

# Delta Power Supplies




2008 - 2009

CE

DELTA ELEKTRONIKA BV




VOLTAGE	CURRENT	MODEL	Page	VOLTAGE	CURRENT	MODEL	Page	VOLTAGE	CURRENT	MODEL	Page			
<b>Single output units</b>														
5 V	1	A 5 U 5	34	28 V	0.2	A 5 U 15-15	34		22	A SM 70-22	10			
	10	A ES 015 - 10	4		2.5	A 75 SX 15-15	24		45	A SM 70-45 D	12			
	10	A ES 030 - 10	6		5	A 150 SX 15-15	24		90	A SM 70-90	14			
		13	A 75 SX 5		24		5	A ES 030 - 5	4	75 V	2	A ES 075-2	4	
		26	A 150 SX 5		24		9	A 240 S 24	28		2	A 150 SX 75-75	24	
		40	A S 6-40		26		10	A ES 030 - 10	6		4	A SM 400-AR-4	8	
		60	A SM 52-AR-60		10		10	A S 28-10	26		8	A SM 400-AR-8	10	
		80	A SM 7.5-80		8		20	A 600 S 24	30		13	A SM 120-13	10	
		100	A SM 15-100		10		24	A SM 70-AR-24	8		25	A SM 120-25 D	12	
		200	A SM 15-200 D		12		30	A SM 52-AR-60	10	50	A SM 120-50	14		
		400	A SM 15-400		14		40	A 1200 S 24	32	100 V	0.45	A ES 0300-0.45	4	
6 V	1	A 5 U 5	34		45	A SM 35-45	10	1	A 150 SX 75-75		24			
	10	A ES 015 - 10	4		100	A SM 30-100 D	12	4	A SM 400-AR-4		8			
	10	A ES 030 - 10	6		200	A SM 30-200	14	8	A SM 400-AR-8	10				
		13	A 75 SX 5	24	30 V	0.2	A 5 U 15-15	34	13	A SM 120-13	10			
		26	A 150 SX 5	24			2.5	A 75 SX 15-15	24	25	A SM 120-25 D	12		
		40	A S 6-40	26			5	A 150 SX 15-15	24	50	A SM 120-50	14		
		60	A SM 52-AR-60	10			5	A ES 030 - 5	4	120 V	0.45	A ES 0300-0.45	4	
		80	A SM 7.5-80	8			8	A 240 S 24	28		1	A 150 SX 75-75	24	
		100	A SM 15-100	10			10	A ES 030 - 10	6		4	A SM 400-AR-4	8	
		200	A SM 15-200 D	12			20	A 600 S 24	30	8	A SM 400-AR-8	10		
		400	A SM 15-400	14			24	A SM 70-AR-24	8	13	A SM 120-13	10		
12 V	0.4	A 5 U 15-15	34			30	A SM 52-AR-60	10	25	A SM 120-25 D	12			
	5	A 75 SX 15-15	24			40	A 1200 S 24	32	50	A SM 120-50	14			
	10	A ES 015 - 10	4			45	A SM 35-45	10	150 V	0.45	A ES 0300-0.45	4		
	10	A ES 030 - 10	6		100	A SM 30-100 D	12	1		A 150 SX 75-75	24			
	10	A 150 SX 15-15	24		200	A SM 30-200	14	4		A SM 400-AR-4	8			
		12	A 240 S 24	28	35 V	2	A ES 075-2	4	8	A SM 400-AR-8	10			
		18	A S 15-18	26			2	A 150 SX 75-75	24	10	A SM 300-10 D	12		
		30	A 600 S 24	30			24	A SM 70-AR-24	8	20	A SM 300-20	14		
		50	A SM 18-50	8			30	A 1200 S 48	32	200 V	0.45	A ES 0300-0.45	4	
		60	A SM 52-AR-60	10			30	A SM 52-AR-60	10		0.6	A 150 SX200-200	24	
		60	A 1200 S 24	32			45	A SM 35-45	10		4	A SM 400-AR-4	8	
	100	A SM 15-100	10			70	A SM 45-70 D	12	5	A SM 300-5	10			
	200	A SM 15-200 D	12			140	A SM 45-140	14	8	A SM 400-AR-8	10			
	400	A SM 15-400	14	45 V		2	A ES 075-2	4	10	A SM 300-10 D	12			
15 V	0.4	A 5 U 15-15	34				12	A SM 70-AR-24	8	20	A SM 300-20	14		
	5	A 75 SX 15-15	24				30	A SM 52-30	10	300 V	0.45	A ES 0300-0.45	4	
	10	A ES 015 - 10	4			30	A SM 52-AR-60	10	0.3		A 150 SX200-200	24		
	10	A ES 030 - 10	6			70	A SM 45-70 D	12	2		A SM 400-AR-4	8		
		10	A 150 SX 15-15		24		140	A SM 45-140	14	4	A SM 400-AR-8	10		
		12	A 240 S 24		28	48 V	2	A ES 075-2	4	5	A SM 300-5	10		
		18	A S 15-18		26			2	A 150 SX 75-75	24	10	A SM 300-10 D	12	
		30	A 600 S 24		30			12	A SM 70-AR-24	8	20	A SM 300-20	14	
		50	A SM 18-50		8			25	A 1200 S 48	32	400 V	0.3	A 150 SX200-200	24
		60	A SM 52-AR-60		10			30	A SM 52-30	10		2	A SM 400-AR-4	8
		60	A 1200 S 24	32			30	A SM 52-AR-60	10	4		A SM 400-AR-8	10	
	100	A SM 15-100	10		45		A SM 70-45 D	12	5	A SM 300-5	10			
	200	A SM 15-200 D	12		100		A SM 60-100	14	10	A SM 300-10 D	12			
	400	A SM 15-400	14	52 V	2		A ES 075-2	4	20	A SM 300-20	14			
24 V	0.2	A 5 U 15-15	34				2	A 150 SX 75-75	24	Dual output units	2x 12 V	0.2	A 5 U 15-15	34
	2.5	A 75 SX 15-15	24				12	A SM 70-AR-24	8			2.5	A 75 SX 15-15	24
	5	A 150 SX 15-15	24			30	A SM 52-30	10	5			A 150 SX 15-15	24	
		5	A ES 030 - 5		4		30	A SM 52-AR-60	10	2x 15 V	0.2	A 5 U 15-15	34	
		10	A ES 030 - 10		6		45	A SM 70-45 D	12		2.5	A 75 SX 15-15	24	
		10	A S 28-10		26		100	A SM 60-100	14		5	A 150 SX 15-15	24	
		10	A 240 S 24		28	60 V	2	A ES 075-2	4	2x 24 V	1	A 150 SX 75-75	24	
		24	A SM 70-AR-24		8			2	A 150 SX 75-75	24	2x 48 V	1	A 150 SX 75-75	24
		25	A 600 S 24		30			12	A SM 70-AR-24	8	2x 75 V	1	A 150 SX 75-75	24
		45	A SM 35-45		10			20	A 1200 S 48	32	2x 200 V	0.3	A 150 SX200-200	24
		50	A 1200 S 24	32			22	A SM 70-22	10	<b>Triple output units</b>				
	60	A SM 52-AR-60	10		45		A SM 70-45 D	12	6 V	13	A			
	100	A SM 30-100 D	12		100		A SM 60-100	14	15 V	2.5	A ST 150	24		
	200	A SM 30-200	14	70 V	2		A ES 075-2	4	15 V	2.5	A			
							2	A 150 SX 75-75	24	10 V	5	A		
							12	A SM 70-AR-24	8	20 V	2.5	A EST 150	2	
									20 V	2.5	A			




150 W 300 W Switched Mode	<b>EST 150</b> (triple)	2x 20 V, 2.5 A	<b>Constant voltage and constant current control from 0 to maximum.</b> Compact and Light-Weight Bench power supplies. Extremely low ripple
	<b>ES 150-series</b>	1x 10 V, 5 A	
	<b>ES 300</b>	up to 300 V, up to 10 A 30 V, 10 A	

ES-SERIES




800 W 1500 W 3000 W 6000 W Switched Mode	<b>SM 800-series</b>	up to 400 V, up to 80 A	<b>Constant voltage and constant current control from 0 to maximum.</b> Programmable. Bench and 19" rack power supplies. Very high efficiency, up to 90%.
	<b>SM 1500-series</b>	up to 400 V, up to 100 A	
	<b>SM 3000-series</b>	up to 300 V, up to 200 A	
	<b>SM 6000-series</b>	up to 300 V, up to 400 A	

SM-SERIES




Various options and optional equipment	<b>OPTIONS</b>	Fast Programming, Screwdriver Adjustment, Redundant Diode, Power Sink, Battery Charging etc.	
	<b>PSC-series</b>	Ethernet, IEEE488 and RS232 interfaces	
	<b>ISO AMP</b>	4 channel analog Isolation Amplifier	
	<b>M/S ADAPTER</b>	Master / Slave Series Adapter	
	<b>AL 24-48</b>	Over and Under voltage Alarm	

OPTIONS




75 W 150 W Switched Mode	<b>75 SX-series</b>	up to 30 V, up to 13 A	<b>Adjustable voltage and fixed current limit.</b> Eurocassette power supplies. Autoranging input for world-wide use.
	<b>150 SX-series</b>	up to 400 V, up to 26 A	

SX-SERIES




280 W Switched Mode	<b>S 6-40</b>	6 V, 40 A	<b>Constant voltage and constant current control from 0 to maximum.</b> Programmable. Industrial power supplies in eurocassette case.
	<b>S 15-18</b>	15 V, 18 A	
	<b>S 28-10</b>	28 V, 10 A	

S-SERIES



240 W 600 W 1200 W Switched Mode	<b>240 S 24</b>	24 V, 10 A	<b>Adjustable voltage and fixed current limit.</b> Industrial power supplies for wall mounting, 19" rack and eurocassette (240S). Series diode and alarm circuit for N+1 redundant operation.
	<b>600 S 24</b>	24 V, 25 A	
	<b>1200 S 24</b>	24 V, 50 A	
	<b>1200 S 48</b>	48 V, 25 A	

240S - 1200S



6 W Linear	<b>5 U 5</b>	6 V, 1 A	<b>Adjustable voltage and fixed current limit.</b> High quality power supplies for PCB, rail and eurocassette mounting.
	<b>5 U 15-15</b> (dual)	2x 15 V, 0.2 A	
	<b>UCS 50</b> current source	50 mA, max. 30 V	

U-SERIES

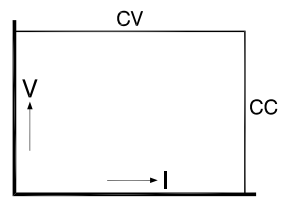
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# EST - SERIES 150 W TRIPLE DC POWER SUPPLIES



## EST 150 3 Independent Floating Outputs

Outputs:	1)	0 - 20 V	0 - 2.5 A
	2)	0 - 20 V	0 - 2.5 A
	3)	0 - 10 V	0 - 5.0 A



- Weight only 3.5 kg
- 4 mm safety Sockets
- Wide input voltage range: 90 - 265 V AC, 48 - 62 Hz
- Very low output ripple and spikes
- 20 V outputs tracking or independent
- Display settings buttons, for settings preview
- Designed for **long life at full power**
- Voltage and current control with 10 turn potentiometers, resolution 0.03 %
- Efficiency up to 81 %
- Active Power Factor Correction, PF = 0.83
- EMC: high immunity and low emission
- Very stable output voltage or current
- 3 Separate **Output On / Off buttons**
- Input / output insulation 3750 Vrms
- Protected against overload and short circuit

### Rear connections

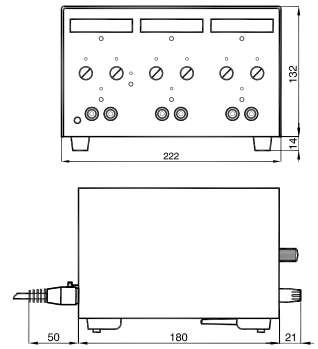
### Dimensions and Weight



Line Cord supplied

Input Connector

Width = half 19"  
Height = 146 mm  
Weight = **3.5 kg**



Specifications EST 150			
Output		10 V output	20 V outputs
voltage		0 - 10 V	0 - 20 V
current		0 - 5 A	0 - 2.5 A
<b>Input</b>			
<b>AC</b> single phase, 48 - 62 Hz		90 - 265 V	
Input current @ 230 V AC		1 A	
power factor, 110 / 230 V AC full load		0.99 / 0.83	
internal fuses		4 AT	
standby input power ( $V_o=I_o=0$ )		12 W	
standby input power ( $V_o=V_{max}$ )		15 W	
<b>Efficiency</b>			
AC 230 V input, full load		81 %	
AC 110 V input, full load		78 %	
<b>Regulation</b>			
Load 0 - 100%, int. sensing	<b>CV</b>	6 mV	5 mV
Line 90 - 265 V AC	<b>CV</b>	0.2 mV	0.5 mV
Load 0 - 100%	<b>CC</b>	1 mA	0.5 mA
Line 90 - 265 V AC	<b>CC</b>	0.2 mA	0.1 mA
<b>Ripple + noise</b> (@full load)			
rms (BW=300 kHz)	<b>CV</b>	0.5 mV	0.5 mV
p-p (BW=50 MHz)	<b>CV</b>	8 mV	8 mV
rms (BW=300 kHz)	<b>CC</b>	0.5 mA	0.25 mA
p-p (BW=50 MHz)	<b>CC</b>	4 mA	1 mA
<b>Output impedance</b> 0-100 kHz	<b>CV</b>	< 250 mOhm	< 250 mOhm
<b>Temp. coeff., per °C</b>	<b>CV</b>	$5.10^{-5}$	
	<b>CC</b>	$10.10^{-5}$	
<b>Stability</b> after 1 hr warm-up during 8 hrs	<b>CV</b>	$10.10^{-5}$	
	<b>CC</b>	$10.10^{-5}$	
<b>Tracking accuracy</b>		0.5 %	



Triple Mode



Dual Voltage Tracking Mode



Series Tracking Mode

Output configurations		
	Voltage	Current
Triple Mode	0 - 10 V	0 - 5 A
	0 - 20 V	0 - 2.5 A
	0 - 20 V	0 - 2.5 A
Dual Voltage Tracking mode	0 - 10 V	0 - 5 A
	0 - +/- 20 V	0 - 2.5 A
Series Mode	0 - 50 V	0 - 2.5 A
Series Tracking Mode	0 - 10 V	0 - 5 A
	0 - 40 V	0 - 2.5 A
Parallel Mode	0 - 10 V	0 - 10 A
Parallel Tracking Mode	0 - 10 V	0 - 5 A
	0 - 20 V	0 - 5 A

**Insulation**

Input/output : 3750 Vrms (1 min.), 8 mm cr./cl.  
 Input/case : 2500 Vrms (1 min.), 5 mm cr./cl.  
 Output/case : 600 V DC

**Safety** : EN 60950 / EN 61010 / SELV

**EMC** : EN 61204-3 Power Supply Standard  
 EN 61000-6-3 Gen.Emission (EN 55022B)  
 EN 61000-6-2 Generic Immunity

**Recovery time** : 100  $\mu$ s for both 10 V and 20 V outputs (after 50 - 100% load step)

**Hold up time** : 25 ms full load, 60 ms half load

**Turn on delay** : 250 ms

**Inrush current** : 10 A with NTC 30 Ohms cold resistance

**Ambient temp.** : - 40 to + 85 °C (storage)  
 - 20 to + 50 °C (operating)

**Series operation** : Maximum 600 V total voltage

**Parallel operation** : No limit  
 max. total current

**Over voltage limit** : max. 13 V for 10 V output  
 max. 25 V for 20 V outputs

**Digital meters** : Digital 3.5 digit.

**MTBF** : 500 000 hrs

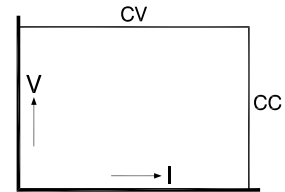
**Dim. and weight** : h x w x d  
 132 x 222 x 180 mm 3.5 kg

**Enclosure** : IP20

# ES 150 - SERIES 150 W DC POWER SUPPLIES



ES 015-10	0 - 15 V	0 - 10 A
ES 030-5	0 - 30 V	0 - 5 A
ES 075-2	0 - 75 V	0 - 2 A
ES 0300-0.45	0 - 300 V	0 - 450 mA



- Weight only 1.7 kg
- 4 mm safety Sockets
- Wide input voltage range for world wide use
- Very low output ripple and spikes
- Low offset analog programming, 0 - 5 V
- **Master / Slave** parallel and series operation
- Very stable output voltage or current
- Efficiency up to 84 %
- Active Power Factor Correction, PF = 0.83
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit
- *optional external **isolated analog** programming*
- *optional rear power output, incl. remote sensing*
- *optional internal **ethernet / RS232** programming*
- *optional external **IEEE488** programming*
- *for more options and details see page 16*



ES150 option P150: Built-in PSC-ETH for ethernet communication.

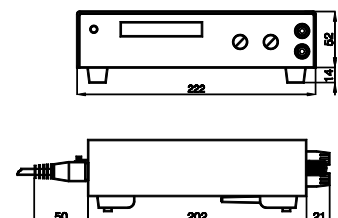
ES150 option P119 - P122: Power output and remote sensing at rear panel (front panel output removed).

