P.O. Box 27
4300 AA Zierikzee
The Netherlands

Tel. +31 111 413656
Fax. +31 111 416919
www.deltapowersupplies.com

DELTA ELEKTRONIKA B.V.

HIGH SPEED PROGRAMMING OPTIONS

FOR SM800, SM1500, SM3000 and SM6000

- Programming speed about 10 - 20 times faster (compared with standard versions)
- Low output capacitance

SM 800 Series (800 Watt)	Order Code	Voltage range	Current range
SM 7.5 - 80	Option P250	0 - 7.5 V	0 - 80 A
SM 18 - 50	Option P251	0 - 18 V	0 - 50 A
SM 70 - AR - 24	Option P252	0 - 70 V	0 - 24 A
SM 400 - AR - 4	Option P253	0 - 400 V	0 - 4 A

SM 1500 Series (1500 Watt)	Order Code	Voltage range	Current range
SM 15 - 100	Option P210	0 - 15 V	0 - 100 A
SM 35 - 45	Option P211	0 - 35 V	0 - 45 A
SM 52 - 30	Option P212	0 - 52 V	0 - 30 A
SM 52 - AR - 60	Option P213	0 - 52 V	0 - 60 A
SM 70 - 22	Option P214	0 - 70 V	0 - 22 A
SM 120 -13	Option P215	0 - 120 V	0 - 13 A
SM 300 - 5	Option P216	0 - 300 V	0 - 5 A

SM 3000 Series (3000 Watt)	Order Code	Voltage range	Current range
SM 15 - 200 D	Option P104	0 - 15 V	0 - 200 A
SM 30 - 100 D	Option P031	0 - 30 V	0 - 100 A
SM 45 - 70 D	Option P105	0 - 45 V	0 - 70 A
SM 70 - 45 D	Option P032	0 - 70 V	0 - 45 A
SM 120 - 25 D	Option P106	0 - 120 V	0 - 25 A
SM 300 - 10 D	Option P061	0 - 300 V	0 - 10 A

SM 6000 Series (6000 Watt)	Order Code	Voltage range	Current range
SM 15 - 400	Option P166	0 - 15 V	0 - 400 A
SM 30 - 200	Option P167	0 - 30 V	0 - 200 A
SM 45 - 140	Option P168	0 - 45 V	0 - 140 A
SM 60 - 100	Option P169	0 - 60 V	0 - 100 A
SM 70 - 90	Option P170	0 - 70 V	0 - 90 A
SM 120 - 50	Option P171	0 - 120 V	0 - 50 A
SM 300 - 20	Option P 172	0 - 300 V	0 - 20 A
SM 600 - 10	Option P270	0 - 600 V	0 - 10 A

Description:

- The SM-Series with the High Speed Programming Options are optimized for maximum programming speed. The speed is about 10 -20 times higher compared to the standard version.
- To achieve the high speed, the output capacitance has been made much smaller. Because of the smaller capacitors, the output ripple voltage is higher, but this is generally no problem for applications requiring high speed.
- The low output capacitance and the fast control results in relatively low current overshoots (if any) in case of sudden voltage variations caused by the load, this is of great advantage for laserdiode applications…

Applications:

- Laser diode power supply, continuous or pulsed
- Test systems requirements a fast settings time to improve trough put of factory.
- A constant current source with a low parallel capacitance : plasma, load sensitive to current overshoots, ect.
- A constant current source on a load with a fast voltage variations.

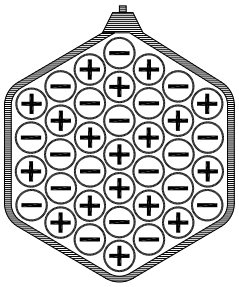
Recommendations:

- Use low inductive cabling, specially for higher currents.
  The inductance of the connecting cables (between the power supply and the load) can cause overshoots and slowdown of the rise and fall times. A low inductive cable can be constructed by using multiple isolated strands for the plus and minus wires and by bundling the combination of the mixed plus and minus wires. Each plus wire should be close to a minus wire (see picture below), For lower currents it can be sufficient to tie the plus and minus wires very close to each other.

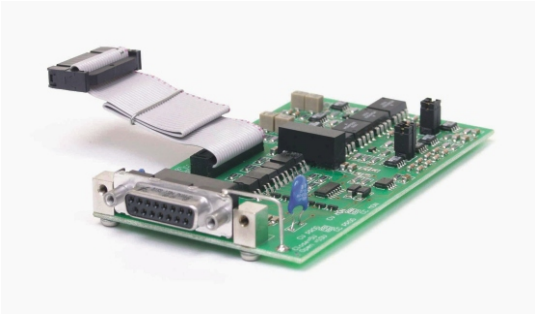
- Depending on the load impedance, the series inductance of the cables and the parallel capacitance of the power supply can make a resonant circuit, causing ringing and overshoots. Note that the voltage and current control of the power supply has little influence on this effect, because it is outside the control loop. To overcome this problem, connect an RC-filter to the head, to damp the circuit.

