Part No. IB026357
Dec 2019

PBZ-SR Series Specifications

This manual contains the specifications of the PBZ-SR.

PBZ20-60 SR, PBZ20-80 SR, PBZ20-100 SR ..... p. 2
PBZ40-30 SR, PBZ40-40 SR, PBZ40-50 SR ..... p. 11
PBZ60-20.1 SR, PBZ60-26.8 SR, PBZ60-33.5 SR ..... p. 20
PBZ80-15 SR, PBZ80-20 SR, PBZ80-25 SR ..... p. 29

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

- The warm-up time is 30 minutes (with current flowing).
- TYP: These are typical values that are representative of situations where the PBZ-SR operates in an environment with an ambient temperature of 23 °C. These values do not guarantee the performance of the PBZ-SR.
- rtg: Indicates the rated voltage or current.
- setting: Indicates a setting.
- rdng: Indicates the readout value of a measured result.
- rtg/CF: The rated voltage or rated current divided by CF (crest factor).
- The polarity of the output voltage and current is defined as follows.
  Voltage: Using the output's COM terminal as a reference, the voltage is positive (+) when the OUT terminal is positive and negative (-) when the OUT terminal is negative.
  Current: Positive (+) when current flows out from the OUT terminal and negative (-) when current flows into the OUT terminal.
- Loads are purely resistive loads.
- Remote sensing is performed with short bars attached to the sensing terminals.
- Rated loads are defined as follows:
  When the PBZ-SR is generating its rated voltage, the load causes the rated current to flow. Or, when the PBZ-SR is generating its rated current, the load makes the voltage drop to the PBZ-SR's rated voltage.

PBZ20-60 SR, PBZ20-80 SR, PBZ20-100 SR

AC Input

Item	PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
Nominal input rating	200 Vac to 240 Vac, 50 Hz to 60 Hz, single phase		
Input voltage range	180 Vac to 250 Vac		
Input frequency range	47 Hz to 63 Hz		
Current[1]	15 Aac or less	20 Aac or less	25 Aac or less
Inrush current	120 Apeak or less	160 Apeak or less	200 Apeak or less
Power[1]	2700 VA or less	3600 VA or less	4500 VA or less
Power factor[1]	0.95 TYP (when the input voltage is 200 V)		

1 When connected to a rated load.

Output

Item		PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
Output rating	Power	1200 W	1600 W	2000 W
	Voltage	±20 V		
	Current	±60 A	±80 A	±100 A
Output terminal	Output terminal	Rear panel output terminals		
	Isolation voltage[1]	500 Vdc		

1 Only the output's COM terminal can be grounded.

CV Mode Output

Item			PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
DC voltage	Settable range[1]	Bipolar mode	0 V to ±(105 % of rtg)		
		Unipolar mode	0 V to +(105 % of rtg)		
		Fine feature	±5 % of rtg		
	Resolution		0.001 V (0.0001 V for the fine feature)		
	Accuracy[2]		±(0.05 % of setting + 0.05 % of rtg)		
	Temperature coefficient		±100 ppm/°C of rtg (TYP)		
AC voltage	Settable range[1]		0.00 Vpp to (210 % of rtg) pp		
	Resolution		0.01 V		
	Accuracy[3]		±0.5 % of rtg		
AC frequency	Settable range		0.01 Hz to 100.00 kHz		
	Resolution		0.01 Hz		
	Accuracy		±200 ppm		
	Sweep		Linear and logarithmic		
	Sweep time		100 µs to 1000 s (resolution of 100 µs)		
AC waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms		
	Start phase		0 to 359°		
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz), 10 % to 90 % (1 kHz ≤ f < 10 kHz), and fixed to 50 % (10 kHz ≤ f)		
Constant voltage characteristics	Frequency response[4]		DC to 100 kHz (-3 dB)		
	Response[5] (TYP)		3.5 µs, 10 µs, 35 µs, 100 µs		
	Overshoot[6]		5 % or less (TYP)		
	Ripple noise	(p-p)[7]	30 mV (TYP)		
		(rms)[8]	3 mV		
	Load effect[9]		±(0.005 % of setting + 1 mV)		
	Source effect[10]		±(0.005 % of setting + 1 mV)		

1 The peak value of the sum of the DC voltage and AC voltage is limited by the DC voltage's settable range.
2 At an ambient temperature of 23 °C ± 5 °C.
3 1 kHz sine wave, 3.5 µs response.
4 A frequency where the amplitude ratio of the output voltage to the external signal input voltage is -3 dB (when the reference frequency is 1 kHz, the response is 3.5 µs, and when a rated load is connected).
5 The rise or fall time (at rated load; excluding when output is turned on and off). The frequency response is based on the specified response setting (frequency bandwidth = 0.35/the rise time).
Rise time: The time it takes for the output voltage to rise from 10 % to 90 % of the rating when the output voltage is changed from 0 V to the rated voltage.
Fall time: The time it takes for the output voltage to fall from 90 % to 10 % of the rating when the output voltage is changed from the rated voltage to 0 V.
6 Under no load or rated load.
7 The measurement frequency bandwidth is 10 Hz to 20 MHz (at the output terminals).
8 The measurement frequency bandwidth is 10 Hz to 1 MHz (at the output terminals).
9 The change in the output voltage in response to a change in the output current from 0 % to 100 % of the current rating (measured at the sensing terminals when remote sensing is used).
10 The change in the output voltage in response to a ±10 % change in the input voltage in reference to the nominal input voltage (measured at the sensing terminals when remote sensing is used).

CC Mode Output

Item			PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
DC current	Settable range[1]	Bipolar mode and unipolar mode	0 A to ±(105 % of rtg)		
		Fine feature	±5 % of rtg		
	Resolution[2]		0.003 A	0.004 A	0.005 A
		Fine feature[2]	0.0003 A	0.0004 A	0.0005 A
	Accuracy[3]		±0.3 % of rtg		
	Temperature coefficient		±100 ppm/°C of rtg (TYP)		
AC current	Settable range[1]		0 App to (210 % of rtg) pp		
	Resolution[4]		0.03 A	0.04 A	0.05 A
	Accuracy[5]		±0.5 % of rtg		
AC frequency	Settable range		0.01 Hz to 100.00 kHz		
	Resolution		0.01 Hz		
	Accuracy		±200 ppm		
	Sweep		Linear and logarithmic		
	Sweep time		100 µs to 1000 s (resolution of 100 µs)		
AC waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms		
	Start phase		0 to 359°		
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz), 10 % to 90 % (1 kHz ≤ f < 10 kHz), and fixed to 50 % (10 kHz ≤ f)		
Constant current characteristics	Frequency response[6]		DC to 10 kHz (-3 dB) (TYP)		
	Response[7] (TYP)		35 µs, 100 µs, 350 µs, 1 ms		
	Overshoot[8]		5 % or less (TYP)		
	Ripple noise (rms)[9]		5 mA		
	Load effect[10]		±(0.01 % of setting + 1 mA)		
	Source effect[11]		±(0.01 % of setting + 1 mA)		

1 The peak value of the sum of the DC current and AC current is limited by the DC current's settable range.
2 You can set the DC current in 0.001 A (0.0001 A for the fine feature) steps, but it may not change at this resolution depending on the relationship with the internal D/A resolution.
3 At an ambient temperature of 23 °C ± 5 °C.
4 You can set the AC current in 0.01 A steps, but it may not change at this resolution depending on the relationship with the internal D/A resolution.
5 100 Hz sine wave, 35 µs/70 µs response, and shorted output.
6 A frequency where the amplitude ratio of the output current to the external signal input voltage is -3 dB (when the reference frequency is 100 Hz, the response is 35 µs/75 µs, and a rated load is connected). The frequency response changes according to the load impedance. When the load impedance increases, the frequency response decreases.
7 The rise or fall time (at rated load; excluding when output is turned on and off). The rise and fall times change according to the load impedance.
Rise time: The time it takes for the output current to rise from 10 % to 90 % of the rating when the output current is changed from 0 A to the rated current.
Fall time: The time it takes for the output current to fall from 90 % to 10 % of the rating when the output current is changed from the rated current to 0 A.
8 Under short circuit or rated load.
9 The measurement frequency bandwidth is 10 Hz to 1 MHz (when the output voltage is in the range of 10 % to 100 % of the rated output voltage).
10 The change in the output current in response to a change in the output voltage from 10 % to 100 % of the voltage rating.
11 The change in the output current in response to a ±10 % change in the input voltage in reference to the nominal input voltage (when the output voltage is in the range of 10 % to 100 % of the voltage rating).

Measurement Display Feature

Item			PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
Voltage measurement	DC	Measurement range (resolution)	120 % of rtg (0.001 V)		
		Accuracy[1]	±(0.05 % of rdng + 0.05 % of rtg)		
		Temperature coefficient	±100 ppm/°C of rtg (TYP)		
	AC	Measurement range (resolution)	120 % of rtg / CF (0.001 V)		
	DC + AC	Measurement range (resolution)	120 % of rtg (0.001 V)		
	AC and DC + AC	Accuracy[1, 2]	±(0.5 % of rdng + 0.1 % of rtg) in the range of 5 Hz to 10 kHz ±(1 % of rdng + 0.2 % of rtg) in the range of 10 kHz to 50 kHz ±(2 % of rdng + 0.2 % of rtg) in the range of 50 kHz to 100 kHz		
	PEAK	Measurement range (resolution)	120 % of rtg (0.01 V)		
		Accuracy[1, 3]	±0.5 % of rtg		
Current measurement	DC	Measurement range (resolution)	120 % of rtg (0.003 A)	120 % of rtg (0.004 A)	120 % of rtg (0.005 A)
		Accuracy[1]	±(0.3 % of rdng + 0.7 % of rtg)	±(0.3 % of rdng + 1.0 % of rtg)	±(0.3 % of rdng + 1.3 % of rtg)
		Temperature coefficient	±150 ppm/°C of rtg (TYP)		
	AC	Measurement range (resolution)	120 % of rtg/CF (0.003 A)	120 % of rtg/CF (0.004 A)	120 % of rtg/CF (0.005 A)
	DC + AC	Measurement range (resolution)	120 % of rtg (0.003 A)	120 % of rtg (0.004 A)	120 % of rtg (0.005 A)
	AC and DC + AC	Accuracy[1, 2]	±(3 % of rdng + 0.1 % of rtg) (5 Hz to 10 kHz) ±(10 % of rdng + 1 % of rtg) (10 kHz to 100 kHz)		
	PEAK	Measurement range (resolution)	120 % of rtg (0.03 A)	120 % of rtg (0.04 A)	120 % of rtg (0.05 A)
		Accuracy[1, 3]	±0.5 % of rtg		
Measurement time (Aperture)			100 µs to 3600 s		

1 At an ambient temperature of 23 °C ± 5 °C.
2 When the input signal is in the 100 kHz bandwidth and has a crest factor of 3 or less (the measurement time is at least 10 times the input signal period).
3 Calibrated with a 1 kHz sine wave.

Protection Features

Item		PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
Overvoltage protection	Protection operation[1, 2]	OVP or V.LIM (output limit) Select whether output or the POWER switch turns off when OVP is activated.		
	Settable ranges (Bipolar mode)	Select whether (-110% of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110% of rtg) or (-110% of rtg ≤ -OVP ≤ -1% of rtg, +1% of rtg ≤ +OVP ≤ +110% of rtg)		
	Settable range (Unipolar mode)	Select whether (-1 % of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110% of rtg) or (+1% of rtg ≤ +OVP ≤ +110% of rtg)		
	Resolution	0.01 V		
	Accuracy	±1 % of rtg		
Overcurrent protection	Protection operation	OCP or I.LIM (output limit) Select whether output or the POWER switch turns off when OVP is activated.		
	Settable ranges	Select whether (-110% of rtg ≤ -I.LIM ≤ -1% of rtg, +1% of rtg ≤ +I.LIM ≤ +110% of rtg) or (-110% of rtg ≤ -OCP ≤ -1% of rtg, +1% of rtg ≤ +OCP ≤ +110% of rtg)		
	Resolution	0.01 A		
	Accuracy	±1 % of rtg		
Overheat protection	Protection operation	Turns output off when overheating is detected.		
Power limit (sink power)	Bipolar mode	300 W (TYP)	400 W (TYP)	500 W (TYP)
	Unipolar mode	1200 W (TYP)	1600 W (TYP)	2000 W (TYP)

1 Voltage is detected at the output terminals.
2 OVP is activated even when V.LIM (voltage limit) is selected. The OVP activation point is approximately ±120 % of rtg.

Control Feature

Item		PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
Internal signal source's DC signal control	Control voltage input	By applying approximately 0 V to approximately ±10.0 V, you can generate 0 % to ±100 % of the rated output.		
	Control voltage ratio input	By using a 10 kΩ external variable resistor to change the internal reference voltage's voltage-divider ratio, you can generate 0 % to ±108 % of the rated output.		
Output on/off control input		External contact input to turn output on and off.		
Shutdown input		External contact input to turn the POWER switch off.		
Status output		CV/CC mode, output on, alarm occurrence.		

Signal I/O

Item			PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
External signal input	Amplifier-gain	CV mode	-20.00 to +20.00		
		CC mode	-60.00 S to +60.00 S	-80.00 S to +80.00 S	-100.00 S to +100.00 S
		Resolution[1]	0.01 V (CV mode) and 0.03 S (CC mode)	0.01 V (CV mode) and 0.04 S (CC mode)	0.01 V (CV mode) and 0.05 S (CC mode)
		Accuracy[2]	±5 % of rtg		
	Maximum allowable input voltage		±12 Vpeak		
	Input impedance		10 kΩ (TYP)		
	Terminal		BNC Safety Socket (Common is connected to the output's COM terminal.)		
Current monitor output	Output voltage[3]		2 V with the rated current		
	Output voltage accuracy		±1 % of rtg (TYP)		
	Output voltage frequency response		DC to 20 kHz		
	Terminal		BNC Safety Socket (Common is connected to the output's COM terminal.)		
Clock input	Input voltage		0.5 Vp-p to 5 Vp-p		
	Input impedance		1 kΩ TYP (AC coupling)		
	Lockable frequency range		10 MHz ± 200 Hz		
	Lock time		2 s or less		
	Terminal		Isolated BNC (Common is isolated from the chassis; the maximum isolation voltage is 42 Vpeak.)		
Clock output	Output voltage		1 Vp-p TYP (when terminated with 50 Ω)		
	Output impedance		50 Ω TYP (AC coupling)		
	Output frequency		10 MHz ± 200 Hz		
	Terminal		BNC (Common is connected to the chassis.)		
Trigger input	Input level		H level: 2 V to 5 V. L level: 0 V to 0.8 V (TTL compatible)		
	Polarity		H level and L level		
	Pulse width		1 µs or more		
	Delay		1 µs or less		
	Input impedance		10 kΩ TYP (DC coupling)		
	Terminal		BNC (Common is connected to the chassis.)		
Trigger output	Output level		H level: 2.7 V to 5 V. L level: 0 V to 0.4 V (TTL compatible)		
	Polarity		H level and L level		
	Pulse width		10 µs (TYP)		
	Rise time and fall time		100 ns or less		
	Fan-out		Five units from the PBZ series and the PBZ-SR series		
	Terminal		BNC (Common is connected to the chassis.)		

