

PLZ-4W LP, PLZ-4WH LP Series Specifications

Unless specified otherwise, the specifications are for the following settings and conditions.

- The product is warmed up for at least 30 minutes (with current flowing).
- After warm-up, in an environment where the temperature is at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, the product is calibrated correctly according to the procedures in the PLZ-4W Series User's Manual or PLZ-4WH Series User's Manual.
- TYP: These are typical values that are representative of situations where the product operates in an environment with an ambient temperature of $23\text{ }^{\circ}\text{C}$ ($73.4\text{ }^{\circ}\text{F}$). They are not guaranteed performance values.
- % of set: Indicates a percentage of the input voltage, input current, or input power setting.
- % of f.s: Indicates a percentage of the rated input voltage, rated input current, or rated input power.
- % of reading: Indicates a percentage of the input voltage, input current, or input power reading.

PLZ9004W LP, PLZ11004W LP, PLZ13004W LPp. 2

PLZ9004WH LP, PLZ11004WH LP, PLZ13004WH LPp. 13

PLZ9004W LP, PLZ11004W LP, PLZ13004W LP

Ratings

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Operating voltage (DC) ^{1, 2}	1.5 V to 150 V		
Current	1800 A	2200 A	2600 A
Power	9 kW	11 kW	13 kW

- 1 The minimum operating voltage that current starts flowing through the product is 0.3 V, at the rear panel load input terminals.
- 2 The minimum operating voltage (including the voltage drop due to wiring inductance) in switching mode increases 0.15 V for every 1 A/ μ s at the slew rate setting of 5 A/ μ s or higher.

Constant current (CC) mode

Item		PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Operating range	H range	0.00 A to 1800.00 A	0.00 A to 2200.00 A	0.00 A to 2600.00 A
	M range	0.000 A to 180.000 A	0.000 A to 220.000 A	0.000 A to 260.000 A
	L range	0.0000 A to 18.0000 A	0.0000 A to 22.0000 A	0.0000 A to 26.0000 A
Setting range	H range	0.00 A to 1890.00 A	0.00 A to 2310.00 A	0.00 A to 2730.00 A
	M range	0.000 A to 189.000 A	0.000 A to 231.000 A	0.000 A to 273.000 A
	L range	0.0000 A to 18.9000 A	0.0000 A to 23.1000 A	0.0000 A to 27.3000 A
Resolution	H range	0.09 A	0.11 A	0.13 A
	M range	0.009 A	0.011 A	0.013 A
	L range	0.0009 A	0.0011 A	0.0013 A
Setting accuracy	H range, M range	$\pm(0.2 \% \text{ of set} + 0.1 \% \text{ of f.s}^1) + V_{in}^2/500 \text{ k}\Omega$		
	L range	$\pm(0.2 \% \text{ of set} + 0.1 \% \text{ of f.s})$		
Input line regulation ³	H range, M range	180 mA	220 mA	260 mA
	L range	18 mA	22 mA	26 mA
Ripple	rms ⁴	180 mA	220 mA	260 mA
	p-p ⁵	1.8 A	2.2 A	2.6 A

- 1 Range full scale. H range full scale for M range.
- 2 V_{in} : Rear panel load input terminal voltage.
- 3 When the input voltage is changed from 1.5 V to 150 V at a current of rated power/150 V.
- 4 Measurement frequency bandwidth: 10 Hz to 1 MHz, measurement current: 100 A
- 5 Measurement frequency bandwidth: 10 Hz to 20 MHz, measurement current: 100 A

Constant resistance (CR) mode

Item		PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Operating range ¹	H range	1199.999 S to 0.0216 S (0.83 mΩ to 46.3 Ω)	1466.666 S to 0.0264 S (0.68 mΩ to 37.88 Ω)	1733.332 S to 0.0312 S (0.577 mΩ to 32.05 Ω)
	M range	119999.9 mS to 2.16 mS (8.3 mΩ to 463 Ω)	146666.6 mS to 2.64 mS (6.8 mΩ to 378.8 Ω)	173333.2 mS to 3.12 mS (5.77 mΩ to 312 Ω)
	L range	11999.99 mS to 0.216 mS (83 mΩ to 4.63 kΩ)	14666.66 S to 0.264 mS (68 mΩ to 3.788 kΩ)	17333.32 mS to 0.312 mS (57.77 mΩ to 3.12 kΩ)
Setting range	H range	1259.971 S to 0.0000 S (0.794 mΩ to OPEN)	1539.964 S to 0.0000 S (0.649 mΩ to OPEN)	1819.958 S to 0.0000 S (0.60576 mΩ to OPEN)
	M range	125997.1 mS to 0.00 mS (7.94 mΩ to OPEN)	153996.4 mS to 0.00 mS (6.49 mΩ to OPEN)	181995.8 mS to 0.00 mS (6.0576 mΩ to OPEN)
	L range	12599.71 mS to 0.000 mS (79.4 mΩ to OPEN)	15399.64 mS to 0.000 mS (64.9 mΩ to OPEN)	18199.58 mS to 0.000 mS (60.576 mΩ to OPEN)
Resolution	H range	0.0216 S	0.0264 S	0.0312 S
	M range	2.16 mS	2.64 mS	3.12 mS
	L range	0.216 mS	0.264 mS	0.312 mS
Setting accuracy ²	H range, M range	$\pm(0.5 \% \text{ of set}^3 + 0.5 \% \text{ of f.s}^4) + \text{Vin}^5/500 \text{ k}\Omega$		
	L range	$\pm(0.5 \% \text{ of set}^3 + 0.5 \% \text{ of f.s})$		

- 1 Conductance [S] = input current [A]/input voltage [V] = 1/resistance [Ω]
- 2 Value obtained by converting the input current, at the sensing terminal.
- 3 set = Vin/ Rset
- 4 Range full scale. H range full scale for M range.
- 5 Vin: Rear panel load input terminal voltage or sensing terminal voltage.

Constant voltage (CV) mode

Item		PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Operating range	H range	1.50 V to 150.00 V		
	L range	1.500 V to 15.000 V		
Setting range	H range	0.00 V to 157.50 V		
	L range	0.000 V to 15.750 V		
Resolution	H range	0.01 V		
	L range	0.001 V		
Setting accuracy ¹	H range, L range	$\pm(0.1 \% \text{ of set} + 0.1 \% \text{ of f.s})$		
Input current variation ²		12 mV		

- 1 With the input voltage within the operating range, and at the sensing terminals during remote sensing.
- 2 For a current change in the range of 10 % to 100 % of the rating at an input voltage of 1.5 V (during remote sensing).

