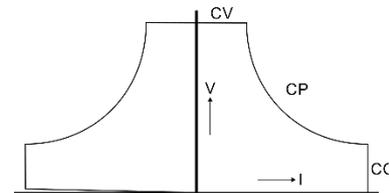




## SM6K - Series 6kW DC POWER SUPPLIES

### Bi-Directional - Constant Power

Models	Voltage range	Current range
SM40-CP-450	0 – 40 V	-450 – 450 A
SM75-CP-250	0 – 75 V	-250 – 250 A
SM330-CP-55	0 – 330 V	-55 – 55 A
SM1000-CP-18	0 – 1000 V	-18 – 18 A



### Features

- 6 kW bidirectional DC source & sink
- Constant-power output curve for extended operating range
- Regenerative design: sink power returned to the grid
- High efficiency, resulting in low heat dissipation
- Fast digital control with tunable load response
- Rated for continuous full-power operation
- Comprehensive overload and short-circuit protection

### Functionalities

- Wide-range three-phase AC input
- Expandable in functions, interfaces and Master-Slave
- Built-in Ethernet interface with browser-based web interface
- Digital encoders for voltage/current setting and navigation
- Large front-panel display with menu-driven operation
- Temperature-controlled fans for low audible noise
- EMC performance beyond CE (low emission, high immunity)

	SM40-CP-450	SM75-CP-250	SM330-CP-55	SM1000-CP-18
<b>Output rating</b> Voltage range Current range	0 - 40 V - 450 - 450 A	0 - 75 V - 250 - 250 A	0 - 330 V - 55 - 55 A	0 - 1000 V - 18 - 18 A
<b>Regenerative mode</b> Minimum sink voltage <i>Note: Unit switches automatically between source ↔ sink.</i> Absolute maximum sink voltage Minimum sink current	330 mV @ - 450 A 100 mV @ - 150 A 45 mV @ - 45 A 42 V 0.4 %	tbd mV @ - 250 A tbd mV @ - 83.3 A tbd mV @ - 25 A tbd V tbd %	tbd mV @ - 55 A tbd mV @ - 18.3 A tbd mV @ - 5.5 A tbd V tbd %	tbd mV @ - 18 A tbd mV @ - 6 A tbd mV @ - 1.8 A tbd V tbd %
<b>AC Input</b> Rated voltage range Rated frequency Rated current  Current, 6kW Power factor, 6kW / 3kW  Internal fuses Standby input power ( $V_o=I_o=0$ ) <sup>1</sup> Standby input power ( $V_o=V_{max}$ ) <sup>1</sup>	380 - 480 V 50 / 60 Hz Maximum 12.2 A  9.8 A 0.99 / 0.95  15 AT 99 W 131 W			
<b>Efficiency (Sink &amp; Source mode):</b> 6 kW, $I_{out}=100\%$ 6 kW, $U_{out}=100\%$	92 % 95 %			
<b>Regulation</b> Load 0 - 100% <b>CV</b> Line 342 - 528 V <sub>AC</sub> <sup>2</sup> <b>CV</b> Load 0 - 100% <b>CC</b> Line 342 - 528 V <sub>AC</sub> <sup>1,3</sup> <b>CC</b>	5 mV < 1 mV 20 mA tbd mA	< tbd mV < tbd mV tbd mA tbd mA	tbd mV < tbd mV tbd mA tbd mA	tbd mV < tbd mV tbd mA tbd mA
<b>Ripple + noise</b> <sup>5</sup> Source mode: rms (BW=300 kHz) <b>CV</b> p-p (BW=20 MHz) <b>CV</b>  rms (BW=300 kHz) <b>CC</b> p-p (BW=20 MHz) <b>CC</b>  rms (BW=300 kHz) <b>CV</b> p-p (BW=20 MHz) <b>CV</b>  rms (BW=300 kHz) <b>CC</b> p-p (BW=20 MHz) <b>CC</b>  Sink mode: rms (BW=300 kHz) <b>CV</b> p-p (BW=20 MHz) <b>CV</b>  rms (BW=300 kHz) <b>CC</b> p-p (BW=20 MHz) <b>CC</b>  rms (BW=300 kHz) <b>CV</b> p-p (BW=20 MHz) <b>CV</b>  rms (BW=300 kHz) <b>CC</b> p-p (BW=20 MHz) <b>CC</b>	13.3 V / 450 A 0.8 mV 6 mV  16 mA 240 mA  40 V / 150 A 1.8 mV 7 mV  9 mA 110 mA  13.3 V / 450 A 0.7 mV 4 mV  4 mA 30 mA  40 V / 150 A 1.0 mV 5.5 mV  4 mA 30 mA	24 V / 250 A tbd mV tbd mV  - -  75 V / 80 A tbd mV tbd mV  - -  24 V / 250 A tbd mV tbd mV  - -  75 V / 80 A tbd mV tbd mV  - -	109 V / 55 A tbd mV tbd mV  - -  330 V / 18.3 A tbd mV tbd mV  - -  109 V / 55 A tbd mV tbd mV  - -  330 V / 18.3 A tbd mV tbd mV  - -	333 V / 18 A tbd mV tbd mV  - -  1000 V / 6 A tbd mV tbd mV  - -  333 V / 18 A tbd mV tbd mV  - -  1000 V / 6 A tbd mV tbd mV  - -
<b>Programming &amp; monitoring accuracy</b> <sup>4</sup> Voltage Current	± 0.08 % ± 0.15 %			
<b>Temperature coefficient, per °C</b> <sup>1,5</sup> <b>CV</b> <b>CC</b>	6 ppm 4 ppm			
<b>Stability over 8 hours</b> <sup>1,5</sup> 25 ± 1 °C <b>CV</b> <b>CC</b> <sup>3</sup>	23 ppm 28 ppm			

