10. Specifications

Specifications are valid under the following settings and conditions and after a warm-up period of 30 minutes at least, unless otherwise noted.

Load:	Resistive load, power factor = 1.
Signal source:	INT (internal signal source).
Output voltage waveform:	sine.
Remote sensing:	off.
AGC/Autocal:	off.
Current limiter:	factory default setting.
Output terminal:	output terminal block on the rear panel.

[set] indicates a setting value, and [rdg] indicates a read value.

The description noted with "/" indicates that the specification changes by the output range, such as "100 V range specification / 200 V range specification."

The input voltage is noted as line voltage in three-phase four-wire input, unless otherwise noted.

A value with the accuracy is the guaranteed value of the specification. However, an accuracy noted as reference value shows the supplemental data for reference when the product is used, and is not under the guarantee. A value without the accuracy is the nominal value or representative value (shown as typ.).

The DP series and DP series Type R, other than single-phase three-wire models (DP030D, DP060D, DP090D, DP120D, DP030RD, DP060RD, DP090RD), corresponds to Clause 2 (8) Frequency converter, Appendix 1 of Export Trade Control Ordinance of Japan. The permission for exportation of the Japanese Administration is necessary for export outside Japan.

Notes on Polyphase System

Single-phase three-wire (1P3W) system can be configured by connecting 2 single-phase models. Three-phase four-wire (3P4W) system can be configured by connecting 3 single-phase models in the same way. These are called as polyphase system. Refer to Table 1-3 to Table 1-5 for the combination of the single-phase models which can configure the polyphase system.

Firmware discriminates power capacity and polyphase type at the start-up process just after turning on the system connected with an optional system cable (either 1P3W or 3P4W type), and the system starts to operate as that power capacity and polyphase type.

Output Lo terminals connected together become a neutral point (N terminal) in both the 1P3W and 3P4W system. Hi terminals are called L1, L2, and L3, respectively (L3 exists only in 3P4W system). The cabinet to which the L1 connector of the System Cable is connected operates as master. The cabinets to which L2 and L3 is connected operate as slave. Output voltage is defined with phase voltage (L1, L2, and L3 to N) in this document unless otherwise noted.

10.1   Output Function

	All models
Output function	Continuous, Sequence, Simulation

10.2   Output Range

	All models
Output range	100 V range, 200 V range

10.3   AC/DC Mode

	Single-phase and Multi-phase models	Polyphase models and Polyphase systems
AC/DC mode	AC, ACDC, DC	AC, ACDC

	Description
AC	The signal source and amplification section of this product are AC-coupled, and the DC component is canceled. Only the AC output setting of 40 Hz or higher is available. The signal sources that can be combined are INT, VCA, SYNC, EXT, and ADD. When the waveform superimposed with DC is amplified using EXT and ADD (using external signal sources), it may not be an intended output because the DC component is canceled. In this case, select the ACDC mode.
ACDC	The signal source and amplification section of this product are DC-coupled, and the DC component is also amplified. The AC and DC output settings of 1 Hz or higher are available. The signal sources that can be combined are INT, SYNC, EXT, and ADD. In the polyphase model, polyphase system, and polyphase output of the Multi-phase model, only the AC setting is available. Fixed to this mode in the Simulation. Select this mode when you want to amplify a signal including DC, to superimpose DC (DC offset), or output a frequency of 40 Hz or lower. Also select this mode when the DC component temporally occurs, for example, by sudden change of voltage or phase.
DC	The signal source and amplification section of this product are DC-coupled. Only the DC setting is available. The signal sources that can be combined are INT and VCA. It is unavailable for the polyphase model, the polyphase system, and polyphase output of the Multi-phase model.

10.4   Signal Source

	Single-phase and Multi-phase models	Polyphase models and Polyphase systems
Signal source	INT, VCA, SYNC, EXT, ADD	INT, VCA, SYNC

	Description
INT	Uses the internal signal source. Sets the output voltage, output waveform, frequency, output on phase, and output off phase by using the panel or the external interface such as USB. Fixed to INT in the Sequence and Simulation.
VCA	Uses the internal signal source. Controls the output voltage setting of the internal signal source with the DC signal which is input to the external input terminal. The output voltage setting cannot be set from external interfaces such as the panel or USB. All conditions except for output voltage setting are same as INT. In the polyphase model, polyphase system, and polyphase output of the Multi-phase model, the setting is common to all the phases. Cannot be selected in the ACDC mode.
SYNC	Uses the internal signal source. Synchronizes the frequency of the internal signal source with the signal (EXT) from the external synchronization signal input terminal (also used as the external input terminal) or the power supply input frequency (LINE) of the product. The frequency setting cannot be set from external interfaces such as the panel or USB. All conditions except for output frequency setting are same as INT. Cannot be selected in the DC mode.
EXT	Uses the external signal source. Amplifies the signal from the external input terminal by the specified gain(variable), and outputs it. Cannot be selected for the polyphase model, the polyphase system, and polyphase output of the Multi-phase model. Cannot be selected in the DC mode.
ADD	Uses both the internal and external signal sources. Amplifies the signal from the external input terminal by the specified gain like EXT, and adds the internal signal source component to it. Cannot be selected for the polyphase model, the polyphase system, and polyphase output of the Multi-phase model. Cannot be selected in the DC mode.

10.5 AC Output

[V]=Vrms, [A]=Arms, unless otherwise noted.

	Single-phase model and Single-phase output of Multi-phase model							
DP series	015S	030S	045S 045M	060S	075S	090S 090M	105S	120S
DP series Type R	015RS	030RS	045RS	060RS	075RS	090RS		
Mode	Single-phase two-wire Floating output, the Lo terminal can be grounded.							
Setting mode *1	Balanced mode, Unbalanced mode							
Rated output voltage	100 V / 200 V							
Voltage setting range *2	Phase voltage setting (for all phases in balanced mode and each phase in unbalanced mode) 0.0 V to 160.0 V / 0.0 V to 320.0 V 0.0 Vp-p to 454.0 Vp-p / 0.0 Vp-p to 908.0 Vp-p (arbitrary wave)							
	Line voltage setting (balanced mode and sine wave only) 0.0 V to 320.0 V / 0.0 V to 640.0 V (1P3W) 0.0 V to 277.2 V / 0.0 V to 554.2 V (3P4W)							
Setting resolution	Phase voltage setting: 0.1 V, Line voltage setting: 0.2 V							
Voltage accuracy *3	±(0.5 % of set + 0.6 V / 1.2 V)							
Maximum current *4	15 A / 7.5 A	30 A / 15 A	45 A / 22.5 A	60 A / 30 A	75 A / 37.5 A	90 A / 45 A	105 A / 52.5 A	120 A / 60 A
Maximum peak current *5	Peak value (Apk) which is four times of the maximum current							
Reverse power flow (only for Type R) *6	40 % (continuous, 30 °C to 40 °C) of maximum current (phase current, RMS) 50 % (continuous, lower than 30 °C) of maximum current (phase current, RMS) 100 % (reverse power flow time ≤ 180 s, reverse power flow duty ≤ 0.2, 40 °C or lower) of maximum current (phase current, RMS)							
Power capacity *7	1.5 kVA	3 kVA	4.5 kVA	6 kVA	7.5 kVA	9 kVA	10.5kVA	12 kVA

Load power factor	DP series
	  0 to 1 (Phase lead or phase lag, 45 Hz to 65 Hz, external power injection or
	  regeneration are not available.)
	DP series Type R
	  −1 to +1 (Phase lead or phase lag, 45 Hz to 65 Hz)							

Frequency setting range	40.00 Hz to 550.00 Hz (AC mode) 1.00 Hz to 550.00 Hz (ACDC mode)							
Setting resolution	0.01 Hz							
Frequency accuracy	±0.01 % of set (23 °C±5 °C)							
Frequency stability*8	±0.005 %							
Voltage frequency characteristic *9	±1 %							
Output waveform	sine wave, arbitrary wave (16 types), clipped sine wave (3 types)							
Output on phase setting range *10	0.0° to 359.9° variable							
Setting resolution	0.1°							
Output off phase setting range *10	0.0° to 359.9° variable (active/inactive selectable)							
Setting resolution	0.1°							
Phase angle setting range *1 (Unbalanced mode)	L2 phase: 0° to 359.9° (1P3W) L2 phase: 0° to 359.9°, L3 phase: 0° to 359.9° (3P4W)							
Setting resolution	0.1°							
Phase angle accuracy *11	45 Hz to 65 Hz: ±1.0° 40 Hz to 550 Hz: ±2.0°							
DC offset *12	Within ±20 mV (typ., fine adjustment available.)							

