Trek Model 30/20A

High-Voltage Power Amplifier

The Model 30/20A is a DC-stable, high-voltage power amplifier featuring an all solid-state design for high slew rate, wide bandwidth, and low-noise operation. t is configured as noninverting with a fixed gain of 3000 V/V and is protected against overvoltage and overcurrent conditions that may be generated by active loads or by output short circuits to ground. Precision voltage and current monitors provide low-voltage representations of the high-voltage output and load current for monitoring purposes or for use as feedback signals in a closed-loop system.

The 4-quadrant, active output stage sinks or sources current to reactive or resistive loads throughout the output voltage range. This is essential to achieve the accurate output response and high slew rates demanded by reactive loads.

Key Specifications

- Output Voltage Range:
- Output Current Range:
- Slew Rate:
- Large Signal Bandwidth (2% distortion):
- DC Voltage Gain:
- 0 to ±30 kV DC or peak AC 0 to ±20 mA DC or peak AC Greater than 550 V/µs DC to greater than 2.5 kHz
- 3000 V/V

Typical Applications Include

- Dielectric studies
- Electron beam ion traps and ion sourcing
- Electrospinning
- Electrostatic deflection (including ion beam steering)
- Electrostatic flame control
- Electrostatic levitation
- Electrostatic precipitation
- High-voltage cable testing
- High-voltage component testing
- Plasma studies (including dielectric barrier discharge)

Features and Benefits

- Four-quadrant output for driving capacitive loads
- Closed loop system for high accuracy
- Short-circuit protected for equipment protection
- All solid-state design for maintenance free operation
- DC-stable for programmable supply applications
- Low output noise for ultra-accurate outputs
- NIST-traceable Certificate of Calibration provided with each unit
- CE compliant (230 VAC unit only)





Model 30/20A Specifications

Performance

Performance	
Output Voltage Range	0 to ±30 kV DC or peak AC
Output Current Range	0 to ±20 mA DC or peak AC
Input Voltage Range	0 to ±10 V DC or peak AC
Input Impedance	25 kΩ nominal (inverting/differential option 50 kΩ, nominal)
DC Voltage Gain	3000 V/V
DC Voltage Gain Accuracy	Better than 0.1% of full scale
Offset Voltage	Less than ±4 V
Output Noise	Less than 1.5 V rms*
Slew Rate (10% to 90%, typical)	Greater than 550 V/µs
Small Signal Bandwidth (-3dB)	DC to greater than 30 kHz
Large Signal Bandwidth (2% distortion)	DC to greater than 2.5 kHz
Stability	
Drift with Time	Less than 50 ppm/hr, noncumulative
Drift with Temperature	Less than 100 ppm/°C
Voltage Monitor	
Ratio	1 V / 3000 V
DC Accuracy	Better than 0.1% of full scale
DC Offset Voltage	Less than ±5 mV
Output Noise	Less than 20 mV rms*
Output Impedance	47 Ω
Current Monito	r dia
Ratio	0.5 V/mA
DC Accuracy	Better than 2% of full scale
Offset Voltage	Less than ±10 mV
Output Noise	Less than 30 mV rms*
Bandwidth (-3dB)	DC to greater than 5 kHz
Output Impedance	47 Ω
Features	
Settling Time (to 1%)	Less than 200 µs for a 0-30 kV step
Dynamic Adjustment	Graduated 1-turn panel potentiometer is used to optimize the AC response for various load

