FT series

750W Rack mount

AC-HVDC power supplies

The FT series of high voltage AC-DC power supplies offer a wide range of voltage outputs from 1kV to 60kV at 750W in a compact, 1U rack-mount format. FT series offers fully adjustable outputs, analog and digital interfaces and control and monitoring options, allowing maximum flexibility for high voltage applications.

Featuring high efficiency, performance, reliability, and stability with air insulation, the FT series ensures low cost of ownership and is specifically designed for easy integration into a wide range of semiconductor manufacturing and industrial technology applications including ion implantation, E-beam and additive manufacturing.

Features

- Output voltages up to 60kV
- 0 to 100% programmable voltage and current
- Analog and RS232 digital control, Ethernet optional
- Compact 1U 19” rack-mount
- 90VAC to 264VAC input
- Output voltage and current regulated
- Voltage and current monitoring
- Positive, negative or reversible polarity
- Efficiency >85%
- Low ripple
- Short circuit, arc quench, arc count, overload and thermal protection
- CE marked for EMC, low voltage (LVD) and RoHS directives
- 3 year warranty

Applications

- Ion implant
- E-beam/Ion beam
- Industrial technology
- Capacitor charging
- High voltage bias

Dimensions

1.72” x 19.0” x 23.86” (43.7 x 482.6 x 606.4mm)
1U 19” rack mount

FT series

Models & ratings

Model number	Polarity	Output voltage	Output current	Max stored energy	Output cable
FT001P750	Positive	0 to +1kV	0 - 750mA	0.6J	RG-58U
FT001N750	Negative	0 to -1kV			RG-58U
FT001R750	Reversible	0 to 1kV			RG-58U
FT1.5P500	Positive	0 to +1.5kV	0 - 500mA	0.7J	RG-58U
FT1.5N500	Negative	0 to -1.5kV			RG-58U
FT1.5R500	Reversible	0 to 1.5kV			RG-58U
FT002P375	Positive	0 to +2kV	0 - 375mA	0.5J	RG-58U
FT002N375	Negative	0 to -2kV			RG-58U
FT002R375	Reversible	0 to 2kV			RG-58U
FT003P250	Positive	0 to +3kV	0 - 250mA	1.1J	RG-58U
FT003N250	Negative	0 to 3kV			RG-58U
FT003R250	Reversible	0 to -3kV			RG-58U
FT005P150	Positive	0 to +5kV	0 - 150mA	1.05J	RG-8U
FT005N150	Negative	0 to -5kV			RG-8U
FT005R150	Reversible	0 to 5kV			RG-8U
FT006P125	Positive	0 to +6kV	0 - 125mA	1.5J	RG-8U
FT006N125	Negative	0 to -6kV			RG-8U
FT006R125	Reversible	0 to 6kV			RG-8U
FT008P094	Positive	0 to +8kV	0 - 94mA	0.56J	RG-8U
FT008N094	Negative	0 to -8kV			RG-8U
FT008R094	Reversible	0 to 8kV			RG-8U
FT010P075	Positive	0 to +10kV	0 - 75mA	0.54J	RG-8U
FT010N075	Negative	0 to -10kV			RG-8U
FT010R075	Reversible	0 to 10kV			RG-8U
FT012P063	Positive	0 to +12kV	0 - 63mA	0.54J	RG-8U
FT012N063	Negative	0 to -12kV			RG-8U
FT012R063	Reversible	0 to 12kV			RG-8U
FT015P050	Positive	0 to +15kV	0 - 50mA	1.12J	RG-8U
FT015N050	Negative	0 to -15kV			RG-8U
FT015R050	Reversible	0 to 15kV			RG-8U
FT020P038	Positive	0 to +20kV	0 - 38mA	1.04J	RG-8U
FT020N038	Negative	0 to -20kV			RG-8U
FT020R038	Reversible	0 to 20kV			RG-8U
FT025P030	Positive	0 to +25kV	0 - 30mA	1.53J	RG-8U
FT025N030	Negative	0 to -25kV			RG-8U
FT025R030	Reversible	0 to 25kV			RG-8U
FT030P025	Positive	0 to +30kV	0 - 25mA	1.52J	RG-8U
FT030N025	Negative	0 to -30kV			RG-8U
FT030R025	Reversible	0 to 30kV			RG-8U
FT040P019	Positive	0 to +40kV	0 - 19mA	2.03J	RG-8U
FT040N019	Negative	0 to -40kV			RG-8U
FT040R019	Reversible	0 to 40kV			RG-8U
FT050P015	Positive	0 to +50kV	0 - 15mA	2.54J	RG-8U
FT050N015	Negative	0 to -50kV			RG-8U
FT050R015	Reversible	0 to 50kV			RG-8U
FT060P013	Positive	0 to +60kV	0 - 13mA	3.05J	RG-8U
FT060N013	Negative	0 to -60kV			RG-8U
FT060R013	Reversible	0 to 60kV			RG-8U

