

> ESDr SERIES

BIDIRECTIONAL PROGRAMMABLE DC POWER SUPPLY

The ESDr Series Bidirectional Programmable DC Power Supply is a high performance DC power supply unit featuring both source and load capabilities. Its core operating principle involves mains input filtering, PFC rectification, LLC resonant conversion, and Buck-Boost conversion, combined with high-precision sampling, drive, and control circuits. This enables a wide range, high-stability DC output while also possessing a load function that can automatically regenerate energy back to the grid. It is widely applicable in various electronic equipment testing, photovoltaic inverter testing, battery simulation, and charge-discharge testing scenarios, providing users with efficient, energy-saving, and flexible testing solutions.



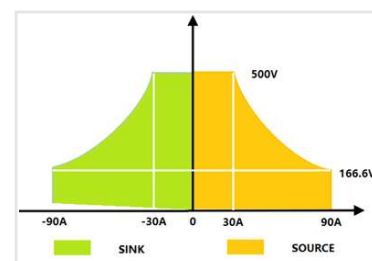
> Features

- **Grid Regeneration**

Combines both source and load functions. In load mode, energy can be automatically regenerated back to the grid, significantly reducing energy consumption and aligning with green environmental concepts.

- **Wide Output Range**

The output range is extended to three times that of conventional "matrix" power supplies of the same power class. Under constant power output mode, it offers more flexible combinations of voltage and current.



- **High Efficiency Design**

Employs active Power Factor Correction (PFC) technology, achieving a power factor >0.99 at full load. Coupled with high-frequency LLC multi-resonant inverter technology, the overall efficiency reaches up to 93%.

- **Multiple Operation Modes**

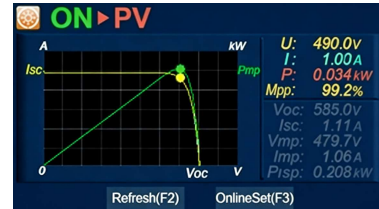
Supports three basic operating modes: Constant Voltage (CV), Constant Current (CC), and Constant Power (CP), catering to diverse testing requirements.

- **Advanced Programmable Functions**

Features 10 non-volatile shortcut groups and 50 sequence tests (each containing 20 steps), supporting custom parameter settings and automatic execution.

- **Comprehensive Simulation Functions**

Includes PV array simulation I-V capability with built-in standard PV test modes like EN 50530 and Sandia. Supports nearly 10 conventional battery curve simulations and custom battery curve settings, providing complete battery charge/discharge functions.



- **High Precision and Stability**

Incorporates precise internal voltage and current measurement modules with excellent output stability. Voltage setting and measurement accuracy: $\leq 0.05\%$ F.S.; Current setting and measurement accuracy: $\leq 0.10\%$ F.S.



- **Comprehensive Protection Mechanisms**

Features multiple protections including Over Voltage Protection(OVP), Over Current Protection (OCP), Over Temperature Protection(OTP), Vsense reverse connection protection, and input over/under voltage protection, ensuring the safety of the equipment and the load.

- **User-Friendly Operation and Display**

Equipped with a 4.3-inch high-brightness color touch LCD display, supporting three control methods: knob, button, and touch, providing an intuitive and easy-to-use interface.

- **Flexible Scalability**

Supports parallel connection of up to 10 units of the same model. Some models support series connection to meet higher voltage or current output requirements.

- **Programming Interfaces**

Standard RS232 interface. Optional interfaces include RS485, GPIB, LAN, CAN, USB. Supports multiple communication protocols such as ESDr protocol, Modbus (RTU/TCP), and SCPI, facilitating integration into automated test systems.

- **Optional Analog Interface Control**

Supports remote control via 0-5V/0-10V voltage signals or 4-20mA current signals, including start/stop control, voltage/current/power setting, and status feedback.

- **Remote Sense**

Equipped with SENSE terminals to enable output lead voltage drop compensation during high-current operation, ensuring voltage measurement accuracy at the load end.

