

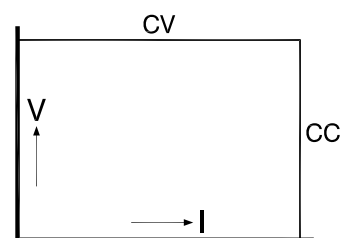


## SM 3000 - series 3000 watts DC POWER SUPPLIES



### 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, 400V, 415V 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, IEEE488** or **RS232** programming with optional internal 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 V rms
- 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 380V, 400V, 415V 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 below 50V: 25/120mV 3/10mA below 50V: 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		1M $\Omega$	1M $\Omega$
<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		20 $\Omega$	20 $\Omega$

<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

<b>Programming speed</b> <i>Standard Version</i> (resistive load)	<b>SM 15-200 D</b>	<b>SM 30-100 D</b>	<b>SM 45-70 D</b>	<b>SM 70-45 D</b>	<b>SM 120-25 D</b>	<b>SM 300-10 D</b>
<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 → 0 V 7 ms 32 ms	30 → 0 V 7 ms 58 ms	45 → 0 V 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 → 0 V 0.37 ms 1.60 ms	30 → 0 V 0.55 ms 3.50 ms	45 → 0 V 0.60 ms 5.00 ms	70 → 0V 0.67 ms 6.00 ms	120 → 0V 0.38 ms 3.50 ms	300 → 0V 1.20ms 11.0ms

<b>Recovery time</b> recovery within di/dt of load step time, @ 50 - 100% load step max. deviation	50mV 2.7 A/μs 100μs 250 mV	50mV 1.9 A/μs 100μs 150 mV	100mV 1.2 A/μs 100μs 200 mV	50 mV 2.2 A/μs 100μs 250 mV	0.5V 1.7 A/μs 100μs 1.5V	1.5V 0.6 A/μs 100μs 2V
<b>Noise suppression</b> line - line ⇒ output line - earth ⇒ output	90 dB 90 dB	84 dB 90 dB	85 dB 90 dB	75 dB 90 dB	75 dB 90 dB	90 dB 90 dB
<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 < 1kHz	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>EN61000-6-3</b> , residential, <b>light</b> industrial environment (EN55022 <b>B</b> ) <b>EN61000-6-2</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 380V AC 50% load Vin = 3x 380V 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 Vout(max) (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

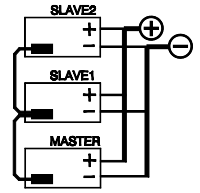
<b>Mounting</b>	Stacking of units allowed, air flow is from left to right.					
<b>Input Terminals</b> input connections	screw terminals for cable 1.5-4.0 mm <sup>2</sup> 3 phase + earth (no neutral required)					
<b>Output Terminals</b>	M10 bolts	M10 bolts	M10 bolts	M8 bolts	7 mm bind post	6 mm bind 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>	128.5 x 483 mm (19", 3 U) 15 kg					

**Screwdriver adjustment****OPTION P001**

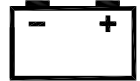
- For a **fixed setting** of the output values, avoids accidental adjusting of the CV and CC settings.
- The potentiometers are moved backwards just behind the frontpanel and plastic caps are inserted to cover the holes, see picture.

**Master / Slave operation**

- Parallel and Series operation with equal Current and Voltage sharing.
- This way two or more 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**

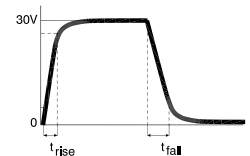
- The maximum output voltage or current can be increased by approximately 10%. Normally this results in a derating of the maximum ambient temperature or other parameters.
  - Always add increased value for voltage or current in ordercode, for example **SM30-100 P069 output 32V**
- For exact details consult 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:*

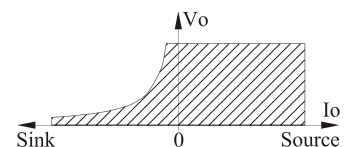


	SM 15-200D	SM 30-100D	SM 45-70D	SM 70-45D	SM 120-25D	SM 300-10D
optionnr.	P104	P031	P105	P032	P106	P061

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

**Power Sink for 2 quadrant operation**

- Can absorb **300W 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 15-200D	SM 30-100D	SM 45-70D	SM 70-45D
optionnr.	P127	P128	P129	P130

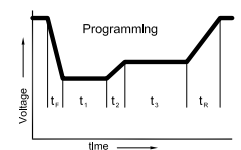
Download the special datasheet for more details from '[www.DeltaPowerSupplies.com/](http://www.DeltaPowerSupplies.com/)'.

**Built-in ISO AMP CARD for isolated analog programming** **OPTION P145**

- Provides galvanic isolation when programming and monitoring.

**Built-in RS232 Power Supply Controller** **OPTION P146**

- Internal RS232 compatible Controller to program a unit by a computer.

**Built-in Ethernet Power Supply Controller** **OPTION P149**

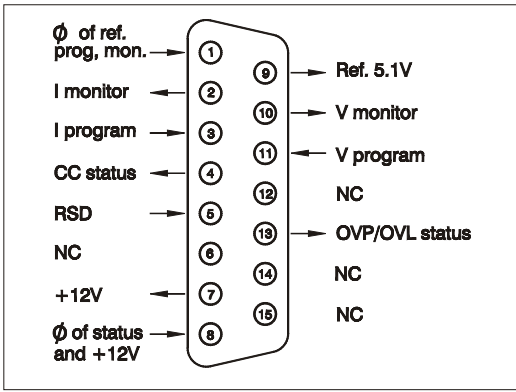
- Internal Ethernet compatible Controller to program a unit by a computer.

**Built-in IEEE488 Power Supply Controller** **OPTION P164**

- Internal IEEE488 compatible Controller to program a unit by a computer.



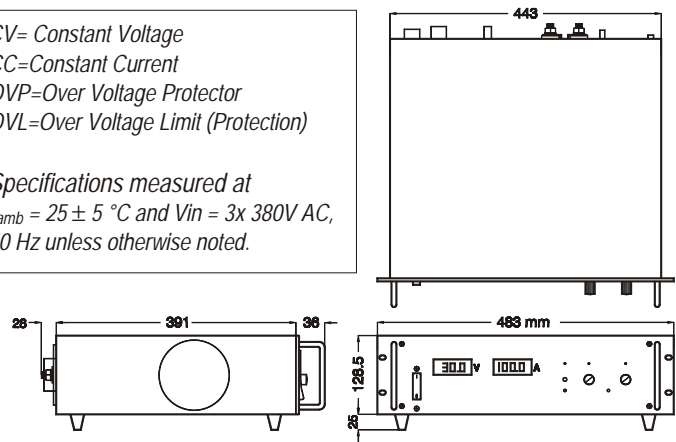
Note: there is only room for one of the interfaces in a unit (P145, P146, P149, P164)



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  $V_{in} = 3x 380V AC$ ,  
 50 Hz unless otherwise noted.



Analog Programming (standard )  
 or Ethernet or RS232 or IEEE488  
 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)