

SLP KONSTANTER Series SLP 120 / 240 / 320 Laboratory Power Supplies

3-348-796-03
3/9.99

- Very short response times thanks to BET technology (bidirectional energy transformation)
- Auto-ranging output with 120 W, 240 W or 320 W
- Output power is doubled in short-time operating range
- Remote sensing
- Minimum residual ripple
- Very good dynamic control parameters
- Output ON / OFF function
- Output terminals at front and rear panels
- Master-slave operation for parallel and series connection
- Protection against excessive temperature
- Minimal power loss
- Compact design and minimum weight



Description

The SLP-KONSTANTER series (single output laboratory power supplies) includes single-channel laboratory power supplies for universal use in research and development, production, training and service.

The instruments are capable of maintaining either constant voltage or constant current levels, and are deliver 120, 240 or 320 W of nominal power over a wide range thanks to the auto-ranging output.

Precision manual adjustment of voltage and current is accomplished with ten-turn potentiometers whose setting ranges can be limited with the help of a screwdriver, in order to prevent inadvertent adjustment to undesirably high values. Two large, 3½ place digital LED displays indicate output voltage or current, and can be switched to setpoint display as well (especially advantageous for current adjustment). Control mode displays indicate respective operating conditions.

Floating outputs are available at both front and rear panels. Activation or deactivation is accomplished by pressing a key, or with a signal to the integrated analog interface which is included as standard equipment.

As soon as sensor cables are connected to the terminals, the KONSTANTER is automatically switched to remote sensing.

The quiet, temperature controlled fan prevents unnecessarily high noise levels in working areas.

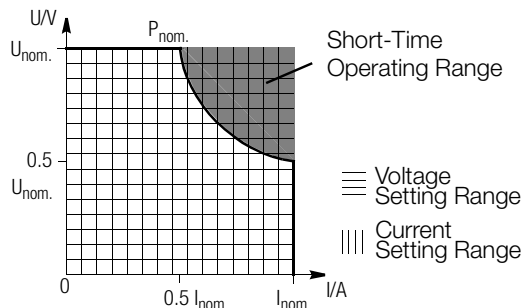
The rugged metal housing is closed at both top and bottom, and is equipped with feet and a standoff at the rear panel to protect the cable from buckling.

Several units can be quickly and easily fastened to one another for the creation of multi-channel units, or can be installed to a 19" rack with the appropriate mounting sets. Only one electrical outlet is required for the supply of mains power to multi-channel units.

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Output Working Range



Applicable Regulations and Standards

IEC 1010-1+A1 ('92) EN 61010-1 ('93) VDE 0411-1 ('94)	Safety requirements for electrical equipment for measurement, control and laboratory use
IEC 950+A1+A2 ('93) EN 60950+A1+A2 ('93) VDE 0805+A2 ('94)	Safety requirements for data processing equipment including electric office machines
IEC 529 ('89) EN 60529 ('91) VDE 0470-1 ('92)	Protection provided by enclosures (IP codes)
EN 50081-2 ('94) VDE 0839-81-2 ('94)	Electromagnetic compatibility (EMC) Generic standard for interference emission – industrial
EN 50082-2 ('96) VDE 0839-82-2 ('96)	Electromagnetic compatibility (EMC) Generic standard for interference immunity – industrial
IEC 68-2-6 ('90)	Vibration resistance
IEC 68-2-27 ('89)	Impact resistance
CISPR 11 ('90) EN 55011 ('91) VDE 0875-11 ('92)	Limit values and measuring procedures for transmitted interference from ISM devices
IEC 1000-4-2 ('95) EN 61000-4-2 ('95) VDE 0847-4-2 ('96)	Electrostatic discharge
IEC 1000-4-3 ('95) ENV 50140 ('95) VDE 0847-3 ('95)	Electromagnetic HF fields
IEC 1000-4-4 ('95) EN 61000-4-4 ('95) VDE 0847-4-4 ('96)	Transient interference – bursts

