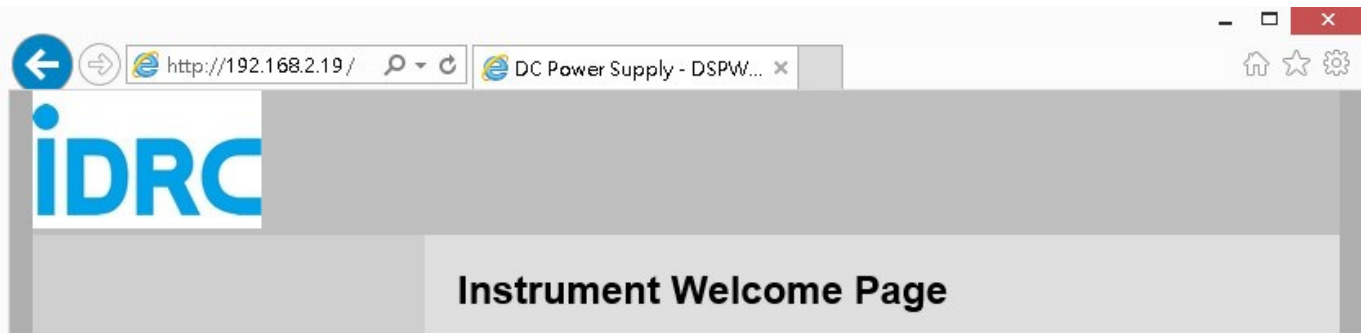
6-1-5. Network Configuration
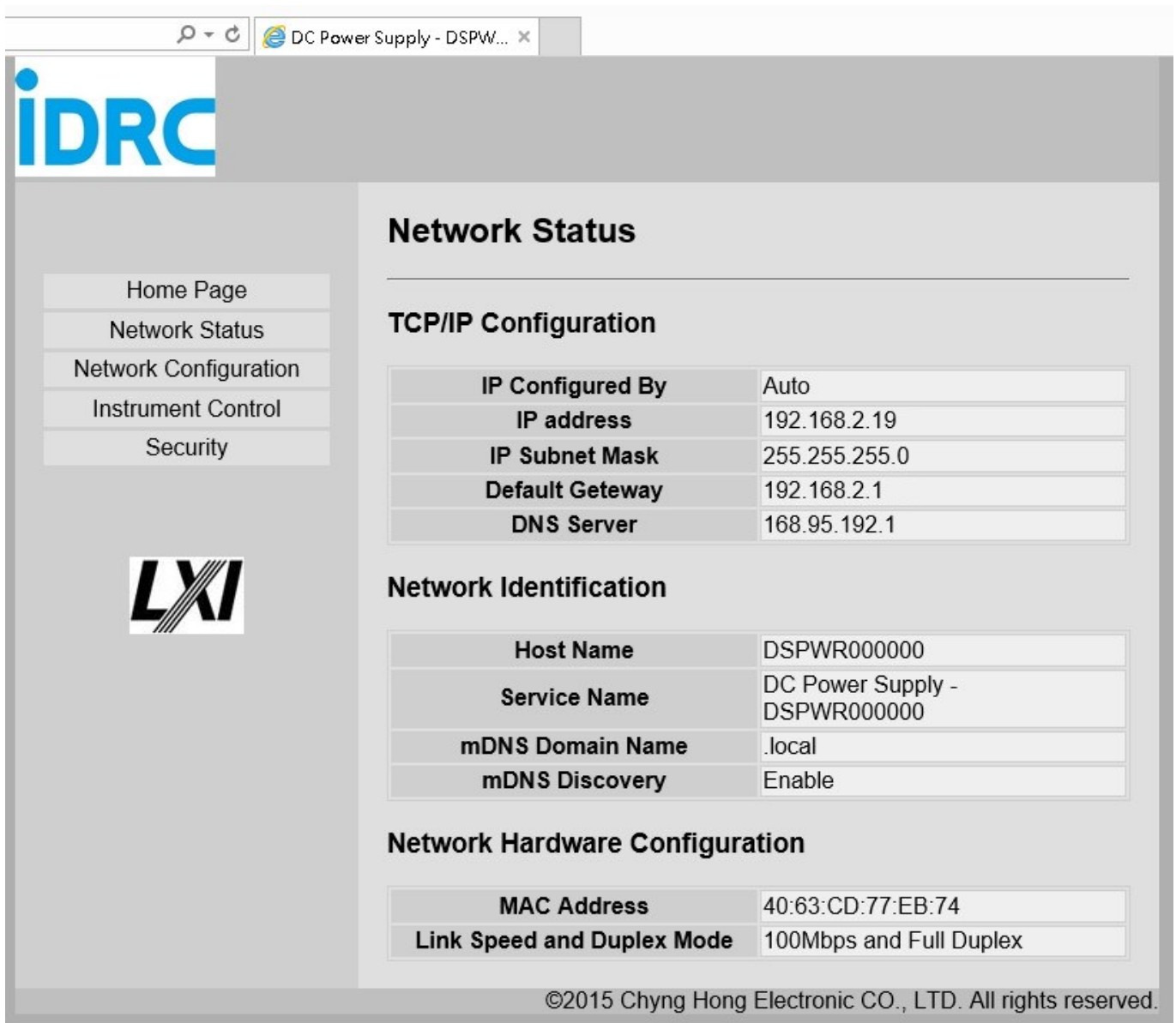
Click the "Network Configuration" on the left side of the browser for the setting of IP configuration, click "Instrument Control" for the control of the DC power supply and change the voltage value or current value those desired, the default password for "Network Configuration" and "Instrument Control" is "admin", the password can be changed in the "Security" page.
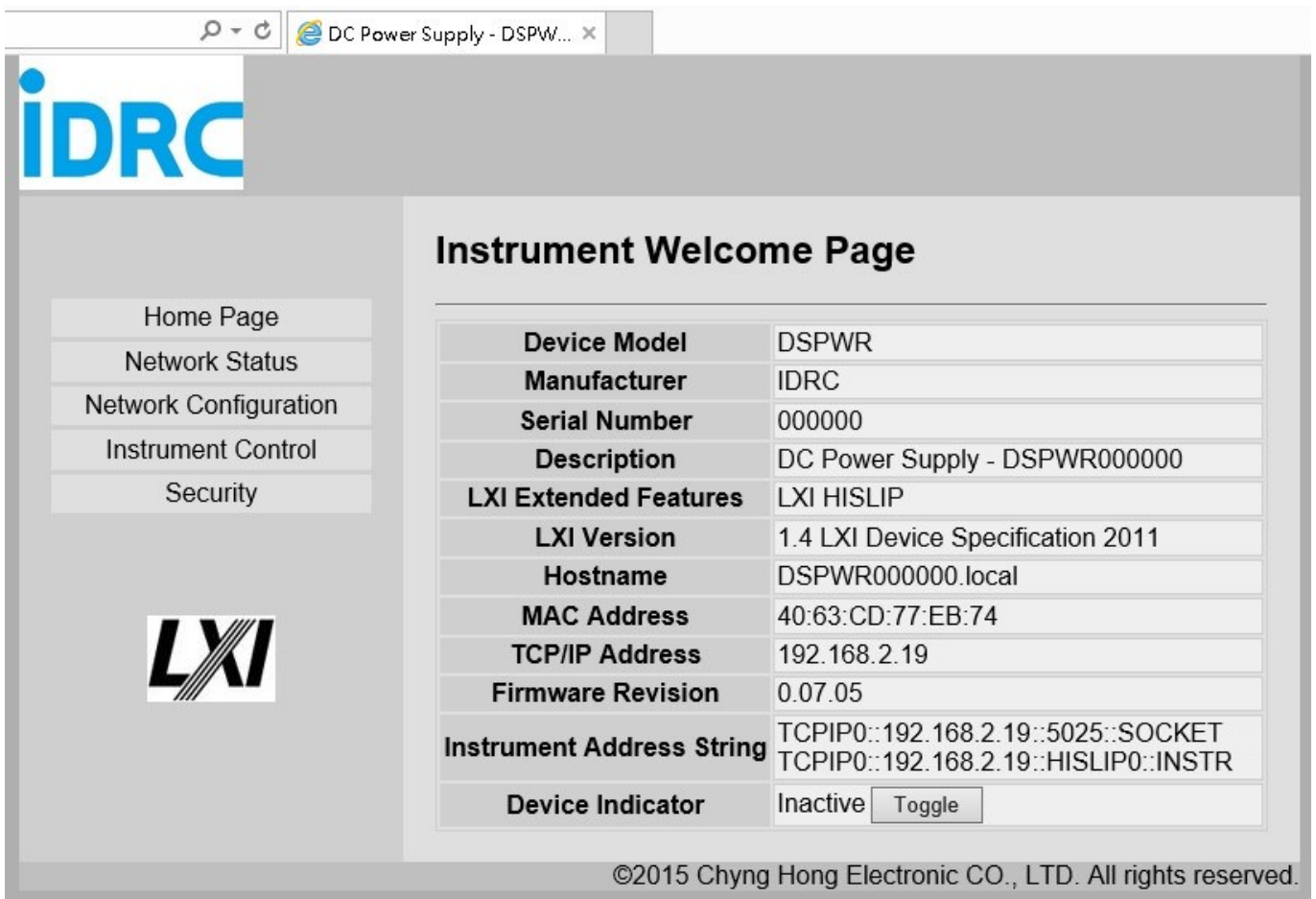
6-1-6. Introduction of Network Status

This page shows all the settings related to network.

6-1-7. Log in screen

The password is required when entering the "Network Configuration" and "Instrument Control" pages, the default password is "admin"
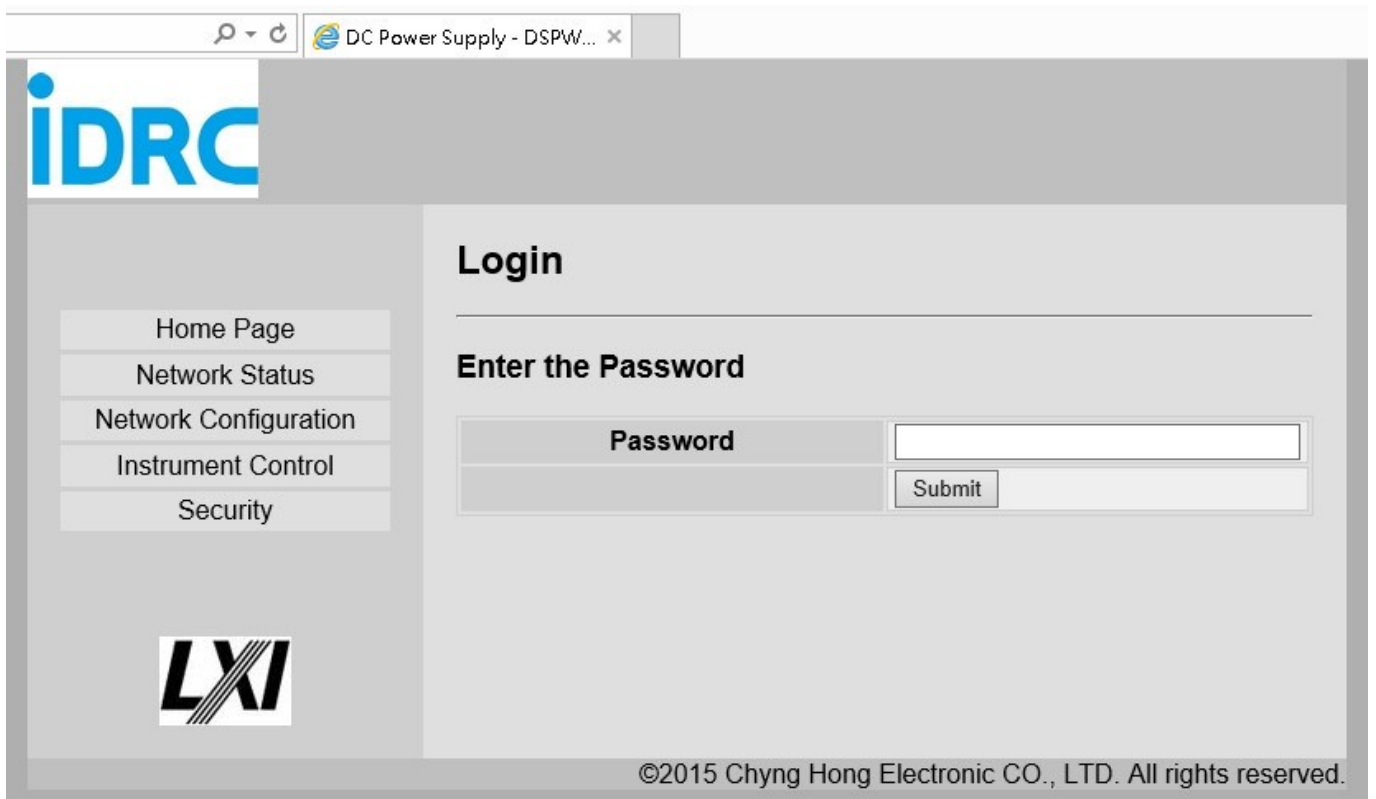
6-1-8. Introduction of Network Configuration

There are five sections in the "Network Configuration",
(1) Setting of Host Name and enable/disable mDNS Discovery.
(2) Setting of IP Address, the IP address will be assigned by the DHCP server if the "DHCP+AutoIP" is selected.
(3) Setting of DNS Server Address.
(4) Setting of Socket Port when using the Hyper Terminal, the default value is 5025.
(5) Loading the default settings.

6-1-9. Introduction of instrument control

There is a control screen for the basic controls of DSP-WR series.

(1) Displaying the measured value when OUTPUT ON.

(2) Displaying the operating status such as output ON/OFF, CV, CC or CP.

(3) Output wave form monitor, the vertical axis represents the amplitude of (voltage/current/power) which has 11 grids representing 0~110% of rated (voltage/current/power). The horizontal axis represents the time, the time per division is selectable.

(4) Three waveforms for selection, Voltage-Yellow, Current –Green, Power-Purple.

(5) START / STOP button to start or stop displaying the waveform, the displayed waveform will be cleared after re-start.

(6) Selectable time per division, 0.5s/1s/2s/5s per division.

(7) Setting for output value.

(8) Setting for internal Resistance.

(9) Setting for Over Voltage Protection value

(10) Setting for Over Current Protection value

(11) Setting for output Slew rate

(12) OUTPUT ON/OFF.

(13) RESET, set the voltage and current to default value and OUTPUT OFF.

