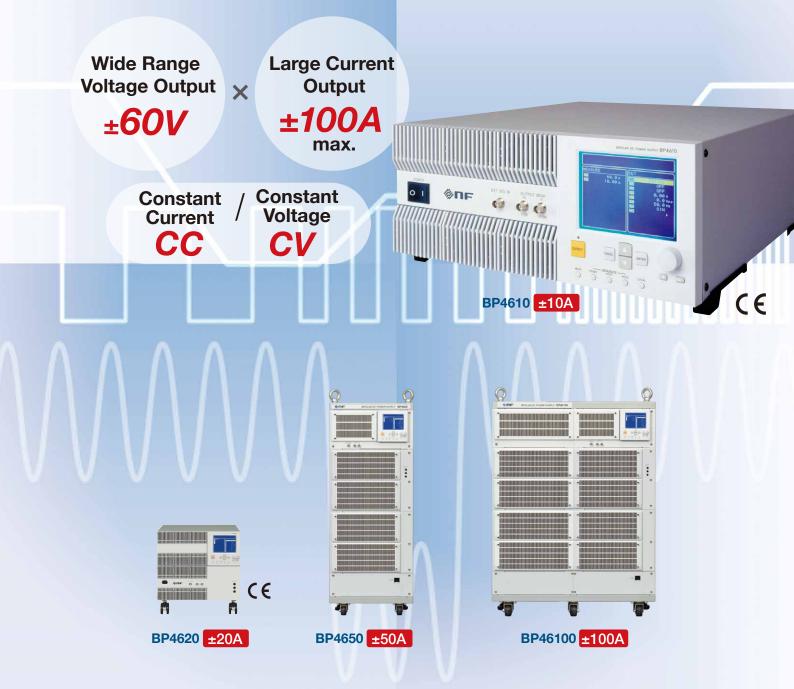


# Bipolar DC Power Supply BP Series





BP4610 (±10A) / BP4620 (±20A) / BP4630 (±30A) / BP4640 (±40A) / BP4650 (±50A) BP4660 (±60A) / BP4670 (±70A) / BP4680 (±80A) / BP4690 (±90A) / BP46100 (±100A)

**NF** Corporation

# Wide Output Range, Variety of Application

# For Various Automotive Components, Motor, Solenoid, **Capacitor and Others**

BP series is a high voltage, large current, high speed bipolar power supply with built-in sequence function. In addition to a bipolar output that allows plus, minus, source, and sink, it has a sequence function that can freely program the output pattern.



		BP4610	BP4620	BP4630	BP4640	BP4650	BP4660	BP4670	BP4680	BP4690	BP46100
Volta	age	By the	limiter setting	, the output ra	inge can be sh	± 60 V, 1 nifted to - 5 V t	20 Vp-p to + 115 V and	- 115 V to + 5	V (Output cur	rrent range ch	anges)
Current	DC	±10A	±20A	±30A	±40A	±50A	±60A	±70A	±80A	±90A	±100A
Current	AC	±15A	±30A	±45A	±60A	±75A	±90A	±105A	±120A	±135A	±150A
Low amp frequency i			Hz (CV, adjus Iz (CC, adjuste						ted, amplitude ed, amplitude		

# Features

1

- Voltage/Current 4 Quadrants Operation
- Wide range voltage output ±60 V (possible to shift the range) 10 Models, ±10 A to ±100 A
- High speed, DC to 150 kHz (CV, Adjusted)
- Constant voltage(CV) / Constant current(CC) operation selectable
- Up to 255 Steps sequence function
- Response calibration function
- Voltage Limiter / Current Limiter
- Measurement function (Output voltage / Output current)
- Analog input as power amplifier

# Wide Range Output Area Voltage / Current 4 Quadrants Operation

BP series can output in four quadrants and is capable of handling two directions of current, which are source (supply) and sink (absorption) current.

From devices that generate back electromotive force such as solenoids, capacitive load such as electrolytic capacitor, and even to piezoelectric material charged with electromotive force and power sources and batteries such as fuel cells, you can drive the devices and systems that cannot be driven with generic DC power supply.

# High Voltage / Large Current / Wide Range, Constant Current Operation

Output voltage is ± 60 V covering the range required in testing vehicle electrical components. Also BP series have large current necessary for large parts, high speed required in driving actuators, and constant current operation effective in driving low impedance solenoids.

With such enriched specification satisfying all such requirements, BP series responds to the needs in development and test of devices.With the lineup from ± 10 A to ± 100 A, BP will respond a variety of application

# Sequence Function

BP series has a built-in sequential signal source. For example, by programming a series of voltage change pattern used in voltage fluctuation test on electrical and electronic components, the test can be done in a single operation since the output changes in order according to the procedure.

- Number of sequences : 1 sequence for each of the CV mode and CC mode
- Number of steps : 1 to 255 (within 1 sequence)
- Step time : 0.1 ms to 999.9999s (resolution 0.1 ms)
- Parameters : DC voltage, superimposed AC voltage, frequency and waveforms
- Jump count : 1 to 999, or continuous
- Sequence control : Start, Stops, Hold, Branch

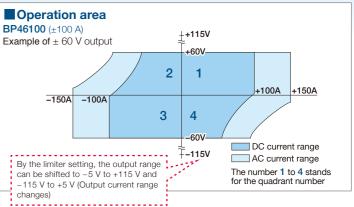
The bundled software allows user to edit the complicated pattern easily

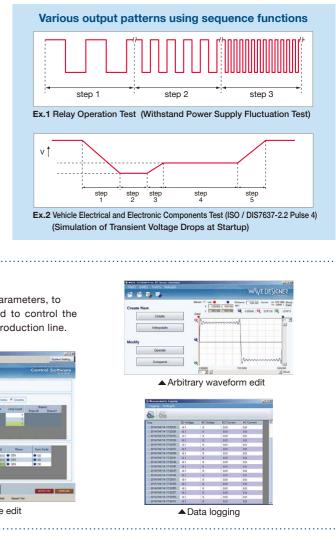
### **Control Software**

The software is bundled that allow user to set the basic parameters, to collect the data, to edit the sequence / the arbitrary waveform and to control the sequence. This will support the data analysis and automate of production line