<sup>1</sup> After 1 hour warm up<sup>2</sup> Remote voltage sense<sup>3</sup> Local voltage sense<sup>4</sup> Excluding INT MOD ANA<sup>5</sup> Measured at full load

	SM40-CP-450	SM75-CP-250	SM330-CP-55	SM1000-CP-18
<b>Programming speed</b> <sup>6, 7</sup> <b>Rise time (10 - 90%)</b> Output voltage step Load = 6 kW Load = 600 W  Output voltage step Load = 6 kW Load = 600 W <b>Fall time (90 - 10%)</b> Output voltage step Load = 6 kW Load = 600 W  Output voltage step Load = 6 kW Load = 600 W	0 → 13.3 V 0.50 ms 0.45 ms  0 → 40 V 2.3 ms 1.6 ms  13.3 → 0 V 0.45 ms 0.48 ms  40 → 0 V 1.6 ms 1.9 ms	0 → 24 V tbd ms tbd ms  0 → 75 V tbd ms tbd ms  24 → 0 V tbd ms tbd ms  75 → 0 V tbd ms tbd ms	0 → 109 V tbd ms tbd ms  0 → 330 V tbd ms tbd ms  109 → 0 V tbd ms tbd ms  330 → 0 V tbd ms tbd ms	0 → 333 V tbd ms tbd ms  0 → 1000 V tbd ms tbd ms  333 → 0 V tbd ms tbd ms  1000 → 0 V tbd ms tbd ms
<b>Recovery time</b> <sup>8, 9</sup> Condition Recovery within di/dt of load step Time Maximum deviation  Condition Recovery within di/dt of load step Time Maximum deviation	13.3 V, 225 → 450 A 100 mV 7.5 A/μs 160 μs 0.6 V  40 V, 75 → 150 A 100 mV 2.5 A/μs 240 μs 0.3 V	24 V, 125 → 250 A tbd mV tbd A/μs tbd μs tbd V  75 V, 40 → 80 A tbd mV tbd A/μs tbd μs tbd V	109 V, 28 → 55 A tbd mV tbd A/μs 100 μs tbd V  330 V, 9 → 18 A tbd mV tbd A/μs 150 μs tbd V	333 V, 9 → 18 A tbd V tbd A/μs 100 μs tbd V  1000 V, 3 → 6 A tbd V tbd A/μs 150 μs tbd V
<b>DC output capacitance</b> X-capacitors (typical) Y-capacitors (typical)	20000 μF 825 nF	tbd μF tbd nF	tbd μF tbd nF	tbd μF tbd nF
<b>Output impedance</b> <sup>10</sup> 0-1 kHz 1-100 kHz	<b>CV</b> < 2 mΩ <b>CV</b> < 30 mΩ	< tbd mΩ < tbd mΩ	< tbd mΩ < tbd mΩ	< tbd mΩ < tbd mΩ
<b>Pulsating load</b> Max. tolerable AC component of load current f > 1 kHz f < 1 kHz	85 A <sub>RMS</sub> 450 A <sub>pk</sub>	tbd A <sub>RMS</sub> tbd A <sub>pk</sub>	tbd A <sub>RMS</sub> 55 A <sub>pk</sub>	tbd A <sub>RMS</sub> 18 A <sub>pk</sub>
<b>Hold-up time</b> V <sub>out</sub> = 100%, P <sub>out</sub> = 6 kW I <sub>out</sub> = 100%, P <sub>out</sub> = 6 kW V <sub>out</sub> = 100%, P <sub>out</sub> = 3 kW	9.9 ms 9.7 ms tbd ms	tbd ms tbd ms tbd ms	tbd ms tbd ms tbd ms	tbd ms tbd ms tbd ms
<b>Turn on delay</b> <sup>11</sup>	8 s after mains switch is turned on, output power is available			
<b>Inrush current</b> <sup>10</sup>	tbd A			
<b>Safety standards</b>	EN 61010-1			
<b>Insulation</b> AC / DC terminals Creepage / clearance AC power terminals / case DC power terminals / case	3750 V <sub>RMS</sub> (1 min.) 8 mm 2500 V <sub>RMS</sub> 1000 V <sub>DC</sub> <sup>12</sup>			
<b>EMC</b> Emission Immunity	<b>EN 61326-1</b> , class B equipment(for use in domestic establishments) <b>EN 61326-1</b> , equipment for use in industrial and domestic establishments			
<b>Environmental conditions</b> Storage temperature Operating temperature Output automatically disabled at overtemperature Humidity  IP Rating Pollution degree	- 40 to + 70 °C - 20 to + 50 °C, Derate output to 75% at 60 °C  Maximum 95% RH, non-condensing, up to 40 °C Maximum 75% RH, non-condensing, up to 50 °C  IP20 2			
<b>MTBF</b>	500 000 hrs			

