



Spellman's ST Series of 12kW high voltage power supplies are available in positive or negative polarities in 20 different models with outputs ranging from 1kV to 225kV. A full featured front panel allows easy local control, while an extensive analog interface provides comprehensive remote capability. The standard Ethernet and RS-232 digital interfaces simplify integrating the ST into your system design.

The ST's robust IGBT inverter is inherently fault tolerant and is ideal for demanding applications like semiconductor processing and vacuum deposition. Many operational features can be configured by the user to suit their particular requirements. Power >100kW's can be provided by configuring additional chassis in parallel.

TYPICAL APPLICATIONS

- Ion Beam Implantation
- Semiconductor Processing
- Electron Beam Welding
- Capacitor Charging
- High Power RF Transmitters
- Electrostatic Precipitators
- X-Ray Systems

HARDWARE BASED OPTIONS

BFP	Blank Front Panel
HS	High Stability
LL(X)	High Voltage Cable Length
400VAC	360-528Vac Input

SOFTWARE CONFIGURABLE FEATURES

- Adjustable Overload Trip
- Arc Trip Count
- Arc Quench Time
- Arc Re-Ramp Time
- Constant Power Control
- Adjustable Power Trip
- Slow Start Ramp Times

- **12kW's in Single 6U (10.5") Chassis**
- **Models from 1kV to 225kV**
- **Remote Analog and Remote Ethernet Interface**
- **Parallel Units for >100kW's**
- **Arc and Short Circuit Protected**
- **Customer Configurable Features Via Ethernet Interface**
- **OEM Customization Available**

www.spellmanhv.com/manuals/ST

SPECIFICATIONS

Input Voltage:

Standard: 180-264Vac, 50/60Hz, three phase, 90% efficiency, 0.85 power factor

Optional: 360-528Vac 50/60Hz, three phase (400Vac)

Input Current:

Standard: 180-264Vac, three phase; 50 amps, maximum

Optional: 360-528Vac, three phase; 25 amps, maximum

Output Voltage:

20 models from 1kV to 225kV. Each model is available with positive or negative outputs. 1kV to 10kV units are internally reversible.

Local Output Controls:

Voltage and current are continuously adjustable over entire range via ten-turn potentiometers with lockable counting dials.

Voltage Regulation:

Load: 0.05% of full voltage +500mV for full load change.

Line: 0.05% of full voltage +500mV over specified input range.

Current Regulation:

Load: 0.05% of full current $\pm 100\mu\text{A}$ for any voltage change.

Line: 0.05% of full current over specified input range.

Ripple:

0.3% p-p +1Vrms. Lower ripple available via special order

Stability:

0.02%/hr. after 1 hour warm-up.

Temperature Coefficient:

100ppm/ $^{\circ}\text{C}$. Higher stability (50ppm/ $^{\circ}\text{C}$) available on special order via the HS option

Environmental:

Temperature Range:

Operating: 0 $^{\circ}\text{C}$ to 40 $^{\circ}\text{C}$

Storage: -40 $^{\circ}\text{C}$ to 85 $^{\circ}\text{C}$

Humidity:

10% to 90% RH, non-condensing.

Cooling:

Forced air; inlet through side panels, outlet at rear panel

Metering:

Digital voltage and current meters, accurate to within 1%

System Status Display:

"Dead Front" type indicators provide status of up to 12 system operations including voltage and current regulation, fault conditions and circuit control.

Input Line Connector:

A 6 foot (1.8 meter) long captive line cord is provided.

Analog Interface Connector:

50 pin female D connector

High Voltage Output Cable:

1-150kV: A detachable 10' (3.05m) long shielded HV cable is provided
225kV: R-28 type X-Ray connector. No output cable is provided

Dimensions:

1kV to 120kV:
10.5" (6U)H X 19" W X 21" D (266mm x 482mm x 533mm)
150kV:
10.5" (6U)H X 19" W X 23" D (266mm x 482mm x 584mm)
225kV:
20.55" H X 17.01" W X 29.7" D (521mm x 432mm x 754mm)

Weight:

1kV to 50kV: <100 pounds (45.36kg)
60kV to 120kV: <140 pounds (63.50kg)
150kV: <150 pounds (68.03kg)
225kV: <260 pounds (117.9kg)
Individual kV models may vary

Regulatory Approvals:

Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. RoHS Compliant.

Electronic Component (Power Source)

ST series is intended for installation as a component of a system.

