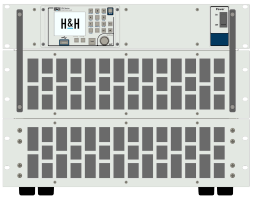
Datasheet Series PLI

H&H Höcherl & Hackl
The electronic load

Model	PLI9612MR4	
Order no.	17-147-000-02	

Basic operating modes	CC, CV, CR, CP
Standard interfaces	RS-232, USB, LAN, CAN
Max. input voltage Vmax	120 V
Min. input voltage Vmin [1)]	1 V
Max. load current Imax	448 A
Continuous power	9600 W
Short-time power [2)]	14400 W
Voltage setting	0 ... 120 V
Current ranges	0 ... 112 A 0 ... 224 A 0 ... 336 A 0 ... 448 A
Resistance ranges	0.0358 ... 28.8037 Ω (max. 112 A) 0.091 ... 73.3187 Ω (max. 224 A) 0.006 ... 4.8006 Ω (max. 336 A) 0.0045 ... 3.6004 Ω (max. 448 A)
Power ranges continuous/short-time [3)]	0 ... 2400 W/3600 W 0 ... 4800 W/7200 W 0 ... 7200 W/10800 W 0 ... 9600 W/14400 W
Rise and fall time fast / medium / slow [4)]	25 µs
Load terminals (front) [5)]	-
Load terminals (rear) [6)]	FKS25/10-SM10
Mains voltage [7)]	1/N/PE AC 230 V 50 ... 60 Hz
Mains voltage toggleable [8)]	1/N/PE AC 115 V 50 ... 60 Hz
Power consumption	380 VA
Noise max. ca. [9)]	74 dB(A)
Weight ca.	63 kg
Housing / 3D model [10)]	19" - 8 / PLI_M23
Width x Height x Depth	483 x 374 x 631 mm

1. Minimum input voltage for maximum static load current.
2. Level and duration of the peak power depend on the previous power.
3. The setting range extends max. to the possible peak power.
4. Rise and fall times are defined of 10 % ... 90 % and 90 % ... 10 % of the maximum current (CC mode, fast regulation speed, tolerance ±20 %). Rise and

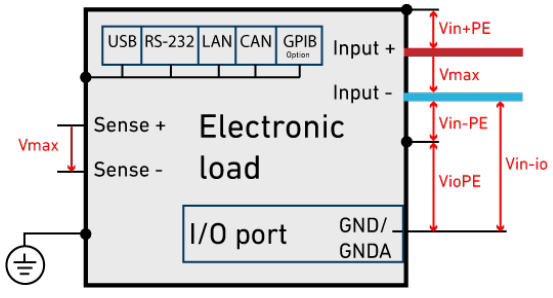
fall time at setting "medium": ca. 150 µs, "slow": ca. 2 ms.

5. BPK4-30L: Touch-protected binding posts for 4 mm laboratory jacks and stripped wires with diameter up to 4 mm, max. 30 A
   BPK4-60L: Touch-protected binding posts for 4 mm laboratory jacks and stripped wires with diameter up to 6 mm, max. 60 A
   FKS20/5-SM8: Flat copper bars 20 x 5 mm vertical with hole for screw M8
   FKS25/8-SM10: Flat copper bars 25 x 8 mm vertical with hole for screw M10
   FKS25/10-SM10: Flat copper bars 25 x 10 mm vertical with hole for screw M10
   FKS40/12-SM12: Flat copper bars 40 x 12 mm vertical with hole for screw M12
   Models with copper bars (FKS) are delivered with safety covers.
6. BPK4-30L: Touch-protected binding posts for 4 mm laboratory jacks and stripped wires with diameter up to 4 mm, max. 30 A
   BPK4-60L: Touch-protected binding posts for 4 mm laboratory jacks and stripped wires with diameter up to 6 mm, max. 60 A
   FKS20/5-SM8: Flat copper bars 20 x 5 mm vertical with hole for screw M8
   FKS25/8-SM10: Flat copper bars 25 x 8 mm vertical with hole for screw M10
   FKS25/10-SM10: Flat copper bars 25 x 10 mm vertical with hole for screw M10
   FKS40/12-SM12: Flat copper bars 40 x 12 mm vertical with hole for screw M12
   Models with copper bars (FKS) are delivered with safety covers.
7. Mains voltage tolerance: ±10 %
8. Mains voltage tolerance: ±10 %
9. Measured on the front from distance of 1 m.
10. Largest width and depth without wiring. 1 U = 44.45 mm.