<sup>6</sup> Measured on resistive load with power supply in CV mode, different conditions may influence the specified speed

<sup>7</sup> Signal latency depends on the interface used & data traffic

<sup>8</sup> Local voltage sense

<sup>9</sup> Remote sensing and long wiring may influence the values

	SM40-CP-450	SM75-CP-250	SM330-CP-55	SM1000-CP-18
<b>Series operation</b>				
Maximum total voltage	Series operation not allowed			tbd
Master / slave operation				Series operation not allowed
<b>Parallel operation</b>				
Master / slave operation	tbd			
<b>Remote sensing</b>				
Maximum voltage drop per load lead	Default 1 V, can be set to 10 V			
<b>Limits</b>				
Adjustable				
Voltage	0 - 101 %			
Current	0 - 101 %			
Power	0 - 101 %			
Fixed				
Voltage Over Load level	102.5 % - unit will continue to operate (OL-indication in display)			
Voltage Self-Protection level	105 % - output is automatically disabled (PROT-indication in display)			
<b>Potentiometers</b>				
Front panel control knob resolution	15 bits			
<b>Meter scale</b>	4 digits	4 digits	4 digits	4 digits
Voltage	0.00 - 40.00 V	0.0 - 75.0 V	0.0 - 330.0 V	0 - 1000 V
Current	-450.0 - 450.0 A	-250.0 - 250.0 A	-55.0 - 55.0 A	-18.00 - 18.00 A
Power	-6000 - 6000 W	-6000 - 6000 W	-6000 - 6000 W	-6000 - 6000 W
Accuracy read output	0.2% + 2 digit	0.2% + 2 digit	0.2% + 2 digit	0.2% + 2 digit
<b>Mounting</b>	Stacking of units allowed			
<b>AC terminals (CON A)</b>	Screw terminals for wire 4 mm <sup>2</sup> , 3 phase + earth (no neutral)			
<b>DC terminals (CON B1 &amp; B2)</b>	M12 bolts		M8 bolts	
<b>Programming connectors (LAN)</b>	Standard with RJ45-connector for Ethernet at rear panel, 1000 Mb/s, full-duplex			
<b>Interlock (CON F)</b>	Input for contact at rear panel			
<b>Cooling</b>				
Audio noise level	Low noise, fan speed adapts to temperature of internal system ca. tbd dBA at full load, 25 °C ambient temperature, 1 m distance ca. tbd dBA at full load, 50 °C ambient temperature, 1 m distance			
Airflow direction	From left to right			
Thermal protection	Output shuts down in case of insufficient cooling (over temperature indication in display)			
<b>Dimensions</b>				
Front panel: h x w	88.1 x 483 mm (19", 2 U)			
behind front panel: h x w x d	86 x 448 x 586 mm (excluding feet)			
	<i>No additional depth is required with optional interfaces assembled</i>			
<b>Weight</b>	16 kg			

