DELTA ELEKTRONIKA B.V.
DC POWER SUPPLIES

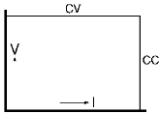
Vissersdijk 4, 4301 ND
Zierikzee, the Netherlands

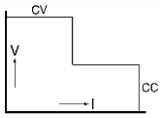
DeltaPowerSupplies.com
Tel. +31 111 413656

SM800 - Series 800 W DC POWER SUPPLIES

CE

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 Autoranging output	0 – 35 V 0 – 70 V	0 – 24 A 0 – 12 A
SM 400-AR-4 Autoranging output	0 – 200 V 0 – 400 V	0 – 4 A 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
Schulz-Electronic GmbH
Dr.-Rudolf-Eberle-Straße 2
D-76534 Baden-Baden
Fon + 49.7223.9636.0
vertrieb@schulz-electronic.de
www.schulz-electronic.de

	SM 7.5-80	SM 18-50	SM 70-AR-24	SM 400-AR-4
DC Power terminals				
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
AC Input				
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:		*Vo = 16V* *Vo = 18 V*		
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
230 V: $P_{out\ max}$ (W), I_{in} (A)	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
Efficiency			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 %
Regulation				
Load 0 - 100% **CV**	0.2 mV	0.5 mV	2 mV	10 mV
Line 120 - 265 V AC **CV** (measured on sense block)	0.2 mV	0.2 mV	0.5 mV	2 mV
Load 0 - 100% **CC**	4 mA	3 mA	1.5 mA	0.5 mA
Line 120 - 265 V AC **CC** (internal voltage sense)	1 mA	1 mA	1 mA	0.2 mA
Ripple + noise				
rms (BW=300 kHz) **CV**	2.5 mV	2 mV	3 mV	15 mV
p-p (BW=20 MHz) **CV**	10 mV	8 mV	15 mV	80 mV
rms (BW=300 kHz) **CC**	25 mA	5 mA	3 / 1 mA	0.8 / 0.5 mA
p-p (BW=20 MHz) **CC** *CC-ripple at full load*	120 mA	25 mA	15 / 5 mA	3 / 1.5 mA
Front panel connection	***Not available***	***Option 257***	***Option 258***	***Option 259***
Load Regulation:				
Load 0 - 100% **CV**	-	15 mV	40 mV	15 mV
Ripple + noise				
rms (BW=300 kHz) **CV**	-	3 mV	4 mV	18 mV
p-p (BW=20 MHz) **CV**	-	18 mV	20 mV	150 mV
Temp. coeff., per °C [1] **CV**	35.10^{-6}			
CC	60.10^{-6}			
Stability [1] after 1 hr warm-up				
during 8 hrs **CV**	6.10^{-5}			
CC	9.10^{-5}			
t_{amb} = 25 ± 1 °C, V_{in} = 230 VAC	(internal voltage sensing for CC-stab.)			

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

Status Outputs			
CC	- status	CC - operation	5 V = logic 1 (Ro = 500 Ohm)
LIM	- status	CV or CC limit	5 V = logic 1 (Ro = 500 Ohm)
OT	- status	Over Temperature	5 V = logic 1 (Ro = 500 Ohm)
PSOL	- status	Power Sink Overload	5 V = logic 1 (Ro = 500 Ohm)
ACF	- status	AC - Fail	5 V = logic 1 (Ro = 500 Ohm)
DCF	- status	DC - Fail [1)]	5 V = logic 1 (Ro = 500 Ohm)
Relay Outputs	ACF	AC - Fail	both NO and NC contact
	DCF	DC - Fail [*)]	both NO and NC contact [*)] output ± 5% beyond set point
Remote shutdown	with + 5 V, 1 mA or relay contact		
Interlock	contact at rear panel, see photo of rear panel on page 1-6		
Indicators (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		
Controls (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		

Notes: 1. Measured at full load. 2. See "Safety instructions" in the product manual.