Instrument Control

Monitor
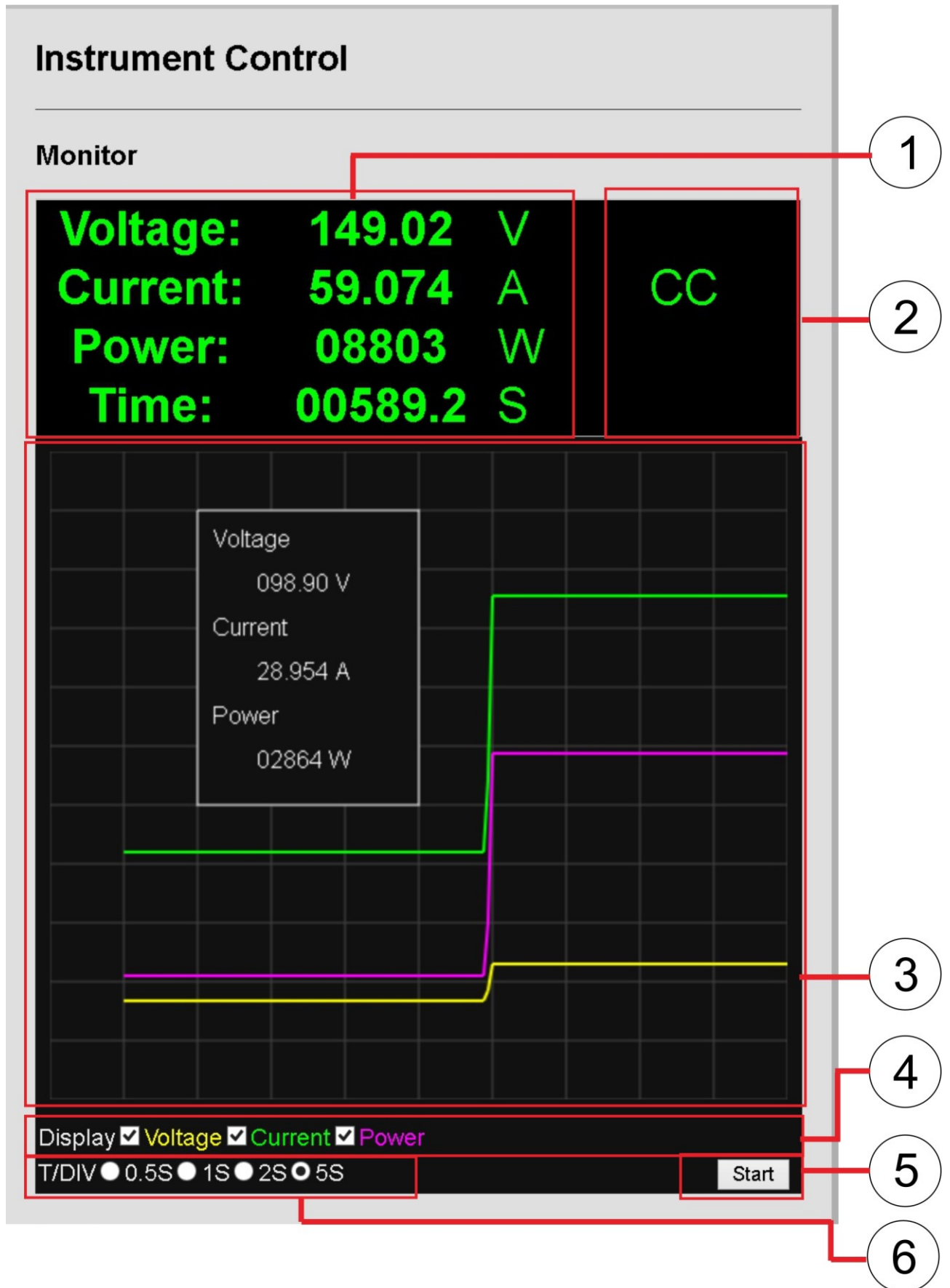
<接下頁>

Setting

Voltage	150.0	V
Current	59.0	A
Power	10300	W
Time	0.0	S
	Apply Undo Change	

Internal Resistance	0.0	Ohm
OVP	715.0	V
OCP	75.9	A
	Apply Undo Change	

Voltage Slew Rate	65000.0	V/mS
Current Slew Rate	6900.0	A/mS
Power Slew Rate	1500000	W/mS
	Apply Undo Change	

Output Off

Instrument Reset

6-1-10.Security

Please ensure the "New Password" and "Confirm Password" fields are filled in with the exactly same content. Execute the "RST1" function in the MENU to load the default password if you forgot the new password, please note, all the settings those related to the Network will be reset to the default settings. after executed the "RST1" function.

6-1-11. Using Hyper Terminal to check if the connection is correctly.

6-2. Hyper Terminal connection

6-2-1. Name the connection

Start up the Hyper Terminal and key in the name of connection for example : "DSP-WR".
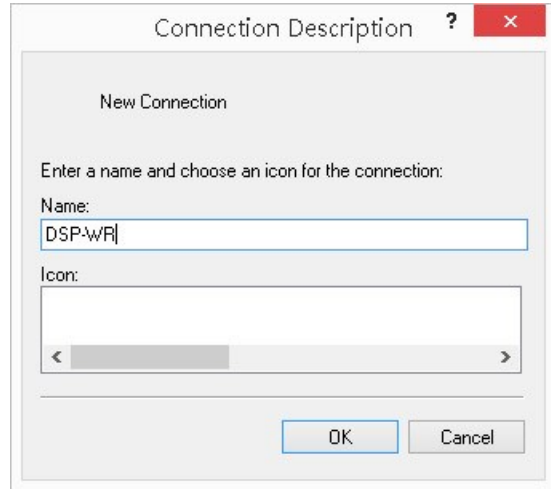
6-2-2. Select SOCKET PORT

Select the "Connect using " to TCP/IP(Winsock) and then key in the Host address and SOCKET PORT.
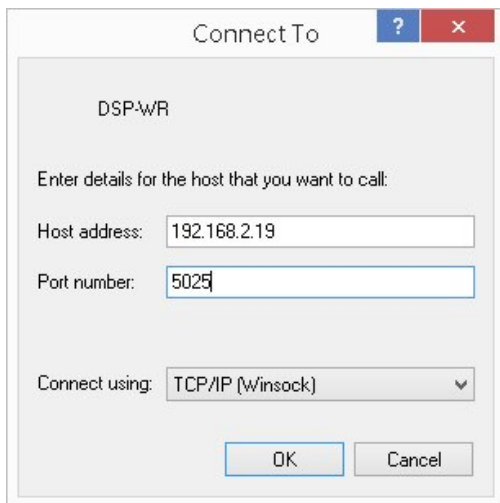
6-2-3. Click "Properties" for setting.

Please click "Disconnect" and then click "Properties" for setting.
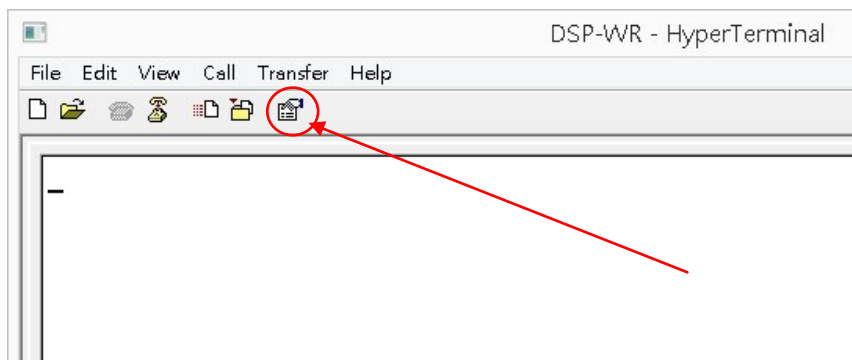
6-2-4. ASCII Setup-1

Click ASCII Setup.
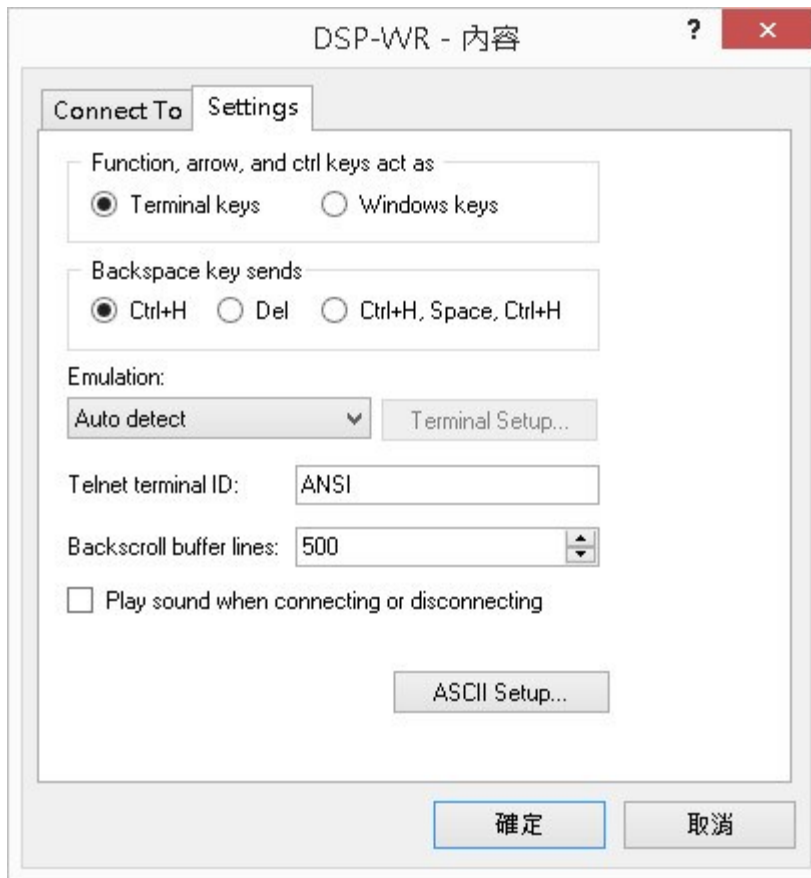
6-2-5. ASCII Setup-2

Click "Send line ends with line feeds" and "Echo typed characters locally".
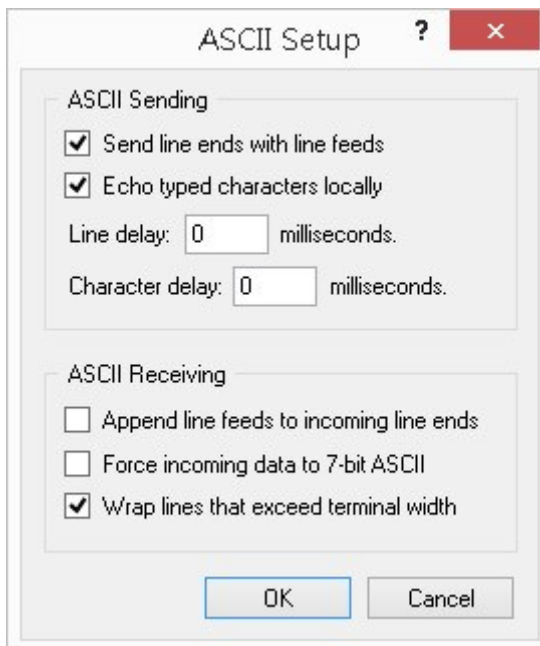
6-2-6. Re-connected again.
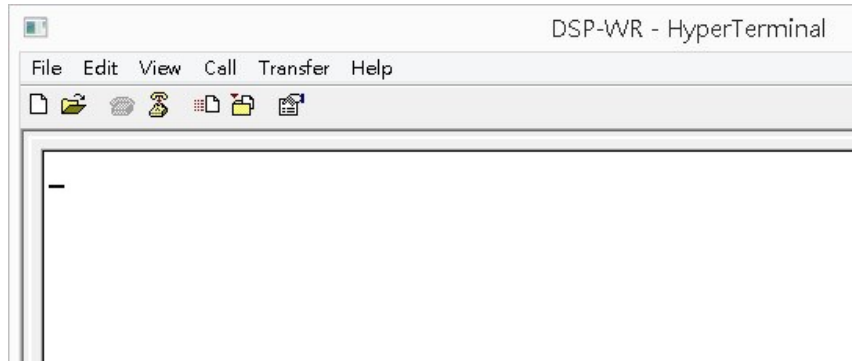
6-2-7. Enter the commands, for example *IDN?
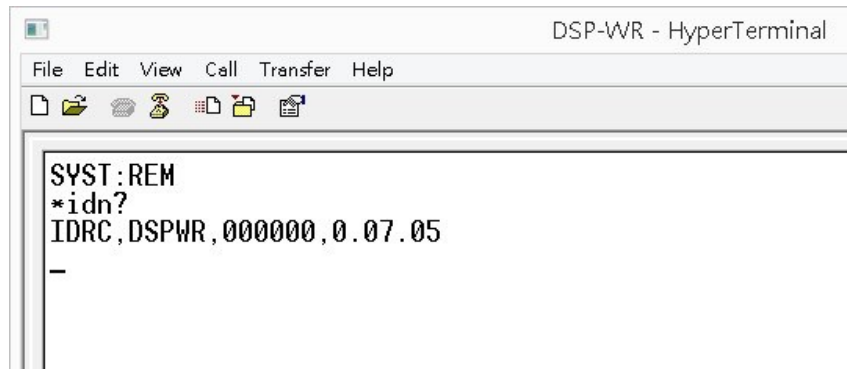
6-3. Application Software

6-3-1. Installation
The requirement of hardware and software for running DSP-WR GUI

Hardware requirement	
Operating System	Microsoft Windows XP / Windows 7 SP1 / Windows 8.1
OS version	32 bit OS
CPU	2.2GHz dual CPU or higher
RAM	2GB of RAM
Hard Disk	5G of available hard-disk space for installation; additional free space required during installation (cannot install on removable flash storage devices)
Display	1280 x 800 display

Software requirement	
LabVIEW Run-Time Engine 2011	http://www.ni.com/download/labview-run-time-engine-2011/2534/en/
NI-VISA 5.1.2	http://www.ni.com/download/ni-visa-run-time-engine-5.1.2/2918/en/
NI-488.2 3.0.2	http://www.ni.com/download/ni-488.2-3.0.2/2922/en/

Note1. The above software provided by National Instruments, the linkages may varied, visit NI web site if the linkage is not applicable.
Note 2. It is required to connect to internet when downloading the software.
Note 3. The above mentioned trademarks and company names only for identification purposes. All trademarks and company names are copyrights to their respective owners.