CV = Constant Voltage

CC = Constant Current

CP = Constant Power

Specifications measured at  $T_{amb} = 25 \pm 5 \text{ }^\circ\text{C}$  and  $V_{in} = 400 V_{AC}$ , 3 phase, 50 Hz unless otherwise noted.

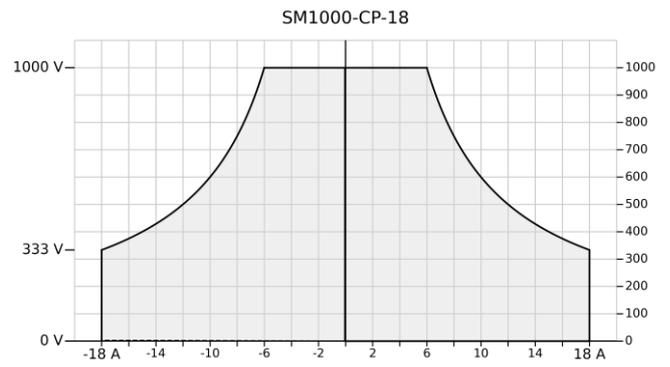
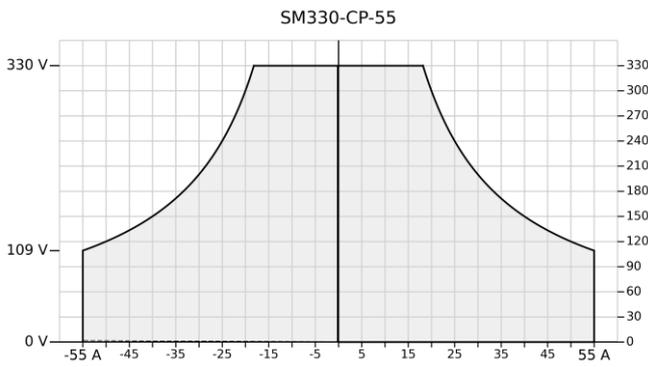
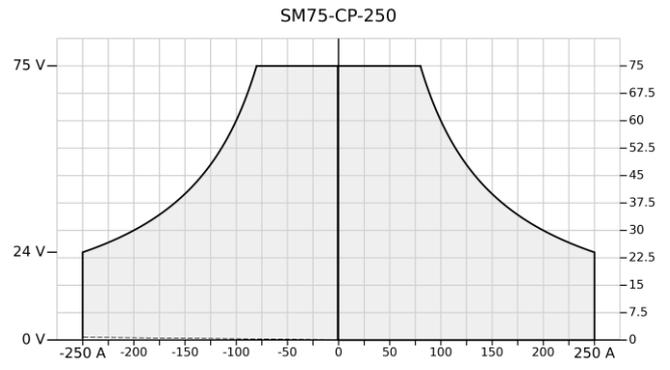
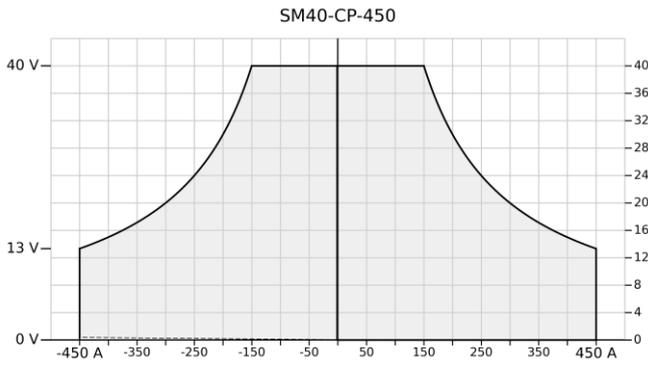
The information in this document is subject to change without notice.