Technical Data

Operating modes				
Basic operating modes	CC, CV, CR, CP			
Combined operating modes	CC+CV, CR+CC+CV, CP+CC+CV, CV+CC			
Accuracy of setting				
	of setting		**of corresponding range**	
Voltage	±0.2 %		±0.05 %	
Current	±0.2 %		PLI MR in R1 ±0.1 %, others ±0.05 %	
Resistance (at 5 % to 100 % of voltage range)	±1.4 %		±0.3 % of current range	
Power (at V and I > 30 % of range) (at V and I > 5 % and < 30 % of range)	**PLI EC** ±1 % ±2 %	**others** ±0.35 % ±0.7 %	**PLI EC** ±0.3 % ±0.75 %	**others** ±0.1 % ±0.25 %
Resolution	14 bits			
Accuracy of adjustable protections				
	of setting		**of corresponding range**	
Overcurrent protection	±1.4 %		±0.3 %	
Undervoltage protection	±1.4 %		±0.3 %	
Resolution	12 bits			
Accuracy of measurement slow				
	of measured value (real value)		**of corresponding range**	
Voltage	±0.01 %		±0.005 %	
Current	±0.2 %		PLI MR in R1 ±0.1 %, others ±0.05 %	
Resistance	is calculated from current and voltage			
Power	is calculated from current and voltage			
Resolution	23 bits			
Sampling time	250 ms, not triggerable			
Accuracy of display				
Number of decimal places	5			
Accuracy	Accuracy of measurement slow ±1 digit of the display value			
Accuracy of measurement fast				
	of measured value (real value)		**of corresponding range**	
Voltage	±0.1 %		±0.05 %	
Current	±0.2 %		PLI MR in R1 ±0.2 %, others ±0.1 %	
External control voltage	±0.2 %		±0.1 %	
Resistance	calculated from voltage and current values			
Power	calculated from voltage and current values			
Resolution	16 Bit			
Sampling time	200 µs ... 1000 s			
Accuracy of trigger voltage and current				
Voltage	±1 % of range			
Current	±1 % of range			
Dynamic function (LIST)				
No. of load levels	max. 300, with ramp and dwell time setting			
	min.		**max.**	
Dwell time	200 µs		1000 s	
Ramp time	0 s		1000 s	
Resolution	200 µs			
Accuracy of the setting times	±0.02 %			
Delay at triggered start	max. 300 µs			

Data acquisition		
to external USB flash drive		
Sampling time	0.5 to 30 s, resolution 0.1 s	
Measurement data	timestamp, voltage, current	
No. of measurement points	limited by USB memory capacity	
File format	.csv	
to internal memory		
Sampling time	200 µs ... 1000 s, resolution 200 µs, synchronized with dynamic function	
Measurement data	timestamp, voltage, current	
No. of measurement points	max. 40,000	
Settings memories		
No. of user settings	9, selectable (incl. programmed list) 1 for last device settings at power-off or power fail	
I/O port: accuracy of analog control 0 ... 10 V		
	of setting	**of corresponding range**
Voltage	±0.2 %	±0.1 %
Current	±0.2 %	PLI MR in R1 ±0.2 %, others ±0.1 %
Resistance (at V > 5 % of Vmax)	±1.6 %	±0.4 % of current range
Power (at V and I > 30 % of max. value) (at V and I > 5 % and < 30 % of max. value)	±0.55 % ±0.9 %	±0.2 % ±0.35 %
Overcurrent protection	±1 %	±0.4 %
Undervoltage protection	±1 %	±0.4 %
	Input resistance of analog inputs >10 kΩ	
I/O port: accuracy of analog monitor outputs 0 ... 10 V		
	of analog signal of real value	**offset voltage**
Voltage	±0.2 %	±15 mV
Current	±0.2 %	±15 mV
	load capacity minimal 2 kΩ	
I/O port: permissible voltages		
	standard I/O port	**isolated I/O port (option PLI06)**
Vin-io (GND - neg. load input)	PLIxxxxZV: must be galvanically isolated all others: max. 2 V [1]	PLIxxxxZV: max. 2 V [1] all others: max. 800 V [1]
VioPE (GND - PE)	max. 125 V [1]	max. 125 V [1]



The specified accuracies refer to an ambient temperature of 23 ±5 °C. The specified accuracies are valid when the sense lines are connected and when the unit is connected to undisturbed voltages (ripple and noise < 0.1 %). At voltages with higher disturbance values the accuracy can change for the worse.