PrOnted Software for BP Serves	ALC IN	Of Control Suffmans for BP Series
Paul Colorian Departer	System Setting.	Desix Controller Designers
	Control Software	That's East Consults
Output Mode CV-INT		Output Mode CV-INT
Output Settings DC Vallage 0.00 Int AC Vallage 0.0 Intend Programmy 50.0 Int Wendam SIN	Voltage Limiter Statings           -Vin         62.0           Vin         62.0           Vin         42.0           -Course Limiter Settings           +lo         28.0           -lo         28.0	Add Targe         Searching         Aug         Of         Cont           100         Total         Total         Aug         Aug         Aug           100         Total         Total         Aug         Aug         Aug         Aug           2         0.000         Total         Contrast.         Contrast.         Aug         Aug
Response Calibration OFF	Reload Set	
output		OUTPUT Control b II 0 1
Convected Nute: 8P4010 Convector Type: VSA		Convected Numer (#PRCN) Convectorn Type VISA Edit Made
▲Remote	e control	▲ Sequence

# Bipolar DC Power Supply BP Series





# Response Calibration Function

Transient response for load with complicated impedance characteristic such as electromagnetic components with inductance (coil component) or capacitance (capacitor component) differs among loads. BP series has a response calibration function that allows users to individually optimize transient response characteristic in square wave output or sudden output change.

RESPONSE	Response improvement example						
CL +	M						
The three knobs to make adjustment while watching the waveform on the oscilloscope.	Before	After					

# Voltage Limiter / Current Limiter

BP have the capability to set each of the maximum voltage and current with + and - independently. When shifting the output voltage range, voltage limiter is used.

# **Other Functions**

- Voltage / Current output monitor
- Measurement function To measure and display the output voltage / current (DC value and p-p value)
- Output on / off function
- External signal input for signal source

- External control I/O (output on/off, sequence control and others)
- USB interface
- Store / Recall memories (30 sets)
- Power input: Three-phase, 3-wire or three-phase, 4-wire (specify on order, BP4640 to BP46100)

### Topics **Evaluation of three-phase motor inverter**

The introduction of a simulation system for a three-phase motor inverter using a bipolar power supply.

- With CC and CV operation, 1 set of BP series allows to test both of inverters and motors.
- Four quadrants operation enables supply and absorption of power, corresponding to motor power running and regeneration
- Fast response Configure 3 phases with 3 units

For motor simulation [Constant current operation] A high-speed motor simulation system that combines a motor HILS and bipolar power supplies instead of the actual motor for various evaluations of motor drive inverters.

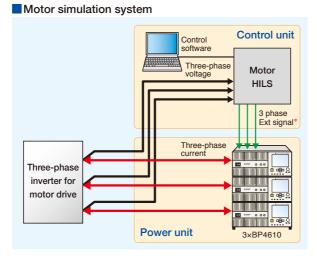
- Point
  - Constant current operation to simulate motor power consumption
  - It is possible to simulate the power running and regeneration of the motor

### For inverter simulation [Constant voltage operation]

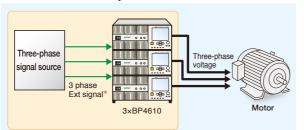
The combination of a three-phase signal source and bipolar power supplies simulates the operation of the inverter. Supports complex evaluation tests of three-phase motors.

- Constant voltage operation to simulate the output of an inverter
- Corresponds to motor regenerative power
- Point • Complex tests such as rated operation, unbalanced three-phase operation and efficiency evaluation are possible

\*The internal signal source cannot be used in the above simulation system



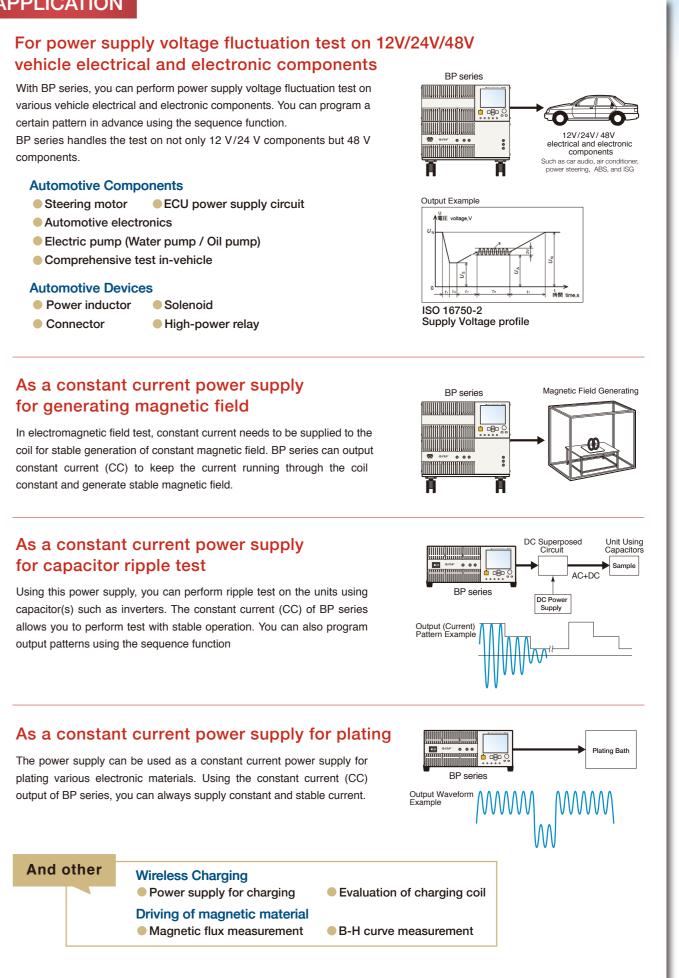
### Inverter simulation system



Note: The common potential of the three-phase external signal must be isolated from the ground potential and each phase must be isolated from each other. Consult us before building a three-phase system.