Constant power (CP) mode

Item		PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Operating range	H range	900.0 W to 9000.0 W	1100.0 W to 11000.0 W	1300.0 W to 13000.0 W
	M range	90.00 W to 900.00 W	110.00 W to 1100.00 W	130.00 W to 1300.00 W
	L range	9.000 W to 90.000 W	11.000 W to 110.000 W	13.000 W to 130.000 W
Setting range	H range	0.0 W to 9450.0 W	0.0 W to 11550.0 W	0.0 W to 13650.0 W
	M range	0.00 W to 945.00 W	0.00 W to 1155.00 W	0.00 W to 1365.00 W
	L range	0.000 W to 94.500 W	0.000 W to 115.500 W	0.000 W to 136.500 W
Resolution	H range	0.9 W	1.1 W	1.3 W
	M range	0.09 W	0.11 W	0.13 W
	L range	0.009 W	0.011 W	0.013 W
Setting accuracy	H range, M range	$\pm(0.6 \% \text{ of set} + 1.4 \% \text{ of f.s.}^1)$		
	L range	$\pm(0.6 \% \text{ of set} + 1.4 \% \text{ of f.s.})$		

1 Range full scale. H range full scale for M range.

Measurement function

Voltmeter

Item		PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Display	H range	0.00 V to 150.00 V		
	L range	0.000 V to 15.000 V		
Accuracy	H range, M range, L range	$\pm(0.1 \% \text{ of reading} + 0.1 \% \text{ of f.s.})$		

Ammeter

Item		PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Display	H range, M range	0.00 A to 1800.0 A	0.00 A to 2200.0 A	0.00 A to 2600.0 A
	L range	0.0000 A to 18.0000 A	0.0000 A to 22.0000 A	0.0000 A to 26.0000 A
Accuracy	H range, M range, L range	$\pm(0.2 \% \text{ of reading} + 0.3 \% \text{ of f.s.})$		

Wattmeter

Item		PLZ9004W LP	PLZ11004W LP	PLZ13004W LP	
Display ¹	H range	0.0 W to 9000.0 W	0 W to 11000 W	0 W to 13000 W	
	M range	Not CP mode	0.0 W to 9000.0 W	0 W to 11000 W	0 W to 13000 W
		CP mode	0.00 W to 900.00 W	0.0 W to 1100.0 W	0.0 W to 1300.0 W
	L range	Not CP mode	0.0 W to 2700.0 W	0.0 W to 3300.0 W	0.0 W to 3900.0 W
CP mode		0.000 W to 90.000 W	0.00 W to 110.00 W	0.00 W to 130.00 W	

1 Displays the product of the voltmeter reading and ammeter reading.

Switching mode

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Operation mode	CC and CR		
Duty cycle setting	5 % to 95 % ¹ in 0.1 % steps		
Frequency setting range	1 Hz to 20 kHz		
Frequency setting resolution	1 Hz to 10 Hz	0.1 Hz	
	10 Hz to 100 Hz	1 Hz	
	100 Hz to 1 kHz	10 Hz	
	1 kHz to 20 kHz	100 Hz	
Frequency setting accuracy	±(0.5 % of set)		

1 The minimum time span is 10 μ s. The maximum duty cycle is limited by the minimum time span for 5 kHz to 20 kHz.

Slew rate

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP	
Setting range ¹	H range	144.44 mA/ μ s to 16.000 A/ μ s	177.9 mA/ μ s to 16.000 A/ μ s	210.5 mA/ μ s to 16.000 A/ μ s
	M range	14.444 mA/ μ s to 1600.0 mA/ μ s	17.79 mA/ μ s to 1600.0 mA/ μ s	21.05 mA/ μ s to 1600.0 mA/ μ s
	L range	1444.4 μ A/ μ s to 160.00 mA/ μ s	1.779 mA/ μ s to 160.00 mA/ μ s	2.105 mA/ μ s to 160.00 mA/ μ s
Resolution (Setting range)	0.0576 A/ μ s (1.600 A/ μ s to 16.000 A/ μ s)	-	-	
	5.76 mA/ μ s (160.0 mA/ μ s to 1600 mA/ μ s)	0.0704 A/ μ s (1.600 A/ μ s to 16.000 A/ μ s)	0.0832 A/ μ s (1.600 A/ μ s to 16.000 A/ μ s)	
	0.576 mA/ μ s (16.00 mA/ μ s to 160.00 mA/ μ s)	7.04 mA/ μ s (160.00 mA/ μ s to 1600.0 mA/ μ s)	8.32 mA/ μ s (160.00 mA/ μ s to 1600.0 mA/ μ s)	
	0.0576 mA/ μ s (1.600 mA/ μ s to 16.000 mA/ μ s)	0.704 mA/ μ s (16.00 mA/ μ s to 160.00 mA/ μ s)	0.832 mA/ μ s (16.00 mA/ μ s to 160.00 mA/ μ s)	
	5.76 μ A/ μ s (1444.4 μ A/ μ s to 1600.0 μ A/ μ s)	0.0704 mA/ μ s (1.779 mA/ μ s to 16.000 mA/ μ s)	0.0832 mA/ μ s (2.105 mA/ μ s to 16.000 mA/ μ s)	
Setting accuracy ²	±(10 % of set + 5 μ s)			

1 At constant current mode In constant resistance mode, the maximum slew rate of each range is 1/10.

2 Time to change from 10 % to 90 % when the current is changed from 2 % to 100 % (20 % to 100 % for M range) of the rated current.

Soft start

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Operation mode	CC and CR		
Time setting range	1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms		
Time setting accuracy	±(30 % of set +100 μ s)		

Remote sensing

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Compensatable voltage	2 V one way		

Protection functions

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Overvoltage protection (OVP)	Set to 110 % of the rated voltage of the selected range, load off		
Overcurrent protection (OCP) ¹	1.8 A to 1980.0 A or 110 % of the maximum current of each range	2.2 A to 2420.0 A or 110 % of the maximum current of each range	2.6 A to 2730.0 A or 110 % of the maximum current of each range
Overpower protection (OPP) ¹	9.0 W to 9900.0 W or 110 % of the maximum power of each range	11.0 W to 12 100 W or 110 % of the maximum power of each range	13.0 W to 14 300 W or 110 % of the maximum power of each range
Overheat protection (OHP)	Turns off the load when the heatsink temperature reaches 95 °C		
Undervoltage protection (UVP)	Can be set to a voltage between 0 V and 150 V or off Turns off the load when the specified value is reached		
Reverse connection protection (REV)	Provided using a diode and fuse Turns off the load when alarms occur		

1 Select load off or limitation.

Sequence function

Item		PLZ9004W LP	PLZ11004W LP	PLZ13004W LP	
Normal sequence	Operation mode	CC, CR, CV, CP			
	Maximum number of steps	256			
	Step execution time	1 ms to 999 h 59 min			
	Time resolution (Setting range)	1 ms to 1 min	1 ms		
		1 min to 1 h	100 ms		
		1 h to 10 h	1 s		
10 h to 100 h		10 s			
	100 h to 999 h 59 min	1 min			
Fast sequence	Operation mode	CC, CR			
	Maximum number of steps	1024			
	Step execution time	25 µs to 100 ms			
	Time resolution	25 µs to 100 µs	25 µs		
100 µs to 100 ms		100 µs			

Analog external control (J1 connector)

