

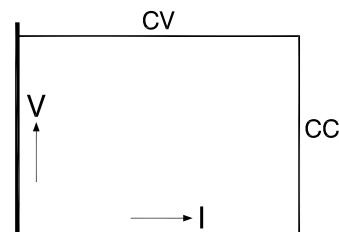


ES150 - series

150 watts DC POWER SUPPLIES



ES 015-10	0 - 15 V	0 - 10 A
ES 030-5	0 - 30 V	0 - 5 A
ES 075-2	0 - 75 V	0 - 2 A
ES 0300-0.45	0 - 300 V	0 - 450 mA



- 4 mm Safety Sockets
- Weight only 1.7 kg
- Wide input voltage range:
90 - 265 VAC, 48 - 62 Hz
- Active Power Factor Correction
- Efficiency up to 84 %
- 0 - 5 V analog programmable
(on both voltage and current)
- Isolated analog programming with optional external ISO AMP MODULE to prevent earth loops
- Programming Inputs and Monitoring Outputs have a very low offset
- **Ethernet** or **RS232** programming with optional internal cards
- **IEEE488** programming with optional external interface PSC-488
- Very low output ripple
- Stable output voltage or current
- Input / output insulation 3750 V rms
- EMC: high immunity and low emission
- Designed for long life at full power
- Protected against all overload and short circuit conditions
- Voltage and current control with 10 turn potentiometers, resolution 0.03 %
- Optional rear panel output connection (option includes remote sensing)
- 48 hours burn-in

	ES 015-10	ES 030-5	ES 075-2	ES 0300-0.45
Output voltage current	0 - 15 V 0 - 10 A	0 - 30 V 0 - 5 A	0 - 75 V 0 - 2 A	0 - 300 V 0 - 450 mA
Input AC single phase, 48 - 62 Hz Input current @ 230 VAC power factor, 110 / 230 VAC full load DC internal fuses standby input power (Vo=Io=0) standby input power (Vo=Vmax)	90 - 265 V 1 A 0.99 / 0.83 contact factory 4 AT 6 W 11 W			
Efficiency AC 230 V input, full load AC 110 V input, full load	83 % 80 %	84 % 82 %	84 % 81 %	84 % 81 %
Regulation				
Load 0 - 100% CV internal sensing optional external sensing Line 90 - 265 V AC CV	15 mV 2 mV 0.2 mV	6 mV 2 mV 0.5 mV	5 mV 5 mV 1 mV	10 mV 10 mV 3 mV
Load 0 - 100% CC Line 90 - 265 V AC CC (internal voltage sensing)	3 mA 0.5 mA	1 mA 0.2 mA	0.5 mA 0.1 mA	0.3 mA 0.05 mA
Ripple + noise (full load) rms (BW=300 kHz) CV p-p (BW=50 MHz) CV rms (BW=300 kHz) CC p-p (BW=50 MHz) CC	0.5 mV 8 mV 1.5 mA 10 mA	0.6 mV 10 mV 0.5 mA 2 mA	1 mV 15 mV 0.1 mA 0.5 mA	7 mV 50 mV (typical 30 mV) 0.03 mA 0.2 mA
Temp. coeff., per °C CV CC	5.10 ⁻⁵ 10.10 ⁻⁵			
Stability after 1 hr warm-up during 8 hrs CV CC tamb = 25 ± 1 °C, Vin = 230 VAC (internal voltage sensing for CC-stab.)	10.10 ⁻⁵ 10.10 ⁻⁵	10.10 ⁻⁵ 10.10 ⁻⁵	10.10 ⁻⁵ 10.10 ⁻⁵	10.10 ⁻⁵ 12.10 ⁻⁵

Analog Programming	CV	CC
Programming inputs input range accuracy offset temp. coeff. offset input impedance	0 - 5 V ± 0.2% 0 ... +3 mV (on 5 V) 10 µV / °C 1 MOhm	0 - 5 V ± 0.8% 0 ... +10 mV (on 5 V) 60 µV / °C 1 MOhm
Monitoring output output range accuracy offset temp. coeff. offset output impedance	0 - 5 V ± 0.2% - 1 ... +1 mV (on 5 V) 10 µV / °C 2 Ohm / max. 4 mA	0 - 5 V ± 0.8% - 10 ... 0 mV (on 5 V) 60 µV / °C 2 Ohm / max. 4 mA