*1: Only when polyphase system is configured with single-phase model.

*2: Line voltage setting only when polyphase system is configured with single-phase model.

*3: In the case of 10 V to 150 V / 20 V to 300 V, sine wave, no load, 45 Hz to 65 Hz, DC voltage setting 0 V, 23 °C±5 °C.

*4: If the output voltage is higher than the rated value, this is limited (lowered) to satisfy the power capacity. If there is the DC superimposition, the active current of AC+DC satisfies the maximum current. In the case of 40 Hz or lower or 400 Hz or higher, and that the ambient temperature is 40 °C or higher, the maximum current may decrease.

*5: For the capacitor input type rectified load (crest factor=4), the rated output voltage, and 45 Hz to 65 Hz.

*6: In the case rated output voltage, 50 Hz or 60 Hz, power factor −1. It may reduce the reverse power flow if ambient temperature is 40 °C or higher. If the output voltage is higher than the rated value, power capacity is limited to 40 % (continuous, 30 °C to 40 °C), 50 % (continuous, lower than 30 °C), and 100 % (reverse power flow time ≤ 180 s, reverse power flow duty ≤ 0.2, 40 °C or lower). About duty, see Figure 10-1. Only for DP series Type R, the reverse power flow is supported.

Reverse power flow time t1 ≤ 180 s
Reverse power flow duty = t1/(t1+t2)≦0.2
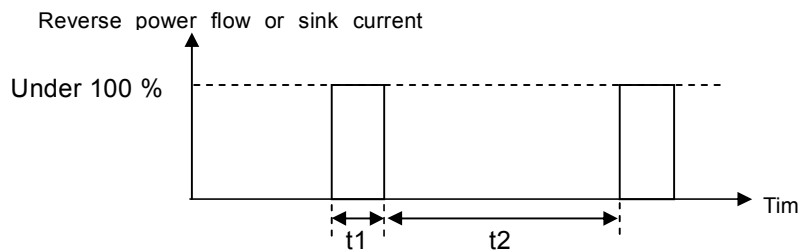
Figure 10-1 Reverse Power Flow Duty or Sink Time Duty

*7: In the case that the power input is single-phase 170 V or lower, models with 6 kVA or higher have the limit on the power capacity in the power running.

*8: For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature.

*9: For 40 Hz to 550 Hz, sine wave, the rated output voltage, the resistance load for the maximum current at 55 Hz, and 55 Hz reference.

*10: Set for the L1 phase. The component of the phase angle setting is added for the other phases.

*11: In the case of 50 V or higher, sine wave, and same load condition and voltage setting for all phases.

*12: In the case of the AC mode and 23 °C±5 °C.

	Polyphase model and Polyphase output of Multi-phase model					
DP series	030D 045M	060D 090M	090D	120D	045T 045M	090T 090M
DP series Type R	030RD	060RD	090RD		045RT	090RT
Mode	Single-phase three-wire				Three-phase four-wire (Y-connection)	
	Floating output, the N terminal can be grounded.					
Setting mode	Balanced mode, Unbalanced mode					
Rated output voltage (Phase voltage)	100 V / 200 V					
Voltage setting range	Phase voltage setting (for all phases in balanced mode and each phase in unbalanced mode) 0.0 V to 160.0 V / 0.0 V to 320.0 V 0.0 Vp-p to 454.0 Vp-p / 0.0 Vp-p to 908.0 Vp-p (arbitrary wave)					
	Line voltage setting (balanced mode and sine wave only)					
	0.0 V to 320.0 V / 0.0 V to 640.0 V				0.0 V to 277.2 V / 0.0 V to 554.2 V	
Setting resolution	Phase voltage setting: 0.1 V, Line voltage setting: 0.2 V					
Voltage accuracy (Phase voltage) *13	±(0.5 % of set + 0.6 V / 1.2 V)					
Maximum current (Phase current) *14	15 A / 7.5 A	30 A / 15 A	45 A / 22.5 A	60 A / 30 A	15 A / 7.5 A	30 A / 15 A
Maximum peak current (Phase current) *15	Peak value (Apk) which is four times of the maximum current					
Reverse power flow (only for Type R) *16	40 % (continuous, 30 °C to 40 °C) of maximum current (phase current, RMS) 50 % (continuous, lower than 30 °C) of maximum current (phase current, RMS) 100 % (reverse power flow time ≤ 180 s, reverse power flow duty ≤ 0.2, 40 °C or lower) of maximum current (phase current, RMS)					
Power capacity *17	3 kVA	6 kVA	9 kVA	12 kVA	4.5 kVA	9 kVA
Load power factor	DP series 0 to 1 (Phase lead or phase lag, 45 Hz to 65 Hz, external power injection or regeneration are not available.) DP series Type R −1 to +1 (Phase lead or phase lag, 45 Hz to 65 Hz)					
Frequency setting range	40.00 Hz to 550.00 Hz (AC mode) 1.00 Hz to 550.00 Hz (ACDC mode)					
Setting resolution	0.01 Hz					
Frequency accuracy	±0.01 % of set (23 °C±5 °C)					
Frequency stability *18	±0.005 %					
Voltage frequency characteristic *19	±1 %					
Output waveform	sine wave, arbitrary wave (16 types), clipped sine wave (3 types)					
Output on phase setting range *20	0.0° to 359.9° variable					
Setting resolution	0.1°					
Output off phase setting range *20	0.0° to 359.9° variable (active/inactive selectable)					
Setting resolution	0.1°					
Phase angle setting range (Unbalanced mode)	L2 phase: 180.0°±35.0°				L2 phase: 120.0°±35.0° L3 phase: 240.0°±35.0°	
Setting resolution	0.1°					
Phase angle accuracy *21	45 Hz to 65 Hz: ±1.0° 40 Hz to 550 Hz: ±2.0°					
DC offset *22	Within ±20 mV (typ., fine adjustment available.)					

*13: In the case of 10 V to 150 V / 20 V to 300 V, sine wave, no load, 45 Hz to 65 Hz, 23 °C±5 °C.

*14: If the output voltage is higher than the rated value, this is limited (lowered) to satisfy the power capacity. In the case of 40 Hz or lower or 400 Hz or higher, and that the ambient temperature is 40 °C or higher, the maximum current may decrease.

*15: For the capacitor input type rectified load (crest factor=4), the rated output voltage, and 45 Hz to 65 Hz.

*16: In the case rated output voltage, 50 Hz or 60 Hz, power factor −1. It may reduce the reverse power flow if ambient temperature is 40 °C or higher. If the output voltage is higher than the rated value, power capacity is limited to 40 % (continuous, 30 °C to 40 °C), 50 % (continuous, lower than 30 °C), and 100 % (reverse power flow time ≤ 180 s, reverse power flow duty ≤ 0.2, 40 °C or lower). About duty, see Figure 10-1. Only for DP series Type R, the reverse power flow is supported.

*17: In the case that the power input is single-phase 170 V or lower, models with 6 kVA or higher have the limit on the power capacity in the power running.

*18: For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature.

*19: For 40 Hz to 550 Hz, sine wave, the rated output voltage, the resistance load for the maximum current at 55 Hz, and 55 Hz reference.

*20: Set for the L1 phase. The component of the phase angle setting is added for the other phases.

*21: In the case of 50 V or higher, sine wave, and same load condition and voltage setting for all phases.

*22: In the case of the AC mode and 23 °C±5 °C.

10.6 DC Output

Only single-phase model and single-phase output of the Multi-phase model. [V]=Vdc, [A]=Adc, unless otherwise noted. The polarity is relative to the Lo terminal.

	Single-phase model and Single-phase output of Multi-phase model							
DP series	015S	030S	045S 045M	060S	075S	090S 090M	105S	120S
DP series Type R	015RS	030RS	045RS	060RS	075RS	090RS		
Mode	Floating output, the Lo terminal can be grounded.							
Rated output voltage	100 V / 200 V							
Voltage setting range	−227.0 V to +227.0 V / −454.0 V to +454.0 V							
Setting resolution	0.1 V							
Voltage accuracy *23	±(|0.5 % of set| + 0.6 V / 1.2 V)							
Maximum source current *24	15 A / 7.5 A	30 A / 15 A	45 A / 22.5 A	60 A / 30 A	75 A / 37.5 A	90 A / 45 A	105 A / 52.5 A	120 A / 60 A
Maximum instantaneous source current *25	Peak value (Apk) which is four times of the maximum current							
Sink current *26 (only for Type R)	40 % (continuous, 30 °C to 40 °C) of maximum source current 50 % (continuous, lower than 30 °C) of maximum source current 100 % (sink time ≤ 180 s, sink time duty ≤ 0.2, 40 °C or lower) of maximum source current							
Power capacity *27	1.5 kW	3 kW	4.5 kW	6 kW	7.5 kW	9 kW	10.5kW	12 kW

*23: In the case of −212 V to −10 V, +10 V to +212 V / −424 V to −20 V, +20 V to +424 V, no load, AC setting 0 V, 23 °C±5 °C.