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Load on/off control input	Turns the load on when a low (or high) level TTL signal is received.		
Load-on status output	On when the load is on (output through an open-collector photocoupler).		
Range switch input ¹	The range can be switched between L, M, and H using a 2 bit signal.		
Range status output	Outputs range L, M, or H using a 2 bit signal (open-collector output from a photocoupler).		
Trigger input	Pauses the sequence operation when a high level TTL signal is received for 10 μs or longer. Resumes the sequence operation when a low level TTL signal is received for 10 μs or longer. The internal circuit is pulled up to 5 V by a 10 kΩ resistor.		
Alarm input	Activates an alarm when a low level TTL signal is received.		
Alarm status output	Turns on when OVP, OCP, OPP, OHP, UVP, or REV is activated and when an external alarm input is received. (open-collector output from a photocoupler)		
Short signal output	Relay contact output (30 Vdc/1 A)		
External voltage control (CC, CR, CP, CV mode)	Operates in CC, CR, CP, and CV modes. 0 V to 10 V corresponds to 0 % to 100 % of the rated current (CC mode), rated voltage (CV mode), or rated power (CP mode). 0 V to 10 V corresponds to the maximum resistance to the minimum resistance (CR mode).		
External resistance control (CC, CR, CP, CV mode)	Operates in CC, CR, CP, and CV modes. 0 Ω to 10 kΩ corresponds to 0 % to 100 % or 100 % to 0 % of the rated current (CC mode), rated voltage (CV mode), or rated power (CP mode). 0 Ω to 10 kΩ corresponds to the maximum resistance to the minimum resistance or from the minimum resistance to the maximum resistance (CR mode).		
Current monitor output	10 V per f.s (H/L range), 1 V per f.s (M range).		

1 Possible only when the front panel is set to H range.

Front panel I MON OUT connector (BNC)

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Trigger output	Transmits pulses during sequence operation and switching operation Output impedance 500 Ω, output voltage: approx. 4.5 V, pulse width: 2 μs		
Current monitor output	1 V per f.s (H/L range), 0.1 V per f.s (M range)		

Communication function

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
GPIB	IEEE std. 488.1-1987 SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E1		
	Supports SCPI and IEEE 488.2-1992 command sets Can be used to set panel functions except the POWER switch and read measured values		
RS232C	D-SUB 9-pin connector (EIA-232-D compliant)		
	Supports SCPI and IEEE 488.2-1992 command sets Can be used to set panel functions except the POWER switch and read measured values Baud rate: 2400, 4800, 9600, 19200 bps Data length: 8 bits, Stop bits: 1, 2 bits, Parity bit: none Flow control: Xon/Xoff		
USB	Standard Type B connector Complies with USB 2.0 and the USBTMC-USB488 device class specifications		
	Can be used to set panel functions except the POWER switch and read measured values Data rate: 12 Mbps (full speed)		

Other functions

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Elapsed time display	Measures the time duration from load on to load off. Can be turned on and off.		
	Measures from 1 s to 999 h 59 min 59 s		
Auto load off timer	Automatically turns off the load after the specified time elapses		
	Can be set from 1 s to 999 h 59 min 59 s or off		