# APPLICATION

- Solenoid



# Specifications

# [BP4610 / BP4620]

frequency characteristics*1 CC mode : DC to 70kHz (amplitude 12 Vp-p)	Output					
voltage CV mode'10.5 kHz to 70 kHz : $\pm 60 V (RL=4\Omega'^2/2\Omega'^3)$ 70 kHz to 150 kHz : $\pm 50 V (RL=6\Omega'^2/2\Omega'^3)$ Maximum output current CC mode'1DC to 0.5 kHz : $\pm 10 A'^2/\pm 20 A'^3 (RL=6\Omega'^2/3\Omega'^3)$ DC to 0.5 kHz to 30 kHz : $\pm 15 A'^2/\pm 30 A'^3 (RL=4\Omega'^2/2\Omega'^3)$ 30 kHz to 70 kHz : $\pm 8.3 A'^2/\pm 16.6 A'^3 (RL=6\Omega'^2/3\Omega'^3)$ Small amplitude frequency characteristic*1CV mode : DC to 200 kHz (amplitude 12 Vp-p) CC mode : DC to 70kHz (amplitude 12 Vp-p) CC mode : DC to 70kHz (amplitude 12 Vp-p)Response calibration functionResponse characteristic can be adjusted with knobs on the front pane (Time constant: T, Voltage: V, and Current: 1)Rise / Fall time*1CV mode : 2.5 µs (square $\pm 10 A'^2/\pm 20 A'^3)$ Output voltage limiterCV mode : 10 k $\Omega//0.45 \mu$ F'2/ 5 k $\Omega//0.90 \mu$ F'3Output voltage limiter+ voltage setting range : - 7 V to + 117 V (resolution 0.1 V) - voltage setting range : - 7 V to + 117 V (resolution 0.1 V) - voltage setting range : - 1 A to -26 A''2/-2 to +52 A''3 (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower	Output voltage range	Any 120 Vp-p between - 115 V and + 115 V				
CV mode*1 (RL=Resistive load)0.5 kHZ to 70 kHZ : $\pm 60 \text{ V}$ (RL= $4\Omega^{-2}/2\Omega^{-3}$ )Maximum output current CC mode*1 (RL=Resistive load)DC to 0.5 kHz : $\pm 10 \text{ A}^{*2}/\pm 20 \text{ A}^{*3}$ (RL= $6\Omega^{*2}/3\Omega^{*3}$ )DC to 0.5 kHz to 30 kHz : $\pm 15 \text{ A}^{*2}/\pm 20 \text{ A}^{*3}$ (RL= $4\Omega^{*2}/2\Omega^{*3}$ ) $30 \text{ kHz to 70 kHz}$ : $\pm 8.3 \text{ A}^{*2}/\pm 16.6 \text{ A}^{*3}$ (RL= $6\Omega^{*2}/3\Omega^{*3}$ )Small amplitude frequency characteristics*1CV mode : DC to 200 kHz (amplitude 12 Vp-p) CC mode : DC to 70kHz (amplitude 12 Vp-p) CC mode : DC to 70kHz (amplitude 12 Vp-p)Response calibration functionResponse characteristic can be adjusted with knobs on the front pane (Time constant: T, Voltage: V, and Current: 1)Rise / Fall time*1 impedance*1CV mode : 2.5 µs (square $\pm 10 \text{ A}^{*2}/\pm 20 \text{ A}^{*3}$ )Output voltage limiterCV mode : 7 m\Omega+1.3 µH^{*2}/3.5 m\Omega+0.65 µH^{*3} CC mode : 10 k\Omega//0.45 µF^{*2}/5 k\Omega//0.90 µF^{*3}Output voltage setting range : - 7 V to + 117 V (resolution 0.1 V) · voltage setting range : - 7 V to + 117 V (resolution 0.1 V) · the difference between the + voltage and the - voltage setting is restricted to 24 V or higher and 124 V or lower.)Output current limiter+ current setting range : -1 A to -26 A^{*2}/-2 to +52 A^{*3} (resolution 0.1 A) - current setting range : -1 A to -26 A^{*2}/-2 to +52A^{*3} (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower	· · ·	DC to 0.5 kHz : ±60 V (RL= 6Ω <sup>*2</sup> / 3Ω <sup>*3</sup> )				
Maximum output current CC mode*1 (RL=Resistive load)DC to 0.5 kHz : ±10 A*2 / ±20 A*3 (RL= 6Ω*2 / 3Ω*3) 0.5 kHz to 30 kHz : ±15 A*2 / ±30 A*3 (RL= 4Ω*2 / 2Ω*3) 30 kHz to 70 kHz : ±8.3 A*2 / ±16.6 A*3 (RL= 6Ω*2 / 3Ω*3)Small amplitude frequency characteristics*1CV mode : DC to 200 kHz (amplitude 12 Vp-p) CC mode : DC to 70kHz (amplitude 12 Vp-p) Response calibration functionResponse calibration functionResponse characteristic can be adjusted with knobs on the front pane (Time constant: T, Voltage: V, and Current: 1)Rise / Fall time*1CV mode : 2.5 µs (square ±60 V) CC mode : 10 kΩ//0.45 µF*2 / 3.5 mΩ+0.65 µH*3 CC mode : 10 kΩ//0.45 µF*2 / 5 kΩ//0.90 µF*3Output voltage limiter+ voltage setting range : - 7 V to + 117 V (resolution 0.1 V) - voltage setting range : - 7 V to + 117 V (resolution 0.1 V) - voltage setting range : -1 A to -26 A*2 / -2 to +52 A*3 (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower		0.5 kHz to 70 kHz : ±60 V (RL=4Ω*2 / 2Ω*3)				
current CC mode*1 (RL=Resistive load) $\pm 10 \text{ A*}^2 / \pm 20 \text{ A*}^3 (\text{RL} = 6\Omega^{*2} / 3\Omega^{*3})$ $(\text{RL=Resistive load)}$ $0.5 \text{ kHz to } 30 \text{ kHz} :$ $\pm 15 \text{ A*}^2 / \pm 30 \text{ A*}^3 (\text{RL} = 4\Omega^{*2} / 2\Omega^{*3})$ $30 \text{ kHz to } 70 \text{ kHz} :$ $\pm 8.3 \text{ A*}^2 / \pm 16.6 \text{ A*}^3 (\text{RL} = 6\Omega^{*2} / 3\Omega^{*3})$ Small amplitude frequency characteristics*1CV mode : DC to 200 kHz (amplitude 12 Vp-p) CC mode : DC to 70kHz (amplitude 12 Vp-p)Response calibration functionResponse characteristic can be adjusted with knobs on the front pane (Time constant: T, Voltage: V, and Current: 1)Rise / Fall time*1CV mode : 2.5 µs (square $\pm 60 \text{ V}$ ) CC mode : 4 µs(square $\pm 10 \text{ A*}^2 / \pm 20 \text{ A*}^3$ )Output impedance*1CV mode : 7 m\Omega+1.3 µH*^2 / 3.5 m\Omega+0.65 µH*3 CC mode : 10 k\Omega//0.45 µF*2 / 5 k\Omega//0.90 µF*3Output voltage limiter+ voltage setting range : - 7 V to + 117 V (resolution 0.1 V) - voltage setting range : - 7 V to + 117 V (resolution 0.1 V) (The difference between the + voltage and the - voltage setting is restricted to 24 V or higher and 124 V or lower.)Output current limiter+ current setting range : -1 A to -26 A*2 / -2 to +52 A*3 (resolution 0.1 A) - current setting range : -1 A to -26 A*2 / -2 to +52 A*3 (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower		70 kHz to 150 kHz : ±50 V (RL= 6Ω*2 / 3Ω*3)				
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$\pm 15 \text{ A}^{*2} / \pm 30 \text{ A}^{*3} (\text{RL} = 4\Omega^{*2} / 2\Omega^{*3})$ $30 \text{ kHz to 70 \text{ kHz}}$ : $\pm 8.3 \text{ A}^{*2} / \pm 16.6 \text{ A}^{*3} (\text{RL} = 6\Omega^{*2} / 3\Omega^{*3})$ Small amplitude frequency characteristics**********************************		±10 A <sup>*2</sup> / ±20 A <sup>*3</sup> (RL= 6Ω <sup>*2</sup> / 3Ω <sup>*3</sup> )				
30 kHz to 70 kHz : ±8.3 A*2 / ±16.6 A*3 (RL= 6Ω*2 / 3Ω*3)Small amplitude frequency characteristics*1CV mode : DC to 200 kHz (amplitude 12 Vp-p) CC mode : DC to 70kHz (amplitude 12 Vp-p)Response calibration functionResponse characteristic can be adjusted with knobs on the front pane (Time constant: T, Voltage: V, and Current: I)Rise / Fall time*1CV mode : 2.5 $\mu$ s (square ±60 V) CC mode : 4 $\mu$ s(square ±10 A*2 / ±20 A*3)Output impedance*1CV mode : 7 mΩ+1.3 $\mu$ H*2 / 3.5 mΩ+0.65 $\mu$ H*3 CC mode : 10 kΩ//0.45 $\mu$ F*2 / 5 kΩ//0.90 $\mu$ F*3Output voltage limiter+ voltage setting range : + 7 V to + 117 V (resolution 0.1 V) . voltage setting is restricted to 24 V or higher and 124 V or lower.)Output current limiter+ current setting range : . + 1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A) . current setting range : 1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower	(RL=Resistive load)	0.5 kHz to 30 kHz :				
$\begin{array}{c} \pm 8.3 \ A^{*2} / \pm 16.6 \ A^{*3} \ (RL = 6\Omega^{*2} / 3\Omega^{*3}) \\ \hline \pm 8.3 \ A^{*2} / \pm 16.6 \ A^{*3} \ (RL = 6\Omega^{*2} / 3\Omega^{*3}) \\ \hline \\ \hline \\ Small amplitude frequency characteristics^{*1} \\ \hline \\ CV \ mode : DC \ to \ 200 \ kHz \ (amplitude \ 12 \ Vp-p) \\ \hline \\ CC \ mode : DC \ to \ 70 \ kHz \ (amplitude \ 12 \ Vp-p) \\ \hline \\ CC \ mode : DC \ to \ 70 \ kHz \ (amplitude \ 12 \ Vp-p) \\ \hline \\ Response \ calibration \\ function \\ \hline \\ \ \\ \ \\ \ \\ \ \\ \ \\ \ \\ \ \\ \ \\ \$		±15 A <sup>*2</sup> / ±30 A <sup>*3</sup> (RL= 4Ω <sup>*2</sup> / 2Ω <sup>*3</sup> )				
