

LINEAR CONTROLLED BIPOLAR POWER SUPPLIES

NLB Series

Tabletop and rack-mounted models up to 1400W

Operating Instructions

(Translation from German)



1 Product properties and data

1.1 Function

The NLB series power supplies (Low Voltage **L**inear **C**ontrolled **B**ipolar Power Supplies) are bipolar, highly stable, rapidly programmable switch-mode power supplies with low ripple.

1.2 Characteristics

- Single-channel power supply with bipolar output voltage and output current. Delay-free polarity reversal (including zero crossing).
- 4-quadrant operation possible with appropriate load (for lower stored energy; optionally also for active loads or higher energy with power recovery)
- A push-button switch can be used to select the control type - constant current or constant voltage control. The set point and the control's limit value can be adjusted via potentiometers.
- Rapidly programmable in connection with an interface, digital or analog (including zero crossing).
- Permanently short-circuit and flash-over proof
- Can be operated indefinitely with rated current in case of a short-circuit
- Inrush current limiting from 700W rated power
- Sensor connections to compensate for voltage drops in the load lines. The stated value of the maximum output voltage always refers to the output terminals.
- Voltage and constant current control with automatic transfer and control mode display with LEDs
- 4½-digit digital display for current and voltage in all power classes
- Voltage and current are set using a ten-turn potentiometer with a lockable precision dial
- Set-point display via a button
- Set-point adjustment possible with disabled output
- Push-button switch for output voltage (OUTPUT)
- Any load type; in principle, any passive two-terminal network is possible

1.3 Linear controlled bipolar power supply operating modes

The power supplies can be operated in the LOCAL, ANALOG (optional) and DIGITAL (optional) operating modes.

1.4 Technical specifications

1.4.1 Dimensions

The maximum rated power for 19" desktop devices is 1400W. The height and depth of the low-voltage power supply depends on its power rating and output voltage. Detailed information can be found on the enclosed equipment card.

A special version as 19" rack-mounted or with optional rack adapter is available.

1.4.2 Electrical specification

Mains connection	230V $\pm 10\%$ 47 - 63Hz The N and PE (protective earth) connections are always required!
Protection class	I
Overvoltage category	II
Output	Output values, voltage / current, see front panel or the equipment card
Short-circuit resistance	The power supply is short-circuit and flash-over proof. The maximum current can be drawn at any output voltage, even in the event of a short-circuit.
Output polarity	Bipolar, isolated, continuous zero crossing, each output connection can be earthed. Exception: If a non-isolated analog programming is installed, the A0 output pole is earthed.
Output isolation	Each output pole can be maximally $\pm 500V$ higher than PE. Exception: If a non-isolated analog programming is installed, the A0 output pole is earthed.
4-quadrant operation	possible with passive loads
Control setting range	Voltage, constant current control via potentiometer -100% to 100% of the rated value
Limit setting range	Voltage, constant current control via potentiometer 0.1% to 100% of the rated value (can also be minimally higher than 100%)
Setting resolution	Using the potentiometer on the front panel, $\pm 1 \times 10^{-3}$ of the rated value
Reproducibility	$\pm 2 \times 10^{-4}$ of rated value
Displays	DVM for voltage and current, range ± 20000
Residual ripple	$< 5 \times 10^{-4}$ of rated value +30mVss (measuring bandwidth 30Hz to 10MHz) $< 1,5 \times 10^{-4}$ of rated value + 10mV RMS
Voltage control time	$< 2ms$ typical 1ms at load change from 10% to 100%, or from 100% to 10%
Current control time	$< 2ms$
Setting time	$< 2ms$ for full stroke (0% to 100%)
Control deviation	with $\pm 10\%$ mains change: $< \pm 2 \times 10^{-5}$ of rated value, for 0 to 100% load change: $< \pm 2 \times 10^{-4}$ of rated value,

	over 8 hours: $< \pm 2 \times 10^{-4}$ of the rated value, with temperature changes: $\pm 2 \times 10^{-4}/K$ of rated value
Power loss	approx. 15% of the rated power with open circuit approx. 35% of the rated power with rated load approx. 140% of the rated power in short circuit with rated current
Inrush current limiting	From 700W as standard
Sensor connections	compensate for voltage drops in the load lines.