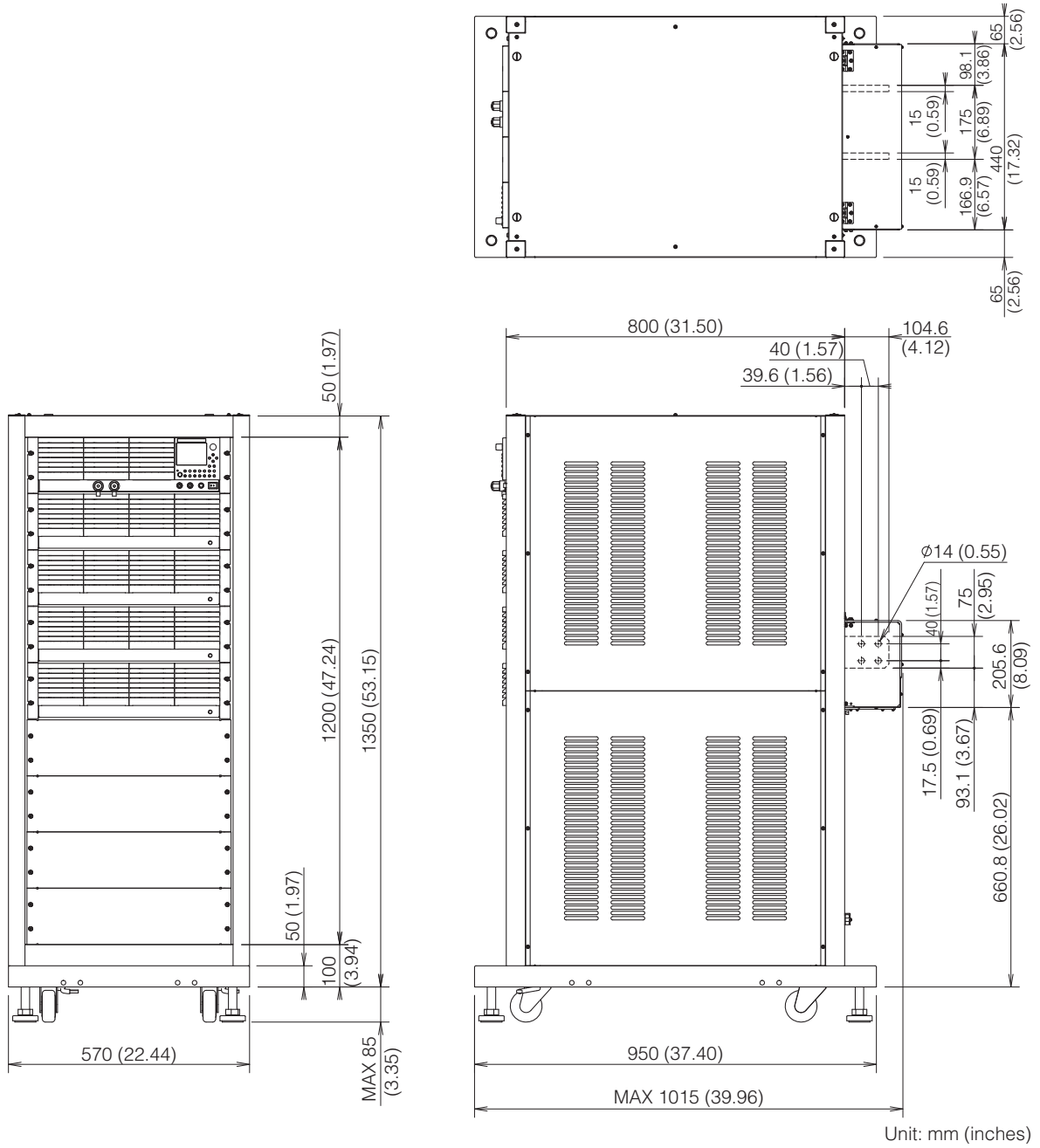
General specifications

Item	PLZ9004W LP	PLZ11004W LP	PLZ13004W LP
Input voltage range	100 Vac to 240 Vac (90 Vac to 250 Vac) single phase, continuous		
Input frequency range	47 Hz to 63 Hz		
Power consumption	960 VAm _{ax}	1160 VAm _{ax}	1360 VAm _{ax}
Inrush current	45 A _{max}		
Operating temperature range	0 °C to 40 °C (32 °F to 104 °F)		
Operating humidity range	20 %rh to 85 %rh (no condensation)		
Storage temperature range	-25 °C to 70 °C (-13 °F to 158 °F)		
Storage humidity range	90 %rh or less (no condensation)		
Isolation voltage	±500 Vdc		
Insulation resistance	Between primary and input terminals	500 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)	
	Between primary and chassis	500 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)	
	Between input terminals and chassis	500 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)	
Withstand voltage	Between primary and input terminals	No abnormalities at 1500 Vac for 1 minute	
	Between primary and chassis	No abnormalities at 1500 Vac for 1 minute	
External dimensions	See p. 10 .	See p. 11 .	See p. 12 .
Weight	Approx. 250 kg (551 lb)	Approx. 275 kg (606 lb)	Approx. 300 kg (661 lb)
Battery backup	Backs up settings		
Accessories	Power cable	1 pc.	
	Lock plate	2 sheets (for flat braided copper wires)	
	Load input terminal screw set	8 sets	
	Heavy object warning label	1 pc.	
	CD-ROM	1 disc	
	Manuals	Setup Guide (1 pc.), Quick Reference (English/Japanese, 1 sheet each)	
Safety	Complies with the requirements of the following standard. IEC 61010-1:2001 (Class I ¹ , Pollution degree 2 ²)		

- 1 This class confirms to Class I. Be sure to ground the protective conductor terminal of this product. If not grounded properly, safety is not guaranteed.
- 2 Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation.