*24: If the output voltage is higher than the rated value, this is limited (lowered) to satisfy the power capacity. If there is the AC superimposition, the active current of DC+AC satisfies the maximum current. In the case that the ambient temperature is 40 °C or higher, the maximum current may decrease.

*25: Instantaneous = within 2 ms, at the rated output voltage.

*26: In the case rated output voltage. It may reduce sink current if ambient temperature is 40 °C or higher. If the output voltage is higher than the rated value, power capacity is limited to 40 % (continuous, 30 °C to 40 °C), 50 % (continuous, lower than 30 °C), and 100 % (sink time ≤ 180 s, sink time duty ≤ 0.2, 40 °C or lower). About duty, see Figure 10-1. Only for DP series Type R, sink current is supported.

*27: In the case that the power input is single-phase 170 V or lower, models with 6 kVA (6 kW) or higher have the limit on the power capacity in the power running.

10.7   Output Voltage Stability

	All models
Fluctuation with input voltage (Phase voltage) *28 *29	Within ±0.15 %

Fluctuation with output current (Phase voltage) *30	DC (Only single-phase model and single-phase output of the Multi-phase model)
	          Within ±0.15 V / ±0.30 V
	45 Hz to 65 Hz
	          Within ±0.15 V / ±0.30 V
	40 Hz to 550 Hz
	          Within ±0.5 V / ±1.0 V

Fluctuation with ambient temperature (Phase voltage) *31	Within ±0.01 %/°C (typ.)

28:   In the case of single-phase input, for power input 90 V to 250 V for 1.5 kVA, 3 kVA, and 4.5 kVA models, power input 170 V to 250 V for the 6 kVA or higher models, power input 200 V reference. In the case of three-phase three-wire input, for power input 170 V to 250 V, power input 200 V reference. In the case of three-phase four-wire input, for power input is 323 V to 433 V, power input 380 V reference.

*29:   For the resistance load at the maximum current, the rated output voltage, DC (only single-phase model and single-phase output of the Multi-phase model) or 45 Hz to 65 Hz. Transition state immediately after a change of the input power-supply voltage is not included.

*30:   In the case that the output current is changed from 0 % to 100 % of the maximum current. For output voltage 75 V to 150 V/150 V to 300 V, no load reference. However, if the output voltage is higher than the rated value, the maximum current is limited to satisfy the power capacity.

*31:   For power input 200 V (single-phase, three-phase three-wire input) or 380 V (three-phase four-wire input), no load, the rated output voltage, DC (only single-phase output) or 45 Hz to 65 Hz.

10.8   Distortion of Output Voltage Waveform

	All models
Distortion (Phase voltage) *32	0.5 % or lower

*32:   40 Hz to 550 Hz, 50 % or higher of the rated output voltage, the maximum current or lower, AC and ACDC modes, THD+N.

10.9 Power Input

For the 4.5 kVA or higher models, ether single-phase input or three-phase three-wire input or three-phase four-wire input can be chosen when ordering.

	Single-phase model, Polyphase model, Multi-phase model							
DP series	015S	030S 030D	045S 045T 045M	060S 060D	075S	090S 090D 090T 090M	105S	120S
DP series Type R	015RS	030RS 030RD	045RS 045RT	060RS 060RD	075RS	090RS 090RD 090RT	/	/
Voltage	Overvoltage Category II							
1P2W input *33	100 V to 230 V ±10 %, with limited to 250 V or lower							
3P3W input	/	/	200 V to 220 V ±15 %, with limited to 250 V or lower					
3P4W input	/	/	380 V (phase voltage: 220 V) ±15 %, with limited to 433 V (phase voltage: 250 V) or lower					
Frequency	50 Hz ±2 Hz or 60 Hz ±2 Hz							
Power factor *34	Power input singe-phase 100 V: 0.95 or higher (typ.) Power input single-phase 200V, three-phase three-wire 200V, three-phase four-wire 380V: 0.90 or higher (typ.)							
Efficiency *34	Power input single-phase 200V, three-phase three-wire 200V, three-phase four-wire 380V: 77 % or higher (typ.)							
Maximum power consumption	2.25 kVA or lower	4.5 kVA or lower	6.75 kVA or lower	9 kVA or lower	11.25kVA or lower	13.5 kVA or lower	15.75kVA or lower	18 kVA or lower

*33: In the 6 kVA or higher models, the output capacity in the power running is limited to 4.5 kW for the single-phase 170 V or lower input.

*34: In the case of AC- INT, the rated output voltage, the resistance load at the maximum current, 45 Hz to 65 Hz output.

10.10 Withstand Voltage and Insulation Resistance

Power input - Output/Chassis and Power input/Chassis - Output

	All models
Withstand voltage	AC 1500 V or DC 2130 V, 1 minute.
Insulation resistance	30 MΩ or higher (DC 500 V)

10.11 Measurement Function

All accuracy of the measurement function is indicated for 23 °C±5 °C.

View

	All models
Normal	Displays almost all the measured and setting values excluding the harmonic current measurement on one screen.
Simple	Enlarges and displays three items among all the measured values except the harmonic current measurement.

Voltage   *35

		All models
Effective value (rms)	Full scale	250.0 V / 500.0 V
	Resolution	0.1 V

	Accuracy	DC, 45 Hz to 65 Hz
		    ± (0.5 % of rdg + 0.3 V / 0.6 V)
		40 Hz to 550 Hz
		    ± (0.7 % of rdg + 0.9 V / 1.8 V)

DC average value (avg)	Full scale	±250.0 V / ±500.0 V
	Resolution	0.1 V
	Accuracy	DC ± (|0.5 % of rdg| + 0.3 V / 0.6 V)
Peak value (pk) (each of max and min)	Full scale	±250.0 V / ±500.0 V
	Resolution	0.1 V
	Accuracy *36	DC, 45 Hz to 65 Hz ± (|2 % of rdg| + 1 V / 2 V)

*35: The accuracy values are in the case that the output voltage is within voltage setting range, values for power factor 1 in DP series, and values for power factor ±1 in DP series Type R. In the polyphase model, polyphase system, and polyphase output of the Multi-phase, this specification is for the phase voltage and the DC average value display cannot be selected.

*36: The accuracy of the peak value is for a waveform of DC or sine wave.

Voltage (Line voltage. Only with the polyphase model, polyphase system, and polyphase output of the Multi-phase model. Only with sine waveform output.)

		Polyphase model, Polyphase system, Polyphase output of the Multi-phase model
Effective value (rms) *37	Full scale	1P3W: 500.0 V / 1000.0 V 3P4W: 433.0 V / 866.0 V
	Resolution	0.1 V

*37: The displayed value is the result of calculation with the phase voltage measured value and the phase angle setting value regarding the output voltage waveform as a sine wave.

Current (phase current) *38 *39 *40

		Single-phase model, Polyphase model, Multi-phase model			
DP series		015S,030D,045T, 045M (polyphase output)	030S,060D,090T, 090M (polyphase output)	045S, 045M (single-phase output)	090D
DP series Type R		015RS,030RD, 045RT	030RS,060RD, 090RT	045RS	090RD
Effective value (rms)	Full scale	20 A / 10 A	40 A / 20 A	60 A / 30 A	
	Resolution	0.01 A			
	Accuracy	DC, 45 Hz to 65 Hz			
		± (0.5 % of rdg + 0.04 A / 0.04 A)	± (0.5 % of rdg + 0.08 A / 0.04 A)	± (0.5 % of rdg + 0.12 A / 0.06 A)	± (0.5 % of rdg + 0.16 A / 0.08 A)
		40 Hz to 550 Hz			
		± (0.7 % of rdg + 0.04 A / 0.04 A)	± (0.7 % of rdg + 0.08 A / 0.04 A)	± (0.7 % of rdg + 0.12 A / 0.06 A)	± (0.7 % of rdg + 0.16 A / 0.08 A)
DC average value (avg)	Full scale	±20 A / ±10 A	±40 A / ±20 A	±60 A / ±30 A	
	Resolution	0.01 A			
	Accuracy	DC			
		± (|0.5 % of rdg| + 0.04 A / 0.04 A)	± (|0.5 % of rdg| + 0.08 A / 0.04 A)	± (|0.5 % of rdg| + 0.12 A / 0.06 A)	± (|0.5 % of rdg| + 0.16 A / 0.08 A)
Peak value (pk) (each of max and min)	Full scale	±80 A / ±40 A	±160 A / ±80 A	±240 A / ±120 A	
	Resolution	0.01 A			
	Accuracy (Reference Value) *41	DC, 45 Hz to 65 Hz			
		± (|2 % of rdg| + 0.2 A / 0.2 A)	± (|2 % of rdg| + 0.4 A / 0.2 A)	± (|2 % of rdg| + 0.6 A / 0.3 A)	± (|2 % of rdg| + 0.8 A / 0.4 A)
	Hold	Holds the maximum values of |max| and |min| with the polarity (with the clear function)			