Programming speed *Standard Version* (resistive load)	**SM 7.5-80**	**SM 18-50**	**SM 70-AR-24**	**SM 400-AR-4**
Rise time (10 - 90%)				
output voltage step	0 → 7.5 V	0 → 16 V	0 → 35 V	0 → 200 V
time, (100 % load)	6.5 ms	12 ms	6 ms	4 ms
time, (10 % load)	2.5 ms	5 ms	2.5 ms	2 ms
output voltage step	-	-	0 → 70 V	0 → 400 V
time, (100 % load)	-	-	10 ms	8 ms
time, (10 % load)	-	-	7 ms	5 ms
Fall time (90 - 10%)				
output voltage step	7.5 → 0 V	16 → 0 V	35 → 0 V	200 → 0 V
time, (100 % load)	6.5 ms	12 ms	6 ms	4 ms
time, (10 % load)	62 ms	120 ms	60 ms	42 ms
output voltage step	-	-	70 → 0 V	400 → 0 V
time, (100 % load)	-	-	25 ms	15 ms
time, (10 % load)	-	-	250 ms	155 ms
Programming speed *Optional High Speed* (resist. load)	**SM 7.5-80** *Option P250*	**SM 18-50** *Option P251*	**SM 70-AR-24** *Option P252*	**SM 400-AR-4** *Option P253*
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	200V / 4 A
typical (rms/pp)	20 / 80 mV	40 / 120 mV	25 / 90 mV	35 / 200 mV
			70 V / 12 A	400 V / 2 A
typical (rms/pp)			30 / 110mV	30 / 160 mV
Output Capacitance (typical)	310 µF	200 µF	80 µF	4 µF

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

Insulation	
AC mains / DC power terminals	3750 V_{rms} (1min.)
creepage / clearance	8 mm
AC mains / case	2500 V_{rms}
DC power terminals / case	600 V DC [2]
Safety	EN 60950 / EN 61010
EMC Emission	**EN 61326-1,** class B equipment (for use in domestic establishments)
Immunity	**EN 61326-1,** equipment for use in industrial and domestic establishments

Operating Temperature	– 20 to + 50 °C @ full load, derate output to 75% at 60 °C
Humidity	maximum 95% RH, non-condensing, up to 40 °C maximum 75% RH, non-condensing, up to 50 °C
Storage temperature	– 40 to + 70 °C
Thermal protection	output shuts down in case of insufficient cooling
MTBF	500 000 hrs

Notes: 1. Measured at full load. 2. See "Safety instructions" in the product manual.

Hold-Up time (@ 230 VAC input) V_{out} = 100%, P_{out} <= 840 W V_{out} = 85%, I_{out} = 100% V_{out} = 100%, I_{out} = 50%	 16 ms 20 ms 36 ms
Turn on delay after mains switch on	 600 ms @ 230 VAC, 900 ms @ 115 VAC
Inrush current	22 A @ 230 VAC, 24 A @ 115 VAC

	SM 7.5-80	SM 18-50	SM 70-AR-24	SM 400-AR-4
Series operation max. total voltage Master / Slave operation		600 V[2] yes		
Parallel operation Normal Master / Slave operation		no limit maximum 4 units		
Remote sensing max. voltage drop per load lead		2 V		
Limits **Voltage** adjust range **Current** adjust range		0 - 102 % 0 - 102 %		
Front panel CV/CC-controls resolution knob operation screwdriver adjustment Lock function for CV/CC-settings Selectable Start-up at 0V / 0A or at last settings		analog potentiometers [3] 10 turns (0.03%) standard optional (P001) no [3] no [3] *[3] optional with digital encoders (P236).*		
Meters 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

Mounting	stacking of units allowed, air flow is from rear to sides
AC Terminals	IEC320/C14, EN60320/C14
DC Terminals	M5 bolts
Programming connector	15 pole D-connector at rear panel (Female)
Interlock	contact at rear panel
Cooling 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
Enclosure degree of protection	 IP20
Dimensions 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)
Weight	5.4 kg

CV = Constant Voltage
CC = Constant Current

Specifications measured at t_{amb} = 25 ± 5 °C and Vin = 230 VAC, 50 Hz unless otherwise noted.

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

Typical Applications

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

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%.

Option 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[1]. Excellent for laser applications, test systems or as current source with low parallel capacitance as used in plasma chambers.