1 You can set the gain in 0.01 S steps in CC mode, but it may not change at this resolution depending on the relationship with the internal D/A resolution.
2 When the amplifier gain is at maximum and the PBZ-SR is generating DC.
3 Output proportional to the total output current of the PBZ-SR for the master unit and output proportional to the output current per slave unit for the slave unit.

Interface

Item		PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
Common specifications	Software protocol	IEEE Std 488.2-1992		
	Command language	Complies with SCPI Specification 1999.0		
RS232C	Hardware	Complies with the EIA232D specifications		
		D-SUB 9-pin connector (male)[1]		
		Baud rate: 1200, 2400, 4800, 9600, 19200, and 38400 bps		
		Data length: 7 bits or 8 bits. Stop bit: 1 bit or 2 bits. Parity bit: None.		
		Flow control: X-flow or none.		
	Program message terminator	LF during reception, LF during transmission		
GPIB	Hardware	Complies with IEEE Std 488.1-1987		
		SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, and E1		
		24-pin connector (receptacle)		
	Program message terminator	LF or EOI during reception, LF + EOI during transmission		
	Primary address	1 to 30		
USB	Hardware	Complies with the USB 2.0 specifications. Data rate: 12 Mbps (full speed).		
		Socket B type		
	Program message terminator	LF or EOM during reception, LF + EOM during transmission		
	Device class	Complies with the USBTMC-USB488 device class specifications		
LAN	Hardware	IEEE 802.3 100Base-TX/10Base-T Ethernet Complies with the LXI 1.4 Core 2011		
		IPv4, RJ-45 connector[2]		
	Communication protocol	VXI-11/ SCPI-RAW		
	Program message terminator	LF or END during reception, LF + END during transmission		

1 Use a cross cable (null modem cable).
2 Category 5; use a straight cable.

Other Features

Item		PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
Sequence feature	Number of programs and number of steps	16 programs and total of 1024 steps		
	Step time	100 µs to 1000 h (resolution of 100 µs) The DC signal ramp and AC signal amplitude sweep both stop after 1000 s. The AC signal frequency sweep repeats once every 1000 s.		
Preset memory		3 memory entries		
Setup memory		10 memory entries		
Key lock		Select one of three security levels		
Remote sensing		Can be turned on and off		
Power-on operation		Turn output on or begin execution of the sequence feature		
Soft start and soft stop		Can be turned on and off. Soft start and soft stop time: 0.1 ms to 1000 s.		

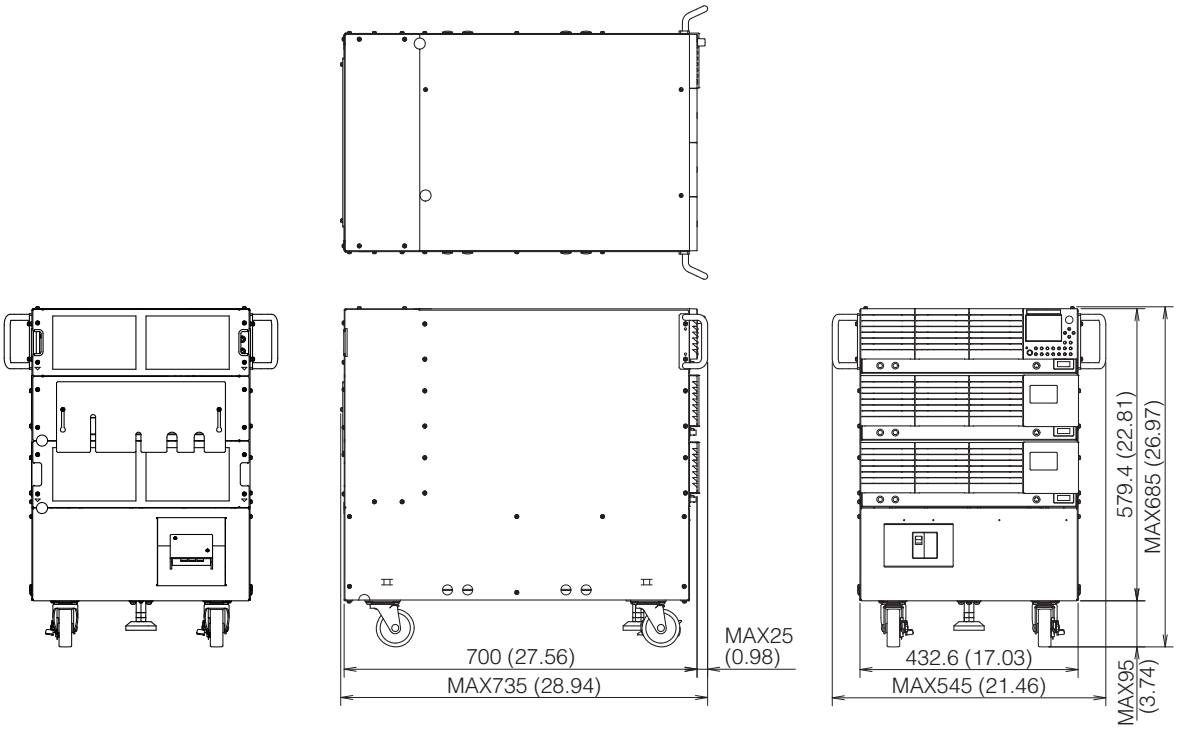
General

Item		PBZ20-60 SR	PBZ20-80 SR	PBZ20-100 SR
Weight (just the PBZ-SR)		Approx. 110 kg (242.5 lb)	Approx. 130 kg (286.6 lb)	Approx. 160 kg (352.7 lb)
Outline drawing		p. 9	p. 9	p. 10
Environmental conditions	Operating environment	Indoor use, overvoltage category II		
	Operating temperature	0 °C to +40 °C (+32 °F to +104 °F)		
	Operating humidity	20 %rh to 85 %rh (no condensation)		
	Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)		
	Storage humidity	90 %rh or less (no condensation)		
	Altitude	Up to 2000 m		
Grounding polarity		Only the output's COM terminal can be grounded.		
Isolation voltage		500 Vdc max		
Withstand voltage	Across the primary circuit and chassis	No abnormalities at 1500 Vac for 1 minute		
	Across the primary circuit and the output terminals			
Insulation resistance	Across the primary circuit and chassis	500 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)		
	Across the primary circuit and the output terminals			
	Across the output terminals and chassis[1]	500 Vdc, 0.33 MΩ or greater	500 Vdc, 0.25 MΩ or greater	500 Vdc, 0.20 MΩ or greater
Leakage current (250 V/60 Hz)		10 mA or less		
Earth continuity	AC input terminal, across the grounding terminal and chassis	100 Aac, 0.1 Ω or less		
Cooling method		Forced air cooling using variable-speed, heat-sensitive fan		
Battery backup		Settings are retained when the power is off. At least three years of battery life (at 25 °C).		
Safety[2]		Complies with the requirements of the following standards. Low Voltage Directive 2014/35/EU[3] EN 61010-1 (Class I[4] , Pollution degree 2[5])		
Electromagnetic compatibility (EMC)[2 3]		Complies with the requirements of the following standard. EMC Directive 2014/30/EU EN 61326-1 (Class A[6]) EN 55011 (Class A[6], Group 1[7]) EN 61000-3-2 EN 61000-3-3 Applicable condition All of the cables and wires connected to the PBZ are less than 3 m in length.		
Accessories	J1 connector kit	Socket (1 pc.)		
		Protection covers (2 pairs)		
		Pins (30 pc.)		
	Heavy object warning label	1 pc.		
	CD-ROM	1 pc.		
	PBZ-SR series manuals	Setup Guide (1 pc.)		
		Quick Reference (Japanese: 1 pc.) (English: 1 pc.)		
		Safety Information (1 pc.)		

1 At 70 %rh humidity or less
2 Does not apply to specially ordered or modified products.
3 Limited to products that have a CE mark.
4 This is a Class I instrument. Be sure to ground this product's protective conductor terminal. The safety of this product is guaranteed only when the product is properly grounded.
5 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.
6 This is a Class A instrument. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
7 This is a Group 1 instrument. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

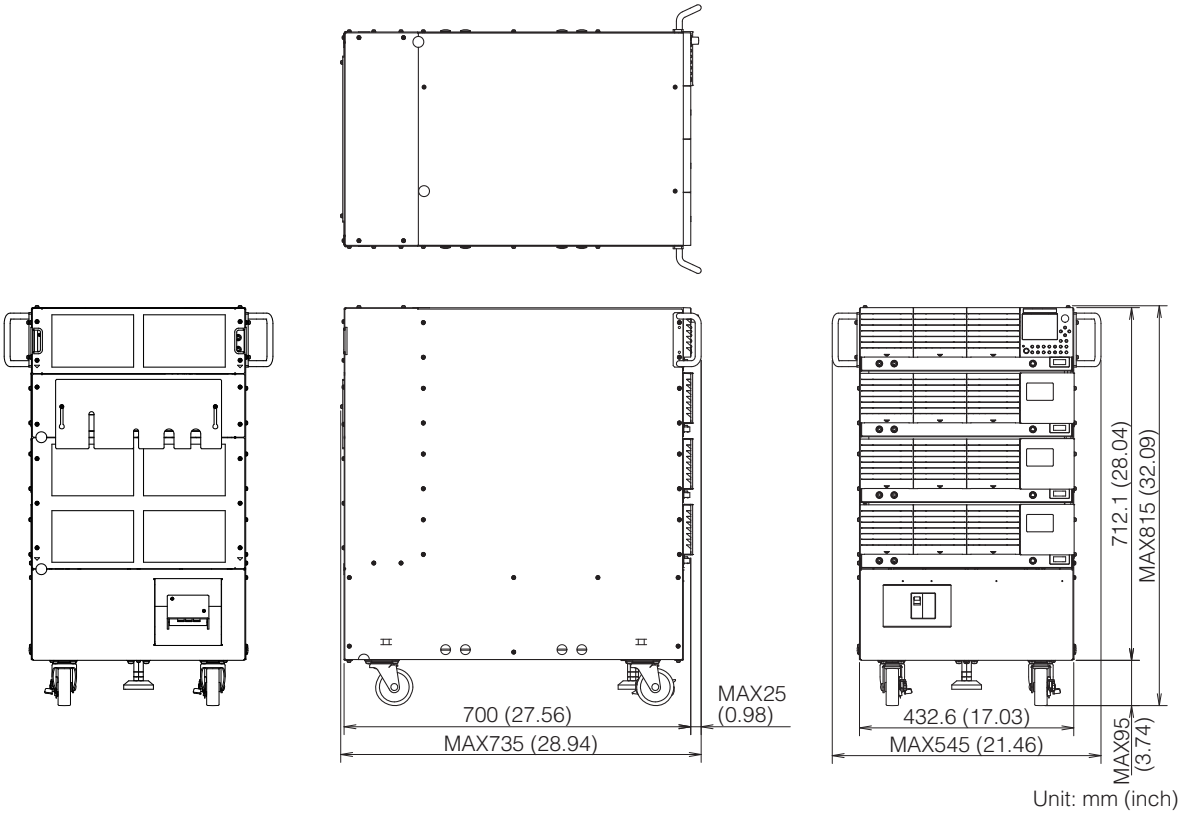
Outline Drawing

PBZ20-60 SR



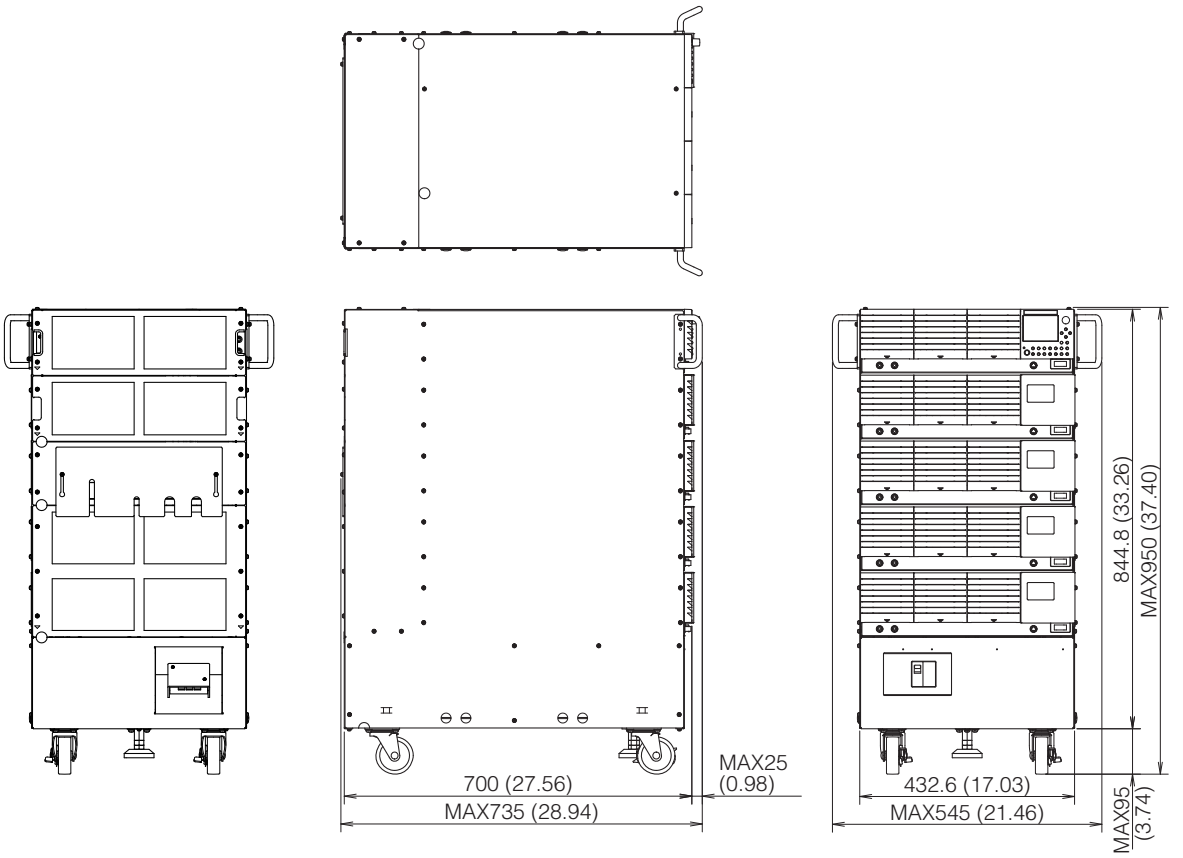
Unit: mm (inch)