Notes:

1. For reversible polarity units two high voltage assemblies will be supplied. Cover must be removed to change polarities.
2. Add suffix “A” for arc count (1-6kV only) e.g. FT001P750A.
3. Add suffix “B” for blank front panel (power switch only) e.g. FT001P750B.
4. Add suffix “E” for ethernet control e.g. FT001P750E.
5. Please consult sales for special requirements.

FT series

Input

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Input voltage	90		264	VAC	47-63Hz
Power factor		0.95			At full load at nominal AC line
Input connector	IEC60320 C20 receptacle. AC power cord not included				

Output

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Output voltage range	0		60	kV	See Models and Ratings
Output current range	13		750	mA	See Models and Ratings
Polarity	Available with either positive, negative or reversible polarity with respect to chassis ground				
Output control	0 to rated voltage or current via rotary dials, analog, RS232, USB or optional ethernet				
Static voltage regulation	±0.005			%	For specified line variations
	±0.005			%	+0.5mV/mA for no load to full load variations
Dynamic voltage regulation	Typical deviation <2%. Load transients from 10% to 99% and 99% to 10 Recovery to <1% in 500µs and recovery to <0.1% in 1ms				
Stability		0.01		%/hr	After 30 min. warm up
		0.05			Over 8 hours under constant conditions after 30 min. warm up
Temperature coefficient		0.01		%/°C	
Voltage rise/decay time constant		50		ms	Rise time constant
		50		ms	Decay time constant, 15% resistive load required
Voltage ripple		0.025		%	+0.5V RMS at full load
Arc quench	Inhibits HV output for 20ms after an arc (optional 1kV to 6kV models, standard on 8kV to 60kV models)				
Arc count	Consecutive arcs > 1 arc/sec for 5 arcs will result in output being disabled for 5 seconds				
HV output connection	Mating HV connector and 10ft (3m) shielded coaxial cable supplied				

General

Characteristic	Minimum	Typical	Maximum	Units	Notes & Conditions
Efficiency		85		%	At full load
HV Insulating Medium	Outputs are air insulated				
External Interlock	Open = off, closed = on. Normally latching except for blank front panel version where it is non-latching				
Remote HV Enable/Disable	0-1.5V = Off, 2.5-15V = On				
Voltage Accuracy	0.5% of setting + 0.2% of rated				
Voltage Monitor	0 to +10V equivalent to 0 to rated voltage. Accuracy: 0.5% of reading +0.2% of rated. Impedance is 10KΩ				
Current Monitor	0 to +10V equivalent to 0 to rated current. Accuracy: 1% of reading + 0.1% of rated. Impedance is 10KΩ				
RS232/USB/Ethernet Programming	Resolution		0.025% of full scale for both the voltage and the current programs 0.1% of full scale for both the voltage and the current monitors		
	Remote setting accuracy		Voltage setting accuracy is better than 0.5% of setting +0.2% rated		
	Remote reading accuracy		Voltage reading accuracy is 0.5% of reading + 0.2% of rated Current reading accuracy is 1% of reading + 0.1% of rated		

Notes:

1. Specifications apply from 5% to 100% rated voltage. Operation is guaranteed down to zero voltage with a slight degradation of performance.

