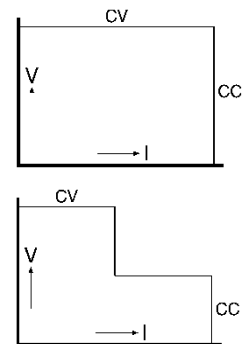




## SM800 - Series 800W DC POWER SUPPLIES

Models	Voltage range	Current range
SM 7.5-80	0 - 7.5 V	0 - 80 A
SM 18-50	0 - 18 V	0 - 50 A
SM 70-AR-24	0 - 35 V	0 - 24 A
Autoranging output	0 - 70 V	0 - 12 A
SM 400-AR-4	0 - 200 V	0 - 4 A
Autoranging output	0 - 400 V	0 - 2 A



### Features

- Designed for long life at full power
- Excellent dynamic response to load changes
- Protected against all overload and short circuit conditions
- EMC surpasses CE requirements: low emission & high immunity
- Low audible noise: temperature controlled fans
- Available options: analog & digital Interfaces, High Speed Programming, Digital Encoders, Sequencer, Power Sink etc.

### Functionalities

- Master/Slave parallel and series operation with voltage and current sharing
- Stacking is allowed, space between units is not required
- High power system configuration from multiple units
- 19" rack mounting or laboratory use (feet included)
- Remote sensing
- Interlock

Your contact:



**Schulz-Electronic**  
Professional Power Supplies

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	SM 7.5-80	SM 18-50	SM 70-AR-24	SM 400-AR-4
<b>DC Power terminals</b>				
voltage	0 - 7.5 V	0 - 18 V	0 - 70 V	0 - 400 V
current	0 - 80 A	0 - 50 A	0 - 24 A	0 - 4 A
AUTORANGING (2 ranges)	no	no	yes	yes
Max. output current / voltages	/	/	24 A / 0-35 V 12 A / 35-70 V	4 A / 0-200 V 2 A / 200-400 V
<b>AC Input</b>				
single phase, 48 - 62 Hz	90-265 V	90-265 V	90-265 V	90-265 V
rated voltage range	100-240 V	100-240 V	100-240 V	100-240 V
rated frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
rated current	max 10A	max 10A	max 10A	max 10A
Power Derating vs input:		$V_o = 16V$ $V_o = 18V$		
90 V : $P_{out\ max}$ (W), $I_{in}$ (A)	580, 8.5	725, 10    670, 9.2	740, 10	750, 10
100 V: $P_{out\ max}$ (W), $I_{in}$ (A)	600, 7.6	800, 9.9    730, 8.9	830, 10	800, 9.5
110 V: $P_{out\ max}$ (W), $I_{in}$ (A)	600, 6.9	800, 8.8    770, 8.4	840, 9	800, 8.5
<b>230 V: <math>P_{out\ max}</math> (W), <math>I_{in}</math> (A)</b>	600, 3.2	800, 4.1    900, 4.5	840, 4.2	800, 4
power factor, 100%, 50% load	0.99, 0.96	0.99, 0.98	0.99, 0.98	0.99, 0.98
internal fuses	12.5 AT	12.5 AT	12.5 AT	12.5 AT
standby input power ( $V_o=I_o=0$ )	14 W	14 W	14 W	14 W
standby input power ( $V_o=V_{max}$ )	18 W	18 W	20 W	26 W
<b>Efficiency</b>			35 V / 70 V	200 V / 400 V
230 V AC, 1 ph input, full load	82 %	87 %	89 %	89 %
115 V AC, 1 ph input, full load	80 %	83 %	85 %	86 %
<b>Regulation</b>				
Load 0 - 100% <b>CV</b>	0.2 mV	0.5 mV	2 mV	10 mV
Line 120 - 265 V AC <b>CV</b> (measured on sense block)	0.2 mV	0.2 mV	0.5 mV	2 mV
Load 0 - 100% <b>CC</b>	4 mA	3 mA	1.5 mA	0.5 mA
Line 120 - 265 V AC <b>CC</b> (internal voltage sense)	1 mA	1 mA	1 mA	0.2 mA
<b>Ripple + noise</b>				
rms (BW=300 kHz) <b>CV</b>	2.5 mV	2 mV	3 mV	15 mV
p-p (BW=20 MHz) <b>CV</b>	10 mV	8 mV	15 mV	80 mV
rms (BW=300 kHz) <b>CC</b>	25 mA	5 mA	3 / 1 mA	0.8 / 0.5 mA
p-p (BW=20 MHz) <b>CC</b> <i>CC-ripple at full load</i>	120 mA	25 mA	15 / 5 mA	3 / 1.5 mA
<b>Front panel connection</b>	<b>Not available</b>	<b>Option 257</b>	<b>Option 258</b>	<b>Option 259</b>
Load Regulation:				
Load 0 - 100% <b>CV</b>	-	15 mV	40 mV	15 mV
Ripple + noise				
rms (BW=300 kHz) <b>CV</b>	-	3 mV	4 mV	18 mV
p-p (BW=20 MHz) <b>CV</b>	-	18 mV	20 mV	150 mV
<b>Temp. coeff., per °C<sup>1</sup></b>			35.10 <sup>-6</sup> 60.10 <sup>-6</sup>	
<b>Stability<sup>1</sup></b> after 1 hr warm-up during 8 hrs <b>CV</b> <b>CC</b>			6.10 <sup>-5</sup> 9.10 <sup>-5</sup>	
$t_{amb} = 25 \pm 1\ ^\circ C$ , $V_{in} = 230\ VAC$			(internal voltage sensing for CC-stab.)	