Small amplitude frequency characteristics*1CV mode : DC to 200 kHz (amplitude 12 Vp-p) CC mode : DC to 70kHz (amplitude 12 Vp-p)Response calibration functionResponse characteristic can be adjusted with knobs on the front pane (Time constant: T, Voltage: V, and Current: 1)Rise / Fall time*1CV mode : 2.5 $\mu$ s (square ±60 V) CC mode : 4 $\mu$ s(square ±10 A*2 / ±20 A*3)Output impedance*1CV mode : 7 mΩ+1.3 $\mu$ H*2 / 3.5 mΩ+0.65 $\mu$ H*3 CC mode : 10 kΩ//0.45 $\mu$ F*2 / 5 kΩ//0.90 $\mu$ F*3Output voltage limiter+ voltage setting range : + 7 V to + 117 V (resolution 0.1 V) - voltage setting range : - 7 V to - 117 V (resolution 0.1 V) (The difference between the + voltage and the - voltage setting is restricted to 24 V or higher and 124 V or lower.)Output current limiter+ current setting range : -1 A to -26 A*2 / -2 to +52 A*3 (resolution 0.1 A) - current setting range : -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower		30 kHz to 70 kHz :				
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CC mode : DC to 70kHz (amplitude 12 Vp-p)Response calibration functionResponse characteristic can be adjusted with knobs on the front pane (Time constant: T, Voltage: V, and Current: I )Rise / Fall time*1CV mode : 2.5 $\mu$ s (square ±60 V) CC mode : 4 $\mu$ s(square ±10 A*2 / ±20 A*3)Output impedance*1CV mode : 7 mΩ+1.3 $\mu$ H*2 / 3.5 mΩ+0.65 $\mu$ H*3 CC mode : 10 kΩ//0.45 $\mu$ F*2 / 5 kΩ//0.90 $\mu$ F*3Output voltage limiter+ voltage setting range : +7 V to + 117 V (resolution 0.1 V) - voltage setting range : -7 V to - 117 V (resolution 0.1 V) (The difference between the + voltage and the - voltage setting is restricted to 24 V or higher and 124 V or lower.)Output current limiter+ current setting range : +1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A) - current setting range : -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower	Small amplitude	CV mode : DC to 200 kHz (amplitude 12 Vp-p)				
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CC mode : 4 $\mu$ s(square $\pm$ 10 A*2 / $\pm$ 20 A*3)Output impedance*1CV mode : 7 m $\Omega$ +1.3 $\mu$ H*2 / 3.5 m $\Omega$ +0.65 $\mu$ H*3 CC mode : 10 k $\Omega$ //0.45 $\mu$ F*2 / 5 k $\Omega$ //0.90 $\mu$ F*3Output voltage limiter+ voltage setting range : +7 V to + 117 V (resolution 0.1 V) - voltage setting range : -7 V to - 117 V (resolution 0.1 V) (The difference between the + voltage and the - voltage setting is restricted to 24 V or higher and 124 V or lower.)Output current limiter+ current setting range : +1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A) - current setting range : -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower	function	(Time constant: T, Voltage: V, and Current: I)				
Output impedance*1CV mode : 7 mΩ+1.3 $\mu$ H*² / 3.5 mΩ+0.65 $\mu$ H*3 CC mode : 10 kΩ//0.45 $\mu$ F*² / 5 kΩ//0.90 $\mu$ F*3Output voltage limiter+ voltage setting range : +7 V to + 117 V (resolution 0.1 V) - voltage setting range : -7 V to - 117 V (resolution 0.1 V) (The difference between the + voltage and the - voltage setting is restricted to 24 V or higher and 124 V or lower.)Output current limiter+ current setting range : +1 A to +26 A*² / +2 to +52 A*3 (resolution 0.1 A) - current setting range : -1 A to -26 A*² / -2 to +52A*3 (resolution 0.1 A)Residual noiseCV mode : 50 mVrms or lower CC mode : 8 mArms or lower	Rise / Fall time*1	CV mode : 2.5 μs (square ±60 V)				
impedance*1       CC mode : 10 kΩ//0.45 μF*2 / 5 kΩ//0.90 μF*3         Output voltage limiter       + voltage setting range : + 7 V to + 117 V (resolution 0.1 V)         - voltage setting range : - 7 V to - 117 V (resolution 0.1 V)         (The difference between the + voltage and the – voltage setting is restricted to 24 V or higher and 124 V or lower.)         Output current limiter         + current setting range :         + 1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A)         - current setting range :         -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)         Residual noise       CV mode : 50 mVrms or lower         CC mode : 8 mArms or lower		CC mode : 4 µs(square ±10 A*2 / ±20 A*3)				
Output voltage limiter       + voltage setting range : +7 V to + 117 V (resolution 0.1 V) - voltage setting range : -7 V to - 117 V (resolution 0.1 V) (The difference between the + voltage and the – voltage setting is restricted to 24 V or higher and 124 V or lower.)         Output current limiter       + current setting range : +1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A) - current setting range : -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)         Residual noise       CV mode : 50 mVrms or lower CC mode : 8 mArms or lower		CV mode : 7 mΩ+1.3 $\mu H^{*2}$ / 3.5 mΩ+0.65 $\mu H^{*3}$				
voltage limiter       - voltage setting range : - 7 V to - 117 V (resolution 0.1 V) (The difference between the + voltage and the – voltage setting is restricted to 24 V or higher and 124 V or lower.)         Output current limiter       + current setting range : +1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A) - current setting range : -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)         Residual noise       CV mode : 50 mVrms or lower CC mode : 8 mArms or lower	Impedance I	CC mode : 10 kΩ//0.45 $\mu F^{*2}$ / 5 kΩ//0.90 $\mu F^{*3}$				
Output current limiter       + current setting range :         + 1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A)         - current setting range :         - 1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)         Residual noise         CV mode : 50 mVrms or lower         CC mode : 8 mArms or lower		+ voltage setting range : + 7 V to + 117 V (resolution 0.1 V)				
Setting is restricted to 24 V or higher and 124 V or lower.)         Output current limiter       + current setting range : +1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A)         - current setting range : -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)         Residual noise       CV mode : 50 mVrms or lower CC mode : 8 mArms or lower	voltage limiter	- voltage setting range : - 7 V to - 117 V (resolution 0.1 V)				
Output current limiter       + current setting range : +1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A)         - current setting range : -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)         Residual noise       CV mode : 50 mVrms or lower CC mode : 8 mArms or lower		(The difference between the + voltage and the - voltage				
current limiter       +1 A to +26 A*2 / +2 to +52 A*3 (resolution 0.1 A)         - current setting range :       -1 A to -26 A*2 / -2 to +52A*3 (resolution 0.1 A)         Residual noise       CV mode : 50 mVrms or lower         CC mode : 8 mArms or lower		setting is restricted to 24 V or higher and 124 V or lower.)				
+1 A to +26 A 2 / +2 to +52 A 3 (resolution 0.1 A)         - current setting range :         -1 A to -26 A'2 / -2 to +52A'3 (resolution 0.1 A)         Residual noise         CV mode : 50 mVrms or lower         CC mode : 8 mArms or lower		+ current setting range :				
-1 A to -26 A'2 / -2 to +52A'3 (resolution 0.1 A)         Residual noise       CV mode : 50 mVrms or lower         CC mode : 8 mArms or lower	current limiter	+1 A to +26 A <sup>*2</sup> / +2 to +52 A <sup>*3</sup> (resolution 0.1 A)				
Residual noise CV mode : 50 mVrms or lower CC mode : 8 mArms or lower		- current setting range :				
CC mode : 8 mArms or lower		-1 A to -26 A <sup>*2</sup> / -2 to +52A <sup>*3</sup> (resolution 0.1 A)				
	Residual noise	CV mode : 50 mVrms or lower				
(The input terminal is shorted. 10Hz to 300kHz)		CC mode : 8 mArms or lower				
		(The input terminal is shorted. 10Hz to 300kHz)				