## Rear connections

## Dimensions and Weight

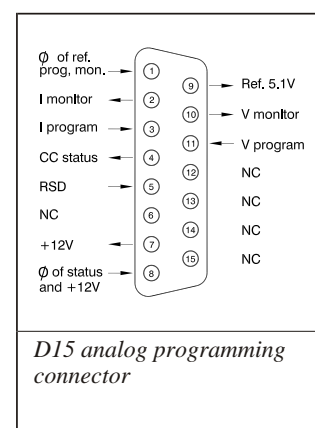


Width = half 19"  
 Height = 66 mm  
 Weight = 1.7 kg



Specifications ES 150 - series				
Output	ES 015-10	ES 030-5	ES 075-2	ES 0300-0.45
voltage	0 - 15 V	0 - 30 V	0 - 75 V	0 - 300 V
current	0 - 10 A	0 - 5 A	0 - 2 A	0 - 450 mA
<b>Input</b>				
<b>AC</b> single phase, 48 - 62 Hz	90 - 265 V			
Input current @ 230 V AC	1 A			
power factor, 110 / 230 V AC	0.99 / 0.83			
full load				
internal fuses	4 AT			
standby input power ( $V_o=I_o=0$ )	6 W			
standby input power ( $V_o=V_{max}$ )	11 W			
<b>Efficiency</b>				
AC 230 V input, full load	83 %	84 %	84 %	84 %
<b>Regulation</b>				
Load 0 - 100%, int. sensing <b>CV</b>	15 mV	6 mV	5 mV	10 mV
optional remote sensing	2 mV	2 mV	5 mV	10 mV
Line 90 - 265 V AC <b>CV</b>	0.2 mV	0.5 mV	1 mV	3 mV
Load 0 - 100% <b>CC</b>	3 mA	1 mA	0.5 mA	0.3 mA
Line 90 - 265 V AC <b>CC</b>	0.5 mA	0.2 mA	0.1 mA	0.05 mA
<b>Ripple + noise</b> (full load)				
rms (BW=300 kHz) <b>CV</b>	0.5 mV	0.6 mV	1 mV	7 mV
p-p (BW=50 MHz) <b>CV</b>	8 mV	10 mV	15 mV	50 mV
				(typical 30 mV)
rms (BW=300 kHz) <b>CC</b>	1.5 mA	0.5 mA	0.1 mA	0.03 mA
p-p (BW=50 MHz) <b>CC</b>	10 mA	2 mA	0.5 mA	0.2 mA
<b>Programming speed (10 - 90%)</b>				
time, (100% load)	0 → 15 V 7 ms	0 → 30 V 15 ms	0 → 75 V 17 ms	0 → 300 V 10 ms
<b>Output impedance</b> 0-100 kHz <b>CV</b>	< 100 mOhm	< 200 mOhm	< 250mOhm	< 5 Ohm
<b>Temp. coeff., per °C</b> <b>CV</b>	5.10 <sup>-5</sup>			
<b>CC</b>	10.10 <sup>-5</sup>			
<b>Stability</b> after 1 hr warm-up				
during 8 hrs <b>CV</b>	10.10 <sup>-5</sup>	10.10 <sup>-5</sup>	10.10 <sup>-5</sup>	10.10 <sup>-5</sup>
<b>CC</b>	10.10 <sup>-5</sup>	10.10 <sup>-5</sup>	10.10 <sup>-5</sup>	12.10 <sup>-5</sup>

Analog Programming	CV	CC
<b>Programming inputs</b>		
input range	0 - 5 V	0 - 5 V
accuracy	± 0.2%	± 0.8%
offset	0... + 3 mV (on 5 V)	0... + 10 mV (on 5 V)
input impedance	1 MOhm	1 MOhm
<b>Monitoring output</b>		
output range	0 - 5 V	0 - 5 V
accuracy	± 0.2%	± 0.8%
offset	- 1... + 1 mV (on 5 V)	- 10... 0 mV (on 5 V)
output impedance	2 Ohm / max. 4 mA	2 Ohm / max. 4 mA
<b>Ethernet, IEEE488 or RS232 Programming</b>		
Optional with interface PSC-ETH, PSC-488 or PSC-232, see pg. 18 and 20 of this catalog. After calibration, the programming accuracy is -0.01%, the monitoring accuracy is ± 0.01%.		



**Insulation**

Input/output : 4 kVrms (1 min.), 8 mm cr./cl.  
 Input/case : 2.5 kVrms (1 min.), 5 mm cr./cl.  
 Output/case : 600 V DC

**Safety** : EN 60950 EN 61010

**EMC** : EN 61204-3 Power Supply Standard  
 EN 61000-6-3 Gen.Emission (EN 55022B)  
 EN 61000-6-2 Generic Immunity

**Recovery time** : 100 µs (after 50-100% load step)

**Hold up time** : 25 ms full load, 60 ms half load

**Ambient temp.** : - 40 to + 85 °C (storage)  
 - 20 to + 50 °C (operating)

**Remote ShutDown** : With 5V or relay contact

**Series operation** : Normal and Master / Slave, max. 600 V total voltage. See page 23 for the M/S SERIES ADAPTER.

**Parallel operation** : Normal and Master / Slave

**CC status output** : +5 V (or 5 mA) when in CC mode

**Remote sensing** : Only with option P119 - 122

**Over voltage limit** : Fixed at 18 / 40 / 90 / 330 V

**Digital meters** : Digital 3.5 digit.

**MTBF** : 500 000 hrs

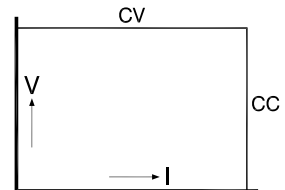
**Dim. and weight** : h x w x d  
 52 x 222 x 202 mm 1.7 kg

**Enclosure** : IP20

**ES 300 300 W DC POWER SUPPLIES**



**ES 030-10 0 - 30 V 0 - 10 A**



- Weight only 3.1 kg
- Wide input voltage range for world wide use
- Very low output ripple and spikes
- Low offset analog programming, 0 - 5 V
- **Master / Slave** parallel and series operation
- Very stable output voltage or current
- Efficiency 86 %
- Active Power Factor Correction, PF = 0.96
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit
- *optional external **isolated analog** programming*
- *optional rear power output, excl. remote sensing*
- *optional internal **ethernet / RS232** programming*
- *optional external **IEEE488** programming*



19" Rack Mounting

**RA 19-IES**  
for one ES030-10

**RA 19-2ES**  
for two ES030-10

**RA 19-ES-PSC**  
for one ES030-10  
and PSC-488 module  
or PSC-232 module

**RA 19-ES-PSC-ETH**  
for one ES030-10  
and PSC-ETH

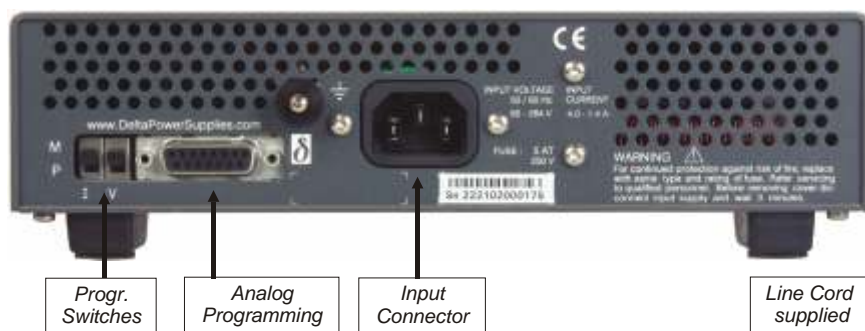


ES030-10 option P179:  
Built-in PSC-ETH for  
ethernet communication.



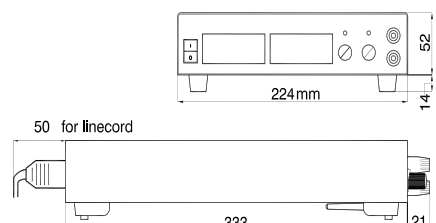
ES030-10 option P185:  
Rear power outlet

**Rear connections**



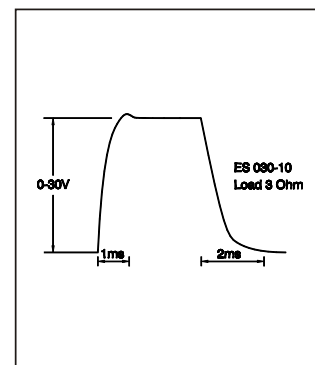
**Dimensions and Weight**

Width = half 19"  
Height = 66 mm  
Weight = 3.1 kg

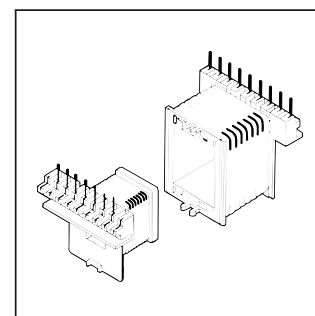




Specifications ES 030-10	
<b>Output</b>	<b>ES 030-10</b>
voltage	0 - 30 V
current	0 - 10 A
<b>Input</b>	
<b>AC</b> single phase, 48 - 62 Hz	92 - 265 V
Input current @ 230 V AC	1.6 A
power factor, 110 / 230 V AC	0.99 / 0.96
full load	
internal fuses	5 AT
standby input power ( $V_o=I_o=0$ )	10 W
standby input power ( $V_o=V_{max}$ )	15 W
<b>Efficiency</b>	
AC 230 V input, full load	86 %
<b>Regulation</b>	
Load 0 - 100%, int. sensing <b>CV</b>	10 mV
optional remote sensing	not available
Line 90 - 265 V AC <b>CV</b>	1 mV
Load 0 - 100% <b>CC</b>	4 mA
Line 90 - 265 V AC <b>CC</b>	1 mA
<b>Ripple + noise</b> (full load)	
rms (BW=300 kHz) <b>CV</b>	5 mV
p-p (BW=50 MHz) <b>CV</b>	15 mV
rms (BW=300 kHz) <b>CC</b>	6 mA
p-p (BW=50 MHz) <b>CC</b>	15 mA
<b>Programming speed (10 - 90%)</b>	
time, (100% load)	0 → 30 V 0.8 ms
<b>Output impedance</b> 0-100 kHz <b>CV</b>	< 300 mOhm
<b>Temp. coeff., per °C</b> <b>CV</b>	$5.10^{-5}$
<b>CC</b>	$10.10^{-5}$
<b>Stability</b> after 1 hr warm-up	
during 8 hrs <b>CV</b>	$30.10^{-5}$
<b>CC</b>	$10.10^{-4}$

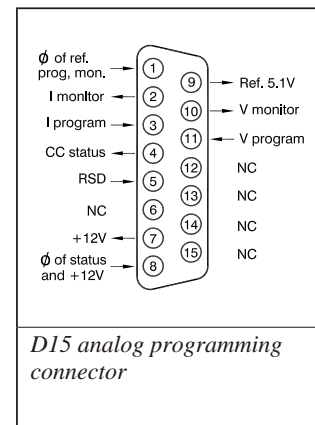


High programming speed of output voltage, 0 - 30 V in less than 1.5 ms (no electrolytic capacitors on output)



HF transformer has two isolated bobbins providing very safe 4 kVrms dielectric strength between input and output circuits.

Analog Programming	CV	CC
<b>Programming inputs</b>		
input range	0 - 5 V	0 - 5 V
accuracy	± 0.2%	± 0.5%
offset	- 3... + 10 mV (on 5 V)	0... + 20 mV (on 5 V)
input impedance	1 MOhm	1 MOhm
<b>Monitoring output</b>	<b>CV</b>	<b>CC</b>
output range	0 - 5 V	0 - 5 V
accuracy	± 0.2%	± 0.5%
offset	0... + 7 mV (on 5 V)	- 5... 0 mV (on 5 V)
output impedance	1 Ohm / max. 4 mA	1 Ohm / max. 4 mA
<b>Ethernet, IEEE488 or RS232 Programming</b>		
Optional with interface PSC-ETH, PSC-488 or PSC-232, see pg. 18 and 20 of this catalog. After calibration, the programming accuracy is -0.01%, the monitoring accuracy is ± 0.01%.		



D15 analog programming connector

**Insulation**

Input/output : 4 kVrms (1 min.), 8 mm cr./cl.  
 Input/case : 2.5 kVrms (1 min.), 5 mm cr./cl.  
 Output/case : 600 V DC

**Safety** : EN 60950 EN 61010

**EMC** : EN 61204-3 Power Supply Standard  
 EN 61000-6-3 Gen.Emission (EN 55022B)  
 EN 61000-6-2 Generic Immunity

**Recovery time** : 50 µs (after 50-100% load step)

**Hold up time** : 18 ms full load, 50 ms half load

**Ambient temp.** : - 40 to + 85 °C (storage)  
 - 20 to + 50 °C (operating)

**Remote ShutDown** : With 5 V or relay contact

**Series operation** : Normal and Master / Slave, max. 600 V total voltage. See page 23 for the M/S SERIES ADAPTER.

**Parallel operation** : Normal and Master / Slave

**CC status output** : +5 V (or 5 mA) when in CC mode

**Remote sensing** : Not available.

**Over voltage limit** : Intern. adjust. 6 - 34 V

**Digital meters** : Digital 3.5 digit

**MTBF** : 500 000 hrs

**Dim. and weight** : h x w x d  
 52 x 224 x 333 mm 3.1 kg

**Enclosure** : IP20

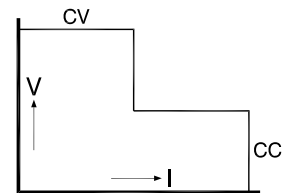
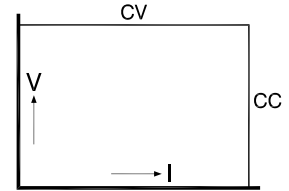


SM 70-AR-24

**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  
    0 - 70 V                      0 - 12 A }

**SM 400-AR-4**                      0 - 200 V                      0 - 4 A } autoranging  
    0 - 400 V                      0 - 2 A }



- Very low output ripple and spikes
- Excellent response to load changes
- Low offset analog programming, 0 - 5 V
- **Master / Slave** parallel and series operation
- Very stable output voltage or current
- Designed for **long life at full power**
- 100 kHz MOSFET power conversion
- Efficiency up to 89 %

- Active Power Factor Correction, PF=0.99
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit
- *optional internal **isolated analog** programming*
- *optional high speed programming*
- *optional internal **ethernet** programming*
- *optional internal **IEEE488 / RS232** programming*
- *optional Power Sink*
- *optional long life high resolution digital encoders*
- *for more options and details see page 16*

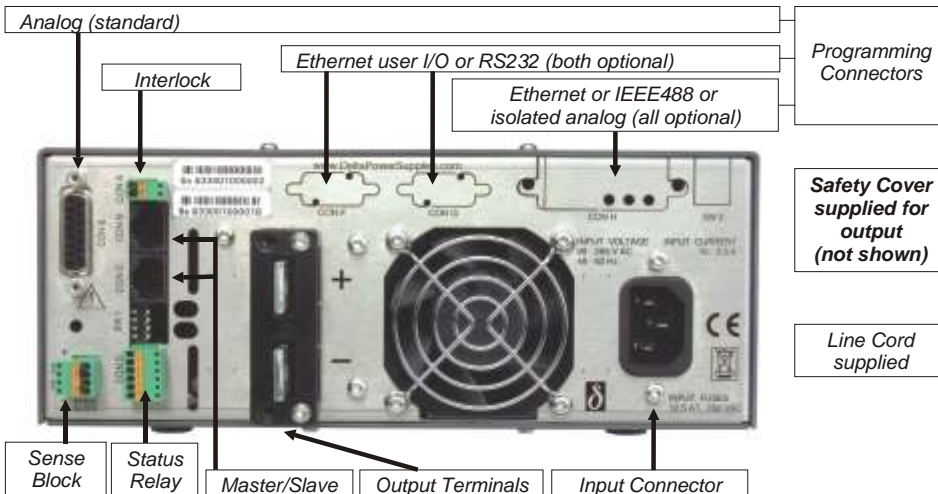


19" Adapter  
RA 19-2SM



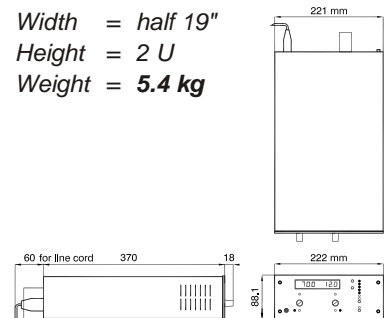
Front connection  
option P257 - SM18-50  
option P258 - SM70-AR-24  
option P259 - SM400-AR-4

## Rear connections



## Dimensions and Weight

Width = half 19"  
 Height = 2 U  
 Weight = 5.4 kg



**Safety Cover**  
supplied for  
output  
(not shown)

Line Cord  
supplied

Specifications SM 800 - series					
Output		SM 7.5-80	SM 18-50	SM 70-AR-24	SM 400-AR-4
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
<b>Input</b>					
AC, single phase, 48-62Hz		90 - 265 V	90 - 265 V	90 - 265 V	90 - 265 V
Power derating vs input at 90, 100, 110 V AC		3.3, 0, 0%	25.5, 18.9, 14.4%	11.9, 1.19, 0%	6.25, 0, 0%
Power Factor: 100, 50% load		0.99, 0.96	0.99, 0.98	0.99, 0.98	0.99, 0.98
current (230 V AC)		3.2	4.5	4.2	4
internal fuses		12.5 AT	12.5 AT	12.5 AT	12.5 AT
<b>Efficiency</b>					
AC 230 V input, full load		82%	87%	89 %	89 %
<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>	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 (internal voltage sense)	<b>CC</b>	1 mA	1 mA	1 mA	0.2 mA
<b>Ripple + noise, rms/p-p</b>	<b>CV</b>	2.5 / 10 mV	2 / 8 mV	3 / 15 mV	15 / 80 mV
	<b>CC</b>	120 / 25 mA	5 / 25 mA	35 V 3 / 1 mA 70 V 15 / 5 mA	200 V 0.8 / 0.5 mA 300 V 3 / 1.5 mA
<b>Progr. speed (10 - 90%)</b> time, (100% load) <i>High Speed options (see page 16)</i>		0 → 7.5 V 6.5 ms 0.20 ms	0 → 16 V 12 ms 0.22 ms	0 → 35 V 6 ms 0.24 ms	0 → 200 V 4 ms 0.40 ms
<b>Progr. speed (10 - 90%)</b> time, (100% load) <i>High Speed options (see page 16)</i>				0 → 70 V 10 ms 0.24 ms	0 → 400 V 8 ms 0.82 ms
<b>Output imp. 1-100 kHz</b>	<b>CV</b>	< 30 mΩ	< 30 mΩ	< 35 mΩ	< 2 Ω
<b>Temp. coeff., per °C</b>	<b>CV</b>			35.10 <sup>-6</sup>	
	<b>CC</b>			60.10 <sup>-6</sup>	
<b>Stability</b> after 1 hr warm-up during 8 hrs	<b>CV</b>			6.10 <sup>-5</sup>	
	<b>CC</b>			9.10 <sup>-5</sup>	
<b>Analog Programming</b>					
<b>Programming inputs</b>		<b>CV</b>		<b>CC</b>	
input range		0 - 5 V		0 - 5 V	
accuracy / offset		± 0.2% / - 0.1 mV ... + 1.3 mV (on 5 V)		± 0.5% / 0 mV ... + 2.2 mV (on 5 V)	
input impedance		> 1 MOhm		> 1 MOhm	
<b>Monitoring output</b>		<b>CV</b>		<b>CC</b>	
output range		0 - 5 V		0 - 5 V	
accuracy / offset		± 0.2% / - 1 mV ... 0 mV (on 5 V)		± 0.5% / - 1.1 mV ... 0 mV (on 5 V)	
output impedance		2 Ohm / max. 4 mA		2 Ohm / max. 4 mA	
<b>Ethernet, IEEE488 or RS232 Programming</b>					
Optional with internal interface PSC-ETH, PSC-488 or PSC-232, see page 18 and 20 of this catalog. After calibration, the programming accuracy is -0.01%, the monitoring accuracy is ± 0.01%.					