<b>Analog Programming</b>	<b>CV</b>	<b>CC</b>
<b>Programming inputs</b>		
accuracy	0 - 5 V $\pm 0.2\%$	0 - 5 V $\pm 0.5\%$
offset	- 0.1 ... +1.3 mV (on 5V)	0 ... +2.2 mV (on 5V)
temp. coeff. offset	10 $\mu V / ^\circ C$	50 $\mu V / ^\circ C$
input impedance	> 1 MOhm	> 1 MOhm
<b>Monitoring outputs</b>		
accuracy	0 - 5 V $\pm 0.2\%$	0 - 5 V $\pm 0.2\%$
offset	- 1 ... 0 mV (on 5V)	- 1.1 ... 0 mV (on 5V)
temp. coeff. offset	3 $\mu V / ^\circ C$	60 $\mu V / ^\circ C$
input impedance	2 Ohm / max. 4mA	2 Ohm / max. 4mA
<b>ISO AMP Programming (optional)</b>	Isolated analog programming, range 0 - 5 V / 200 kOhm or 0 - 10 V / 400 kOhm. See datasheet ISO AMP on <a href="http://www.DeltaPowerSupplies.com">www.DeltaPowerSupplies.com</a> for accuracy, offset etc.	
<b>Reference voltage</b> on prog. connector	$V_{ref}$ TC	5.114 $\pm 15$ mV ( $R_o = 2$ Ohm, max. 4 mA) 20 ppm
<b>+12 V output</b> on prog. Connector	$V_o$ $I_{max}$ $R_o$	12 V $\pm 0.2$ V 0.2 A 3 Ohm

Notes: 1. Measured at full load. 2. See "Safety instructions".