6-3-2. GUI panel
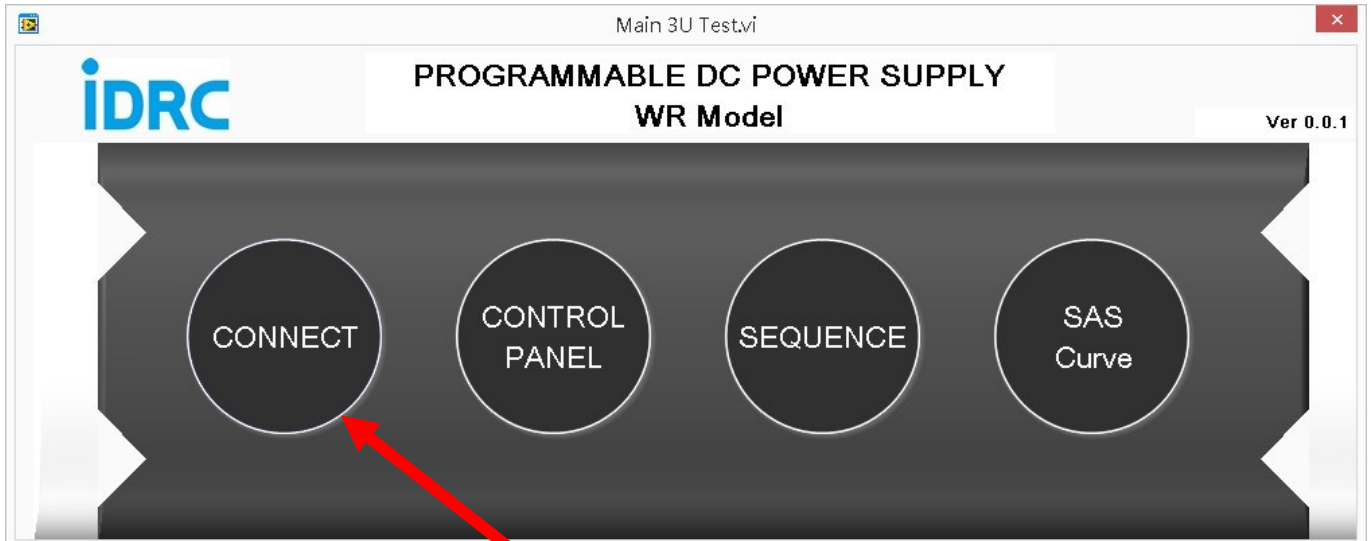
6-3-2. CONNECT : Establishing the connection between controller and power supply
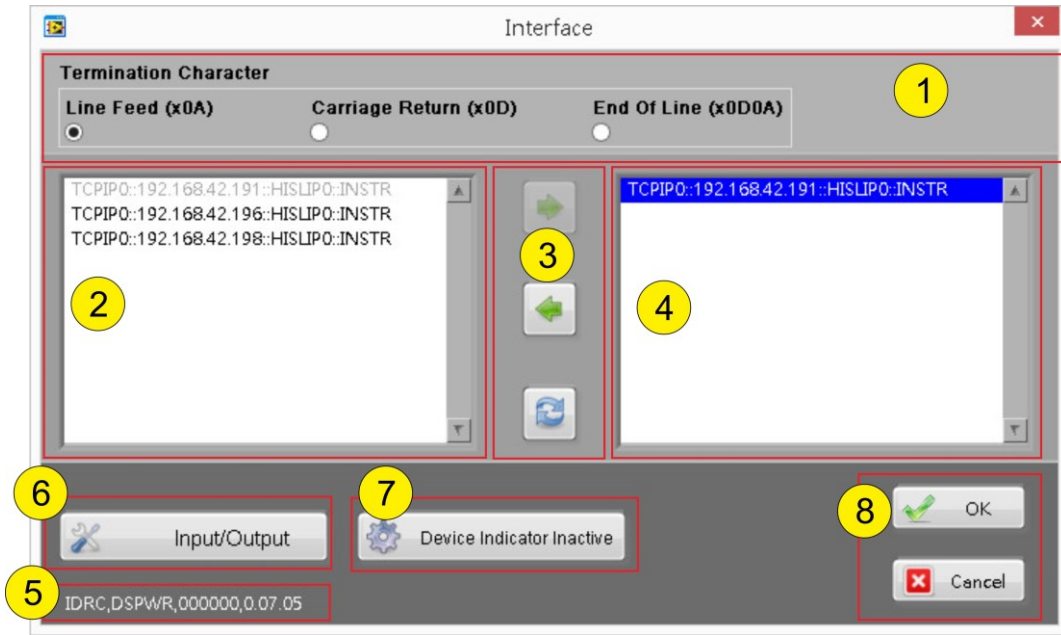
(1) Select the Termination Character, default is Line Feed (x0A).

(2) The software will search and shows all the DSP-WR models those connected to this network on the left side window.

(3) The ⬛ and ⬛ for selecting the unit to be remote controlled.

(4) Select the desired unit and click ⬛ , then the selected unit will show up on the right side window.

(5) The ID of connected unit will show up at the lower left corner after clicked ⬛

(6) Click ⬛ Input/Output the below window pop up, use it to send command manually.
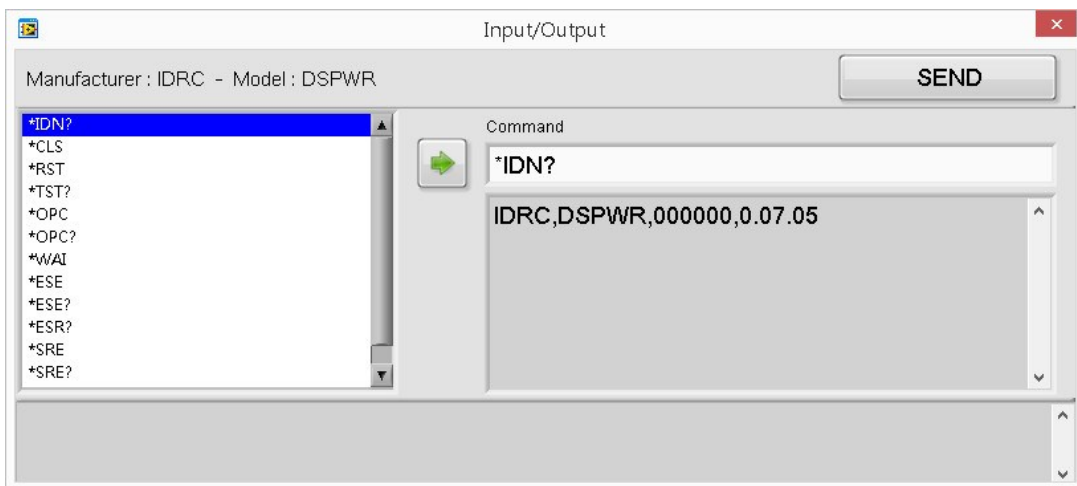
(7) According to LXI regulation, the remote controlled unit should be able to identify from a pile of instrument. Click ⬛ Device Indicator Active the LAN led of connected unit will blinking, click again to keep the LED lights.

(8) Click ⬛ OK to confirm or ⬛ Cancel to leave from this pop window.

CHAPTER 7   INTERFACE COMMAND INTRODUCTION

7-1. IEEE488.2 INTERFACE

7-1-1. Specification :

Standard IEE488.2

7-1-2. Function :

 1.SH1: Full Source Handshake

 2.AH1: Full Acceptor Handshake

 3.T6: Basic Talker

 4.L4: Basic Listener

 5.SR0: Without Service Request

 6.RL1: Remote/Local Change

 7.PP0: Without Parallel Polling

 8.DC1: Device Clear

7-1-3. Command :

7-1-3-1. *CLS - CLEAR STATUS COMMAND

Syntax: *CLS
Description: Clears status data. Clears the following registers without affecting the
corresponding Enable Registers: Standard Event Status Register (ESR),
Operation Status Event Register, Questionable Status. Event Register, and Status
Byte Register (STB). Also clears the Error Queue.

7-1-3-2. *ESE - Event status enable

Syntax: *ESE <enable_value>
Description: Sets bits in the standard event status enable register. .

7-1-3-3. *ESE? - Event Status Enable Query

Syntax: *ESE <enable_value>
Description: Returns the results of the standard event enable register. The register is cleared
after reading it.

7-1-3-4. *ESR - Event Status Enable Register

Syntax: *ESR
Description: Reads and clears event status enable register.

7-1-3-5. *IDN? - IDENTIFICATION QUERY

Syntax: *IDN?

Description: *IDN? - IDENTIFICATION QUERY Identifies the instrument. This query requests identification. The power supply returns a string which contains the manufacturer name, the model, the serial number and the firmware level. The character string contains the following fields: <Manufacturer>, <Model>, <Serial Number>, <Firmware revision> where: <Manufacturer> = IDRC, <Model> = DSP-WR model number, <Serial Number> = SSSSSS <Firmware revision=n.m, (e.g, 1.0).

7-1-3-6. *OPC - Operation complete command

Syntax: *OPC

Description: Generates the OPC message in the standard event status register when all pending overlapped operations have been completed (for example, a sweep, or a Default).

7-1-3-7. *OPC? - Operation complete query

Syntax: *OPC?

Description: Returns an ASCII "+1" when all pending overlapped operations have been completed.

7-1-3-8. *RST - RESET COMMAND

Syntax: *RST

Description: Resets power supply to the power on default state. The power supply output set to power-on default state. After sending *RST, output voltage is set to 0, output current is set to 0, output power is set to 0, OVP is set to rated voltage +10% and OCP is set to rated current +10%. It is recommended that this command is always the first command set after remote digital control starts, to ensure that the output is set to zero and control of output on/off is properly enabled.

7-1-3-9. *SRE - Service Request Enable

Syntax: *SRE

Description: Before reading a status register, bits must be enabled. This command enables bits in the service request register. The current setting is saved in non-volatile memory.

7-1-3-10. *SRE? - Service Request Enable Query

Syntax: *SRE?

Description: Reads the current state of the service request enable register. The register is cleared after reading it. The return value can be decoded using the table in Status Commands. .

7-1-3-11. *STB? - Status Byte Query

Syntax: *STB?

Description: Reads the value of the instrument status byte. The register is cleared only when the registers feeding it are cleared.

7-1-3-12. *TRG - Trigger command

Syntax: *TRG

Description: Generates a trigger when the trigger system has BUS selected as its source.

7-1-3-13. *TST? - SELF TEST QUERY

Syntax: *TST?

Description: Power Supply test.This query causes the power supply to do a self-test and provide the controller with pass/fail results. A 0 is returned if the unit passes the test. A 1 is returned to indicate the unit failed self-test.

7-1-3-14. *WAI - Wait for all pending operations to complete

Syntax: *WAI

Description: Configures the instrument's output buffer to wait for all pending operations to complete before executing any additional commands over the interface.

7-2. NUMERIC PARAMETERS

<NR1>   Digits with an implied decimal point assumed at the right of the least-significant digit.
Examples: 123

<NRf>   The data format <NRf> is defined in IEEE 488.2 for flexible Numeric. Representation. Zero, positive and negative floating point numeric values are some examples of valid data.
Examples: 1.2300E+02

<Bool>   Boolean Data. Can be numeric (0, 1), or named (OFF, ON).

<address>   Netword address
Examples: 192.168.0.1

<String>   String program data.

7-3. SCPI COMMAND – Voltage commands

7-3-1. VOLTage

	Syntax:	**Short Form:** VOLT <NRf+> | MIN | MAX **Long Form:** [SOURce:]VOLTage[:LEVel][:IMMediate][:AMPLitude] <NRf+> | MIN | MAX
	Query Syntax	VOLT?
	Description:	Sets the output voltage value.
	Argument:	<NRf+> is a value in the range from 0 to rated voltage of unit. MIN can be 0 MAX can be 105% of rated value
	Example:	VOLT 60 VOLT 70.55 VOLT MAX

7-3-2. VOLTage:TRIGgered

	Syntax:	**Short Form:** VOLT:TRIG <NRf+> | MIN | MAX **Long Form:** [SOURce:]VOLTage[:LEVel]:TRIGgered[:AMPLitude] <NRf+> | MIN | MAX
	Query Syntax	VOLT:TRIG?
	Description:	Set the voltage value after triggered.
	Argument:	<NRf+> is a value in the range from 0 to rated voltage of unit. MIN can be 0 MAX can be 105% of rated value
	Example:	VOLT:TRIG 120 VOLT:TRIG MAX

7-3-3. VOLTage:MODE

	Syntax:	**Short Form:** VOLT:MODE FIX | STEP **Long Form:** [SOURce:]VOLTage:MODE FIXed | STEP
	Query Syntax	VOLT:MODE?
	Description:	When set to FIX, the output voltage setting can only by using 7-3-1. VOLTage When set to STEP, the output voltage setting can only by using 7-3-2. VOLTage:TRIGgered
	Argument:	FIXed : Output voltage varies by the specified value immediately. STEP : Output voltage varies by the specified value after triggered.
	Example:	VOLT:MODE FIX

7-3-4. VOLTage:PROTection

	Syntax:	**Short Form:** VOLT:PROT <NRf+> | MIN | MAX **Long Form:** [SOURce:]VOLTage:PROTection[:LEVel] <NRf+> | MIN | MAX
	Query Syntax	VOLT:PROT?
	Description:	Sets the over voltage protection (OVP) value (in Volts).
	Argument:	<NRf+> is a value in the range from 0% to 110% of rated voltage.
	Example:	VOLT:PROT 300 VOLT:PROT MAX

7-3-5. VOLTage:SLEW:RATE

	Syntax:	**Short Form:** VOLT:SLEW:RATE < NRf+> | MIN | MAX **Long Form:** [SOURce:]VOLTage:SLEW:RATE < NRf+> | MIN | MAX
	Query Syntax	VOLT:SLEW:RATE?
	Description:	This command sets the slew rate for all programmed changes in the output voltage level of the dc source.
	Argument:	< NRf+> is a value with V/mS as unit, the setting range varied by model. MIN sets the slew rate to its minimum possible rate. MAX sets the slew rate to its maximum possible rate.
	Example:	VOLT:SLEW:RATE 50 VOLT:SLEW:RATE MAX

7-4. SCPI COMMAND – Current commands

7-4-1. CURRent

	Syntax:	**Short Form:** CURR <NRf+> | { MIN | MAX } **Long Form:** [SOURce:]CURRent[:LEVel][:IMMediate][:AMPLitude] <NRf+> | { MIN | MAX }
	Query Syntax	CURR?
	Description:	Sets the output current value.
	Argument:	<NRf+> is a value in the range from 0 to rated current of unit. MIN can be 0 MAX can be 105% of rated value
	Example:	CURR 188 CURR 540 CURR MAX

7-4-2. CURRent:TRIGgered

	Syntax:	**Short Form:** CURR:TRIG <NRf+> | MIN | MAX **Long Form:** [SOURce:]CURRent[:LEVel]:TRIGgered <NRf+> | MIN | MAX
	Query Syntax	CURR:TRIG?
	Description:	Set the current value after triggered.
	Argument:	<NRf+> is a value in the range from 0 to rated current of unit. MIN can be 0 MAX can be 105% of rated value
	Example:	CURR:TRIG 120 CURR:TRIG MAX

7-4-3. CURRent:Mode

	Syntax:	**Short Form:** CURR:MODE FIX | STEP **Long Form:** [SOURce:]CURRent:MODE FIXed | STEP
	Query Syntax	CURR:MODE?
	Description:	When set to FIX, the output current setting can only by using 7-4-1. CURRent When set to STEP, the output current setting can only by using 7-4-2. CURRent:TRIGgered
	Argument:	FIXed : Output current varies by the specified value immediately. STEP : Output current varies by the specified value after triggered.
	Example:	CURR:MODE STEP