Environmental

Characteristic	Minimum	Typical	Maximum	Units	Notes & conditions
Ambient temperature	-20		+40	°C	Operating
	-40		+85	°C	Storage
Cooling	Forced air cooling with fan assist				
Protection	Overload, short circuit, arc, over temperature and surge protection				
RoHS	Restriction of the use of Hazardous Substances				

EMC: emissions

Phenomenon	Standard	Test level	Notes & conditions
Conducted emissions	EN61000-6-4	Class A	CISPER 11
Radiated emissions	EN61000-6-4	Class A	CISPER 11
Line harmonics	EN61000-3-2	Class A	

EMC: immunity

Phenomenon	Standard	Performance criteria	Notes & conditions
ESD immunity	EN61000-4-2	B	
Radiated immunity	EN61000-4-3	A	
EFT/burst	EN61000-4-4	B	
Surge	EN61000-4-5	B	
Conducted	EN61000-4-6	A	
Voltage dips & interruptions	EN61000-4-11	B & C	

Safety approvals

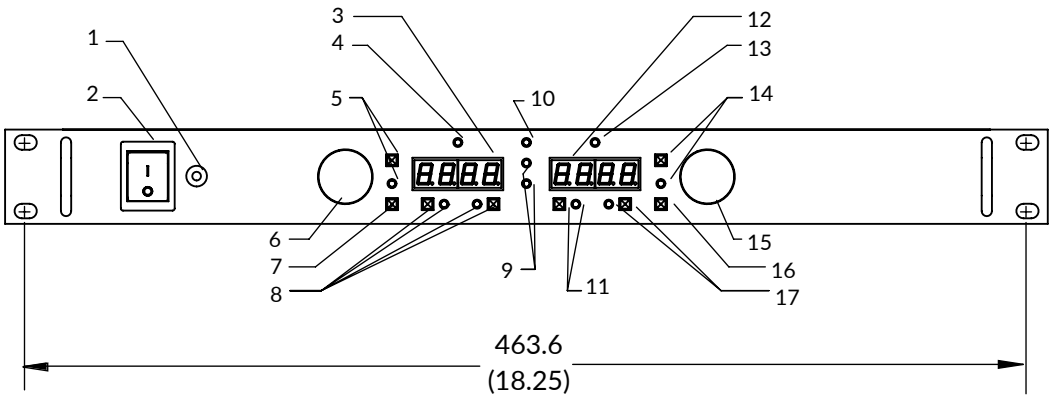
Safety agency	Standard	Test level	Notes & conditions
EN	EN61010/IEC61010	-	Safety
CE	Meets all applicable directives		
UKCA	Meets all applicable legislation		

Notes:

1. Specifications apply from 5% to 100% rated voltage. Operation is guaranteed down to zero voltage with a slight degradation of performance.

Mechanical details

Front view



Key	Function	Key	Function
1	Power ON indicator	10	Fault
2	Power ON switch	11	Preset and indicator
3	Current display	12	Voltage display
4	Current mode	13	Voltage mode
5	HV ON and indicator	14	Control lock and indicator
6	Current adjust	15	Voltage (Slope) adjust
7	Standby	16	SS slope
8	Remote/local and indicators	17	Fine adjust and indicator
9	Polarity		

Notes:

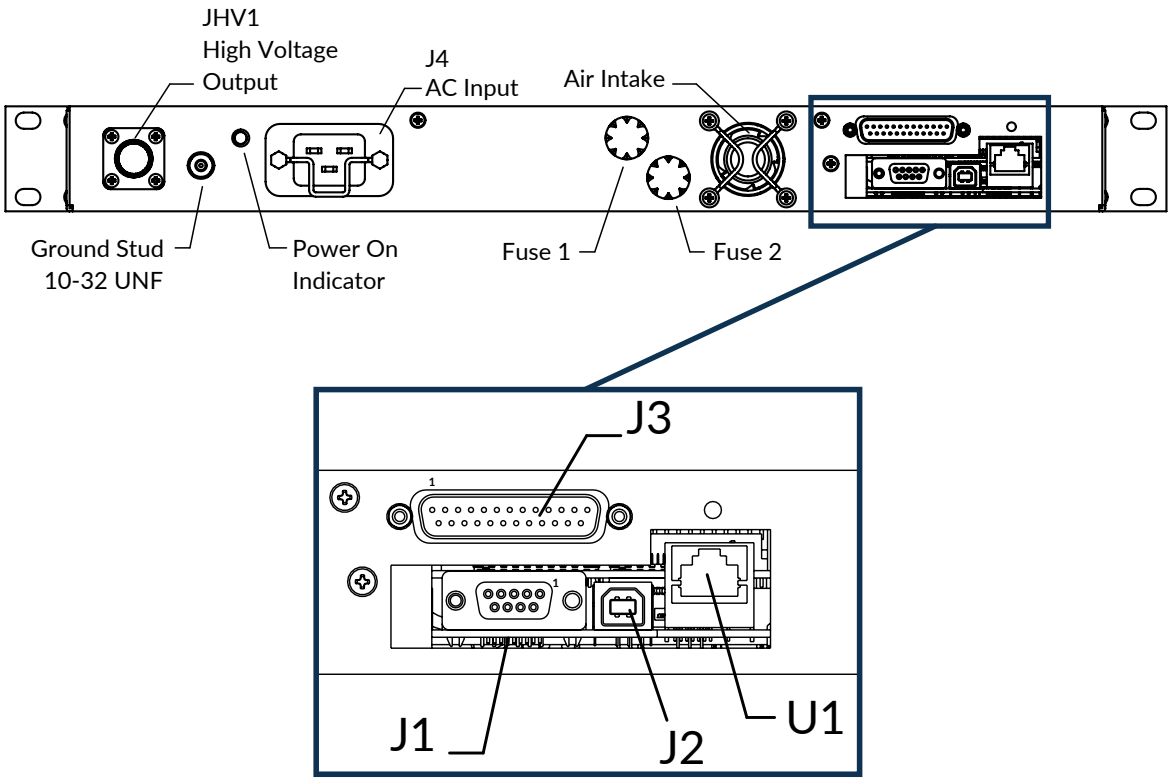
1. All dimensions are in inches (mm).

Signals & controls

	Function	
Front panel control	HV On/Off, rotary dials for voltage and current adjust, fine adjustment 0.025%, 0.25% coarse adjustment	
Front panel indicators	3.5 digit digital meters, AC power, current mode, voltage mode, pol+, pol-, fault, fine adjustment, preset, control lock, remote enable, remote program, HV On	
Rear panel control	AC power entry connector, fuses, power on indicator, ground stud, HV output connector, remote interface connector, RS232/USB connectors	
Interface signals	Inputs	Safety interlock, output voltage and current program signals, high voltage enable and remote HV On
	Outputs	Output voltage and current monitor signals, HV status, fault status, I/V mode status, arc status and a +10V reference source
External interlock	Open = Off, closed = On. Normally latching except for blank front panel version where it is non-latching	
Remote HV enable/disable	0 - 1.5V = Off, 2.5 - 15V = On	

Mechanical details

Rear view



RS232 Interface - J1	
Pin	**Function**
1	DCD
2	RX
3	TX
4	DTR
5	Common
6	DSR
7	RTS
8	CTS
9	N/C

USB Interface - J2	
Pin	**Function**
1	+5V
2	D-
3	D+
4	Common

Analog Interface - J3					
Pin	**Function**	**Pin**	**Function**	**Pin**	**Function**
1	Ground	10	Current Monitor	19	Reserved
2	Common	11	Common	20	HV Enable
3	Safety Interlock	12	Reference	21	HV Status
4	Reserved	13	Reserved	22	Fault Status
5	Reserved	14	Reserved	23	Mode Status
6	Voltage Program	15	Remote HV On	24	Arc Status
7	Current Program	16	Remote HV On	25	Ground
8	Common	17	CL/CT		
9	Voltage Monitor	18	CL/CT		