High-Voltage On/OffLocalIndividual push-button switchesRemoteTL compatible input. TTL high (or open) turns off high-voltage output. TTL low turns on high- voltage output.Current Limit/TripSwitch selectable for limit or trip. Graduated 1- run panel potentiometer is used to adjust limit or trip level from 0 to ±20 mA.Otd Regulation Status Indicator and ConnectorIlluminates and TTL low is provided when unit dis to produce required HV output such as during current limit.Imit/Trip Status Indicator and ConnectorAn indicator will illuminate and a BNC will provide a TTL low when the high-voltage output the current trip level, the detection of a high- voltage supply fault, the removal of one of the geuglation for greater than 500 ms. Mechanical 103.9 cm H x43 cm Wx 87 cm D (40.9" H x 17" W x 34" D Depth dimension includes wheels, handles and spacing for air fow.Weight73 kg (160 lb) approximateHV ConnectorGaton high-voltage OnnectorBNC ConnectorsMiplifier Input, Voltage Monitor, Current Monitor, Remote High Voltage Monitor, Current Monitor, Remote High Voltage ON/OFF, Out of Regulation status, Fault/Trip StatusAltitude0*C to 40°C (32°F to 104°F)Relative Humidity75%, noncondensingAltitude10524 meters (5000 ft.)Ine Voltage103.0 VA, maximumAct Line ReceptaceStatus for one of fwo ranges: 104 to 127 V AC or 180 to 250 VAC at 48 to 63 Hz (specify when ordering)Poreators ManualNY: 23343Autorida Status, Fault, Trip StatusFaultAutor ReceptaceStatus, Fault, Trip Status	Features (cont.)		
RemoteTL compatible input. TTL high (or open) turns of high-voltage output.Current Limit/TripSwitch selectable for limit or trip. Graduated 1-turn panel potentiometer is used to adjust limit or trip level from 0 to ±20 mA.Out of Regulation Status Indicator and ConnectorIlluminates and TTL low is provided when unit fails to produce required HV output such as during current limit.Limit/Trip Status Indicator and ConnectorAn indicator will illuminate and a BNC will provide a TTL low when the high-voltage output is disabled due to the output current exceeding the current trip level, the detection of a high- voltage supply fault, the removal of one of the panels, or if the Model 30/20A is out of regulation for greater than 500 ms. Mechanical 103.9 cm H x 43 cm W x 87 cm D (40.9" H x 17" W x 34" D) Depth dimension includes wheels, handles and spacing for air flow.Weight73 kg (160 lb) approximate HV ConnectorBNC ConnectorsAmplifier Input, Voltage ON/OFF, out of Regulation status, Fault/Trip StatusFerenzer0°C to 40°C (32°F to 104°F)Relative Humidity75%, noncondensingAltitude10 1524 meters (5000 ft.)ElectricalFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAc Line ReceptaePN: 23343Shorting BNC CapPN: 23343Shorting BNC CapPN: 83060HV Output CablePN: 43466Line VoltagePN: 43466Line Cord, FusesSalected per geographic destination <th>High-Voltage On/Off</th> <th></th>	High-Voltage On/Off		
Current Limit/TripSwitch selectable for limit or trip. Graduated 1-turn panel potentiometer is used to adjust limit or trip level from 0 to ±20 mA.Out of Regulation Status Indicator and ConnectorIlluminates and TTL low is provided when unit fails to produce required HV output such as during current limit.Limit/Trip Status Indicator and ConnectorAn indicator will illuminate and a BNC will provide a TTL low when the high-voltage output is disabled due to the output current exceeding the current trip level, the detection of a high- voltage supply fault, the removal of one of the panels, or if the Model 30/20A is out of regulation for greater than 500 ms. Mechanical 103.9 cm H x 43 cm W x 87 cm D (40.9' H x 17" W x 34" D) Depth dimension includes wheels, handles and spacing for air flow.Weight73 kg (160 lb) approximateHV ConnectorGaton high-voltage ON/OFF, Out of Regulation Status, Fault/Trip StatusBNC ConnectorsMpilfier Input, Voltage Monitor, Current Monitor, Remote High Voltage ON/OFF, Out of Regulation Status, Fault/Trip StatusAltitude0°C to 40°C (32°F to 104°F)Relative Humidity75%, noncondensingAltitude101524 meters (5000 ft.)Electrical104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line Receptace810 AA, maximumAc Line ReceptacePN: 23343Shorting BNC CapPN: 83060HV Output CablePN: 83060HV Output CablePN: 43466Line VoltagePN: 43466	Local	Individual push-button switches	