PBZ20-80 SR



Unit: mm (inch)

PBZ20-100 SR



Unit: mm (inch)

AC Input

Item	PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
Nominal input rating	200 Vac to 240 Vac, 50 Hz to 60 Hz, single phase		
Input voltage range	180 Vac to 250 Vac		
Input frequency range	47 Hz to 63 Hz		
Current[1]	15 Aac or less	20 Aac or less	25 Aac or less
Inrush current	120 Apeak or less	160 Apeak or less	200 Apeak or less
Power[1]	2700 VA or less	3600 VA or less	4500 VA or less
Power factor[1]	0.95 TYP (when the input voltage is 200 V)		

1 When connected to a rated load.

Output

Item		PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
Output rating	Power	1200 W	1600 W	2000 W
	Voltage	±40 V		
	Current	±30 A	±40 A	±50 A
Output terminal	Output terminal	Rear panel output terminals		
	Isolation voltage[1]	500 Vdc		

1 Only the output's COM terminal can be grounded.

CV Mode Output

Item			PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
DC voltage	Settable range[1]	Bipolar mode	0 V to ±(105 % of rtg)		
		Unipolar mode	0 V to +(105 % of rtg)		
		Fine feature	±5 % of rtg		
	Resolution		0.001 V (0.0001 V for the fine feature)		
	Accuracy[2]		±(0.05 % of setting + 0.05 % of rtg)		
	Temperature coefficient		±100 ppm/°C of rtg (TYP)		
AC voltage	Settable range[1]		0.0 Vpp to (210 % of rtg) pp		
	Resolution		0.1 V		
	Accuracy[3]		±0.5 % of rtg		
AC frequency	Settable range		0.01 Hz to 100.00 kHz		
	Resolution		0.01 Hz		
	Accuracy		±200 ppm		
	Sweep		Linear and logarithmic		
	Sweep time		100 µs to 1000 s (resolution of 100 µs)		
AC waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms		
	Start phase		0 to 359°		
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz), 10 % to 90 % (1 kHz ≤ f < 10 kHz), and fixed to 50 % (10 kHz ≤ f)		
Constant voltage characteristics	Frequency response[4]		DC to 100 kHz (-3 dB)		
	Response[5] (TYP)		3.5 µs, 10 µs, 35 µs, 100 µs		
	Overshoot[6]		5 % or less (TYP)		
	Ripple noise	(p-p)[7]	30 mV (TYP)		
		(rms)[8]	6 mV		
	Load effect[9]		±(0.005 % of setting + 1 mV)		
	Source effect[10]		±(0.005 % of setting + 1 mV)		

1 The peak value of the sum of the DC voltage and AC voltage is limited by the DC voltage's settable range.
2 At an ambient temperature of 23 °C ± 5 °C.
3 1 kHz sine wave, 3.5 µs response.
4 A frequency where the amplitude ratio of the output voltage to the external signal input voltage is -3 dB (when the reference frequency is 1 kHz, the response is 3.5 µs, and when a rated load is connected).
5 The rise or fall time (at rated load; excluding when output is turned on and off). The frequency response is based on the specified response setting (frequency bandwidth = 0.35/the rise time).
Rise time: The time it takes for the output voltage to rise from 10 % to 90 % of the rating when the output voltage is changed from 0 V to the rated voltage.
Fall time: The time it takes for the output voltage to fall from 90 % to 10 % of the rating when the output voltage is changed from the rated voltage to 0 V.
6 Under no load or rated load.
7 The measurement frequency bandwidth is 10 Hz to 20 MHz (at the output terminals).
8 The measurement frequency bandwidth is 10 Hz to 1 MHz (at the output terminals).
9 The change in the output voltage in response to a change in the output current from 0 % to 100 % of the current rating (measured at the sensing terminals when remote sensing is used).
10 The change in the output voltage in response to a ±10 % change in the input voltage in reference to the nominal input voltage (measured at the sensing terminals when remote sensing is used).

CC Mode Output

Item			PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
DC current	Settable range[1]	Bipolar mode and unipolar mode	0 A to ±(105 % of rtg)		
		Fine feature	±5 % of rtg		
	Resolution[2]		0.003 A	0.004 A	0.005 A
		Fine feature[2]	0.0003 A	0.0004 A	0.0005 A
	Accuracy[3]		±0.3 % of rtg		
	Temperature coefficient		±100 ppm/°C of rtg (TYP)		
AC current	Settable range[1]		0 App to (210 % of rtg) pp		
	Resolution[4]		0.03 A	0.04 A	0.05 A
	Accuracy[5]		±0.5 % of rtg		
AC frequency	Settable range		0.01 Hz to 100.00 kHz		
	Resolution		0.01 Hz		
	Accuracy		±200 ppm		
	Sweep		Linear and logarithmic		
	Sweep time		100 µs to 1000 s (resolution of 100 µs)		
AC waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms		
	Start phase		0 to 359°		
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz), 10 % to 90 % (1 kHz ≤ f < 10 kHz), and fixed to 50 % (10 kHz ≤ f)		
Constant current characteristics	Frequency response[6]		DC to 5 kHz (-3 dB) (TYP)		
	Response[7] (TYP)		70 µs, 100 µs, 350 µs, 1 ms		
	Overshoot[8]		5 % or less (TYP)		
	Ripple noise (rms)[9]		5 mA		
	Load effect[10]		±(0.01 % of setting + 1 mA)		
	Source effect[11]		±(0.01 % of setting + 1 mA)		

1 The peak value of the sum of the DC current and AC current is limited by the DC current's settable range.0.001

2 You can set the DC current in 0.001 A (0.0001 A for the fine feature) steps, but it may not change at this resolution depending on the relationship with the internal D/A resolution.

3 At an ambient temperature of 23 °C ± 5 °C.

4 You can set the AC current in 0.001 A steps, but it may not change at this resolution depending on the relationship with the internal D/A resolution.

5 100 Hz sine wave, 35 µs/70 µs response, and shorted output.

6 A frequency where the amplitude ratio of the output current to the external signal input voltage is -3 dB (when the reference frequency is 100 Hz, the response is 35 µs/75 µs, and a rated load is connected). The frequency response changes according to the load impedance. When the load impedance increases, the frequency response decreases.

7 The rise or fall time (at rated load; excluding when output is turned on and off). The rise and fall times change according to the load impedance.
Rise time: The time it takes for the output current to rise from 10 % to 90 % of the rating when the output current is changed from 0 A to the rated current.
Fall time: The time it takes for the output current to fall from 90 % to 10 % of the rating when the output current is changed from the rated current to 0 A.

8 Under short circuit or rated load.

9 The measurement frequency bandwidth is 10 Hz to 1 MHz (when the output voltage is in the range of 10 % to 100 % of the rated output voltage).

10 The change in the output current in response to a change in the output voltage from 10 % to 100 % of the voltage rating.

11 The change in the output current in response to a ±10 % change in the input voltage in reference to the nominal input voltage (when the output voltage is in the range of 10 % to 100 % of the voltage rating).

Measurement Display Feature

Item			PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
Voltage measurement	DC	Measurement range (resolution)	120 % of rtg (0.001 V)		
		Accuracy[1]	±(0.05 % of rdng + 0.05 % of rtg)		
		Temperature coefficient	±100 ppm/°C of rtg (TYP)		
	AC	Measurement range (resolution)	120 % of rtg / CF (0.001 V)		
	DC + AC	Measurement range (resolution)	120 % of rtg (0.001 V)		
	AC and DC + AC	Accuracy[1, 2]	±(0.5 % of rdng + 0.1 % of rtg) in the range of 5 Hz to 10 kHz ±(1 % of rdng + 0.2 % of rtg) in the range of 10 kHz to 50 kHz ±(2 % of rdng + 0.2 % of rtg) in the range of 50 kHz to 100 kHz		
	PEAK	Measurement range (resolution)	120 % of rtg (0.01 V)		
		Accuracy[1, 3]	±0.5 % of rtg		
Current measurement	DC	Measurement range (resolution)	120 % of rtg (0.003 A)	120 % of rtg (0.004 A)	120 % of rtg (0.005 A)
		Accuracy[1]	±(0.3 % of rdng + 0.7 % of rtg)	±(0.3 % of rdng + 1.0 % of rtg)	±(0.3 % of rdng + 1.3 % of rtg)
		Temperature coefficient	±150 ppm/°C of rtg (TYP)		
	AC	Measurement range (resolution)	120 % of rtg/CF (0.003 A)	120 % of rtg/CF (0.004 A)	120 % of rtg/CF (0.005 A)
	DC + AC	Measurement range (resolution)	120 % of rtg (0.003 A)	120 % of rtg (0.004 A)	120 % of rtg (0.005 A)
	AC and DC + AC	Accuracy[1, 2]	±(3 % of rdng + 0.1 % of rtg) (5 Hz to 10 kHz) ±(10 % of rdng + 1 % of rtg) (10 kHz to 100 kHz)		
	PEAK	Measurement range (resolution)	120 % of rtg (0.03 A)	120 % of rtg (0.04 A)	120 % of rtg (0.05 A)
		Accuracy[1, 3]	±0.5 % of rtg		
Measurement time (Aperture)			100 µs to 3600 s		

1 At an ambient temperature of 23 °C ± 5 °C.
2 When the input signal is in the 100 kHz bandwidth and has a crest factor of 3 or less (the measurement time is at least 10 times the input signal period).
3 Calibrated with a 1 kHz sine wave.

Protection Features

Item		PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
Overvoltage protection	Protection operation[1, 2]	OVP or V.LIM (output limit) Select whether output or the POWER switch turns off when OVP is activated.		
	Settable ranges (Bipolar mode)	Select whether (-110% of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110% of rtg) or (-110% of rtg ≤ -OVP ≤ -1% of rtg, +1% of rtg ≤ +OVP ≤ +110% of rtg)		
	Settable range (Unipolar mode)	Select whether (-1 % of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110% of rtg) or (+1% of rtg ≤ +OVP ≤ +110% of rtg)		
	Resolution	0.01 V		
	Accuracy	±1 % of rtg		
Overcurrent protection	Protection operation	OCP or I.LIM (output limit) Select whether output or the POWER switch turns off when OVP is activated.		
	Settable ranges	Select whether (-110% of rtg ≤ -I.LIM ≤ -1% of rtg, +1% of rtg ≤ +I.LIM ≤ +110% of rtg) or (-110% of rtg ≤ -OCP ≤ -1% of rtg, +1% of rtg ≤ +OCP ≤ +110% of rtg)		
	Resolution	0.01 A		
	Accuracy	±1 % of rtg		
Overheat protection	Protection operation	Turns output off when overheating is detected.		
Power limit (sink power)	Bipolar mode	540 W (TYP)	720 W (TYP)	900 W (TYP)
	Unipolar mode	1200 W (TYP)	1600 W (TYP)	2000 W (TYP)

1 Voltage is detected at the output terminals.
2 OVP is activated even when V.LIM (voltage limit) is selected. The OVP activation point is approximately ±120 % of rtg.

Control Feature

Item		PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
Internal signal source's DC signal control	Control voltage input	By applying approximately 0 V to approximately ±10.0 V, you can generate 0 % to ±100 % of the rated output.		
	Control voltage ratio input	By using a 10 kΩ external variable resistor to change the internal reference voltage's voltage-divider ratio, you can generate 0 % to ±108 % of the rated output.		
Output on/off control input		External contact input to turn output on and off.		
Shutdown input		External contact input to turn the POWER switch off.		
Status output		CV/CC mode, output on, alarm occurrence.		

Signal I/O

Item			PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
External signal input	Amplifier gain	CV mode	-40.0 to +40.0		
		CC mode	-30.00 S to +30.00 S	-40.00 S to +40.00 S	-40.00 S to +40.00 S
		Resolution[1]	0.1 V (CV mode) and 0.03 S (CC mode)	0.1 V (CV mode) and 0.04 S (CC mode)	0.1 V (CV mode) and 0.05 S (CC mode)
		Accuracy[2]	±5 % of rtg		
	Maximum allowable input voltage		±12 Vpeak		
	Input impedance		10 kΩ (TYP)		
	Terminal		BNC Safety Socket (Common is connected to the output's COM terminal.)		
Current monitor output	Output voltage[3]		2 V with the rated current		
	Output voltage accuracy		±1 % of rtg (TYP)		
	Output voltage frequency response		DC to 20 kHz		
	Terminal		BNC Safety Socket (Common is connected to the output's COM terminal.)		
Clock input	Input voltage		0.5 Vp-p to 5 Vp-p		
	Input impedance		1 kΩ TYP (AC coupling)		
	Lockable frequency range		10 MHz ± 200 Hz		
	Lock time		2 s or less		
	Terminal		Isolated BNC (Common is isolated from the chassis; the maximum isolation voltage is 42 Vpeak.)		
Clock output	Output voltage		1 Vp-p TYP (when terminated with 50 Ω)		
	Output impedance		50 Ω TYP (AC coupling)		
	Output frequency		10 MHz ± 200 Hz		
	Terminal		BNC (Common is connected to the chassis.)		
Trigger input	Input level		H level: 2 V to 5 V. L level: 0 V to 0.8 V (TTL compatible)		
	Polarity		H level and L level		
	Pulse width		1 µs or more		
	Delay		1 µs or less		
	Input impedance		10 kΩ TYP (DC coupling)		
	Terminal		BNC (Common is connected to the chassis.)		
Trigger output	Output level		H level: 2.7 V to 5 V. L level: 0 V to 0.4 V (TTL compatible)		
	Polarity		H level and L level		
	Pulse width		10 µs (TYP)		
	Rise time and fall time		100 ns or less		
	Fan-out		Five units from the PBZ series and the PBZ-SR series		
	Terminal		BNC (Common is connected to the chassis.)		