1.4.3 Ambient conditions

Operation

Operation location	Only for use in dry indoor areas
Temperature	0°C to +40°C
Humidity	Max. relative humidity 80% up to 31°C, decreasing linearly down to 50% relative humidity at 40°C
Altitude	up to 2000m above sea level
Pollution degree	1
Protection type	IP20
Cooling	The heat generated in the power supply unit is dissipated by convection or, in the case of high-power units, by forced ventilation.

Transport / Storage

Temperature	-20°C up to +50°C
Humidity	No precipitation and max. relative humidity of 80%
Storage rooms	Dust-free and dry

2 Preparation for installation

2.1 DC power supply components

2.1.1 Front view with controls

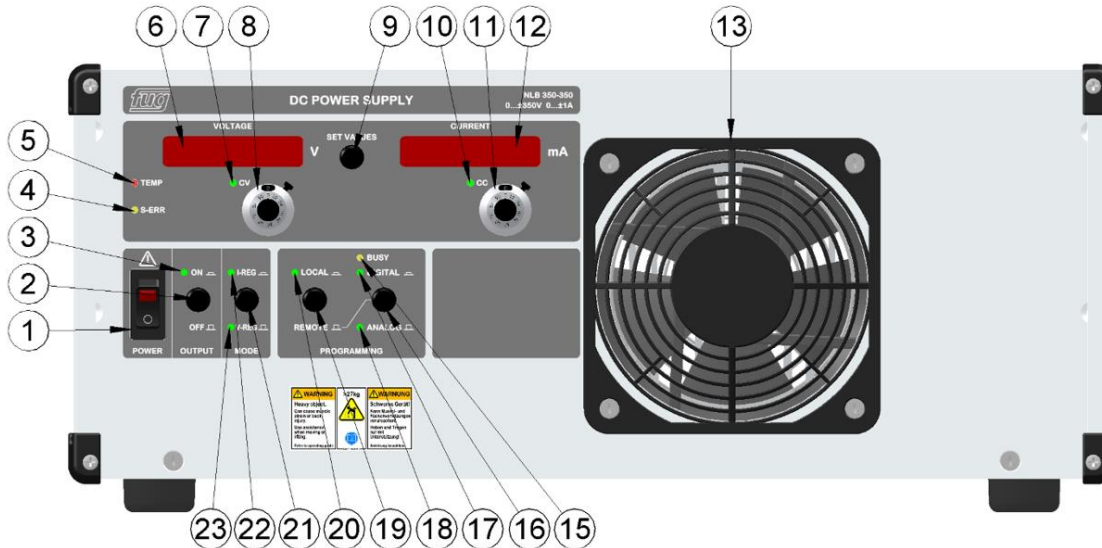


Figure 1 Front panel

Model example NLB 350 - 350. Different dimensions apply for DC power supplies with higher power

1	AC power switch with indicator light Disconnects the power supply from the mains, two-pole switching	12	Current display flashing: Set point, not flashing: Actual value
2	DC output ON (OUTPUT) There is no mains disconnection!	13	Air inlet
3	DC output ON LED Lights up green when the controller and therefore the power stage is operating (OUTPUT ON)	15	(Optional) LED BUSY displays data traffic on the digital interface
4	S-ERR LED for errors at the sensor connections or sensor lines	16	(Optional) Switching the operation mode between REMOTE/ANALOG and REMOTE/DIGITAL
5	Over-temperature LED, internal device temperature too high, fan failure or contaminated fan. (Use is type-dependent)	17	(Optional) LED indicating digital programming active
6	Voltage display flashing: Set point; not flashing: Actual value	18	(Optional) LED indicating analog programming active
7	LED for constant voltage control mode (Constant Voltage)	19	(Optional) Switching the operation mode between LOCAL and REMOTE
8	Lockable potentiometer for voltage adjustment	20	(Optional) LED indicating local control mode active
9	SET VALUES Switch displays between Set- point mode and Actual output mode, displays flash when in set point mode.	21	Switches the operating mode (constant voltage control or constant current control operation) V-REG or I-REG
10	LED for constant current control mode (Constant Current)	22	LED display for constant current control operation
11	Lockable potentiometer for current adjustment	23	LED display for constant voltage control operation