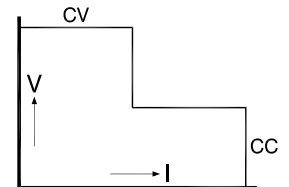
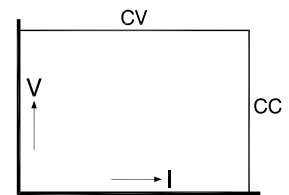
<b>Standby input power</b>	: 14 W	<b>Operation amb. temp.</b>	: - 20 to + 50 °C
<b>Remote ShutDown</b>	: With +5 V, 1 mA or relay contact	<b>Hold-Up time</b>	: 16 ms (100 % load) 36 ms (50 % load)
<b>Status outputs</b>	: CC, LIM, OT, PSOL, ACF, DCF,	<b>Series operation</b>	: Normal and Master / Slave, max. 600 V total voltage
<b>Relay outputs</b>	: AC-Fail, DC-Fail	<b>Parallel operation</b>	: Normal and Master / Slave
<b>Recovery time</b>	: 100 μs (50 -100% load step)	<b>Remote sensing</b>	: Max. 2 V per lead
<b>Insulation</b>		<b>Limit adjust range</b>	: 0 - 102 % of V <sub>max</sub> and I <sub>max</sub>
Input/Output	: 3750 Vrms (1 min.) 8 mm creepage/clearance	<b>Meters</b>	: Digital 3.5 digit
Input/case	: 2500 Vrms	<b>Mounting</b>	: Stacking allowed, air flow is from rear to the sides
Output/case	: 600 V DC	<b>Cooling</b>	: Fan with temperature controlled speed, air flow is from rear to the sides
<b>Safety</b>	: EN 60950 / EN 61010	<b>MTBF</b>	: 500 000 hrs
<b>EMC</b>		<b>Enclosure</b>	: IP20
Power Supply Standard	: EN 61204-3		
Generic Emission	: EN 61000-6-3 (EN 55022B)		
Generic Immunity	: EN 61000-6-2		
<b>Thermal protection</b>	: Output shuts down in case of insufficient cooling		



SM 52-AR-60

SM 15-100	0 - 15 V	0 - 100 A
SM 35-45	0 - 35 V	0 - 45 A
SM 52-30	0 - 52 V	0 - 30 A
SM 70-22	0 - 70 V	0 - 22 A
SM 120-13	0 - 120 V	0 - 13 A
SM 300-5	0 - 300 V	0 - 5 A

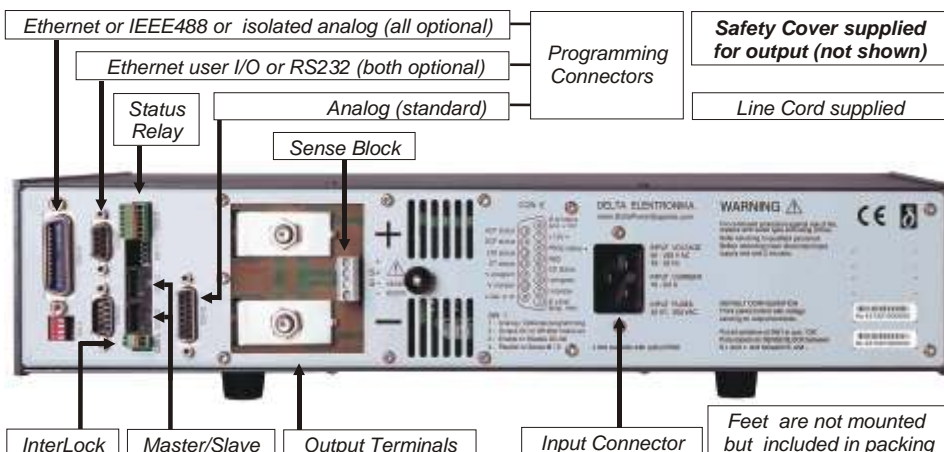
SM 52-AR-60	0 - 26 V	0 - 60 A	] autoranging
	0 - 52 V	0 - 30 A	
SM 400-AR-8	0 - 200 V	0 - 8 A	] autoranging
	0 - 400 V	0 - 4 A	



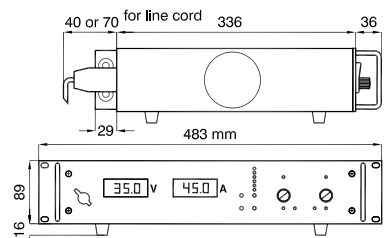
- Very low output ripple and spikes
- Excellent response to load changes
- Low offset analog programming, 0 - 5 V
- **Master / Slave** parallel and series operation
- Very stable output voltage or current
- Designed for **long life** at **full power**
- 100 kHz MOSFET power conversion
- Efficiency up to 91 %
- Active Power Factor Correction, PF=0.99
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit
- *optional internal **isolated analog** programming*
- *optional high speed programming*
- *optional internal **ethernet** programming*
- *optional internal **IEEE488 / RS232** programming*
- *optional Power Sink*
- *optional long life high resolution digital encoders for more options and details see page 16*

Rear connections

Dimensions and Weight



Width = 19"  
 Height = 2 U  
 Weight = 9.9 kg



Specifications SM 1500 - series									
Output	SM 15-100	SM 35-45	SM 52-30	SM 52-AR-60	SM 70-22	SM 120-13	SM 300-5	SM 400-AR-8	
voltage	0 - 15 V	0 - 35 V	0 - 52 V	0-26 V@60 A	0 - 70 V	0 - 120 V	0 - 300 V	0-200 V@8 A	
current	0 - 100 A	0 - 45 A	0 - 30 A	0-52 V@30 A	0 - 22 A	0 - 13 A	0 - 5 A	0-400 V@4 A	
<b>Input</b>									
AC, single phase, 48-62Hz Power derating vs input at 90, 100, 110 V AC Power Factor: 100, 50% load	90 - 265 V	90 - 265 V	90 - 265 V	90 - 265 V	90 - 265 V	90 - 265 V	90 - 265 V	90 - 265 V	90 - 265 V
	22,13, 1% 0.99, 0.98	25,16, 5% 0.99, 0.98	24, 14, 4% 0.99, 0.98	24,15, 4% 0.99, 0.98	22, 13, 3% 0.99, 0.98	24, 15, 4% 0.99, 0.98	20, 10, 0% 0.99, 0.98	25, 16, 6% 0.99, 0.98	
current (230 V AC) internal fuses	7.5 Arms 25 AT	7.7 Arms 25 AT	7.7 Arms 25 AT	7.7 Arms 25 AT	7.6 Arms 25 AT	7.7 Arms 25 AT	7.4 Arms 25 AT	7.8 Arms 25 AT	
<b>Efficiency</b>				26 V / 52 V					200 V / 400 V
AC 230 V input, full load	87 %	90 %	90 %	89 / 90 %	90 %	90 %	91 %	90 / 91 %	
<b>Regulation</b>									
Load 0 - 100% Line 120 - 265 V AC	<b>CV</b>	0.5 mV	1 mV	2 mV	2 mV	2.5 mV	4 mV	10 mV	12 mV
	<b>CC</b>	0.2 mV	0.5 mV	0.7 mV	0.7 mV	1 mV	2 mV	3 mV	4 mV
Load 0 - 100% Line 120 - 265 V AC (internal voltage sense)	<b>CV</b>	5 mA	3 mA	1.5 mA	2 mA	1 mA	0.6 mA	0.5 mA	0.5 mA
	<b>CC</b>	1 mA	0.5 mA	0.5 mA	1 mA	0.25 mA	0.2 mA	0.1 mA	0.2 mA
Ripple + noise, rms/p-p	<b>CV</b>	2 / 8 mV	1.8 / 8 mV	2 / 15 mV	2 / 15 mV	3 / 15 mV	7 / 30 mV	7 / 50 mV	15 / 80 mV
	<b>CC</b>	15 / 80 mA	5 / 15 mA	3 / 10 mA	26 V 10 / 30 mA 52 V 3 / 10 mA	3 / 10 mA	2 / 6 mA	0.5 / 4 mA	200 V 1.2 / 6 mA 400 V 0.6 / 3 mA
Progr. speed (10 - 90%) time, (100% load) High Speed options (see page 16)	0 → 15 V	0 → 35 V	0 → 52 V	0 → 26 V	0 → 70 V	0 → 120 V	0 → 300 V	0 → 200 V	
	6.1 ms 0.20 ms	15.4 ms 0.27 ms	7.3 ms 0.31 ms	8.5 ms 0.44 ms	13.2 ms 0.47 ms	3.4 ms 0.46 ms	9.0 ms 1.0 ms	3.7 ms 0.35 ms	
Progr. speed (10 - 90%) time, (100% load) High Speed options (see page 16)	0 → 52 V			0 → 52 V				0 → 400 V	
	34.2 ms 0.53 ms			15 ms 0.98 ms					
Output imp. 0-100 kHz CV	< 25 mΩ	< 30 mΩ	< 30 mΩ	< 40 mΩ	< 30 mΩ	< 0.6 Ω	< 1 Ω	< 1.3 Ω	
Temp. coeff., per °C	<b>CV</b>				35.10 <sup>-6</sup>				
	<b>CC</b>				60.10 <sup>-6</sup>				
Stability after 1 hr warm-up during 8 hrs	<b>CV</b>				6.10 <sup>-5</sup>				
	<b>CC</b>				9.10 <sup>-5</sup>				

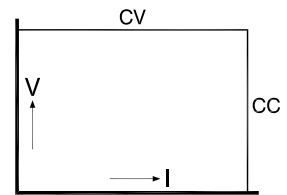
Analog Programming	CV	CC
Programming inputs input range accuracy / offset input impedance	0 - 5 V ± 0.2% / - 0.1 mV ... + 1.3 mV (on 5 V) > 1 MOhm	0 - 5 V ± 0.5% / 0 mV ... + 2.2 mV (on 5 V) > 1 MOhm
Monitoring output output range accuracy / offset output impedance	0 - 5 V ± 0.2% / - 1 mV ... 0 mV (on 5 V) 2 Ohm / max. 4 mA	0 - 5 V ± 0.5% / - 1.1 mV ... 0 mV (on 5 V) 2 Ohm / max. 4 mA
<b>Ethernet, IEEE488 or RS232 Programming</b>		
Optional with internal interface PSC-ETH, PSC-488 or PSC-232, see page 18 and 20 of this catalog. After calibration, the programming accuracy is -0.01%, the monitoring accuracy is ± 0.01%.		

<b>Standby input power</b>	: 12 W	<b>Operation amb. temp.</b>	: - 20 to + 50 °C
<b>Remote ShutDown</b>	: With 5V or relay contact	<b>Hold-Up time</b>	: 16 ms (100 % load) 36 ms (50 % load)
<b>Status outputs</b>	: CC, LIM, OT, ACF, DCF, PSOL	<b>Series operation</b>	: Normal and Master / Slave, max. 600 V total voltage
<b>Relay outputs</b>	: AC-Fail, DC-Fail	<b>Parallel operation</b>	: Normal and Master / Slave
<b>Recovery time</b>	: 100 μs (50 -100% load step)	<b>Remote sensing</b>	: Max. 2 V per lead
<b>Insulation</b>		<b>Limit adjust range</b>	: 0 - 102 % of V <sub>max</sub> and I <sub>max</sub>
Input/Output	: 3750 Vrms (1 min.) 8 mm creepage/clearance	<b>Meters</b>	: Digital 3.5 digit
Input/case	: 2500 Vrms (1 min.)	<b>Mounting</b>	: Stacking allowed, air flow is from left to right
Output/case	: 600 V DC	<b>Cooling</b>	: Fan with temperature controlled speed, air flow from left to right
<b>Safety</b>	: EN 60950 / EN 61010	<b>MTBF</b>	: 500 000 hrs
<b>EMC</b>		<b>Enclosure</b>	: IP20
Power Supply Standard	: EN 61204-3		
Generic Emission	: EN 61000-6-3 (EN 55022B)		
Generic Immunity	: EN 61000-6-2		
<b>Thermal protection</b>	: Output shuts down in case of insufficient cooling		



SM 30-100 D

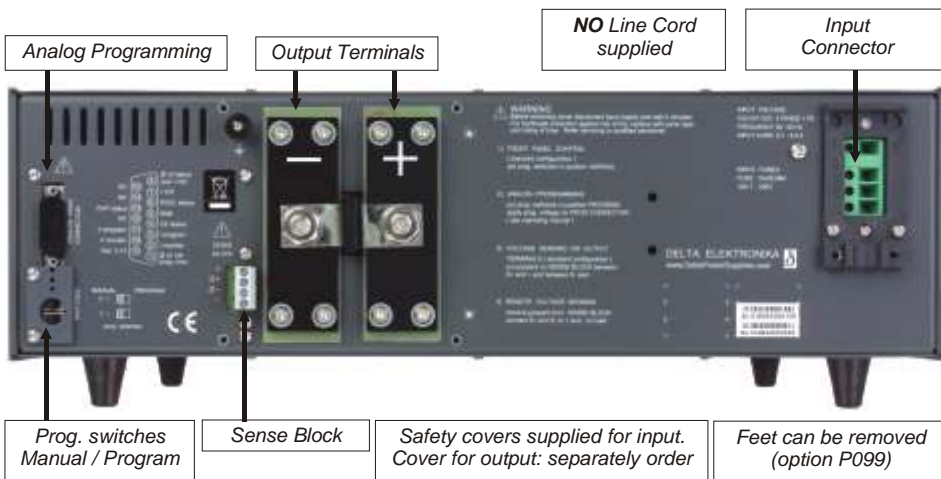
SM 15-200 D	0 - 15 V	0 - 200 A
SM 30-100 D	0 - 30 V	0 - 100 A
SM 45-70 D	0 - 45 V	0 - 70 A
SM 70-45 D	0 - 70 V	0 - 45 A
SM 120-25 D	0 - 120 V	0 - 25 A
SM 300-10 D	0 - 300 V	0 - 10 A



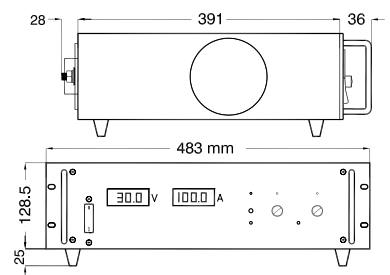
- Very low output ripple and spikes
- Excellent response to load changes
- 3 phase input 380 V, 400 V, 415 V AC
- Low offset analog programming, 0 - 5 V
- **Master / Slave** parallel and series operation
- Very stable output voltage or current
- Designed for **long life** at **full power**
- 200 kHz MOSFET power conversion
- Efficiency up to 91 %
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit
- *optional internal **isolated analog** programming*
- *optional high speed programming*
- *optional internal **ethernet** programming*
- *optional internal **IEEE488 / RS232** programming*
- *optional Power Sink*
- *for more options and details see page 16*

Rear connections

Dimensions and Weight



Width = 19"  
 Height = 3 U  
 Weight = 15 kg



Specifications SM 3000 - series						
Output	SM 15-200 D	SM 30-100 D	SM 45-70 D	SM 70-45 D	SM 120-25 D	SM 300-10 D
voltage current	0 - 15 V 0 - 200 A	0 - 30 V 0 - 100 A	0 - 45 V 0 - 70 A	0 - 70 V 0 - 45 A	0 - 120 V 0 - 25 A	0 - 300 V 0 - 10 A
<b>Input</b>						
AC, 3 phase, 48-62 Hz, full load for use at 380, 400, 415 V nominal line - line voltage DC	342 - 457 V contact factory	342 - 457 V contact factory	342 - 457 V contact factory	342 - 457 V contact factory	342 - 457 V contact factory	342 - 457 V contact factory
current (380 V AC / 3 phase ) fuses	6.0 Arms 16 AT	5.8 Arms 16 AT	6.1 Arms 16 AT	6.1 Arms 16 AT	5.8 Arms 16 AT	5.8 Arms 16 AT
<b>Efficiency</b>						
AC 3 phase input, full load	87 %	90 %	89 %	90 %	90 %	90 %
<b>Regulation</b>						
Load 0 - 100% Line 342 - 457 V AC	<b>CV</b> <b>CV</b> 5 mV 5 mV	5 mV 5 mV	5 mV 5 mV	10 mV 5 mV	10 mV 10 mV	15 mV 10 mV
Load 0 - 100% Line 342 - 457 V AC	<b>CC</b> <b>CC</b> 50 mA 50 mA	25 mA 25 mA	15 mA 15 mA	10 mA 10 mA	10 mA 10 mA	3 mA 3 mA
<b>Ripple + noise, rms / p-p</b>	<b>CV</b> <b>CC</b> 2 / 12 mV 100 / 250 mA	1.6 / 8 mV 20 / 60 mA	3.5 / 17 mV 20 / 60 mA	2 / 12 mV 6 / 25 mA	5 / 25 mV 7 / 25 mA	10 / 50 mV 3 / 10 mA
<b>Programming speed (10 - 90%)</b> time, (100% load) High Speed options (see page 16)	0 → 15 V 7 ms 0.36 ms	0 → 30 V 7 ms 0.33 ms	0 → 45 V 7 ms 0.50 ms	0 → 70 V 7 ms 0.45 ms	0 → 120 V 7 ms 0.34 ms	0 → 300 V 7 ms 1.00 ms
<b>Output impedance</b> 0-100 kHz	<b>CV</b> 0.02 Ohm	0.02 Ohm	0.06 Ohm	0.06 Ohm	0.15 Ohm	0.8 Ohm
<b>Temp. coeff., per °C</b>	<b>CV</b> <b>CC</b>	typical $10 \cdot 10^{-6}$ , max. $35 \cdot 10^{-6}$ typical $20 \cdot 10^{-6}$ , max. $60 \cdot 10^{-6}$				
<b>Stability</b> during 8 hrs after 1 hr warmup	<b>CV</b> <b>CC</b>	typical $2 \cdot 10^{-5}$ , max. $4 \cdot 10^{-5}$ typical $3 \cdot 10^{-5}$ , max. $10 \cdot 10^{-5}$				

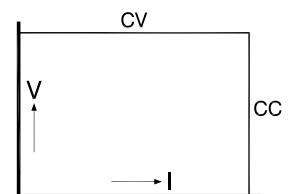
Analog Programming	CV	CC
<b>Programming inputs</b> input range accuracy / offset input impedance	0 - 5 V $\pm 0.2\%$ / 0 mV ... + 8 mV (on 5 V) 1 MOhm	0 - 5 V $\pm 0.5\%$ / 0 mV ... + 20 mV (on 5 V) 1 MOhm
<b>Monitoring output</b> output range accuracy / offset output impedance	0 - 5 V $\pm 0.2\%$ / - 3 mV ... + 11 mV (on 5 V) 20 Ohm	0 - 5 V $\pm 0.5\%$ / - 5 mV ... 0 mV (on 5 V) 20 Ohm
<b>Ethernet, IEEE488 or RS232 Programming</b>		
Optional with internal interface PSC-ETH, PSC-488 or PSC-232, see page 18 and 20 of this catalog. After calibration, the programming accuracy is -0.01%, the monitoring accuracy is $\pm 0.01\%$ .		