7-4-4. CURRent:PROTection:DELay

	Syntax:	**Short Form:** CURR:PROT:DEL <NRf+> **Long Form:** [SOURce:]CURRent:PROTection:DELay <NRf+>
	Query Syntax	CURR:PROT:DEL?
	Description:	Set the OCP delay time (0.005~65.535 Second)
	Argument:	<NRf+> is a value in a range of 0.005~65.535 Second
	Example:	CURR:PROT:DEL 50

7-4-5. CURRent:PROTection:LEVel

	Syntax:	*Short Form:* CURR:PROT:LEV <NRf+> | MIN | MAX *Long Form:* [SOURce:]CURRent:PROTection:LEVel <NRf+> | MIN | MAX
	Query Syntax	CURR:PROT:LEV?
	Description:	Sets the over current protection (OCP) value (in Amps).
	Argument:	<NRf+> is a value in the range from 10% to 110% of rated current.
	Example:	CURR:PROT:LEV 200

7-4-6. CURRent:PROTection:STATe

	Syntax:	*Short Form:* CURR:PROT:STATE <Bool> | { ON | OFF } *Long Form:* [SOURce:]CURRent:PROTection:STATe <Bool> | { ON | OFF }
	Query Syntax	CURR:PROT:STAT?
	Description:	Controls whether the output protection circuit is enabled.
	Argument:	1 or ON will turn the OCP <ON> 0 or OFF will turn the OCP <OFF>
	Example:	CURR:PROT:STATE 1

7-4-7. CURRent:SLEW:RATE

	Syntax:	*Short Form:* CURR:SLEW:RATE <NR1> | MIN | MAX *Long Form:* [SOURce:]CURRent:SLEW:RATE <NR1> | MIN | MAX
	Query Syntax	CURR:SLEW:RATE?
	Description:	This command sets the slew rate for all programmed changes in the output current level of the dc source.
	Argument:	< NRf+> is a value with A/mS as unit, the setting range varied by model. MIN sets the slew rate to its minimum possible rate. MAX sets the slew rate to its maximum possible rate.
	Example:	CURR:SLEW:RATE 50 CURR:SLEW:RATE MAX

7-5. SCPI COMMAND – Power commands

7-5-1. POWer

	Syntax:	*Short Form:* POW <NRf+> | MIN | MAX *Long Form:* [SOURce:]POWer[:LEVel][:IMMediate][:AMPLitude] <NRf+> | MIN | MAX
	Query Syntax	POW?
	Description:	Sets the output power value.
	Argument:	<NRf+> is a value in the range from 0 to rated power of unit. MIN can be 0 MAX can be 102% of rated value
	Example:	POW 10000 POW MAX

7-5-2. POWer:TRIGgered

	Syntax:	*Short Form:* POW:TRIG <NRf+> | MIN | MAX *Long Form:* [SOURce:]POWer[:LEVel]:TRIGger <NRf+> | MIN | MAX
	Query Syntax	POW:TRIG?
	Description:	Set the output power value after triggered.
	Argument:	<NRf+> is a value in the range from 0 to rated power of unit. MIN can be 0 MAX can be 102% of rated value
	Example:	POW:TRIG 12000 POW MAX

7-5-3. POWer:SLEW:RATE

	Syntax:	*Short Form:* POW:SLEW:RATE <NR1> | MIN | MAX *Long Form:* [SOURce:]POWer:SLEW:RATE <NR1> | MIN | MAX
	Query Syntax	POW:SLEW:RATE?
	Description:	This command sets the slew rate for all programmed changes in the output power level of the dc source.
	Argument:	< NRf+> is a value with W/mS as unit, the setting range varied by model. MIN sets the slew rate to its minimum possible rate. MAX sets the slew rate to its maximum possible rate.
	Example:	POW:SLEW:RATE 80 POW:SLEW:RATE MIN

7-6. SCPI COMMAND – Internal resistance commands

7-6-1. RESistance

	Syntax:	*Short Form:* RES <NRf+> | MIN | MAX *Long Form:* [SOURce:]RESistance < NRf+> | MIN | MAX
	Query Syntax	RES?
	Description:	Set the internal resistance value.
	Argument:	< NRf+> is a value with ohm as unit, the setting range varied by model, shown in the following tables. MIN sets the slew to its minimum possible rate. MAX sets the slew to its maximum possible rate.
	Example:	RES 1.05

Setting range tables:

5kW model	Internal R range
DSP80-180WR	0~444mΩ
DSP250-60WR	0~4.17Ω
DSP350-42WR	0~8.33Ω
DSP500-30WR	0~16.7Ω
DSP650-23WR	0~28.3Ω

10kW model	Internal R range
DSP80-360WR	0~222mΩ
DSP250-120WR	0~2.08Ω
DSP350-84WR	0~4.17Ω
DSP500-60WR	0~8.33Ω
DSP650-46WR	0~14.1Ω
DSP1000-30WR	0~33.3Ω

15kW model	Internal R range
DSP80-540WR	0~148mΩ
DSP250-180WR	0~1.39Ω
DSP350-126WR	0~2.78Ω
DSP500-90WR	0~5.56Ω
DSP650-69WR	0~9.42Ω
DSP1050-42WR	0~25.0Ω
DSP1500-30WR	0~50.0Ω

7-7. SCPI COMMAND – Output time command

7-7-1. TIME

	Syntax:	**Short Form:** TIME <NRf+> | MIN | MAX **Long Form:** [SOURce:]TIME < NRf+> | MIN | MAX
	Query Syntax	TIME?
	Description:	Set the output time, unit is second. When set to 0, the output will execute continuously. When set with any value except 0, the output will execute the set time.
	Argument:	< NRf+> MIN can be 0 (When set to 0, the output will execute continuously.) MAX can be 99999.9 S
	Example:	TIME 30

7-8. SCPI COMMAND – Output commands

7-8-1. OUTPut

	Syntax:	**Short Form:** OUTP ON | OFF | <Bool> **Long Form:** OUTPut[:STATe] ON | OFF | <Bool>
	Query Syntax	OUTP?
	Description:	Enables or disables the power supply output. To enable DC power supply output: <ON> or 1. To disable DC power supply output: <OFF> or 0
	Argument:	<ON> or 1 to enable power supply output <OFF> or 0 to disable power supply output
	Example:	OUTP ON

7-8-2. OUTPut:PON

	Syntax:	**Short Form:** OUTP:PON OFF| LAST **Long Form:** OUTPut:PON[:STATe] OFF| LAST
	Query Syntax	OUTP:PON?
	Description:	Determines power up status of output and operation of OUTP command after power up or recovery from mains loss. When set to OFF (recommended), the power supply will power up with output off; output on/off can be controlled with OUTP command. When set to LAST (NOT recommended), the power supply will return to the output setting (on or off) in effect when power turned off or lost. If output was off, unit powers up with output off. If output was on, unit powers up with output on, however OUTP command can no longer turn the output off and *RST is required to set output off.
	Argument:	<OFF> Programs the unit to output off upon power up or recovery from mains loss. <LAST> Programs the unit to output on/off setting in effect just before the unit was turned off.
	Example:	OUTP:PON OFF

7-8-3. OUTPut:PRIOrity

	Syntax:	**Short Form:** OUTP:PRIO CV | CC | CP **Long Form:** OUTPut:PRIOrity CV | CC | CP
	Query Syntax	OUTP:PRIO?
	Description:	Set the priority of operating mode.
	Argument:	CV set the operating mode to CV as priority. CC set the operating mode to CC as priority. CP set the operating mode to CP as priority.
	Example:	OUTP:PRIO CC

7-8-4. OUTPut:PROTection:CLEar

	Syntax:	**Short Form:** OUTP:PROT:CLE **Long Form:** OUTPut:PROTection:CLEar
	Description:	This command clears the latched signals that have disabled the output. Such as over-voltage, over-current, over-temperature and AC-fail condition. All conditions that generate the fault must be removed before the latch can be cleared. The output is then restored to the state it was in before the fault condition occurred.
	Argument:	none
	Example:	OUTP:PROT:CLE clears the latched signals that have disabled the output.

7-9. SCPI COMMAND – Measurement commands

7-9-1. FETCh?

	Query Syntax	*Short Form:* FETC? *Long Form:* FETCh?
	Description:	Measures actual output voltage and current. The query performs a measurement and returns the value of DC output current in Amperes and DC output voltage in Volts.
	Argument:	<NR1>
	Example:	FETC? returns 1.41000E+1 , 3.00100E-0, 4.2E+1 (Voltage is 14.1V, current is 3.001A and power is 42W)

7-9-2. MEASure:VOLTate?

	Query Syntax	*Short Form:* MEAS:VOLT? *Long Form:* MEASure[:SCALar]:VOLTage[:DC]?
	Description:	Measure commands measure the output voltage.
	Argument:	Volts as a 5-digit number.
	Example:	MEAS:VOLT?

7-9-3. MEASure:CURRent?

	Query Syntax	*Short Form:* MEAS:CURR? *Long Form:* MEASure[:SCALar]:CURRent[:DC]?
	Description:	Measure commands measure the output current.
	Argument:	Amps as a 5-digit number.
	Example:	MEAS:CURR?

7-9-4. MEASure:POWer?

	Query Syntax	*Short Form:* MEAS:POW? *Long Form:* MEASure[:SCALar]:POWer[:DC]?
	Description:	Measure commands measure the output power.
	Argument:	Watt as a 5-digit number.
	Example:	MEAS:POW?

7-10. SCPI COMMAND – Parallel commands

7-10-1. SYSTem:MS:MODE

	Syntax:	*Short Form:* SYST:MS:MODE INDE | MAST | SLAV *Long Form:* SYSTem:MS:MODE INDEpendent | MASTer | SLAVe
	Query Syntax	SYST:MS:MODE?
	Return	INDEpendent MASTer SLAVe INITIALIZING
	Description:	Set the unit to Independent, Master or Slave.
	Argument:	INDEpendent set the unit to Independent. MASTer set the unit to Master unit. SLAVe set the unit to Slave unit.
	Example:	SYST:MS:MODE MAST

7-10-2. SYSTem:MS:NUMber?

	Query Syntax	*Short Form:* SYST:MS:NUM? *Long Form:* SYSTem:MS:NUMber?
	Description:	Querying the number of power supplies connected in parallel.
	Argument:	<NR1>
	Example:	SYST:MS:NUM?

7-11. SCPI COMMAND – Sequence commands

7-11-1. FUNCtion:SEQUence:STEP

	Syntax:	**Short Form:** FUNC:SEQU:STEP \<NR1\> **Long Form:** [SOURce:]FUNCtion:SEQUence:STEP \<NR1\>
	Query Syntax	FUNC:SEQU:STEP?
	Description:	Specifying the STEP number
	Argument:	\<NR1\>：1 ~ 500
	Example:	FUNC:SEQU:STEP 100

7-11-2. FUNCtion:SEQUence:EDIT

	Syntax:	**Short Form:** FUNC:SEQU:EDIT \<NR1\> **Long Form:** [SOURce:]FUNCtion:SEQUence:EDIT \<NR1\>
	Query Syntax	FUNC:SEQU:EDIT?
	Description:	Specifying the sequence number and access into edit mode.
	Argument:	\<NR1\>：1 ~ 16
	Example:	FUNC:SEQU:IND 1

7-11-3. FUNCtion:SEQUence:VOLT

	Syntax:	**Short Form:** FUNC:SEQU:VOLT \<NRf+\> **Long Form:** [SOURce:]FUNCtion:SEQUence:VOLTage \<NRf+\>
	Query Syntax	FUNC:SEQU:VOLT?
	Description:	Set the voltage of specified STEP.
	Argument:	\<NRf+\>：0 ~ 105% of rated value
	Example:	FUNC:SEQU:VOLT 80

7-11-4. FUNCtion:SEQUence:CURR

	Syntax:	**Short Form:** FUNC:SEQU:CURR \<NRf+\> **Long Form:** [SOURce:]FUNCtion:SEQUence:CURRent \<NRf+\>
	Query Syntax	FUNC:SEQU:CURR?
	Description:	Set the current of specified STEP.
	Argument:	\<NRf+\>：0 ~ 105% of rated value
	Example:	FUNC:SEQU:CURR 540

7-11-5. FUNCtion:SEQUence:POWer

	Syntax:	**Short Form:** FUNC:SEQU:POW \<NRf+\> **Long Form:** [SOURce:]FUNCtion:SEQUence:POWer \<NRf+\>
	Query Syntax	FUNC:SEQU:POW?
	Description:	Set the output power of specified STEP.
	Argument:	\<NRf+\>：0 ~ 102% of rated value.
	Example:	FUNC:SEQU:POW 15000

7-11-6. FUNCtion:SEQUence:TIME

	Syntax:	**Short Form:** FUNC:SEQU:TIME <NRf+> **Long Form:** [SOURce:]FUNCtion:SEQUence:TIME <NRf+>
	Query Syntax	FUNC:SEQU:TIME?
	Description:	Set the time of specified STEP.
	Argument:	<NRf+>：0.001 ~ 99999.999
	Example:	FUNC:SEQU:TIME 0.001

7-11-7. FUNCtion:SEQUence:LOOP

	Syntax:	**Short Form:** FUNC:SEQU:LOOP <NR1> **Long Form:** [SOURce:]FUNCtion:SEQUence:LOOP <NR1>
	Query Syntax	FUNC:SEQU:LOOP?
	Description:	Set the loop number of specified Sequence.
	Argument:	<NR1>：0~ 99999999
	Example:	FUNC:SEQU:LOOP 50

7-11-8. FUNCtion:SEQUence:END

	Syntax:	**Short Form:** FUNC:SEQU:END <NR1> **Long Form:** [SOURce:]FUNCtion:SEQUence:END <NR1>
	Query Syntax	FUNC:SEQU:END?
	Description:	Set the end STEP of specified Sequence.
	Argument:	<NR1>：1 ~ 500
	Example:	FUNC:SEQU:END 500

7-11-9. FUNCtion:SEQUence:COMPlete

	Syntax:	**Short Form:** FUNC:SEQU:COMP **Long Form:** [SOURce:]FUNCtion:SEQUence:COMPlete
	Query Syntax	FUNC:SEQU:COMPlete?
	Description:	Complete and leave from edit mode.
	Argument:	PROCESSING DONE
	Example:	FUNC:SEQU:COMP

7-11-10 FUNCtion:SEQUence:NOW?

	Syntax:	**Short Form:** FUNC:SEQU:NOW? **Long Form:** [SOURce:]FUNCtion:SEQUence:NOW?
	Description:	Querying the status of Sequence
	Argument:	Returns <sequence>,<step>,<loop>
	Example:	FUNC:SEQU:NOW?