Signal So	ources
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Selectable	Selectable from among internal source, external signal, and internal source + external signal				
Internal	DC	Amplitude setting range : CV mode ±115 V(resolution 0.01 V)			
signal source		CC mode ±10 A*2 (resolution 0.001 A)			
		±20 A <sup>*3</sup> (resolution 0.001 A)			
	Superimposed	Waveform : Sine, Square, Arbitrary (16 types )			
	AC	Frequency setting range : 1 Hz to 100 kHz (resolution 0.1 Hz )			
		Amplitude setting range : CV mode 0 to 120 Vp-p (resolution 0.1 Vp-p)			
		CC mode 0 to 30 Ap-p*2 (resolution 0.01 Ap-p)			
		0 to 60 Ap-p <sup>*3</sup> (resolution 0.01 Ap-p)			
External	signal input	Frequency range : DC to 200 kHz			
		Gain : CV mode 100 times (100V / 1V), In phase			
		CC mode 10 times (10 A / 1 V) <sup>*2</sup> , In phase			
		20 times (20 A / 1 V)*3, In phase			

Sequence Function				
Number of s	equences	1 sequence for each of the CV mode and CC mode		
Number of st	eps	1 to 255 (within 1 sequence)		
Step time		0.1 ms to 999.9999 s (resolution 0.1 ms)		
Operation within	n each steps	Constant or linear sweep		
Parameters	CV mode	DC voltage, Superimposed AC voltage, Frequency,		
		Waveform, Step sync output 2 bits		
	CC mode	DC current, Superimposed AC current, Frequency,		
		Waveform, Step sync output 2 bits		
Jump count		1 to 999, or continuous		
Sequence	Start	Start the sequence.		
control	Stop	Stop the sequence.		
	Hold	Maintains settings at that point. The operation resumes at sequence start.		
	Branch	Branches to the specified step.		