<b>Standby input power</b>	: 25 W	<b>Hold-Up time</b>	: 6 ms (100 % load) 15 ms (50 % load)
<b>Remote ShutDown</b>	: With 5 V or relay contact	<b>Phase loss</b>	: Power supply will continue operating on one phase but at 90 % of $V_{max}$
<b>Recovery time</b> 50 - 100% load step	: 100 $\mu$ s	<b>Series operation</b>	: Normal and Master / Slave, max. 600 V total voltage
<b>Insulation</b> Input/Output	: 3750 Vrms (1 min.) 8 mm creepage/clearance	<b>Parallel operation</b>	: Normal and Master / Slave
Input/case	: 2500 Vrms (1 min.)	<b>Remote sensing</b>	: Max. 2 V per lead
Output/case	: 600 V DC	<b>OVP / OVL adjust range</b>	: 0 - 115 % of $V_{max}$
<b>Safety</b>	: EN 60950 / EN 61010	<b>Meters</b>	: Digital 3.5 digit
<b>EMC</b> Power Supply Standard	: EN 61204-3	<b>Mounting</b>	: Stacking allowed, air flow is from left to right
Generic Emission	: EN 61000-6-3 (EN 55022B)	<b>Cooling</b>	: Fan with temperature controlled speed, air flow from left to right
Generic Immunity	: EN 61000-6-2	<b>MTBF</b>	: 500 000 hrs
<b>Operating ambient temp.</b>	: - 20 to + 50 °C	<b>Enclosure</b>	: IP20
<b>Thermal protection</b>	: Output shuts down in case of insufficient cooling		



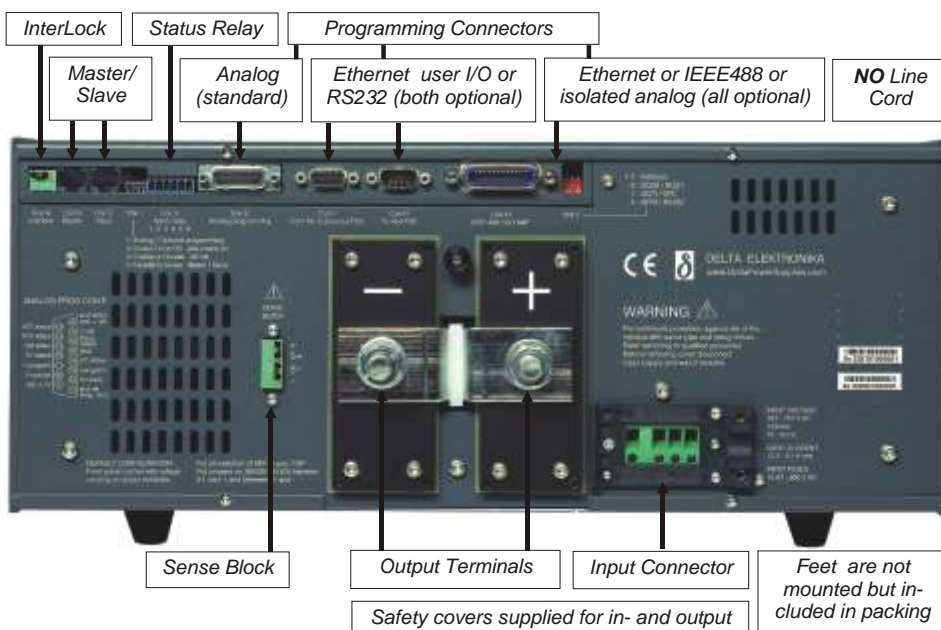
SM 15-400

SM 15-400	0 - 15 V	0 - 400 A
SM 30-200	0 - 30 V	0 - 200 A
SM 45-140	0 - 45 V	0 - 140 A
SM 60-100	0 - 60 V	0 - 100 A
SM 70-90	0 - 70 V	0 - 90 A
SM 120-50	0 - 120 V	0 - 50 A
SM 300-20	0 - 300 V	0 - 20 A



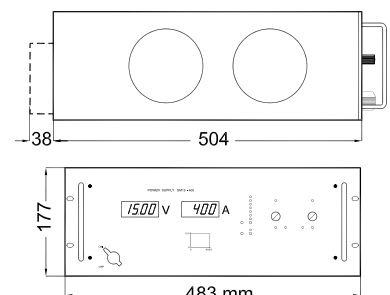
- Very low output ripple and spikes
  - Excellent response to load changes
  - 3 phase input 380 V, 400 V, 415 V AC
  - Low offset analog programming, 0 - 5 V
  - **Master / Slave** parallel and series operation
  - Very stable output voltage or current
  - Designed for **long life at full power**
  - Efficiency up to 90 %
  - Active Power Factor Correction, PF=0.98
  - Excellent EMC: high immunity, low emission
  - Protected against overload and short circuit
  - *optional 480 V AC input voltage (US)*
  - *optional internal **isolated analog** programming*
  - *optional high speed programming*
  - *optional internal **ethernet** programming*
  - *optional internal **IEEE488 / RS232** programming*
  - *optional long life high resolution digital encoders*
  - *optional Power Sink*
- for more options and details see page 16

### Rear connections



### Dimensions and Weight

Width = 19"  
 Height = 4 U  
 Weight = 27 kg





Specifications SM 6000 - series							
Output	SM 15-400	SM 30-200	SM 45-140	SM 60-100	SM 70-90	SM 120-50	SM 300-20
voltage current	0 - 15 V 0 - 400 A	0 - 30 V 0 - 200 A	0 - 45 V 0 - 140 A	0 - 60 V 0 - 100 A	0 - 70 V 0 - 90 A	0 - 120 V 0 - 50 A	0 - 300 V 0 - 20 A
<b>Input</b>							
<b>AC</b> 3 phase, 48 - 62 Hz for use at 380 V, 400 V, 415 V nominal line - line voltage	342 - 457 V	342 - 457 V	342 - 457 V	342 - 457 V	342 - 457 V	342 - 457 V	342 - 457 V
<b>Option P165</b> for use at 440 V, 480 V (USA)	396 - 528 V	396 - 528 V	396 - 528 V	396 - 528 V	396 - 528 V	396 - 528 V	396 - 528 V
power factor, 100, 50% load	0.98, 0.97	0.98, 0.97	0.98, 0.97	0.98, 0.97	0.98, 0.97	0.98, 0.97	0.98, 0.97
current (400 V / 3 ph, full load) internal fuses	10.2 A 16 AT	10 A 16 AT	10.3 A 16 AT	10 A 16 AT	10.4 A 16 AT	9.9 A 16 AT	10 A 16 AT
<b>Efficiency</b>							
400 V AC, 3 ph input, full load	87 %	89 %	90 %	89 %	89 %	89 %	89 %
<b>Regulation</b>							
Load 0 - 100% <b>CV</b> Line 342 - 457 V AC <b>CV</b> (external voltage sense)	2.5 mV 0.2 mV	5 mV 0.5 mV	5 mV 1 mV	5 mV 2 mV	5 mV 2 mV	8 mV 2 mV	15 mV 3 mV
Load 0 - 100% <b>CC</b> Line 342 - 457 V AC <b>CC</b> (internal voltage sense, after warm-up)	24 mA 4 mA	12 mA 2 mA	9 mA 1.5 mA	6 mA 1 mA	5 mA 1 mA	3 mA 0.5 mA	1.2 mA 0.2 mA
<b>Ripple + noise, rms/p-p</b> <b>CV</b> <b>CC</b>	0.8 / 8 mV 100 / 300 mA	1 / 8 mV 20 / 60 mA	1.5 / 10 mV 8 / 25 mA	2 / 10 mV 3 / 10 mA	2 / 10 mV 3 / 10 mA	3 / 25 mV 3 / 10 mA	5 / 50 mV 2 / 5 mA
<b>Programming speed (10 - 90%)</b> time, (100% load High Speed options (see page 16)	0 → 15 V 3.3 ms 0.40 ms	0 → 30 V 6.4 ms 0.41 ms	0 → 45 V 2.7 ms 0.53 ms	0 → 60 V 5.4 ms 0.44 ms	0 → 70 V 6.8 ms 0.62 ms	0 → 120 V 5.1 ms 0.57 ms	0 → 300 V 8.5 ms 1.1 ms
<b>Output impedance</b> 0-100 kHz <b>CV</b>	< 2.3 mΩ	< 5 mΩ	< 10 mΩ	< 12 mΩ	< 12 mΩ	< 90 mΩ	< 330 mΩ
<b>Temp. coeff., per °C</b> <b>CV</b> <b>CC</b>				35.10 <sup>-6</sup> 60.10 <sup>-6</sup>			
<b>Stability</b> after 1 hr warm-up during 8 hrs <b>CV</b> <b>CC</b>				5.10 <sup>-5</sup> 10.10 <sup>-5</sup>			

Analog Programming	CV	CC
<b>Programming inputs</b> input range accuracy / offset input impedance	0 - 5 V ± 0.2% / - 0.1... +1.3 mV (on 5 V) > 1 MOhm	0 - 5 V ± 0.5% / 0... +2.2 mV (on 5 V) > 1 MOhm
<b>Monitoring output</b> output range accuracy / offset output impedance	0 - 5 V ± 0.2% / - 1... 0 mV (on 5 V) 2 Ohm / max. 4 mA	0 - 5 V ± 0.5% / - 1.1 ... 0 mV (on 5 V) 2 Ohm / max. 4 mA
<b>Ethernet, IEEE488 or RS232 Programming</b>		
Optional with internal interface PSC-ETH, PSC-488 or PSC-232, see page 18 and 20 of this catalog. After calibration, the programming accuracy is -0.01%, the monitoring accuracy is ± 0.01%.		

<b>Standby input power</b> : 55 W	<b>Hold-Up time</b> : 11 ms (100 % load) 27 ms (50 % load)	insufficient cooling
<b>Remote ShutDown</b> : With 5 V or relay contact	<b>Phase loss</b> : Power supply will shut down	
<b>Recovery time</b> 50 - 100% load step : 100 μs (120 μs for SM15-400)	<b>Series operation</b> : Normal and Master / Slave, max. 600 V total voltage	
<b>Insulation</b> Input/Output : 3750 Vrms (1 min.) 8 mm creepage/clearance Input/case : 2500 Vrms (1 min.) Output/case : 600 V DC	<b>Parallel operation</b> : Normal and Master / Slave	
<b>Safety</b> : EN 60950 / EN 61010	<b>Remote sensing</b> : Max. 2 V per lead	
<b>EMC</b> Power Supply Standard : EN 61204 - 3 Generic Emission : EN 61000-6-3 (EN 55022B) Generic Immunity : EN 61000-6-2	<b>Limit adjust range</b> : 0 - 102 % of V <sub>max</sub> and I <sub>max</sub>	
<b>Operating amb. temp.</b> : - 20 to + 50 °C	<b>Meters</b> : Digital 3.5 digit	
<b>Thermal protection</b> : Output shuts down in case of	<b>Mounting</b> : Stacking allowed, air flow is from left to right	
	<b>Cooling</b> : Two fans with temperature controlled speed, air flow from left to right	
	<b>MTBF</b> : 500 000 hrs	

# OPTIONS for SM - SERIES

## Battery Charging

- The CV / CC regulated power supplies are ideal battery chargers. Once set at the correct output voltage, the battery will charge constantly without overcharging. This can be useful for **emergency power systems**.
  - Use a circuit breaker in series to protect the internal diode from reverse connection of the battery.
  - Some units need an **external diode set** on the output as extra protection for the internal diode.
- Download the special Battery Charging datasheet from '[www.DeltaPowerSupplies.com](http://www.DeltaPowerSupplies.com)'.

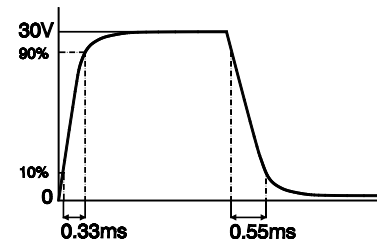


## High Speed Programming

- The speed is **10 - 20 times higher** because of the smaller output capacitors.
- Recovery time only 100  $\mu$ s for a 50  $\rightarrow$  100% load step
- Relatively low current overshoots (if any) in case of sudden voltage variations caused by the load, this is of great advantage for laser diode 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**.



Example of rise and fall time  
SM30-100D with option P031

Specifications and ordering information: see datasheet on '[www.DeltaPowerSupplies.com](http://www.DeltaPowerSupplies.com)'.

SM 800				
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
Rise time (10 - 90%) output voltage step time, (100 % load)	0 $\rightarrow$ 7.5V 0.20 ms	0 $\rightarrow$ 16 V 0.22 ms	0 $\rightarrow$ 70 V 0.24 ms	0 $\rightarrow$ 400 V 0.82 ms
Fall time (90 - 10%) output voltage step time, (100 % load)	7.5 $\rightarrow$ 0 V 0.20 ms	16 $\rightarrow$ 0 V 0.24 ms	70 $\rightarrow$ 0 V 0.85 ms	400 $\rightarrow$ 0 V 1.7 ms
Output Capacitance	310 $\mu$ F	200 $\mu$ F	80 $\mu$ F	4 $\mu$ F

SM 1500								
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
Rise time (10 - 90%) output voltage step time, (100 % load)	0 $\rightarrow$ 15 V 0.20 ms	0 $\rightarrow$ 35 V 0.27 ms	0 $\rightarrow$ 52 V 0.31 ms	0 $\rightarrow$ 52 V 0.53 ms	0 $\rightarrow$ 70 V 0.47 ms	0 $\rightarrow$ 120 V 0.46 ms	0 $\rightarrow$ 300 V 1.0 ms	0 $\rightarrow$ 400 V 0.98 ms
Fall time (90 - 10%) output voltage step time, (100 % load)	15 $\rightarrow$ 0 V 0.21 ms	35 $\rightarrow$ 0 V 0.33 ms	52 $\rightarrow$ 0 V 0.38 ms	52 $\rightarrow$ 0 V 1.0 ms	70 $\rightarrow$ 0 V 0.78 ms	120 $\rightarrow$ 0 V 0.51 ms	300 $\rightarrow$ 0 V 1.40 ms	400 $\rightarrow$ 0 V 1.7 ms
Output Capacitance	390 $\mu$ F	190 $\mu$ F	91 $\mu$ F	195 $\mu$ F	113 $\mu$ F	21 $\mu$ F	10 $\mu$ F	7 $\mu$ F

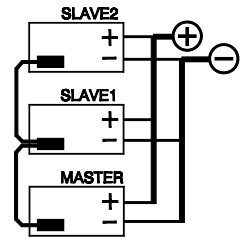
SM 3000						
Programming speed High Speed Version	SM 15-200 D option P104	SM 30-100 D option P031	SM 45-70 D option P105	SM 70-45 D option P032	SM 120-25 D option P106	SM 300-10 D option P061
Rise time (10 - 90%) output voltage step time, (100 % load)	0 $\rightarrow$ 15 V 0.36 ms	0 $\rightarrow$ 30 V 0.33 ms	0 $\rightarrow$ 45 V 0.50 ms	0 $\rightarrow$ 70 V 0.45 ms	0 $\rightarrow$ 120 V 0.34 ms	0 $\rightarrow$ 300 V 1.00 ms
Fall time (90 - 10%) output voltage step time, (100 % load)	15 $\rightarrow$ 0 V 0.37 ms	30 $\rightarrow$ 0 V 0.55 ms	45 $\rightarrow$ 0 V 0.60 ms	70 $\rightarrow$ 0 V 0.67 ms	120 $\rightarrow$ 0 V 0.38 ms	300 $\rightarrow$ 0 V 1.20 ms
Output Capacitance	800 $\mu$ F	500 $\mu$ F	360 $\mu$ F	170 $\mu$ F	33 $\mu$ F	16 $\mu$ F

SM 6000							
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
Rise time (10 - 90%) output voltage step time, (100 % load)	0 $\rightarrow$ 15 V 0.40 ms	0 $\rightarrow$ 30 V 0.41 ms	0 $\rightarrow$ 45 V 0.53 ms	0 $\rightarrow$ 60 V 0.44 ms	0 $\rightarrow$ 70 V 0.62 ms	0 $\rightarrow$ 120 V 0.57 ms	0 $\rightarrow$ 300 V 1.1 ms
Fall time (90 - 10%) output voltage step time, (100 % load)	15 $\rightarrow$ 0 V 0.39 ms	30 $\rightarrow$ 0 V 0.41 ms	45 $\rightarrow$ 0 V 0.26 ms	60 $\rightarrow$ 0 V 0.57 ms	70 $\rightarrow$ 0 V 0.50 ms	120 $\rightarrow$ 0 V 0.38 ms	300 $\rightarrow$ 0 V 1.0 ms
Output Capacitance	1200 $\mu$ F	800 $\mu$ F	520 $\mu$ F	330 $\mu$ F	290 $\mu$ F	73 $\mu$ F	32 $\mu$ F

# OPTIONS for SM - SERIES

## Master / Slave operation

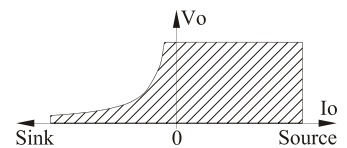
- Parallel and Series operation with **equal Current and Voltage sharing**.
- This way two or more units can be used together as one high power unit.
- Voltage and current of the units is controlled by the master (by potentiometers or by programming).
- The SM800, SM1500 and SM6000 units are easy to connect in Master / Slave mode, using standard UTP-cables (RJ45). **No special option is required**.
- For other units in M/S series mode, the M/S SERIES ADAPTER must be used, see page 23. For M/S parallel operation, a special programming cable must be used.