		Single-phase model, Single-phase three-wire model, Single-phase output of Multi-phase model				
DP series		060S, 120D	075S	090S, 090M	105S	120S
DP series Type R		060RS	075RS	090RS		
Effective value (rms)	Full scale	80 A / 40 A	100 A / 50 A	120 A / 60 A	140 A / 70 A	160 A / 80 A
	Resolution	0.01 A				
	Accuracy	DC, 45 Hz to 65 Hz				
		± (0.5 % of rdg + 0.16 A / 0.08 A)	± (0.5 % of rdg + 0.24 A / 0.12 A)		± (0.5 % of rdg + 0.32 A / 0.16 A)	
		40 Hz to 550 Hz				
		± (0.7 % of rdg + 0.16 A / 0.08 A)	± (0.7 % of rdg + 0.24 A / 0.12 A)		± (0.7 % of rdg + 0.32 A / 0.16 A)	
DC average value (avg)	Full scale	±80 A / ±40 A	±100A / ±50A	±120A / ±60A	±140A / ±70A	±160A / ±80A
	Resolution	0.01 A				
	Accuracy	DC				
		± (|0.5 % of rdg| + 0.16 A / 0.08 A)	± (|0.5 % of rdg| + 0.24 A / 0.12 A)		± (|0.5 % of rdg| + 0.32 A / 0.16 A)	
Peak value (pk) (each of max and min)	Full scale	±320A / ±160A	±400A/±200A	±480A/±240A	±560A/±280A	±640A/±320A
	Resolution	0.01 A				
	Accuracy (Reference Value) *41	DC, 45 Hz to 65 Hz				
		± (|2 % of rdg| + 0.8 A / 0.4 A)	± (|2 % of rdg| + 1.2 A / 0.6 A)		± (|2 % of rdg| + 1.6 A / 0.8 A)	
	Hold	Holds the maximum values of |max| and |min| with the polarity (with the clear function)				

*38: For DP series, the accuracy values are in the case that the output current is 5 % to 100 % of the maximum current. For DP series Type R, the accuracy values are in the case that the output current is −5 % to −100 % or +5 % to +100 % of the maximum current.

*39: In the polyphase model, polyphase system, and polyphase output of the Multi-phase, these are the specifications for the phase current. The DC average value display cannot be selected.

*40: For DP series Type R, the accuracy values in the reverse power flow are in the case of DC or 50 Hz or 60 Hz, power factor −1.

*41: The accuracy of the peak value is for a waveform of DC or sine wave.

Power *42 *43 *44 *45

		Single-phase model, Polyphase model, Multi-phase model			
DP series		015S, 030D, 045T, 045M (polyphase output)	030S, 060D, 090T, 090M (polyphase output)	045S, 045M (single-phase output)	090D
DP series Type R		015RS,030RD 045RT	030RS,060RD 090RT	045RS	090RD
Active (W)	Full scale *46	DP series 1800 W	3600 W	5400 W	
		DP series Type R ±1800 W	±3600 W	±5400 W	
	Resolution	0.1 W / 1 W (1000 W or higher)			
	Accuracy *47	DC, 45 Hz to 65 Hz ±(1 % of rdg + 1.5 W)	±(1 % of rdg + 1.5 W)	±(1% of rdg + 2.25 W)	±(1 % of rdg + 3 W)
Apparent (VA)	Full scale	2250 VA	4500 VA	6750 VA	
	Resolution	0.1 VA / 1 VA (1000 VA or higher)			
	Accuracy *48	45 Hz to 65 Hz ±(2 % of rdg + 3 VA)	±(2 % of rdg + 3 VA)	±(2% of rdg + 4.5 VA)	±(2 % of rdg + 6 VA)
Reactive (var)	Full scale	2250 var	4500 var	6750 var	
	Resolution	0.1 var / 1 var (1000 var or higher)			
	Accuracy *49	45 Hz to 65 Hz ±(2 % of rdg + 3 var)	±(2 % of rdg + 3 var)	±(2 % of rdg + 4.5 var)	±(2 % of rdg + 6 var)

		Single-phase model, Single-phase three-wire model, Single-phase output of the Multi-phase model				
DP series		060S, 120D	075S	090S, 090M	105S	120S
DP series Type R		060RS	075RS	090RS		
Active (W)	Full scale *46	DP series 7200 W	9000 W	10800 W	12600 W	14400 W
		DP series Type R ±7200 W	±9000 W	±10800 W	±12600 W	±14400 W
	Resolution	0.1 W / 1 W (1000 W or higher)				
	Accuracy *47	DC, 45 Hz to 65 Hz ±(1 % of rdg + 3 W)	±(1 % of rdg + 4.5 W)		±(1 % of rdg + 6 W)	
Apparent (VA)	Full scale	9000 VA	11250 VA	13500 VA	15750 VA	18000 VA
	Resolution	0.1 VA / 1 VA (1000 VA or higher)				
	Accuracy *48	45 Hz to 65 Hz ±(2 % of rdg + 6 VA)	±(2 % of rdg + 9 VA)		±(2 % of rdg + 12 VA)	
Reactive (var)	Full scale	9000 var	11250 var	13500 var	15750 var	18000 var
	Resolution	0.1 var / 1 var (1000 var or higher)				
	Accuracy *49	45 Hz to 65 Hz ±(2 % of rdg + 6 var)	±(2 % of rdg + 9 var)		±(2 % of rdg + 12 var)	

*42: All in the case of sine wave, 50 V or higher output voltage, and that the output current is 10 % or higher of the maximum current.

*43: In the polyphase model, polyphase system, and polyphase output of the Multi-phase, these are the specifications for each phase.

*44: In the polyphase model, polyphase system, and polyphase output of the Multi-phase, the all-phase total display is available.

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*45: The apparent and reactive powers are not displayed in the DC mode.

*46: For DP series Type R, the value is plus display in the power running and minus display in the reverse power flow.

*47: The accuracy of the active power is for the load with the power factor +1. In the case of the load with the power factor +0.5 or more and lower than +1, the accuracy is twice the value with the power factor +1. For DP series Type R, the accuracy values in the reverse power flow are in the case of DC or 50 Hz or 60 Hz, power factor −1.

*48: The accuracy of the apparent power is for the load with the power factor +1. For DP series Type R, the accuracy in the reverse power flow is in the case of power factor −1.

*49: The accuracy of the reactive power is for the load with the power factor 0.5 or lower.

Load power factor, Load crest factor

		All models
Power factor *50	Measurement range	DP series : 0.00 to 1.00 DP series Type R: −1.00 to +1.00
	Resolution	0.01
Crest factor	Measurement range	0.00 to 50.00
	Resolution	0.01

*50: The power factor is not displayed in the DC mode. The value of the power factor is plus display in the power running and minus display in the reverse power flow.