1 You can set the gain in 0.01 S steps in CC mode, but it may not change at this resolution depending on the relationship with the internal D/A resolution.
2 When the amplifier gain is at maximum and the PBZ-SR is generating DC.
3 Output proportional to the total output current of the PBZ-SR for the master unit and output proportional to the output current per slave unit for the slave unit.

Interface

Item		PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
Common specifications	Software protocol	IEEE Std 488.2-1992		
	Command language	Complies with SCPI Specification 1999.0		
RS232C	Hardware	Complies with the EIA232D specifications		
		D-SUB 9-pin connector (male)[1]		
		Baud rate: 1200, 2400, 4800, 9600, 19200, and 38400 bps		
		Data length: 7 bits or 8 bits. Stop bit: 1 bit or 2 bits. Parity bit: None.		
		Flow control: X-flow or none.		
	Program message terminator	LF during reception, LF during transmission		
GPIB	Hardware	Complies with IEEE Std 488.1-1987		
		SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, and E1		
		24-pin connector (receptacle)		
	Program message terminator	LF or EOI during reception, LF + EOI during transmission		
	Primary address	1 to 30		
USB	Hardware	Complies with the USB 2.0 specifications. Data rate: 12 Mbps (full speed).		
		Socket B type		
	Program message terminator	LF or EOM during reception, LF + EOM during transmission		
	Device class	Complies with the USBTMC-USB488 device class specifications		
LAN	Hardware	IEEE 802.3 100Base-TX/10Base-T Ethernet Complies with the LXI 1.4 Core 2011		
		IPv4, RJ-45 connector[2]		
	Communication protocol	VXI-11/ SCPI-RAW		
	Program message terminator	LF or END during reception, LF + END during transmission		

1 Use a cross cable (null modem cable).
2 Category 5; use a straight cable.

Other Features

Item		PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
Sequence feature	Number of programs and number of steps	16 programs and total of 1024 steps		
	Step time	100 µs to 1000 h (resolution of 100 µs) The DC signal ramp and AC signal amplitude sweep both stop after 1000 s. The AC signal frequency sweep repeats once every 1000 s.		
Preset memory		3 memory entries		
Setup memory		10 memory entries		
Key lock		Select one of three security levels		
Remote sensing		Can be turned on and off		
Power-on operation		Turn output on or begin execution of the sequence feature		
Soft start and soft stop		Can be turned on and off. Soft start and soft stop time: 0.1 ms to 1000 s.		

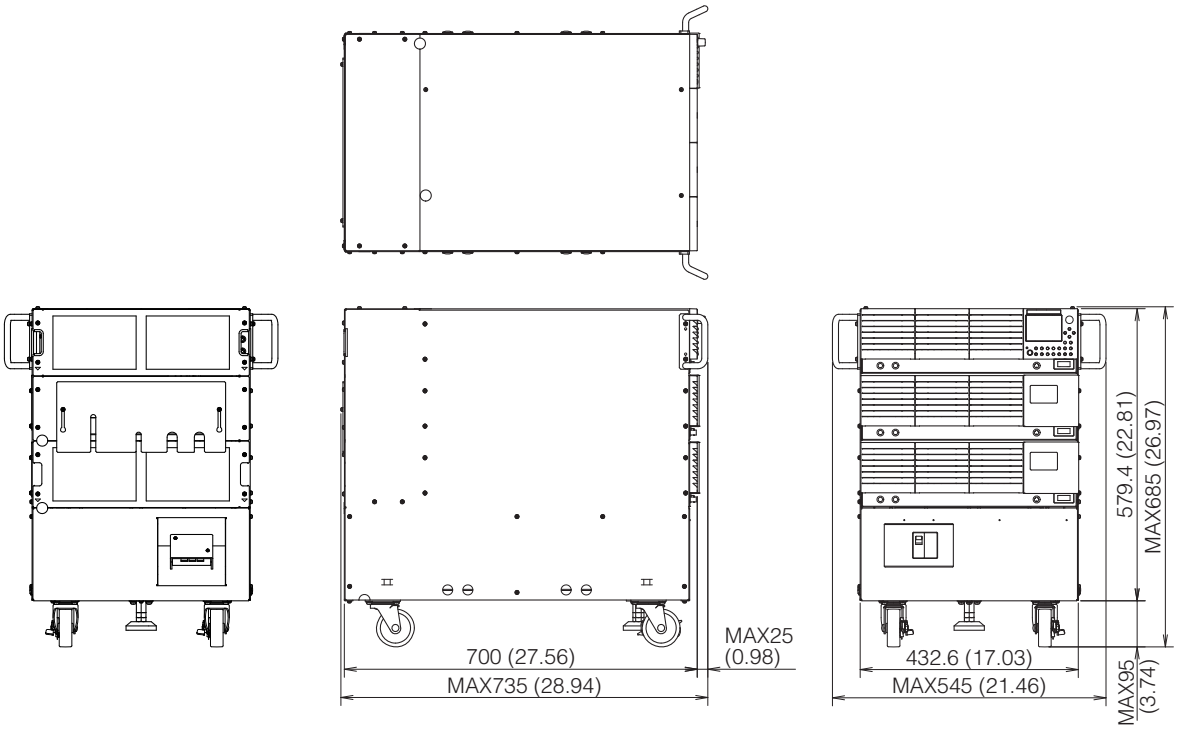
General

Item		PBZ40-30 SR	PBZ40-40 SR	PBZ40-50 SR
Weight (just the PBZ-SR)		Approx. 110 kg (242.5 lb)	Approx. 130 kg (286.6 lb)	Approx. 160 kg (352.7 lb)
Outline drawing		p. 18	p. 18	p. 19
Environmental conditions	Operating environment	Indoor use, overvoltage category II		
	Operating temperature	0 °C to +40 °C (+32 °F to +104 °F)		
	Operating humidity	20 %rh to 85 %rh (no condensation)		
	Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)		
	Storage humidity	90 %rh or less (no condensation)		
	Altitude	Up to 2000 m		
Grounding polarity		Only the output's COM terminal can be grounded.		
Isolation voltage		500 Vdc max		
Withstand voltage	Across the primary circuit and chassis	No abnormalities at 1500 Vac for 1 minute		
	Across the primary circuit and the output terminals			
Insulation resistance	Across the primary circuit and chassis	500 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)		
	Across the primary circuit and the output terminals			
	Across the output terminals and chassis[1]	500 Vdc, 0.33 MΩ or greater	500 Vdc, 0.25 MΩ or greater	500 Vdc, 0.20 MΩ or greater
Leakage current (250 V/60 Hz)		10 mA or less		
Earth continuity	AC input terminal, across the grounding terminal and chassis	100 Aac, 0.1 Ω or less		
Cooling method		Forced air cooling using variable-speed, heat-sensitive fan		
Battery backup		Settings are retained when the power is off. At least three years of battery life (at 25 °C).		
Safety[2]		Complies with the requirements of the following standards. Low Voltage Directive 2014/35/EU[3] EN 61010-1 (Class I[4] , Pollution degree 2[5])		
Electromagnetic compatibility (EMC)[2] [3]		Complies with the requirements of the following standard. EMC Directive 2014/30/EU EN 61326-1 (Class A[6]) EN 55011 (Class A[6], Group 1[7]) EN 61000-3-2 EN 61000-3-3 Applicable condition All of the cables and wires connected to the PBZ are less than 3 m in length.		
Accessories	J1 connector kit	Socket (1 pc.)		
		Protection covers (2 pairs)		
		Pins (30 pc.)		
	Heavy object warning label	1 pc.		
	CD-ROM	1 pc.		
	PBZ-SR series manuals	Setup Guide (1 pc.)		
		Quick Reference (Japanese: 1 pc.) (English: 1 pc.)		
		Safety Information (1 pc.)		

1 At 70 %rh humidity or less
2 Does not apply to specially ordered or modified products.
3 Limited to products that have a CE mark.
4 This is a Class I instrument. Be sure to ground this product's protective conductor terminal. The safety of this product is guaranteed only when the product is properly grounded.
5 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.
6 This is a Class A instrument. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
7 This is a Group 1 instrument. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

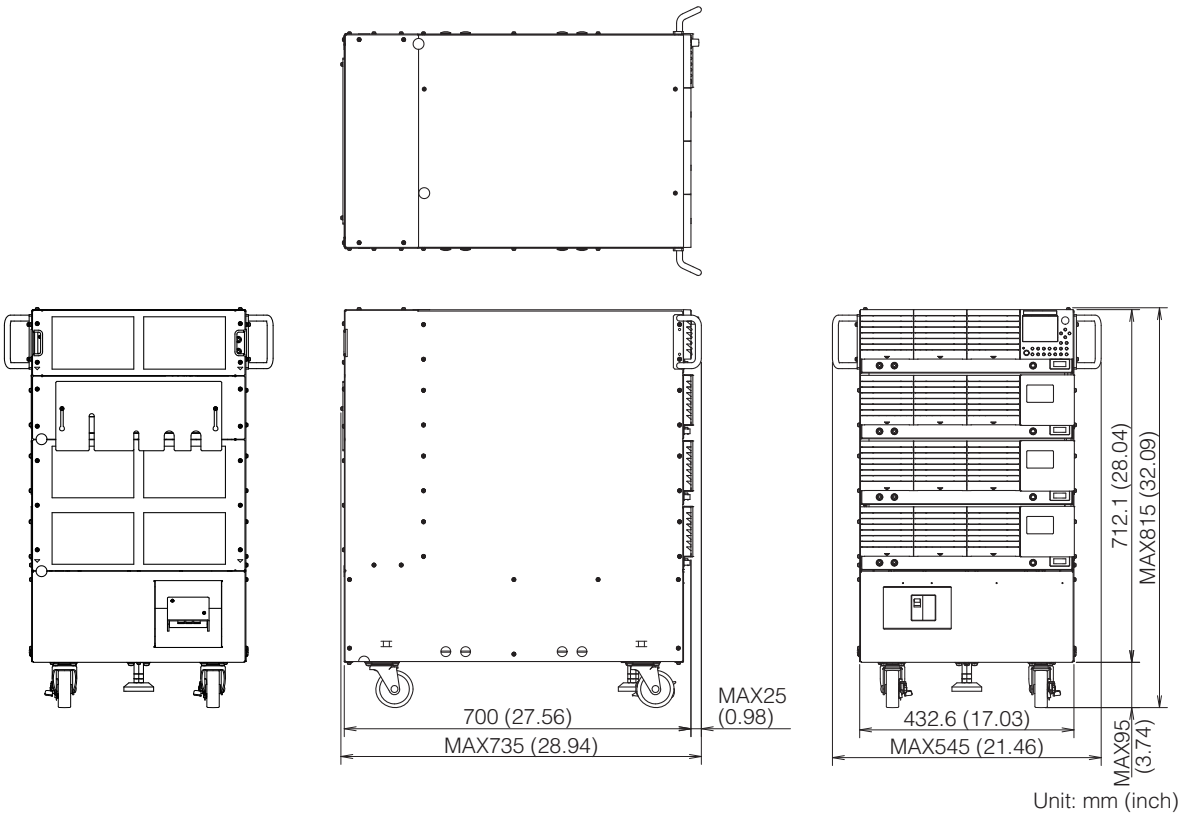
Outline Drawing

PBZ40-30 SR



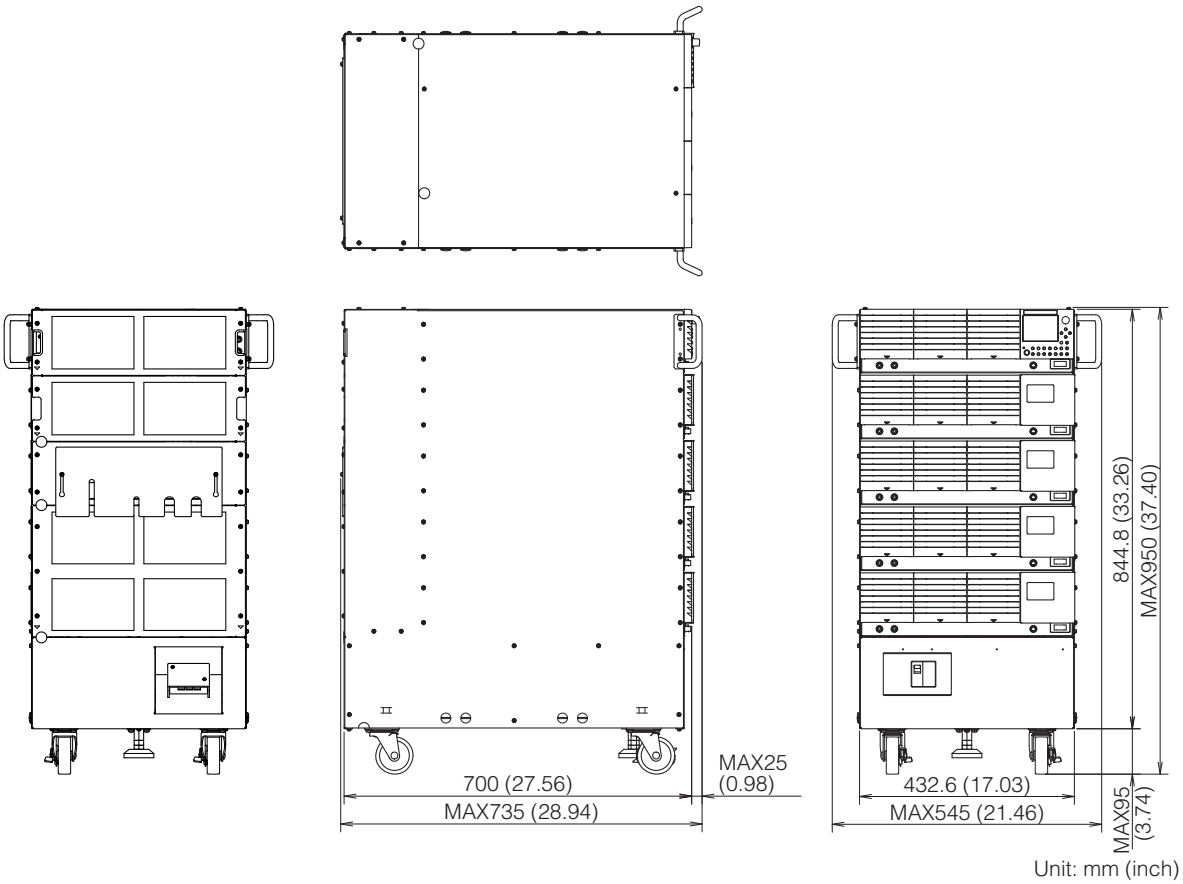
Unit: mm (inch)