## Power Sink for 2 quadrant operation

- Maintains output voltage regardless the output current is positive or negative (source & sink).
- Ideal solution for supplying **electric motors** with PWM-speed control.
- Fast down programming at no load conditions.
- Peak **power absorption** 140 W in SM800, 200 W in SM1500, 300 W in SM3000.

Ordering information:



<b>SM 800</b> Power Sink	<b>SM 7.5-80</b> option P245	<b>SM 18-50</b> option P246	<b>SM 70-AR-24</b> option P247	<b>SM 400-AR-4</b> option P248	-
<b>SM 1500</b> Power Sink	<b>SM 15-100</b> option P202	<b>SM 35-45</b> option P203	<b>SM 52-30</b> option P204	<b>SM 52-AR-60</b> option P205	<b>SM 70-22</b> option P206
<b>SM 3000</b> Power Sink	<b>SM 15-200D</b> option P127	<b>SM 30-100D</b> option P128	<b>SM 45-70D</b> option P129	<b>SM 70-45D</b> option P130	-
<b>SM 6000</b> Power Sink	<b>SM 15-400</b> option P230	<b>SM 30-200</b> option P231	<b>SM 45-140</b> option P232	<b>SM 60-100</b> option P233	<b>SM 70-90</b> option P234

Download the special Power Sink datasheet from '[www.DeltaPowerSupplies.com](http://www.DeltaPowerSupplies.com)'.

## Fixed output settings

### OPTION P001

- Screwdriver adjustment standard potentiometers  
CV and CC knobs are moved backwards to avoid accidental adjusting

Contact technical support for more information on '[Support@Delta-Elektronika.nl](mailto:Support@Delta-Elektronika.nl)'.

screwdriver  
adjustment



## Digital Encoders

### OPTION P236 / P220

- CV and CC encoders with a very long life time and intelligent functions (e.g. Keylock)  
SM800 - Option 236, SM1500 and SM6000 - Option 220

Contact technical support for more information on '[Support@Delta-Elektronika.nl](mailto:Support@Delta-Elektronika.nl)'.

## Increased max. output voltage/current

### OPTION P069

- The maximum output voltage or current can be increased by **approximately 10%**.  
Normally this results in a derating of the maximum ambient temperature or other parameters.
- Always add increased value for voltage or current in ordercode, for example **SM35-45 P069 output 38 V**.

## Enforced secondary insulation 1000 V

### OPTION P089

- The secondary insulation between output and ground is increased from standard 600 V to 1000 V .

## Interfaces and Programmers

Ethernet Power Supply Controller

see page 18

IEEE488 Power Supply Controller

see page 20

RS232 Power Supply Controller

see page 20

Isolated analog programming interface

see page 22



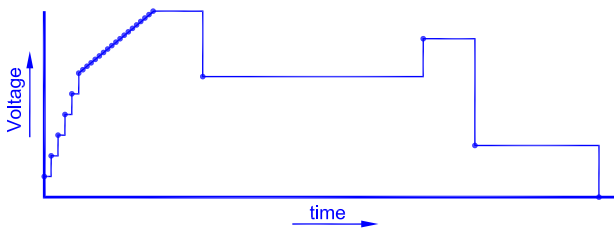
# PSC - SERIES      ETHERNET INTERFACE



## PSC-ETH Interface between Ethernet IP Network and Power Supply

OPTIONS

- Built-in Card or External Module
- Make use of existing IP networks
- **16-bit programming** and monitoring
- Digital user in- and outputs (isolated)
- IP-address configurable
- Software Calibration
- LabVIEW driver included
- Read-back of status signals



User defined Waveforms can be stored in the Sequencer



Test pulses for Automotive applications

### Integrated Sequencer:

- Ideal for repetitive testing and automotive
- Converts Power Supply into **Waveform Generator**
- Can work like a PLC for stand-alone automation: steps interact with the actual in- and outputs
- **Car battery simulation**, Surges, etc.
- 25 free programmable sequences, 2000 steps each
- Combination of very fast and slow sequences, steps from 1 millisecond till hours

### 19" Rack mounting



Behind the panel **RA19-3-PSC** or **RA19-3-PSC-ETH** up to 3 external PSCs can be mounted. See page 20 for the panel **RA19-ES-PSC** or **RA19-ES-PSC-ETH** to mount a PSC in combination with a power supply from the ES-SERIES.

### External module



External module PSC-ETH

## The Sequencer

The PSC-ETH can control the power supply by a sequence without the need of an external computer.

A sequence step can do the following:

- Set the output Voltage or Current
- Set a Digital output (6 available), read a digital input (8 available)
- Wait for trigger from computer or Pause
- Set an internal Variable (8x) or an internal Timer (2x)
- Possibility to create loops, subroutines, ramps etc.
- Increment or Decrement output Voltage or Current

Sequences can be started / paused / stopped by : Commands via Ethernet (software) or by User Inputs (hardware).

Using digital user inputs for starting or stopping a sequence, makes it possible to choose the sequences by selecting the corresponding input, without being connected to a computer.

## Specifications

### Analog inputs and outputs

The 2 analog in- and outputs have a 16 bits resolution. Offset and full scale can be software calibrated. Input linearity error is 1 LSB, output linearity error is 2 LSB. TC typical is 10 ppm / °C.

### Status monitoring

The PSC provides logic status inputs to monitor the status signals of the power supply such as CC mode, current or voltage limit, DC fail, AC fail, Over Temperature, PSOL, etc.

### Controls

Remote ShutDown: Enables / disables the output voltage of the power supply.  
REMOTE: Switches from manual control to remote control (only on SM800 / SM1500 / SM6000)

### Digital User Inputs and Outputs (not on ES- and SM3000-SERIES)

The PSC-ETH provides eight 1000 V opto-isolated logic inputs with common zero for custom use. The input impedance is 1800 Ohm, Logic high = 2.5 ... 30 V, Logic low = 0 V. The PSC-ETH provides also six 1000 V opto-isolated, logic, open drain outputs with common zero for custom use. The output impedance is 7 Ohm, maximum rating is 30 V / 200 mA.

### Accessories

PSC built-in: CD with example software and manual in PDF format.  
External module: CD with example software and manual in PDF format, Analog cable and Line Cord.

### Ordering information

	Description	Digital User I/O	Notes
<b>ES 150 option P150</b>	ES 150 - series with Built-in Card	not available	Analog programming connector removed
<b>ES 300 option P179</b>	ES 300 - series with Built-in Card	not available	Analog programming connector removed
<b>SM 800 option P256</b>	SM 800 - series with Built-in Card	yes	Analog programming connector still <b>available</b>
<b>SM 1500 option P177</b>	SM 1500 - series with Built-in Card	yes	Analog programming connector still <b>available</b>
<b>SM 3000 option P149</b>	SM 3000 - series with Built-in Card	not available	Analog programming connector removed
<b>SM 6000 option P157</b>	SM 6000 - series with Built-in Card	yes	Analog programming connector still <b>available</b>
<b>PSC-ETH</b>	External module	yes	Uses analog programming connector

### Specifications external module

#### Dimensions (h x w x d)

89 x 85.5 x 118.5 mm, 0.7 kg

#### Input Power

Wide range 98-264 V AC, 48-62 Hz  
Power consumption 10 W  
Hold-up time @ 110 V AC : 80 ms  
Hold-up time @ 230 V AC : 300 ms

#### Ambient temperature

Operating 0 to +55 °C  
Storage -20 to +70 °C

#### Insulation

Analog in- and outputs to case : 1000 V DC  
Logic in- and outputs to case : 1000 V DC  
Ethernet to case : 1000 V DC  
Line input to case : 2500 V AC

#### EMC

Emission : EN 61000-6-3, residential, light industrial environment  
EN 55022B  
Immunity : EN 61000-6-2, industrial environment  
Enclosure : IP20

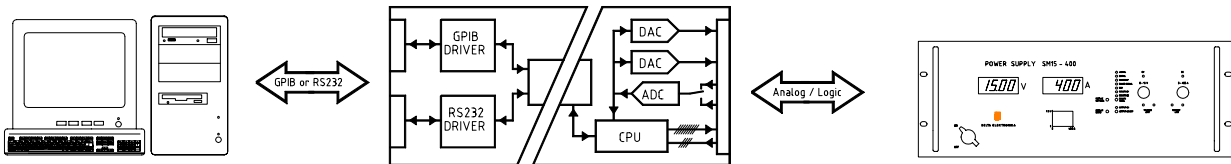


### PSC-232 Interface between RS232 Computer port and Power Supply

### PSC-488 Interface between IEEE488 Computer port and Power Supply

OPTIONS

- Built-in Card or External Module
- **14 Bit** voltage and current **programming**
- 12 - 16 Bit voltage and current monitoring
- Up to 15 PSCs on 1 BUS to control multiple supplies
- SCPI commands
- Software Calibration
- LabVIEW driver included
- Read-back of status signals



The PSC is an interface between the Computer and an analog programmable Power Supply.

- **RS232 Programming**  
The interface PSC-232 programs a Power Supply through the standard RS232 port on the computer.
- **IEEE488 Programming**  
The interface PSC-488 programs a Power Supply through the IEEE488 Bus.

#### 19" Rack mounting

#### External module



Use panel **RA19-ES-PSC** or **RA19-ES-PSC-ETH** to mount a PSC in combination with a power supply from the **ES-SERIES**.

Behind the panel **RA19-3-PSC** or **RA19-3-PSC-ETH** up to 3 external PSCs can be mounted (see also page 18).



External module PSC-488

## Commands

The PSC allows three groups of commands:

- IEEE488.2 Common Commands
- SCPI (Standard Commands for Programmable Instruments)
- DPC (Delta Programming Commands) emulation mode of the old PSC44M (for compatibility only)

The PSC can be programmed using languages like Basic, Pascal, C, Visual Basic, Delphi, Hpvee, Labview etc. Software examples are available on [www.DeltaPowerSupplies.com](http://www.DeltaPowerSupplies.com)

## Specifications

### Analog inputs and outputs

The 2 analog inputs have a 12 - 16 bit resolution. The 2 analog outputs have a 14 bits resolution. Offset and full scale can be software calibrated. Input linearity error is 2 LSB, output linearity error is 1 LSB. TC typical is 30 ppm / °C.

### Status monitoring

The PSC provides logic status inputs to monitor the status signals of the power supply such as CC mode, current or voltage limit, DC fail, AC fail, PSOL and Over Temperature.

### Controls

Remote ShutDown: Enables / disables the output voltage of the power supply.  
 REMOTE: Switches from manual control to remote control (only on SM800 / SM1500 / SM6000)

### User Inputs (only on module)

The PSC-232 and the PSC-488 provide two 1000 V opto-isolated logic inputs with common zero for custom use. The input impedance is 470 Ohm, Logic high = 2.5 ... 8 V, Logic low = 0 V.

### User Outputs (only on module)

The PSC-232 and the PSC-488 provide two 1000 V opto-isolated, logic, open collector outputs with common zero for custom use. The output collector emitter max. rating is 50 V / 4.5 - 7 mA (dissipation max. 150 mW).

### Accessories

PSC built-in: CD with example software and manual in PDF format, RS232 cable (except with option P164).  
 External module: CD with example software and manual in PDF format, RS232 cable, Analog cable and Line Cord.

	Description	Notes
ES 150 option P148	ES 150 - series with Built-in RS232 Card	Analog programming connector removed
ES 300 option P180	ES 300 - series with Built-in RS232 Card	
SM 800 option P255	SM 800 - series with Built-in PSC-488 Card	Analog programming connector still <b>available</b>
SM 800 option P254	SM 800 - series with Built-in PSC-232 Card	
SM 1500 option P184	SM 1500 - series with Built-in IEEE488 Card	Analog programming connector still <b>available</b>
SM 1500 option P183	SM 1500 - series with Built-in RS232 Card	
SM 3000 option P164	SM 3000 - series with Built-in IEEE488 Card	Analog programming connector removed
SM 3000 option P146	SM 3000 - series with Built-in RS232 Card	
SM 6000 option P156	SM 6000 - series with Built-in IEEE488 Card	Analog programming connector still <b>available</b>
SM 6000 option P155	SM 6000 - series with Built-in RS232 Card	
PSC-488 module	External IEEE488 module	Uses analog programming connector
PSC-232 module	External RS232 module	

Note: the PSC-488 models can also be configured for RS232 programming.

### Specifications external module

#### Dimensions (h x w x d)

89 x 85.5 x 118 mm, 0.8 kg

#### Input Power

Wide range 98-264 V AC, 48-62 Hz  
 Power consumption 10 W  
 Hold-up time @ 110 V AC : 80 ms  
 Hold-up time @ 230 V AC : 300 ms

#### Ambient temperature

Operating 0 to +55 °C  
 Storage -20 to +70 °C

#### Insulation

Analog in- and outputs to case : 1000 V DC  
 Logic in- and outputs to case : 1000 V DC  
 GPIB or RS232 to case : 1000 V DC  
 Line input to case : 2500 V AC

#### EMC

Emission : EN 61000-6-3, residential, light industrial environment  
 EN 55022B  
 Immunity : EN 61000-6-2, industrial environment  
 Enclosure : IP20



## 4 channel analog isolation amplifier

- Built-in Card or External Module
- **Isolated programming** of voltage and current
- Galvanic isolation when programming and monitoring
- **Prevents** problems with **earth loops** and common mode voltages
- **Isolated logic inputs and outputs**
- Isolated monitoring of voltage and current
- Selectable 0 - 5 V or 0 - 10 V signal levels
- The external Module is pin compatible with the D15 connector on Delta Elektronika power supplies

### Ordering information

- The ISO AMP CARD is mounted, tested and calibrated in combination with the power supply:  
SM 800 **option P249**  
SM 1500 **option P218**  
SM 3000 **option P145**  
SM 6000 **option P154**
- Order **ISO AMP MODULE** for the external module. The module can be used in combination with all programmable Delta Elektronika power supplies. For operation of the module an external 24 V DC supply voltage is needed.

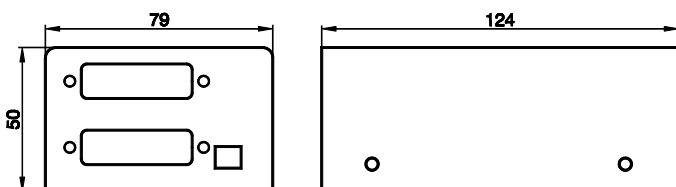
### Specifications

Analog inputs / outputs	
Offset	$\pm 60 \mu\text{V}$ typical, $\pm 180 \mu\text{V}$ max
Full scale error	0.1 % calibrated
Non-linearity	0.01 % typical, 0.05 % max
Temperature coefficient	- 65 ppm typical
Common mode rejection	80 dB @ 50 Hz
Voltage range	0 - 5 V or 0 - 10 V (dip-jumper)

### Accessories External Module

- rail adapter for 35 mm rail mounting
- wall mounting adapter
- 0.6 m cable with 15 pole D-connectors (for connecting to power supply).

### Dimensions



Dimensions of the external ISO AMP MODULE

### External module



External ISO AMP MODULE



# MASTER / SLAVE SERIES ADAPTER



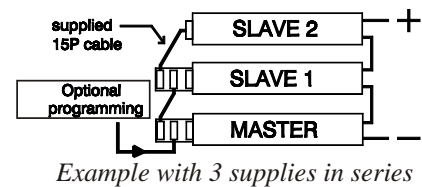
## Operation in Master / Slave Series Mode

- Provides equal voltage sharing in series mode
- Connecting power supplies in Master / Slave series mode (for ES - and SM3000 - SERIES)
- Series operation possible up to 600 V total voltage
- The master power supply can be the upper or the lower power supply in the series system

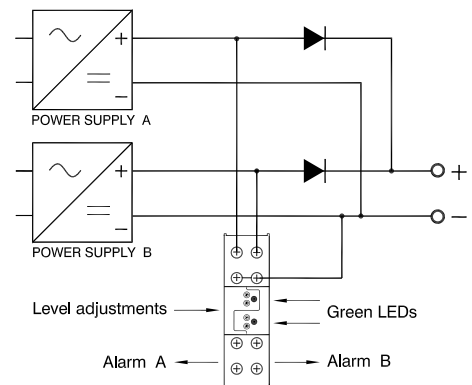
### Specifications

Slave programming voltage	
Offset	$\pm 60 \mu\text{V}$ typical, $\pm 180 \mu\text{V}$ max
Full scale error	0.1 % calibrated
Non-linearity	0.01 % typical, 0.05 % max
Temperature coefficient	- 65 ppm typical

### Connections



# AL24-48 UNDER AND OVER VOLTAGE ALARM



*Monitoring 2 power supplies in redundant operation.*

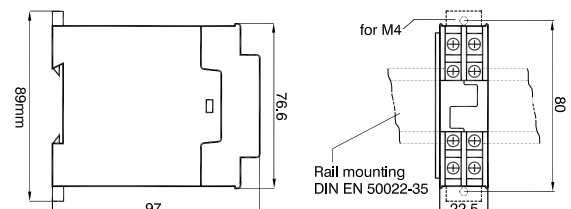
## 2 channel alarm for use from 18 V to 64 V DC

- Large adjustment for use on both 24 V and 48 V DC.
- Contains two window comparator circuits, isolated from each other. Each has an isolated alarm contact.
- Monitors the output voltages of two power supplies.
- Between the levels of under and over voltage a green LED lights up and an alarm contact closes.