Analog Interface

Connection 11-pin plug-in terminal strip

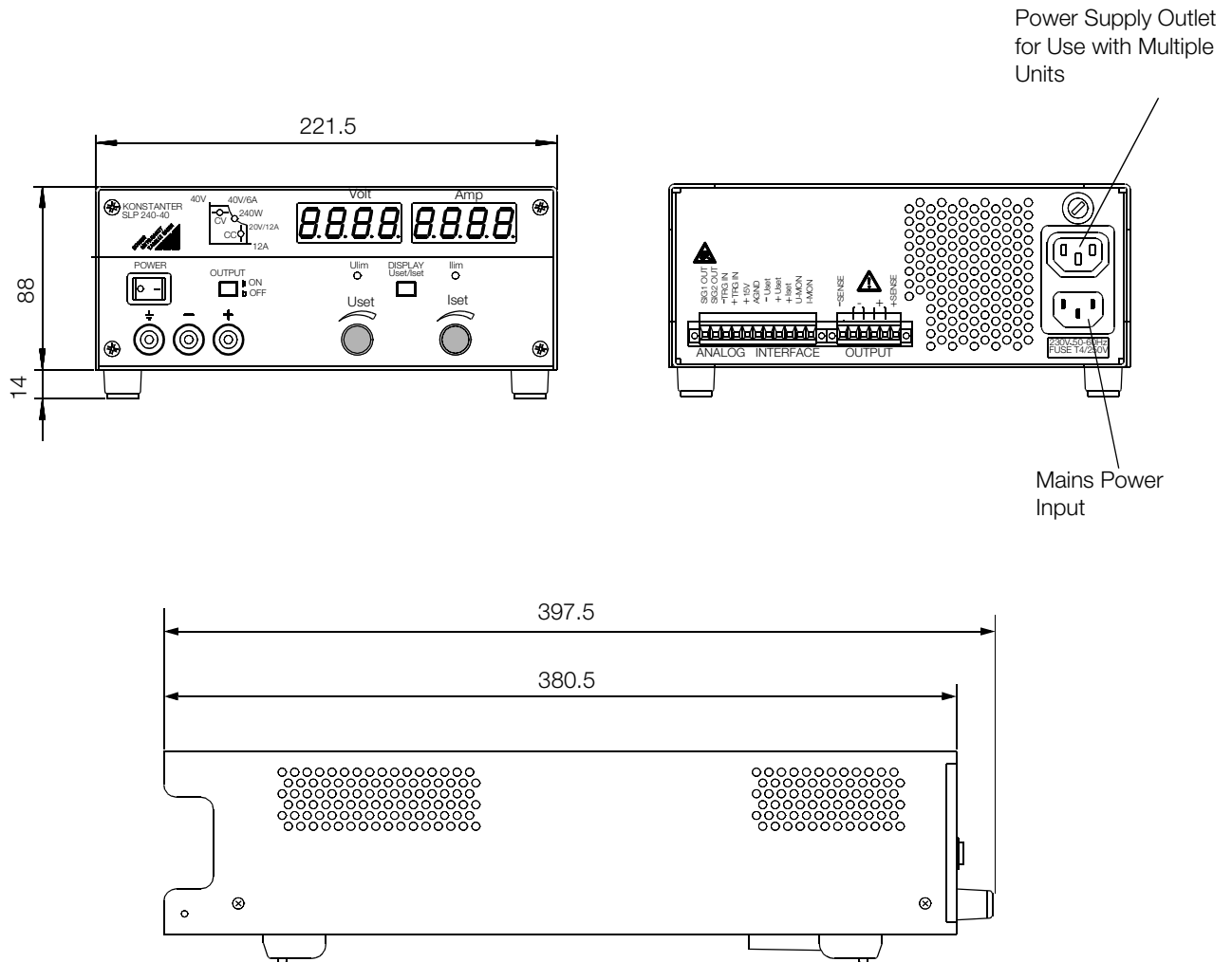
Reference Potential minus pole at output,
floating TRG input

Connector Pin Assignments:

PIN	Designation	Function
1	SIG1 OUT	status signal output for input ON / OFF (open collector, max. 30 V – / 20 mA)
2	SIG2 OUT	status signal output control mode CV / CC (open collector, max. 30 V – / 20 mA)
3	TRG IN +	digital control input for input ON / OFF (low: < 1 V, high: 4 ... 26 V), floating input
4	TRG IN –	
5	+15 V	auxiliary voltage: +15 V / max. 40 mA
6	AGND	reference point connected to –output with reversible fuse
7	U_{set-}	analog, inverted voltage control input (0 ... –5 V corresponds to 0 ... $U_{nom.}$, $R_i = 10\text{ k}\Omega$)
8	U_{set+}	analog voltage control input (0 ... +5 V corresponds to 0 ... $U_{nom.}$, $R_i = 10\text{ k}\Omega$)
9	I_{set+}	analog current control input (0 ... +5 V corresponds to 0 ... $I_{nom.}$, $R_i = 10\text{ k}\Omega$)
10	U-MON	output voltage measurement output (0 ... 10 V corresponds to 0 ... $U_{nom.}$, $R_i = 9.8\text{ k}\Omega$)
11	I-MON	output current measurement output (0 ... 10 V correspond to 0 ... $I_{nom.}$, $R_i = 9.4\text{ k}\Omega$)