<sup>10</sup> Typical

<sup>11</sup> Unit should be configured to switch on the output at startup

<sup>12</sup> See "Safety Instructions"

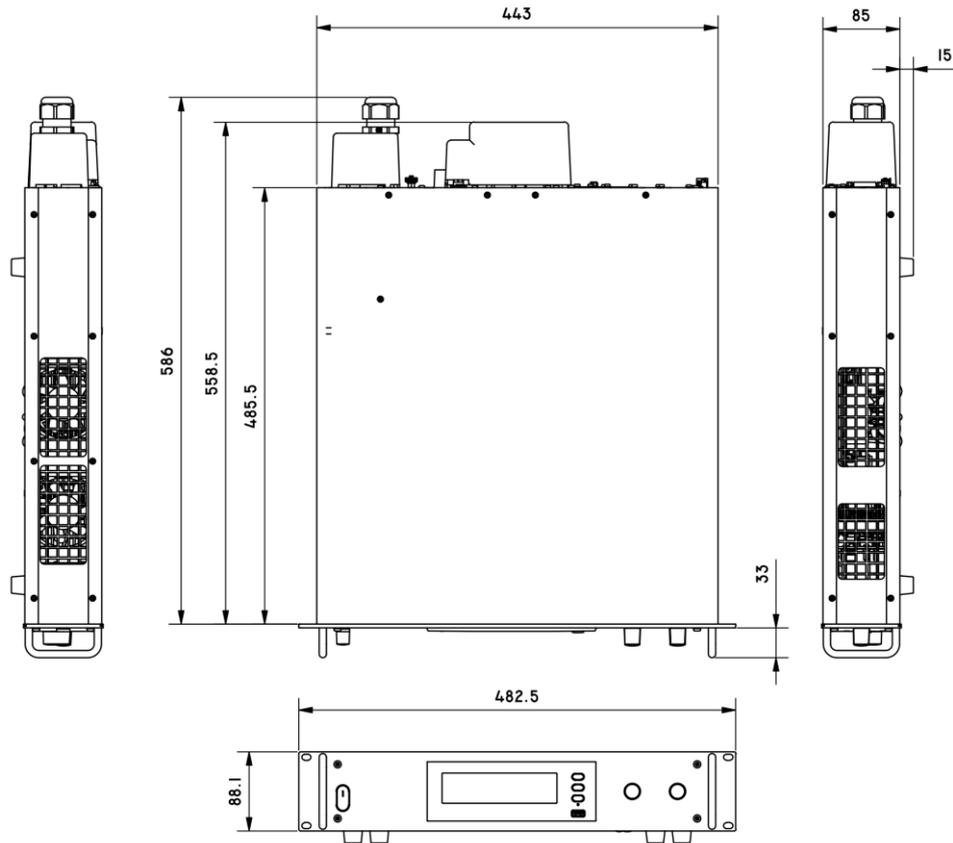
Operating range



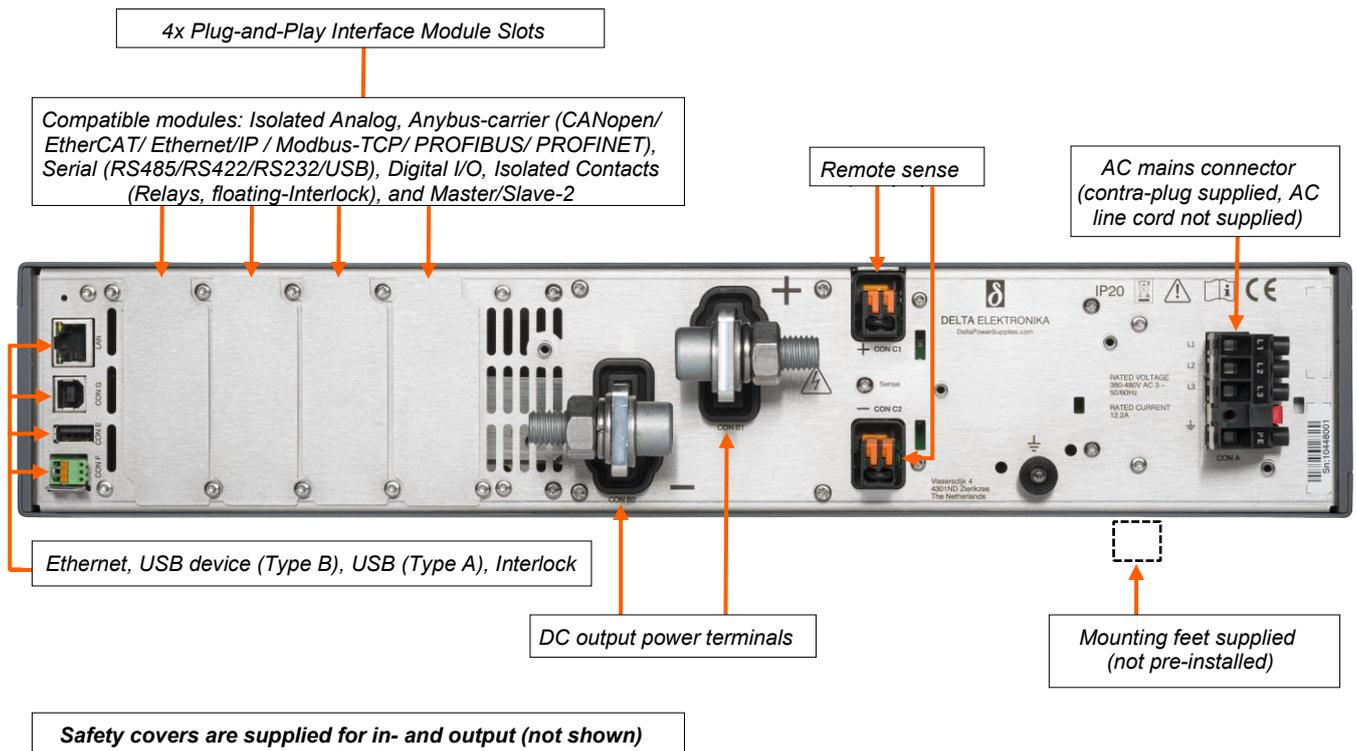
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<sup>13</sup> Operating range graphs are visualisations of the output specifications.

Dimensions



Rear view



## Typical Applications

- PV simulation and inverter testing
- Automotive test systems
- Automotive battery simulation
- Controlled battery (dis)charge test
- ATE in industrial production lines
- Precision current sources
- PWM-controlled DC motor testing
- Renewable-energy systems
- Plasma chambers
- Lasers
- Aerospace applications
- Defense / military applications

## Standard Features



### Bi-Directional Two-Quadrant Output

Full-power bidirectional two-quadrant operation keeps the DC output voltage constant whether power is sourced or sunk. Ideal for PWM-controlled DC motors and ATE systems.



### Digital CV- and CC-Settings

Long-life digital encoders on the front panel provide precise CV/CC setting with coarse/fine adjustment and full front-panel lock (including CV/CC knobs).



### High Voltage Isolation

A high DC output isolation allows floating operation up to 1000 V for all types.



### Sequencer

Arbitrary Waveform generator or standalone automation.