Synchronization frequency (only SYNC)

	All models
Display range	38.0 Hz to 525.0 Hz
Resolution	0.1 Hz
Accuracy	±0.2 Hz

Harmonic current (AC-INT, fundamental wave 50 Hz/60 Hz only, phase current) *51

		Single-phase model, Polyphase model, Multi-phase model			
DP series		015S,030D,045T, 045M (polyphase output)	030S,060D,090T, 090M (polyphase output)	045S, 045M (single-phase output)	090D
DP series Type R		015RS,030RD 045RT	030RS,060RD 090RT	045RS	090RD
Effective value (rms) Percent (%)	Measurement range	Up to 40th order of the fundamental wave			
	Full scale	20 A / 10 A 100 %	40 A / 20 A 100 %	60 A / 30 A 100 %	
	Resolution	0.01 A 0.1 %			
	Accuracy (at RMS, reference value)	Up to 20th ± (1 % of rdg + 0.2 A / 0.2 A)	± (1 % of rdg + 0.4 A / 0.2 A)	± (1 % of rdg + 0.6 A / 0.3 A)	± (1 % of rdg + 0.8 A / 0.4 A)
		21st to 40th ± (1.5 % of rdg + 0.2 A / 0.2 A)	± (1.5 % of rdg + 0.4 A / 0.2 A)	± (1.5 % of rdg + 0.6 A / 0.3 A)	± (1.5 % of rdg + 0.8 A / 0.4 A)

		Single-phase model, Single-phase three-wire model, Single-phase output of the Multi-phase model				
DP series		060S, 120D	075S	090S, 090M	105S	120S
DP series Type R		060RS	075RS	090RS		
Effective value (rms) Percent (%)	Measurement range	Up to 40th order of the fundamental wave				
	Full scale	80 A / 40 A 100 %	100 A / 50 A 100 %	120 A / 60 A 100 %	140 A / 70 A 100 %	160 A / 80 A 100 %
	Resolution	0.01 A 0.1 %				
	Accuracy (at RMS, reference value)	Up to 20th ± (1 % of rdg +0.8 A / 0.4 A)	± (1 % of rdg + 1.2 A / 0.6 A)		± (1 % of rdg + 1.6 A / 0.8 A)	
		21st to 40th ± (1.5 % of rdg +0.8 A/ 0.4 A)	± (1.5 % of rdg + 1.2 A / 0.6 A)		± (1.5 % of rdg + 1.6 A / 0.8 A)	

*51:   The measurement does not conform to the IEC or other standard.

Display of emission CO_2 *52

	All models
Displayed items	Displays the instantaneous ($kgCO_2$/h) and integration (tCO_2, can be cleared) values for the internal loss and the output power
Full scale	Instantaneous: 20 $kgCO_2$/h, Integration: 2000 tCO_2
Resolution	Instantaneous: 0.001 $kgCO_2$/h, Integration: 0.000001 tCO_2
Emission CO_2 coefficient	Variable (resolution 0.000001 tCO_2/kWh) Factory default: 0.000555 tCO_2/kWh

*52:   In DP series Type R, instantaneous values are not displayed while the reverse power flow is operating. Also, integration operation stops.

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10.12 Power Unit Energization Setting

The power consumption can be decreased by decreasing the number of the power units in operation according to the load capacity. Each power unit can be enabled (energized)/disabled (not energized) separately. (1.5 kVA or 1.5 kW/power unit)

	Single-phase model and Single-phase output of Multi-phase model							
DP series	015S	030S	045S 045M	060S	075S	090S 090M	105S	120S
DP series Type R	015RS	030RS	045RS	060RS	075RS	090RS		
Number of units	1	2	3	4	5	6	7	8
Energizing setting *53	No	Yes						

*53: Can be set for only a model with more than one unit.

	Polyphase model and Polyphase output of Multi-phase model					
DP series	030D	060D	090D	120D	045T 045M	090T 090M
DP series Type R	030RD	060RD	090RD		045RT	090RT
Number of units (per phase)	1	2	3	4	1	2
Energizing setting *54	No	Yes			No	Yes

*54: Can be set for only a model with more than one unit per phase.

10.13 Current Limiter

This controls the output voltage for the output current to be within the limiter setting value when the peak value or RMS exceeds it. The output can be configured to be turned off when the limited state continues over the specified time.

In the polyphase model, polyphase system, and polyphase output of the Multi-phase model, the settings are made for the phase current and common to all the phases.

Peak current limiter

		Single-phase model, Polyphase model, Multi-phase model			
DP series		015S,030D,045T, 045M (polyphase output)	030S,060D,090T, 090M (polyphase output)	045S, 090D, 045M (single-phase output)	060S, 120D
DP series Type R		015RS,030RD, 045RT	030RS,060RD, 090RT	045RS,090RD	060RS
Positive current *55	Setting Range (Peak value)	+7.5 A to +63.0 A / +3.7 A to +31.5 A	+15.0 A to +126.0 A / +7.5 A to +63.0 A	+22.5 A to +189.0 A / +11.2 A to +94.5 A	+30.0 A to +252.0 A /+15.0 A to +126.0 A
	Factory default	+63.0 A / +31.5 A	+126.0 A / +63.0 A	+189.0 A / +94.5 A	+252.0 A / +126.0 A
Negative current *55	Setting Range (Peak value)	−63.0 A to −7.5 A / −31.5 A to −3.7 A	−126.0 A to −15.0 A / −63.0 A to −7.5 A	−189.0 A to −22.5 A / −94.5 A to −11.2 A	−252.0 A to −30.0 A / −126.0 A to −15.0 A
	Factory default	−63.0 A / −31.5 A	−126.0 A / −63.0 A	−189.0 A / −94.5 A	−252.0 A / −126.0 A
Resolution		0.1 A			
Limiter operation		Select whether to recover automatically (continuous) or turn the output off when the limited state continues over the specified time (1 s to 10 s, resolution 1 s). Factory default setting is output OFF when the limit state continues for 10 s.			

		Single-phase model and Single-phase output of Multi-phase model			
DP series		075S	090S, 090M	105S	120S
DP series Type R		075RS	090RS		
Positive current *55	Setting Range (Peak value)	+37.5 A to +315.0 A /+18.7 A to +157.5 A	+45.0 A to +378.0 A /+22.5 A to +189.0 A	+52.5 A to +441.0 A /+26.2 A to +220.5 A	+60.0 A to +504.0 A /+30.0 A to +252.0 A
	Factory default	+315.0 A / +157.5 A	+378.0 A / +189.0 A	+441.0 A / +220.5 A	+504.0 A / +252.0 A
Negative current *55	Setting Range (Peak value)	−315.0 A to −37.5 A / −157.5 A to −18.7 A	−378.0 A to −45.0 A / −189.0 A to −22.5 A	−441.0 A to −52.5 A / −220.5 A to −26.2 A	−504.0 A to −60.0 A / −252.0 A to −30.0 A
	Factory default	−315.0 A / −157.5 A	−378.0 A / −189.0 A	−441.0 A / −220.5 A	−504.0 A / −252.0 A
Resolution		0.1 A			
Limiter operation		Select whether to recover automatically (continuous) or turn the output off when the limited state continues over the specified time (1 s to 10 s, resolution 1 s). Factory default setting is output OFF when the limit state continues for 10 s.			

*55:   If you increased or decreased the number of units by the power unit energization setting, the factory default setting corresponding to the capacity is used. (Example: In the case that only 3 units operate in 6 kVA model, the factory default setting of 4.5 kVA model is used.)

RMS current limiter *56

	Single-phase model, Polyphase model, Multi-phase model			
DP series	015S,030D,045T, 045M (polyphase output)	030S,060D,090T, 090M (polyphase output)	045S, 090D, 045M (single-phase output)	060S, 120D
DP series Type R	015RS,030RD, 045RT	030RS,060RD, 090RT	045RS,090RD	060RS
Setting range (effective value) *57	0.8 A to 15.8 A / 0.8 A to 7.9 A	1.5 A to 31.5 A / 1.5 A to 15.8 A	2.3 A to 47.3 A / 2.3 A to 23.7 A	3.0 A to 63.0 A / 3.0 A to 31.5 A
Factory default	15.8 A / 7.9 A	31.5 A / 15.8 A	47.3 A / 23.7 A	63.0 A / 31.5 A
Resolution	0.1 A			
Limiter operation	Select whether to recover automatically (continuous) or turn the output off when the limited state continues over the specified time (1 s to 10 s, resolution 1 s). Factory default setting is output OFF when the limit state continues for 10 s.			

	Single-phase model and Single-phase output of Multi-phase model			
DP series	075S	090S, 090M	105S	120S
DP series Type R	075RS	090RS		
Setting range (effective value) *57	3.8 A to 78.8 A / 3.8 A to 39.4 A	4.5 A to 94.5 A / 4.5 A to 47.3 A	5.3 A to 110.3 A / 5.3 A to 55.2 A	6.0 A to 126.0 A / 6.0 A to 63.0 A
Factory default	78.8 A / 39.4 A	94.5 A / 47.3 A	110.3 A / 55.2 A	126.0 A / 63.0 A
Resolution	0.1 A			
Limiter operation	Select whether to recover automatically (continuous) or turn the output off when the limited state continues over the specified time (1 s to 10 s, resolution 1 s). Factory default setting is output OFF when the limit state continues for 10 s.			

*56: In DP series Type R, effective value of output current is not limited while the reverse power flow is occurring. However, LIMIT LED lights up and the specified limiter operation is performed.

