

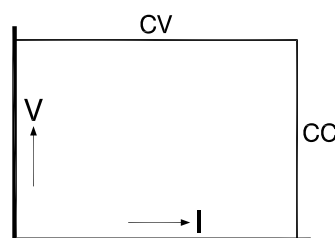


## SM 3000 - series 3000 watts DC POWER SUPPLIES



### Three phase input

SM 15-200 D	0 - 15 V	0 - 200 A
SM 30-100 D	0 - 30 V	0 - 100 A
SM 45-70 D	0 - 45 V	0 - 70 A
SM 70-45 D	0 - 70 V	0 - 45 A
SM 120-25 D	0 - 120 V	0 - 25 A
SM 300-10 D	0 - 300 V	0 - 10 A



- Efficiency 91 %.
- Weight only 15 kg
- 3 phase 380 V, 400 V, 415 V AC input (48 - 62 Hz, line to line voltage)
- 200 kHz MOSFET power conversion technique
- 0 - 5 V analog programmable (on both voltage and current)
- Isolated analog programming with optional ISO AMP CARD to prevent earth loops
- **Ethernet, CAN/PROFI-Bus, IEEE488** or **RS232** programming with optional interface cards
- Very low output ripple and spikes
- Very stable output voltage or current ( $2 \cdot 10^{-5} - 10^{-4}$ )
- No inrush current during switch on
- Master / Slave parallel and series operation with equal current and voltage sharing
- Can be used as a building block to form a high power unit
- Input / output insulation 3750 Vrms
- Designed for long life at full power
- Protected against all overload and short circuit conditions
- Modular built-up, service friendly
- Voltage and current control with 10 turn potentiometers, resolution 0.03 %
- Low noise blower, fan speed adapts to temperature

		SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D	SM 120-25 D	SM 300-10 D
<b>Output</b>							
voltage		0-15V	0-30V	0-45V	0-70V	0-120V	0-300V
current		0-200A	0-100A	0-70A	0-45A	0-25A	0-10A
<b>Input</b>							
<b>AC</b>	3 phase, 48 - 62 Hz for use at 380 V, 400 V, 415 V nominal line - line voltage	342-457V	342-457V	342-457V	342-457V	342-457V	342-457V
	current (400 V AC / 3 phase )	5.7Arms	5.5Arms	5.8Arms	5.8Arms	5.5Arms	5.5Arms
	power factor (380 V / 3 phase)						
	100% load	0.88	0.88	0.88	0.88	0.88	0.88
	50% load	0.78	0.78	0.78	0.78	0.78	0.78
<b>DC</b>		contact factory	contact factory	contact factory	contact factory	contact factory	contact factory
	fuses	16AT	16AT	16AT	16AT	16AT	16AT
	standby input power ( $V_o=I_o=0$ )	25W	25W	25W	25W	25W	25W
	standby input power ( $V_o=V_{max}$ )	50W	50W	50W	50W	50W	50W
<b>Efficiency</b>							
	AC 3 phase input, full load	87%	90%	89%	90%	90%	90%
<b>Regulation</b>							
	Load 0 - 100%	<b>CV</b>	5mV	5mV	5mV	10mV	10mV
	Line 342 - 457 V AC	<b>CV</b>	5mV	5mV	5mV	5mV	10mV
	Load 0 - 100%	<b>CC</b>	50mA	25mA	15mA	10mA	10mA
	Line 342 - 457 V AC	<b>CC</b>	50mA	25mA	15mA	10mA	3mA
<b>Ripple + noise, rms / p-p</b>		<b>CV</b>	2/12mV	1.6/8mV	3.5/17mV	2/12mV	5/25mV
		<b>CC</b>	100/250mA	20/60mA	20/60mA	6/25mA	7/25mA
							10/50mV below50V: 25/120mV 3/10mA below50V: 60/200mA
<b>Temp. coeff., per °C</b>		<b>CV</b>	typical $10 \cdot 10^{-6}$ , max. $35 \cdot 10^{-6}$				
		<b>CC</b>	typical $20 \cdot 10^{-6}$ , max. $60 \cdot 10^{-6}$				
<b>Stability</b>							
	after 1 hr warm-up during 8 hrs	<b>CV</b>	typical $2 \cdot 10^{-5}$ , max. $4 \cdot 10^{-5}$				
		<b>CC</b>	typical $3 \cdot 10^{-5}$ , max. $10 \cdot 10^{-5}$				
	during 30 hrs	<b>CV</b>	typical $2 \cdot 10^{-5}$ , max. $5 \cdot 10^{-5}$				
		<b>CC</b>	typical $5 \cdot 10^{-5}$ , max. $10 \cdot 10^{-5}$				
	$t_{amb} = 25 \pm 1 \text{ °C}$						

