

**DELTA ELEKTRONIKA BV**



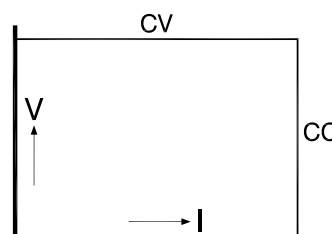
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## ES 150 - series 150 watts DC POWER SUPPLIES



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, CAN/PROFI-Bus or RS232**  
programming with optional internal interfaces
- **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
<b>Output</b> 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
<b>Input</b> <b>AC</b> single phase, 48 - 62 Hz rated voltage range rated frequency  Input current @ 230 VAC power factor, 110 / 230 VAC full load  <b>DC</b>  internal fuses  standby input power (Vo=Io=0) standby input power (Vo=Vmax)		90 - 265 V 100 - 240 V 50 / 60 Hz  1 A 0.99 / 0.83  contact factory  4 AT  6 W 11 W		
<b>Efficiency</b> AC 230 V input, full load AC 110 V input, full load	83 % 80 %	84 % 82 %	84 % 81 %	84 % 81 %
<b>Regulation</b>				
Load 0 - 100% <b>CV</b> internal sensing optional external sensing  Line 90 - 265 V AC <b>CV</b>	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% <b>CC</b> Line 90 - 265 V AC <b>CC</b> (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
<b>Ripple + noise</b> (full load) rms (BW=300 kHz) <b>CV</b> p-p (BW=50 MHz) <b>CV</b>  rms (BW=300 kHz) <b>CC</b> p-p (BW=50 MHz) <b>CC</b>	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
<b>Temp. coeff., per °C</b> <b>CV</b> <b>CC</b>			5.10 <sup>-5</sup> 10.10 <sup>-5</sup>	
<b>Stability</b> after 1 hr warm-up during 8 hrs <b>CV</b> <b>CC</b>  tamb = 25 ± 1 °C, Vin = 230 VAC (internal voltage sensing for CC-stab.)	10.10 <sup>-5</sup> 10.10 <sup>-5</sup>	10.10 <sup>-5</sup> 10.10 <sup>-5</sup>	10.10 <sup>-5</sup> 10.10 <sup>-5</sup>	10.10 <sup>-5</sup> 12.10 <sup>-5</sup>

Analog Programming	CV	CC
<b>Programming inputs</b> 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
<b>Monitoring output</b> 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

<b>Reference voltage</b> on prog. connector TC	Vref	5.137 ± 10 mV (Ro = 2 Ohm, max. 4 mA) 50 ppm
<b>+12 V output</b> on prog. Connector	Vo Ro	12 V ± 0.5 V 100 Ohm

riešenia na presné meranie

<b>Status output</b> CC - status	CC - operation	5 V / 5 mA = logic 1
<b>Remote shutdown</b>	with + 5 V, 1 mA or relay contact	
<b>Indicators</b> (front panel)	CV-mode, CC-mode	
<b>Controls</b> (front panel)	Mains on/off, CV- and CC-potmeter	

<b>Programming speed</b> (resistive load)	<b>ES 015-10</b>	<b>ES 030-5</b>	<b>ES 075-2</b>	<b>ES 0300-0.45</b>
<b>Rise time (10 - 90%)</b> 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
<b>Fall time (90 - 10%)</b> 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

	<b>ES 015-10</b>	<b>ES 030-5</b>	<b>ES 075-2</b>	<b>ES 0300-0.45</b>
<b>Recovery time</b> 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
<b>Output impedance</b> CV, 0-100 kHz	< 100 mOhm	< 200 mOhm	< 250 mOhm	< 5 Ohm
<b>Pulsating load</b> 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

<b>Insulation</b> input / output creepage / clearance	3750 Vrms (1 min.) 8 mm
input / case output / case	2500 Vrms 600 V DC
<b>Safety</b>	EN 60950 / EN 61010
<b>EMC</b> Power Supply Standard	<b>EN 61204-3</b> , Emission: residential, <b>light</b> industrial environment (CISPR22-Class <b>B</b> ) Immunity: industrial environment
Generic Emission Generic Immunity	<b>EN 61000-6-3</b> , residential, <b>light</b> industrial environment (EN 55022 <b>B</b> ) <b>EN 61000-6-2</b> , industrial environment
<b>Operating Temperature at full load</b>	- 20 to + 50 °C derate output to 75% at 60 °C
<b>Humidity</b>	max. 95% RH, non condensing, up to 40 °C max. 75% RH, non condensing, up to 50 °C
<b>Storage temperature</b>	- 40 to + 85 °C
<b>Thermal protection</b>	Output shuts down in case of insufficient cooling
<b>MTBF</b>	500 000 hrs

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

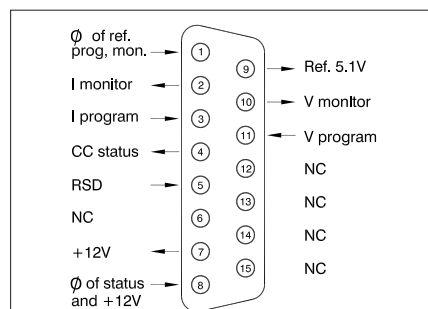
	ES 015-10	ES 030-5	ES 075-2	ES 0300-0.45
<b>Series operation</b> max. total voltage Master / Slave operation	600 V with optional external Master / Slave Adapter			
<b>Parallel operation</b> max. total current Master / Slave operation	no limit max. 4 units			
<b>Remote sensing</b> (optional)	option P119	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>			
<b>Over Voltage Limit</b> (fixed)	max. 18 V	max. 40 V	max. 90 V	max. 330 V
<b>Potentiometers</b> front panel control with knobs resolution screwdriver adjustment at front panel	standard 0.03%  option P001			
<b>Meters</b> 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

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

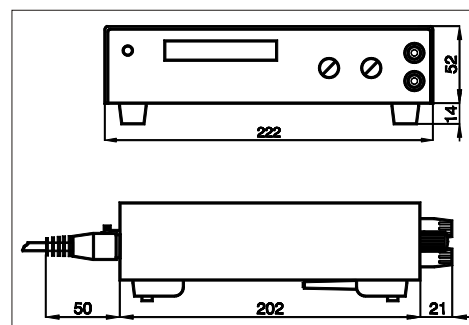
CV = Constant Voltage  
CC = Constant Current

OVL = Over Voltage Limit

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



Connections programming connector



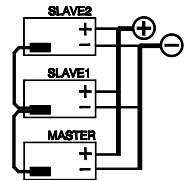
Dimensions

**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**

- At some derating, either the max. output voltage or current can be increased by 10%.
- Always add increased value 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.

**External IEEE488 Power Supply Controller****PSC-488**

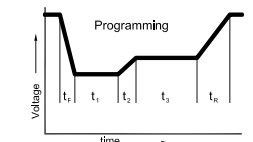
- External IEEE488 compatible interface to program a unit by a computer.
- Pin compatible with the programming connector on the rear side.
- Bench operation and rail mounting.

**Built-in RS232 Power Supply Controller****OPTION P148**

- Combination possible with P119 - P122 (rear output terminals).

**Built-in Ethernet Power Supply Controller****OPTION P150**

- Note: in ES150, digital user I/O are not available. Use external module instead.
- Combination possible with P119 - P122 (rear output terminals).

**Built-in Profibus Power Supply Controller****OPTION P279****Built-in CANopen Power Supply Controller****OPTION P280**

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