7-11-11. FUNCtion:SEQUence:LIST

	Syntax:	**Short Form:** FUNC:SEQU:LIST\<value> \<NR1> **Long Form:** [SOURce:]FUNCtion:SEQUence:LIST\<value> \<NR1>
	Query Syntax	FUNC:SEQU:LIST\<value>?
	Description:	Specifying the order when proceeding multiple Sequences.
	Argument:	value: 1 ~ 16, \<NR1>: 0 ~ 16
	Example:	FUNC:SEQU:LIST2 3

7-11-12. FUNCtion:SEQUence

	Syntax:	**Short Form:** FUNC:SEQU RUN | STOP | PAUSE **Long Form:** [SOURce:]FUNCtion:SEQUence[:STATe] RUN | STOP | PAUSE
	Query Syntax	FUNC:SEQU?
	Description:	Set to RUN, STOP or PAUSE the sequence
	Argument:	RUN STOP PAUSE
	Example:	FUNC:SEQU RUN

7-12. SCPI COMMAND – MEMORY commands

7-12-1. MEMory:VOLTage<index>

Syntax:	**Short Form:** MEM:VOLT<index> <NRf> **Long Form:** MEMory:VOLTage<index> <NRf>
Query Syntax	MEM:VOLT<index>?
Description:	Set the voltage value to specified memory location.
Argument:	<index> is a number from 1 to 3 representing one of 3 memory locations <NRf> is a value in the range from 0 to 105% of rated voltage of unit.
Example:	MEM:VOLT2 62.4

7-12-2. MEMory:CURRent<index>

Syntax:	**Short Form:** MEM:CURR<index> <NRf> **Long Form:** MEMory:CURRent<index> <NRf>
Query Syntax	MEM:CURR<index>?
Description:	Set the current value to specified memory location.
Argument:	<index> is a number from 1 to 3 representing one of 3 memory locations <NRf> is a value in the range from 0 to 105% of rated current of unit.
Example:	MEM:CURR2 312

7-12-3. MEMory:POWer<index>

Syntax:	**Short Form:** MEM:POW<index> <NRf> **Long Form:** MEMory:POWer<index> <NRf>
Query Syntax	MEM:POW<index>?
Description:	Set the wattage value to specified memory location.
Argument:	<index> is a number from 1 to 3 representing one of 3 memory locations <NRf> is a value in the range from 0 to 102% of rated power of unit.
Example:	MEM:POW2 10000

7-12-4. MEMory:RECall

Syntax:	**Short Form:** MEM:REC <NR1> **Long Form:** MEMory:RECall <NR1>
Query Syntax	MEM:REC?
Description:	Restores power supply settings to the voltage and current values stored in memory location defined by <NR1>. If the output is off, the recalled voltage and current set values are shown on the front panel Voltage and Current displays. If the output is on, the output changes to the recalled voltage and current values which are also shown on the front panel Voltage and Current displays.
Argument:	<NR1> is a number from 1 to 3 representing one of 3 memory locations
Example:	MEM:REC 3 sets power supply set points to 500V and 25A (values previously stored via either front panel or MEM:VOLT<NR1> and MEM:CURR<NR1>commands). If output is on, output is changed to 500V, 25A. If output is off, set values of 500V and25A are displayed on the front panel.

7-12-5. MEMory:LIST

	Query Syntax	**Short Form:** MEM:LIST<NR1>? **Long Form:** MEMory:LIST<NR1>?
	Description:	For the memory location defined by <NR1>, returns voltage (Volts), current (Amperes) and power (Watt) in scientific notation.
	Argument:	Return <voltage>,<current>,<power>
	Example:	MEMory:LIST3?

7-12-6. MEMory:CLS

	Syntax:	**Short Form:** MEM:CLS **Long Form:** MEMory:CLS
	Description:	Clears all memory locations used for storing and recalling power supply settings.
	Argument:	None
	Example:	MEMory:CLS clears all memory locations.

7-13. SCPI COMMAND – LAN/LXI commands

7-13-1. SYSTem:COMMunicate:TCPip:CONTrol?

	Query Syntax:	*Short Form:* SYST:COMM:TCP:CONT? *Long Form:* SYSTem:COMMunicate:TCPip:CONTrol?
	Description:	Querying SCPI-RAW Port
	Argument:	
	Example:	SYST:COMM:TCP:CONT?

7-13-2. SYSTem:COMMunicate:RLSTate

	Syntax:	*Short Form:* SYST:COMM:RLST LOC | REM | RWL *Long Form:* SYSTem:COMMunicate:RLSTate LOC | REM | RWL
	Query Syntax:	SYST:COMM:RLST?
	Description:	Set or querying the control mode Local/Remote/Remote with lock
	Argument:	LOC : Local REM : Remote RWL : Remote controlled with locked "Local key".
	Example:	SYST:COMM:RLST RWL

7-13-3. LXI:IDENtify

	Syntax:	*Short Form:* LXI:IDEN 0 | 1 | OFF | ON *Long Form:* LXI:IDENtify[:STATe] 0 | 1 | OFF | ON
	Query Syntax	LXI:IDEN?
	Description:	Set the LXI indicator blinking
	Argument:	0 | OFF stop blinking 1 | ON start blinking
	Example:	LXI:IDEN 0

7-14. SCPI COMMAND – System commands

7-14-1. SYSTem:REMote

	Syntax:	*Short Form:* SYST:REM *Long Form:* SYSTem:REMote
	Description:	Sets the power supply to be in remote mode. The front panel [REMOTE] indicator lights and the front panel keys and encoder are disabled. Pressing SHIFT/LOC key on the front panel restores the unit to local mode.
	Argument:	None
	Example:	SYSTem:REMote puts the power supply in remote mode.

7-14-2. SYSTem:LOCal

	Syntax:	*Short Form:* SYST:LOC *Long Form:* SYSTem:LOCal
	Description:	Sets the power supply to be in local mode. The front panel [REMOTE] indicator goes off and the front panel keys and encoder are enabled.
	Argument:	None
	Example:	SYSTem:LOCal puts the power supply in local mode.

7-14-3. SYSTem:ERRor?

	Query Syntax	*Short Form:* SYST:ERR? *Long Form:* SYSTem:ERRor[:NEXT]?
	Description:	Returns error codes and messages.
	Return Format:	<string> is text format in -XXX XXXXXXXXXXXX
	Example:	Input command S0URce:VOLTage 2w will cause error. SYSTem:ERR? returns error code "-148" and sending SYSTem:ERR? again returns no error code "0". Refer to Table for a complete list of error codes.

7-14-4. SYSTem:RWLock

	Syntax:	*Short Form:* SYST:RWL *Long Form:* SYSTem:RWLock
	Description:	Set the unit be controlled remotely and lock the Local key.
	Argument:	
	Example:	SYST:RWL

7-14-5. DISPlay

	Syntax:	*Short Form:* DISP 0 | 1 | OFF | ON *Long Form:* DISPlay 0 | 1 | OFF | ON
	Query Syntax	DISP?
	Description:	Set the back light ON or OFF
	Argument:	0 | OFF Turn off the back light 1 | ON Turn on the back light
	Example:	DISP ON

7-14-6. DISPlay:BRIGhtness

Syntax:	**Short Form:** DSIP:BRIG <NR1> **Long Form:** DSIPlay:BRIGhtness <NR1>
Query Syntax	DSIP:BRIG?
Description:	Sets the brightness of display screen.
Argument:	<NR1> is a value in the range from 1 to 9.
Example:	DSIP:BRIG 3 sets display brightness to level 3.

7-14-7. SYSTem:DATE

Syntax:	**Short Form:** SYST:DATE "YYYY/MM/DD" **Long Form:** SYSTem:DATE "YYYY/MM/DD"
Query Syntax	SYST:DATE?
Description:	Set the date of this power supply
Argument:	YYYY MM DD
Example:	SYST:DATE "2020/03/23"

7-14-8. SYSTem:TIME

Syntax:	**Short Form:** SYST:TIME "HH:MM:SS" **Long Form:** SYSTem:TIME "HH:MM:SS"
Query Syntax	SYST:TIME?
Description:	Set the time of this power supply
Argument:	HH MM SS
Example:	SYST:TIME "15:20:26"

7-14-9. SYSTem:NTP

Syntax:	**Short Form:** SYST:NTP 0 | 1 | OFF | ON **Long Form:** SYSTem:NTP 0 | 1 | OFF | ON
Query Syntax	SYST:NTP?
Description:	Set the Network Time Protocol enable/disable.
Argument:	0 | OFF Disable 1 | ON Enable
Example:	SYST:NTP 1

7-14-10. SYSTem:NTP:SERVer

Syntax:	**Short Form:** SYST:NTP:SERV <IP address> **Long Form:** SYST:NTP:SERVer <IP address>
Query Syntax	SYST:NTP:SERV?
Description:	Set the IP address of NTP server.
Argument:	<IP address> IPV4 address, ex: "129.6.15.30"
Example:	SYST:NTP:SERV "66.199.22.67"

7-14-11. SYSTem:ZONE

	Syntax:	**Short Form:** SYST:ZONE <UTC> **Long Form:** SYSTem:ZONE	
	Query Syntax	SYST:ZONE?	
	Description:	Set the time zone of this power supply	
	Argument:	<UTC> UTC-12:00 UTC-11:00 UTC-10:00 UTC-09:00 UTC-08:00 UTC-07:00 UTC-06:00 UTC-05:00 UTC-04:00 UTC-03:30 UTC-03:00 UTC-02:00 UTC-01:00 UTC UTC+01:00 UTC+02:00 UTC+03:00	UTC+03:30 UTC+04:00 UTC+04:30 UTC+05:00 UTC+05:30 UTC+05:45 UTC+06:00 UTC+06:30 UTC+07:00 UTC+08:00 UTC+09:00 UTC+09:30 UTC+10:00 UTC+11:00 UTC+12:00 UTC+13:00 UTC+14:00
	Example:	SYST:ZONE UTC-01:00	

7-14-12. SYSTem:VERSion? QUERY

	Syntax:	**Short Form:** SYST:VERS? **Long Form:** SYSTem:VERSion?
	Description:	Indicates the SCPI version to which unit complies.
	Return Format:	<string> where <string> is text in XXXX.X format corresponding to SCPI year and revision.
	Example:	SYSTem:VERSion? returns 1990.0 (unit complies with SCPI version 1990.0.)

7-14-13. SYSTem:BEEP

	Syntax:	**Short Form:** SYST:BEEP 0 | 1 | OFF | ON **Long Form:** SYSTem:BEEP 0 | 1 | OFF | ON
	Query Syntax	SYST:BEEP?
	Description:	Sets the beep sound each time a front panel key or knob is pressed to on or off.
	Argument:	0 | OFF disables beep sound 1 | ON enables beep sound
	Example:	SYSTem:BEEP 1 turns on the beep sound.

7-14-14. SYSTem:BUZZer

	Syntax:	**Short Form:** SYST:BUZZ 0 | 1 | OFF | ON **Long Form:** SYSTem:BUZZer 0 | 1 | OFF | ON
	Query Syntax	SYST:BUZZ?
	Description:	Set the alarm buzzer ON or OFF
	Argument:	0 | OFF Disable the alarm buzzer 1 | ON Enable the alarm buzzer
	Example:	SYST:BEEP 0

7-14-15. SYSTem:LOG:LAST?

	Query Syntax:	**Short Form:** SYST:LOG:LAST? **Long Form:** SYSTem:LOG:LAST?
	Description:	Querying the last event in logged data.
	Argument:	YYYY/MM/DD HH:MM/SS,"description"
	Example:	SYST:LOG:LAST?

7-14-16. SYSTem:LOG:PREV?

	Query Syntax:	**Short Form:** SYST:LOG:PREV? **Long Form:** SYSTem:LOG:PREV?
	Description:	Querying the previous event in logged data after queried the last event. It is required to be used following the 7-14-15. SYSTem:LOG:LAST?
	Argument:	YYYY/MM/DD HH:MM/SS,"description"
	Example:	For example to querying the 3rd last event. SYST:LOG:LAST? SYST:LOG:PREV? SYST:LOG:PREV?

7-14-17. MODE

	Syntax:	**Short Form:** MODE SIMP | COMP | SEQU | INSE **Long Form:** [SOURce:]MODE SIMPle | COMPlete | SEQUence | INSErtion
	Query Syntax:	MODE?
	Description:	Set the operating mode to Simple, Complete,
	Argument:	SIMPle : Simple mode, voltage and current adjustable but power will be forced to rated. COMPlete : Complete mode, voltage, current, power and time are adjustable.
	Example:	MODE COMP

7-14-18. INITiate:TRANsient

	Syntax:	**Short Form:** INIT:TRAN **Long Form:** INITiate[:IMMediate]:TRANsient
	Description:	To initiate the transient mode, once initiated the VOLTage:TRIGgered, CURRent:TRIGgered and POWer:TRIGgered are applicable. Re-initiate the transient mode each time after triggered and not set the transient mode to continuous.
	Argument:	
	Example:	INIT:TRAN

7-14-19. ABORt:TRANsient

	Syntax:	**Short Form:** ABOR:TRAN **Long Form:** ABORt:TRANsient
	Description:	To abort the transient mode.
	Argument:	
	Example:	ABOR:TRAN

7-14-20. INITiate:CONTinuous:TRANsient

	Syntax:	**Short Form:** INIT:CONT:TRAN 0 | 1 | OFF | ON **Long Form:** INITiate:CONTinuous:TRANsient 0 | 1 | OFF | ON
	Query Syntax	INIT:CONT:TRAN?
	Description:	Set the transient mode to continuous, it doesn't need to re-initiate the transient mode once set to continuous.
	Argument:	0 | OFF Disable the continuous 1 | ON Enable the continuous
	Example:	INIT:CONT:TRAN 1

7-14-21 TRIGger:TRANsient

	Syntax:	**Short Form:** TRIG:TRAN **Long Form:** TRIGger:TRANsient[:IMMediate]
	Description:	To trigger the transient mode.
	Argument:	
	Example:	TRIG:TRAN

7-14-22. TRIGger:TRANsient:SOURce

	Syntax:	**Short Form:** TRIG:TRAN:SOUR BUS **Long Form:** TRIGger:TRANsient:SOURce BUS
	Query Syntax	TRIG:TRANSOUR?
	Description:	Set the trigger source from digital interface.
	Argument:	BUS
	Example:	TRIG:TRAN:SOUR BUS

7-15. SCPI COMMAND – Status commands

Bit Configuration of Operation Status Registers

Bit position	0	1	2	3	4	5	6	7-15
Bit Name	CV	CC	OFF	Not used	WTG-tran	RAMP	SEQU	Not used
Decimal Value	1	2	4	Not used	16	32	64	Not used
CV : Output is in constant voltage CC : Output is in constant current OFF : Output is programmed off WTG-tran : Transient system is waiting or a trigger RAMP : Output ramp up/down is executing SEQU : The sequence is executing								

7-15-1. STATus:OPERation:ENABle

	Syntax:	**Short Form:** STAT:OPER:ENAB <NR1> **Long Form:** STATus:OPERation:ENABle <NR1>
	Query Syntax:	STAT:OPER:ENAB?
	Description:	This command and its query set and read the value of the Operation Enable register. This register is a mask for enabling specific bits from the Operation Event register to set the operation summary bit (OPER) of the Status Byte register. The operation summary bit is the logical OR of all enabled Operation Event register bits.
	Argument:	<NR1> 0~65535
	Example:	STAT:OPER:ENAB 32

7-15-2. STATus:OPERation:CONDition?