It is designed to meet CE standards, with conditions of acceptance often being: customer provided enclosure mounting, EMC filtering, and appropriate protection, and isolation devices. The ST series is not intended to be operated by end users as a stand-alone device. The ST series power supply can only be fully assessed when installed within a system, and as a component part within that system.

Parallel Capability

The ST series is designed to offer additional power capability by adding chassis in parallel to create a Master/Slave configuration providing up to and beyond 100kW's. The Master chassis is the point of connection for customer interfacing; this multi-chassis system effectively functions as a single power supply. The Master unit retains the full featured front panel, while slave units have a Blank Front Panel. To configure an orderable model number, simply use Spellman's applicable base ST model number and increment the power denominator in 12kW steps as required:

ST60P24 This would be an ST with a 60kV, positive polarity, providing 24kW's of power (2 chassis)



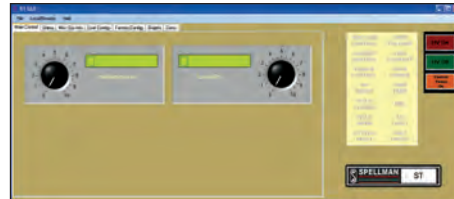
Rear panel showing connections for parallel operation



Master/slave 24kW ST

Digital Interface

The ST features a standard RS-232 and Ethernet digital interface. Utilizing these standard digital interfaces can dramatically simplify power supply interfacing requirements saving the user both time and money, while enhancing functionality and overall capability. Spellman provides a GUI with the ST that allows the customer to both customize operational features of the ST while also providing basic power supply operational features. Details of the ST's digital interface capability are described in the ST manual, downloadable via the link on the first page of this data sheet.



Main control screen



Status screen



User configuration screen

Arc Intervention

Spellman's ST power supplies have an arc intervention feature that senses arc currents via a fast acting current sense transformer. The purpose of the arc intervention circuitry is to prevent power supply damage from continuous, long term arcing. The factory default configuration will trip off the unit with an Arc Fault if 4 arcs occur in a 10 second time period. Customers can change basic arc intervention parameters (Arc Count, Arc Quench, Reramp Time, and Window Time) within preset limits via the digital interface interface; customized units can be provided for unique arc prone environments, contact Spellman for details.

ST SELECTION TABLE

MAXIMUM RATING		MODEL NUMBER
kV	mA	
1	12,000	ST1*12
2	6,000	ST2*12
3	4,000	ST3*12
4	3,000	ST4*12
6	2,000	ST6*12
8	1,500	ST8*12
10	1,200	ST10*12
12	1,000	ST12*12
15	800	ST15*12
20	600	ST20*12
30	400	ST30*12
40	300	ST40*12
50	240	ST50*12
60	200	ST60*12
70	171	ST70*12
80	150	ST80*12
100	120	ST100*12
120	100	ST120*12
150	67	ST150*10
225	40	ST225*10

*Substitute "P" for positive polarity and "N" for negative polarity. Polarity must be specified at time of order. 1-10kV units are inherently reversible by design requiring an internal wiring change to swap polarities. Intermediate voltage units are available by special order. 150kV and 225kV units are limited to a maximum output of 10kW's

NOTE: ST225 units cannot be paralleled!

Parallel operation:

Additional power can be provided in increments of 12kW's by connecting chassis in parallel via the use of the ST's master/slave configuration.

Use the applicable base ST model number and increment the power denominated in 12kW steps as required.