> Main Functions and Descriptions

- **Basic Output Functions**

Constant Power Wide Range Output: Transcends the limitations of traditional "matrix" power supplies by allowing a wide combination of voltage and current output within the rated power. For example, the 80V/510A/15kW model can output either 80V @ 187.5A or 29.4V @ 510A at 15kW.

Multi-Mode Output: Automatically switches between CV, CC, and CP modes based on output parameters and load resistance. Operating modes can also be specified manually to adapt to different load characteristic tests.

- **Programmable and Sequence Test Functions**

Shortcut Group Storage and Recall: Supports storage of operating parameters for 10 groups. Non-volatile memory design ensures parameters are retained after power-off, allowing quick recall of commonly used test parameters.

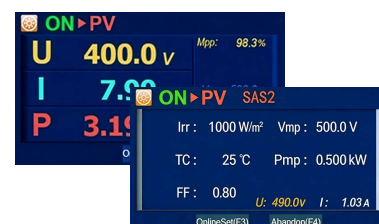
Sequence Test Function: Supports editing of up to 50 sequences, each containing 20 steps. Configurable parameters include voltage/current/power ramping, cycle counts, and jump logic, suitable for automatic aging tests, multi-condition continuous testing, etc.



Step	Mode	V	I	P	Time
00	UIP	60.00V	100.00A	15.000kW	00:00:05.000
01	UIP	30.00V	30.00A	15.000kW	00:00:05.000
02	U	20.00V → 10.00V	50.00A		00:00:05.000
03	I		10.00A → 20.00A	10.00V	00:00:05.000
04	UIP	5.00V	100.00A	15.000kW	00:00:05.000

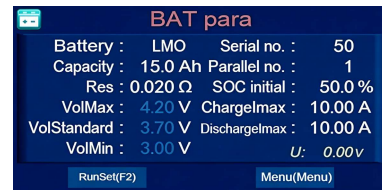
- **Specific Simulation Functions**

PV Simulation Function: Supports multiple PV models like SAS, EN 50530, Sandia, and SAS2. By inputting parameters such as irradiance, temperature, and maximum power point, it can accurately simulate the I-V output curve of PV panels, suitable for PV inverter testing scenarios.

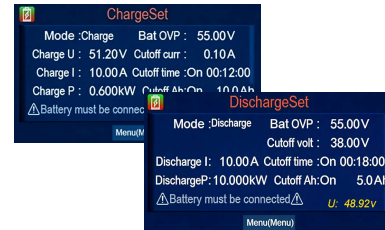


Parameter	Value
U	400.0 V
I	7.56 A
P	3.11 kW
Mpp	98.3%
Irr	1000 W/m²
Vmp	500.0 V
TC	25 °C
Pmp	0.500 kW
FF	0.80
U	490.0V
I	1.03A

Battery Simulation Function: Built-in curves for nearly 10 conventional battery types such as LMO, LCO, LFP. Supports user-defined battery voltage SOC curves and provides visual display of V-Soc curve changes, suitable for testing battery-related equipment.



Battery Charge/Discharge Function: Supports modes like constant current charging, constant voltage charging, and constant current discharging. Allows setting charge/discharge termination conditions (cut-off current, cut-off voltage, cut-off time, cut-off capacity), meeting battery performance testing requirements.



- **Load Mode Functions**

Provides Constant Current (CC), Constant Voltage (CV), Constant Power (CP), Constant Resistance (CR), and composite load modes including CVCC, CVCR, CCCR, and AUTO. These modes can simulate different load characteristics for applications such as power supply load regulation testing.