Option Codes:
- SM 7.5-80 – P250
- SM 18-50 – P251
- SM 70-AR-24 – P252
- SM400-AR-4 – P253

Two-Quadrant Output Power Sink

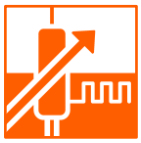
Two quadrant operation maintains the DC output voltage constant regardless the output power is positive or negative[1]. Ideal for PWM-speed controlled DC-Motors and ATE systems.

Option 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.

Option 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.

Option 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.

Option Code:
- P001

Software Control and Interfaces

Interfaces to be installed by factory [2].

Option Codes:
- Ethernet controller – P256 (including sequencer)
- ISO AMP Card - isolated analog – P249
- RS232 controller – P254

19" Rack Mounting adapter

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

Order Codes:
- RA19 - 1SM800 (for 1 unit)
- RA19 - 2SM800 (for 2 units)

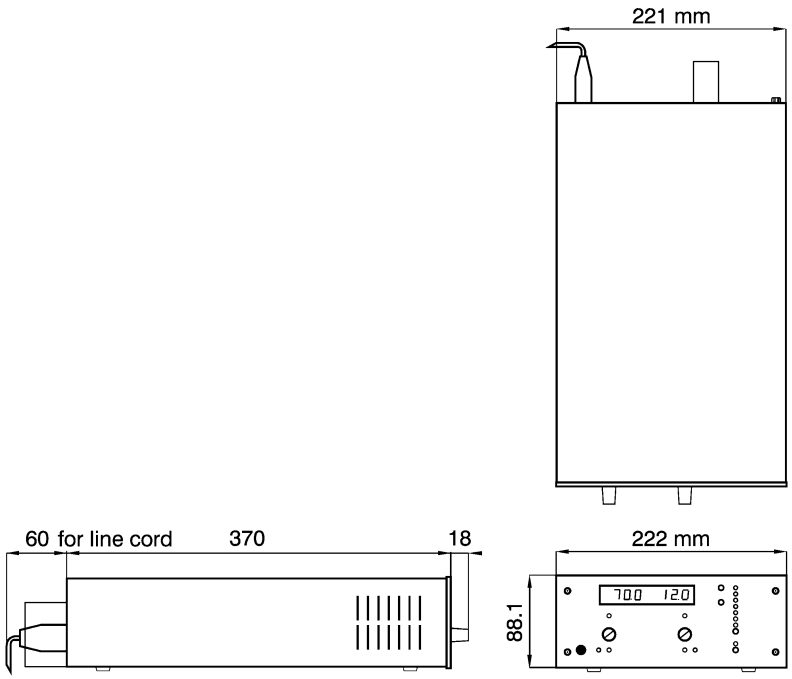
Front Power Output

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

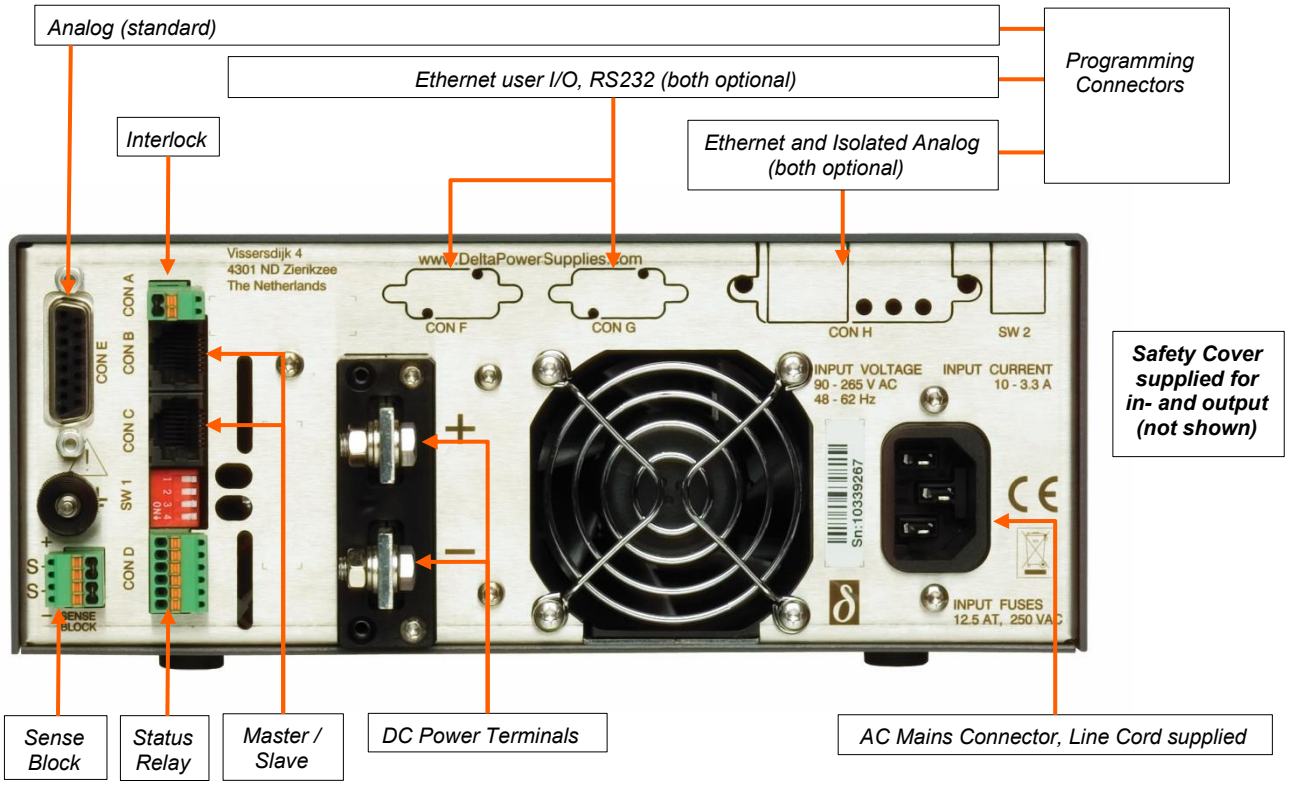
Option Codes:
- SM 7.5-80 – n.a.
- SM 18-50 – P257
- SM 70-AR-24 – P258
- SM400-AR-4 – P259