PBZ40-40 SR



Unit: mm (inch)

PBZ40-50 SR



Unit: mm (inch)

AC Input

Item	PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
Nominal input rating	200 Vac to 240 Vac, 50 Hz to 60 Hz, single phase		
Input voltage range	180 Vac to 250 Vac		
Input frequency range	47 Hz to 63 Hz		
Current[1]	15 Aac or less	20 Aac or less	25 Aac or less
Inrush current	120 Apeak or less	160 Apeak or less	200 Apeak or less
Power[1]	2700 VA or less	3600 VA or less	4500 VA or less
Power factor[1]	0.95 TYP (when the input voltage is 200 V)		

1 When connected to a rated load.

Output

Item		PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
Output rating	Power	1206 W	1608 W	2010 W
	Voltage	±60 V		
	Current	±20.1 A	±26.8 A	±33.5 A
Output terminal	Output terminal	Rear panel output terminals		
	Isolation voltage[1]	500 Vdc		

1 Only the output's COM terminal can be grounded.

CV Mode Output

Item			PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
DC voltage	Settable range[1]	Bipolar mode	0 V to ±(105 % of rtg)		
		Unipolar mode	0 V to +(105 % of rtg)		
		Fine feature	±5 % of rtg		
	Resolution		0.002 V (0.0002 V for the fine feature)		
	Accuracy[2]		±(0.05 % of setting + 0.05 % of rtg)		
	Temperature coefficient		±100 ppm/°C of rtg (TYP)		
AC voltage	Settable range[1]		0.0 Vpp to (210 % of rtg) pp		
	Resolution		0.1 V		
	Accuracy[3]		±0.5 % of rtg		
AC frequency	Settable range		0.01 Hz to 100.00 kHz		
	Resolution		0.01 Hz		
	Accuracy		±200 ppm		
	Sweep		Linear and logarithmic		
	Sweep time		100 µs to 1000 s (resolution of 100 µs)		
AC waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms		
	Start phase		0 to 359°		
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz), 10 % to 90 % (1 kHz ≤ f < 10 kHz), and fixed to 50 % (10 kHz ≤ f)		
Constant voltage characteristics	Frequency response[4]		DC to 100 kHz (-3 dB)		
	Response[5] (TYP)		3.5 µs, 10 µs, 35 µs, 100 µs		
	Overshoot[6]		5 % or less (TYP)		
	Ripple noise	(p-p)[7]	40 mV (TYP)		
		(rms)[8]	6 mV		
	Load effect[9]		±(0.005 % of setting + 1 mV)		
	Source effect[10]		±(0.005 % of setting + 1 mV)		

1 The peak value of the sum of the DC voltage and AC voltage is limited by the DC voltage's settable range.
2 At an ambient temperature of 23 °C ± 5 °C.
3 1 kHz sine wave, 3.5 µs response.
4 A frequency where the amplitude ratio of the output voltage to the external signal input voltage is -3 dB (when the reference frequency is 1 kHz, the response is 3.5 µs, and when a rated load is connected).
5 The rise or fall time (at rated load; excluding when output is turned on and off). The frequency response is based on the specified response setting (frequency bandwidth = 0.35/the rise time).
Rise time: The time it takes for the output voltage to rise from 10 % to 90 % of the rating when the output voltage is changed from 0 V to the rated voltage.
Fall time: The time it takes for the output voltage to fall from 90 % to 10 % of the rating when the output voltage is changed from the rated voltage to 0 V.
6 Under no load or rated load.
7 The measurement frequency bandwidth is 10 Hz to 20 MHz (at the output terminals).
8 The measurement frequency bandwidth is 10 Hz to 1 MHz (at the output terminals).
9 The change in the output voltage in response to a change in the output current from 0 % to 100 % of the current rating (measured at the sensing terminals when remote sensing is used).
10 The change in the output voltage in response to a ±10 % change in the input voltage in reference to the nominal input voltage (measured at the sensing terminals when remote sensing is used).

CC Mode Output

Item			PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
DC current	Settable range[1]	Bipolar mode and unipolar mode	0 A to ±(105 % of rtg)		
		Fine feature	±5 % of rtg		
	Resolution[2]		0.003 A	0.004 A	0.005 A
		Fine feature[2]	0.0003 A	0.0004 A	0.0005 A
	Accuracy[3]		±0.3 % of rtg		
	Temperature coefficient		±100 ppm/°C of rtg (TYP)		
AC current	Settable range[1]		0 App to (210 % of rtg) pp		
	Resolution[4]		0.03 A	0.04 A	0.05 A
	Accuracy[5]		±0.5 % of rtg		
AC frequency	Settable range		0.01 Hz to 100.00 kHz		
	Resolution		0.01 Hz		
	Accuracy		±200 ppm		
	Sweep		Linear and logarithmic		
	Sweep time		100 µs to 1000 s (resolution of 100 µs)		
AC waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms		
	Start phase		0 to 359°		
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz), 10 % to 90 % (1 kHz ≤ f < 10 kHz), and fixed to 50 % (10 kHz ≤ f)		
Constant current characteristics	Frequency response[6]		DC to 10 kHz (-3 dB) (TYP)		
	Response[7] (TYP)		35 µs, 100 µs, 350 µs, 1 ms		
	Overshoot[8]		5 % or less (TYP)		
	Ripple noise (rms)[9]		5 mA		
	Load effect[10]		±(0.01 % of setting + 1 mA)		
	Source effect[11]		±(0.01 % of setting + 1 mA)		

1 The peak value of the sum of the DC current and AC current is limited by the DC current's settable range.0.001
2 You can set the DC current in 0.001 A (0.0001 A for the fine feature) steps, but it may not change at this resolution depending on the relationship with the internal D/A resolution.
3 At an ambient temperature of 23 °C ± 5 °C.
4 You can set the AC current in 0.001 A steps, but it may not change at this resolution depending on the relationship with the internal D/A resolution.
5 100 Hz sine wave, 35 µs/70 µs response, and shorted output.
6 A frequency where the amplitude ratio of the output current to the external signal input voltage is -3 dB (when the reference frequency is 100 Hz, the response is 35 µs/75 µs, and a rated load is connected). The frequency response changes according to the load impedance. When the load impedance increases, the frequency response decreases.
7 The rise or fall time (at rated load; excluding when output is turned on and off). The rise and fall times change according to the load impedance.
Rise time: The time it takes for the output current to rise from 10 % to 90 % of the rating when the output current is changed from 0 A to the rated current.
Fall time: The time it takes for the output current to fall from 90 % to 10 % of the rating when the output current is changed from the rated current to 0 A.
8 Under short circuit or rated load.
9 The measurement frequency bandwidth is 10 Hz to 1 MHz (when the output voltage is in the range of 10 % to 100 % of the rated output voltage).
10 The change in the output current in response to a change in the output voltage from 10 % to 100 % of the voltage rating.
11 The change in the output current in response to a ±10 % change in the input voltage in reference to the nominal input voltage (when the output voltage is in the range of 10 % to 100 % of the voltage rating).

Measurement Display Feature

Item			PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
Voltage measurement	DC	Measurement range (resolution)	120 % of rtg (0.001 V)		
		Accuracy[1]	±(0.05 % of rdng + 0.05 % of rtg)		
		Temperature coefficient	±100 ppm/°C of rtg (TYP)		
	AC	Measurement range (resolution)	120 % of rtg / CF (0.001 V)		
	DC + AC	Measurement range (resolution)	120 % of rtg (0.001 V)		
	AC and DC + AC	Accuracy[1, 2]	±(0.5 % of rdng + 0.1 % of rtg) in the range of 5 Hz to 10 kHz ±(1 % of rdng + 0.2 % of rtg) in the range of 10 kHz to 50 kHz ±(2 % of rdng + 0.2 % of rtg) in the range of 50 kHz to 100 kHz		
	PEAK	Measurement range (resolution)	120 % of rtg (0.01 V)		
		Accuracy[1, 3]	±0.5 % of rtg		
Current measurement	DC	Measurement range (resolution)	120 % of rtg (0.003 A)	120 % of rtg (0.004 A)	120 % of rtg (0.005 A)
		Accuracy[1]	±(0.3 % of rdng + 0.7 % of rtg)	±(0.3 % of rdng + 1.0 % of rtg)	±(0.3 % of rdng + 1.3 % of rtg)
		Temperature coefficient	±150 ppm/°C of rtg (TYP)		
	AC	Measurement range (resolution)	120 % of rtg/CF (0.003 A)	120 % of rtg/CF (0.004 A)	120 % of rtg/CF (0.005 A)
	DC + AC	Measurement range (resolution)	120 % of rtg (0.003 A)	120 % of rtg (0.004 A)	120 % of rtg (0.005 A)
	AC and DC + AC	Accuracy[1, 2]	±(3 % of rdng + 0.1 % of rtg) (5 Hz to 10 kHz) ±(10 % of rdng + 1 % of rtg) (10 kHz to 100 kHz)		
	PEAK	Measurement range (resolution)	120 % of rtg (0.03 A)	120 % of rtg (0.04 A)	120 % of rtg (0.05 A)
		Accuracy[1, 3]	±0.5 % of rtg		
Measurement time (Aperture)			100 µs to 3600 s		

1 At an ambient temperature of 23 °C ± 5 °C.
2 When the input signal is in the 100 kHz bandwidth and has a crest factor of 3 or less (the measurement time is at least 10 times the input signal period).
3 Calibrated with a 1 kHz sine wave.

Protection Features

Item		PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
Overvoltage protection	Protection operation[1, 2]	OVP or V.LIM (output limit) Select whether output or the POWER switch turns off when OVP is activated.		
	Settable ranges (Bipolar mode)	Select whether (-110% of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110% of rtg) or (-110% of rtg ≤ -OVP ≤ -1% of rtg, +1% of rtg ≤ +OVP ≤ +110% of rtg)		
	Settable range (Unipolar mode)	Select whether (-1 % of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110% of rtg) or (+1% of rtg ≤ +OVP ≤ +110% of rtg)		
	Resolution	0.01 V		
	Accuracy	±1 % of rtg		
Overcurrent protection	Protection operation	OCP or I.LIM (output limit) Select whether output or the POWER switch turns off when OVP is activated.		
	Settable ranges	Select whether (-110% of rtg ≤ -I.LIM ≤ -1% of rtg, +1% of rtg ≤ +I.LIM ≤ +110% of rtg) or (-110% of rtg ≤ -OCP ≤ -1% of rtg, +1% of rtg ≤ +OCP ≤ +110% of rtg)		
	Resolution	0.01 A		
	Accuracy	±1 % of rtg		
Overheat protection	Protection operation	Turns output off when overheating is detected.		
Power limit (sink power)	Bipolar mode	600 W (TYP)	800 W (TYP)	1000 W (TYP)
	Unipolar mode	1200 W (TYP)	1600 W (TYP)	2000 W (TYP)

1 Voltage is detected at the output terminals.
2 OVP is activated even when V.LIM (voltage limit) is selected. The OVP activation point is approximately ±120 % of rtg.

Control Feature

Item		PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
Internal signal source's DC signal control	Control voltage input	By applying approximately 0 V to approximately ±10.0 V, you can generate 0 % to ±100 % of the rated output.		
	Control voltage ratio input	By using a 10 kΩ external variable resistor to change the internal reference voltage's voltage-divider ratio, you can generate 0 % to ±108 % of the rated output.		
Output on/off control input		External contact input to turn output on and off.		
Shutdown input		External contact input to turn the POWER switch off.		
Status output		CV/CC mode, output on, alarm occurrence.		

Signal I/O

Item			PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
External signal input	Amplifier gain	CV mode	-60.0 to +60.0		
		CC mode	-20.10 S to +20.10 S	-26.80 S to +26.80 S	-33.50 S to +33.50 S
		Resolution[1]	0.1 V (CV mode) and 0.03 S (CC mode)	0.1 V (CV mode) and 0.04 S (CC mode)	0.1 V (CV mode) and 0.05 S (CC mode)
		Accuracy[2]	±5 % of rtg		
	Maximum allowable input voltage		±12 Vpeak		
	Input impedance		10 kΩ (TYP)		
	Terminal		BNC Safety Socket (Common is connected to the output's COM terminal.)		
Current monitor output	Output voltage[3]		2 V with the rated current		
	Output voltage accuracy		±1 % of rtg (TYP)		
	Output voltage frequency response		DC to 20 kHz		
	Terminal		BNC Safety Socket (Common is connected to the output's COM terminal.)		
Clock input	Input voltage		0.5 Vp-p to 5 Vp-p		
	Input impedance		1 kΩ TYP (AC coupling)		
	Lockable frequency range		10 MHz ± 200 Hz		
	Lock time		2 s or less		
	Terminal		Isolated BNC (Common is isolated from the chassis; the maximum isolation voltage is 42 Vpeak.)		
Clock output	Output voltage		1 Vp-p TYP (when terminated with 50 Ω)		
	Output impedance		50 Ω TYP (AC coupling)		
	Output frequency		10 MHz ± 200 Hz		
	Terminal		BNC (Common is connected to the chassis.)		
Trigger input	Input level		H level: 2 V to 5 V. L level: 0 V to 0.8 V (TTL compatible)		
	Polarity		H level and L level		
	Pulse width		1 µs or more		
	Delay		1 µs or less		
	Input impedance		10 kΩ TYP (DC coupling)		
	Terminal		BNC (Common is connected to the chassis.)		
Trigger output	Output level		H level: 2.7 V to 5 V. L level: 0 V to 0.4 V (TTL compatible)		
	Polarity		H level and L level		
	Pulse width		10 µs (TYP)		
	Rise time and fall time		100 ns or less		
	Fan-out		Five units from the PBZ series and the PBZ-SR series		
	Terminal		BNC (Common is connected to the chassis.)		

1 You can set the gain in 0.01 S steps in CC mode, but it may not change at this resolution depending on the relationship with the internal D/A resolution.
2 When the amplifier gain is at maximum and the PBZ-SR is generating DC.
3 Output proportional to the total output current of the PBZ-SR for the master unit and output proportional to the output current per slave unit for the slave unit.