Reference voltage on prog. connector TC	Vref	5.137 ± 10 mV (Ro = 2 Ohm, max. 4 mA) 50 ppm
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+12 V output on prog. Connector	Vo Ro	12 V ± 0.5 V 100 Ohm		
Status output CC - status	CC - operation 5 V / 5 mA = logic 1			
Remote shutdown	with + 5 V, 1 mA or relay contact			
Indicators (front panel)	CV-mode, CC-mode			
Controls (front panel)	Mains on/off, CV- and CC-potmeter			
Programming speed (resistive load)	ES 015-10	ES 030-5	ES 075-2	ES 0300-0.45
Rise time (10 - 90%) output voltage step time, (100% load) time, (10% load)	0 → 15 V 7 ms 3 ms	0 → 30 V 15 ms 6 ms	0 → 75 V 17 ms 7 ms	0 → 300 V 10 ms 4 ms
Fall time (90 - 10%) output voltage step time, (100% load) time, (10% load)	15 → 0 V 7 ms 70 ms	30 → 0 V 15 ms 150 ms	75 → 0 V 17 ms 160 ms	300 → 0 V 10 ms 100 ms
	ES 015-10	ES 030-5	ES 075-2	ES 0300-0.45
Recovery time recovery within di/dt of load step time, @ 50 - 100% load step max. deviation @ 230 VAC input voltage	50 mV 250 mA/µs 100 µs 160 mV	50 mV 125 mA/µs 100 µs 160 mV	50 mV 70 mA/µs 100 µs 150 mV	200 mV 6 mA/µs 130 µs 700 mV
Output impedance CV, 0-100 kHz	< 100 mOhm	< 200 mOhm	< 250 mOhm	< 5 Ohm
Pulsating load max. tolerable AC component of load current f > 1 kHz f < 1 kHz	2 A rms 10 A peak	2 A rms 5 A peak	2 A rms 2 A peak	2 A rms 0.45 A peak
Insulation input / output creepage / clearance input / case output / case	3750 Vrms (1 min.) 8 mm 2500 Vrms 600 V DC			
Safety	EN 60950 / EN 61010			
EMC Power Supply Standard Generic Emission Generic Immunity	EN 61204-3 , Emission: residential, light industrial environment (CISPR22-Class B) Immunity: industrial environment EN 61000-6-3 , residential, light industrial environment (EN 55022 B) EN 61000-6-2 , industrial environment			
Operating Temperature at full load	– 20 to + 50 °C derate output to 75% at 60 °C			
Humidity	max. 95% RH, non condensing, up to 40 °C max. 75% RH, non condensing, up to 50 °C			
Storage temperature	– 40 to + 85 °C			
Thermal protection	Output shuts down in case of insufficient cooling			
MTBF	500 000 hrs			

Hold-Up time (230 VAC input) Vout = 100% , Iout = 100% Vout = 85% , Iout = 100% Vout = 100% , Iout = 50%	25 ms 40 ms 60 ms
Turn on delay (230 VAC input) after mains switch on	250 ms
Inrush current	10 A with NTC resistor 30 Ohms cold resistance