Analog Programming		CV	CC
<b>Programming inputs</b>			
input range		0-5V	0-5V
accuracy		$\pm 0.2\%$ 0mV...+8mV (on5V)	$\pm 0.5\%$ 0mV...+20mV (on5V)
temp. coeff. offset		$10 \mu\text{V}/\text{°C}$	$150 \mu\text{V}/\text{°C}$
input impedance		1MOhm	1MOhm
<b>Monitoring output</b>			
output range		0-5V	0-5V
accuracy		$\pm 0.2\%$ -3mV...+11mV	$\pm 0.5\%$ -5mV...+0mV
temp. coeff. offset		$10 \mu\text{V}/\text{°C}$	$150 \mu\text{V}/\text{°C}$
output impedance		20Ohm	20Ohm

<b>Reference voltage</b>		
on prog. connector	Vref TC	$5.165 \pm 31 \text{ mV}$ typical 12ppm/max. 30ppm
<b>Status outputs</b>		
CC-status		5V/10mA=logic 1
OVP-status		5V/10mA=logic 1
<b>Remote ShutDown</b>		with +5V or relay contact

riešenia na presné meranie

Programming speed <i>Standard Version</i> (resistive load)	SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D	SM 120-25 D	SM 300-10 D
<b>Rise time (10 - 90%)</b> output voltage step time, (100 % load) time, (10 % load)	0 → 15V 7 ms 7 ms	0 → 30V 7 ms 7 ms	0 → 45V 7 ms 7 ms	0 → 70V 7 ms 7 ms	0 → 120V 7 ms 7 ms	0 → 300V 7 ms 7 ms
<b>Fall time (90 - 10%)</b> output voltage step time, (100 % load) time, (10 % load)	15 → 0V 7 ms 32 ms	30 → 0V 7 ms 58 ms	45 → 0V 8 ms 29 ms	70 → 0V 8 ms 82 ms	120 → 0V 7 ms 39 ms	300 → 0V 11 ms 91 ms
<b>Programming bandwidth</b> small signal large signal, (100 % load) large signal, (10 % load)	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz	50Hz 50Hz 5Hz
<b>Programming speed</b> <i>High Speed Version</i> (resistive load)	<b>SM 15-200 D</b> <i>option P104</i>	<b>SM 30-100 D</b> <i>option P031</i>	<b>SM 45-70 D</b> <i>option P105</i>	<b>SM 70-45 D</b> <i>option P032</i>	<b>SM 120-25 D</b> <i>option P106</i>	<b>SM 300-10 D</b> <i>option P061</i>
<b>Rise time (10 - 90%)</b> output voltage step time, (100 % load) time, (10 % load)	0 → 15V 0.36 ms 0.26 ms	0 → 30V 0.33 ms 0.32 ms	0 → 45V 0.50 ms 0.35 ms	0 → 70V 0.45 ms 0.30 ms	0 → 120V 0.34 ms 0.32 ms	0 → 300V 1.00 ms 0.40 ms
<b>Fall time (90 - 10%)</b> output voltage step time, (100 % load) time, (10 % load)	15 → 0V 0.37 ms 1.60 ms	30 → 0V 0.55 ms 3.50 ms	45 → 0V 0.60 ms 5.00 ms	70 → 0V 0.67 ms 6.00 ms	120 → 0V 0.38 ms 3.50 ms	300 → 0V 1.20 ms 11.0 ms

<b>Recovery time</b> recovery within di/dt of load step time, @ 50 - 100% load step max. deviation	50mV 2.7A/μs 100μs 250mV	50mV 1.9A/μs 100μs 150mV	100mV 1.2A/μs 100μs 200mV	50mV 2.2A/μs 100μs 250mV	0.5V 1.7A/μs 100μs 1.5V	1.5V 0.6A/μs 100μs 2V
<b>Noise suppression</b> line - line ⇒ output line - earth ⇒ output	90dB 90dB	84dB 90dB	85dB 90dB	75dB 90dB	75dB 90dB	90dB 90dB
<b>Output impedance</b> CV, 0-100 kHz	<25 mOhm	<20 mOhm	<60 mOhm	<60 mOhm	<150 mOhm	<800 mOhm
<b>Pulsating load</b> max. tolerable AC component of load current f > 1 kHz f < 1 kHz	15 Arms 200 A peak	15 Arms 100 A peak	10 Arms 70 A peak	10 Arms 45 A peak	5 Arms 25 A peak	2.5 Arms 10 A peak