ST10P24 10kV @ 24kW's

ST10P36 10kV @ 36kW's

ST10P48 10kV @ 48kW's



ST 1-150kV rear panel view



ST 225V rear panel view

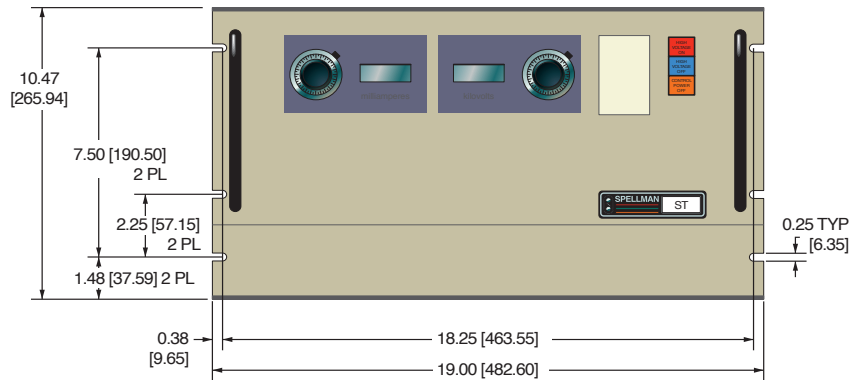
JB1 ST ANALOG INTERFACE— 50 PIN FEMALE D CONNECTOR

PIN	SIGNAL	PARAMETERS
1	Power Supply Common	Power Supply Ground
2	Reset/HV Inhibit	Normally open, Low = Reset/Inhibit
3	External Interlock	+24Vdc @ open, <25mA @ closed
4	External Interlock Return	Return for External Interlock
5	mA Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
6	kV Test Point	0-10Vdc = 0-100% rated output, Zout= 1KΩ, 1%
7	+10Vdc Reference Output	+10Vdc @ 1mA
8	mA Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
9	Local mA Program Output	0-10Vdc = 0-100% rated output, front panel pot
10	kV Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
11	Local kV Program Output	0-10Vdc = 0-100% rated output, front panel pot
12	Remote Power On Output	+24Vdc @ open, 2A peak, 1Adc @ closed
13	Remote Power On Return	Return for Remote Power On
14	Remote HV Off	+24Vdc @ open, 2A peak, 1Adc @ closed, connect to pin15 for front panel operation
15	Remote HV Off/On Common	HV On/Off Common
16	Remote HV On	+24Vdc @ open, 2A peak, 1Adc @ closed, momentarily connect to pin 15 enable high voltage
17	HV Off Indicator	+24Vdc @ 25mA = HV Off
18	HV On Indicator	+24Vdc @ 25mA = HV On
19	Power Supply Common	Supply Ground
20	+24Vdc Output	+24Vdc @ 100mA, maximum
21	Voltage Mode Status	Open Collector, Low = Active
22	Current Mode Status	Open Collector, Low = Active
23	Power Mode Status	Open Collector, Low = Active
24	Interlock Closed Status	Open Collector, Low = Active
25	Power Test Point	0-10Vdc = 0-100% rated output, Zout= 5KΩ, 1%
26	Spare	
27	Spare	
28	Remote Overvoltage Adjust	0-10Vdc = 0-100% rated output
29	Over Power Fault	Open Collector, Low = Active
30	Over Voltage Fault	Open Collector, Low = Active
31	Over Current Fault	Open Collector, Low = Active
32	System Fault	Open Collector, Low = Active
33	RGLT Error Fault	Open Collector, Low = Active
34	Arc	Open Collector, Low = Active
35	Over Temp Fault	Open Collector, Low = Active
36	AC Fault	Open Collector, Low = Active
37	Spare	
38	Spare	
39	Spare	
40	Spare	
41	Spare	
42	Remote Power Program Input	0-10Vdc = 0-100% rated output, Zin>10MΩ
43	Local Power Program Output	0-10Vdc = 0-100% rated output, internal pot
44	+5Vdc Output	+5Vdc @ 100mA, maximum
45	+15Vdc Output	+15Vdc @ 100mA, maximum
46	-15Vdc Output	-15Vdc @ 10mA, maximum
47	RS232 Tx	
48	RS232 Rx	
49	RS232 GND	
50	Power Supply Common	Power Supply Ground

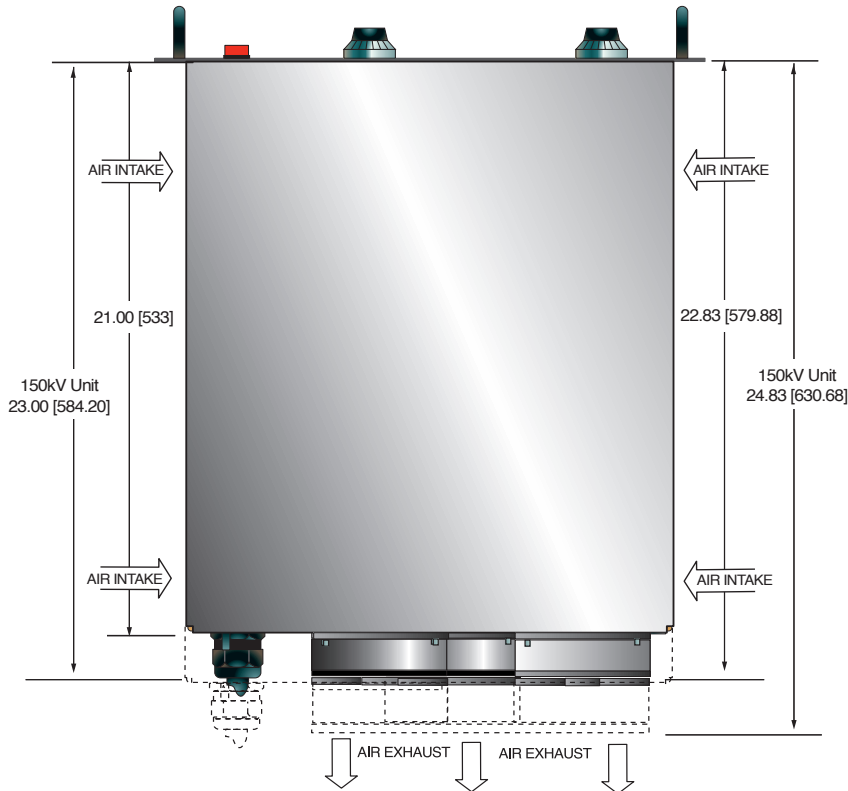
DIMENSIONS: in.[mm]