turn panel potentiometer is used to adjust limit or trip level from 0 to ±20 mA.Out of Regulation ConnnectorIlluminates and TTL low is provided when unit fails to produce required HV output such as during current limit.Limit/Trip Status Indicator and ConnectorAn indicator will illuminate and a BNC will provide a TTL low when the high-voltage output is disabled due to the output current exceeding the current trip level, the detection of a high- voltage supply fault, the removal of one of the panels, or if the Model 30/20A is out of regulation for greater than 500 ms. Mechanical VDimensions103.9 cm H × 43 cm W × 87 cm D (40.9° H × 17° W × 34° D) Depth dimension includes wheels, handles and spacing for air flow.Weight73 kg (160 lb) approximateHV ConnectorCaton high-voltage ConnectorBNC ConnectorsAmplifier Input, Voltage Monitor, Current Monitor, Remote High Voltage ON/OFF, Out of Regulation status, Fault/Trip StatusPoperating Comtume°C to 40°C (32°F to 104°F)Relative HumidityTo 75%, noncondensingAltitudeTo 1524 meters (5000 ft.)ElectricalIsta to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptaceStandard 3-prong with integral fuse holderGuperators ManualPN: 23343Shorting BNC CapPN: 23343Shorting BNC CapPN: 43466Line VoltagePN: 43466Line Cord, FusesSelected per geographic destination	Remote	off high-voltage output. TTL low turns on high-	
Status Indicator and Connectorfails to produce required HV output such as during current limit.Limit/Trip Status Indicator and ConnectorAn indicator will illuminate and a BNC will provide a TTL low when the high-voltage output is disabled due to the output current exceeding the current trip level, the detection of a high- voltage supply fault, the removal of one of the panels, or if the Model 30/20A is out of regulation for greater than 500 ms.MechanicalImage: Image:	Current Limit/Trip	turn panel potentiometer is used to adjust limit	
Indicator and Connectorprovide a TTL low when the high-voltage output is disabled due to the output current exceeding the current trip level, the detection of a high- voltage supply fault, the removal of one of the panels, or if the Model 30/20A is out of regulation for greater than 500 ms. Mechanical 103.9 cm H x 43 cm W x 87 cm D (40.9" H x 17" W x 34" D) Depth dimension includes wheels, handles and spacing for air flow.Weight73 kg (160 lb) approximateHV ConnectorCaton high-voltage ConnectorBNC ConnectorsAmplifier Input, Voltage Monitor, Current Monitor, Remote High Voltage ON/OFF, Out of Regulation Status, Fault/Trip Status Operating Contextors 0°C to 40°C (32°F to 104°F)Relative HumidityTo 75%, noncondensing AltitudeAltitudeTo 1524 meters (5000 ft.) Electrical Impute the 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holder Supplied Access-ries Pous PN: 23343Chart ManualPN: 23343Shorting BNC CapPN: 83060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Status Indicator and	fails to produce required HV output such as	
Dimensions103.9 cm H x 43 cm W x 87 cm D (40.9" H x 17" W x 34" D) Depth dimension includes wheels, handles and spacing for air flow.Weight73 kg (160 lb) approximateHV ConnectorCaton high-voltage ConnectorBNC ConnectorsAmplifier Input, Voltage Monitor, Current Monitor, Remote High Voltage ON/OFF, Out of Regulation Status, Fault/Trip StatusOperating CoorticsRelative Humidity70 75%, noncondensing AltitudeAltitude70 1524 meters (5000 ft.)ElectricalLine VoltageStatus, Factory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holderSupplied Access-viesPN: 23343Shorting BNC CapPN: 83060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Indicator and	provide a TTL low when the high-voltage output is disabled due to the output current exceeding the current trip level, the detection of a high- voltage supply fault, the removal of one of the panels, or if the Model 30/20A is out of	
(40.9" H x 17" W x 34" D) Depth dimension includes wheels, handles and spacing for air flow.Weight73 kg (160 lb) approximateHV ConnectorCaton high-voltage ConnectorBNC ConnectorsAmplifier Input, Voltage Monitor, Current Monitor, Remote High Voltage ON/OFF, Out of Regulation Status, Fault/Trip StatusOperating ContextorsTemperature0°C to 40°C (32°F to 104°F)Relative HumidityTo 75%, noncondensingAltitudeTo 1524 meters (5000 ft.)ElectricalLine VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holderSupplied AccestriesPN: 23343Operators ManualPN: 23343HV Output CablePN: 43466HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Mechanical		