*57: If you increased or decreased the number of units by the power unit energization setting, the factory default setting corresponding to the capacity is used. (Example: In the case that only 3 units operate in 6 kVA model, the factory default setting of 4.5 kVA model is used.)

10.14 Setting Range Limit Function

This is the limit function for the setting of the internal signal source. It works when the signal source is INT, VCA (frequency setting limit only), SYNC (voltage setting limit only), or ADD (internal signal source only). The limitation does not work for the Sequence and Simulation. It does not also work for the external signal source of EXT and ADD.

In the polyphase model, polyphase system, and polyphase output of the Multi-phase model, the setting is common to all the phases.

Voltage setting limit 1 (in the AC mode, and sine wave or clipped sine wave is selected)

	All models
Setting range (effective value) *58	Phase voltage setting 0.1 V to 160.0 V / 0.1 V to 320.0 V
	Line voltage setting (single-phase three-wire) 0.2 V to 320.0 V / 0.2 V to 640.0 V
	Line voltage setting (three-phase four-wire) 0.2 V to 277.2 V / 0.2 V to 554.2 V
Factory default	Phase voltage setting, 160.0 V / 320.0 V
Resolution	Phase voltage setting: 0.1 V, line voltage setting: 0.2 V

*58:   The line voltage setting is available only when the output voltage setting is set as the line voltage and sine wave is selected in the balanced mode of the polyphase model, polyphase system, and polyphase output of the Multi-phase model.

Voltage setting limit 2 (other than Voltage setting limit 1, phase voltage setting only) *59

		All models
Positive voltage	Setting Range (Peak value)	+0.1 V to +227.0 V / +0.1 V to +454.0 V
	Factory default	+227.0 V / +454.0 V
Negative voltage	Setting Range (Peak value)	−227.0 V to −0.1 V / −454.0 V to −0.1 V
	Factory default	−227.0 V / −454.0 V
Resolution		0.1 V

*59:   The limitation is applied to the additional values of the AC voltage setting (recalculated to a peak value) and the DC voltage setting.

Frequency setting limit (the lower limit ≤ the upper limit) *60

		All models
Upper limit	Setting Range	1.00 Hz (AC mode : 40.00 Hz) to 550.00 Hz
	Factory default	550.00 Hz
Lower limit	Setting Range	1.00 Hz (AC mode : 40.00 Hz) to 550.00 Hz
	Factory default	1.00 Hz (AC mode : 40.00 Hz)
Resolution		0.01 Hz

*60:   In the AC mode, the setting range is 40.00 Hz to 550.00 Hz.

10.15 Remote Sensing

This switches the voltage used for measurement. When the remote sensing is on, the sensing input terminal voltage is used. When it is off, the output terminal voltage is used.

By combining with AGC or Autocal, a voltage drop due to wiring to the load can be compensated. When the remote sensing is on, the output voltage detection point corrected by the AGC or Autocal function is switched to the sensing input terminal. When AGC or Autocal is off, only the detection voltage used for measurement display is switched.

Effective only for AC-INT, AC-VCA, AC-SYNC, DC-INT, and DC-VCA and when the waveform is sine wave or DC. It is turned off when the Sequence or Simulation is selected.

However, in case the stand-by state of sequence mode (step 0) effective only for AC-INT, ACDC-INT and DC-INT and when the waveform is sine wave or DC. Remote sensing cannot be activated unless either AC voltage or DC voltage setting is 0 V for ACDC-INT. Also, remote sensing is turned off once when you change ACDC mode from AC mode of DC mode even in stand-by state. Turn ON it again when you need.

	Measurement voltage, power, power factor	AGC/Autocal	
		Off	On
On	Use the sensing input terminal voltage	Not active	Active
Off	Use the output terminal voltage	Not active (factory default)	Active

10.16 AGC

When the AGC (Automatic Gain Control) is on, the detection point voltage is always measured, and the output voltage is continuously corrected so that its effective value is equal to the output voltage setting value. The fluctuation of the detection point voltage can be suppressed even when the load is fluctuated. The detection point can be switched between the sensing input terminal (remote sensing on) and the output terminal (remote sensing off).

Effective only for AC-INT, AC-VCA, AC-SYNC, DC-INT, and DC-VCA and when the waveform is sine wave or DC. It is turned off when the Sequence or Simulation is selected. It cannot be selected when the Autocal is set to on.

	All models
Response time	Within 100 ms (typ.) (DC/50 Hz/60 Hz, at the rated output voltage)
Operation range	The output voltage setting is 8 V or higher
Calibration range	Within ±10 % (difference between the output voltage and measured value) The output voltage should be within the allowed voltage setting range of the product.
Accuracy	Within ±0.5 V / ±1.0 V (in the case of DC or 40 Hz to 550 Hz, 50 V or higher output voltage, resistance load, the output current is the maximum current or less)

10.17 Autocal (Output Voltage Compensation)

When the Autocal (Automatic Calibration) is on, the detection point voltage is always measured, and the output voltage is continuously corrected so that its effective value is equal to the output voltage setting value. The ratio (correction factor) of the detection point voltage to the output voltage setting value is used until the Autocal or the power is turned off. Therefore, the detection point voltage is not necessarily maintained if the load changes while the Autocal is on. The detection point can be switched between the sensing input terminal (remote sensing on) and the output terminal (remote sensing off).

Unlike the AGC, it cannot follow a load fluctuation because it does not keep track of the voltage. On the other hand, when the load is stable, it has a merit of short response time on changing the output voltage setting.

Effective only for AC-INT, AC-VCA, AC-SYNC, DC-INT, and DC-VCA and when the waveform is sine wave or DC. It is turned off when the Sequence or Simulation is selected. It cannot be selected when the AGC is set to on.

However, in case the stand-by state of sequence mode (step 0) effective only for AC-INT, ACDC-INT and DC-INT and when the waveform is sine wave or DC. Autocal cannot be activated unless either AC voltage or DC voltage setting is 0 V for ACDC-INT. Also, Autocal is turned off once when you change ACDC mode from AC mode of DC mode even in stand-by state. Turn ON it again when you need.

	All models
Restriction when on	The output voltage setting is 8 V or higher
Calibration range *61	Within ±10 % (difference between the output voltage and measured value) The output voltage should be within the allowed voltage setting range of the product.
Accuracy *61	Within ±0.5 V / ±1.0 V (in the case of DC or 40 Hz to 550 Hz, 50 V or higher output voltage, resistance load, the output current is the maximum current or less)

*61:   The values of the calibration range and accuracy are the ones at the time when the Autocal is turned on.

10.18 Sequence

Effective only for AC-INT, ACDC-INT, and DC-INT.

	All models
Number of memories	5 (non-volatile)
Number of steps	Maximum 255 (for each sequence)
Setting range of Step Time	0.0010 s to 999.9999 s
Intra-Step behavior	Constant, Keep, Linear Sweep
Parameter *62 *63 *64 *65	Output range AC/DC mode (The signal source is fixed to INT) (The above 2 items are common within one sequence) AC phase voltage, frequency, waveform DC voltage Start Phase Stop Phase Phase angle Step termination Jump count (1 to 9999, or infinite) Specification of the Jump-to step Synchronous step output (2bit) Specification of the branch step Trigger output
Sequence control	Start Stop Hold Resume Branch 1, Branch 2

*62: The output of AC voltage, Frequency and DC voltage of step 0 can be changed on Sequence Edit View during output ON.

*63: For DC-INT, the AC phase voltage, frequency, waveform, Start Phase, and Stop Phase cannot be set.

*64: The DC voltage cannot be set in the polyphase model, polyphase system, and polyphase output of the Multi-phase model.

*65: The Phase angle can be set only in the polyphase model, polyphase system, and polyphase output of the Multi-phase model. The Start Phase and Stop Phase are specified for the L1 phase, and the component of the Phase angle setting is added to them for the other phases.

10.19 Simulation

This allows you to simulate power line abnormalities, such as blackout, voltage rise, voltage drop, abrupt phase change, and abrupt frequency change. It can be used only for AC, sine wave, and ACDC-INT. Note that it does not support IEC or other standards test. When performing the tests specified by the standards, use appropriate peripheral equipment. In the polyphase model, polyphase system, and polyphase output of the Multi-phase model, only the balanced mode is available.