Interface

Item		PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
Common specifications	Software protocol	IEEE Std 488.2-1992		
	Command language	Complies with SCPI Specification 1999.0		
RS232C	Hardware	Complies with the EIA232D specifications		
		D-SUB 9-pin connector (male)[1]		
		Baud rate: 1200, 2400, 4800, 9600, 19200, and 38400 bps		
		Data length: 7 bits or 8 bits. Stop bit: 1 bit or 2 bits. Parity bit: None.		
		Flow control: X-flow or none.		
	Program message terminator	LF during reception, LF during transmission		
GPIB	Hardware	Complies with IEEE Std 488.1-1987		
		SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, and E1		
		24-pin connector (receptacle)		
	Program message terminator	LF or EOI during reception, LF + EOI during transmission		
	Primary address	1 to 30		
USB	Hardware	Complies with the USB 2.0 specifications. Data rate: 12 Mbps (full speed).		
		Socket B type		
	Program message terminator	LF or EOM during reception, LF + EOM during transmission		
	Device class	Complies with the USBTMC-USB488 device class specifications		
LAN	Hardware	IEEE 802.3 100Base-TX/10Base-T Ethernet Complies with the LXI 1.4 Core 2011		
		IPv4, RJ-45 connector[2]		
	Communication protocol	VXI-11/ SCPI-RAW		
	Program message terminator	LF or END during reception, LF + END during transmission		

1 Use a cross cable (null modem cable).
2 Category 5; use a straight cable.

Other Features

Item		PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
Sequence feature	Number of programs and number of steps	16 programs and total of 1024 steps		
	Step time	100 µs to 1000 h (resolution of 100 µs) The DC signal ramp and AC signal amplitude sweep both stop after 1000 s. The AC signal frequency sweep repeats once every 1000 s.		
Preset memory		3 memory entries		
Setup memory		10 memory entries		
Key lock		Select one of three security levels		
Remote sensing		Can be turned on and off		
Power-on operation		Turn output on or begin execution of the sequence feature		
Soft start and soft stop		Can be turned on and off. Soft start and soft stop time: 0.1 ms to 1000 s.		

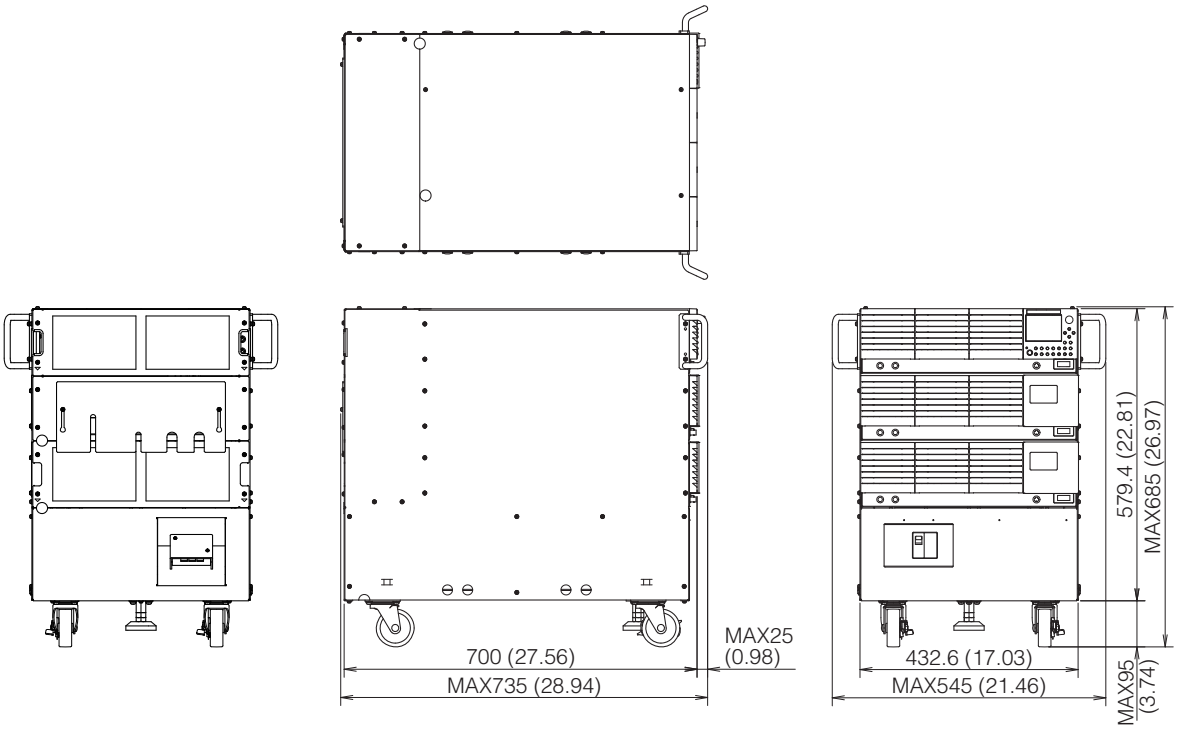
General

Item		PBZ60-20.1 SR	PBZ60-26.8 SR	PBZ60-33.5 SR
Weight (just the PBZ-SR)		Approx. 110 kg (242.5 lb)	Approx. 130 kg (286.6 lb)	Approx. 160 kg (352.7 lb)
Outline drawing		p. 18	p. 18	p. 19
Environmental conditions	Operating environment	Indoor use, overvoltage category II		
	Operating temperature	0 °C to +40 °C (+32 °F to +104 °F)		
	Operating humidity	20 %rh to 85 %rh (no condensation)		
	Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)		
	Storage humidity	90 %rh or less (no condensation)		
	Altitude	Up to 2000 m		
Grounding polarity		Only the output's COM terminal can be grounded.		
Isolation voltage		500 Vdc max		
Withstand voltage	Across the primary circuit and chassis	No abnormalities at 1500 Vac for 1 minute		
	Across the primary circuit and the output terminals			
Insulation resistance	Across the primary circuit and chassis	500 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)		
	Across the primary circuit and the output terminals			
	Across the output terminals and chassis[1]	500 Vdc, 0.33 MΩ or greater	500 Vdc, 0.25 MΩ or greater	500 Vdc, 0.20 MΩ or greater
Leakage current (250 V/60 Hz)		10 mA or less		
Earth continuity	AC input terminal, across the grounding terminal and chassis	100 Aac, 0.1 Ω or less		
Cooling method		Forced air cooling using variable-speed, heat-sensitive fan		
Battery backup		Settings are retained when the power is off. At least three years of battery life (at 25 °C).		
Safety[2]		Complies with the requirements of the following standards. Low Voltage Directive 2014/35/EU[3] EN 61010-1 (Class I[4] , Pollution degree 2[5])		
Electromagnetic compatibility (EMC)[2] [3]		Complies with the requirements of the following standard. EMC Directive 2014/30/EU EN 61326-1 (Class A[6]) EN 55011 (Class A[6], Group 1[7]) EN 61000-3-2 EN 61000-3-3 Applicable condition All of the cables and wires connected to the PBZ are less than 3 m in length.		
Accessories	J1 connector kit	Socket (1 pc.)		
		Protection covers (2 pairs)		
		Pins (30 pc.)		
	Heavy object warning label	1 pc.		
	CD-ROM	1 pc.		
	PBZ-SR series manuals	Setup Guide (1 pc.)		
		Quick Reference (Japanese: 1 pc.) (English: 1 pc.)		
		Safety Information (1 pc.)		

1 At 70 %rh humidity or less
2 Does not apply to specially ordered or modified products.
3 Limited to products that have a CE mark.
4 This is a Class I instrument. Be sure to ground this product's protective conductor terminal. The safety of this product is guaranteed only when the product is properly grounded.
5 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.
6 This is a Class A instrument. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
7 This is a Group 1 instrument. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

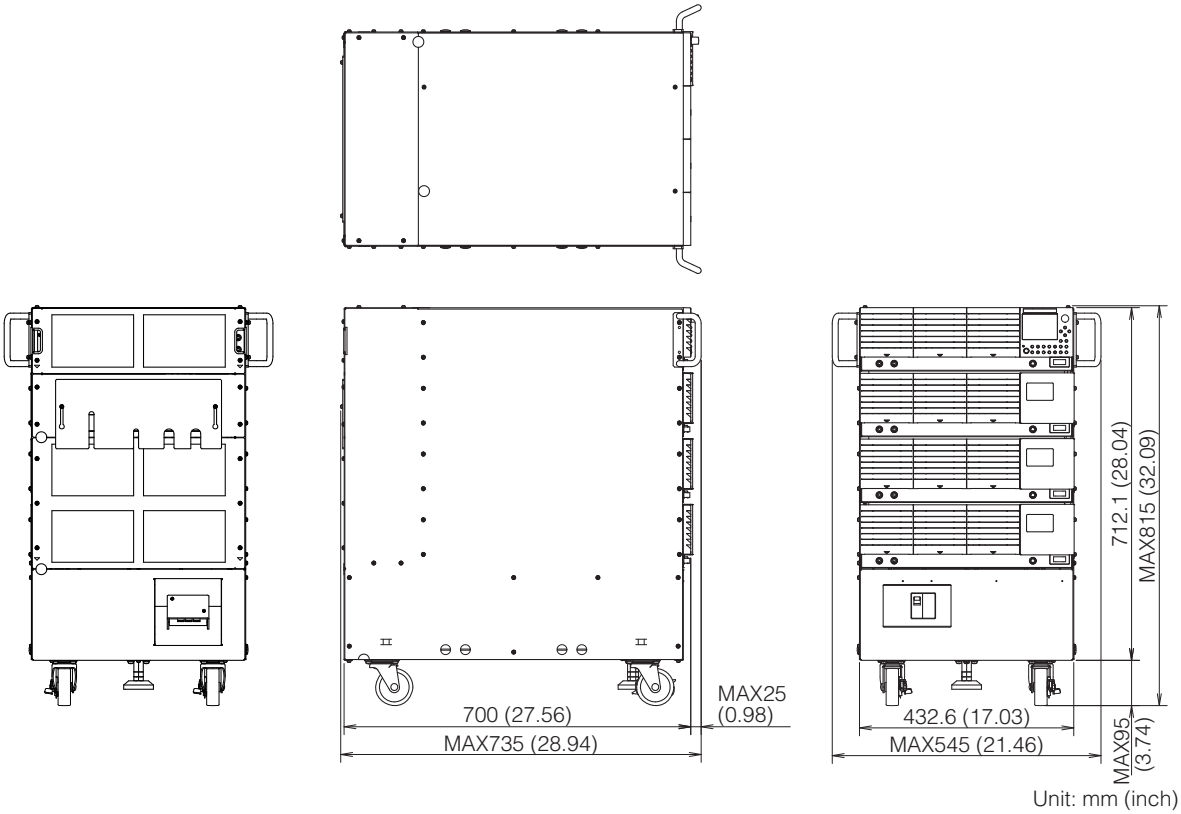
Outline Drawing

PBZ60-20.1 SR



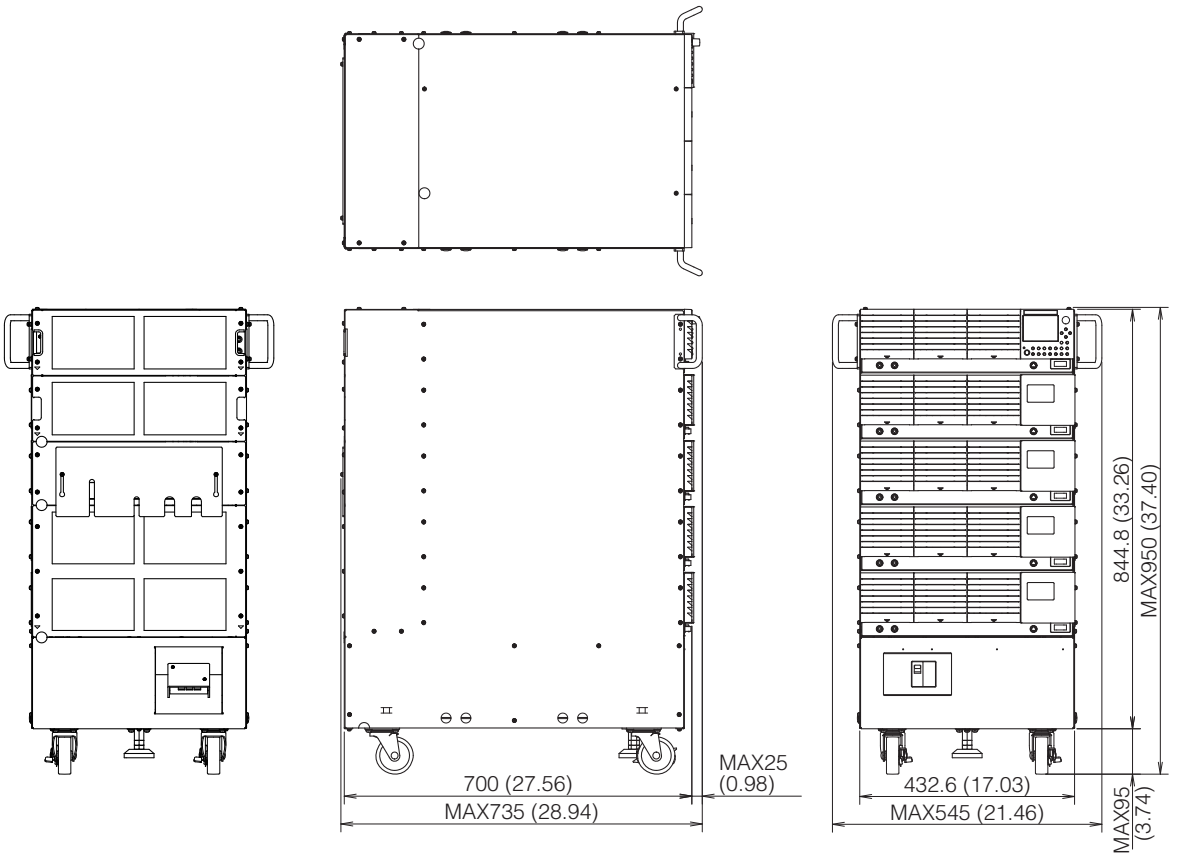
Unit: mm (inch)

PBZ60-26.8 SR



Unit: mm (inch)

PBZ60-33.5 SR



Unit: mm (inch)

AC Input

Item	PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
Nominal input rating	200 Vac to 240 Vac, 50 Hz to 60 Hz, single phase		
Input voltage range	180 Vac to 250 Vac		
Input frequency range	47 Hz to 63 Hz		
Current[1]	15 Aac or less	20 Aac or less	25 Aac or less
Inrush current	120 Apeak or less	160 Apeak or less	200 Apeak or less
Power[1]	2700 VA or less	3600 VA or less	4500 VA or less
Power factor[1]	0.95 TYP (when the input voltage is 200 V)		