<b>Insulation</b> input / output creepage / clearance input / case output / case	3750 Vrms (1 min.) 8 mm 2500 Vrms 600 VDC
<b>Safety</b>	EN 60950/EN 61010
<b>EMC Power Supply Standard</b>	<b>EN 61204-3</b> , Emission: residential, <b>light</b> industrial environment (CISPR22-Class <b>B</b> ) Immunity: industrial environment
<b>Generic Emission Generic Immunity</b>	<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
<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> 100% load Vin = 3x 380 V AC 50% load Vin = 3x 380 V AC	6 ms 15 ms
<b>Turn on delay</b> after mains switch on	300 ms
<b>Inrush current</b>	5.8 A @ 400 V AC input
<b>Phase loss</b>	The power supply will continue to operate on one phase but at 90% of V <sub>out(max)</sub> (a SM30-100D adjusted at 27 V will continue to deliver 27 V after phase loss)

	SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D	SM 120-25 D	SM 300-10 D
<b>Series operation</b> max. total voltage Master / Slave operation	600 V yes	600 V yes	600 V yes	600 V yes	600 V yes	600 V yes
<b>Parallel operation</b> max. total current Master / Slave operation	no limit max. 4 units	no limit max. 4 units	no limit max. 4 units	no limit max. 4 units	no limit max. 4 units	no limit max. 4 units
<b>Remote sensing</b> max. voltage drop per load lead	2 V	2 V	2 V	2 V	2 V	2 V
<b>OVP / OVL</b> adjustment range	0-17 V	0-35 V	0-54 V	0-80 V	0-140 V	0-350 V

<b>Potentiometers</b> front panel control with knobs resolution	standard 0.03 %	standard 0.03 %	standard 0.03 %	standard 0.03 %	standard 0.03 %	standard 0.03 %
screwdriver adjustment at front panel at rear panel	option P001 option P002	option P001 option P002	option P001 option P002	option P001 option P002	option P001 option P002	option P001 option P002
<b>Meters</b> scale voltage scale current accuracy	3.5 digit 0-15.00 V 0-200 A 0.5%+2 digit	3.5 digit 0-30.0 V 0-100.0 A 0.5%+2 digit	3.5 digit 0-45.0 V 0-70.0 A 0.5%+2 digit	3.5 digit 0-70.0 V 0-45.0 A 0.5%+2 digit	3.5 digit 0-120.0 V 0-25.0 A 0.5%+2 digit	3.5 digit 0-300 V 0-10.00 A 0.5%+2 digit

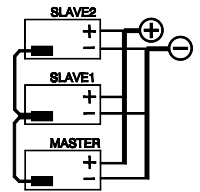
<b>Mounting</b>	Stacking of units allowed, air flow is from left to right.					
<b>Input Terminals</b> input connections	screw terminals for cable 1.5-4.0 mm <sup>2</sup> 3 phase + earth (no neutral required)					
<b>Output Terminals</b>	M10 bolts	M10 bolts	M10 bolts	M8 bolts	7 mm bind post	6 mm bind post
<b>Programming connector</b>	15 pole D-connector at rear panel (FEMALE)					
<b>Cooling</b> audio noise level	Low noise blower, fan speed adapts to temperature of internal heatsink. ca. 50 dBA at full load and 25 °C ambient temperature ca. 60 dBA at full load and 50 °C ambient temperature					
<b>Enclosure</b> degree of protection	IP20					
<b>Dimensions</b> behind front panel: h x w x d front panel: h x w	128.5 x 443 x 416 mm			(with option P099, feet are removed)		
<b>Weight</b>	15 kg					
	128.5 x 483 mm (19", 3 U)					

**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 front panel 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 SM-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 15p shielded cables (1:1)

**Battery Charging**

- The CV / CC regulated power supplies are ideal battery chargers. Once set at the correct output voltage, the battery will charge constantly without overcharging. This can be useful for **emergency power systems**.
- Use a circuit breaker in series to protect the internal diode from reverse connection of the battery.
- The SM300-10 needs an **external diode set** (option P023) on the output as protection for the internal diode.



Download the special datasheet for more details from '[www.DeltaPowerSupplies.com/](http://www.DeltaPowerSupplies.com/)'.

**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 **SM30-100 P069 output 32 V**

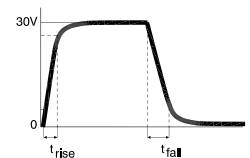
For exact details consult the technical department, email '[Support@Delta-Elektronika.nl](mailto:Support@Delta-Elektronika.nl)'.