### Specifications

Alarm circuits	
Undervoltage range	18 - 48 V
Overvoltage range	24 - 64 V
insulation between circuits	500 V
Alarm contact, gold, rating	100 mA / 30 V, Normally Closed
Ambient temperature	- 20 to + 70 °C

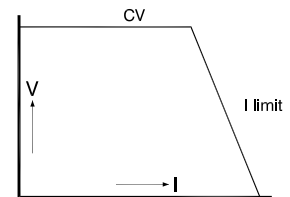
### Dimensions





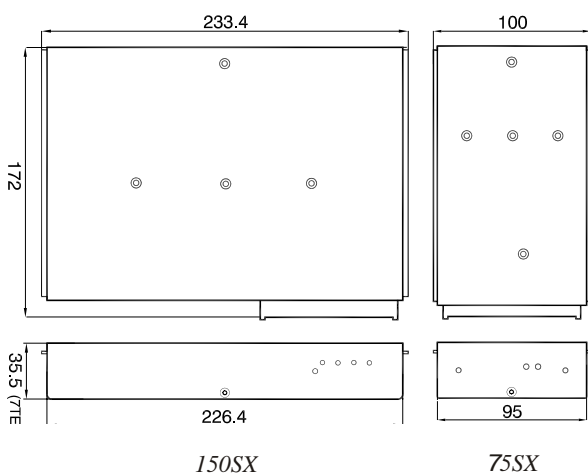
SX-SERIES

<b>75 SX 5</b>	<b>3.5 - 6 V</b>	<b>13 A</b>
<b>150 SX 5</b>	<b>3.5 - 6 V</b>	<b>26 A</b>
<b>75 SX 15-15</b>	<b>2 x 6 - 15 V</b>	<b>2.5 A</b>
<b>150 SX 15-15</b>	<b>2 x 6 - 15 V</b>	<b>5 A</b>
<b>150 SX 75-75</b>	<b>2 x 15 - 75 V</b>	<b>1 A</b>
<b>150 SX 200-200</b>	<b>2 x 35 - 200 V</b>	<b>0.3 A</b>
<b>ST 150</b>	<b>3.5 - 6 V</b>	<b>13 A</b>
	<b>2 x 6 - 15 V</b>	<b>2.5 A</b>

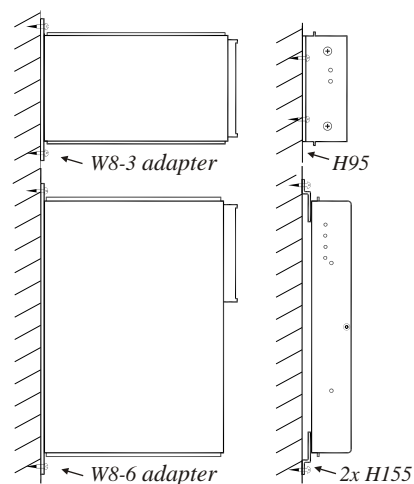


- Very low output ripple and spikes
- Weight only 0.6 kg (75SX), 1.2 kg (150SX)
- Covers whole output range from 3.5 V to 400 V DC
- Wide input voltage range for world wide use
- 2 outputs series mode, parallel mode or dual mode
- Protected against overload and short circuit
- Output voltage adjustable with 20 turn trimmer
- Including mating connector with faston tabs

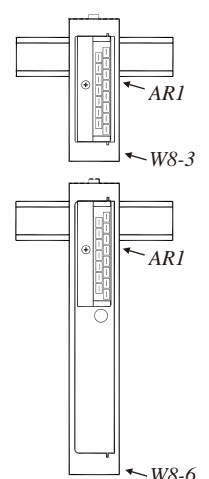
### Dimensions



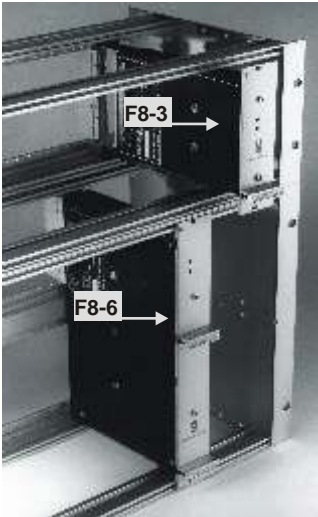

### Wall mounting



### Rail mounting



## Specifications 75SX - series and 150SX - series

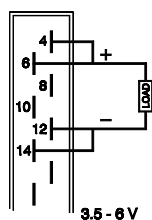
<b>Input voltage</b>	: 98 - 132 V AC or 185 - 264 V AC, 48 - 62 Hz For DC operation and operation at 400 Hz contact factory.	
<b>Input current</b>	: 75SX 1.3 Arms (98 - 132 V AC), 0.7 Arms (185 - 264 V AC) 150SX 2.6 Arms (98 - 132 V AC), 1.4 Arms (185 - 264 V AC)	
<b>Fuses</b>	: 75SX 2 A T 150SX 4 A T	
<b>Inrush current limit</b>	: 10 A with NTC resistor 30 Ohms cold resistance.	
<b>Insulation</b>	: Input / output : 4 kVrms (1 min.), 8 mm creepage/cl. Input / case : 2.5 kVrms (1 min.), 5 mm creepage/cl. Output / case : 500 V DC, 1 mm creepage/clearance 1 kV DC for 150 SX75-75 and 200-200.	
<b>Safety</b>	: EN 60950 EN 61010	
<b>EMC</b>	: EN 61204-3 Power Supply Standard EN 61000-6-3 (EN 55022B) Generic Emission EN 61000-6-2 Generic Immunity	
<b>Efficiency</b>	: 84 % dual units, 80 % 5 V units at 230 V AC input. 81 % and 78 % respectively at 110 V AC input.	
<b>Voltage regulation</b>	: 5 and 15 V models : 75 and 200 V models Load 0 - 100% : 10 mV (with remote sensing) 200 mV Line 185 - 264 V AC : 10 mV 150 mV	<i>Eurocard rack mounting: Use front panel F8-3 for 75SX, 3U height (132.5 mm). Use front panel F8-6 for 150SX, 6U height (265 mm). Use front panel F8-6T for ST150, 6U height (265 mm).</i>
<b>Ripple + noise</b>	: 5 mVrms, max. 20 mV p-p 70 mVrms, 100 mV p-p	
<b>Stability</b>	: $5 \cdot 10^{-4}$ during 8 hours after 1 hr warm up.	
<b>Temp. coefficient</b>	: $1 \cdot 10^{-4}$ per °C	
<b>Output impedance</b>	: Max. 0.1 Ohm up to 100 kHz, except 150SX75-75 and 200-200 max. 1 Ohm.	
<b>Recovery time</b>	: 0.1 ms to recover to within 0.1 V after a 50-100% load step. Max. deviation 0.4 V. 0.6 ms / 1.2 V for 75 V and 200 V models.	
<b>Ambient temperature</b>	: Storage : - 40 to + 85 °C Operating : - 20 to + 50 °C, derate current linearly to 20% from 50 to 75 °C.	
<b>Temp. protection</b>	: Overtemperature protected.	
<b>Hold-up time</b>	: 15 ms at full load, 30 ms at half load (230 V AC).	
<b>Series operation</b>	: Up to 500 V total voltage. Up to 1 kV for 150SX75-75 and 200-200.	
<b>Parallel operation</b>	: Allowed up to 40 °C ambient temperature	
<b>Redundant par. operation</b>	: Is possible with external diodes	
<b>Current limit</b>	: The current limit is fixed and protects the power supply during overload and short circuit. 10% more current can be taken at the low end of the voltage range.	
<b>Voltage limit</b>	: For safety a second regulation circuit limits the output voltage to about 10% above its range in case the normal regulation loop fails.	
<b>Voltage adjustment</b>	: The output voltage is continuously variable over the whole range with a 20 turn screw driver adjustment through the front panel.	
<b>Remote control</b>	: Voltage control with an external potentiometer is possible after some small internal changes.	
<b>Remote programming</b>	: An analog voltage of 5 V between PROG. and S- corresponds with the max output voltage.	
<b>Remote sensing</b>	: Max. 2 V per load lead for SX15-15 and 0.5 V for SX5. ST150, 150SX75-75 and 200-200 have no remote sensing.	
<b>Remote ShutDown</b>	: By +5 V (3.5 - 12 V) between RSD and S- or -.	
<b>MTBF</b>	: 1 000 000 hrs	
<b>Dim. and weight</b>	: 75SX h x w x d = 100 x 35.5 x 172 mm, 0.6 kg 150SX h x w x d = 233.4 x 35.5 x 172 mm, 1.2 kg	

## Bench operation

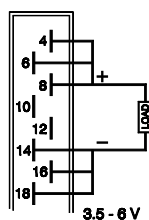
### Parallel-, Series- and Dual-Mode



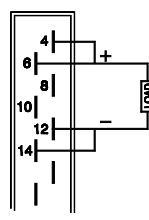
Adapter BA 150 for 150SX.  
Use BA 75 for the 75SX.



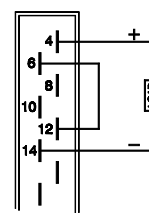
75SX5,  
2 pins parallel



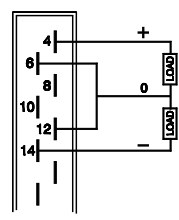
150SX5,  
3 pins parallel



Units with two equal outputs:  
Parallel mode



Series mode

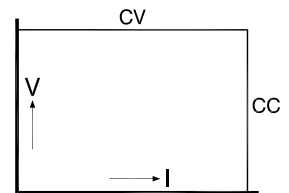


Dual mode

# S 280 - SERIES      280 W      DC POWER SUPPLIES



S 6 - 40	0 - 6 V	0 - 40 A
S 15 - 18	0 - 15 V	0 - 18 A
S 28 - 10	0 - 28 V	0 - 10 A



- Very low output ripple and spikes
- Redundant operation with RA-10 adapter
- Low offset analog programming, 0 - 5 V
- **Master / Slave** parallel operation
- Adjustable output voltage and current
- Designed for **long life** at **full power**
- Efficiency up to 88 %
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit
- optional **isolated analog** programming  
optional **Ethernet / IEEE488 / RS232** programming  
for more options and details see page 16

S-SERIES

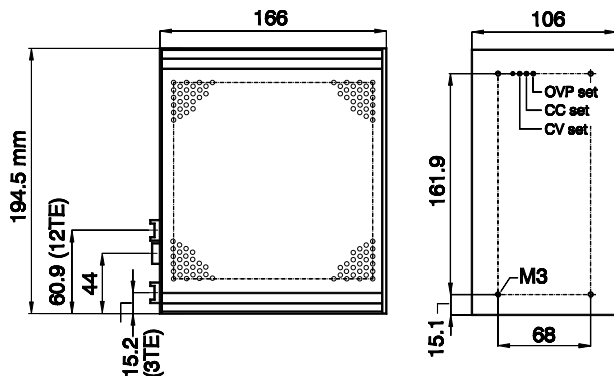


Wall mounting with front panel FPW



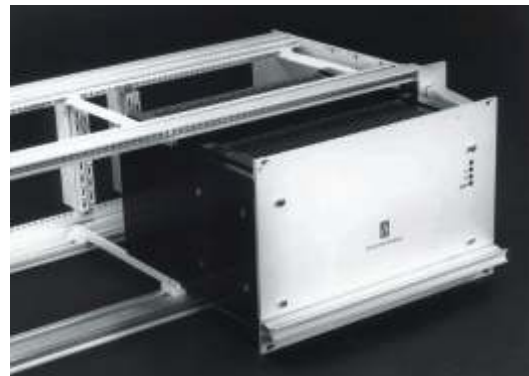
Redundant adapter RA 10 for S28-10

## Dimensions



Dimensions S280

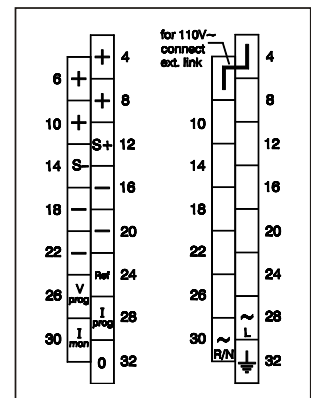
## Eurocard rack mounting



Eurorack mounting with front panel FP40

Specifications S 280 - series			
Output	S 6 - 40	S 15 - 18	S 28 - 10
voltage / current	0 - 6 V / 0 - 40 A	0 - 15 V / 0 - 18 A	0 - 28 V / 0 - 10 A
<b>Input</b>			
AC input, full load	100 - 132 V 48 - 62 Hz 195 - 265 V 48 - 62 Hz	100 - 132 V 48 - 62 Hz 195 - 265 V 48 - 62 Hz	100 - 132 V 48 - 62 Hz 195 - 265 V 48 - 62 Hz
DC input, full load	contact factory		
current (230 V AC / 110 V AC) fuse 230 V / 110 V	2.2 / 4.0 Arms 4 AT / 6.3 AT	2.3 / 4.2 Arms 4 AT / 6.3 AT	2.3 / 4.2 Arms 4 AT / 6.3 AT
<b>Efficiency</b>			
AC input, 220 V, full load	80 %	86 %	88 %
<b>Regulation</b>			
Load 0 - 100% Line 198 - 265 V AC	<b>CV</b> <b>CV</b> 5 mV 5 mV	5 mV 5 mV	5 mV 5 mV
Load 0 - 100% Line 198 - 265 V AC	<b>CC</b> <b>CC</b> 30 mA 30 mA	10 mA 10 mA	10 mA 10 mA
<b>Ripple + noise</b> , rms / p-p	<b>CV</b> <b>CC</b> 5 / 25 mV 15 / 50 mA	5 / 25 mV 5 / 15 mA	5 / 25 mV 5 / 15 mA
<b>Programming speed</b> 0 → V <sub>max</sub>	10 ms	12 ms	15 ms
<b>Output impedance</b> 0-100 kHz	<b>CV</b> 0.1 Ohm	0.1 Ohm	0.1 Ohm
<b>Temp. coeff.</b> , per °C	<b>CV</b> <b>CC</b>	5.10 <sup>-5</sup> 1.10 <sup>-4</sup>	
<b>Stability</b> during 8 hrs after 1 hr warmup	<b>CV</b> <b>CC</b>	5.10 <sup>-4</sup> 1.10 <sup>-3</sup>	

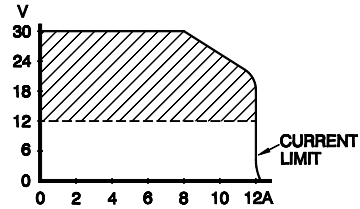
Analog Programming	CV	CC
Programming inputs input range accuracy input impedance	0 - 5 V ± 0.2% - 5 mV / + 12 mV 5 kOhm	0 - 5 V ± 0.5% - 4 mV / + 20 mV 5 kOhm
Monitoring output output range accuracy output impedance	not available	0 - 5 V ± 0.5% - 6 mV / + 0 mV 20 Ohm
<b>Ethernet, IEEE488 or RS232 Programming</b>		
Optional with external interface PSC-ETH, PSC-488 or PSC-232, see pg. 18 and 20. Programming and monitoring of Voltage and Current with accurate AD and DA converters.		