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Dimensional Drawing (benchtop instrument)



All dimensions in mm

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Characteristic Values, 120 W Series

Unless otherwise indicated, all entries represent maximum values and are valid within an operating temperature range of 0 to 50° C, the nominal power range and a line voltage range of 230 V ± 10% after a warm-up period of 30 minutes.

Description (abbreviated designation)		SLP 120-20	SLP 120-40	SLP 120-80
Type		32 N 20 R 10	32 N 40 R 6	32 N 80 R 3
Nominal Output Data	Voltage Setting Range	0 ... 20 V	0 ... 40 V	0 ... 80 V
	Current Setting Range	0 ... 10 A	0 ... 6 A	0 ... 3 A
	Continuous Power at Tu ≤ 40° C	max. 120 W	max. 120 W	max. 120 W
	Short-Time Rating for t < 90 s / Tu ≤ 25° C	max. 200 W	max. 240 W	max. 240 W
	Current Derating at Tu > 40° C	– 0.25 A / K	– 0.15 A / K	– 0.07 A / K
Output Operating Characteristics				
Overall Setting Tolerance at 23 ± 5° C with Reference to 3½ Place Setpoint Display including System Deviation for Load / Line	Voltage	0.2 % + 50 mV	0.2 % + 150 mV	0.2 % + 250 mV
	Current	0.5 % + 45 mA	0.5 % + 35 mA	0.5 % + 20 mA
Static System Deviation ¹⁾ at 100% Load Variation ¹⁾	Voltage	15 mV	10 mV	10 mV
	Current	20 mA	10 mA	10 mA
Static System Deviation ¹⁾ at 10% Line Voltage Variation ¹⁾	Voltage	5 mV	5 mV	5 mV
	Current	8 mA	5 mA	5 mA
Residual Ripple ¹⁾	Voltage (10 Hz ... 10 MHz)	10 mV _{eff}	10 mV _{eff}	10 mV _{eff}
	Current (10 Hz ... 1 MHz)	25 mA _{eff}	20 mA _{eff}	10 mA _{eff}
Common-Mode Interference (10 Hz ... 1 MHz)		0.5 mA _{eff}	0.5 mA _{eff}	0.5 mA _{eff}
Settling Time (voltage) with Sudden Load Variations of 10 to 90% I _{nom.}	Tolerance	40 mV	80 mV	80 mV
	Δ I = 80%	200 μs	200 μs	200 μs
Under and Overshooting with Sudden Load Variations of 50 A / ms		400 mV	400 mV	800 mV
	Δ I = 80%			
Response Time (voltage) with Setpoint Change 0 → 100% with Setpoint Change 100% → 0	Tolerance	40 mV	80 mV	160 mV
	Open-Circuit / Nominal Load	1 ms / 1 ms	1 ms / 1 ms	4 ms / 4 ms
Response Time (current) with Setpoint Change 0 → 100% with Setpoint Change 100% → 0	Tolerance	100 mA	60 mA	30 mA
	Short-Circuit / Nominal Load	< 5 ms / < 5 ms	< 5 ms / < 5 ms	< 10 ms / < 10 ms
Measurement Value Display (3½ place)				
Measuring Resolution	Voltage	10 mV	100 mV	100 mV
	Current	10 mA	10 mA	10 mA
Measuring Accuracy at 23 ± 5° C with Reference to the respective Measurement Value	Voltage	0.15 % + 25 mV	0.2 % + 120 mV	0.2 % + 150 mV
	Current	0.5 % + 30 mA	0.5 % + 25 mA	0.5 % + 20 mA
Protective Functions				
Output Overvoltage Protection	Threshold	25 ± 1 V	50 ± 2 V	100 ± 4 V
Protection against Pole Reversal – Load Capacity	Continuous	10 A	6 A	3 A
Reverse Voltage Resistance	Continuous	40 V	80 V	100 V
General				
Power Supply ¹⁾	at Nominal Load	230 V~ +10 / –15 %	230 V~ +10 / –15 %	230 V~ +10 / –15 %
	in Standby Mode	47 ... 63 Hz	47 ... 63 Hz	47 ... 63 Hz
Power Consumption	at max. Short-Time Power	280 VA, 180 W	280 VA, 150 W	280 VA, 170 W
	at Nominal Load	45 VA, 15 W	45 VA, 15 W	45 VA, 15 W
	Typical	450 VA	550 VA	550 VA
Efficiency	at Nominal Load	> 67 %	> 70 %	> 70 %
Switching Frequency	in Standby Mode at max. Short-Time Power	200 kHz	200 kHz	200 kHz
Article Number		K220A	K221A	K222A

