



## 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
SM 600-10	Option P270	0 - 600 V	0 - 10 A

## Description:

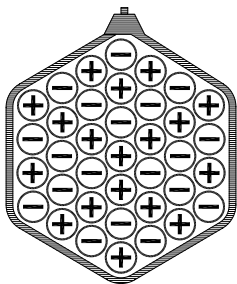
- The SM-series with the High Speed Programming Options are optimized for maximum programming speed. The speed is about **10 - 20 times higher** compared to the standard version.
- To achieve the high speed, the output capacitance has been made much smaller. Because of the smaller capacitors, the output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

<b>SM800</b>				
<b>Programming speed</b> <i>High Speed Version</i>	<b>SM 7.5-80</b> <i>option P250</i>	<b>SM 18-50</b> <i>option P251</i>	<b>SM 70-AR-24</b> <i>option P252</i>	<b>SM 400-AR-4</b> <i>option P253</i>
<b>CV-mode, resistive load</b>				
<b>Rise time (10 - 90%)</b> output voltage step time, (100 % load) time, (10 % load)	0 → 7.5V 0.2 ms 0.2 ms	0 → 16V 0.22 ms 0.26 ms	0 → 35V 0.24 ms 0.24 ms	0 → 200V 0.4ms 0.3ms
	- - -	- - -	0 → 70V 0.24 ms 0.24 ms	0 → 400V 0.82 ms 0.55 ms
<b>Fall time (90 - 10%)</b> output voltage step time, (100 % load) time, (10 % load)	7.5 → 0 V 0.2 ms 1 ms	16 → 0 V 0.24 ms 1.95 ms	35 → 0 V 0.27 ms 3 ms	200 → 0 V 0.42 ms 4.6ms
	- - -	- - -	70 → 0 V 0.85 ms 9.5 ms	400 → 0 V 1.7ms 20 ms
<b>Ripple</b> @ full load typical (rms / pp)	20/80mV	40/120mV	35V/24A 25/90mV 70V/12A 30/110mV	200V/4A 35/200mV 400V/2A 30/160mV
@ full load typical (rms / pp)	-	-	-	-
<b>Recovery time</b> @ 50 - 100% load step, typical	100µs	100µs	100µs	100µs
<b>Output Capacitance</b> (typical)	310µF	200µF	80 µF	4µF
<b>CC-mode, resistive load</b>	Similar result as with CV-mode and resistive load			
<b>CC-mode, diode load</b> (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.			

<b>SM1500</b>								
<b>Programming speed</b> <i>High Speed Version</i>	<b>SM 15-100</b> <i>option P210</i>	<b>SM 35-45</b> <i>option P211</i>	<b>SM 52-30</b> <i>option P212</i>	<b>SM 52-AR-60</b> <i>option P213</i>	<b>SM 70-22</b> <i>option P214</i>	<b>SM 120-13</b> <i>option P215</i>	<b>SM 300-5</b> <i>option P216</i>	<b>SM400-AR-8</b> <i>option P217</i>
<b>CV-mode, resistive load</b>								
<b>Rise time (10 - 90%)</b> output voltage step time, (100 % load) time, (10 % load)	0 → 15V 0.20 ms 0.11 ms	0 → 35V 0.27 ms 0.14 ms	0 → 52V 0.31 ms 0.23 ms	0 → 26V 0.44 ms 0.43 ms	0 → 70V 0.47 ms 0.30 ms	0 → 120V 0.46 ms 0.27 ms	0 → 300V 1.0 ms 0.51 ms	0 → 200V 0.35 ms 0.33 ms
	- - -	- - -	- - -	0 → 52V 0.53 ms 0.34 ms	- - -	- - -	- - -	- - -
<b>Fall time (90 - 10%)</b> output voltage step time, (100 % load) time, (10 % load)	15 → 0 V 0.21 ms 1.6 ms	35 → 0 V 0.33 ms 3.5 ms	52 → 0 V 0.38 ms 3.9 ms	26 → 0 V 0.27 ms 3.2 ms	70 → 0V 0.78 ms 8.3 ms	120 → 0V 0.51 ms 4.5 ms	300 → 0V 1.40 ms 13ms	200 → 0V 0.35 ms 3.8 ms
	- - -	- - -	- - -	52 → 0 V 1.0ms 9.7 ms	- - -	- - -	- - -	- - -
<b>Ripple</b> @ full load typical (rms / pp)	15/50mV	50/115mV	55/135mV	26V/60A 30/105mV 52V/30A 25/90mV	45/150mV	20/80mV	25/115mV	200V/8A 85/355mV 400V/4A 60/245mV
@ full load typical (rms / pp)	-	-	-	-	-	-	-	-
<b>Recovery time</b> @ 50 - 100% load step, typical	100µs	100µs	100µs	100µs	100µs	100µs	100µs	100µs
<b>Output Capacitance</b> (typical)	390µF	190µF	91µF	195µF	113µF	21µF	10µF	7µF
<b>CC-mode, resistive load</b>	Similar result as with CV-mode and resistive load							
<b>CC-mode, diode load</b> (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.							