FRONT VIEW

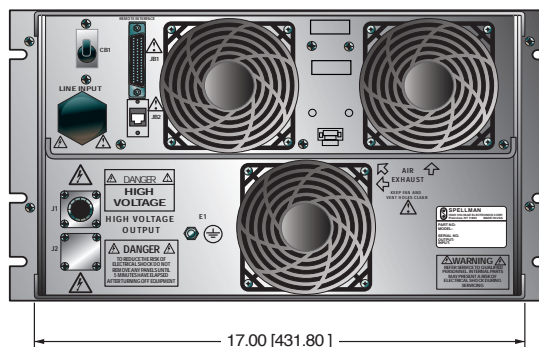
ST 1kV-150kV



TOP VIEW



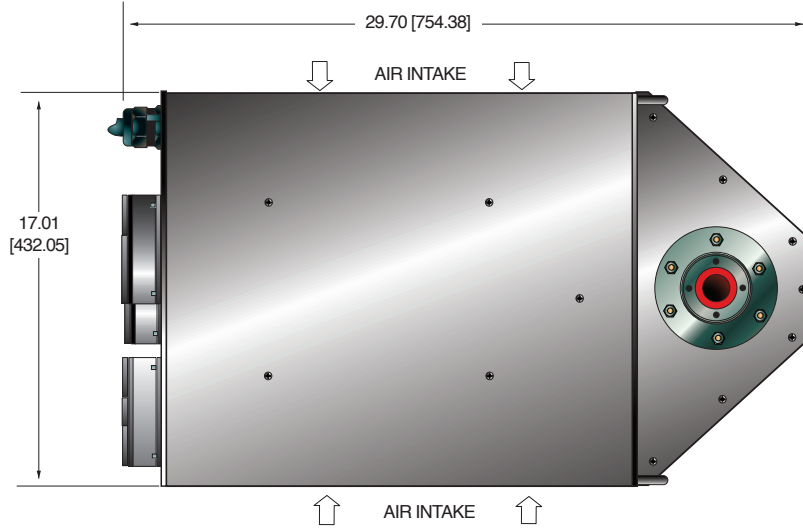
BACK VIEW



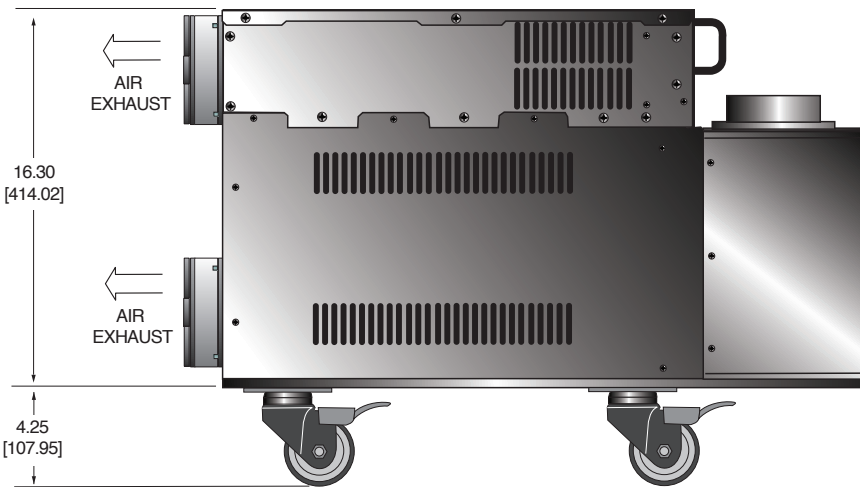
ST 225kV

DIMENSIONS: in.[mm]

TOP VIEW



SIDE VIEW



FRONT VIEW

REAR VIEW

NOTE:
Blank front
panel on
ST 225kV units