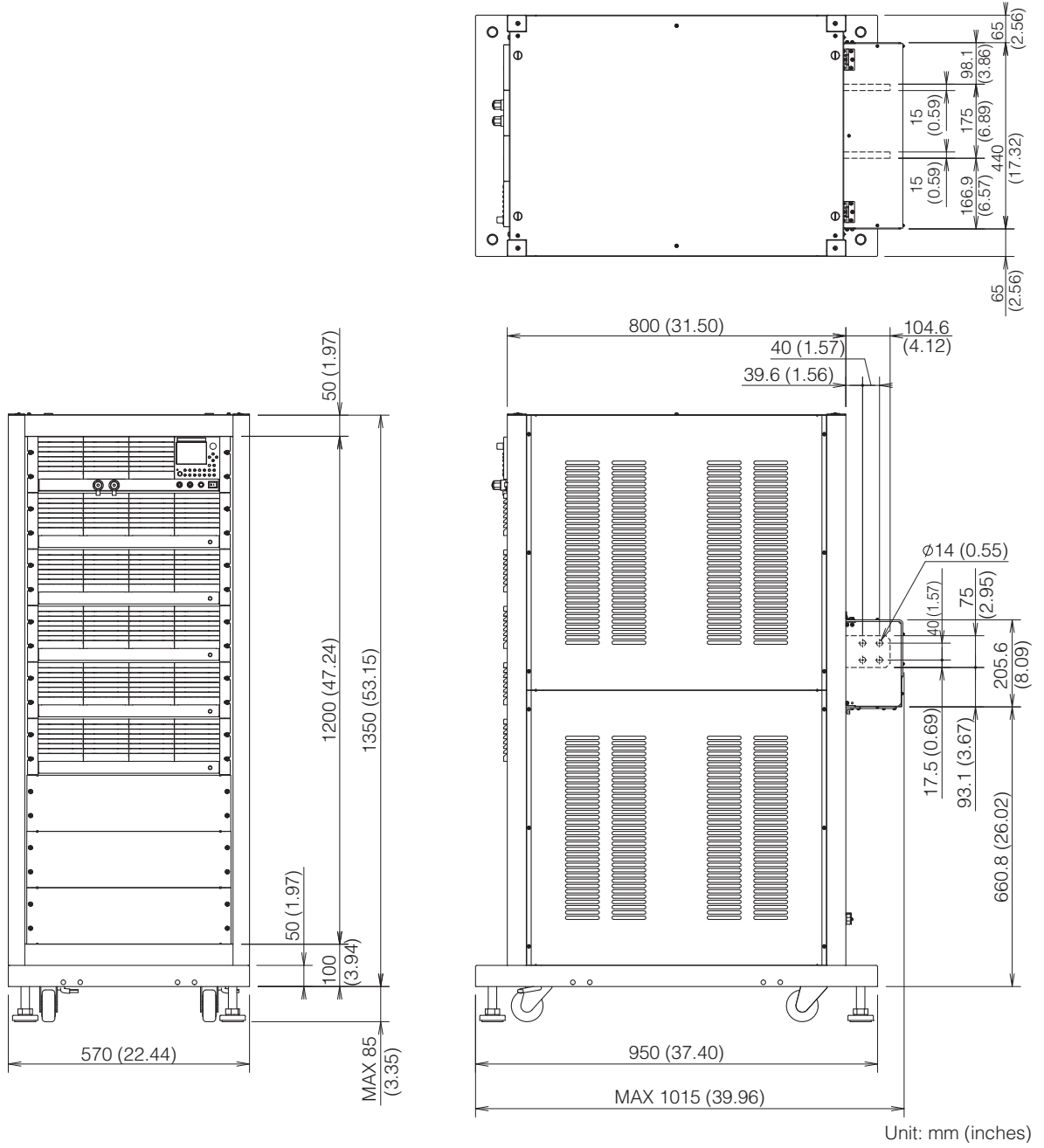
External dimensions

PLZ9004W LP



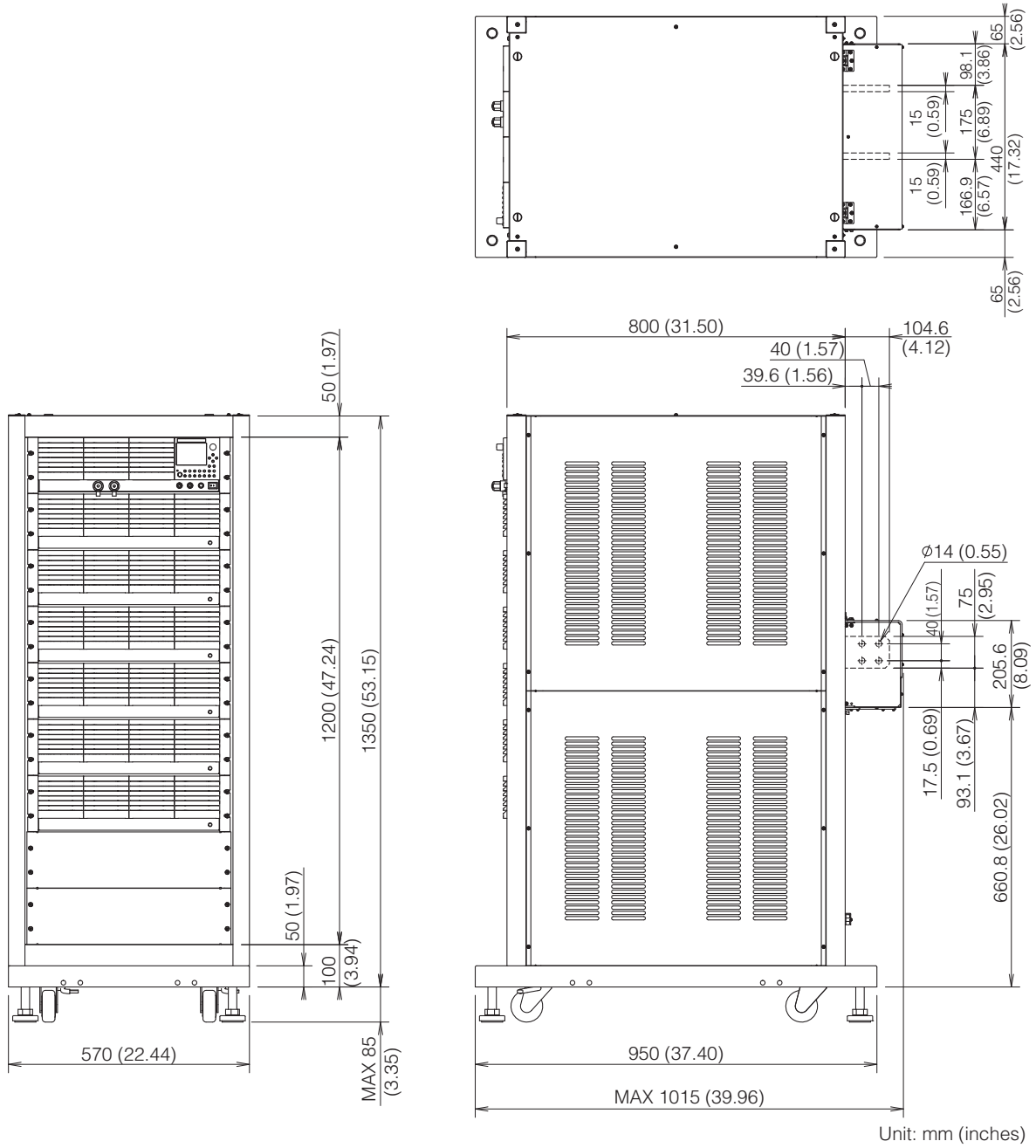
Unit: mm (inches)

PLZ11004W LP



External dimensions (continued)

PLZ13004W LP



PLZ9004WH LP, PLZ11004WH LP, PLZ13004WH LP

Ratings

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Operating voltage (DC) ¹	5 V to 650 V		
Current	450 A	550 A	650 A
Power	9 kW	11 kW	13 kW
Input resistance when the load is off	2.21 MΩ		

1 The minimum operating voltage that current starts flowing through the product is 0.5 V, at the rear panel load input terminals.

Constant current (CC) mode

Item		PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Operating range	H range	0.00 A to 450.00 A	0.00 A to 550.00 A	0.00 A to 650.00 A
	M range	0.000 A to 45.000 A	0.000 A to 55.000 A	0.000 A to 65.000 A
	L range	0.0000 A to 4.5000 A	0.0000 A to 5.5000 A	0.0000 A to 6.5000 A
Setting range	H range	0.00 A to 472.50 A	0.00 A to 577.50 A	0.00 A to 682.48 A
	M range	0.000 A to 47.250 A	0.000 A to 57.750 A	0.000 A to 68.248 A
	L range	0.0000 A to 4.7250 A	0.0000 A to 5.7750 A	0.0000 A to 6.8248 A
Resolution	H range	0.02 A	0.02 A	0.04 A
	M range	0.002 A	0.002 A	0.004 A
	L range	0.0002 A	0.0002 A	0.0004 A
Setting accuracy	H range, M range ¹		±(0.2 % of set + 0.1 % of f.s)	
	L range	300 μA or greater	±(0.2 % of set + 0.1 % of f.s)	
		Less than 300 μA	±(0.2 % of set + 0.1 % of f.s) + $V_{in}^2 / 2.21 \text{ M}\Omega$	-
Input line regulation ³	H range, M range		30 mA	
	L range		3 mA	
Ripple	rms ⁴	108 mA	132 mA	156 mA
	p-p ⁵	1.08 A	1.32 A	1.56 A

1 Range full scale. H range full scale for M range.

2 V_{in} : Rear panel load input terminal voltage or sensing terminal voltage.

3 When the input voltage is changed from 5 V to 650 V at a current of rated power/650 V.

4 Measurement frequency bandwidth: 10 Hz to 1 MHz, measurement current: 100 A

5 Measurement frequency bandwidth: 10 Hz to 20 MHz, measurement current: 100 A

Constant resistance (CR) mode

Item		PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Operating range ¹	H range	90.0000 S to 0.0018 S (11.1111 mΩ to 555.55 Ω)	110.0000 S to 0.0022 S (9.0909 mΩ to 454.54 Ω)	130.0000 S to 0.0026 S (7.9623 mΩ to 384.61 Ω)
	M range	9.00000 S to 0.00018 S (111.111 mΩ to 5.5555 kΩ)	11.00000 S to 0.00022 S (90.909 mΩ to 4.5454 kΩ)	13.00000 S to 0.00026 S (79.623 mΩ to 3.8461 kΩ)
	L range	900.00 mS to 0.018 mS (1.11111 Ω to 55.555 kΩ)	1.100000 S to 0.022 mS (909.09 mΩ to 45.454 kΩ)	1.300000 S to 0.026 mS (796.23 mΩ to 38.461 kΩ)
Setting range	H range	94.5000 S to 0.0000 S (10.582 mΩ to OPEN)	115.5000 S to 0.0000 S (8.658 mS to OPEN)	136.5000 S to 0.0000 S (7.326 mΩ to OPEN)
	M range	9.45000 S to 0.00000 S (105.82 mΩ to OPEN)	11.55000 S to 0.00000 S (86.58 mΩ to OPEN)	13.65000 S to 0.00000 S (73.26 mΩ to OPEN)
	L range	945.000 mS to 0.000 mS (1.0582 Ω to OPEN)	1.155000 S to 0.000 mS (865.8 mΩ to OPEN)	1.365000 S to 0.000 mS (732.6 mΩ to OPEN)
Resolution	H range	0.0018 S	0.0022 S	0.0026 S
	M range	0.00018 S	0.00022 S	0.00026 S
	L range	0.018 mS	0.022 mS	0.026 mS
Setting accuracy ²	H range, M range	±(0.5 % of set ³ + 0.5 % of f.s ⁴)		
	L range	±(0.5 % of set ³ + 0.5 % of f.s) + Vin ⁵ / 2.21 MΩ		

- 1 Conductance [S] = input current [A]/input voltage [V] = 1/resistance [Ω]
- 2 Value obtained by converting the input current, at the sensing terminal.
- 3 set = Vin/ Rset
- 4 Range full scale. H range full scale for M range.
- 5 Vin: Rear panel load input terminal voltage or sensing terminal voltage.

Constant voltage (CV) mode

Item		PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Operating range	H range	5.00 V to 650.00 V		
	L range	5.000 V to 65.000 V		
Setting range	H range	0.00 V to 682.50 V		
	L range	0.000 V to 68.250 V		
Resolution	H range	0.02 V		
	L range	0.002 V		
Setting accuracy ¹	±(0.2 % of set + 0.2 % of f.s)			
Input current variation ²	65 mV			

- 1 With the input voltage within the operating range, and at the sensing terminals during remote sensing.
- 2 For a current change in the range of 10 % to 100 % of the rating at an input voltage of 5 V (during remote sensing).