<b>SM3000</b>						
<b>Programming speed</b> <i>High Speed Version</i>	<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>CV-mode, resistive load</b>						
<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>Ripple</b> @ full load typical (rms / pp)	5/35mV	15/70mV	20/100mV	30/120mV	30/120mV	60/320mV
<b>Recovery time</b> @ 50 - 100% load step typical time	100µs	100µs	100µs	100µs	100µs	100µs
<b>Output Capacitance</b> (typical)	800µF	500µF	360µF	170µF	33µF	16µF
<b>CC-mode, resistive load</b>	Similar result as with CV-mode and resistive load					
<b>CC-mode, diode load</b> (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.					

<b>SM6000</b>								
<b>Programming speed</b> <i>High Speed Version</i>	<b>SM 15-400</b> <i>option P166</i>	<b>SM 30-200</b> <i>option P167</i>	<b>SM 45-140</b> <i>option P168</i>	<b>SM 60-100</b> <i>option P169</i>	<b>SM 70-90</b> <i>option P170</i>	<b>SM 120-50</b> <i>option P171</i>	<b>SM 300-20</b> <i>option P172</i>	<b>SM 600-10</b> <i>option P270</i>
<b>CV-mode, resistive load</b>								
<b>Rise time (10 - 90%)</b> output voltage step time, (100 % load) time, (10 % load)	0 → 15V 0.40 ms 0.38 ms	0 → 30V 0.41 ms 0.38 ms	0 → 45V 0.53 ms 0.16 ms	0 → 60V 0.44 ms 0.41 ms	0 → 70V 0.62 ms 0.40 ms	0 → 120V 0.57 ms 0.19 ms	0 → 300V 1.1 ms 0.44 ms	0 → 600V 1.9 ms 0.80 ms
<b>Fall time (90 - 10%)</b> output voltage step time, (100 % load) time, (10 % load)	15 → 0V 0.39 ms 1.5 ms	30 → 0V 0.41 ms 3.6 ms	45 → 0V 0.26 ms 10 ms	60 → 0V 0.57 ms 5.6 ms	70 → 0V 0.50 ms 6.2 ms	120 → 0V 0.38 ms 4.2 ms	300 → 0V 1.0 ms 10 ms	600 → 0V 2.2 ms 20 ms
<b>Ripple</b> @ full load typical (rms / pp)	6/20 mV	28/80mV	34 / 80mV	34/90mV	38/100mV	30/120mV	48 / 150mV	35 / 220mV
<b>Recovery time</b> @ 50 - 100% load step typical time	100µs	100µs	100µs	100µs	100µs	100µs	100µs	100µs
<b>Output Capacitance</b> (typical)	1200µF	800µF	520µF	330µF	290µF	73µF	32µF	19µF
<b>CC-mode, resistive load</b>	Similar result as with CV-mode and resistive load							
<b>CC-mode, diode load</b> (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.							