	Query Syntax:	**Short Form:** STAT:OPER:COND? **Long Form:** STATus:OPERation:CONDition?
	Description:	This query returns the value of the Operation Condition register. That is a read-only register which holds the real-time (unlatched) operational status of the ac source.
	Argument:	<NR1> (register value)
	Example:	STAT:OPER:COND?

7-15-3. STATus:OPERation:EVENt?

	Query Syntax:	**Short Form:** STAT:OPER:EVEN? **Long Form:** STATus:OPERation:EVENt?
	Description:	Queries the event register for the Operation Status group. This is a read-only register, which stores (latches) all events that are passed by the Operation NTR and PTR filter. Reading the Operation Status Event register clears it.
	Argument:	<NR1> (register value)
	Example:	STAT:OPER:EVEN?

7-15-4. STATus:OPERation:NTRansition

	Syntax:	**Short Form:** STAT:OPER:NTR <NR1> **Long Form:** STATus:OPERation:NTRansition <NR1>
	Query Syntax:	STAT:OPER:NTR?
	Description:	These commands set or read the value of the Operation NTR (Negative-Transition) registers. These registers serve as polarity filters between the Operation Enable and Operation Event registers to cause the following actions: + When a bit in the Operation NTR register is set to 1, then a 1-to-0 transition of the corresponding bit in the Operation Condition register causes that bit in the Operation Event register to be set. + If the same bits in both NTR and PTR registers are set to 1, then any transition of that bit at the Operation Condition register sets the corresponding bit in the Operation Event register. + If the same bits in both NTR and PTR registers are set to 0, then no transition of that bit at the Operation Condition register can set the corresponding bit in the Operation Event register.
	Argument:	<NR1> (register value)
	Example:	STAT:OPER:NTR 32

7-15-5. STATus:OPERation:PTRansition

	Syntax:	**Short Form:** STAT:OPER:PTR <NR1> **Long Form:** STATus:OPERation:PTRansition <NR1>
	Query Syntax:	STAT:OPER:PTR?
	Description:	These commands set or read the value of the Operation PTR (Positive-Transition) registers. These registers serve as polarity filters between the Operation Enable and Operation Event registers to cause the following actions: + When a bit of the Operation PTR register is set to 1, then a 0-to-1 transition of the corresponding bit in the Operation Condition register causes that bit in the Operation Event register to be set. + If the same bits in both NTR and PTR registers are set to 1, then any transition of that bit at the Operation Condition register sets the corresponding bit in the Operation Event register. + If the same bits in both NTR and PTR registers are set to 0, then no transition of that bit at the Operation Condition register can set the corresponding bit in the Operation Event register.
	Argument:	<NR1> (register value)
	Example:	STAT:OPER:PTR 32

Bit Configuration of Questionable Status Registers

Bit Position	0	1	2	3	4	5	6-8	9	11-15
Bit Name	OV	OC	PF	CP	OT	MSP	Not used	SHF	Not used
Decimal Value	1	2	4	8	16	32	Not used	512	Not used

OV	over-voltage protection has tripped
OC	over-current protection has tripped
PF	output is disabled by power failed
CP	output is under constant power
OT	over-temperature protection has tripped
MSP	output is disabled by Master/Slave protection
SHF	output is disabled by external Shut Off.

7-15-6. STATus:QUEStionable:ENABle

Syntax:	*Short Form:* STAT:QUES:ENAB <NR1> *Long Form:* STATus:QUEStionable:ENABle <NR1>
Query Syntax:	STAT:QUES:ENAB?
Description:	Sets and queries bits in the enable register for the Questionable Status group. The enable register is a mask for enabling specific bits from the Operation Event register to set the QUES (questionable summary) bit of the Status Byte register. STATus:PRESet clears all bits in the enable register.
Argument:	<NR1> (register value)
Example:	STAT:QUES:ENAB 32

7-15-7. STATus:QUEStionable:EVENt?

Query Syntax:	*Short Form:* STAT:QUES:EVEN? *Long Form:* STATus:QUEStionable:EVENt?
Description:	This query returns the value of the Questionable Event register. The Event register is a read-only register which holds (latches) all events that are passed by the Questionable NTR and/or PTR filter. Reading the Questionable Event register clears it.
Argument:	<NR1> (register value)
Example:	STAT:QUES:EVEN?

7-15-8. STATus:QUEStionable:CONDition?

Query Syntax:	*Short Form:* STAT:QUES:COND? *Long Form:* STATus:QUEStionable:CONDition?
Description:	This query returns the value of the Questionable Condition register. That is a read-only register which holds the real-time (unlatched) questionable status of the ac source.
Argument:	<NR1> (register value)
Example:	STAT:QUES:COND?

7-15-9. STATus:QUEStionable:NTRansition

	Syntax:	***Short Form:*** STAT:QUES:NTR<NR1> ***Long Form:*** STATus:QUEStionable:NTRansition <NR1>
	Query Syntax:	STAT:QUES:NTR?
	Description:	These commands set or read the value of the Questionable NTR (Negative-Transition) registers. These registers serve as polarity filters between the Questionable Enable and Questionable Event registers to cause the following actions: + When a bit in the Questionable NTR register is set to 1, then a 1-to-0 transition of the corresponding bit in the Questionable Condition register causes that bit in the Questionable Event register to be set. + If the same bits in both NTR and PTR registers are set to 1, then any transition of that bit at the Questionable Condition register sets the corresponding bit in the Questionable Event register. + If the same bits in both NTR and PTR registers are set to 0, then no transition of that bit at the Questionable Condition register can set the corresponding bit in the Questionable Event register.
	Argument:	<NR1> (register value)
	Example:	STAT:QUES:NTR 32

7-15-10. STATus:QUEStionable:PTRansition

	Syntax:	***Short Form:*** STAT:QUES:PTR<NR1> ***Long Form:*** STATus:QUEStionable:PTRansition <NR1>
	Query Syntax:	STAT:QUES:PTR?
	Description:	These commands set or read the value of the Questionable PTR (Positive-Transition) registers. These registers serve as polarity filters between the Questionable Enable and Questionable Event registers to cause the following actions: + When a bit of the Questionable PTR register is set to 1, then a 0-to-1 transition of the corresponding bit in the Questionable Condition register causes that bit in the Questionable Event register to be set. + If the same bits in both NTR and PTR registers are set to 1, then any transition of that bit at the Questionable Condition register sets the corresponding bit in the Questionable Event register. + If the same bits in both NTR and PTR registers are set to 0, then no transition of that bit at the Questionable Condition register can set the corresponding bit in the Questionable Event register.
	Argument:	<NR1> (register value)
	Example:	STAT:QUES:PTR 32

7-16. SCPI COMMAND –Optional Analog programming commands

7-16-1. SYSTem:CONFig:ANAlog:REFerence

	Syntax:	**Short Form:** SYST:CONF:ANA:REF 5 | 10 **Long Form:** SYSTem:CONFig:ANAlog:REFerence 5 | 10
	Query Syntax	SYST:CONF:ANA:REF?
	Description:	Set the programming source and monitor level to 5V or 10V
	Argument:	5 : Set the programming source and monitor level to 5V 10 : Set the programming source and monitor level to 10V
	Example:	SYST:CONF:ANA:REF 10

7-16-2. SYSTem:CONFig:ANAlog:VOLTage

	Syntax:	**Short Form:** SYST:CONF:ANA:VOLT 0 | 1 | OFF | ON **Long Form:** SYSTem:CONFig:ANAlog:VOLTage 0 | 1 | OFF | ON
	Query Syntax	SYST:CONF:ANA:VOLT?
	Description:	Set the output voltage adjustment to be controlled by analog input.
	Argument:	0 | OFF Disable 1 | ON Enable
	Example:	SYST:CONF:ANA:VOLT 1

7-16-3. SYSTem:CONFig:ANAlog:CURRent

	Syntax:	**Short Form:** SYST:CONF:ANA:CURR 0 | 1 | OFF | ON **Long Form:** SYSTem:CONFig:ANAlog:CURRent 0 | 1 | OFF | ON
	Query Syntax	SYST:CONF:ANA:CURR?
	Description:	Set the output current adjustment to be controlled by analog input.
	Argument:	0 | OFF Disable 1 | ON Enable
	Example:	SYST:CONF:ANA:CURR 1

7-16-4. SYSTem:CONFig:ANAlog:POWer

	Syntax:	**Short Form:** SYST:CONF:ANA:POW 0 | 1 | OFF | ON **Long Form:** SYSTem:CONFig:ANAlog:POWer 0 | 1 | OFF | ON
	Query Syntax	SYST:CONF:ANA:POW?
	Description:	Set the output power adjustment to be controlled by analog input.
	Argument:	0 | OFF Disable 1 | ON Enable
	Example:	SYST:CONF:ANA:POW OFF

7-16-5. SYSTem:CONFig:ANAlog:MONItor

	Syntax:	**Short Form:** SYST:CONF:ANA:MONI 0 | 1 | OFF | ON **Long Form:** SYSTem:CONFig:ANAlog:MONItor 0 | 1 | OFF | ON
	Query Syntax	SYST:CONF:ANA:MONI?
	Description:	Set the analog monitoring to ON/OFF
	Argument:	0 | OFF Disable 1 | ON Enable
	Example:	SYST:CONF:ANA:MONI OFF

CHAPTER 8   ERROR CODE

8-1. Independent/Master unit Error Code

0	No error		73	Remote sensing over
-102	Syntax error		74	Module A fault
-104	Data type error		75	Module B fault
-108	Parameter not allowed		76	Module C fault
-109	Missing parameter		77	Module A AC fail (Fuse open)
-113	Undefined header		78	Module B AC fail (Fuse open)
-114	Header suffix out of range		79	Module C AC fail (Fuse open)
-130	Suffix error		80	OTP
-148	Character data not allowed		81	Interlock error
-158	String data not allowed		82	External shut off
-221	Settings conflict		83	AUX power fault
-222	Parameter out of range		84	Slave model error
-410	Query INTERRUPTED		85	Unknown slave SN
-501	IP address conflict		86	M/S comm. fail
-502	Queue overflow		201	Store memory error
70	ADC/DAC fault		202	Missing Controller
71	OVP		203	Expansion board fault
72	OCP			

8-2. Slave unit Error Code

1070	Slave-01 ADC/DAC fault		2070	Slave-02 ADC/DAC fault
1071	Slave-01 OVP		2071	Slave-02 OVP
1072	Slave-01 OCP		2072	Slave-02 OCP
1073	Slave-01 Remote sensing over		2073	Slave-02 Remote sensing over
1074	Slave-01 Module A fault		2074	Slave-02 Module A fault
1075	Slave-01 Module B fault		2075	Slave-02 Module B fault
1076	Slave-01 Module C fault		2076	Slave-02 Module C fault
1077	Slave-01 Module A AC fail (Fuse open)		2077	Slave-02 Module A AC fail (Fuse open)
1078	Slave-01 Module B AC fail (Fuse open)		2078	Slave-02 Module B AC fail (Fuse open)
1079	Slave-01 Module C AC fail (Fuse open)		2079	Slave-02 Module C AC fail (Fuse open)
1080	Slave-01 OTP		2080	Slave-02 OTP
1083	Slave-01 24V fault		2083	Slave-02 24V fault
1084	Slave-01 M/S comm. fail		2084	Slave-02 M/S comm. fail

3070	Slave-03 ADC/DAC fault		4070	Slave-04 ADC/DAC fault
3071	Slave-03 OVP		4071	Slave-04 OVP
3072	Slave-03 OCP		4072	Slave-04 OCP
3073	Slave-03 Remote sensing over		4073	Slave-04 Remote sensing over
3074	Slave-03 Module A fault		4074	Slave-04 Module A fault
3075	Slave-03 Module B fault		4075	Slave-04 Module B fault
3076	Slave-03 Module C fault		4076	Slave-04 Module C fault
3077	Slave-03 Module A AC fail (Fuse open)		4077	Slave-04 Module A AC fail (Fuse open)
3078	Slave-03 Module B AC fail (Fuse open)		4078	Slave-04 Module B AC fail (Fuse open)
3079	Slave-03 Module C AC fail (Fuse open)		4079	Slave-04 Module C AC fail (Fuse open)
3080	Slave-03 OTP		4080	Slave-04 OTP
3083	Slave-03 24V fault		4083	Slave-04 24V fault
3084	Slave-03 M/S comm. fail		4084	Slave-04 M/S comm. fail
5070	Slave-05 ADC/DAC fault		6070	Slave-06 ADC/DAC fault
5071	Slave-05 OVP		6071	Slave-06 OVP
5072	Slave-05 OCP		6072	Slave-06 OCP
5073	Slave-05 Remote sensing over		6073	Slave-06 Remote sensing over
5074	Slave-05 Module A fault		6074	Slave-06 Module A fault
5075	Slave-05 Module B fault		6075	Slave-06 Module B fault
5076	Slave-05 Module C fault		6076	Slave-06 Module C fault
5077	Slave-05 Module A AC fail (Fuse open)		6077	Slave-06 Module A AC fail (Fuse open)
5078	Slave-05 Module B AC fail (Fuse open)		6078	Slave-06 Module B AC fail (Fuse open)
5079	Slave-05 Module C AC fail (Fuse open)		6079	Slave-06 Module C AC fail (Fuse open)
5080	Slave-05 OTP		6080	Slave-06 OTP
5083	Slave-05 24V fault		6083	Slave-06 24V fault
5084	Slave-05 M/S comm. fail		6084	Slave-06 M/S comm. fail