HV ConnectorCaton high-voltage ConnectorBNC ConnectorsAmplifier Input, Voltage Monitor, Current Monitor, Remote High Voltage ON/OFF, Out of Regulation Status, Fault/Trip Status Operating ConticutorsOperating Conticutors Temperature0°C to 40°C (32°F to 104°F)Relative HumidityTo 75%, noncondensingAltitudeTo 1524 meters (5000 ft.) ElectricalStatus Line VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holder Supplied Access-ries PN: 23343Operators ManualPN: 23343HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Dimensions	(40.9" H x 17" W x 34" D) Depth dimension includes wheels, handles and spacing for air	
BNC ConnectorsAmplifier Input, Voltage Monitor, Current Monitor, Remote High Voltage ON//OFF, Out of Regulation Status, Fault/Trip Status Operating ConditionsCoperating Conditions Temperature0°C to 40°C (32°F to 104°F)Relative HumidityTo 75%, noncondensingAltitudeTo 1524 meters (5000 ft.) Electrical Line VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holder Supplied Accessive Operators ManualPN: 23343Shorting BNC CapPN: 83060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Weight	73 kg (160 lb) approximate	
Remote High Voltage ON/OFF, Out of Regulation Status, Fault/Trip StatusOperating ConditionsTemperature0°C to 40°C (32°F to 104°F)Relative HumidityTo 75%, noncondensingAltitudeTo 1524 meters (5000 ft.)ElectricalLine VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holderSupplied AccessivesOperators ManualPN: 23343Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	HV Connector	Caton high-voltage Connector	
Temperature0°C to 40°C (32°F to 104°F)Relative HumidityTo 75%, noncondensingAltitudeTo 1524 meters (5000 ft.) ElectricalElectrical Line VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holder Supplied Access-vies PN: 23343Operators ManualPN: 23343Shorting BNC CapPN: 83060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	BNC Connectors	Remote High Voltage ON/OFF, Out of Regulation	
Relative HumidityTo 75%, noncondensingAttitudeTo 1524 meters (5000 ft.)ElectricalLine VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holderSupplied AccessivePN: 23343Operators ManualPN: 23343Shorting BNC CapPN: 43466HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Operating Conditions		
AltitudeTo 1524 meters (5000 ft.)ElectricalLine VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holderSupplied AccessiveVaccessiveOperators ManualPN: 23343Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Temperature	0°C to 40°C (32°F to 104°F)	
ElectricalLine VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holderSupplied AccessStandard 3-prong with integral fuse holderOperators ManualPN: 23343Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Relative Humidity	To 75%, noncondensing	
Line VoltageFactory set for one of two ranges: 104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holderSupplied AccessoriesOperators ManualPN: 23343Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Altitude	To 1524 meters (5000 ft.)	
104 to 127 V AC or 180 to 250 V AC at 48 to 63 Hz (specify when ordering)Power Consumption1800 VA, maximumAC Line ReceptacleStandard 3-prong with integral fuse holder Supplied Accessories Operators ManualPN: 23343Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Electrical		
AC Line ReceptacleStandard 3-prong with integral fuse holderSupplied AccessoriesOperators ManualPN: 23343Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Line Voltage	104 to 127 V AC or 180 to 250 V AC at 48 to	
Supplied AccessoriesOperators ManualPN: 23343Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Power Consumption	1800 VA, maximum	
Operators ManualPN: 23343Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	AC Line Receptacle	Standard 3-prong with integral fuse holder	
Shorting BNC CapPN: B3060HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Supplied Access	sories	
HV Output CablePN: 43466Line Cord, FusesSelected per geographic destination	Operators Manual	PN: 23343	
Line Cord, Fuses Selected per geographic destination	Shorting BNC Cap	PN: B3060	
	HV Output Cable	PN: 43466	
Locking Wheel Kit CN: 1K042	Line Cord, Fuses	Selected per geographic destination	
	Locking Wheel Kit	CN: 1K042	

*Measured using the true rms feature of the Hewlett Packard Model 34401A digital multimeter



Measurement and Power Solutions[™] (



Copyright ${\small ©}$ 2015 TREK, INC. All specifications are subject to change. 1518/JRB