<b>Status Outputs</b>	CC - status LIM - status OT - status PSOL - status ACF - status DCF - status	CC - operation CV or CC limit Over Temperature Power Sink Overload AC - Fail DC - Fail <sup>1)</sup>	5 V = logic 1 (Ro = 500 Ohm) 5 V = logic 1 (Ro = 500 Ohm) 5 V = logic 1 (Ro = 500 Ohm) 5 V = logic 1 (Ro = 500 Ohm) 5 V = logic 1 (Ro = 500 Ohm) 5 V = logic 1 (Ro = 500 Ohm)
<b>Relay Outputs</b>	ACF DCF	AC - Fail DC - Fail <sup>1)</sup>	both NO and NC contact both NO and NC contact <sup>1)</sup> output ± 5% beyond set point
<b>Remote shutdown</b>	with + 5 V, 1 mA or relay contact		
<b>Interlock</b>	contact at rear panel, see photo of rear panel on page 1-6		
<b>Indicators</b> (front panel)	AC-Fail, DC-Fail, Over Temperature, Power Sink Overload, Remote-ShutDown, Remote-CV, Remote-CC, Output On, CV-limit, CC-limit, CV- and CC- mode		
<b>Controls</b> (front panel)	Mains on/off, CV-and CC-potmeter, CV- and CC-limit-potmeter, Display-Settings button, Display-Limits button, Remote/Local, Output On/Off, Front panel Lock		

<b>Programming speed</b> <i>Standard Version</i> (resistive load)	<b>SM 7.5-80</b>	<b>SM 18-50</b>	<b>SM 70-AR-24</b>	<b>SM 400-AR-4</b>
<b>Rise time (10 - 90%)</b> output voltage step time, (100 % load) time, (10 % load)	0 → 7.5 V 6.5 ms 2.5 ms	0 → 16 V 12 ms 5 ms	0 → 35 V 6 ms 2.5 ms	0 → 200 V 4 ms 2 ms
output voltage step time, (100 % load) time, (10 % load)	- - -	- - -	0 → 70 V 10 ms 7 ms	0 → 400 V 8 ms 5 ms
<b>Fall time (90 - 10%)</b> output voltage step time, (100 % load) time, (10 % load)	7.5 → 0 V 6.5 ms 62 ms	16 → 0 V 12 ms 120 ms	35 → 0 V 6 ms 60 ms	200 → 0 V 4 ms 42 ms
output voltage step time, (100 % load) time, (10 % load)	- - -	- - -	70 → 0 V 25 ms 250 ms	400 → 0 V 15 ms 155 ms
<b>Programming speed</b> <i>Optional High Speed</i> (resist. load)	<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>Rise time (10 - 90%)</b> output voltage step time, (100 % load) time, (10 % load)	0 → 7.5 V 0.2 ms 0.2 ms	0 → 16 V 0.22 ms 0.26 ms	0 → 35 V 0.24 ms 0.24 ms	0 → 200 V 0.4 ms 0.3 ms
output voltage step time, (100 % load) time, (10 % load)	- - -	- - -	0 → 70 V 0.24 ms 0.24 ms	0 → 400 V 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 4.6 ms
output voltage step time, (100 % load) time, (10 % load)	- - -	- - -	70 → 0 V 0.85 ms 9.5 ms	400 → 0 V 1.7 ms 20 ms
<b>Ripple</b> @ full load typical (rms/pp) typical (rms/pp)	20 / 80 mV 310 µF	40 / 120 mV 200 µF	35 V / 24 A 25 / 90 mV 70 V / 12 A 30 / 110mV	200V / 4 A 35 / 200 mV 400 V / 2 A 30 / 160 mV
<b>Output Capacitance</b> (typical)	310 µF	200 µF	80 µF	4 µF

	<b>SM 7.5-80</b>	<b>SM 18-50</b>	<b>SM 70-AR-24</b>	<b>SM 400-AR-4</b>
<b>Recovery time</b> recovery within di/dt of load step output voltage time, @ 50 - 100% load step max. deviation	50 mV 1.25 A/µs 7 V 100 µs 160 mV	60 mV 0.9 A/µs 15 V 100 µs 150 mV	35 / 70 V 75 mV 0.4 / 0.2 A/µs 30 / 65 V 100 µs 250 / 200 mV	200 / 400 V 1.0 / 0.5 V 0.1 / 0.05 A/µs 185 / 370 V 100 µs 2 / 1.5 V
<b>Output impedance</b> CV, 0-1 kHz CV, 1-100 kHz	< 1 mΩ < 30 mΩ	< 2 mΩ < 30 mΩ	< 7 mΩ < 35 mΩ	< 0.18 Ω < 2 Ω
<b>Pulsating load</b> max. tolerable AC component of load current f > 1 kHz, f < 1 kHz	15 A <sub>rms</sub> , 80 A <sub>peak</sub>	15 A <sub>rms</sub> , 50 A <sub>peak</sub>	10 A <sub>rms</sub> , 24 / 12 A <sub>peak</sub>	0.4 A <sub>rms</sub> , 4 / 2 A <sub>peak</sub>