### Ethernet Interface

Ethernet interface for programming and monitoring (SCPI), including an integrated web interface for remote control.



### USB-Input

*Feature not yet available. Front and rear USB inputs (Host / Type-A) are planned for exchanging settings and waveforms. Sequences can be uploaded via the web interface.*

## Interfaces



### Plug-and-play extension modules

Interfacing and functional capabilities of the power supply can be extended at any time by inserting modules. Four slots are available at the rear of the power supply unit. Consult the [interfaces data sheet](#) for more information.

Modules:

- **Isolated Analog programming** (INT-MOD-ANA)  
High speed and accurate analog programming and monitoring
- **Anybus-carrier** (INT-MOD-ANY)  
Carrier for Anybus CompactCom 40 fieldbus inserts:  
CANopen, EtherCAT, Ethernet/IP, Modbus-TCP, POWERLINK, PROFIBUS, PROFINET
- **Digital I/O** (INT-MOD-DIG)  
Interacts with sequencer and Ethernet programming.
- **Isolated contacts** (INT-MOD-CON)  
Programmable relays and floating interlock
- **Serial communication** (INT-MOD-SER)  
RS232, RS485, RS422, USB
- **Master/Slave** (INT MOD M/S-2)  
Series/parallel output configuration

## Where to buy?

Visit our [website to request a quote](#), free of charge.

Alternatively, contact us directly or get in touch with one of our [authorized distributors](#).

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