1) Indicated values are increased by a factor of approximately 1.2 within a mains input voltage range of –10% to –15%.

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Characteristic Values, 240 W Series

Unless otherwise indicated, all entries represent maximum values and are valid within an operating temperature range of 0 to 50° C, the nominal power range and a line voltage range of 230 V ± 10% after a warm-up period of 30 minutes.

Description (abbreviated designation)		SLP 240-20	SLP 240-40	SLP 240-80
Type		32 N 20 R 20	32 N 40 R 12	32 N 80 R 6
Nominal Output Data	Voltage Setting Range	0 ... 20 V	0 ... 40 V	0 ... 80 V
	Current Setting Range	0 ... 20 A	0 ... 12 A	0 ... 6 A
	Continuous Power at Tu ≤ 40° C	max. 240 W	max. 240 W	max. 240 W
	Short-Time Rating for t < 90 s / Tu ≤ 25° C	max. 400 W	max. 480 W	max. 480 W
	Current Derating at Tu > 40° C	– 0.5 A / K	– 0.3 A / K	– 0.15 A / K
Output Operating Characteristics				
Overall Setting Tolerance at 23 ± 5° C with Reference to 3½ Place Setpoint Display including System Deviation for Load / Line	Voltage	0.2 % + 100 mV	0.2 % + 150 mV	0.2 % + 250 mV
	Current	0.5 % + 55 mA	0.5 % + 45 mA	0.5 % + 35 mA
Static System Deviation ¹⁾ at 100% Load Variation ¹⁾	Voltage	25 mV	18 mV	18 mV
	Current	30 mA	30 mA	15 mA
Static System Deviation ¹⁾ at 10% Line Voltage Variation ¹⁾	Voltage	5 mV	5 mV	5 mV
	Current	8 mA	8 mA	5 mA
Residual Ripple ¹⁾	Voltage (10 Hz ... 10 MHz)	15 mV _{eff}	15 mV _{eff}	15 mV _{eff}
	Current (10 Hz ... 1 MHz)	50 mA _{eff}	25 mA _{eff}	20 mA _{eff}
Common-Mode Interference (10 Hz ... 1 MHz)		0.5 mA _{eff}	0.5 mA _{eff}	0.5 mA _{eff}
Settling Time (voltage) with Sudden Load Variations of 10 to 90% I _{nom} .	Tolerance	40 mV	80 mV	160 mV
	Δ I = 80%	400 μs	200 μs	200 μs
Under and Overshooting with Sudden Load Variations of 50 A / ms	Δ I = 80%	400 mV	400 mV	800 mV
Response Time (voltage) with Setpoint Change 0 → 100% with Setpoint Change 100% → 0	Tolerance	40 mV	80 mV	160 mV
	Open-Circuit / Nominal Load	1 ms / 1 ms	1 ms / 1 ms	4 ms / 4 ms
Response Time (current) with Setpoint Change 0 → 100% with Setpoint Change 100% → 0	Tolerance	200 mA	120 mA	60 mA
	Short-Circuit / Nominal Load	< 5 ms / < 5 ms	< 5 ms / < 5 ms	< 10 ms / < 10 ms
Measurement Value Display (3½ place)				
	Measuring Resolution	Voltage 10 mV Current 10 mA	100 mV 10 mA	100 mV 10 mA
Measuring Accuracy at 23 ± 5° C with Reference to the respective Measurement Value	Voltage	0.2 % + 50 mV	0.2 % + 120 mV	0.2 % + 120 mV
	Current	0.5 % + 25 mA	0.5 % + 30 mA	0.5 % + 25 mA
Protective Functions				
Output Overvoltage Protection	Threshold	25 ± 1 V	50 ± 2 V	100 ± 4 V
Protection against Pole Reversal – Load Capacity	Continuous	20 A	12 A	6 A
Reverse Voltage Resistance	Continuous	40 V	80 V	100 V
General				
Power Supply ¹⁾	at Nominal Load	230 V~ +10 / –15 %	230 V~ +10 / –15 %	230 V~ +10 / –15 %
	in Standby Mode	47 ... 63 Hz	47 ... 63 Hz	47 ... 63 Hz
Power Consumption	at max. Short-Time Power	550 VA, 360 W	550 VA, 340 W	550 VA, 340 W
	at Nominal Load	45 VA, 15 W	45 VA, 15 W	45 VA, 15 W
	Typical	900 VA	1050 VA	1050 VA
Efficiency	at Nominal Load	> 67 %	> 70 %	> 70 %
Switching Frequency	in Standby Mode at max. Short-Time Power	200 kHz	200 kHz	200 kHz
Article Number		K230A	K231A	K232A