Output and input S280

<b>Standby input power</b>	: 4 W	<b>Hold-up time</b>	100 % load, 230 VAC : 20 ms 50 % load, 230 VAC : 40 ms
<b>Recovery time</b>	50 - 100% load step : 100 μs S6-40, S28-10 200 μs S15-18	<b>Series operation</b>	: Max. 500 V total voltage
<b>Insulation</b>	Input/Output : 3750 Vrms (1 min.) 8 mm creepage/clearance Input/case : 2500 Vrms (1 min.) Output/case : 500 V DC	<b>Remote sensing</b>	: Max. 2 V per lead
<b>Safety</b>	: EN 60950 EN 61010	<b>Mounting</b>	: Vertical airflow through the unit should not be obstructed
<b>EMC</b>	Power Supply Standard : EN 61204-3 Generic Emission : EN 61000-6-3 (EN 55022B) Generic Immunity : EN 61000-6-2	<b>Cooling</b>	: Natural convection cooling, no blower, no noise.
<b>Thermal protection</b>	: Output shuts down in case of insufficient cooling	<b>MTBF</b>	: 500 000 hrs
<b>Operating ambient temp.</b>	: - 20 to + 50 °C	<b>Dimensions (h x w x d)</b>	: 106 x 194.5 x 166 mm
<b>OVP / OVL adjust range</b>	: 5 - 35 V	<b>Case</b>	: DIN 41494 / IP20
		<b>Connectors</b>	: H15 (DIN 41612)
		<b>Weight</b>	: 2.8 kg

# 240 S 24    240 W    DC POWER SUPPLIES

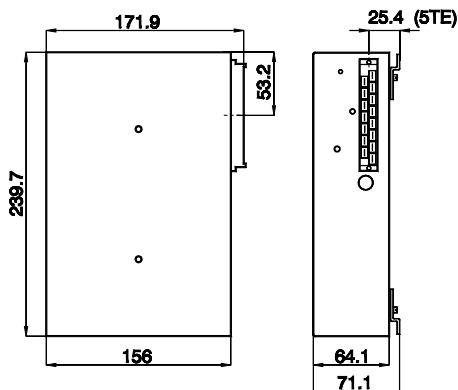


<b>240 S 24</b>	<b>12 - 15 V</b>	<b>12 A</b>
	<b>24 V</b>	<b>10 A</b>
	<b>30 V</b>	<b>8 A</b>

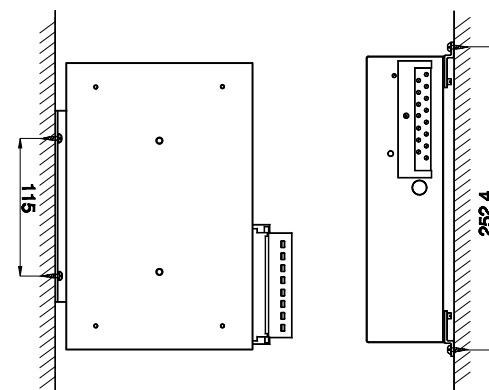
- Very low output ripple and spikes
- Built-in diode for redundant operation
- Low offset analog programming, 2 - 5 V
- Adjustable output voltage
- Very high reliability, MTBF 1000 000 hrs
- Designed for **long life at full power**
- Natural convection cooling, no blower no noise
- Efficiency up to 87 %
- Under voltage alarm contact
- Low inrush current
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit

240S - 1200S

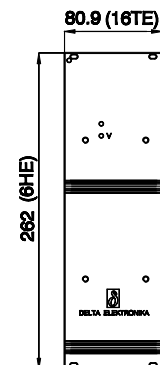
## Dimensions      Wall mounting      Eurocard Rack mounting



Dimensions 240S24



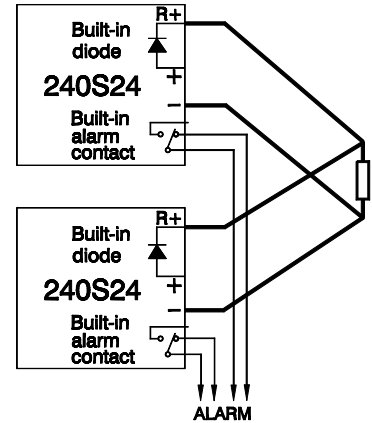
Two ways of vertical wall mounting with the included brackets H155 (2 pieces).



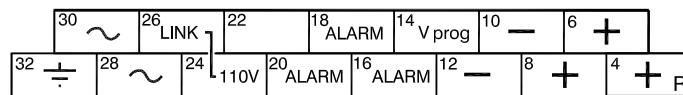
Use front panel F16-6 for Eurocard Rack Mounting.

## Specifications 240 S 24

<b>Output</b>	:	Adjustable 12 - 30 V with a screwdriver or analog programmable by 2 - 5 V. Factory set at 24 V.
<b>Input</b>	:	AC 195 - 265 V 48 - 62 Hz 1.8 Arms 100 - 132 V 48 - 62 Hz 3.2 Arms  For DC or operation at 400 Hz contact factory Fuse 4 A T at 230 V, 6.3 A T at 110 V
<b>Safety</b>	:	EN 60950 EN 61010
<b>EMC</b>	:	EN 61204-3 Power Supply Standard EN 61000-6-3 (EN 55022B) Generic Emission EN 61000-6-2 Generic Immunity
<b>Efficiency</b>	:	87% at 240 W output (max.heat dissipation 36 W)
<b>Regulation</b>	:	Load 0 - 100% : 50 mV (10 mV when using sense points) Line 198 - 265 V AC : 10 mV
<b>Ripple + noise</b>	:	5 mV rms, 15 mV p-p
<b>Temperature coefficient</b>	:	$5 \cdot 10^{-5}$ per °C
<b>Stability during 8 hrs</b>	:	$3 \cdot 10^{-4}$ (after 1 hr warm up)
<b>Output impedance</b>	:	0.1 Ohm up to 100 kHz
<b>Recovery time</b>	:	200 µs after 50 - 100% load step
<b>Insulation</b>	:	Input / output : 3750 Vrms (1 min.) Input / case : 2500 Vrms (1 min.) Output / case : 500 V DC
<b>Hold-up time</b>	:	20 ms (24 V / 10 A, 230 V AC input)
<b>Ambient temperature</b>	:	Operating: - 10 to + 50 °C. Above 50 °C derate current linearly to 20% at 80 °C. Storage: - 40 to + 85 °C.
<b>Series operation</b>	:	Up to 500 V total voltage
<b>Parallel operation</b>	:	At 90% of max. current (Internal current limit switch at low). The extra positive output terminal, via a built-in Schottky diode, separates the output circuits when units are operated in parallel.
<b>Alarm circuit</b>	:	A relay contact changes over when the output drops 10% below the set value. Gold contact, rating max. 100 mA / 30 V.
<b>Current limit</b>	:	Constant power limit from 30 to 22 V, constant current below 22 V. Current limit protects against continuous overload and short circuit.
<b>OVL</b>	:	Limits the maximum output voltage at about 33 V.
<b>Mounting</b>	:	The 240 S 24 should be mounted vertically for optimal cooling. When mounted horizontally put internal current limit switch at low and keep the ambient temperature below 40 °C.
<b>MTBF</b>	:	1 000 000 hrs
<b>Dimensions and weight</b>	:	240 x 71 x 156 mm (h x w x d) 14 TE 6 U 2.0 kg
<b>Remote sensing</b>	:	The sense points (pin 8 and 10) are internally connected to + and - output (pin 6 and pin 12), but these links can be removed when remote sensing is required. The voltage drop across the leads plus the load can never exceed the supply maximum output rating. For example at 24 V 8 A it is possible to compensate 6 V (3 V per lead) because the unit can supply max. 30 V 8 A.
<b>Remote programming</b>	:	2 - 5 V between pin 14 and 10 gives 12 - 30 V output (internal switch in position P).
<b>Voltage adjustment with external potmeter</b>	:	Is possible if an internal link and a resistor are removed
<b>In- and output connections :</b>		



*Redundant parallel operation with undervoltage alarm. Outputs are separated by built-in Schottky series diodes.*

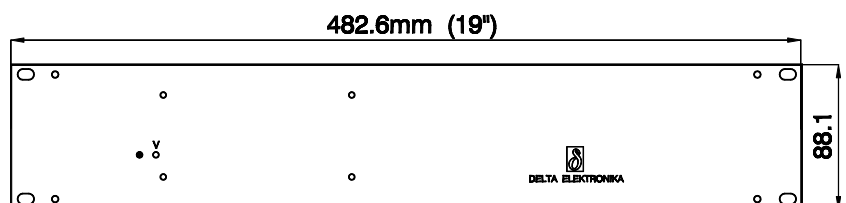


## Bench operation

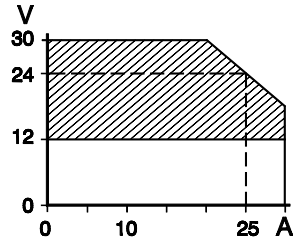
## 19" Rack mounting



240S24 with bench adapter BA 150



Front panel F 19/2 for horizontal 19" rack mounting of one unit



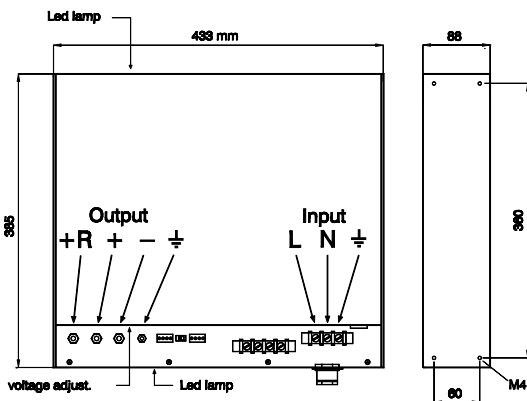
- Very low output ripple and spikes
- Built-in diode for redundant operation
- Low offset analog programming, 2 - 5 V
- Adjustable output voltage
- Very high reliability, MTBF 1000 000 hrs
- Designed for **long life at full power**
- Natural convection cooling, no blower no noise
- Efficiency up to 89 %
- Under voltage alarm contact
- Low inrush current
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit

600 S 24	12 - 15 V	30 A
	24 V	25 A
	30 V	20 A

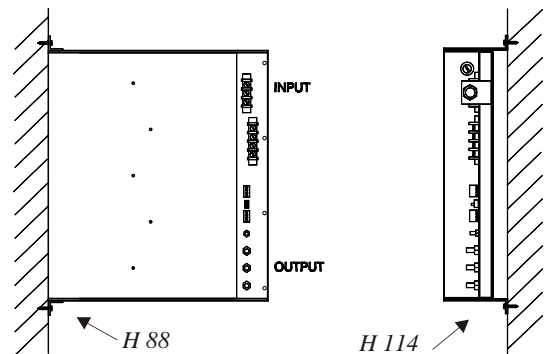
240S - 1200S

Dimensions

Wall mounting



Dimensions 600S24



Two ways of vertical wall mounting



## Specifications 600 S 24

**Input voltage** : AC 198-264 V 48-62 Hz  
3.8 Arms, fuse 6.3 A T  
crest factor 2.0

AC 99-132 V 48-62 Hz  
7.6 Arms, fuse 12.5 A T

DC contact factory

### Insulation

Input / output : 3750 Vrms (1 min.)  
Input / case : 2500 Vrms (1 min.)  
Output / case : 500 V DC

**Inrush current** : Limited by 47 Ohm during start up

**Line distortion** : Harmonic current meets EN 61000-3-2

**Power factor** : 0.76 at 230 V AC input and full load.

**Safety** : EN 60950 EN 61010

### EMC

Power Supply  
Standard : EN 61204-3

Generic Emission : EN 61000-6-3 (EN 55022B)

Generic Immunity : EN 61000-6-2

**VDE0160 impuls test** : Input withstands non periodic impuls 2.3  
 $\hat{U}_N$  1.3 ms of VDE0160 class 2.

**Output voltage** : Factory set at 24.0 V.  
Screwdriver adjustable with  
10-turn potmeter at the rear side.  
Analog programmable by 2 - 5 V.

**Efficiency** : 89% at 230 VAC input

**Temp. coeff.** :  $5 \cdot 10^{-5}$  per °C

**Stability** :  $3 \cdot 10^{-4}$  during 8 hours after 1 hr warm up.

### Regulation

Load 0 - 100% : Better than 10 mV  
Line 198 - 264 V : Better than 5 mV

**Ripple + noise** : Max. 7 mVrms, 20 mV p-p.

**Output imp.** : Less than 0.05 Ohm up to 100 kHz

**Recovery time** : 0.3 milliseconds to recover to within  
100 mV after a 50 to 100% load step.  
Max. deviation 300 mV.

**Hold-up time** : 30 ms at 230 V AC input and full load.  
60 ms at half load.

**Series operation** : Up to 500 V total voltage

**Parallel operation**: No restrictions.

**Redundant parallel operation** : Use R+ connection via the built-in  
Schottky diode to separate the outputs.  
Do not use remote sensing.

**Under voltage alarm contact** : Changes over when output voltage drops  
to 10% below the set value.  
Gold contact, rating 100 mA/30 V.

**Remote control** : Is possible with a 10 kΩ potmeter.

**Remote progr.** : Output voltage is programmable with  
2 - 5 V, corresponding with 12 - 30 V.  
Programming speed is 100 ms from  
12 - 30 V at max. Current.

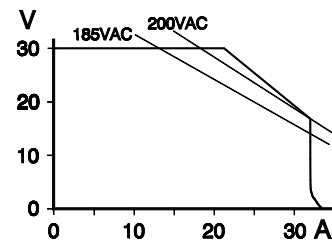
**Remote sensing** : Max. 3 V per load lead.  
With parallel operation remote sensing is  
not recommended.

**Remote on/off** : By 5 V, optocoupler isolated.

### Ambient temperature

Storage : - 40 to + 85 °C  
Operating : - 20 to + 60 °C, derate to 20% at 75 °C

**Current limit** : From 30 to 18 V the current limit follows  
more or less a constant power curve.  
Below 18 V it resembles a  
constant current curve.



Normal current limit and derating at low input voltage

**Overload protection** : Continuous overload and short circuit  
does not harm the unit.

**Voltage limit** : For safety an extra regulation circuit  
limits the output voltage to about 31 V in  
case of malfunction of the normal  
regulation. This limit is internally  
adjustable 20 - 31 V (R111).

**Overtemperature protection** : In case of insufficient cooling the  
output shuts down.

**Led lamps** : Green leds on front and rear panel  
indicate output voltage.

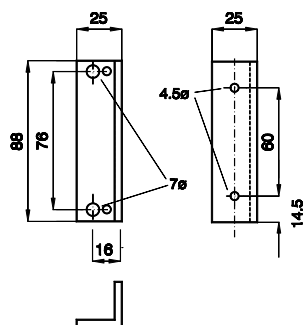
**Wall mounting** : Any position, as long as the air can flow  
freely along the unit for cooling.

**19 inch rack mounting** : With two brackets H88 with handle  
the unit can be 19 inch rack mounted (2U  
height).

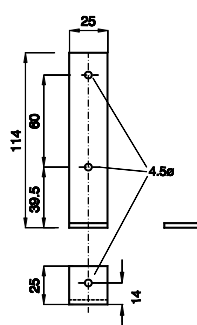
**MTBF** : 1 000 000 hrs

**Dim. and weight** : 88 x 433 x 385 mm (h x w x d), 10.5 kg

## Wall mounting brackets

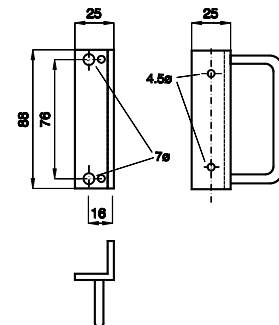


Bracket H88 for vertical wall  
mounting (2 pcs required)



Bracket H114 for vertical wall  
mounting (4 pcs required)

## 19" Rack mounting brackets

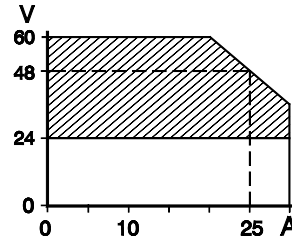
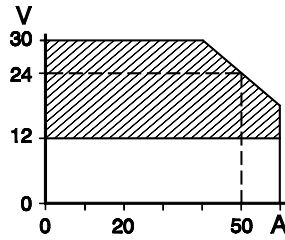


Bracket H88 with handle  
for 19" rack mounting  
(2 pcs required)

1200 S

1200 W

DC POWER SUPPLIES



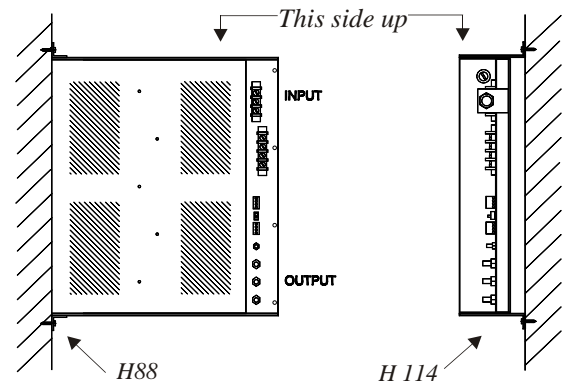
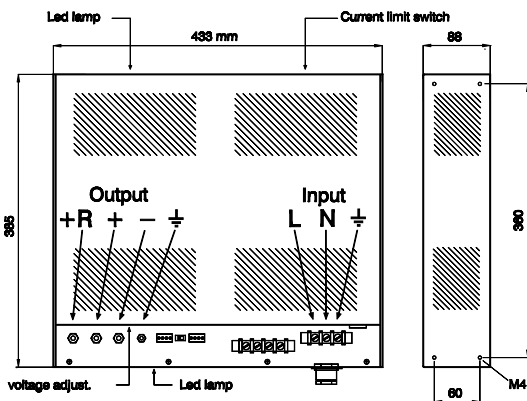
1200 S 24	12 - 15 V	60 A
	24 V	50 A
	30 V	40 A
1200 S 48	24 - 30 V	30 A
	48 V	25 A
	60 V	20 A

- Very low output ripple and spikes
- Built-in diode for redundant operation
- Low offset analog programming, 2 - 5 V
- Adjustable output voltage
- Very high reliability, MTBF 500 000 hrs
- Designed for **long life at full power**
- Natural convection cooling, no blower no noise
- Efficiency up to 89 %
- Under voltage alarm contact
- Low inrush current
- Excellent EMC: high immunity, low emission
- Protected against overload and short circuit

240S - 1200S

Dimensions

Wall mounting



Dimensions 1200S24

Two ways of vertical wall mounting

## Specifications 1200 S 24 and 1200 S 48

**Input voltage** : AC 198-264 V 48-62 Hz  
8.2 Arms, fuse 15 A T  
crest factor 2.2

AC 99-132 V 48-62 Hz  
16.4 Arms, fuse 25 A T

DC contact factory

### Insulation

Input / output : 3750 Vrms (1 min.)  
Input / case : 2500 Vrms (1 min.)  
Output / case : 500 V DC

**Inrush current** : Limited by 39 Ohm during start up

**Line distortion** : Suppressed by a large input choke.

**Power factor** : 0.72 at 230 V AC input and full load.

**Safety** : EN 60950 EN 61010

### EMC

Power Supply  
Standard : EN 61204-3

Generic Emission : EN 61000-6-3 (EN 55022B)

Generic Immunity : EN 61000-6-2

**VDE0160 impuls test** : Input withstands non periodic impuls  $2.3 \hat{U}_N$   
0.3 ms of VDE0160 class 1.

**Output voltage** : Factory set at 24.0 V.  
Screwdriver adjustable with 10-turn  
potmeter at the rear side.  
Analog programmable by 2 - 5 V.

**Efficiency** : 89% at 230 V AC input.

**Temp. coeff.** :  $5.10^{-5}$  per °C

**Stability** :  $3.10^{-4}$  during 8 hours after 1 hr warm up.

### Regulation

Load 0 - 100% : Better than 10 mV  
Line 198 - 264 V : Better than 5 mV

**Ripple + noise** : Max. 7 mVrms, 20 mV p-p.

**Output imp.** : Less than 0.05 Ohm up to 100 kHz

**Recovery time** : 0.3 milliseconds to recover to within  
100 mV after a 50 to 100% load step.  
Max. deviation 300 mV.