	All models
Number of memories	5 (non-volatile)
Number of steps	6 (Initial, Normal 1, Trans 1, Abnormal, Trans 2, Normal 2)
Setting range of Step Time	0.0010 s to 999.9999 s (0 s is available only for the Transition Step)
Parameter	Output range (The above item is common within the Simulation) AC voltage Frequency Waveform (sine wave only) Start Phase (excluding the Transition Step) Stop Phase (excluding the Transition Step) Synchronous step output (2bit) Trigger output Repeat count (1 to 9999 times or infinite) Initial Normal1 Trans1 Abnormal Trans2 Normal2 Initial Trigger setting example Step sync 1 output example Step sync 2 output example
Simulation control	Start Stop

10.20 Clipped Sine Wave

The peak clipped sine wave can be output, based on the crest factor (CF) setting or the percent setting to the peak value.

		All models
Number of memories		3 (non-volatile)
CF *66 *67	Variable range	1.10 to 1.41
	Factory default	1.41
	Setting resolution	0.01
	Effective value correction	Yes
Clip ratio *66 *68	Variable range	40.0 % to 100.0 %
	Factory default	100.0 %
	Setting resolution	0.1 %
	Effective value correction	None

*66: In the polyphase model, polyphase system, and polyphase output of the Multi-phase model, these are the settings for the phase voltage.

*67: The crest factor is represented as "voltage peak value/voltage effective value." It is 1.41 for sine wave.

*68: When the clip ratio is specified, the peak is clipped by the voltage corresponding to the specified % to the peak value of the setting voltage (100 %).
Example) For the output voltage setting of 100 Vrms and the clip rate of 80 %, the peak is clipped at 113.1 Vpk.

10.21 Arbitrary Wave

This uses the waveform data saved in the internal memory, which is transferred and recalled using the external interface or USB memory.

	All models
Number of memories	16 (non-volatile)
Waveform length	4096 words
Amplitude resolution	16 bit

10.22 External Signal Input

The external signal input works differently depending on the selection of the signal source.

10.22.1 External Synchronous Signal Input (Signal Source SYNC only)

This is the signal to synchronize the frequency of the internal signal source with the one of the external signal source.

When the signal source is SYNC, you can select whether to synchronize with this external signal input or the power input frequency of the product. When synchronizing with the power input frequency, no signal input is needed.

	All models	Factory default
Synchronization signal source switch	External synchronization signal (EXT) or Power input (LINE)	LINE
Synchronization frequency range	40 Hz to 500 Hz	
Input terminal	BNC connector (rear panel, unbalanced)	
Input impedance	1 MΩ	
Threshold of input voltage	TTL level	
Minimum pulse width	500 μs	
Nondestructive maximum input voltage	±10 V	

10.22.2 Voltage Setting Signal Input (Signal Source VCA only)

This is the signal to set the output voltage amplitude of the internal signal source (DC input).

Output voltage (Vpk) = Voltage setting signal (Vdc) × Gain (Vpk/Vdc)

Example 1)   For the AC mode, signal source = VCA, the gain of 100.0, and the voltage setting signal input of 1 Vdc, the output voltage is 100 Vpk.

Example 2)   For the AC mode, signal source = VCA, the gain of 141.4, and the voltage setting signal input of 1 Vdc, the output voltage is 141.4 Vpk (=100 Vrms).

		All models	Factory default
Gain setting range	*69	100 V range: 0.0 to 227.0 times	100
		200 V range: 0.0 to 454.0 times	200
Setting resolution	*69	0.1	
Gain accuracy	*70	±5 %	
Input terminal		BNC connector (rear panel, unbalanced) Also used as the external synchronization signal input	
Input impedance		1 MΩ	
Input voltage range		±2.2 V (A/D resolution 10 bit)	
Nondestructive maximum input voltage		±10 V	

*69:   In the polyphase model, polyphase system, and polyphase output of the Multi-phase model, the setting is common to all the phases.
*70:   DC or 45 Hz to 65 Hz, the gain is the factory default, the rated output voltage, no load.

10.22.3 External Signal Input (only EXT and ADD)

This multiplies the input signal by the specified gain and outputs it. For ADD, the internal signal source is added.

EXT: Output voltage (V) = External signal input (V) × Gain (V/V)

ADD: Output voltage (V) = External signal input (V) × Gain (V/V)

+ Internal signal source setting (V)

	Specification *71	Factory default
Setting Range for gain	100 V range: 0.0 to 227.0 times	100
	200 V range: 0.0 to 454.0 times	200
Setting resolution	0.1	
Gain accuracy *72	±5 %	
Input-output phase	In-phase	
Input terminal	BNC connector (rear panel, unbalanced) Also used as the external synchronization signal input	
Input impedance	1 MΩ	
Input voltage range	±2.2 V (A/D resolution 10 bit)	
Nondestructive maximum input voltage	±10 V	
Input frequency range	DC to 550 Hz (sine wave) DC to 100 Hz (other than sine wave)	

*71:   Not available for the polyphase model. It cannot be used for the polyphase system or polyphase output of the Multi-phase.
*72:   DC or 45 Hz to 65 Hz, the gain is the factory default, the rated output voltage, no load.

10.23 General Function

		Description	Factory default
LCD display setting	Contrast	0 to 99	
	Color	Blue tone or white tone	Blue tone
Beep (key operation, erroneous operation)		On or Off Alarms on abnormal situation regardless of the setting	On
Key lock		On or Off On: Only key lock-off and output-off are available	Off
Output relay control		Enable: The output relay is used to turn the output on/off Disable: The output relay is not used. High impedance to turn the output off	Enable
Output setting at power-on		On or Off On: Output on after power-on	Off
Trigger output setting		Polarity: positive ⎍ or negative ⎍ Pulse width: 0.1 ms to 10 ms (resolution 0.1 ms)	Negative 10 ms
Time unit setting for Sequence and Simulation		ms or s	s
Reset function		Resets the items stored in the System Setting Memory (excluding the external interface setting and external control setting) and the items that are to be reset at power-on, to the factory default settings.	

10.24 Memory Function

You can save basic settings (AC/DC mode, signal source, output range, AC setting, DC setting, current limiter, setting range limit, etc.) for each output phase configuration in the non-volatile Basic Setting Memory of No.1 to No.30, and recall them to use when the output is off. The No.1 setting is restored at power-on. The No.0 setting includes the setting items for the factory default.

The external control, display, and other settings are saved in non-volatile System Setting Memory when they are changed by the panel operation or remote command.

The Sequence, Simulation, clipped sine wave, and arbitrary wave are saved in their own non-volatile memories.

Items in the Basic Setting Memory *73

	Factory default
Output range	100 V range
AC/DC mode	AC mode
Signal source	INT
External synchronization signal (LINE or EXT)	LINE
AC voltage setting	0 V
Frequency	50 Hz
Output waveform	Sine wave
Output on phase and output off phase	0.0°
Phase voltage/Line voltage setting selection	Phase voltage
Phase angle setting	Single-phase three-wire: 180° Three-phase four-wire: 120°, 240°
Balanced/Unbalanced	Balanced
DC voltage setting	0 V
Current limiter	See *10.13*
Setting range limit	See *10.14*
External input gain	100 / 200

*73: Some items do not exist depending on the AC/DC mode or signal source.

Items in the System Setting Memory

	Factory default
Output function	Continuous
DC offset setting	0 mV
Measurement display mode	Normal View
Measurement unit selection	rms
Power unit energization setting	All enabled (energization)
Remote sensing	Off
AGC	Off
General function	See *10.23* (excluding the time unit setting of the Step Time for the Sequence and Simulation)
Monitor output target	Current (L1 phase)
External interface	USB
External control	Disabled

10.25 Self-diagnosis/Protection Function

At power-on	Description
ROM check	Checks the internal ROM.
RAM check	Checks the internal RAM.
Basic setting Memory check	Checks the Basic Setting Memory.
System Setting Memory check	Checks the System Setting Memory.
Waveform Memory check	Checks the Waveform Memory.
Sequence Memory check	Checks the Sequence Memory.
Simulation Memory check	Checks the Simulation Memory.
Adjustment value memory check	Checks the adjustment data memory.
Version check	Checks the version of the internal software.
System configuration check	Checks the polyphase system.

While energizing	Description
Abnormal output	Turns off the panel display and output when an output overvoltage or overcurrent is detected.
Power unit error	Turns off the panel display and output when a power unit error is detected.
Internal control error	Turns off the panel display and output when an internal communication or other error is detected. Also stops all the operations excluding power-off.

10.26 External Control Function

The following functions can be selected.

Item	Description
Disable	Disable the control input of the CONTROL I/O. The status output signal is output. （See *10.26.1*）
Enable	Enable the CONTROL I/O. （See *10.26.2*）
DevCtrl	You can control DIP. （See *10.26.2*）

10.26.1 CONTROL I/O

When you enabled the external control from the menu, you can control this product by using the external signal (or non voltage contact). The state output is always on. The detection and state switching is done at 10 ms-cycle. If the Remote state is achieved by the external interface, a control input is ignored.