1 When connected to a rated load.

Output

Item		PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
Output rating	Power	1200 W	1600 W	2000 W
	Voltage	±80 V		
	Current	±15 A	±20 A	±25 A
Output terminal	Output terminal	Rear panel output terminals		
	Isolation voltage[1]	500 Vdc		

1 Only the output's COM terminal can be grounded.

CV Mode Output

Item			PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
DC voltage	Settable range[1]	Bipolar mode	0 V to ±(105 % of rtg)		
		Unipolar mode	0 V to +(105 % of rtg)		
		Fine feature	±5 % of rtg		
	Resolution		0.002 V (0.0002 V for the fine feature)		
	Accuracy[2]		±(0.05 % of setting + 0.05 % of rtg)		
	Temperature coefficient		±100 ppm/°C of rtg (TYP)		
AC voltage	Settable range[1]		0.0 Vpp to (210 % of rtg) pp		
	Resolution		0.1 V		
	Accuracy[3]		±0.5 % of rtg		
AC frequency	Settable range		0.01 Hz to 100.00 kHz		
	Resolution		0.01 Hz		
	Accuracy		±200 ppm		
	Sweep		Linear and logarithmic		
	Sweep time		100 µs to 1000 s (resolution of 100 µs)		
AC waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms		
	Start phase		0 to 359°		
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz), 10 % to 90 % (1 kHz ≤ f < 10 kHz), and fixed to 50 % (10 kHz ≤ f)		
Constant voltage characteristics	Frequency response[4]		DC to 100 kHz (-3 dB)		
	Response[5] (TYP)		3.5 µs, 10 µs, 35 µs, 100 µs		
	Overshoot[6]		5 % or less (TYP)		
	Ripple noise	(p-p)[7]	40 mV (TYP)		
		(rms)[8]	6 mV		
	Load effect[9]		±(0.005 % of setting + 1 mV)		
	Source effect[10]		±(0.005 % of setting + 1 mV)		

1 The peak value of the sum of the DC voltage and AC voltage is limited by the DC voltage's settable range.
2 At an ambient temperature of 23 °C ± 5 °C.
3 1 kHz sine wave, 3.5 µs response.
4 A frequency where the amplitude ratio of the output voltage to the external signal input voltage is -3 dB (when the reference frequency is 1 kHz, the response is 3.5 µs, and when a rated load is connected).
5 The rise or fall time (at rated load; excluding when output is turned on and off). The frequency response is based on the specified response setting (frequency bandwidth = 0.35/the rise time).
Rise time: The time it takes for the output voltage to rise from 10 % to 90 % of the rating when the output voltage is changed from 0 V to the rated voltage.
Fall time: The time it takes for the output voltage to fall from 90 % to 10 % of the rating when the output voltage is changed from the rated voltage to 0 V.
6 Under no load or rated load.
7 The measurement frequency bandwidth is 10 Hz to 20 MHz (at the output terminals).
8 The measurement frequency bandwidth is 10 Hz to 1 MHz (at the output terminals).
9 The change in the output voltage in response to a change in the output current from 0 % to 100 % of the current rating (measured at the sensing terminals when remote sensing is used).
10 The change in the output voltage in response to a ±10 % change in the input voltage in reference to the nominal input voltage (measured at the sensing terminals when remote sensing is used).

CC Mode Output

Item			PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
DC current	Settable range[1]	Bipolar mode and unipolar mode	0 A to ±(105 % of rtg)		
		Fine feature	±5 % of rtg		
	Resolution[2]		0.003 A	0.004 A	0.005 A
		Fine feature[2]	0.0003 A	0.0004 A	0.0005 A
	Accuracy[3]		±0.3 % of rtg		
	Temperature coefficient		±100 ppm/°C of rtg (TYP)		
AC current	Settable range[1]		0 App to (210 % of rtg) pp		
	Resolution[4]		0.03 A	0.04 A	0.05 A
	Accuracy[5]		±0.5 % of rtg		
AC frequency	Settable range		0.01 Hz to 100.00 kHz		
	Resolution		0.01 Hz		
	Accuracy		±200 ppm		
	Sweep		Linear and logarithmic		
	Sweep time		100 µs to 1000 s (resolution of 100 µs)		
AC waveform	Type		Sine wave, square wave, triangle wave, and 16 user-defined arbitrary waveforms		
	Start phase		0 to 359°		
	Square wave duty cycle		0.1 % to 99.9 % (f < 100 Hz), 1 % to 99 % (100 Hz ≤ f < 1 kHz), 10 % to 90 % (1 kHz ≤ f < 10 kHz), and fixed to 50 % (10 kHz ≤ f)		
Constant current characteristics	Frequency response[6]		DC to 10 kHz (-3 dB) (TYP)		
	Response[7] (TYP)		35 µs, 100 µs, 350 µs, 1 ms		
	Overshoot[8]		5 % or less (TYP)		
	Ripple noise (rms)[9]		5 mA		
	Load effect[10]		±(0.01 % of setting + 1 mA)		
	Source effect[11]		±(0.01 % of setting + 1 mA)		

1 The peak value of the sum of the DC current and AC current is limited by the DC current's settable range.0.001

2 You can set the DC current in 0.001 A (0.0001 A for the fine feature) steps, but it may not change at this resolution depending on the relationship with the internal D/A resolution.

3 At an ambient temperature of 23 °C ± 5 °C.

4 You can set the AC current in 0.001 A steps, but it may not change at this resolution depending on the relationship with the internal D/A resolution.

5 100 Hz sine wave, 35 µs/70 µs response, and shorted output.

6 A frequency where the amplitude ratio of the output current to the external signal input voltage is -3 dB (when the reference frequency is 100 Hz, the response is 35 µs/75 µs, and a rated load is connected). The frequency response changes according to the load impedance. When the load impedance increases, the frequency response decreases.

7 The rise or fall time (at rated load; excluding when output is turned on and off). The rise and fall times change according to the load impedance.
Rise time: The time it takes for the output current to rise from 10 % to 90 % of the rating when the output current is changed from 0 A to the rated current.
Fall time: The time it takes for the output current to fall from 90 % to 10 % of the rating when the output current is changed from the rated current to 0 A.

8 Under short circuit or rated load.

9 The measurement frequency bandwidth is 10 Hz to 1 MHz (when the output voltage is in the range of 10 % to 100 % of the rated output voltage).

10 The change in the output current in response to a change in the output voltage from 10 % to 100 % of the voltage rating.

11 The change in the output current in response to a ±10 % change in the input voltage in reference to the nominal input voltage (when the output voltage is in the range of 10 % to 100 % of the voltage rating).

Measurement Display Feature

Item			PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
Voltage measurement	DC	Measurement range (resolution)	120 % of rtg (0.001 V)		
		Accuracy[1]	±(0.05 % of rdng + 0.05 % of rtg)		
		Temperature coefficient	±100 ppm/°C of rtg (TYP)		
	AC	Measurement range (resolution)	120 % of rtg / CF (0.001 V)		
	DC + AC	Measurement range (resolution)	120 % of rtg (0.001 V)		
	AC and DC + AC	Accuracy[1, 2]	±(0.5 % of rdng + 0.1 % of rtg) in the range of 5 Hz to 10 kHz ±(1 % of rdng + 0.2 % of rtg) in the range of 10 kHz to 50 kHz ±(2 % of rdng + 0.2 % of rtg) in the range of 50 kHz to 100 kHz		
	PEAK	Measurement range (resolution)	120 % of rtg (0.01 V)		
		Accuracy[1, 3]	±0.5 % of rtg		
Current measurement	DC	Measurement range (resolution)	120 % of rtg (0.003 A)	120 % of rtg (0.004 A)	120 % of rtg (0.005 A)
		Accuracy[1]	±(0.3 % of rdng + 0.7 % of rtg)	±(0.3 % of rdng + 1.0 % of rtg)	±(0.3 % of rdng + 1.3 % of rtg)
		Temperature coefficient	±150 ppm/°C of rtg (TYP)		
	AC	Measurement range (resolution)	120 % of rtg/CF (0.003 A)	120 % of rtg/CF (0.004 A)	120 % of rtg/CF (0.005 A)
	DC + AC	Measurement range (resolution)	120 % of rtg (0.003 A)	120 % of rtg (0.004 A)	120 % of rtg (0.005 A)
	AC and DC + AC	Accuracy[1, 2]	±(3 % of rdng + 0.1 % of rtg) (5 Hz to 10 kHz) ±(10 % of rdng + 1 % of rtg) (10 kHz to 100 kHz)		
	PEAK	Measurement range (resolution)	120 % of rtg (0.03 A)	120 % of rtg (0.04 A)	120 % of rtg (0.05 A)
		Accuracy[1, 3]	±0.5 % of rtg		
Measurement time (Aperture)			100 µs to 3600 s		

1 At an ambient temperature of 23 °C ± 5 °C.
2 When the input signal is in the 100 kHz bandwidth and has a crest factor of 3 or less (the measurement time is at least 10 times the input signal period).
3 Calibrated with a 1 kHz sine wave.

Protection Features

Item		PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
Overvoltage protection	Protection operation[1, 2]	OVP or V.LIM (output limit) Select whether output or the POWER switch turns off when OVP is activated.		
	Settable ranges (Bipolar mode)	Select whether (-110% of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110% of rtg) or (-110% of rtg ≤ -OVP ≤ -1% of rtg, +1% of rtg ≤ +OVP ≤ +110% of rtg)		
	Settable range (Unipolar mode)	Select whether (-1 % of rtg ≤ -V.LIM ≤ +V.LIM ≤ +110% of rtg) or (+1% of rtg ≤ +OVP ≤ +110% of rtg)		
	Resolution	0.01 V		
	Accuracy	±1 % of rtg		
Overcurrent protection	Protection operation	OCP or I.LIM (output limit) Select whether output or the POWER switch turns off when OVP is activated.		
	Settable ranges	Select whether (-110% of rtg ≤ -I.LIM ≤ -1% of rtg, +1% of rtg ≤ +I.LIM ≤ +110% of rtg) or (-110% of rtg ≤ -OCP ≤ -1% of rtg, +1% of rtg ≤ +OCP ≤ +110% of rtg)		
	Resolution	0.01 A		
	Accuracy	±1 % of rtg		
Overheat protection	Protection operation	Turns output off when overheating is detected.		
Power limit (sink power)	Bipolar mode	600 W (TYP)	800 W (TYP)	1000 W (TYP)
	Unipolar mode	1200 W (TYP)	1600 W (TYP)	2000 W (TYP)

1 Voltage is detected at the output terminals.
2 OVP is activated even when V.LIM (voltage limit) is selected. The OVP activation point is approximately ±120 % of rtg.

Control Feature

Item		PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
Internal signal source's DC signal control	Control voltage input	By applying approximately 0 V to approximately ±10.0 V, you can generate 0 % to ±100 % of the rated output.		
	Control voltage ratio input	By using a 10 kΩ external variable resistor to change the internal reference voltage's voltage-divider ratio, you can generate 0 % to ±108 % of the rated output.		
Output on/off control input		External contact input to turn output on and off.		
Shutdown input		External contact input to turn the POWER switch off.		
Status output		CV/CC mode, output on, alarm occurrence.		

Signal I/O

Item			PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
External signal input	Amplifier gain	CV mode	-80.0 to +80.0		
		CC mode	-15.00 S to +15.00 S	-20.00 S to +20.00 S	-25.00 S to +25.00 S
		Resolution[1]	0.1 V (CV mode) and 0.03 S (CC mode)	0.1 V (CV mode) and 0.04 S (CC mode)	0.1 V (CV mode) and 0.05 S (CC mode)
		Accuracy[2]	±5 % of rtg		
	Maximum allowable input voltage		±12 Vpeak		
	Input impedance		10 kΩ (TYP)		
	Terminal		BNC Safety Socket (Common is connected to the output's COM terminal.)		
Current monitor output	Output voltage[3]		2 V with the rated current		
	Output voltage accuracy		±1 % of rtg (TYP)		
	Output voltage frequency response		DC to 20 kHz		
	Terminal		BNC Safety Socket (Common is connected to the output's COM terminal.)		
Clock input	Input voltage		0.5 Vp-p to 5 Vp-p		
	Input impedance		1 kΩ TYP (AC coupling)		
	Lockable frequency range		10 MHz ± 200 Hz		
	Lock time		2 s or less		
	Terminal		Isolated BNC (Common is isolated from the chassis; the maximum isolation voltage is 42 Vpeak.)		
Clock output	Output voltage		1 Vp-p TYP (when terminated with 50 Ω)		
	Output impedance		50 Ω TYP (AC coupling)		
	Output frequency		10 MHz ± 200 Hz		
	Terminal		BNC (Common is connected to the chassis.)		
Trigger input	Input level		H level: 2 V to 5 V. L level: 0 V to 0.8 V (TTL compatible)		
	Polarity		H level and L level		
	Pulse width		1 µs or more		
	Delay		1 µs or less		
	Input impedance		10 kΩ TYP (DC coupling)		
	Terminal		BNC (Common is connected to the chassis.)		
Trigger output	Output level		H level: 2.7 V to 5 V. L level: 0 V to 0.4 V (TTL compatible)		
	Polarity		H level and L level		
	Pulse width		10 µs (TYP)		
	Rise time and fall time		100 ns or less		
	Fan-out		Five units from the PBZ series and the PBZ-SR series		
	Terminal		BNC (Common is connected to the chassis.)		

1 You can set the gain in 0.01 S steps in CC mode, but it may not change at this resolution depending on the relationship with the internal D/A resolution.
2 When the amplifier gain is at maximum and the PBZ-SR is generating DC.
3 Output proportional to the total output current of the PBZ-SR for the master unit and output proportional to the output current per slave unit for the slave unit.