- When using analog programming, take care that the programming source is fully floating.
  In case of a non-floating source, the power supply should be equipped with a ISO AMP CARD.
  When the source is not sufficiently floating, it could result in distorted waveforms.

- Remote sensing is not recommended.



Low Inductance Cable cross section



An ISO AMP CARD should be used in case of a non-floating programming source.

SM800

Programming speed *High Speed Version*	SM 7.5-80 *option P250*	SM 18-50 *option P251*	SM 70-AR-24 *option P252*	SM 400-AR-4 *option P253*
CV-mode, resistive load				
Rise time (10 - 90%)				
output voltage step	0 → 7.5 V	0 → 16 V	0 → 35 V	0 → 200 V
time, (100 % load)	0.2 ms	0.22 ms	0.24 ms	0.4 ms
time, (10 % load)	0.2 ms	0.26 ms	0.24 ms	0.3 ms
output voltage step	-	-	0 → 70 V	0 → 400 V
time, (100 % load)	-	-	0.24 ms	0.82 ms
time, (10 % load)	-	-	0.24 ms	0.55 ms
Fall time (90 - 10%)				
output voltage step	7.5 → 0 V	16 → 0 V	35 → 0 V	200 → 0 V
time, (100 % load)	0.2 ms	0.24 ms	0.27 ms	0.42 ms
time, (10 % load)	1 ms	1.95 ms	3 ms	4.6 ms
output voltage step	-	-	70 → 0 V	400 → 0 V
time, (100 % load)	-	-	0.85 ms	1.7 ms
time, (10 % load)	-	-	9.5 ms	20 ms
Ripple @ full load typical (rms / pp)	20 / 80 mV	40 / 120 mV	35 V / 24 A 25 / 90 mV	200 V / 4 A 35 / 200 mV
@ full load typical (rms / pp)	-	-	70 V / 12 A 30 / 110 mV	400 V / 2 A 30 / 160 mV
Recovery time @ 50 - 100% load step, typical	100 µs	100 µs	100 µs	100 µs
Output Capacitance (typical)	310 µF	200 µF	80 µF	4 µF
CC-mode, resistive load	Similar result as with CV-mode and resistive load			
CC-mode, diode load (constant voltage load)	Even higher speed possible. Generally 2 - 8 times, depending on unit and load. Needs special attention on layout of cabling and damping networks because of the very high speed. Special "low inductive cables" recommended, see section Recommendations.			

SM1500

Programming speed *High Speed Version*	SM 15-100 *option P210*	SM 35-45 *option P211*	SM 52-30 *option P212*	SM 52-AR-60 *option P213*	SM 70-22 *option P214*	SM 120-13 *option P215*	SM 300-5 *option P216*	SM400-AR-8 *option P217*
CV-mode, resistive load								
Rise time (10 - 90%)								
output voltage step	0 → 15 V	0 → 35 V	0 → 52 V	0 → 26 V	0 → 70 V	0 → 120 V	0 → 300 V	0 → 200 V
time, (100 % load)	0.20 ms	0.27 ms	0.31 ms	0.44 ms	0.47 ms	0.46 ms	1.0 ms	0.35 ms
time, (10 % load)	0.11 ms	0.14 ms	0.23 ms	0.43 ms	0.30 ms	0.27 ms	0.51 ms	0.33 ms
output voltage step	-	-	-	0 → 52 V	-	-	-	0 → 400 V
time, (100 % load)	-	-	-	0.53 ms	-	-	-	0.98 ms
time, (10 % load)	-	-	-	0.34 ms	-	-	-	0.59 ms
Fall time (90 - 10%)								
output voltage step	15 → 0 V	35 → 0 V	52 → 0 V	26 → 0 V	70 → 0 V	120 → 0 V	300 → 0 V	200 → 0 V
time, (100 % load)	0.21 ms	0.33 ms	0.38 ms	0.27 ms	0.78 ms	0.51 ms	1.40 ms	0.35 ms
time, (10 % load)	1.6 ms	3.5 ms	3.9 ms	3.2 ms	8.3 ms	4.5 ms	13 ms	3.8 ms
output voltage step	-	-	-	52 → 0 V	-	-	-	400 → 0 V
time, (100 % load)	-	-	-	1.0 ms	-	-	-	1.7 ms
time, (10 % load)	-	-	-	9.7 ms	-	-	-	18 ms
Ripple @ full load typical (rms / pp)	15 / 50 mV	50 / 115 mV	55 / 135 mV	26 V / 60 A 30 / 105 mV	45 / 150 mV	20 / 80 mV	25 / 115 mV	200 V / 8 A 85 / 355 mV
@ full load typical (rms / pp)	-	-	-	52 V / 30 A 25 / 90 mV	-	-	-	400 V / 4 A 60 / 245 mV
Recovery time @ 50 - 100% load step, typical	100 µs	100 µs	100 µs	100 µs	100 µs	100 µs	100 µs	100 µs
Output Capacitance (typical)	390 µF	190 µF	91 µF	195 µF	113 µF	21 µF	10 µF	7 µF
CC-mode, resistive load	Similar result as with CV-mode and resistive load							
CC-mode, diode load (constant voltage load)	Even higher speed possible. Generally 2 - 8 times, depending on unit and load. Needs special attention on layout of cabling and damping networks because of the very high speed. Special "low inductive cables" recommended, see section Recommendations.							