**Enforced secondary isolation 1000 V****OPTION P089**

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

**High Speed Programming**

- The speed is **10 - 20 times higher** because of the smaller output capacitors.
  - Relatively low current overshoots (if any) in case of sudden voltage variations caused by the load, this is of great advantage for laser diode applications.
- Applications:*
- **Laser diode** power supply, continuous or pulsed.
  - Test systems requiring a fast settling time to improve throughput of factory.
  - A constant current source with a low parallel capacitance: plasma, load sensitive to current overshoots, etc.
  - A constant current source on a load with **fast voltage variations**.
  - *Ordering information:*

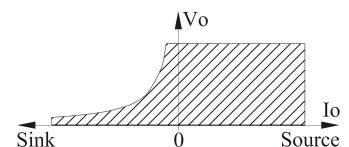


	SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D	SM 120-25 D	SM 300-10 D
optionnr.	P104	P031	P105	P032	P106	P061

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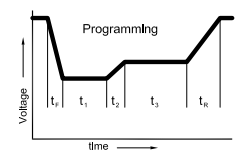
**Power Sink for 2 quadrant operation**

- Can absorb **300 W peak power**.
- Maintains output voltage regardless output power is positive or negative (source & sink).
- Ideal solution for supplying **electric motors** with PWM-speed control.
- Fast down programming at no load conditions.
- *Ordering information:*



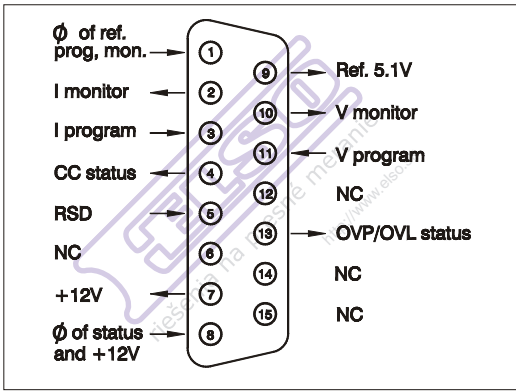
	SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D
optionnr.	P127	P128	P129	P130

Download the special datasheet for more details from '[www.DeltaPowerSupplies.com/](http://www.DeltaPowerSupplies.com/)'.

**Built-in ISO AMP CARD for isolated analog programming****OPTION P145****Built-in RS232 Power Supply Controller****OPTION P146****Built-in IEEE488 Power Supply Controller****OPTION P164****Built-in Ethernet Power Supply Controller****OPTION P149****Built-in Profibus Power Supply Controller****OPTION P275****Built-in CANopen Power Supply Controller****OPTION P276**

Note: there is only room for one of the interfaces in a unit (P145, P146, P149, P164, P275, P276)

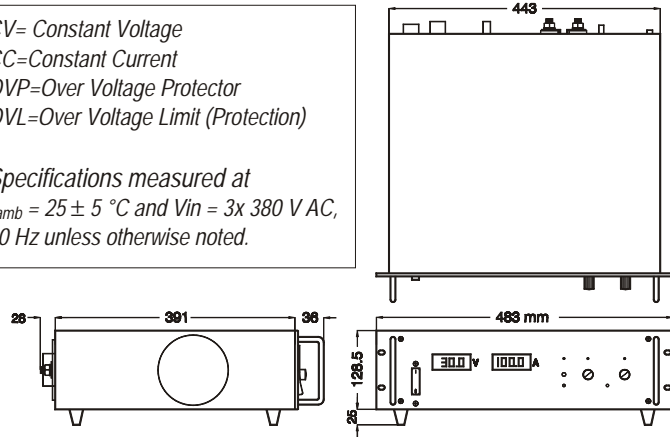
<http://www.elseo.sk>



Connections programming connector

CV= Constant Voltage  
CC=Constant Current  
OVP=Over Voltage Protector  
OVL=Over Voltage Limit (Protection)

Specifications measured at  
 $t_{amb} = 25 \pm 5 \text{ }^\circ\text{C}$  and  $V_{in} = 3 \times 380 \text{ V AC}$ ,  
50 Hz unless otherwise noted.



Analog Programming (standard)  
or Ethernet or RS232 or IEEE488  
or CANBUS or PROFIBUS or  
isolated analog (all optional)

Output Terminals

No Line Cord  
supplied

Input Connector



Progr. Switches  
Manual / Program

Sense Block

Safety Cover supplied for input.  
Cover for output must be ordered separately.

Feet can be removed  
(option P099)



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