Monitor output	Voltage, Current			
Measurement	DC output voltage, DC output current,			
functions	AC output voltage, AC output current			
Arbitrary waveform	16 (1024 words, 16 bit.)			
memory	Write is performed via the USB interface.			
Store / Recall memory	The basic settings can be saved to memories No. 1 to No. 30			
Protective functions	If Output voltage over, Output current over, Internal output loss,			
	Power supply anomaly, Internal overheating and Operation panel			
	anomaly are detected, the protective function works.			
Interface	USB Interface ( USBTMC / USB488,USB1.1 )			
Other function	Output ON / OFF function, external control input / output,			
	key lock, beep, reset, self-diagnosis function			
Power input	BP4610 : 100 V to 230 V ±10% 250 V or lower			
	BP4620 : 200 V to 230 V ±10% 50 Hz / 60 Hz ± 2%			
Power consumption/	BP4610 : Maximum of 1200 VA, Power factor 0.95 (at AC 100 V)			
Power factor	BP4620 : Maximum of 2400 VA, Power factor 0.93 (at AC 200 V)			
Ambient temperature /	Performance Guarantee : +5 to +35°C / 5 to 85%RH			
Humidity range	with absolute humidity of 1 to 25g/m <sup>3</sup> and no condensation			
	Storing Conditions : -10 to +50°C / 5 to 95%RH			
	with absolute humidity of1 to 29g / m <sup>3</sup> and no condensation			
Dimensions	BP4610 : 430(W) × 176(H) × 551(D) (No protrusions)			
(W×H×D)(mm)	BP4620 : 430(W) × 354(H) × 551(D) (No protrusions)			
Weight (Approx.)	BP4610 : 26 kg			
	BP4610 : 53 kg			
Accessory	Manual, CD-ROM, Ferrite core (for USB cable) , Power code set			

### [BP4630 / BP4640 / BP4650 / BP4660 / BP4670 / BP4680 / BP4690 / BP46100]

-115 V (set + BP4630 RL=7.7 Ω BP4670 RL=3.3 Ω ±60 V BP4630 RL=2.0 Ω BP4670	Vo limit to 117 Vo limit to 7 V BP4640 RL=5.8 Ω BP4680 RL=2.9 Ω BP4640 RL=1.5 Ω	and - Vo limit t <u>BP4650</u> RL=4.6 Ω <u>BP4690</u> RL=2.6 Ω <u>BP4650</u>	,
-115 V (set + BP4630 RL=7.7 Ω BP4670 RL=3.3 Ω ±60 V BP4630 RL=2.0 Ω BP4670	Vo limit to 7 V <u>BP4640</u> RL=5.8 Ω <u>BP4680</u> RL=2.9 Ω <u>BP4640</u>	and - Vo limit t <u>BP4650</u> RL=4.6 Ω <u>BP4690</u> RL=2.6 Ω <u>BP4650</u>	0 - 117 V) <u>BP4660</u> RL=3.8 Ω <u>BP46100</u> RL=2.3 Ω
BP4630           RL=7.7 Ω           BP4670           RL=3.3 Ω           ±60 V           BP4630           RL=2.0 Ω           BP4670	BP4640 RL=5.8 Ω BP4680 RL=2.9 Ω BP4640	BP4650 RL=4.6 Ω BP4690 RL=2.6 Ω BP4650	BP4660 RL=3.8 Ω BP46100 RL=2.3 Ω
RL=7.7 Ω           BP4670           RL=3.3 Ω           ±60 V           BP4630           RL=2.0 Ω           BP4670	RL=5.8 Ω BP4680 RL=2.9 Ω BP4640	RL=4.6 Ω BP4690 RL=2.6 Ω BP4650	RL=3.8 Ω BP46100 RL=2.3 Ω
BP4670 RL=3.3 Ω ±60 V BP4630 RL=2.0 Ω BP4670	BP4680 RL=2.9 Ω BP4640	BP4690 RL=2.6 Ω BP4650	BP46100 RL=2.3 Ω
RL=3.3 Ω ±60 V BP4630 RL=2.0 Ω BP4670	RL=2.9 Ω BP4640	RL=2.6 Ω BP4650	RL=2.3 Ω
±60 V BP4630 RL=2.0 Ω BP4670	BP4640	BP4650	
BP4630 RL=2.0 Ω BP4670			BP4660
RL=2.0 Ω BP4670			BP4660
BP4670	RL=1.5 Ω		D14000
		RL=1.2 Ω	RL=1.0 Ω
	BP4680	BP4690	BP46100
HL=0.86 Ω	RL=0.75 Ω	RL=0.67 Ω	RL=0.60 Ω
±60 V			
BP4630	BP4640	BP4650	BP4660
RL=1.3 Ω	RL=1.0 Ω	RL=0.80 Ω	RL=0.67 Ω
BP4670	BP4680	BP4690	BP46100
RL=0.57 Ω	RL=0.50 Ω	RL=0.44 Ω	RL=0.40 Ω
±50 V			
BP4630	BP4640	BP4650	BP4660
RL=2.0 Ω	RL=1.5 Ω	RL=1.2 Ω	RL=1.0 Ω
BP4670	BP4680	BP4690	BP46100
RL=0.86 Ω	RL=0.75 Ω	RL=0.67 Ω	RL=0.60 Ω
t* CC mode			
1	BP4640	BP4650	BP4660
			±60 A
	-		RL=1.0 Ω
-			BP46100
±70 A		+90 A	±100 A
			RL=0.60 Ω
			BP4660
			±90 A
-		-	E30 A RL=0.67 Ω
-			BP46100
			±150 A
	-		RL=0.40 Ω
			BP4660
			±49.8 A
-		-	
			RL=1.0 Ω
			BP46100
			±83 A RL=0.60 Ω
	BP4630           RL=1.3 Ω           BP4670           RL=0.57 Ω           ±50 V           BP4630           RL=2.0 Ω           BP4670           RL=0.86 Ω           t* CC mode           BP4630           ±30 A           RL=2.0 Ω           BP4630	L60 V         BP4630         BP4640           RL=1.3 Ω         RL=1.0 Ω           BP4670         BP4680           RL=0.57 Ω         RL=0.50 Ω           L50 V         BP4630           BP4670         BP4640           RL=2.0 Ω         RL=1.5 Ω           BP4670         BP4680           RL=0.86 Ω         RL=0.75 Ω           t* CC mode         BP4630           BP4670         BP4640           ±30 A         ±40 A           RL=2.0 Ω         RL=1.5 Ω           BP4670         BP4680           ±70 A         ±80 A           RL=0.75 Ω         BP4640           ±45 A         ±60 A           RL=1.3 Ω         RL=1.0 Ω           BP4670         BP4680           ±45 A         ±60 A           RL=1.0 Ω         RP4630           BP4630         BP4640           ±45 A         ±102 A           RL=0.57 Ω         RL=0.50 Ω           BP4630         BP4640           ±24.9 A         ±33.2 A           RL=2.0 Ω         RL=1.5 Ω           BP4670         BP4680           ±49.4         ±33.2 A           RL=2.0 Ω	L60 V         BP4630         BP4640         BP4650           BP4630         BP4640         BP4650           RL=1.3 Ω         RL=1.0 Ω         RL=0.80 Ω           BP4670         BP4680         BP4690           RL=0.57 Ω         RL=0.50 Ω         RL=0.44 Ω           L50 V         BP4630         BP4640         BP4650           BP4670         BP4680         BP4690         RL=1.2 Ω           BP4670         BP4680         BP4690         RL=0.67 Ω           RL=0.86 Ω         RL=0.75 Ω         RL=0.67 Ω         RL=0.67 Ω           L*C C mode         BP4670         BP4680         BP4690           ±30 A         ±40 A         ±50 A         RL=1.2 Ω           BP4670         BP4680         BP4690         ±70 A           ±80 A         ±90 A         RL=0.67 Ω         RL=0.67 Ω           BP4670         BP4680         BP4650         ±45 A           ±60 A         ±75 A         RL=1.0 Ω         RL=0.80 Ω           BP4670         BP4680         BP4690         ±45 A           ±105 A         ±120 A         ±135 A         RL=0.50 Ω           RL=0.57 Ω         RL=0.50 Ω         RL=0.44 Ω         BP4630 <t< td=""></t<>