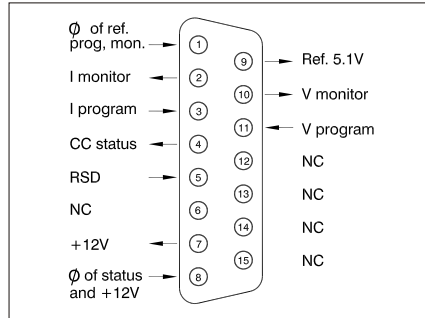
	ES 015-10	ES 030-5	ES 075-2	ES 0300-0.45
Series operation max. total voltage Master / Slave operation	600 V with optional external Master / Slave Adapter			
Parallel operation max. total current Master / Slave operation	no limit max. 4 units			
Remote sensing (optional)	option P119	option P120	option P121	option P122
max. voltage drop per load lead	2 V <i>Note: voltage drop across load leads will subtract from max. available output voltage</i>			
Over Voltage Limit (fixed)	max. 18 V	max. 40 V	max. 90 V	max. 330 V
Potentiometers front panel control with knobs resolution screwdriver adjustment at front panel	standard 0.03% option P001			
Meters scale voltage scale current accuracy V-meter accuracy A-meter	3.5 digit 0 - 15.00 V 0 - 10.00 A 0.5% + 2 digits 1% + 2 digits	3.5 digit 0 - 30.0 V 0 - 5.00 A 0.5% + 2 digits 1% + 2 digits	3.5 digit 0 - 75.0 V 0 - 2.00 A 0.5% + 2 digits 1% + 2 digits	3.5 digit 0 - 300 V 0 - 450 mA 0.5% + 2 digits 1% + 2 digits

Input Connector	Euro-connector at rear panel 10 Amp / 65 °C IEC320/C14, EN60320/C14
Output Terminals	Standard: 4 mm safety sockets at front-panel Option: screw terminals (0.2-4 mm ²) at rear-panel (sockets at front removed) only combined with remote sensing, see remote sensing for option numbers (P119 - 122)
Programming connector	15 pole D-connector at rear panel (FEMALE)
Cooling	Convection cooling
Enclosure degree of protection	IP20
Dimensions (h x w x d)	52 x 222 x 202 mm
Weight	1.7 kg

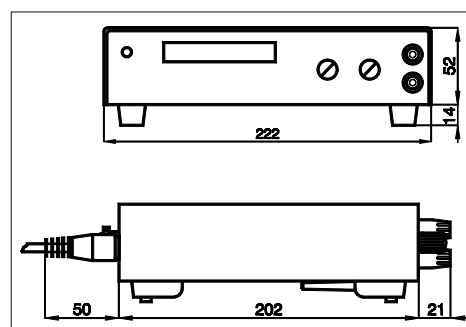
CV = Constant Voltage
CC = Constant Current

OVL = Over Voltage Limit

Specifications measured at $t_{amb} = 25 \pm 5^\circ\text{C}$ and
 $V_{in} = 230\text{ VAC}$, 50 Hz unless otherwise noted.



Connections programming connector



Dimensions

Screwdriver adjustment

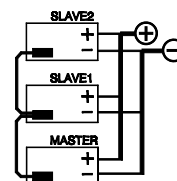
OPTION P001

- For a **fixed setting** of the output values, avoids accidental adjusting of the CV and CC settings.
- The potmeters are moved backwards just behind the frontpanel and plastic caps are inserted to cover the holes, see picture.



Master / Slave operation

- Parallel and Series operation with equal Current and Voltage sharing.
- This way two or more ES-units can be used together as one high power unit.
- Voltage and current of the units is controlled by the master (by potentiometers or by programming).
- For Parallel operation use 15 pole shielded cables, no special option required.
- For Series operation use the **Master / Slave Series Adapter** together with 15 pole shielded cables (1:1).



Increased max. output voltage/current

OPTION P069

- The maximum output voltage or current can be increased by approximately 10%. Normally this results in a derating of the maximum ambient temperature or other parameters.
- Always add increased value for voltage or current in ordercode, for example **ES 030-5 P069 output 32V**.

For exact details consult the technical department, email 'Support@Delta-Elektronika.nl'.

Enforced secondary isolation 1000 V

OPTION P089

- The secondary isolation between output and ground is increased from standard 600 V to 1000 V.

Remote sensing / Rear power outlet

OPTION P119-122

- The voltage across the load is constant regardless of the output current.
- Rear connections for power leads.
- Maximum 2 V per load lead can be compensated.
- The sense leads are protected against accidental interruption.



External ISO AMP for isolated analog programming ISO AMP MODULE

- Provides galvanic isolation when programming and monitoring.
- Prevents problems with earth loops and common mode voltages.
- Pin compatible with the programming connector on the rear side.
- Bench operation and rail mounting.



