DELTA ELEKTRONIKA BV

P.O. BOX 27
4300 AA ZIERIKZEE
NETHERLANDS
TEL. +31 111 413656
FAX +31 111 416919
www.DeltaPowerSupplies.com

CE

HIGH SPEED PROGRAMMING OPTIONS FOR SM800, SM1500, SM3000 and SM6000

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

SM800-series (800 watt)			
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

SM1500-series (1500 watt)			
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

SM3000-series (3000 watt)			
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

SM6000-series (6000 watt)			
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 P172	0 - 300 V	0 - 20 A

Description:

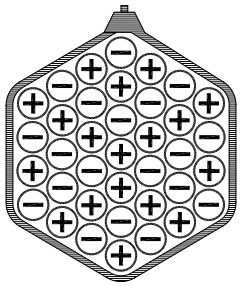
- The SM-series with the High Speed Programming Options are optimized for maximum programming speed. The speed is about **10 - 20 times higher** compared to the standard version.
- To achieve the high speed, the output capacitance has been made much smaller. Because of the smaller capacitors, the output ripple voltage is higher, but this is generally no problem for applications requiring high speed.
- The low output capacitance and the fast control result 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 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.

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 slow-down 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 figure below. For lower currents it can be sufficient to tie the plus- and minus-wire very close to each other.



Low Inductance Cable cross section

- 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 load, 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 an ISO AMP CARD.
  When the source is not sufficiently floating, it could result in distorted waveforms.
- Remote sensing is not recommended.

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			35 V / 24 A	200 V / 4 A
typical (rms / pp)	20 / 80 mV	40 / 120 mV	25 / 90 mV	35 / 200 mV
@ full load			70 V / 12 A	400 V / 2 A
typical (rms / pp)	-	-	30 / 110 mV	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				26 V / 60 A				200 V / 8 A
typical (rms / pp)	15 / 50 mV	50 / 115 mV	55 / 135 mV	30 / 105 mV	45 / 150 mV	20 / 80 mV	25 / 115 mV	85 / 355 mV
@ full load				52 V / 30 A				400 V / 4 A
typical (rms / pp)	-	-	-	25 / 90 mV	-	-	-	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*
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
time, (100 % load)	0.40 ms	0.41 ms	0.53 ms	0.44 ms	0.62 ms	0.57 ms	1.1 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
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
time, (100 % load)	0.39 ms	0.41 ms	0.26 ms	0.57 ms	0.50 ms	0.38 ms	1.0 ms
time, (10 % load)	1.5 ms	3.6 ms	10 ms	5.6 ms	6.2 ms	4.2 ms	10 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
Recovery time @ 50 - 100% load step typical time	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
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.						