1. positive/negative DC voltage or RMS value of a sinusoidal AC voltage

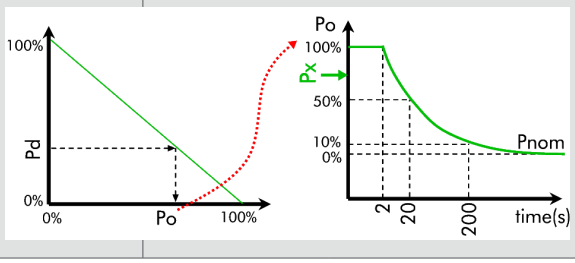
Technical Data

I/O port: control outputs and inputs	
Outputs	activation state load input (low active) status overload (OV, OCP, OPP, OTP, low active) trigger output (low active) programmable logic output (by SCPI command)
Output level	selectable, 3.3 V, 5 V, 12 V or externally programmable up to 30 V
Control inputs	activation state load input (low active) operating mode selection trigger input (high active) readable logic input (by SCPI command) control input (activates the analog signals, low active) remote shut-down (low active)
input level	3 ... 30 V

Input	
Input resistance	> 50 kΩ when load input is off diode function at reverse polarity up to nominal current, except ZV models
Input capacity	see model overview
Parallel operation	up to 5 devices in Master-Slave operation
Max. input voltage	see model overview
Min. input voltage	see model overview

Input: permissible voltages		
	standard I/O port	isolated I/O port (option PLI06)
Vin-PE (neg. load input - PE)	max. 125 V [1]	PLIxxxxZV: max. 125 V[1] all others: max. 800 V[1]
Vin+PE (pos. load input - PE)	Vmax + max. 125 V[1]	PLIxxxxZV: Vmax + max. 125 V[1] all others: Vmax + max. 800 V[1]

Power	
Continuous power	see model overview (at Ta = 21 °C)
Derating	-1.2 %/°C for Ta > 21 °C
Overload capability (short-time power)	see model overview The max. possible overload Po depends on the temperature of the device and therefore on the previously consumed continuous power Pd. The possible overload duration depends on the value of the overload Px.



Protection and monitoring	
Protective devices	overcurrent overpower overtemperature
Monitoring	overvoltage indication reverse polarity indication undervoltage indication (if the input voltage is too low for the set current)

Terminals	
Load input	see model overview
Sense	PH2/7.62-BU16

Operating conditions	
Operating temperature	5 ... 40 °C
Stock temperature	-25 ... 65 °C
Max. operating height	2,000 m above sea level
Pollution degree	2
Overvoltage category of mains	II
Max. humidity	80 % at 31 °C, linear decreasing to 50 % at 40 °C
Min. distance rear panel to wall or other objects	70 cm
Cooling	3-stage air cooling, up from 3200 W variably controlled
Noise. weight	see model overview
Mains voltage with option PLI18	see model overview 11 ... 15 V DC
Mains cable	length max. 3 m cross-section of mains leads min. 1 mm²
Power consumption	see model overview

Housing	
Color Front Rear Top, side panels	 RAL7035 (light grey) stainless steel RAL7037 (dusty grey)

Safety and EMC	
Protection class	1
Measuring category	O (CAT I according to EN61010:2004)
Electrical safety	DIN EN 61010-1 DIN EN 61010-2-030
EMC	DIN EN 61326-1 DIN EN 55011 DIN EN 61000-3-2 DIN EN 61000-3-3

Standard interfaces	
Data interfaces	RS-232, USB, LAN, CAN
I/O port	standard I/O port (not isolated)

Available options	
Data interfaces PLI02	 GPIB
Mechanical options PLI10 PLI11 PLI12 PLI13 PLI14	 19" installation kit for 1 device with ½ 19", 2 U 19" installation kit for 2 devices with ½ 19", 2 U 19" installation kit for 1 device with 19", 2 U 19" installation kit for 1 device with 19", 3 U heavy-load castors (5 U and upwards)
Function enhancement PLI21 Accuracy	 MPPT function with activation code see accuracy of measurement fast
Hardware extensions PLI06	 galvanically isolated I/O port
PLI16-06 PLI16-12 Accuracy Load current Activation Activation time	Charger Starter Interface (CST) for 60 V models (6...60 V) Charger Starter Interface (CST) for 120V models (6...120V) ±1 % ±200 mV max. 0.1 A can be coupled with activation state of load input 0.1 ... 100 s ±0.3 s
PLI17	switch box for external load activation via I/O port
DC mains supply PLI18 PLI19	 12 V DC mains supply (only for PLI14xx) 12 V DC mains supply (only for PLI32xx with housing extension to 5 U, toggling by mains selection switch)

Calibration, warranty	
FCC-PLIxx	Factory Calibration Certificate, twice for free
Warranty	2 years

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