Internal Ethernet Power Supply Controller

OPTION P150

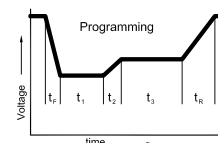
- Internal Ethernet compatible interface to program a unit by a computer.
 - Combination possible with P119 - P122 (rear output terminals).
- Note: built inside the ES150, the digital user in- and outputs of the PSC-ETH are not available. Use the external module PSC-ETH module instead.*



Internal RS232 Power Supply Controller

OPTION P148

- Internal RS232 compatible interface to program a unit by a computer.
- Combination possible with P119 - P122 (rear output terminals).



External IEEE488 Power Supply Controller

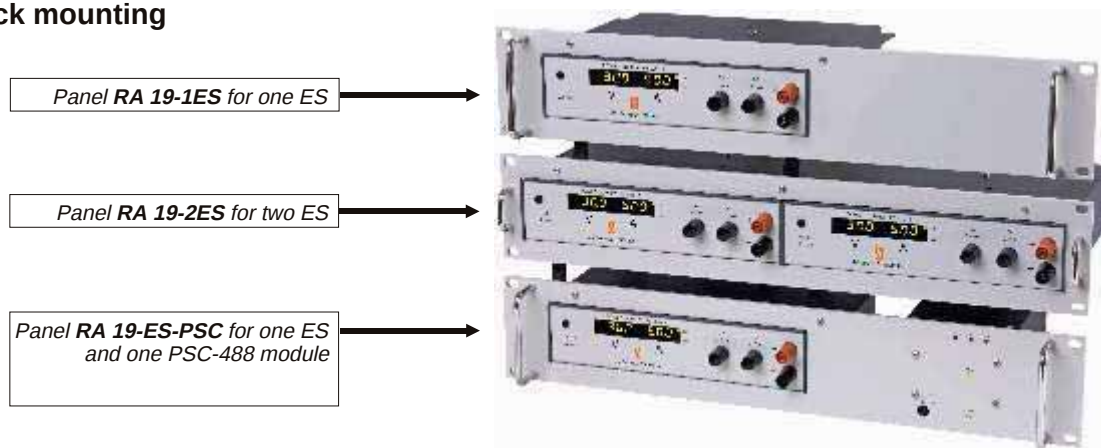
PSC-488

- External IEEE488 compatible interface to program a unit by a computer.
- Pin compatible with the programming connector on the rear side.
- Bench operation and rail mounting.



Note: it is not possible to have a combination of multiple internal and/or external interfaces.

19" rack mounting

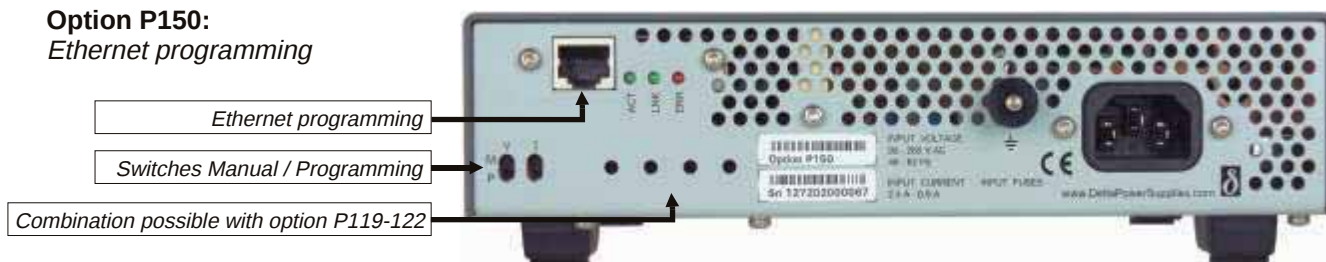


Rear Connections

Standard unit:
Analog programming



Option P150:
Ethernet programming



Option P148:
RS232 programming



Option P119 - 122:
Rear power outlet / rem. sensing