7070	Slave-07 ADC/DAC fault		8070	Slave-08 ADC/DAC fault
7071	Slave-07 OVP		8071	Slave-08 OVP
7072	Slave-07 OCP		8072	Slave-08 OCP
7073	Slave-07 Remote sensing over		8073	Slave-08 Remote sensing over
7074	Slave-07 Module A fault		8074	Slave-08 Module A fault
7075	Slave-07 Module B fault		8075	Slave-08 Module B fault
7076	Slave-07 Module C fault		8076	Slave-08 Module C fault
7077	Slave-07 Module A AC fail (Fuse open)		8077	Slave-08 Module A AC fail (Fuse open)
7078	Slave-07 Module B AC fail (Fuse open)		8078	Slave-08 Module B AC fail (Fuse open)
7079	Slave-07 Module C AC fail (Fuse open)		8079	Slave-08 Module C AC fail (Fuse open)
7080	Slave-07 OTP		8080	Slave-08 OTP
7083	Slave-07 24V fault		8083	Slave-08 24V fault
7084	Slave-07 M/S comm. fail		8084	Slave-08 M/S comm. fail
9070	Slave-09 ADC/DAC fault		10070	Slave-10 ADC/DAC fault
9071	Slave-09 OVP		10071	Slave-10 OVP
9072	Slave-09 OCP		10072	Slave-10 OCP
9073	Slave-09 Remote sensing over		10073	Slave-10 Remote sensing over
9074	Slave-09 Module A fault		10074	Slave-10 Module A fault
9075	Slave-09 Module B fault		10075	Slave-10 Module B fault
9076	Slave-09 Module C fault		10076	Slave-10 Module C fault
9077	Slave-09 Module A AC fail (Fuse open)		10077	Slave-10 Module A AC fail (Fuse open)
9078	Slave-09 Module B AC fail (Fuse open)		10078	Slave-10 Module B AC fail (Fuse open)
9079	Slave-09 Module C AC fail (Fuse open)		10079	Slave-10 Module C AC fail (Fuse open)
9080	Slave-09 OTP		10080	Slave-10 OTP
9083	Slave-09 24V fault		10083	Slave-10 24V fault
9084	Slave-09 M/S comm. fail		10084	Slave-10 M/S comm. fail

CHAPTER 9   SPECIFICATION

Table1-1	DSP80-180WR	DSP250-60WR	DSP350-42WR	DSP500-30WR	DSP650-23WR
Input					
Nominal input rating	200~415V 50Hz/60Hz 3-phase 3 wires/4 wires				
Input voltage range	180~460VAC				
Input frequency range	47Hz ～ 63Hz				
Current (Maximum)	8.5A	8.5A	8.5A	8.5A	8.5A
Inrush current(Maximum)	30A	30A	30A	30A	30A
Input Power (Maximum)	6kVA	6kVA	6kVA	6kVA	6kVA
Efficiency	90~95% varies by model[*1]				
Leak current	< 3.5 mA				
Power Factor	0.95 typ.				
Temperature coefficient for set values	100ppm/°C of rated output voltage, after a 30 minutes warm-up				
Memory & Sequence					
Number of memory	3 sets (operating in front panel)				
Maximum step number	500 steps per each Sequence				
Maximum Sequence number	16				
Step time settable range	0.00 sec ～ 99hour 59minute 59.99sec				
Output voltage					
Rated value	0~80V	0~250V	0~350V	0~500V	0~650V
Settable range	0~84V	0~262.5V	0~367.5V	0~525V	0~682.5V
Overvoltage protection (OVP)	0%～110% of rated output voltage				
Voltage @Rated Current	27.78V	83.33V	119.05V	166.67V	217.39V
Programming resolution	5 digits				
Programming accuracy[*2]	± 0.1% of rated voltage				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.1% of rated voltage				
Line regulation[*6]	± 0.02% of rated voltage				
Load regulation[*7]	± 0.05% of rated voltage				
Ripple & noise (rms) [*3][*4]	< 200mV$_{pp}$ < 16mV$_{rms}$	< 300mV$_{pp}$ < 40mV$_{rms}$	< 320mV$_{pp}$ < 55mV$_{rms}$	< 350mV$_{pp}$ < 70mV$_{rms}$	< 800mV$_{pp}$ < 200mV$_{rms}$
Full load up	<30ms				
Full load down	<80ms				
No load down	<30s	<10s	<10s	<10s	<10s
Transient Response[*5]	< 1.5 ms				
Remote compensation	5V				
Output current					
Rated value	0~180A	0~60A	0~42A	0~30A	0~23A
Settable range	0~189A	0~63A	0~44.1A	0~31.5	0~24.15A
Over current protection (OCP)	0%～110% of rated output current				
Current @Rated Voltage	62.5A	20A	14.28A	10A	7.69A
Programming resolution	5 digits				
Programming accuracy[*2]	± 0.2% of rated current				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.2% of rated current				
Line regulation[*6]	± 0.05% of rated current				
Load regulation[*7]	± 0.15% of rated current				
Ripple & noise (rms)[*3][*4]	80mA	22mA	18mA	16mA	16mA
Output power					
Rated value	0~5kW				
Settable range	0~5100W				
Over power protection (OPP)	0%~110% of rated output power				
Programming resolution	5 digits				
Programming accuracy[*2]	< 1% of rated output power				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.2% of rated output power				
Line regulation[*6]	< 0.05% of rated output power				
Load regulation[*7]	< 0.75% of rated output power				

Table1-2	DSP80-180WR	DSP250-60WR	DSP350-42WR	DSP500-30WR	DSP650-23WR
Internal resistance					

Adjustment range	0~0.444Ω	0~4.170Ω	0~8.330Ω	0~16.70Ω	0~28.30Ω
Programming resolution	0.001Ω	0.001Ω	0.001Ω	0.01Ω	0.01Ω
Programming Accuracy [*2]	≤2% of max. resistance ± 0.3% of maximum current				
Display: Resolution	4 digits				
Display: Accuracy [*2]	≤0.4%				
Insulation					
Primary - Chassis	2.5 kV DC				
Primary - Secondary	2.5 kV DC				
Secondary - Chassis	750VDC	750VDC	750VDC	1000VDC	1500VDC
Operating environment	Indoor use				
Operating temperature	0°C ~ 45°C				
Operating humidity	30%rh ~ 80%rh (no condensation) Max 80% RH up to 30°C, linear decrease to 50% RH at 40°C				
Storage temperature	-20°C ~ 70°C				
Storage humidity	10%rh ~ 80%rh (no condensation)				
Altitude	Up to 2000m				
Cooling method	Forced air cooling using the speed controlled fan				
Ground polarity	Capable of Negative ground or Positive ground				
Standard Interface					
LAN interfaces	1 x LXI 1.4 for communication,				
J1 (Auxiliary control)	Function : Interlock , External output ON/OFF , Shut OFF , Alarm signal output, Output voltage downward signal				
Optional Analog programming Interface					
Status indication	CV State, CC State , CP State , CR State , ON/OFF State				
Voltage control	0% ~ 100% of rated output voltage in the range of 0V ~ 5V or 0V ~ 10V				
Voltage control accuracy [*2]	±0.2%				
Current control	0% ~ 100% of rated output current in the range of 0V ~ 5V or 0V ~ 10V				
Current control accuracy [*2]	±0.2%				
Power control	0% ~ 100% of rated output current in the range of 0V ~ 5V or 0V ~ 10V				
Power control accuracy [*2]	±0.2%				
Monitoring output	0~5V or 0~10V output for monitoring V/A/W				
Monitoring accuracy [*2]	± 2%				
Reference output	0~5VDC or 0~10VDC (max=5mA), selectable in MENU.				
Size and Weight					
Dimensions(WxHxD)	483 x 132 x 750 mm				
Weight (kg)					

Table2-1	DSP080-360WR	DSP250-120WR	DSP350-84WR	DSP500-60WR	DSP650-46WR
Input					
Nominal input rating	200~415V 50Hz/60Hz 3-phase 3 wires/4 wires				
Input voltage range	180~460VAC				
Input frequency range	47Hz ～ 63Hz				
Current (Maximum)	17A	17A	17A	17A	17A
Inrush current(Maximum)	60A	60A	60A	60A	60A
Input Power (Maximum)	12kVA	12kVA	12kVA	12kVA	12kVA
Efficiency	90~95% varies by model [*1]				
Leak current	< 3.5 mA				
Power Factor	0.95 typ.				
Temperature coefficient for set values	100ppm/°C of rated output voltage, after a 30 minutes warm-up				
Memory & Sequence					
Number of memory	3 sets (operating in front panel)				
Maximum step number	500 steps per each Sequence				
Maximum Sequence number	16				
Step time settable range	0.00 sec ～ 99hour 59minute 59.99sec				
Output voltage					
Rated value	0~80V	0~250V	0~350V	0~500V	0~650V
Settable range	0~84V	0~262.5V	0~367.5V	0~525V	0~682.5V
Overvoltage protection (OVP)	0%～110% of rated output voltage				
Voltage @Rated Current	27.78V	83.33V	119.05V	166.67V	217.39V
Programming resolution	5 digits				
Programming accuracy[*2]	± 0.1% of rated voltage				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.1% of rated voltage				
Line regulation[*6]	± 0.02% of rated voltage				
Load regulation[*7]	± 0.05% of rated voltage				
Ripple & noise (rms) [*3][*4]	< 320mVpp < 25mVrms	< 300mVpp < 40mVrms	< 320mVpp < 55mVrms	< 350mVpp < 70mVrms	< 800mVpp < 200mVrms
Full load up	<30ms				
Full load down	<80ms				
No load down	<30s	<10s	<10s	<10s	<10s
Transient Response[*5]	< 1.5 ms				
Remote sense	5V				
Output current					
Rated value	0~360A	0~120A	0~84A	0~60A	0~46A
Settable range	0~378A	0~126A	0~88.2A	0~63A	0~48.3A
Over current protection (OCP)	0%～110% of rated output current				
Current @Rated Voltage	125A	40A	28.56A	20A	15.38A
Programming resolution	5 digits				
Programming accuracy[*2]	± 0.2% of rated current				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.2% of rated current				
Line regulation[*6]	± 0.05% of rated current				
Load regulation[*7]	± 0.15% of rated current				
Ripple & noise (rms)[*3][*4]	120mA	160mA	35mA	32mA	32mA
Output power					
Rated value	0~10kW				
Settable range	0~10200W				
Over power protection (OPP)	0%~110% of rated output power				
Programming resolution	5 digits				
Programming accuracy[*2]	< 1% of rated output power				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.2% of rated output power				
Line regulation[*6]	< 0.05% of rated output power				
Load regulation[*7]	< 0.75% of rated output power				

Table2-2	DSP080-360WR	DSP250-120WR	DSP350-84WR	DSP500-60WR	DSP650-46WR
Internal resistance					
Adjustment range	0~0.222Ω	0~2.080Ω	0~4.170Ω	0~8.330Ω	0~14.10Ω
Programming resolution	0.001Ω	0.001Ω	0.001Ω	0.01Ω	0.01Ω
Programming Accuracy [*2]	≤2% of max. resistance ± 0.3% of maximum current				
Display: Resolution	4 digits				
Display: Accuracy [*2]	≤0.4%				
Insulation					
Primary - Chassis	2.5 kV DC				
Primary - Secondary	2.5 kV DC				
Secondary - Chassis	750VDC	750VDC	750VDC	1000VDC	1500VDC
Operating environment	Indoor use				
Operating temperature	0°C ~ 45°C				
Operating humidity	30%rh ~ 80%rh (no condensation) Max 80% RH up to 30°C, linear decrease to 50% RH at 40°C				
Storage temperature	-20°C ~ 70°C				
Storage humidity	10%rh ~ 80%rh (no condensation)				
Altitude	Up to 2000m				
Cooling method	Forced air cooling using the speed controlled fan				
Ground polarity	Capable of Negative ground or Positive ground				
Standard Interface					
LAN interfaces	1 x LXI 1.4 for communication,				
J1 (Auxiliary control)	Function : Interlock , External output ON/OFF , Shut OFF , Alarm signal output, Output voltage downward signal				
Optional Analog programming Interface					
Status indication	CV State, CC State , CP State , CR State , ON/OFF State				
Voltage control	0% ~ 100% of rated output voltage in the range of 0V ~ 5V or 0V ~ 10V				
Voltage control accuracy[*2]	±0.2%				
Current control	0% ~ 100% of rated output current in the range of 0V ~ 5V or 0V ~ 10V				
Current control accuracy[*2]	±0.2%				
Power control	0% ~ 100% of rated output current in the range of 0V ~ 5V or 0V ~ 10V				
Power control accuracy[*2]	±0.2%				
Monitoring output	0~5V or 0~10V output for monitoring V/A/W				
Monitoring accuracy [*2]	± 2%				
Reference output	0~5VDC or 0~10VDC (max=5mA), selectable in MENU.				
Size and Weight					
Dimensions(WxHxD)	483 x 132 x 750 mm				
Weight (kg)					

Table3-1	DSP1000-30WR	DSP80-540WR	DSP250-180WR	DSP350-126WR	DSP500-90WR
Input					
Nominal input rating	200~415V 50Hz/60Hz 3-phase 3 wires/4 wires				
Input voltage range	180~460VAC				
Input frequency range	47Hz ～ 63Hz				
Current (Maximum)	17A	26A	26A	26A	26A
Inrush current(Maximum)	60A	90A	90A	90A	90A
Input Power (Maximum)	12kVA	18kVA	18kVA	18kVA	18kVA
Efficiency	90~95% varies by model[1]				
Leak current	< 3.5 mA				
Power Factor	0.95 typ.				
Temperature coefficient for set values	100ppm/°C of rated output voltage, after a 30 minutes warm-up				
Memory & Sequence					
Number of memory	3 sets (operating in front panel)				
Maximum step number	500 steps per each Sequence				
Maximum Sequence number	16				
Step time settable range	0.00 sec ～ 99hour 59minute 59.99sec				
Output voltage					
Rated value	0~1000V	0~80V	0~250V	0~350V	0~500V
Settable range	0~1050V	0~84V	0~262.5V	0~367.5V	0~525V
Overvoltage protection (OVP)	0%～110% of rated output voltage				
Voltage @Rated Current	333.33V	27.78V	83.33V	119.05V	166.67V
Programming resolution	5 digits				
Programming accuracy[2]	± 0.1% of rated voltage				
Meter resolution	5 digits				
Meter accuracy[2]	± 0.1% of rated voltage				
Line regulation[6]	± 0.02% of rated voltage				
Load regulation[7]	± 0.05% of rated voltage				
Ripple & noise (rms) [3][4]	< 1600mV$_{pp}$ < 350mV$_{rms}$	< 320mV$_{pp}$ < 25mV$_{rms}$	< 300mV$_{pp}$ < 50mV$_{rms}$	< 320mV$_{pp}$ < 55mV$_{rms}$	< 350mV$_{pp}$ < 70mV$_{rms}$
Full load up	<30ms				
Full load down	<80ms				
No load down	<10s	<30s	<10s	<10s	<10s
Transient Response[5]	< 1.5 ms				
Remote sense	5V				
Output current					
Rated value	0~30A	0~540A	0~180A	0~126A	0~90A
Settable range	0~31.5A	0~567A	0~189A	0~132.3A	0~94.5A
Over current protection (OCP)	0%～110% of rated output current				
Current @Rated Voltage	10A	187.5A	60A	42.84A	30A
Programming resolution	5 digits				
Programming accuracy[2]	± 0.2% of rated current				
Meter resolution	5 digits				
Meter accuracy[2]	± 0.2% of rated current				
Line regulation[6]	± 0.05% of rated current				
Load regulation[7]	± 0.15% of rated current				
Ripple & noise (rms)[3][4]	22mA	240mA	66mA	50mA	48mA
Output power					
Rated value	0~10kW	0~15kW	0~15kW	0~15kW	0~15kW
Settable range	0~10200W	0~15300W	0~15300W	0~15300W	0~15300W
Over power protection (OPP)	0%~110% of rated output power				
Programming resolution	5 digits				
Programming accuracy[2]	< 1% of rated power				
Meter resolution	5 digits				
Meter accuracy[2]	± 0.2% of rated power				
Line regulation[6]	< 0.05% of rated power				
Load regulation[7]	< 0.75% of rated power				