SM3000						
Programming speed *High Speed Version*	**SM 15-200 D** *option P104*	**SM 30-100 D** *option P031*	**SM 45-70 D** *option P105*	**SM 70-45 D** *option P032*	**SM 120-25 D** *option P106*	**SM 300-10 D** *option P061*
CV-mode, resistive load						
Rise time (10 - 90%)						
output voltage step	0 → 15 V	0 → 30 V	0 → 45 V	0 → 70 V	0 → 120 V	0 → 300 V
time, (100 % load)	0.36 ms	0.33 ms	0.50 ms	0.45 ms	0.34 ms	1.00 ms
time, (10 % load)	0.26 ms	0.32 ms	0.35 ms	0.30 ms	0.32 ms	0.40 ms
Fall time (90 - 10%)						
output voltage step	15 → 0 V	30 → 0 V	45 → 0 V	70 → 0 V	120 → 0 V	300 → 0 V
time, (100 % load)	0.37 ms	0.55 ms	0.60 ms	0.67 ms	0.38 ms	1.20 ms
time, (10 % load)	1.60 ms	3.50 ms	5.00 ms	6.00 ms	3.50 ms	11.0 ms
Ripple @ full load typical (rms / pp)	5/35 mV	15/70 mV	20/100 mV	30/120 mV	30/120 mV	60/320 mV
Recovery time @ 50 - 100% load step typical time	100 µs	100 µs	100 µs	100 µs	100 µs	100 µs
Output Capacitance (typical)	800 µF	500 µF	360 µF	170 µF	33 µF	16 µF
CC-mode, resistive load	Similar result as with CV-mode and resistive load					
CC-mode, diode load (constant voltage load)	Even higher speed possible. Generally 2 - 8 times, depending on unit and load. Needs special attention on layout of cabling and damping networks because of the very high speed. Special "low inductive cables" recommended, see section Recommendations.					

SM6000								
Programming speed *High Speed Version*	**SM 15-400** *option P166*	**SM 30-200** *option P167*	**SM 45-140** *option P168*	**SM 60-100** *option P169*	**SM 70-90** *option P170*	**SM 120-50** *option P171*	**SM 300-20** *option P172*	**SM 600-10** *option P270*
CV-mode, resistive load								
Rise time (10 - 90%)								
output voltage step	0 → 15 V	0 → 30 V	0 → 45 V	0 → 60 V	0 → 70 V	0 → 120 V	0 → 300 V	0 → 600 V
time, (100 % load)	0.40 ms	0.41 ms	0.53 ms	0.44 ms	0.62 ms	0.57 ms	1.1 ms	1.9 ms
time, (10 % load)	0.38 ms	0.38 ms	0.16 ms	0.41 ms	0.40 ms	0.19 ms	0.44 ms	0.80 ms
Fall time (90 - 10%)								
output voltage step	15 → 0 V	30 → 0 V	45 → 0 V	60 → 0 V	70 → 0 V	120 → 0 V	300 → 0 V	600 → 0 V
time, (100 % load)	0.39 ms	0.41 ms	0.26 ms	0.57 ms	0.50 ms	0.38 ms	1.0 ms	2.2 ms
time, (10 % load)	1.5 ms	3.6 ms	10 ms	5.6 ms	6.2 ms	4.2 ms	10 ms	20 ms
Ripple @ full load typical (rms / pp)	6/20 mV	28/80 mV	34 / 80 mV	34/90 mV	38/100 mV	30/120 mV	48 / 150 mV	35 / 220 mV
Recovery time @ 50 - 100% load step typical time	100 µs	100 µs	100 µs	100 µs	100 µs	100 µs	100 µs	100 µs
Output Capacitance (typical)	1200 µF	800 µF	520 µF	330 µF	290 µF	73 µF	32 µF	19 µF
CC-mode, resistive load	Similar result as with CV-mode and resistive load							
CC-mode, diode load (constant voltage load)	Even higher speed possible. Generally 2 - 8 times, depending on unit and load. Needs special attention on layout of cabling and damping networks because of the very high speed. Special "low inductive cables" recommended, see section Recommendations.							