Constant power (CP) mode

Item		PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Operating range	H range	900.0 W to 9000.0 W	1100.0 W to 11000 W	1300.0 W to 13000 W
	M range	90.00 W to 900.00 W	110.00 W to 1100.0 W	130.00 W to 1300.0 W
	L range	9.000 W to 90.000 W	11.000 W to 110.00 W	13.000 W to 130.00 W
Setting range	H range	0.0 W to 9450.0 W	0.0 W to 11550 W	0.0 W to 13650 W
	M range	0.00 W to 945.00 W	0.00 W to 1155.0 W	0.00 W to 1365.0 W
	L range	0.000 W to 94.500 W	0.000 W to 115.50 W	0.000 W to 136.50 W
Resolution	H range	0.9 W	1.1 W	1.3 W
	M range	0.09 W	0.11 W	0.13 W
	L range	0.009 W	0.011 W	0.013 W
Setting accuracy	H range, M range		$\pm(3\% \text{ of f.s}^1)$	
	L range	0.25 W or greater	$\pm(3\% \text{ of f.s})$	
		Less than 0.25 W	$\pm(3\% \text{ of f.s} + V_{in}^2/2.21 \text{ M}\Omega)$	

1 Range full scale. H range full scale for M range.

2 V_{in} : Rear panel load input terminal voltage or sensing terminal voltage.

Measurement function

Voltmeter

Item		PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Display	H range	0.00 V to 650.00 V		
	L range	0.000 V to 65.000 V		
Accuracy	H range, M range, L range	$\pm(0.1\% \text{ of reading} + 0.1\% \text{ of f.s})$		

Ammeter

Item		PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Display	H range, M range	0.00 A to 450.00 A	0.00 A to 550.00 A	0.00 A to 650.00 A
	L range	0.0000 A to 4.5000 A	0.0000 A to 5.5000 A	0.0000 A to 6.5000 A
Accuracy	H range, M range, L range	$\pm(0.2\% \text{ of reading} + 0.3\% \text{ of f.s}^1)$		

1 Range full scale. H range full scale for M range.

Wattmeter

Item		PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Display ¹	H range		0.0 W to 9000.0 W	0 W to 11000 W
	M range	Not CP mode	0.0 W to 9000.0 W	0 W to 11000 W
		CP mode	0.00 W to 900.00 W	0.0 W to 1100.0 W
	L range	Not CP mode	0.0 W to 2925.0 W	0.0 W to 3575.0 W
		CP mode	0.000 W to 90.000 W	0.00 W to 110.00 W

1 Displays the product of the voltmeter reading and ammeter reading.

Switching mode

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Operation mode	CC and CR		
Duty cycle setting	5 % to 95 % ¹ in 0.1 % steps		
Frequency setting range	1 Hz to 4 kHz		
Frequency setting Resolution	1 Hz to 10 Hz	0.1 Hz	
	10 Hz to 100 Hz	1 Hz	
	100 Hz to 1 kHz	10 Hz	
	1 kHz to 4 kHz	100 Hz	
Frequency setting accuracy	±(0.5 % of set)		

1 The minimum time span is 50 μs. The maximum duty cycle is limited at 1 kHz to 4 kHz.

Slew rate

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP	
Operation mode	CC mode and CR mode			
Setting range ¹	H range	7.200 mA/μs to 0.8010 A/μs	8.800 mA/μs to 800.14 mA/μs	10.400 mA/μs to 800.15 mA/μs
	M range	720.0 μA/μs to 80.10 mA/μs	880.0 μA/μs to 80.014 mA/μs	1040.0 μA/μs to 80.015 mA/μs
	L range	72.00 μA/μs to 8.010 mA/μs	88.00 μA/μs to 8001.4 μA/μs	104.00 μA/μs to 8001.5 μA/μs
Resolution (Setting range)	0.0027 A/μs (0.7200 A/μs to 0.8010 A/μs)	-	-	
	0.27 mA/μs (72.00 mA/μs to 720.00 mA/μs)	0.33 mA/μs (88.00 mA/μs to 800.14 mA/μs)	0.39 mA/μs (104.00 mA/μs to 800.15 mA/μs)	
	0.027 mA/μs (7.200 mA/μs to 72.000 mA/μs)	0.033 mA/μs (8.800 mA/μs to 88.000 mA/μs)	0.039 mA/μs (10.400 mA/μs to 104.000 mA/μs)	
	2.7 μA/μs (720.0 μA/μs to 7200.0 μA/μs)	3.3 μA/μs (880.0 μA/μs to 8800.0 μA/μs)	3.9 μA/μs (1040.0 μA/μs to 10400.0 μA/μs)	
	0.27 μA/μs (72.00 μA/μs to 720.00 μA/μs)	0.33 μA/μs (88.00 μA/μs to 880.00 μA/μs)	0.39 μA/μs (104.00 μA/μs to 1040.00 μA/μs)	
Setting accuracy ²	±(10 % of set + 25 μs)			

1 At constant current mode In constant resistance mode, the maximum slew rate of each range is 1/10.

2 Time to change from 10 % to 90 % when the current is changed from 2 % to 100 % (20 % to 100 % for M range) of the rated current.

Soft start

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Operation mode	CC mode		
Time setting range ¹	1 ms, 2 ms, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms, 200 ms		
Time setting accuracy	±(30 % of set + 100 μs)		

1 Time for the input current to change from 10 % to 90 %.

Response speed

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
CC mode, CR mode	Switchable between four settings (1/1, 1/2, 1/5, 1/10)		
CV mode	Switchable between five settings (100, 10, 1, 1/10, 1/100)		

Remote sensing

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Compensatable voltage	2 V one way		

Protection functions

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Overvoltage protection (OVP)	Set to 110 % of the rated voltage of the selected range, load off		
Overcurrent protection (OCP) ¹	Can be set to a value between 0.01 A to 495.00 A or 110 % of the maximum current of each range	Can be set to a value between 0.01 A to 605.00 A or 110 % of the maximum current of each range	Can be set to a value between 0.01 A to 715.00 A or 110 % of the maximum current of each range
Overpower protection (OPP) ¹	Can be set to a value between 9.0 W to 9900.0 W or 110 % of the maximum power of each range	Can be set to a value between 11.0 W to 12 100 W or 110 % of the maximum power of each range	Can be set to a value between 13.0 W to 14 300 W or 110 % of the maximum power of each range
Overheat protection (OHP)	Turns off the load when the heatsink temperature reaches 90 °C		
Undervoltage protection (UVP)	Can be set to a voltage between 5 V to 650 V or off Turns off the load when the specified value is reached		
Reverse connection protection (REV)	Provided using a fuse Turns off the load when an alarm occurs		

¹ Select load off or limitation.