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

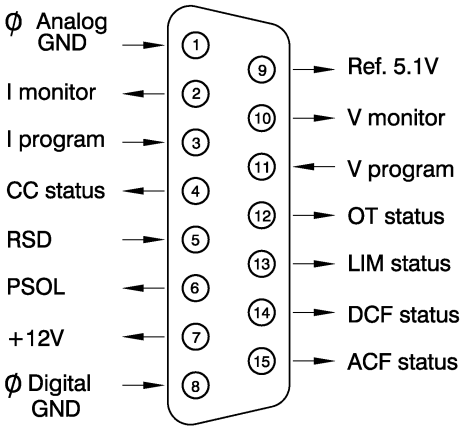
Dimensions



Rear view



Analog Programming Connector



Option Examples

Front panel connection:

SM18-50	*Option P257*
SM70-AR-24	*Option P258*
SM400-AR-4	*Option P259*

19" Rack Adapter RA19-2 SM800

19" Rack Adapter RA19-1 SM800

Ordering Information

A complete overview of base-unit order codes, options, common option combinations and add-ons, is provided in the SM800 Order Codes document on our website. For product details, downloads, and quotation requests, please visit the SM800 series page or contact Delta Elektronika or your local authorized distributor.

Delta Elektronika B.V.
Vissersdijk 4, 4301 ND
Zierikzee
The Netherlands

T: +31 111 413656
E: via contact form on our website
W: www.DeltaPowerSupplies.com

Online resources

- SM800 product page
- SM800 order codes
- Contact Delta Elektronika
- Authorized distributors

Scan for SM800 product information

Your contact:

Schulz Electronic
Professional Power Supplies
Schulz-Electronic GmbH
Dr.-Rudolf-Eberle-Straße 2
D-76534 Baden-Baden
Fon + 49.7223.9636.0
vertrieb@schulz-electronic.de
www.schulz-electronic.de