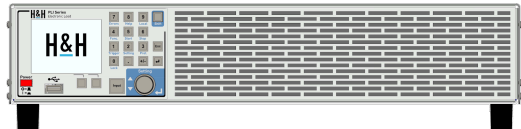


# Datasheet Series PLI

Model	PLI2160		
Order no.	17-014-000-02		
Basic operating modes	CC, CV, CR, CP		
Standard interfaces	RS-232, USB, LAN, CAN		
Max. input voltage Vmax	600 V		
Min. input voltage Vmin <sup>1)</sup>	3 V		
Max. load current Imax	24 A		
Continuous power	2100 W		
Short-time power <sup>2)</sup>	2100 W		
Voltage setting	0 ... 600 V		
Current ranges	0 ... 24 A		
Resistance ranges	0.125 Ohm ... 268.836 Ohm		
Power ranges continuous/short-time <sup>3)</sup>	0 ... 2100 W		
Rise and fall time fast / medium / slow <sup>4)</sup>	20 / 150 / 2000 µs		
Load terminals (front) <sup>5)</sup>	-		
Load terminals (rear) <sup>6)</sup>	BPK4-30L		
Mains voltage <sup>7)</sup>	1/N/PE AC 230 V 50 ... 60 Hz		
Mains voltage toggleable <sup>8)</sup>	1/N/PE AC 115 V 50 ... 60 Hz		
Power consumption	75 VA		
Noise max. ca. <sup>9)</sup>	60 dB(A)		
Weight ca.	17.5 kg		
Housing / 3D model <sup>10)</sup>	19" - 2 U / PLI_M7		
Width x Height x Depth	444 x 88 x 485 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

# Datasheet Series PLI

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:  $\pm 10\%$
8. Mains voltage tolerance:  $\pm 10\%$
9. Measured on the front from distance of 1 m.
10. Largest width and depth without wiring. 1 U = 44.45 mm.

## 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	$\pm 0.2 \%$		$\pm 0.05 \%$	
Current	$\pm 0.2 \%$		PLI MR in R1 $\pm 0.1 \%$ , others $\pm 0.05 \%$	
Resistance (at 5 % to 100 % of voltage range)	$\pm 1.4 \%$		$\pm 0.3 \%$ of current range	
Power (at V and I > 30 % of range) (at V and I > 5 % and < 30 % of range)	PLI EC	others	PLI EC	others
	$\pm 1 \%$	$\pm 0.35 \%$	$\pm 0.3 \%$	$\pm 0.1 \%$
	$\pm 2 \%$	$\pm 0.7 \%$	$\pm 0.75 \%$	$\pm 0.25 \%$
Resolution	14 bits			

## Accuracy of adjustable protections

	of setting	of corresponding range
Overcurrent protection	$\pm 1.4 \%$	$\pm 0.3 \%$
Undervoltage protection	$\pm 1.4 \%$	$\pm 0.3 \%$
Resolution	12 bits	

## Accuracy of measurement slow

	of measured value (real value)	of corresponding range
Voltage	$\pm 0.01 \%$	$\pm 0.005 \%$
Current	$\pm 0.2 \%$	PLI MR in R1 $\pm 0.1 \%$ , others $\pm 0.05 \%$
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 $\pm 1$ digit of the display value

## Accuracy of measurement fast

	of measured value (real value)	of corresponding range
Voltage	$\pm 0.1 \%$	$\pm 0.05 \%$
Current	$\pm 0.2 \%$	PLI MR in R1 $\pm 0.2 \%$ , others $\pm 0.1 \%$
External control voltage	$\pm 0.2 \%$	$\pm 0.1 \%$
Resistance	calculated from voltage and current values	
Power	calculated from voltage and current values	
Resolution	16 Bit	
Sampling time	200 $\mu$ s ... 1000 s	

## Accuracy of trigger voltage and current

Voltage	$\pm 1 \%$ of range
Current	$\pm 1 \%$ of range

## Dynamic function (LIST)

No. of load levels	max. 300, with ramp and dwell time setting	
	min.	max.
Dwell time	200 $\mu$ s	1000 s
Ramp time	0 s	1000 s
Resolution	200 $\mu$ s	
Accuracy of the setting times	$\pm 0.02 \%$	
Delay at triggered start	max. 300 $\mu$ s	

## 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 $\mu$ s ... 1000 s, resolution 200 $\mu$ s, 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
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## I/O port: accuracy of analog control 0 ... 10 V

	of setting	of corresponding range
Voltage	$\pm 0.2 \%$	$\pm 0.1 \%$
Current	$\pm 0.2 \%$	PLI MR in R1 $\pm 0.2 \%$ , others $\pm 0.1 \%$
Resistance (at V > 5 % of Vmax)	$\pm 1.6 \%$	$\pm 0.4 \%$ of current range
Power (at V and I > 30 % of max. value) (at V and I > 5 % and < 30 % of max. value)	$\pm 0.55 \%$	$\pm 0.2 \%$
	$\pm 0.9 \%$	$\pm 0.35 \%$
Overcurrent protection	$\pm 1 \%$	$\pm 0.4 \%$
Undervoltage protection	$\pm 1 \%$	$\pm 0.4 \%$
Input resistance of analog inputs > 10 k $\Omega$		

## I/O port: accuracy of analog monitor outputs 0 ... 10 V

	of analog signal of real value	offset voltage
Voltage	$\pm 0.2 \%$	$\pm 15$ mV
Current	$\pm 0.2 \%$	$\pm 15$ mV
load capacity minimal 2 k $\Omega$		

## 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 <sup>1)</sup>	PLIxxxxZV: max. 2 V <sup>1)</sup> all others: max. 800 V <sup>1)</sup>
VioPE (GND - PE)	max. 125 V <sup>1)</sup>	max. 125 V <sup>1)</sup>



The specified accuracies refer to an ambient temperature of 23  $\pm$  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 <sup>1)</sup>	PLIxxxZV: max. 125 V <sup>1)</sup> all others: max. 800 V <sup>1)</sup>
Vin+PE (pos. load input - PE)	Vmax + max. 125 V <sup>1)</sup>	PLIxxxZV: Vmax + max. 125 V <sup>1)</sup> all others: Vmax + max. 800 V <sup>1)</sup>

### 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 mm <sup>2</sup>
Power consumption	see model overview

### Housing

Color	
Front	RAL7035 (light grey)
Rear	stainless steel
Top, side panels	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	GPIO
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	MPPT function with activation code see accuracy of measurement fast
Hardware extensions PLI06	galvanically isolated I/O port
PLI16-06 PLI16-12	Charger Starter Interface (CST) for 60 V models (6...60 V) Charger Starter Interface (CST) for 120V models (6...120V)
Accuracy Load current Activation Activation time	±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

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

Technical data of production series B, rev. 6. Subject to technical changes without notice.