Interface

Item		PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
Common specifications	Software protocol	IEEE Std 488.2-1992		
	Command language	Complies with SCPI Specification 1999.0		
RS232C	Hardware	Complies with the EIA232D specifications		
		D-SUB 9-pin connector (male)[1]		
		Baud rate: 1200, 2400, 4800, 9600, 19200, and 38400 bps		
		Data length: 7 bits or 8 bits. Stop bit: 1 bit or 2 bits. Parity bit: None.		
		Flow control: X-flow or none.		
	Program message terminator	LF during reception, LF during transmission		
GPIB	Hardware	Complies with IEEE Std 488.1-1987		
		SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, and E1		
		24-pin connector (receptacle)		
	Program message terminator	LF or EOI during reception, LF + EOI during transmission		
	Primary address	1 to 30		
USB	Hardware	Complies with the USB 2.0 specifications. Data rate: 12 Mbps (full speed).		
		Socket B type		
	Program message terminator	LF or EOM during reception, LF + EOM during transmission		
	Device class	Complies with the USBTMC-USB488 device class specifications		
LAN	Hardware	IEEE 802.3 100Base-TX/10Base-T Ethernet Complies with the LXI 1.4 Core 2011		
		IPv4, RJ-45 connector[2]		
	Communication protocol	VXI-11/ SCPI-RAW		
	Program message terminator	LF or END during reception, LF + END during transmission		

1 Use a cross cable (null modem cable).
2 Category 5; use a straight cable.

Other Features

Item		PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
Sequence feature	Number of programs and number of steps	16 programs and total of 1024 steps		
	Step time	100 µs to 1000 h (resolution of 100 µs) The DC signal ramp and AC signal amplitude sweep both stop after 1000 s. The AC signal frequency sweep repeats once every 1000 s.		
Preset memory		3 memory entries		
Setup memory		10 memory entries		
Key lock		Select one of three security levels		
Remote sensing		Can be turned on and off		
Power-on operation		Turn output on or begin execution of the sequence feature		
Soft start and soft stop		Can be turned on and off. Soft start and soft stop time: 0.1 ms to 1000 s.		

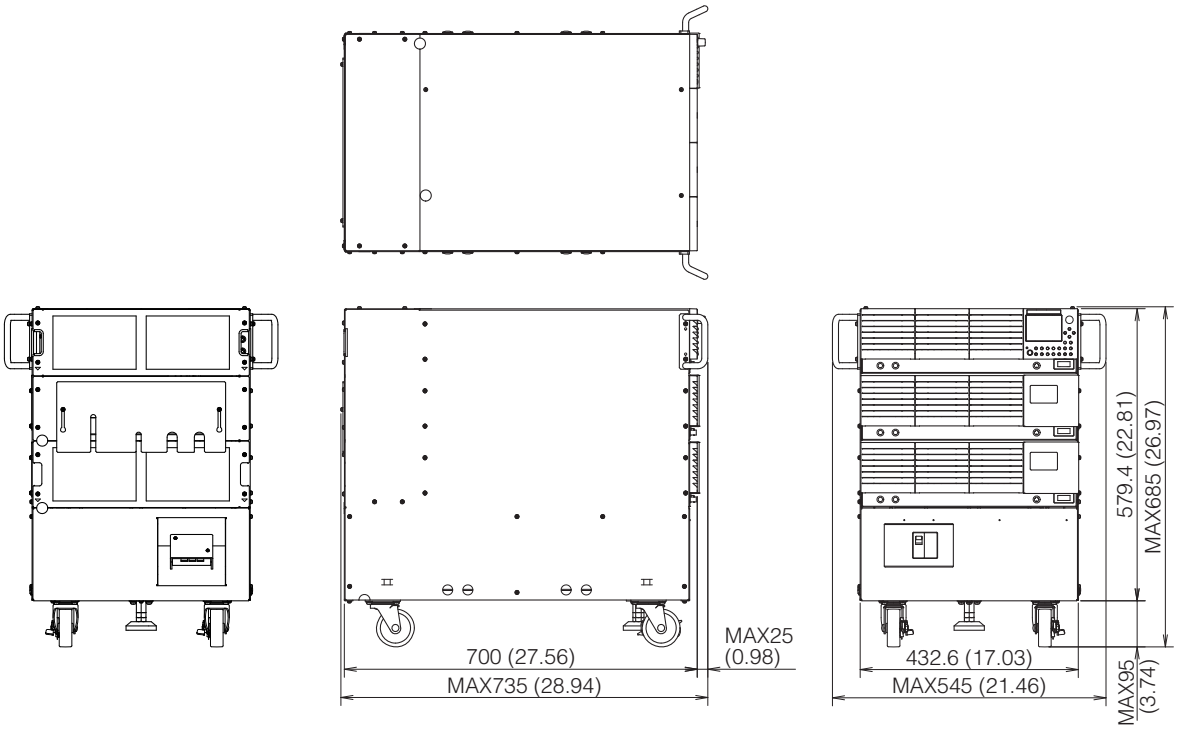
General

Item		PBZ80-15 SR	PBZ80-20SR	PBZ80-25 SR
Weight (just the PBZ-SR)		Approx. 110 kg (242.5 lb)	Approx. 130 kg (286.6 lb)	Approx. 160 kg (352.7 lb)
Outline drawing		p. 18	p. 18	p. 19
Environmental conditions	Operating environment	Indoor use, overvoltage category II		
	Operating temperature	0 °C to +40 °C (+32 °F to +104 °F)		
	Operating humidity	20 %rh to 85 %rh (no condensation)		
	Storage temperature	-25 °C to +70 °C (-13 °F to +158 °F)		
	Storage humidity	90 %rh or less (no condensation)		
	Altitude	Up to 2000 m		
Grounding polarity		Only the output's COM terminal can be grounded.		
Isolation voltage		500 Vdc max		
Withstand voltage	Across the primary circuit and chassis	No abnormalities at 1500 Vac for 1 minute		
	Across the primary circuit and the output terminals			
Insulation resistance	Across the primary circuit and chassis	500 Vdc, 30 MΩ or greater (at 70 %rh humidity or less)		
	Across the primary circuit and the output terminals			
	Across the output terminals and chassis[1]	500 Vdc, 0.33 MΩ or greater	500 Vdc, 0.25 MΩ or greater	500 Vdc, 0.20 MΩ or greater
Leakage current (250 V/60 Hz)		10 mA or less		
Earth continuity	AC input terminal, across the grounding terminal and chassis	100 Aac, 0.1 Ω or less		
Cooling method		Forced air cooling using variable-speed, heat-sensitive fan		
Battery backup		Settings are retained when the power is off. At least three years of battery life (at 25 °C).		
Safety[2]		Complies with the requirements of the following standards. Low Voltage Directive 2014/35/EU[3] EN 61010-1 (Class I[4] , Pollution degree 2[5])		
Electromagnetic compatibility (EMC)[2] [3]		Complies with the requirements of the following standard. EMC Directive 2014/30/EU EN 61326-1 (Class A[6]) EN 55011 (Class A[6], Group 1[7]) EN 61000-3-2 EN 61000-3-3 Applicable condition All of the cables and wires connected to the PBZ are less than 3 m in length.		
Accessories	J1 connector kit	Socket (1 pc.)		
		Protection covers (2 pairs)		
		Pins (30 pc.)		
	Heavy object warning label	1 pc.		
	CD-ROM	1 pc.		
	PBZ-SR series manuals	Setup Guide (1 pc.)		
		Quick Reference (Japanese: 1 pc.) (English: 1 pc.)		
		Safety Information (1 pc.)		

1 At 70 %rh humidity or less
2 Does not apply to specially ordered or modified products.
3 Limited to products that have a CE mark.
4 This is a Class I instrument. Be sure to ground this product's protective conductor terminal. The safety of this product is guaranteed only when the product is properly grounded.
5 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.
6 This is a Class A instrument. This product is intended for use in an industrial environment. This product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.
7 This is a Group 1 instrument. This product does not generate and/or use intentionally radio-frequency energy, in the form of electromagnetic radiation, inductive and/or capacitive coupling, for the treatment of material or inspection/analysis purpose.

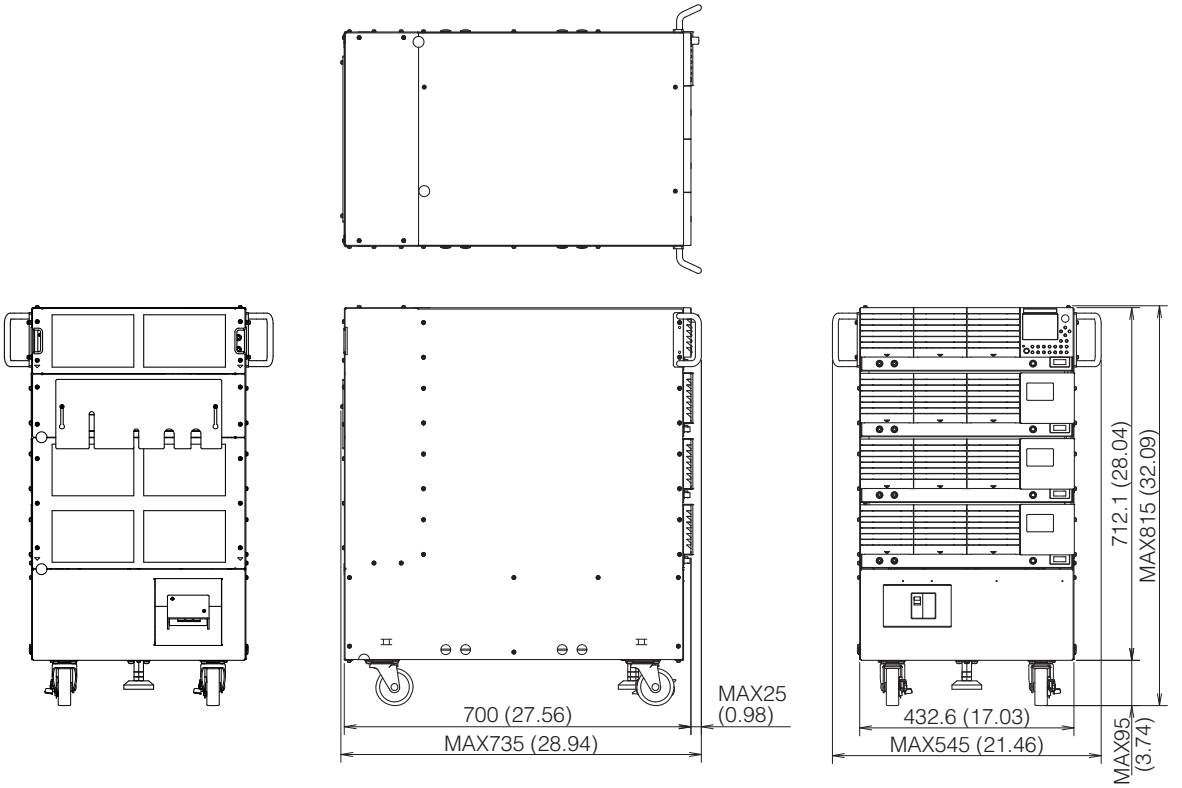
Outline Drawing

PBZ80-15 SR



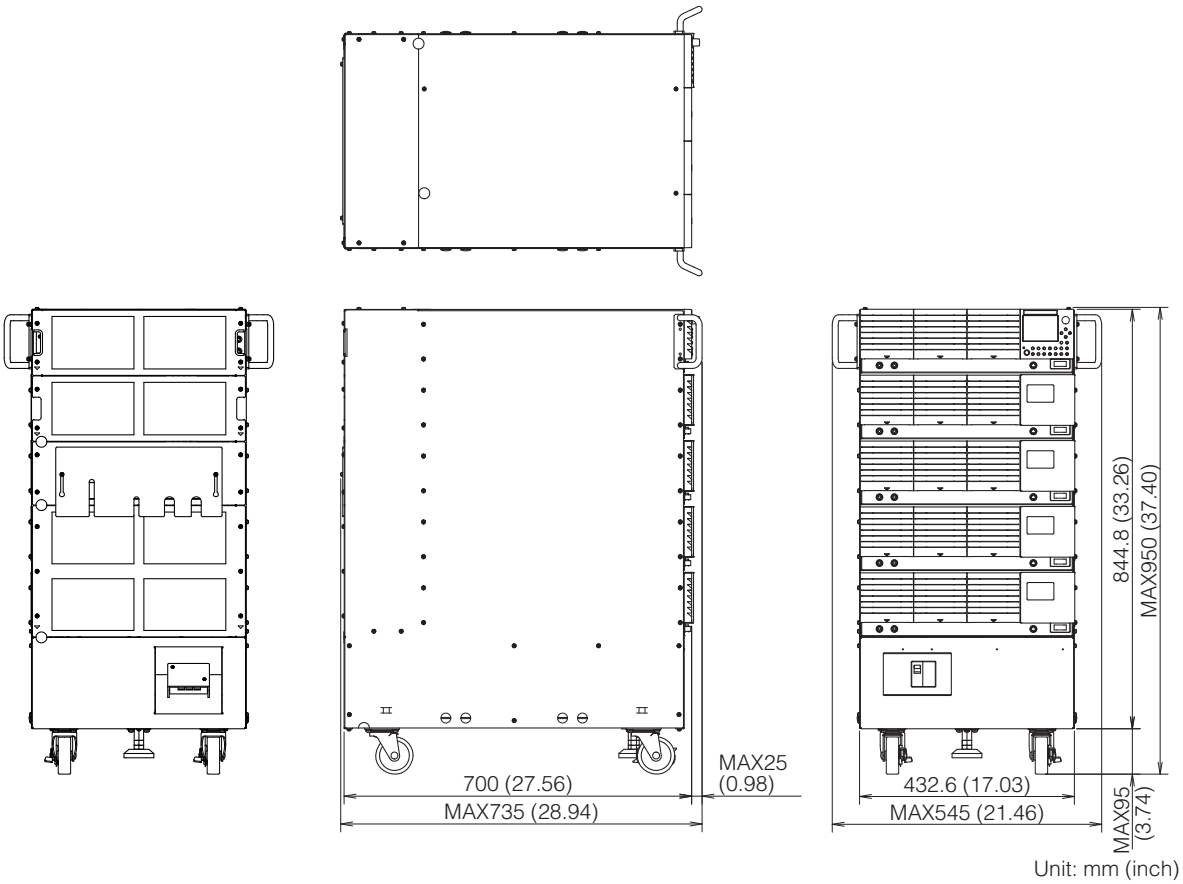
Unit: mm (inch)

PBZ80-20 SR



Unit: mm (inch)

PBZ80-25 SR



Unit: mm (inch)

This page is intentionally blank.

This page is intentionally blank.

If you find any misplaced or missing pages in the manuals, they will be replaced. If the manual gets lost or soiled, a new copy can be provided for a fee. In either case, please contact your Kikusui agent or distributor. At that time, inform your agent or distributor of the “Part No.” written on the front cover of this manual.

Every effort has been made to ensure the accuracy of this manual. However, if you have any questions or find any errors or omissions, please contact your Kikusui agent or distributor.

After you have finished reading this manual, store it so that you can use it for reference at any time.

KIKUSUI ELECTRONICS CORP.

1-1-3 Higashiyamata, Tsuzuki-ku, Yokohama,
224-0023, Japan

Tel: +81-45-482-6353
Fax: +81-45-482-6261

www.kikusui.co.jp/en