1) Indicated values are increased by a factor of approximately 1.2 within a mains input voltage range of –10% to –15%.

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Characteristic Values, 320 W Series

Unless otherwise indicated, all entries represent maximum values and are valid within an operating temperature range of 0 to 50° C, the nominal power range and a line voltage range of 230 V ± 10% after a warm-up period of 30 minutes.

Description (abbreviated designation)		SLP 320-32		
Type		32 N 32 R 18		
Nominal Output Data	Voltage Setting Range	0 ... 32 V		
	Current Setting Range	0 ... 18 A		
	Continuous Power at $T_u \leq 40^\circ \text{C}$	max. 320 W		
	Short-Time Rating for $t < 90 \text{ s} / T_u \leq 25^\circ \text{C}$	max. 480 W		
	Current Derating at $T_u > 40^\circ \text{C}$	- 0.5 A / K		
Output Operating Characteristics				
Overall Setting Tolerance at $23 \pm 5^\circ \text{C}$ with Reference to 3½ Place Setpoint Display including System Deviation for Load / Line	Voltage	0.2 % + 150 mV		
	Current	0.5 % + 50 mA		
Static System Deviation ¹⁾ at 100% Load Variation ¹⁾	Voltage	30 mV		
	Current	40 mA		
Static System Deviation ¹⁾ at 10% Line Voltage Variation ¹⁾	Voltage	10 mV		
	Current	20 mA		
Residual Ripple ¹⁾	Voltage (10 Hz ... 10 MHz)	30 mV _{eff}		
	Current (10 Hz ... 1 MHz)	50 mA _{eff}		
Common-Mode Interference (10 Hz ... 1 MHz)		0.5 mA _{eff}		
Settling Time (voltage) with Sudden Load Variations of 10 to 90% I_{nom} .	Tolerance	64 mV		
	$\Delta I = 80\%$	200 μs		
Under and Overshooting with Sudden Load Variations of 50 A / ms	$\Delta I = 80\%$		400 mV	
Response Time (voltage) with Setpoint Change 0 → 100% with Setpoint Change 100% → 0	Tolerance	64 mV		
	Open-Circuit / Nominal Load	1 ms / 1 ms		
Response Time (current) with Setpoint Change 0 → 100% with Setpoint Change 100% → 0	Tolerance	180 mA		
	Short-Circuit / Nominal Load	< 5 ms / < 5 ms		
Measurement Value Display (3½ place)				
Measuring Resolution	Voltage	100 mV		
	Current	10 mA		
Measuring Accuracy at $23 \pm 5^\circ \text{C}$ with Reference to the respective Measurement Value	Voltage	0.2 % + 120 mV		
	Current	0.5 % + 40 mA		
Protective Functions				
Output Overvoltage Protection	Threshold	40 ± 1 V		
Protection against Pole Reversal – Load Capacity	Continuous	20 A		
Reverse Voltage Resistance	Continuous	64 V		
General				
Power Supply ¹⁾	at Nominal Load	230 V~ +10 / -15 %		
	in Standby Mode	47 ... 63 Hz		
Power Consumption	at max. Short-Time Power	660 VA, 460 W		
	at Nominal Load	50 VA, 15 W		
	Typical	1050 VA		
Efficiency	at Nominal Load	> 70 %		
Switching Frequency	in Standby Mode	200 kHz		
	at max. Short-Time Power			
Article Number		K234A		

1) Indicated values are increased by a factor of approximately 1.2 within a mains input voltage range of -10% to -15%.