> Standard Models Specification

Voltage	Model	Current	Power	Voltage	Model	Current	Power
0-100V	ESDr 5-100-170	170A	5kW	0-200V	ESDr 10-200-170	170A	10kW
	ESDr 10-100-340	340A	10kW				
	ESDr 15-100-510	510A	15kW	0-300V	ESDr 15-300-170	170A	15kW
	ESDr 18-100-510	510A	18kW				
Voltage	Model	Current	Power	Voltage	Model	Current	Power
0-500V	ESDr 5-500-40	40A	5kW	0-750V	ESDr 5-750-25	25A	5kW
	ESDr 10-500-80	80A	10kW		ESDr 10-750-50	50A	10kW
	ESDr 15-500-120	120A	15kW		ESDr 15-750-75	75A	15kW
	ESDr 20-500-160	160A	20kW		ESDr 20-750-120	120A	20kW
	ESDr 30-500-240	240A	30kW		ESDr 30-750-180	180A	30kW
Voltage	Model	Current	Power	Voltage	Model	Current	Power
0-1000V	ESDr 10-1000-40	40A	10kW	0-1500V	ESDr 10-1500-25	25A	10kW
	ESDr 20-1000-80	80A	20kW		ESDr 15-1500-40	40A	15kW
0-2250V	ESDr 15-2250-25	25A	15kW		ESDr 20-1500-60	60A	20kW
	ESDr 30-2250-60	60A	30kW		ESDr 30-1500-80	80A	30kW

Note: Windows-based software will be provided in a future release.

- **High-Power Integrated Cabinet Solutions**

Leveraging the flexible scalability of the ESDr series, we provide integrated cabinet solutions with a maximum output power of up to 600kW. These pre-configured systems are designed for high-power testing applications, offering a space-saving, turn-key solution that simplifies on-site installation and eliminates the complexity of multi-unit assembly.

› Examples of High-Power Cabinet Configurations

Voltage	Model	Current	Power	Voltage	Model	Current	Power
0-100V	ESDr 60-100-2040	2040A	60kW	0-1000V	ESDr 60-1000-240	240A	60kW
	ESDr 90-100-2550	2550A	90kW		ESDr 100-1000-400	400A	100kW
					ESDr 160-1000-640	640A	160kW
Voltage	Model	Current	Power	Voltage	Model	Current	Power
0-1500V	ESDr 150-1500-400	400A	150kW	0-2250V	ESDr 210-2250-420	420A	210kW
	ESDr 240-1500-640	640A	240kW		ESDr 270-2250-540	540A	270kW
	ESDr 300-1500-800	800A	300kW		ESDr 300-2250-600	600A	300kW

Note: Custom configurations for voltage, current, and power within the 600kW range are available upon request.

> General Specifications

Model	ESDr 5-100-170	ESDr 10-100-340	ESDr 15-100-510	ESDr 18-100-510	
Output Range	Voltage	0 ~ 100V			
	Current	0 ~ 170A	0 ~ 340A	0 ~ 510A	0 ~ 510A
	Power	0 ~ 5kW	0 ~ 10kW	0 ~ 15kW	0 ~ 18kW
	Resistance	0 ~ 100Ω			
Setting Accuracy	Voltage	≤0.10%FS			
	Current	≤0.20%FS			
	Power	≤1.00%FS			
Setting Resolution	Voltage	0.01V			
	Current	0.01A			
	Power	0.001kW			
Readback Accuracy	Voltage	≤0.10%FS			
	Current	≤0.20%FS			
	Power	≤1.00%FS			
Readback Resolution	Voltage	0.01V			
	Current	0.01A			
	Power	0.001kW			
Ripple (20Hz ~ 2MHz)	Vrms	35mV			
	Vpp	250mV			
Dynamic Response Time	Voltage	≤1.5ms			
Rise Time	Voltage	10ms(10% ~ 90%)			
Source-load Switching Time	Current	2ms(+90% ~ -90%)			
Line Regulation	Voltage	≤0.02%FS			
	Current	≤0.05%FS			
Load Regulation	Voltage	≤0.05%FS			
	Current	≤0.15%FS			
Over Voltage Protection(OVP)	0 ~ 110%FS (adjustable)				
Sense Compensated Voltage	5V				
Protection Functions	OVP, OCP, OPP, OTP, Vsense reverse polarity protection, input over/under voltage protection				
Parallel Function	Support multi-unit parallel output				
Communication Interface	RS232(Std), RS485, LAN, CAN(Opt)				
Efficiency	~ 93%				
Operating Temperature	0 ~ 40°C				
Storage Temperature	-10°C ~ 70°C				
Humidity	20% ~ 90%RH, None Condensing				
Input Range	Phase	Three-phase three-wire + PE			
	Voltage	342 ~ 528V			
	Frequency	47 ~ 63Hz			
	PF	0.99			
	Regenerative Efficiency	93%			
Dimensions(W×H×D,mm)	19" standard chassis, 3U height, 482×133.3×790				
Weight(Kg)	24	32	40	43	