Small amplitude frequency characteristics*		CV mode : BP4630 to BP4650 : DC to 200 kHz (amplitude 12 Vp-p, 500 Hz reference ) BP4660 to BP46100 : DC to 170kHz (amplitude 12 Vp-p, 500 Hz reference				
		CC mode : DC	to 70kHz (ampli	tude 12 Vp-p, 50	0 Hz reference )	
Response calibration function			cteristic can be adj T, Voltage: V, and		n the front panel	
Rise / Fa	all time	CV mode BP4630 to BP4650 : 2.5 μs (adjusted, square ±60 V)				
		BP4660 to BP46100 : 2.7 μs (adjusted, square ±60 V) CC mode BP4630 to BP4650 : 4 μs (adjusted, square, for the following current) BP4660 to BP46100 : 4.2 μs (adjusted, square, for the following current)				
		BP4630	BP4640	BP4650	BP4660	
		±30 A	±40 A	±50 A	±60 A	
		BP4670	BP4680	BP4690	BP46100	
		±70 A	±80 A	±90 A	±100 A	
Output		CV mode* :	-			
impedar	ice	BP4630	BP4640	BP4650	BP4660	
		2.3 mΩ+	1.8 mΩ+	1.4 mΩ+	1.2 mΩ+	
		0.43 µH	0.33 µH	0.31 μH	0.3 µH	
		BP4670	BP4680	BP4690	BP46100	
		1 mΩ+	0.9 mΩ+	0.8 mΩ+	0.7 mΩ+	
		0.29 μH	0.27 µH	0.26 µH	0.24 μH	
		CC mode* :				
		BP4630	BP4640	BP4650	BP4660	
		3.3 kΩ//	2.5 kΩ//	2 kΩ//	1.7 kΩ//	
		1.35 µF	1.8 μF	2.25 μF	2.7 μF	
		BP4670	BP4680	BP4690	BP46100	
		1.4 kΩ//	1.3 kΩ//	1.1 kΩ//	1 kΩ//	
		3.15 μF	3.6 µF	4.05 μF	4.5 μF	
	+voltage setting range	+7 V to +117	′ V (initial : +62	V, resolution (	0.1 V)	
Output voltage	-voltage setting range	-117 V to -7	V (initial : -62	V, resolution (	0.1 V)	
limiter		Note : The diffe	erence between icted to 24 V or h	the + voltage an	id the - voltage	
Output	+current setting range	BP4630	BP4640	BP4650	BP4660	
current		+3 A to +78 A	+4 A to +104 A	+5 A to +130 A	+6 A to +156 A	
limiter		BP4670	BP4680	BP4690	BP46100	
		+7A to +182 A	+8 A to +208 A	+9 A to +234 A	+10 A to +260 A	
	-current setting range	BP4630	BP4640	BP4650	BP4660	
		-78A to -3A	-104A to -4A	-130A to -5A	–156 A to –6 A	
		BP4670	BP4680	BP4690	BP46100	
		-182 A to -7 A	-208 A to -8 A	–234 A to –9 A	-260 A to -10 A	

### Signal Sources

Selectable from among internal source, external signal, and internal source + external signal.

•	ntern	al signal source	e					
0	CV mo	de						
	DC vo	Itage setting range	- 115 to + 115 V ( resolution 0.01 V )					
	AC	Amplitude setting range	nplitude setting range 0 Vp-p to 120 Vp-p (resolution 0.1 Vp-p)					
	voltage	Waveform	Sine, Square	, Arbitrary (16	types )			
	Frequency setting range		1 Hz to 100 k	Hz ( resolution	0.1 Hz )			
CC mode								
	DC	Setting range	BP4630	BP4640	BP4650	BP4660		
	current		-30 A to +30 A	-40 A to +40 A	-50 A to +50 A	-60 A to +60 A		
			BP4670	BP4680	BP4690	BP46100		
			-70 A to +70 A	-80 A to +80 A	-90 A to +90 A	-100 A to +100 A		
		Resolution	0.01A					
	AC .	Amplitude	BP4630	BP4640	BP4650	BP4660		
	current	setting range	0 Ap-p to 90 Ap-p	0 Ap-p to 120 Ap-p	0 Ap-p to 150 Ap-p	0 Ap- to 180 Ap-p		
			BP4670	BP4680	BP4690	BP46100		
			0 Ap-p to 210 Ap-p	0 Ap-p to 240 Ap-p	0 Ap-p to 270 Ap-p	0 Ap-p to 300 Ap-p		
		Resolution	0.1 Ар-р					
		Waveform	Sine, Square	, Arbitrary (16	types)			
		Frequency setting range	1 Hz to 100 k	Hz (resolution	0.1 Hz )			
E	Extern	nal signal input						
F	hase		In phase					
h	nput ir	npedance	10 kΩ					
Non-destructive max. input voltage		uctive max. input voltage	±5 V					
Frequency range		ency range	DC to 200 kHz					
Gain			CV mode : 100					
			CC mode :					
			BP4630	BP4640	BP4650	BP4660		
			30 A / V	40 A / V	50 A / V	60 A / V		
			BP4670	BP4680	BP4690	BP46100		
			70 A / V	80 A / V	90 A / V	100 A / V		