Notes: 1. Measured at full load. 2. See "Safety instructions".

<b>Insulation</b> AC mains / DC power terminals creepage / clearance AC mains / case DC power terminals / case	3750 V <sub>rms</sub> (1min.) 8 mm 2500 V <sub>rms</sub> 600 V DC <sup>2</sup>			
<b>Safety</b>	EN 60950 / EN 61010			
<b>EMC</b> <b>Generic Emission</b> <b>Generic Immunity</b>	EN 61326-1, class B equipment (for use in domestic establishments) EN 61326-1, equipment for use in industrial and domestic establishments			
<b>Operating Temperature</b>	- 20 to + 50 °C @ full load, derate output to 75% at 60 °C			
<b>Humidity</b>	maximum 95% RH, non condensing, up to 40 °C maximum 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> (@ 230 VAC input) V <sub>out</sub> = 100%, P <sub>out</sub> ≤ 840 W V <sub>out</sub> = 85%, I <sub>out</sub> = 100% V <sub>out</sub> = 100%, I <sub>out</sub> = 50%	16 ms 20 ms 36 ms			
<b>Turn on delay</b> after mains switch on	600 ms @ 230 VAC, 900 ms @ 115 VAC			
<b>Inrush current</b>	22 A @ 230 VAC, 24 A @ 115VAC			
	<b>SM 7.5-80</b>	<b>SM 18-50</b>	<b>SM 70-AR-24</b>	<b>SM 400-AR-4</b>
<b>Series operation</b> max. total voltage Master / Slave operation	600 V <sup>2</sup> yes			
<b>Parallel operation</b> Normal Master / Slave operation	no limit maximum 4 units			
<b>Remote sensing</b> max. voltage drop per load lead	2 V			
<b>Limits</b> <b>Voltage</b> adjust range <b>Current</b> adjust range	0 - 102 % 0 - 102 %			
<b>Front panel CV/CC-controls</b> resolution knob operation screwdriver adjustment  Lock function for CV/CC-settings Selectable Start-up at 0V / 0A or at last settings	analog potentiometers <sup>3)</sup> 10 turns (0.03%) standard optional (P001)  no <sup>3)</sup> no <sup>3)</sup>  <sup>3) optional with digital encoders (P236).</sup>			
<b>Meters</b> scale voltage scale current accuracy read output read limit setting (d = digit)	3.5 digit 0 - 7.50 V 0 - 80.0 A 0.5% + 2d 2% + 2d	3.5 digit 0 - 18.00 V 0 - 50.0A 0.5% + 2d 2% + 2d	3.5 digit 0 - 70.0V 0 - 24.0 A 0.5% + 2d 2% + 2d	3.5 digit 0 - 400 V 0 - 4.00 A 0.5% + 2d 2% + 2d
<b>Mounting</b>	stacking of units allowed, air flow is from rear to sides			
<b>AC Terminals</b>	IEC320/C14, EN60320/C14			
<b>DC Terminals</b>	M5 bolts			
<b>Programming connector</b>	15 pole D-connector at rear panel (Female)			
<b>Interlock</b>	contact at rear panel			
<b>Cooling</b> audio noise level  air flow	low noise blower, fan speed adapts to temperature of internal system ca. 45 dBA at full load, 25 °C ambient temperature, 1 m distance ca. 50 dBA at full load, 50 °C ambient temperature, 1 m distance From rear to sides			
<b>Enclosure</b> degree of protection	IP20			
<b>Dimensions</b> front panel: h x w behind front panel: h x w x d	88.1 x 222 mm (1/2 19", 2 U) 86 x 221 x 406 mm (feet removed)			
<b>Weight</b>	5.4 kg			

Notes: 1. Measured at full load. 2. See "Safety instructions".