2.1.2 Rear view with AC input

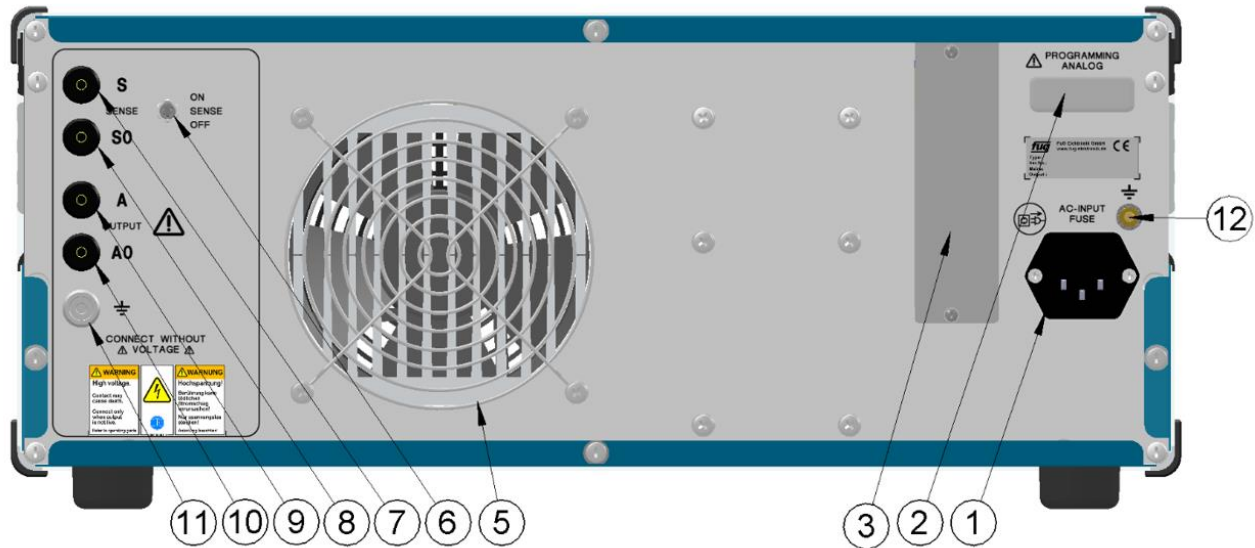


Figure 2 Rear panel

Model example NLB 350 - 350. For DC power supplies with higher power or other voltages, other dimensions may apply. The elements' layout may vary from that shown here.

1	AC input with mains fuses Up to 700W IEC connector (as shown) with integrated fuse, at 1400W, C20 mains cable in accordance with IEC60320-C20, equipped with automatic circuit breaker.
2	(Optional) 15-pin Sub-D connector for analog programming
3	(Optional) Slot for digital interface (e.g.: IEEE-488, RS232, USB, LAN, ...)
5	Air outlet
6	Switch for sensor (SENSE ON / OFF)
7	Connection for sensor line S (SENSE)
8	Connection for sensor line S0 (SENSE)
9	Output A
10	Output A0
11	Earthing plug socket: This connection can be connected to the ground of the load; this applies for devices with an output current $\leq 20A$
12	Earth bolt: This connection can be connected to the main PE