# Bipolar DC Power Supply BP Series

### Sequence Function

Number of sequences		1 sequence for each of the CV mode and CC mode		
Number of ste	eps	1 to 255 (within 1 sequence)		
Step time		0.1 ms to 999.9999 s (resolution 0.1 ms)		
Operation within each steps		Constant or linear sweep		
Parameters	CV mode	DC voltage, Superimposed AC voltage, Frequency,		
		Waveform, Step sync output 2 bits		
CC mode		DC current, Superimposed AC current, Frequency,		
		Waveform, Step sync output 2 bits		
Jump count		1 to 999, or continuous		
Sequence	Start	Start the sequence.		
control	Stop	Stop the sequence.		
Hold		Maintains settings at that point. The operation resumes at sequence start.		
	Branch	Branches to the specified step.		

### Others

	e. Curre	ant			
	Voltage, Current				
	DC output voltage, DC output current,				
functions AC out	AC output voltage, AC output current				
	16 (1024 words, 16 bit.)				
memory Write is	Write is performed via the USB interface.				
Store / Recall memory The bas	The basic settings can be saved to memories No. 1 to No. 30				
Protective functions If Output	If Output voltage over, Output current over, Internal output loss,				
Power s	Power supply anomaly, Internal overheating and Operation				
anomaly	anomaly are detected, the protective function works.				
Interface USB In	USB Interface (USBTMC / USB488,USB1.1)				
Other function Output	Output ON / OFF function, external control input / output,				
key loc	key lock, beep, reset, self-diagnosis function				
Power input BP4630	BP4630 : single-phase 180 V to 250 V, 50 Hz/60 Hz $\pm 2$ Hz				
BP4640	BP4640 to BP46100 (specify on order):				
three-pl	three-phase, 3-wire 180 V to 250 V or				
three-pl	three-phase, 4-wire 323 V to 433 V				
50 Hz/6	50 Hz/60 Hz ±2 Hz				
Power factor (Approx.) 0.93	0.93				
Power consumption BP46	630	BP4640	BP4650	BP4660	
3.6 k	VA	4.8 kVA	6 kVA	7.2 kVA	
BP46	670	BP4680	BP4690	BP46100	
8.4 k	VA	9.6 kVA	10.8 kVA	12 kVA	
Dimensions BP463	BP4630 : 430(W) × 710(H) × 686(D)				
(W×H×D)(mm) BP464	BP4640 / BP4650 : 505(W) × 1150(H) × 700(D)				
(No Protrusuons) BP466	BP4660 to BP46100 : 995(W) ×1150(H) × 700(D)				
Weight (Approx.) BP46	630	BP4640	BP4650	BP4660	
97 kg	9	165 kg	180 kg	260 kg	
BP46	670	BP4680	BP4690	BP46100	
280 k	0	300 kg	320 kg	340 kg	
	KN 11 (Group 1, Class A)				
(Excluding BP4630) KN 610	KN 61000-6-2				
Accessory Manual	Manual, CD-ROM, Ferrite core (for USB cable)				

### Option

• PA-001-3019 : Rack mount adapter (for EIA BP4630)

• PA-001-3020 : Rack mount adapter (for JIS BP4630)

• PA-001-3021 : Replacement air filter 1 (for BP4630)

- PA-001-3022 : Replacement air filter 2 (for BP4630)
- PA-001-3023 : Replacement air filter 1S (for BP4640/4650/4660/4670/4680/4690/46100)
- PA-001-3024 : Replacement air filter 2S (for BP4640/4650/4660/4670/4680/4690/46100)
- PA-001-3025 : Replacement air filter W (for BP4660/4670/4680/4690/46100)
- PA-001-3026 : Fixing Bracket (for BP4630)
- PA-001-3027 : Fixing Bracket (for BP4640/BP4650)
- PA-001-3028 : Fixing Bracket (BP4660/4670/4680/4690/46100)

# **Related Products**

### MULTIFUNCTION GENERATOR WF1973 / WF1974



### Sine, Square (duty variable), Pulse, Ramp wave, Noise, DC, Arbitrary waveforms

- Auto burst, trigger burst, gate, triggered gate
- Internal and external modulation, sweep

Frequency range : 0.01 µHz to 30 MHz

- Sequence function
- 2-channel operation (WF1974)

# FREQUENCY RESPONSE ANALYZER From FRA51615 Serve



# GAIN-PHASE ANALYZER FRA51602



# From power electronics such as inverters and wireless charging to servo control, evaluation of electronic components and batteries

Effortless waveform generator via an intuitive graphical user interface

- Frequency range : 10  $\mu$ Hz to 15 MHz
- Measurement speed : 0.5 ms/point
- Basic accuracy : Gain : ±0.01 dB, Phase : ±0.06°
- Isolation : 600 V CATII / 300 V CATIII
- Maximum measurement voltage : 600 Vrms
- Sequence measurement function, Marker search, Load correction, Port extension.

### Loop-gain measurement for inverters and switching power supply

- Frequency range : 10  $\mu$ Hz to 2 MHz
- Measurement speed : 0.5 ms/point
- Basic accuracy : Gain : ±0.01 dB, Phase:±0.06°
- Maximum input voltage / Isolation : 600 V CAT II / 300 V CAT III
- Maximum measurement voltage : 600 Vrms
- Dynamic range : 140 dB
- Sequence measurement function, Auto ranging, Amplitude compression function, Equalization.

Note: The contents of this catalog are current as of April 1st, 2020. Product appearance and specifications are subject to change without notice. Before purchase, contact us to confirm the latest specifications, price and delivery date.

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