Sequence function

Item		PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP	
Normal sequence	Operation mode	CC, CR, CV, CP			
	Maximum number of steps	256			
	Step execution time	1 ms to 999 h 59 min			
	Time resolution (Setting range)	1 ms to 1 min	1 ms		
		1 min to 1 h	100 ms		
		1 h to 10 h	1 s		
		10 h to 100 h	10 s		
100 h to 999 h 59 min	1 min				
Fast sequence	Operation mode	CC, CR			
	Maximum number of steps	1024			
	Step execution time	100 μ s to 100 ms			
	Time resolution	100 μ s			

Analog external control (EXT CONT connector)

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Load on/off control input	Turns the load on when a high (or low) level CMOS signal is received Logic level switchable The internal circuit is pulled up to 5 V by a 10 k Ω resistor.		
Range switch input	The range can be switched between L, M, and H using a 2 bit signal.		
Trigger input	Resumes the sequence operation when a high level CMOS signal is received for 10 μ s or longer. The internal circuit is pulled down to common by a 100 k Ω resistor.		
External alarm input	Activates an alarm when a low level CMOS signal is received The internal circuit is pulled up to 5 V by a 10 k Ω resistor.		
Alarm status output	Turns on when OVP, OCP, OPP, OHP, or REV is activated and when an external alarm input is received (open-collector output from a photocoupler)		
Load-on status output	On when the load is on (output through an open-collector photocoupler)		
Range status output	Outputs current range L, M, or H using a 2 bit signal (open-collector output from a photocoupler).		
Short signal output	Relay contact output (30 Vdc/1 A)		
External voltage control (CC, CR, CP, and CV modes)	0 V to 10 V corresponds to 0 % to 100 % of the rated current (CC mode), rated power (CP mode), or rated voltage (CV mode). 0 V to 10 V corresponds to the maximum resistance to the minimum resistance (CR mode).		
External resistance control (CC, CR, CP, and CV modes)	0 Ω to 10 k Ω corresponds to 0 % to 100 % or 100 % to 0 % of the rated current (CC mode), rated power (CP mode), or rated voltage (CV mode). 0 Ω to 10 k Ω corresponds to the maximum resistance to the minimum resistance or from the minimum resistance to the maximum resistance (CR mode).		
Current monitor output	10 V per f.s (H/L range), 1 V per f.s (M range), output impedance 1 k Ω		
Voltage monitor output	10 V per f.s of each range, output impedance 1 k Ω		

Front panel I MON OUT connector (BNC)

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Trigger output	Transmits pulses during sequence operation and switching operation Output impedance 1 k Ω , output voltage: approx. 4.5 V, pulse width: 2 μ s		
Current monitor output	10 V per f.s (H/L range), 1 V per f.s (M range) Op amp output, output current: up to 5 mA		
Voltage monitor output	6.5 V per f.s (H/L range), op amp output, output current: 5 mA		

Communication function

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
GPIB	IEEE std. 488.1-1987 SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E1		
	Supports SCPI and IEEE 488.2-1992 command sets Can be used to set panel functions except the POWER switch and read measured values		
RS232C	D-SUB 9-pin connector (EIA-232-D compliant)		
	Supports SCPI and IEEE 488.2-1992 command sets Can be used to set panel functions except the POWER switch and read measured values Baud rate: 2400, 4800, 9600, 19200 bps Data length: 8 bits, Stop bits: 1, 2 bits, Parity bit: none Flow control: Xon/Xoff		
USB	Standard Type B connector Complies with USB 2.0 and the USBTMC-USB488 device class specifications		
	Can be used to set panel functions except the POWER switch and read measured values Data rate: 12 Mbps (full speed)		

Other functions

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Elapsed time display	Measures the time duration from load on to load off. Can be turned on and off.		
	Measures from 1 s to 999 h 59 min 59 s		
Auto load off timer	Automatically turns off the load after the specified time elapses		
	Can be set from 1 s to 999 h 59 min 59 s or off		

General specifications

Item	PLZ9004WH LP	PLZ11004WH LP	PLZ13004WH LP
Input voltage range	100 Vac to 240 Vac (90 Vac to 250 Vac) single phase, continuous		
Input frequency range	47 Hz to 63 Hz		
Power consumption	960 VAmax	1160 VAmax	1360 VAmax
Inrush current ¹	140 Amax		
Protective conductor current ²	500 µA (100 Vac, 50 Hz; TYP)		
Operating temperature range	0 °C to 40 °C (32 °F to 104 °F)		
Operating humidity range	20 %rh to 85 %rh (no condensation)		
Storage temperature range	-20 °C to +70 °C (-4 °F to 158 °F).		
Storage humidity range	90 %rh or less (no condensation)		
Isolation voltage	±750 Vdc		
Insulation resistance	Between primary and input terminals	1000 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)	
	Between primary and chassis	1000 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)	
	Between input terminals and chassis	1000 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)	
Withstand voltage	Between primary and input terminals	No abnormalities at 1500 Vac for 1 minute	
	Between primary and chassis	No abnormalities at 1500 Vac for 1 minute	
	Between input terminals and chassis	No abnormalities at 1000 Vac for 1 minute	
External Dimensions	See p. 21 .	See p. 22 .	See p. 23 .
Weight	Approx. 235 kg (518 lb)	Approx. 260 kg (573 lb)	Approx. 285 kg (629 lb)
Battery backup	Backs up settings		
Accessories	Power cable	1 pc.	
	Lock plate	2 sheets (for flat braided copper wires)	
	Load input terminal screw set	4 sets	
	Heavy object warning label	1 pc.	
	CD-ROM	1 disc	
	Manuals	Setup Guide (1 pc.), Quick Reference (English/Japanese, 1 sheet each)	
Safety	Complies with the requirements of the following standard. IEC 61010-1:2001 (Class I ³ , Pollution degree 2 ⁴)		