Table3-2	DSP1000-30WR	DSP80-540WR	DSP250-180WR	DSP350-126WR	DSP500-90WR
Internal resistance					
Adjustment range	0~33.30Ω	0~0.148Ω	0~1.390Ω	0~2.780Ω	0~5.560Ω
Programming resolution	0.001Ω	0.001Ω	0.001Ω	0.01Ω	0.01Ω
Programming Accuracy [*2]	≤2% of max. resistance ± 0.3% of maximum current				
Display: Resolution	4 digits				
Display: Accuracy [*2]	≤0.4%				
Insulation					
Primary - Chassis	2.5 kV DC				
Primary - Secondary	2.5 kV DC				
Secondary - Chassis	1500VDC	750VDC	750VDC	750VDC	1000VDC
Operating environment	Indoor use				
Operating temperature	0°C ~ 45°C				
Operating humidity	30%rh ~ 80%rh (no condensation) Max 80% RH up to 30°C, linear decrease to 50% RH at 40°C				
Storage temperature	-20°C ~ 70°C				
Storage humidity	10%rh ~ 80%rh (no condensation)				
Altitude	Up to 2000m				
Cooling method	Forced air cooling using the speed controlled fan				
Ground polarity	Capable of Negative ground or Positive ground				
Standard Interface					
LAN interfaces	1 x LXI 1.4 for communication,				
J1 (Auxiliary control)	Function : Interlock , External output ON/OFF , Shut OFF , Alarm signal output, Output voltage downward signal				
Optional Analog programming Interface					
Status indication	CV State, CC State , CP State , CR State , ON/OFF State				
Voltage control	0% ~ 100% of rated output voltage in the range of 0V ~ 5V or 0V ~ 10V				
Voltage control accuracy [*2]	±0.2%				
Current control	0% ~ 100% of rated output current in the range of 0V ~ 5V or 0V ~ 10V				
Current control accuracy [*2]	±0.2%				
Power control	0% ~ 100% of rated output current in the range of 0V ~ 5V or 0V ~ 10V				
Power control accuracy [*2]	±0.2%				
Monitoring output	0~5V or 0~10V output for monitoring V/A/W				
Monitoring accuracy [*2]	± 2%				
Reference output	0~5VDC or 0~10VDC (max=5mA), selectable in MENU.				
Size and Weight					
Dimensions(WxHxD)	483 x 132 x 750 mm				

Table4-1	DSP650-69WR	DSP1050-42WR	DSP1500-30WR	--	--
Input					
Nominal input rating	200~415V 50Hz/60Hz 3-phase 3 wires/4 wires				
Input voltage range	180~460VAC				
Input frequency range	47Hz $\sim$ 63Hz				
Current (Maximum)	26A	26A	26A	--	--
Inrush current(Maximum)	90A	90A	90A	--	--
Input Power (Maximum)	18kVA	18kVA	18kVA	--	--
Efficiency	90~95% varies by model[*1]				
Leak current	< 3.5 mA				
Power Factor	0.95 typ.				
Temperature coefficient for set values	100ppm/°C of rated output voltage, after a 30 minutes warm-up				
Memory & Sequence					
Number of memory	3 sets (operating in front panel)				
Maximum step number	500 steps per each Sequence				
Maximum Sequence number	16				
Step time settable range	0.00 sec $\sim$ 99hour 59minute 59.99sec				
Output voltage					
Rated value	0~650V	0~1050V	0~1500V	--	--
Settable range	0~682.5V	0~1102.5V	0~1575V	--	--
Overvoltage protection (OVP)	0%~110% of rated output voltage				
Voltage @Rated Current	217.39V	357.14V	500V	--	--
Programming resolution	5 digits				
Programming accuracy[*2]	± 0.1% of rated voltage				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.1% of rated voltage				
Line regulation[*6]	± 0.02% of rated voltage				
Load regulation[*7]	± 0.05% of rated voltage				
Ripple & noise (rms) [*3][*4]	< 800mV$_{pp}$ < 170mV$_{rms}$	< 1600mV$_{pp}$ < 350mV$_{rms}$	< 2400mV$_{pp}$ < 400mV$_{rms}$	--	--
Full load up	<30ms				
Full load down	<80ms				
No load down	<10s	<10s	<10s	--	--
Transient Response[*5]	< 1.5 ms				
Remote sense	5V				
Output current					
Rated value	0~69A	0~42A	0~30A	--	--
Settable range	0~72.45A	0~44.1A	0~31.5A		
Over current protection (OCP)	0%~110% of rated output current				
Current @Rated Voltage	23.07A	14.29A	10A	--	--
Programming resolution	5 digits				
Programming accuracy[*2]	± 0.2% of rated current				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.2% of rated current				
Line regulation[*6]	± 0.05% of rated current				
Load regulation[*7]	± 0.15% of rated current				
Ripple & noise (rms)[*3][*4]	48mA	35mA	26mA	--	--
Output power					
Rated value	0~15kW	0~15kW	0~15kW	--	--
Settable range	0~15300W	0~15300W	0~15300W		
Over power protection (OPP)	0%~110% of rated output power				
Programming resolution	5 digits				
Programming accuracy[*2]	< 1% of rated power				
Meter resolution	5 digits				
Meter accuracy[*2]	± 0.2% of rated power				
Line regulation[*6]	< 0.05% of rated power				
Load regulation[*7]	< 0.75% of rated power				

Table4-2	DSP650-69WR	DSP1050-42WR	DSP1500-30WR	--	--
Internal resistance					
Adjustment range	0~9.420Ω	0~25.00Ω	0~50.00Ω	--	--
Programming resolution	0.001Ω	0.01Ω	0.01Ω	--	--
Programming Accuracy [*2]	≤2% of max. resistance ± 0.3% of maximum current				
Display: Resolution	4 digits				
Display: Accuracy [*2]	≤0.4%				
Insulation					
Primary - Chassis	DC2500V				
Primary - Secondary	DC2500V				
Secondary - Chassis	1500VDC	1500VDC	1500VDC	--	--
Operating environment	Indoor use				
Operating temperature	0°C ~ 45°C				
Operating humidity	30%rh ~ 80%rh (no condensation) Max 80% RH up to 30°C, linear decrease to 50% RH at 40°C				
Storage temperature	-20°C ~ 70°C				
Storage humidity	10%rh ~ 80%rh (no condensation)				
Altitude	Up to 2000m				
Cooling method	Forced air cooling using the speed controlled fan				
Ground polarity	Capable of Negative ground or Positive ground				
Standard Interface					
LAN interfaces	1 x LXI 1.4 for communication,				
J1 (Auxiliary control)	Function : Interlock , External output ON/OFF , Shut OFF , Alarm signal output, Output voltage downward signal				
Optional Analog programming Interface					
Status indication	CV State, CC State , CP State , CR State , ON/OFF State				
Voltage control	0% ~ 100% of rated output voltage in the range of 0V ~ 5V or 0V ~ 10V				
Voltage control accuracy [*2]	±0.2%				
Current control	0% ~ 100% of rated output current in the range of 0V ~ 5V or 0V ~ 10V				
Current control accuracy [*2]	±0.2%				
Power control	0% ~ 100% of rated output current in the range of 0V ~ 5V or 0V ~ 10V				
Power control accuracy [*2]	±0.2%				
Monitoring output	0~5V or 0~10V output for monitoring V/A/W				
Monitoring accuracy [*2]	± 2%				
Reference output	0~5VDC or 0~10VDC (max=5mA), selectable in MENU.				
Size and Weight					
Dimensions(WxHxD)	483 x 132 x 750 mm				
Weight (kg)				--	--

Notes:

|	
*1.	Warranted at 0℃ ～ 45℃ of ambient temperature and warmed up more than 30 min. ,Humidity: Under 80% RH, ,with 2%~100% of rated voltage, 1%~100% of rated current, measured at the output terminals with local sensing.
*2.	Accuracy specifications warranted at 23℃ ± 5℃
*3	Ripple and Noise (rms value) Measurement bandwidth up to 300 kHz
*4	Ripple and Noise (peak value) measurement bandwidth up to 20 MHz
*5	Time for output voltage recover within +/-1% of rated value when load changes from 10% to 90% (Fig9-1)
*6	Constant load (0~100%), Input changes between 180 ~ 264VAC or 342 ~ 460VAC
*7	CV : Constant Input (Full input range), current changes 10% ~ 90% CC : Constant Input (Full input range), voltage changes 10% ~ 100% CP : Constant Input (Full input range), voltage * current 10% ~ 90%
*8	Output response UP time : Time for output voltage rises from 10% to 90% of rated voltage. (Fig9-2) Output response Down time : Time for output voltage falls from 90% to 10% of rated voltage.

*9	DSP-WR series, Internal resistance setting resolution is 1mΩ, settable digits varies by model, for example:
	     DSP80-188WR, settable range 0.001~0.444
	     DSP1500-30WR, settable range 0.01~50.00
	     See detail in "CHAPTER 4 B-10. Internal Resistance"
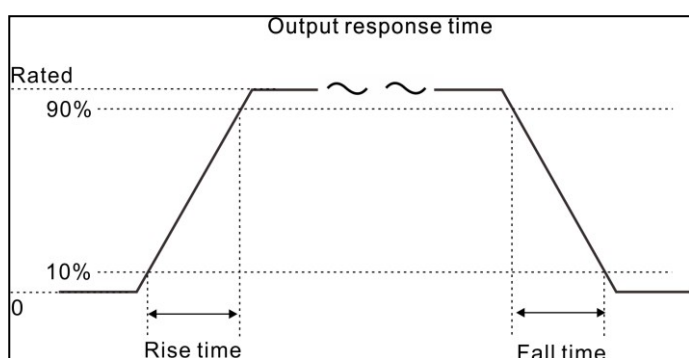
Fig9-1
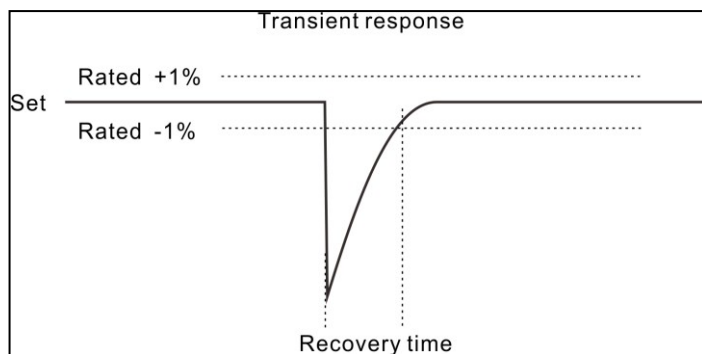
Fig9-2

APPENDIX 1   LOAD PROTECTION FUNCTION

Since the power supplies meet a wide range of user needs, the use of various loads is also considered. Depending on the load, the use of power supply as is may cause trouble or erroneous operation and countermeasures must be taken.

A1-1. HIGH CAPACITANCE LOAD

When the high capacitance load connects to the DC power supply, please insert a diode in series to protect the DC power supply from OVP rapidly.
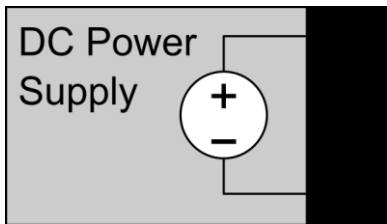
A1-2. RECHARGEABLE BATTERY

Use the DC power supply in series with a diode. Since the DC power supply output electrolytic capacitor is full charged, when the DC power supply is connected to the load, sparks may fly.
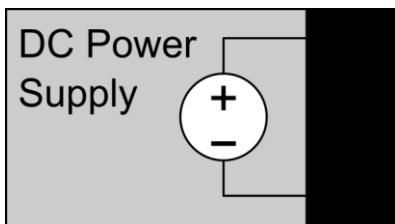
A1-3. INDUCTIVE LOAD

The counter electromotive force generated when turning output off the power supply, add a free wheel diode D1 and connect in parallel with the output is required.
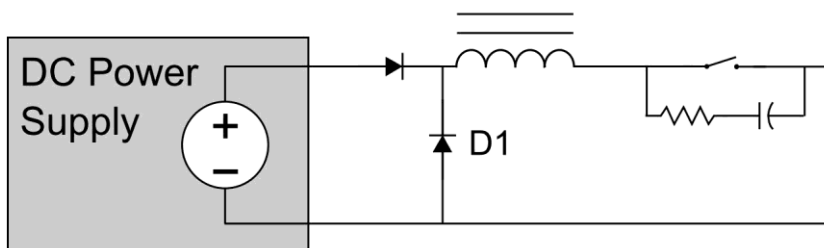
A1-4. OUTPUT IS TURNED ON/OFF WITH A MECHANICAL SWITCH

When the output voltage is higher than 100V and using a magnetic contactor as the switch, the arc may generate. The noise may enter the power supply differential amplifier through the load line and cause the output to become unstable. The noise can be absorb by add a RC connected in parallel. When using the remote sensing, always turn the sensing cable ON and OFF simultaneously.
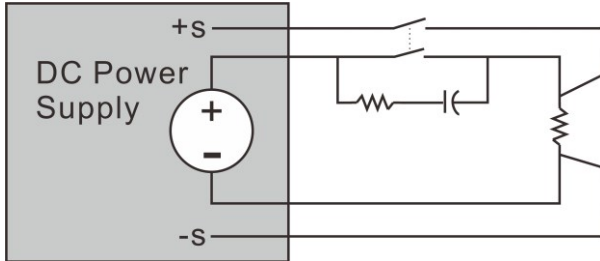
A1-5. WHEN THE LOAD DRAWS THE PULSE CURRENT

When connected to the PWM load, although some times the measured current value (Mean or RMS) is lower than the rated current of the power supply. But the peak value is exceeding the rated value. The output voltage in this case will still drop. However, if the pulse width is narrow or the peak value is not too high, the user can solve this problem by install a large capacitor at the load side.

The current waveform when connecting a DC TO DC converter	
The current waveform when connecting a DC TO AC inverter	
The current waveform when connecting resistance load	

A1-6. WHEN THE LOAD MAY REGENERATES A REVERSE CURRENT

Since the DC power supply can not absorb the reverse current from the load, so the output voltage will rise. Please connect a resistor in parallel at the output stage to absorb the reverse current, if the load regenerates a surge current, please connect a capacitor in parallel.