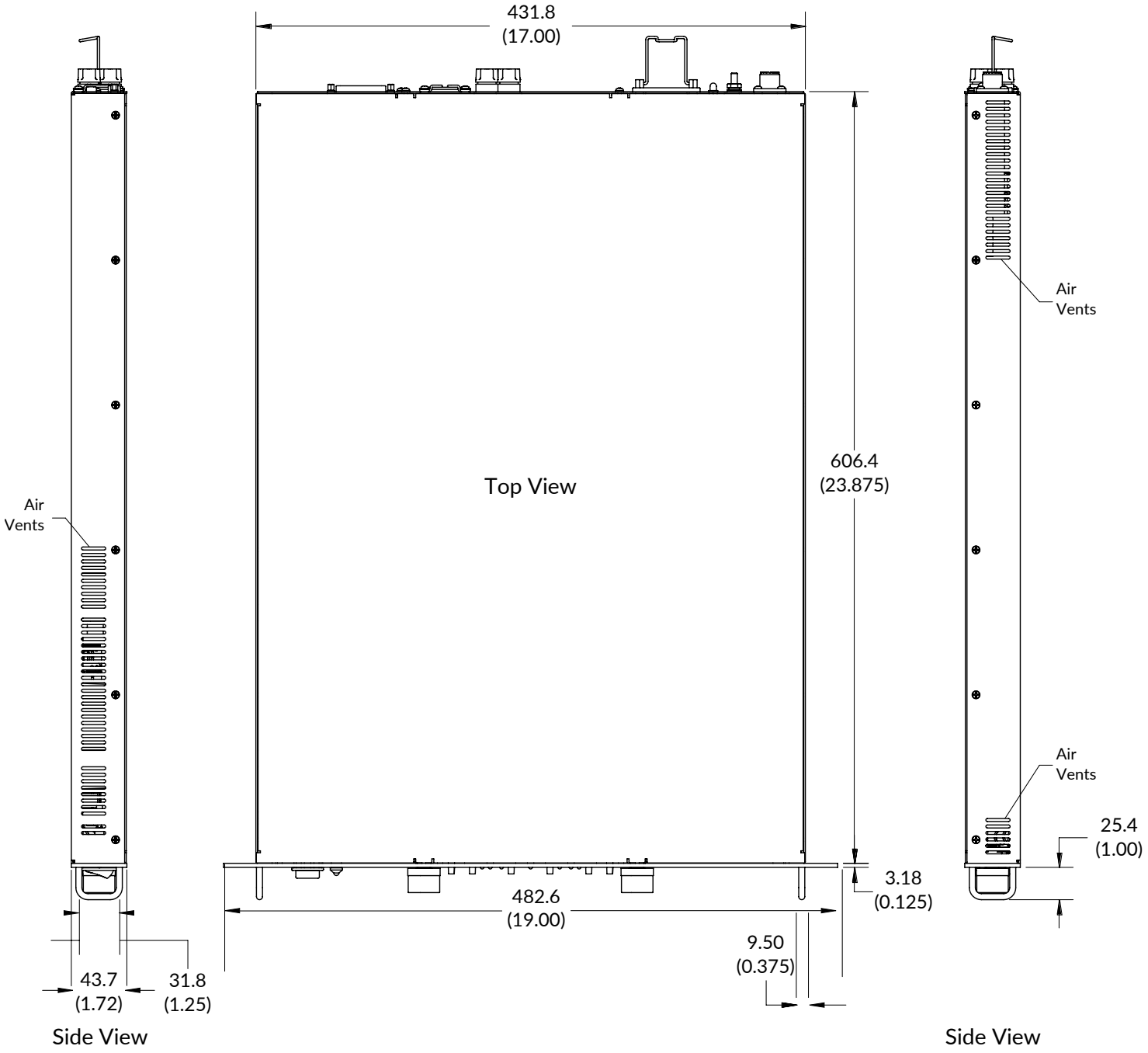
U1 Option			
Pin	**Function**	**Pin**	**Function**
1	TXD+	5	E Power+
2	TXD-	6	RXD-
3	RXD+	7	E Power-
4	E Power+	8	E Power-

AC Input - J4	
Pin	**Function**
1	Line
2	Neutral
3	Ground

HV Output - JHV1
1kV to 3kV KINGS SHV 1704-1 or equivalent
5kV to 60kV AMPHENOL 83-1R-RFX or equivalent

Mechanical details

Top & side view



Notes:

1. All dimensions are in inches (mm)
2. Weight: 14lbs (6.5kg)

Specifications subject to change without notice.