> General Specifications

Model		ESDr 10-200-170		ESDr 15-300-170	
Output Range	Voltage	0 ~ 200V		0~300V	
	Current	0 ~ 170A		0 ~ 170A	
	Power	0 ~ 10kW		0 ~ 15kW	
	Resistance	0 ~ 300Ω			
Setting Accuracy	Voltage	≤0.10%FS			
	Current	≤0.20%FS			
	Power	≤1.00%FS			
Setting Resolution	Voltage	0.01V			
	Current	0.01A			
	Power	0.001kW			
Readback Accuracy	Voltage	≤0.10%FS			
	Current	≤0.20%FS			
	Power	≤1.00%FS			
Readback Resolution	Voltage	0.01V			
	Current	0.01A			
	Power	0.001kW			
Ripple (20Hz ~ 2MHz)	Vrms	90mV			
	Vpp	650mV			
Dynamic Response Time	Voltage	≤1.5ms			
Rise Time	Voltage	10ms(10% ~ 90%)			
Source-load Switching Time	Current	2ms(+90% ~ -90%)			
Line Regulation	Voltage	≤0.02%FS			
	Current	≤0.05%FS			
Load Regulation	Voltage	≤0.05%FS			
	Current	≤0.15%FS			
Over Voltage Protection(OVP)		0 ~ 110%FS (adjustable)			
Sense Compensated Voltage		6V			
Protection Functions		OVP, OCP, OPP, OTP, Vsense reverse polarity protection, input over/under voltage protection			
Parallel Function		Support multi-unit parallel output			
Communication Interface		RS232(Std), RS485、LAN、CAN(Opt)			
Efficiency		~ 93%			
Operating Temperature		0 ~ 40°C			
Storage Temperature		-10°C ~ 70°C			
Humidity		20% ~ 90%RH, None Condensing			
Input Range	Phase	Three-phase three-wire + PE			
	Voltage	342 ~ 528V			
	Frequency	47 ~ 63Hz			
	PF	0.99			
	Regenerative Efficiency	93%			
Dimensions(W×H×D,mm)		19" standard chassis, 3U height, 482×133.3×790			
Weight(Kg)		32		40	

> General Specifications

Model		ESDr 5-500-40	ESDr 10-500-80	ESDr 15-500-120	ESDr 20-500-160	ESDr 30-500-240
Output Range	Voltage	0 ~ 500V				
	Current	0 ~ 40A	0 ~ 80A	0 ~ 120A	0 ~ 160A	0 ~ 240A
	Power	0 ~ 5kW	0 ~ 10kW	0 ~ 15kW	0 ~ 20kW	0 ~ 30kW
	Resistance	0 ~ 500Ω				
Setting Accuracy	Voltage	≤0.10%FS				
	Current	≤0.20%FS				
	Power	≤1.00%FS				
Setting Resolution	Voltage	0.01V				
	Current	0.01A				
	Power	0.001kW				
Readback Accuracy	Voltage	≤0.10%FS				
	Current	≤0.20%FS				
	Power	≤1.00%FS				
Readback Resolution	Voltage	0.01V				
	Current	0.01A				
	Power	0.001kW				
Ripple (20Hz ~ 2MHz)	Vrms	95mV				
	Vpp	600mV				
Dynamic Response Time	Voltage	≤1.5ms				
Rise Time	Voltage	10ms(10% ~ 90%)				
Source-load Switching Time	Current	2ms(+90% ~ -90%)				
Line Regulation	Voltage	≤0.02%FS				
	Current	≤0.05%FS				
Load Regulation	Voltage	≤0.05%FS				
	Current	≤0.15%FS				
Over Voltage Protection(OVP)		0 ~ 110%FS (adjustable)				
Sense Compensated Voltage		25V				
Protection Functions		OVP, OCP, OPP, OTP, Vsense reverse polarity protection, input over/under voltage protection				
Parallel Function		Support multi-unit parallel output				
Communication Interface		RS232(Std), RS485, LAN, CAN(Opt)				
Efficiency		~ 93%				
Operating Temperature		0 ~ 40°C				
Storage Temperature		-10°C ~ 70°C				
Humidity		20% ~ 90%RH, None Condensing				
Input Range	Phase	Three-phase three-wire + PE				
	Voltage	342 ~ 528V				
	Frequency	47 ~ 63Hz				
	PF	0.99				
	Regenerative Efficiency	93%				
Dimensions(W×H×D,mm)		19" standard chassis, 3U height, 482×133.3×790				
Weight(Kg)		24	32	40	34	43