## Typical Applications

- Accurate current sources
- Automotive battery simulations
- Driving PWM-Controlled DC motors
- Electronic circuit design
- Controlled battery (dis)charging
- Medical research equipment
- Component device testing
- Lasers
- Aerospace and military equipment
- ATE in industrial production lines

## Available Options



### Increased Output Power

The conservatively rated unit allows to deliver extra output with the same reliability.

At some derating, either the maximum output voltage or the maximum output current can be increased by about 10%.

Order Code :

- P069



### High Speed Programming

A 10 to 20 times higher programming speed (down to 0.2ms rise time at full load) and lower output capacitance<sup>1)</sup>. Excellent for laser applications, test systems or as current source with low parallel capacitance as used in plasma chambers.

Order Codes :

- SM 7.5-80 P250
- SM 18-50 P251
- SM 70-AR-24 P252
- SM400-AR-4 P253



### Two-Quadrant Output Power Sink

Two quadrant operation maintains the DC output voltage constant regardless the output power is positive or negative<sup>1)</sup>. Ideal for PWM-speed controlled DC-Motors and ATE systems.

Order Codes :

- SM 7.5-80 P245
- SM 18-50 P246
- SM 70-AR-24 P247
- SM400-AR-4 P248



### Sequencer

Arbitrary Waveform generator or standalone automation. The sequencer is integrated in the Ethernet controller.

Order Code :

- P256



### Digital CV- and CC-Settings

Reliable, long-life digital encoders can be implemented at the front panel. Includes total front panel lock (also for CV- / CC-knobs) and a coarse or fine pitch adjustment depending on the turning speed.

Order Code :

- P236



### Secured Voltage and Current Settings

For maximum security, the CV/CC settings can be adjusted with a screwdriver only and are protected with a plastic cap from accidental adjusting.

Order Code :

- P001



### Software Control and Interfaces

Interfaces to be installed by factory <sup>2)</sup>.

Order Codes:

- Ethernet controller (including sequencer) - P256
- ISO AMP Card - isolated analog - P249
- RS232 controller - P254
- IEEE488 controller - P255



### 19" Rack Mounting adapter

The 19" mounting adapters make it possible to position one or two units side by side in a 19" rack.

Order Codes:

- RA19 - 1SM800 (for 1unit)
- RA19 - 2SM800 (for 2units)



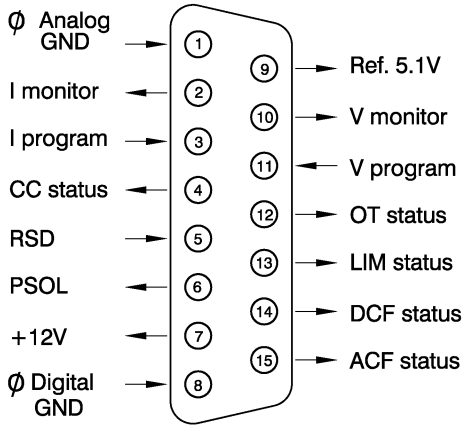
### Front Power Output

Bind posts at the front panel instead of at the rear panel.

Order Codes :

- SM 7.5-80 n.a.
- SM 18-50 P257
- SM 70-AR-24 P258
- SM400-AR-4 P259

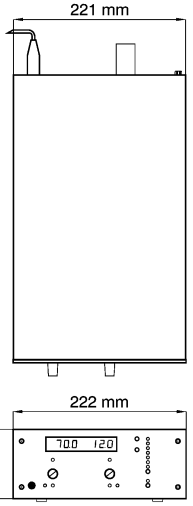
Notes: 1. Download datasheets about High Speed Programming, Power Sink and Battery Charging from [www.DeltaPowerSupplies.com](http://www.DeltaPowerSupplies.com).  
2. There is only room for one of the interfaces in a unit.