1 Approximately 70 A when 100 Vac is applied.

2 If the input voltage or input frequency is different, the following equation can be used to calculate the value.

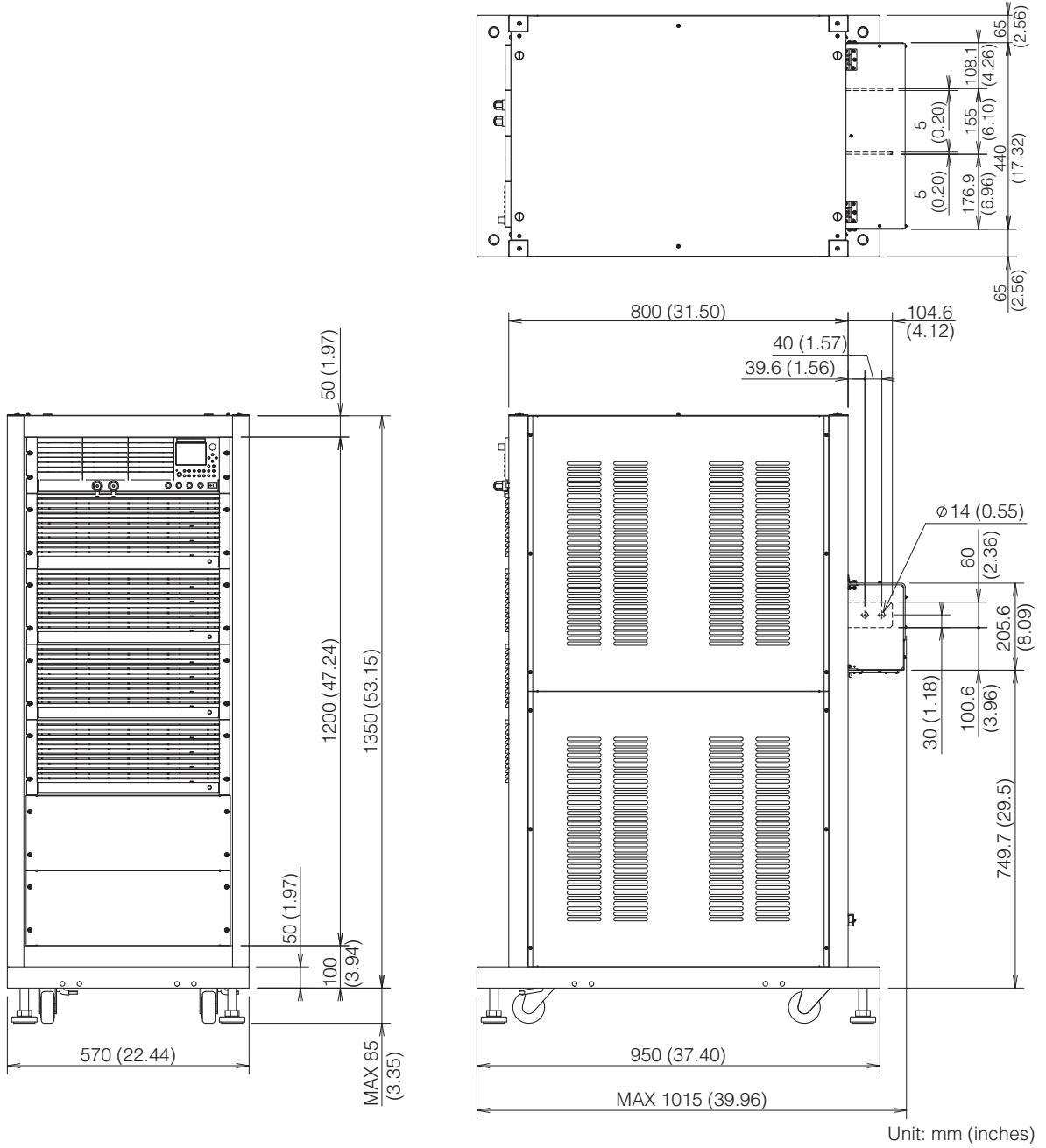
$$\text{Protective conductor current} = \frac{\text{Input voltage [V]}}{100 \text{ [V]}} \times \frac{\text{Input frequency [Hz]}}{50 \text{ [Hz]}} \times 500 \text{ [\mu A]}$$

3 This class confirms to Class I. Be sure to ground the protective conductor terminal of this product. If not grounded properly, safety is not guaranteed.

4 Pollution is addition of foreign matter (solid, liquid or gaseous) that may produce a reduction of dielectric strength or surface resistivity. Pollution Degree 2 assumes that only non-conductive pollution will occur except for an occasional temporary conductivity caused by condensation.

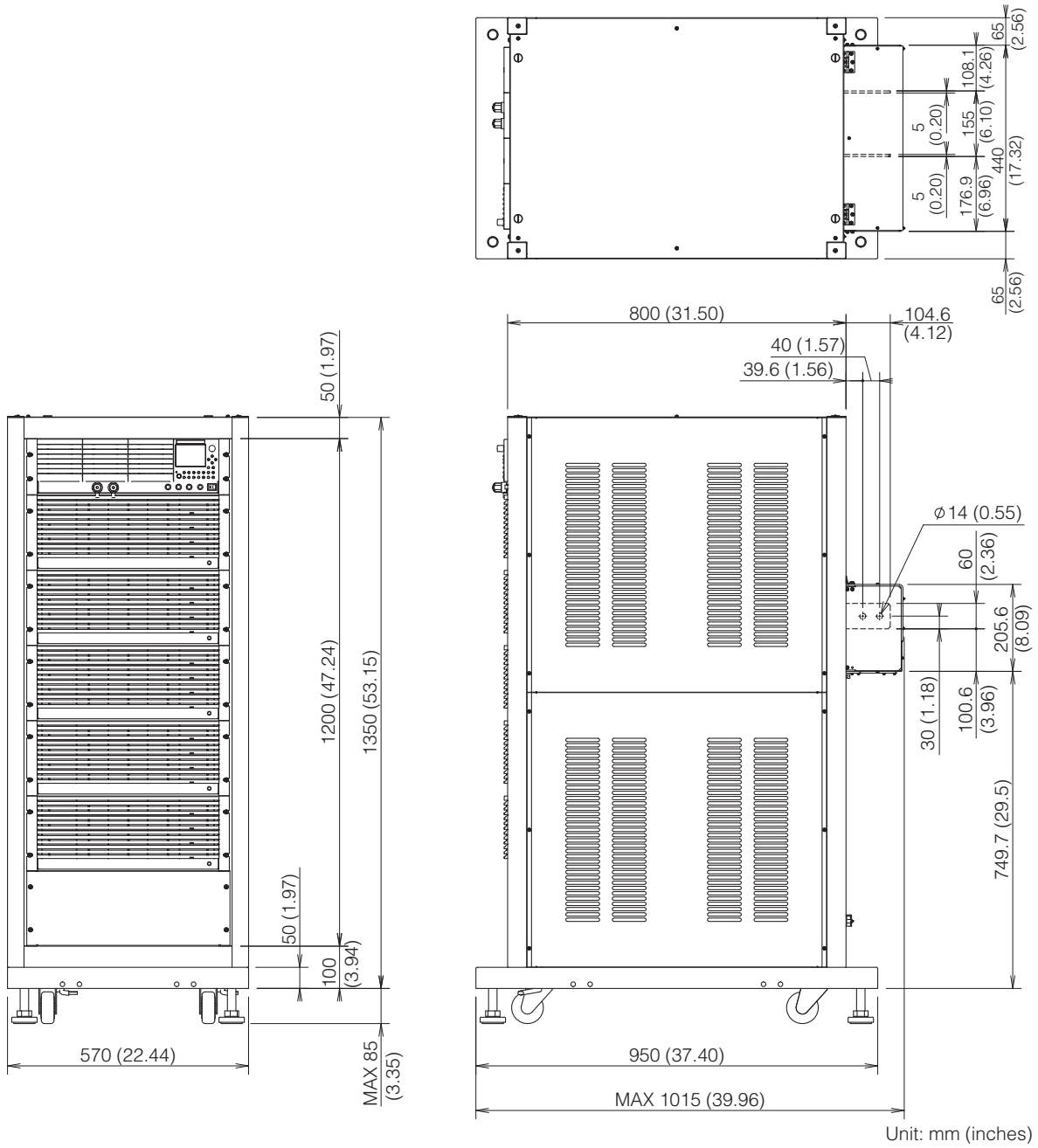
External Dimensions

PLZ9004WH LP



External dimensions (continued)

PLZ11004WH LP



PLZ13004WH LP