> General Specifications

Model		ESDr 5-750-25	ESDr 10-750-50	ESDr 15-750-75	ESDr 20-750-120	ESDr 30-750-180
Output Range	Voltage	0 ~ 750V				
	Current	0 ~ 25A	0 ~ 50A	0 ~ 75A	0 ~ 120A	0 ~ 180A
	Power	0 ~ 5kW	0 ~ 10kW	0 ~ 15kW	0 ~ 20kW	0 ~ 30kW
	Resistance	0 ~ 750Ω				
Setting Accuracy	Voltage	≤0.10%FS				
	Current	≤0.20%FS				
	Power	≤1.00%FS				
Setting Resolution	Voltage	0.01V				
	Current	0.01A				
	Power	0.001kW				
Readback Accuracy	Voltage	≤0.10%FS				
	Current	≤0.20%FS				
	Power	≤1.00%FS				
Readback Resolution	Voltage	0.1V				
	Current	0.01A				
	Power	0.001kW				
Ripple (20Hz ~ 2MHz)	Vrms	100mV				
	Vpp	900mV				
Dynamic Response Time	Voltage	≤1.5ms				
Rise Time	Voltage	10ms(10% ~ 90%)				
Source-load Switching Time	Current	2ms(+90% ~ -90%)				
Line Regulation	Voltage	≤0.02%FS				
	Current	≤0.05%FS				
Load Regulation	Voltage	≤0.05%FS				
	Current	≤0.15%FS				
Over Voltage Protection(OVP)		0 ~ 110%FS (adjustable)				
Sense Compensated Voltage		37.5V				
Protection Functions		OVP, OCP, OPP, OTP, Vsense reverse polarity protection, input over/under voltage protection				
Parallel Function		Support multi-unit parallel output				
Communication Interface		RS232(Std), RS485, LAN, CAN(Opt)				
Efficiency		~ 93%				
Operating Temperature		0 ~ 40°C				
Storage Temperature		-10°C ~ 70°C				
Humidity		20% ~ 90%RH, None Condensing				
Input Range	Phase	Three-phase three-wire + PE				
	Voltage	342 ~ 528V				
	Frequency	47 ~ 63Hz				
	PF	0.99				
	Regenerative Efficiency	93%				
Dimensions(W×H×D,mm)		19" standard chassis, 3U height, 482×133.3×790				
Weight(Kg)		24	32	40	34	43