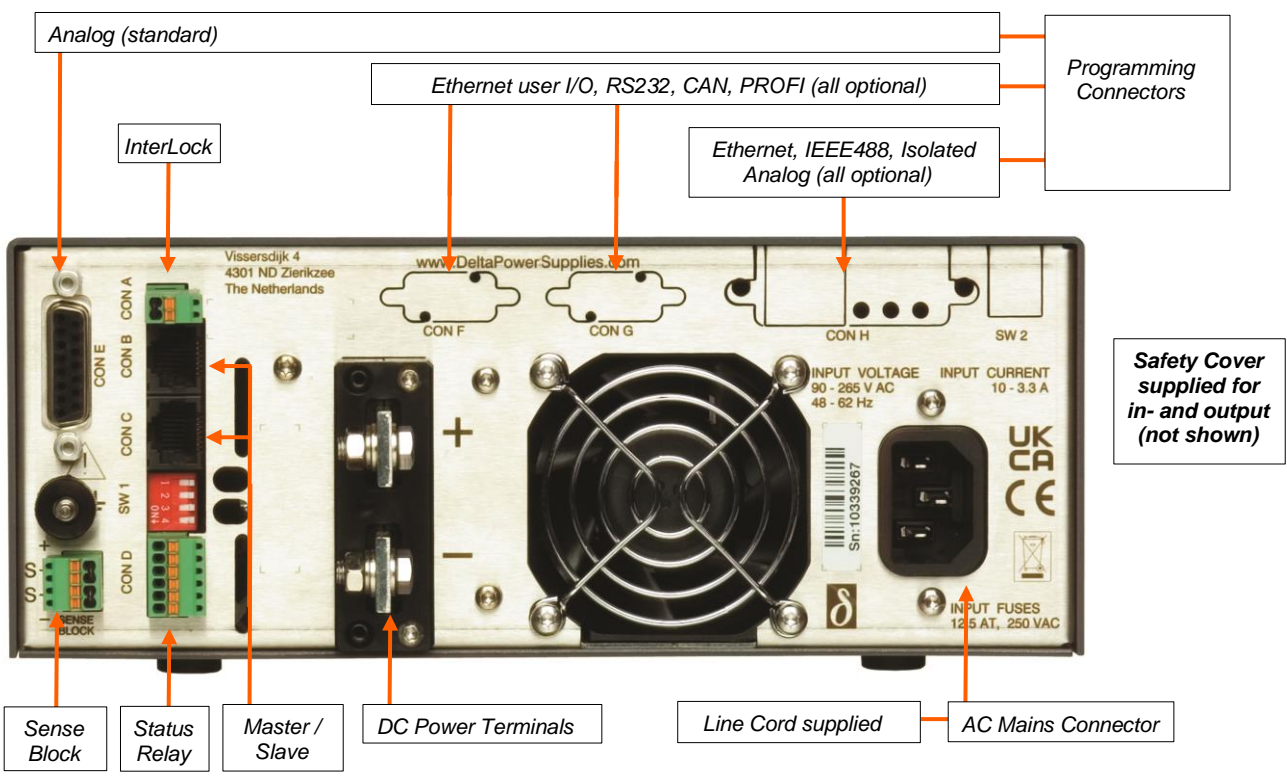
CV = Constant Voltage  
 CC = Constant Current

Specifications measured at  
 $t_{amb} = 25 \pm 5 \text{ }^\circ\text{C}$  and  $V_{in} = 230 \text{ VAC}$ ,  
 50 Hz unless otherwise noted.

The information in this document is  
 subject to change without notice.



Connections analog programming connector



19" Rack Adapter RA19-2 SM800



Front panel connection:  
 SM18-50 Option P257  
 SM70-AR-24 Option P258  
 SM400-AR-4 Option P259



19" Rack Adapter RA19-1 SM800