**Hold-up time** : 20 ms at 230 V AC input and full load.  
40 ms at half load.

**Series operation** : Up to 500 V total voltage

**Parallel operation:** For safe parallel operation put current limit  
switch at 'LO' (max. 1100 W).

**Redundant parallel operation** : Use R+ connection via built-in Schottky  
diode to separate the outputs.  
Put current limit at 'LO'.  
Do not use remote sensing.

**Under voltage alarm contact** : Changes over when output voltage drops to  
10% below the set value.  
Gold contact, rating 100 mA/30 V.

**Remote control** : Is possible with a 10 kΩ potmeter.

**Remote progr.** : Output voltage is programmable with  
2 - 5 V, corresponding with 12 - 30 V  
(24 - 60 V). Programming speed is  
100 ms from 12 - 30 V (24 - 60 V) at  
max. current.

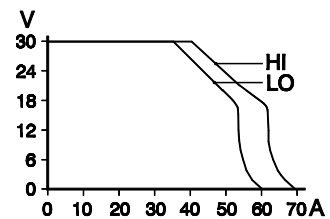
**Remote sensing** : Max. 3 V per load lead.  
With parallel operation remote sensing  
is not recommended.

**Remote on/off** : By 5 V, optocoupler isolated.

### Ambient temperature

Storage : - 40 to + 85 °C  
Operating : - 20 to + 50 °C mounted vertically.  
- 20 to + 40 °C mounted horizontally.  
Derate to 20% at 75 °C

**Current limit** : Can be put on HI or LO with a switch on  
the front panel.  
From 30 to 18 V (60 to 36 V) the current  
limit follows more or less a constant  
power curve. Below 18 V (36 V) it  
resembles a constant current curve.



Current limit 1200 S 24

**Overload protection** : Continuous overload and short circuit  
does not harm the unit.

**Voltage limit** : For safety an extra regulation circuit  
limits the output voltage to about 31 V  
(62 V) in case of malfunction of the  
normal regulation. This limit is internally  
adjustable 20-31 V (40-62 V).

**Overtemperature protection** : In case of insufficient cooling the  
output shuts down.

**Led lamps** : Green leds on front and rear panel  
indicate output voltage.

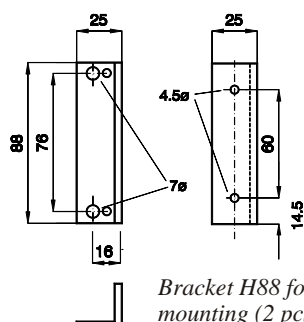
**Wall mounting** : The natural convection cooling functions  
best when the unit is mounted vertically  
as drawn (input at upper side).  
The covers are used as heat sinks, so  
some space between cover and wall is  
necessary.

**19 inch rack mounting** : With a unit mounted horizontally in a 19"  
rack (2 U), the current limit switch has to  
be put on 'LO' (max. 1100 W). With  
forced cooling, the full 1200 W can be  
taken continuously (limit = 'HI').

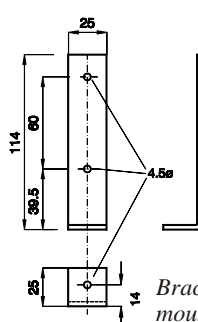
**MTBF** : 500 000 hrs

**Dim. and weight** : 88 x 433 x 385 mm (h x w x d), 11 kg.

## Wall mounting brackets

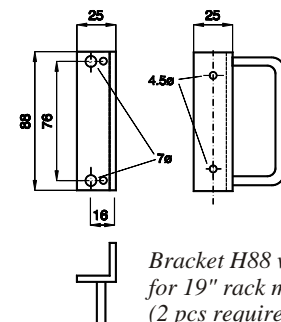


Bracket H88 for vertical wall  
mounting (2 pcs required)



Bracket H114 for vertical wall  
mounting (4 pcs required)

## 19" Rack mounting brackets

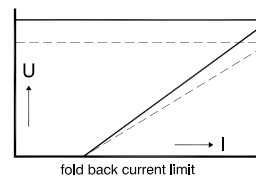


Bracket H88 with handle  
for 19" rack mounting  
(2 pcs required)

# U - SERIES      6 W      DC POWER SUPPLIES



**5 U 5**                      **5 - 6 V**      **1 A**  
**5 U 15 - 15**      **2 x 12 - 15 V**      **0.2 A**



- Very low output ripple and spikes
- Two outputs for series-, parallel- or dual mode (5U15-15)
- Very low leakage current and coupling capacitance
- Protected against overload and short circuit
- Output voltage adjustable with 20 turn trimmer
- Eurocard mounting with optional adapter

## Output configurations

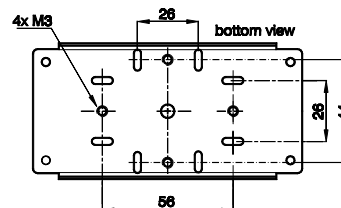
The **5 U 15 - 15** has two isolated, regulated outputs which are independently adjustable from 12 to 15 V. The unit can be used in 4 different configurations:

- |                     |                      |              |
|---------------------|----------------------|--------------|
| 1) Isolated outputs | <b>2 x 12 - 15 V</b> | <b>0.2 A</b> |
| 2) Parallel mode    | <b>12 - 15 V</b>     | <b>0.4 A</b> |
| 3) Series mode      | <b>24 - 30 V</b>     | <b>0.2 A</b> |
| 4) Dual mode        | <b>+/- 12 - 15 V</b> | <b>0.2 A</b> |

## B-models

The **5 U 5 B** and the **5 U 15-15 B** are models with screw terminals for wall and rail mounting. Included with these units are two clamps for 35 mm rail mounting.

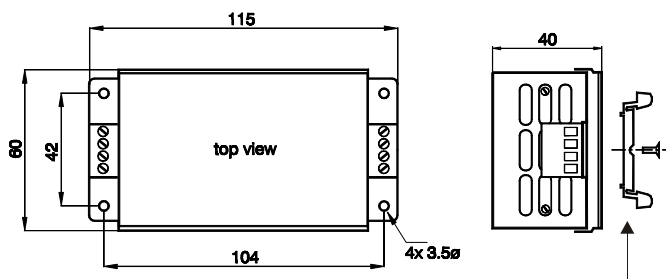
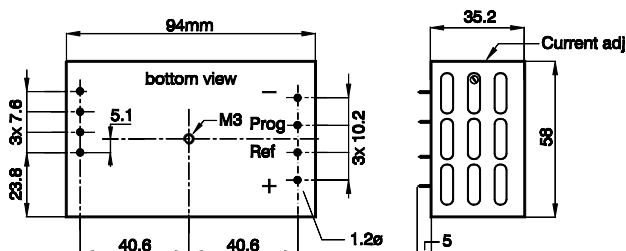
*On the rear side of the B-models there are M3 holes for wall or rail mounting*



**Accessories:** P500 Eurocard for 2 U-units  
 Front panel F10-3 for P500

## Dimensions

## Wall and rail mounting



Standard U-model has solder pins of 1.2 mm  $\phi$  for PCB mounting

B-model with screw terminals for wall or rail mounting, incl. 2 clamps for 35 mm DIN rail

Clamp for rail mounting

U-SERIES

## Specifications 5U5 and 5U15-15

<b>Input</b>	: 230 / 115 V 48 - 62 Hz
<b>Transformer</b>	: Split bobbin, potted, safety transformer according to:  VDE0551 EN 60742

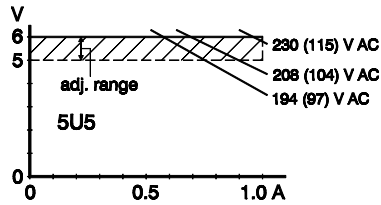


<b>Test voltage:</b>	
Input / Output	: 4000 Vrms (output / case shorted)
Input / Case	: 4000 Vrms (output / case shorted)
Output / Case	: 500 V DC
Output / Output	: 500 V DC (5 U 15-15)

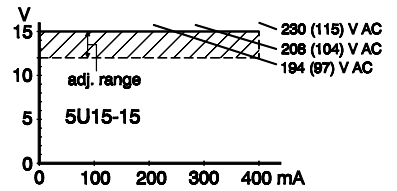
<b>Input to output</b>	
Leakage current	: Typical 5 micro-amps
Coupling capacitance	: Less than 60 pF
Insulation resistance	: 1000 MOhms
Attenuation input spikes	: Better than 100 dB
<b>Safety</b>	: EN 60950 EN 61010

<b>EMC</b>	
Power Supply Standard	: EN 61204-3
Generic Emission	: EN 61000-6-3 (EN 55022B)
Generic Immunity	: EN 61000-6-2
<b>Current limit</b>	: Foldback characteristic
<b>Regulation</b>	
Load 0 - 100%	: 5 mV
Line ±10%	: 5 mV (at 4 W output)
<b>Ripple + noise</b>	: 0.5 mVrms, 2 mV p-p
<b>Temp. coeff., per °C</b>	: 0.01%
<b>Output impedance</b>	up to 100 kHz : 0.5 Ohm
<b>Recovery time</b>	10 - 100% load step : 25 µs
<b>Operating ambient temp.</b>	: - 20 to + 50 °C
<b>MTBF</b>	: 1 000 000 hrs
<b>Dim. and weight (h x w x d)</b>	: 35 x 58 x 94 mm, 0.39 kg

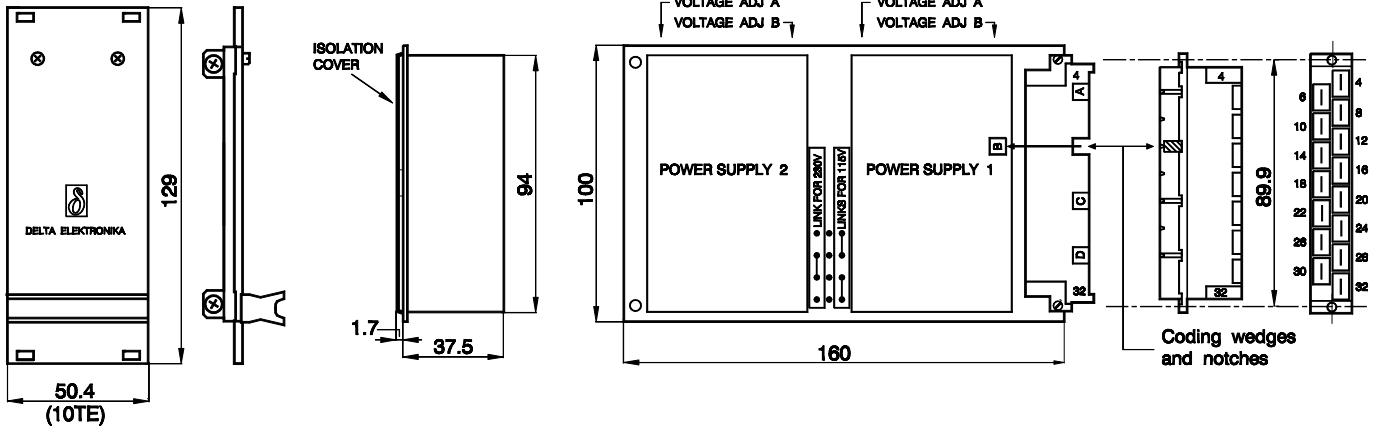
5 U 5:  
Output voltage and current derating at low AC input voltage.



5 U 15-15:  
Output voltage and current derating at low AC input voltage.



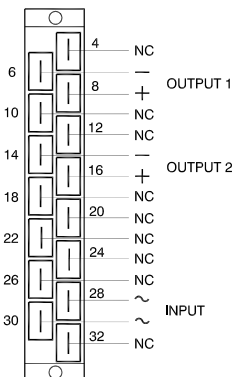
## Eurocard mounting



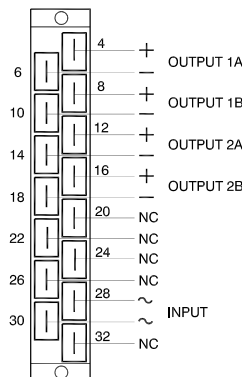
F 10-3 front panel

P500 Eurocard for 1 or 2 U-units, incl. contra connector H15

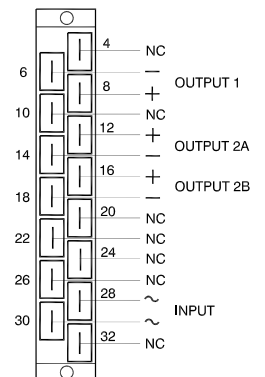
2x 5U5



2x 5U15-15



1x 5U5 and  
1x 5U15-15




Input and output connections of P500

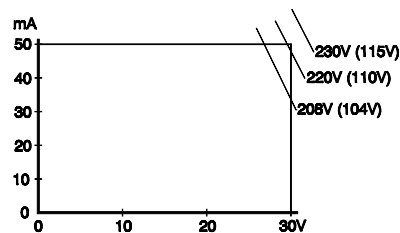
# UCS 50 6 W DC CURRENT SOURCE



## UCS 50 0-50 mA, max 30 V

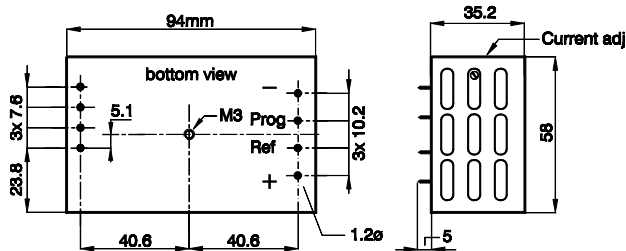
<b>Input</b>	: 230 / 115 V 48 - 62 Hz Split bobbin, potted, safety transformer according to VDE0551 EN 60742 	<b>Ripple + noise</b>	: 30 $\mu$ A p-p, measured across 600 Ohm // 0.1 $\mu$ F
<b>Test voltage</b>	: 4 kV rms (output/case shorted) Input / case : 4 kV rms (output/case shorted) Output / case : 500 V DC (output shorted)	<b>Temp. coeff.</b>	: 0.005% per $^{\circ}$ C
<b>Input to output</b>	: Typical 5 $\mu$ A Leakage current : Less than 60 pF Coupling capacitance : 1000 MOhms Insulation resistance : Better than 100 dB Attenuation input spikes	<b>Stability</b>	: 0.01% per 8 hrs after 20 min. warm up
<b>Safety</b>	: EN 60950 EN 61010	<b>Output impedance</b>	: DC : 10 MOhm 1 kHz : 33 kOhm 10 kHz : 3.3 kOhm 100 kHz : 0.33 kOhm
<b>EMC</b>	Power Supply Standard : EN 61204-3 Generic Emission : EN 61000-6-3 (EN 55022B) Generic Immunity : EN 61000-6-2	<b>Recovery time</b>	600 - 60 Ohm : 10 $\mu$ s
<b>Current adjustment</b>	: 0-50 mA a) By 20-turn screwdriver adjustment b) By external potmeter 10 k $\Omega$ c) By 0-5 V analog programming	<b>Open voltage limit</b>	: 33 V +/- 5%
<b>Programming input</b>	: 0-5 V, full scale error $\pm$ 0.2%, offset error $\leq$ 20 $\mu$ A, input impedance 500 kOhm.	<b>Ambient temp.</b>	: - 20 to + 50 $^{\circ}$ C
<b>Current regulation</b>	Load 600 - 0 Ohm : 3 $\mu$ A Line +/- 10% : 3 $\mu$ A	<b>MTBF</b>	: 1 000 000 hrs
		<b>Dim. and weight</b>	: 35 x 58 x 94 mm (h x w x d) 0.39 kg
		<b>Accessories</b>	: P500 Eurocard for 2 units. Front panel F10-3 for P500. For more details see also U-series.

Derating of max. voltage at low line voltage

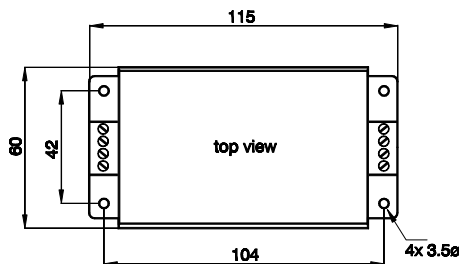


### Dimensions

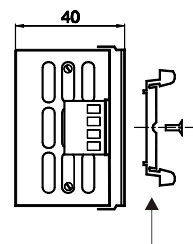
### Wall mounting



UCS 50 with solder pins for PCB mounting



UCS 50B with screw terminals for wall or rail mounting



Clamp for rail mounting

U-SERIES



## About us....

Delta Elektronika operates from the 13th century city of Zierikzee in the southwest of Holland. The city was a very important centre as far back as the 14th and 15th century, where most of the shipping trade in the area was concentrated. Zierikzee is now a quiet city where tourists can stroll and admire the attractive panorama.

Our factory which is located just outside the city walls manufactures power units which today are an integral component in equipment found all over the world. Unfortunately, the power supply is a minor part of any equipment, since for many it is just the electronic `box`, often taken for granted, and usually ordered at the last moment. At the same time, any power supply will be expected to supply the demands of the equipment it is driving. However, the design of any complicated machinery rarely starts from the power supply – which is needed so that the equipment functions efficiently.

The Delta range of products has been designed to meet the challenges of today's demanding equipment. Since its inception in 1959, Delta has been designing and producing power supplies and has become a leader in a market that demands efficiency and reliability. An on-going research programme has resulted in production designs that can meet an ever-increasing number of specifications. Tracking Mode, Master / Slave Configuration, Active PFC, Clean Current, Low Ripple are terms frequently used to describe Delta units.

All Delta power supply units undergo rigorous thermal soaking tests before being dispatched to the customer. This ensures the long term correct functioning of each unit and client satisfaction.

Designers at Delta are extremely conscious of the problems engineers encounter on site. Delta Power Supplies are guaranteed to meet the challenges found in today's market.



View from office  
Delta Elektronika



Delta Elektronika main building

# FELSO

riešenia na presné meranie

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