> General Specifications

Model		ESDr 10-1000-40	ESDr 10-1500-25	ESDr 15-1500-40	ESDr 20-1000-80	ESDr 20-1500-60	ESDr 30-1500-80
Output Range	Voltage	0 ~ 1000V	0 ~ 1500V	0 ~ 1500V	0 ~ 1000V	0 ~ 1500V	0 ~ 1500V
	Current	0 ~ 40A	0 ~ 25A	0 ~ 40A	0 ~ 80A	0 ~ 60A	0 ~ 80A
	Power	10kW	10kW	15kW	20kW	20kW	30kW
	Resistance	0 ~ 1000Ω	0 ~ 1500Ω	0 ~ 1500Ω	0 ~ 1000Ω	0 ~ 1500Ω	0 ~ 1500Ω
Setting Accuracy	Voltage	≤0.10%FS					
	Current	≤0.20%FS					
	Power	≤1.00%FS					
Setting Resolution	Voltage	0.1V					
	Current	0.01A					
	Power	0.001kW					
Readback Accuracy	Voltage	≤0.10%FS					
	Current	≤0.20%FS					
	Power	≤1.00%FS					
Readback Resolution	Voltage	0.01V					
	Current	0.01A					
	Power	0.001kW					
Ripple (20Hz ~ 2MHz)	Vrms	295mV	350mV	350mV	310mV	370mV	370mV
	Vpp	1700mV	2000mV	2000mV	2000mV	2400mV	2400mV
Dynamic Response Time	Voltage	≤1.5ms					
Rise Time	Voltage	10ms(10% ~ 90%)					
Source-load Switching Time	Current	2ms(+90% ~ -90%)					
Line Regulation	Voltage	≤0.02%FS					
	Current	≤0.05%FS					
Load Regulation	Voltage	≤0.05%FS					
	Current	≤0.15%FS					
Over Voltage Protection(OVP)		0 ~ 110%FSadjustable					
Sense Compensated Voltage		50V	75V	75V	50V	75V	75V
Protection Functions		OVP, OCP, OPP, OTP, Vsense reverse polarity protection, input over/under voltage protection					
Parallel Function		Support multi-unit parallel output					
Communication Interface		RS232(Std), RS485, LAN, CAN(Opt)					
Efficiency		~ 93%					
Operating Temperature		0 ~ 40°C					
Storage Temperature		-10°C ~ 70°C					
Humidity		20% ~ 90%RH, None Condensing					
Input Range	Phase	Three-phase three-wire + PE					
	Voltage	342 ~ 528V					
	Frequency	47 ~ 63Hz					
	PF	0.99					
	Regenerative Efficiency	93%					
Dimensions(W×H×D,mm)		19"standard chassis, 3U height, 482×133.3×790					
Weight(Kg)		32	32	40	34	34	43

> General Specifications

Model		ESDr 15-2250-25		ESDr 30-2250-60	
Output Range	Voltage	0 ~ 2250V	0 ~ 2250V		
	Current	0 ~ 25A	0 ~ 60A		
	Power	15kW	30kW		
	Resistance	0 ~ 2250Ω	0 ~ 1500Ω		
Setting Accuracy	Voltage	≤0.10%FS			
	Current	≤0.20%FS			
	Power	≤1.00%FS			
Setting Resolution	Voltage	0.1V			
	Current	0.01A			
	Power	0.001kW			
Readback Accuracy	Voltage	≤0.10%FS			
	Current	≤0.20%FS			
	Power	≤1.00%FS			
Readback Resolution	Voltage	0.01V			
	Current	0.01A			
	Power	0.001kW			
Ripple (20Hz ~ 2MHz)	Vrms	200mV	300mV		
	Vpp	2100mV	2700mV		
Dynamic Response Time	Voltage	≤1.5ms			
Rise Time	Voltage	10ms(10% ~ 90%)			
Source-load Switching Time	Current	2ms(+90% ~ -90%)			
Line Regulation	Voltage	≤0.02%FS			
	Current	≤0.05%FS			
Load Regulation	Voltage	≤0.05%FS			
	Current	≤0.15%FS			
Over Voltage Protection(OVP)		0 ~ 110%FS (adjustable)			
Sense Compensated Voltage		112.5V			
Protection Functions		OVP, OCP, OPP, OTP, Vsense reverse polarity protection, input over/under voltage protection			
Parallel Function		Support multi-unit parallel output			
Communication Interface		RS232(Std), RS485, LAN, CAN(Opt)			
Efficiency		~ 93%			
Operating Temperature		0 ~ 40°C			
Storage Temperature		-10°C ~ 70°C			
Humidity		20% ~ 90%RH, None Condensing			
Input Range	Phase	Three-phase three-wire + PE			
	Voltage	342 ~ 528V			
	Frequency	47 ~ 63Hz			
	PF	0.99			
	Regenerative Efficiency	93%			
Dimensions(W×H×D,mm)		19" standard chassis, 3U height, 482×133.3×790			
Weight(Kg)		40	43		