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Ambient Conditions

Vibration Resistance	IEC 68-2-6: 1990 10 ... 55 Hz, 0.3 mm, 1 oct. / min. 3 x 30 min.
Impact Resistance	IEC 68-2-27: 1989 15 gr., 11 ms, semi-sinusoidal, 3 x 6 impacts
Temperature Range	operation: 0 ... 50° C at > 40° C current derating storage: -25 ... +75° C
Humidity	operation: ≤ 75% relative humidity, no condensation allowed
Cooling	with built-in fan air intake: side panel / air outlet: rear panel

Power Supply

Connectors	In: 10 A IEC inlet plug connector Out: 10 A IEC inlet socket connector, no switch, no fuse
Line Voltage	230 V~, +10 / -15%, 47 ... 63 Hz
Power Consumption	see Characteristic Values
Inrush Current	max. 50 A _s
Mains Fusing	1 ea. T 4 A / 250 V (6.3 x 32 mm, UL) internal: 1 ea. T 5 A / 250 V (5 x 20 mm)

Output

Connectors	
Output	front panel: 2 ea. 4 mm safety jacks rear panel: 6-pin plug-in terminal strip
Sensors	rear panel: incl. in output plug connector
Regulator	primary switched-mode regulator with BET
Operating Modes	adjustable constant voltage / constant current source with automatic sharp transition
Output Isolation	floating output with "protective separation" from the mains inlet, max. allowable potential output-ground: 120 V, capacitance output-ground (housing): 60 nF

Electrical Safety

Safety Class	I
Overvoltage Category:	II for mains inlet I for output and interface
Contamination Level	2
Earth Leakage Current	typ. 2.5 mA
Electrical Isolation	test voltage
Mains / Output-PE	1.35 kV~
Mains-Output	2.7 kV~ (type test: 3.7 kV~7 kV~)

Electromagnetic Compatibility (EMC)

Interference Emission	EN 50081-2: 1994 VDE 0839-81-2: 1994
Limit Values and Measuring Procedures for Transmitted Interference from ISM Devices	CISPR 11: 1990 EN 55011: 1991 VDE 0875-11: 1992
Interference Immunity	EN 50082-2: 1996 VDE 0839-82-2: 1996
Electrostatic Discharge	IEC 1000-4-2: 1995 EN 61000-4-2: 1995 VDE 0847-4-2: 1996 severity level 2 for contact discharge, severity level 3 for atmospheric discharge
Electromagnetic HF Fields	IEC 1000-4-3: 1995 ENV 50140: 1995 VDE 0847-3: 1995 10 V / m, no influence
Transient Interference - Bursts	IEC 1000-4-4: 1995 EN 61000-4-4: 1995 VDE 0847-4-4: 1996 severity level 3

Mechanical Design

Protection	IP 20 for housing, as well as mains, output and analog interface terminals, IP 00 for PC interfaces in accordance with IEC 529: 1989 EN 60529: 1991 VDE 0470-1: 1992
Type	benchtop instrument, suitable for rack mounting
Dimensions (W x H x D)	benchtop unit: 221.5 x 102 x 397.5 mm 19" rack unit: 1/2 19" x 2 standard height units x 400 mm
Weight	approx. 2.8 kg

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Accessories

Description	Comment	Article No.
19" Adapter, 1 x 32 N	Required for mounting 1 type 32 N ... instrument to a 19" rack	K990A
19" Adapter, 2 x 32 N	Required for mounting 2 type 32 N ... instruments to a 19" rack	K990B
Mains Jumper Cable, 0.4 meters long	The cable is equipped with one 10 A inlet connector plug and one 10 A inlet connector socket. Used for cascading mains power when several instruments are mechanically connected to a single multi-channel unit. The system thus requires only one mains outlet.	K991A

Order Information

Description (abbreviated designation)	Article No.
SLP 120-20	K220A
SLP 120-40	K221A
SLP 120-80	K222A
SLP 240-20	K230A
SLP 240-40	K231A
SLP 240-80	K232A
SLP 320-32	K234A

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