It is not available to use *10.26.2* at the same time.

Item			Description	Factory default
Control input	External control input		Enabled or Disabled	
	Input level		TTL *74	
	Nondestructive maximum input		+10 V / −5 V	
	Input impedance		Pull-up to +5 V via 47 kΩ	
	Control	Output Off	Falling Off	
		Output On	Falling On	
		Sequence start/resume *75	Falling Start	
		Stop of sequence *75	Falling Stop	
		Sequence is in the Hold status	Falling Hold	
		Sequence branch 1	Falling Branch start	
		Sequence branch 2	Falling Branch start	
		Memory recall (+ compile) *76	Falling Recall	
		Memory specification 1	Specify 0 to 3	
		Memory specification 2	(Equivalent to memory 1 to 4, respectively)	
		Clear the current peak-hold value	Falling Clear	
State output	Output level		TTL *77	
	Output impedance		220 Ω	
	Polarity *78		Positive or Negative	Negative
	Status	Power On/Off	Low: Off, High: On	
		Output On/Off*	Low: On, High: Off (Negative) Low: Off, High: On (Positive)	
		Protection operation*	Low: Active, High: None (Negative) Low: None, High: Active (Positive)	
		Limiter operation*	Low: Active, High: None (Negative) Low: None, High: Active (Positive)	
		AGC/Autocal setting state*	Low: On, High: Off (Negative) Low: Off, High: On (Positive)	
		Software busy*	Low: Busy, High: Ready (Negative) Low: Ready, High: Busy (Positive)	
		Output range	Low: 200 V, High: 100 V	
		Sequence operation Step sync 1 *75	High level or Low level	
		Sequence operation Step sync 2 *75		
		Trigger	Positive ⎍ or Negative ⎍	
Terminal	D-sub 25-pin multi-connector (rear panel, female, M2.6 screw)			

*74: Low: 0.8 V or lower, High: 2.6 V or higher, the chassis potential.

*75: Sequence start and stop of the control input are effective for the Simulation as well. Also, step sync output 1 and 2 of the control output are effective for the Simulation as well.

*76: The memory recall input of the control input recalls the setting memory for the Normal (Continuous), the Sequence Memory for the Sequence, and the Simulation Memory for the Simulation. For the Sequence and Simulation, the compile data is also included.

*77: Low: 0.4 V or lower, High: 2.7 V or higher, the chassis potential.

*78: Polarity reverse (collective) is available only for the state with *.

10.26.2 Control of Peripherals by Device Control

You can control DIP.

Set external control function to DevCtrl and connect between CONTROL I/O connector of this product and CONTROL SIGNAL connector and QUICK CHANGE SYNC INPUT connector of DIP with the attached cable of DIP. The quick change sync signal is output from this product.

It is not available to use *10.26.1* at the same time.

10.27 External Interface

This is the interface to control the product from an external computer. The RS232 and USB interfaces are provided by default, and either GPIB or LAN interface can be chosen when ordering. (Both GPIB and LAN cannot be chosen.)

The command language is compliant with the SCPI Specification Version 1999.0. (Factory default is USB).

USB interface (USB1.1) *79

Item	Description
Device class	USBTMC
ID	Already assigned for each device
Terminator	"LF"

*79: The use of USB hub may cause a communication failure. It is recommended to use a fully-shielded, short cable.

RS232 interface *80 *81

Item	Description or Selection	Factory default
Terminal	D-sub 9-pin (male, UNC #4-40 screw)	
Baud rate	9600 / 19200	9600 bps
Terminator	"CR" "LF" / "CR" / "LF"	"CR" "LF"
Parity	None/Odd/Even	None
Stop bit	1 / 2	1 bit
Data bit	7 / 8	8 bit
Flow control	None/Hardware/Software	None

*80: Binary transmission is not supported.
*81: Use a cross cable.

GPIB interface (IEEE488.1 std 1987) *82 *83

Item	Description or Selection	Factory default
Address	0 to 30	2
Terminator	"LF"	

*82: Binary transmission is not supported.
*83: Query for the main unit status byte using a serial poll is not supported.

LAN interface (IEEE802.3, LXI 1.4 Core 2011) *84

Item	Description or Selection	Factory default
Terminal	RJ-45 modular jack	
Transmission method	Ethernet(100BASE-TX / 10BASE-T)	
Communication protocol	SCPI-RAW	
Terminator	"LF"	
IP address setting	Auto, Fixed	Auto

*84 : Binary transmission is not supported.

10.28 USB Memory Interface

Commercial USB memory sticks can be used.

	Description
Available memory *85	USB 1.1 or USB 2.0-compliant product
Connector	USB-A (front panel)
Format	FAT32
Writable/readable contents	Basic Setting Memory, Sequence, Simulation, arbitrary wave
File operation *86	Create dedicated directory, rename, load, and save 2-byte characters (Japanese, etc.) are not supported.

*85:   We do not guarantee that all USB memories can be operational with this product.
*86:   The time stamp recorded on a file is different from the actual date and time.

10.29 Waveform Monitor Output

This can monitor the waveform of the output voltage or current. (only one terminal)

	Single-phase model, Polyphase model, Multi-phase model			
DP series	015S,030D,045T, 045M (polyphase output)	030S,060D,090T, 090M (polyphase output)	045S, 045M (single-phase output)	060S, 090D, 120D
DP series Type R	015RS,030RD, 045RT	030RS,060RD, 090RT	045RS	060RS,090RD
Monitored	Output phase voltage or output phase current (switched)			
Gain — Phase voltage	$\dfrac{1}{200}/\dfrac{1}{400}$			
Gain — Phase current *87	$\dfrac{1}{50}/\dfrac{1}{25}$	$\dfrac{1}{100}/\dfrac{1}{50}$	$\dfrac{1}{150}/\dfrac{1}{75}$	$\dfrac{1}{200}/\dfrac{1}{100}$
Accuracy *88	±5 %			
Output terminal	BNC connector (rear panel, unbalanced)			
Output impedance	600 Ω			

	Single-phase model and Single-phase output of Multi-phase model			
DP series	075S	090S, 090M	105S	120S
DP series Type R	075RS	090RS		
Monitored	Output phase voltage or output phase current (switched)			
Gain — Phase voltage	$\dfrac{1}{200}/\dfrac{1}{400}$			
Gain — Phase current *87	$\dfrac{1}{300}/\dfrac{1}{150}$		$\dfrac{1}{400}/\dfrac{1}{200}$	
Accuracy *88	±5 %			
Output terminal	BNC connector (rear panel, unbalanced)			
Output impedance	600 Ω			

*87:   If you increased or decreased the number of units by the power unit energization setting, the gain corresponding to the capacity is used for the current monitor. (Example: In the case that only 3 units operate in 6 kVA model, the current gain of 4.5 kVA model is used. However, in 7.5 kVA or higher model, the current gain of 6.0 kVA model is used for 4.5 kVA output, and the one of 3.0 kVA model is used for 1.5 kVA output.)
*88:   No load on the monitor output, the rated output voltage, the resistance load at the maximum current.

10.30 Safety, EMC, and RoHS

DP series Type R is excluded. Only in the case that power input single-phase and GPIB interface selected.

	Description
Safety *89	Compliant with the following standard requirement. EN 61010-1 Pollution Degree 2
EMC *89 *90 *91	Compliant with the following standard requirement. EN 61326-1 (Group 1, Class A)
RoHS *89 *92	Compliant with the following. Directive 2011/65/EU

*89:   Only Models with a CE Marking on the Rear Panel.
*90:   Current limiter operation or indication malfunction of LEDs or measured values may occur if the DP series is exposed to a strong radiated radio frequency electromagnetic field or a strong radio frequency conducted disturbance.
*91:   Electromagnetic emissions from this product may interfere with reception of radio and television broadcasts. Unless the user takes special measures to reduce electromagnetic emissions, using this product in a residential area must be avoided.
*92:   For compliant manufacturing lot, please contact us or our agent.

10.31 Operation Environment

	All models
Operation Environment	Indoor, Pollution Degree 2
Altitude	2000 m or lower
Operating temperature/ humidity	0 °C to +50 °C, 5 % to 85 %RH The absolute humidity should be 1 to 25 g/m^3, without dew condensation. On some specifications, the temperature range limit is stricter.
Storage temperature/ humidity	−10 °C to +60 °C, 5 % to 95 %RH The absolute humidity should be 1 to 29 g/m^3, without dew condensation.

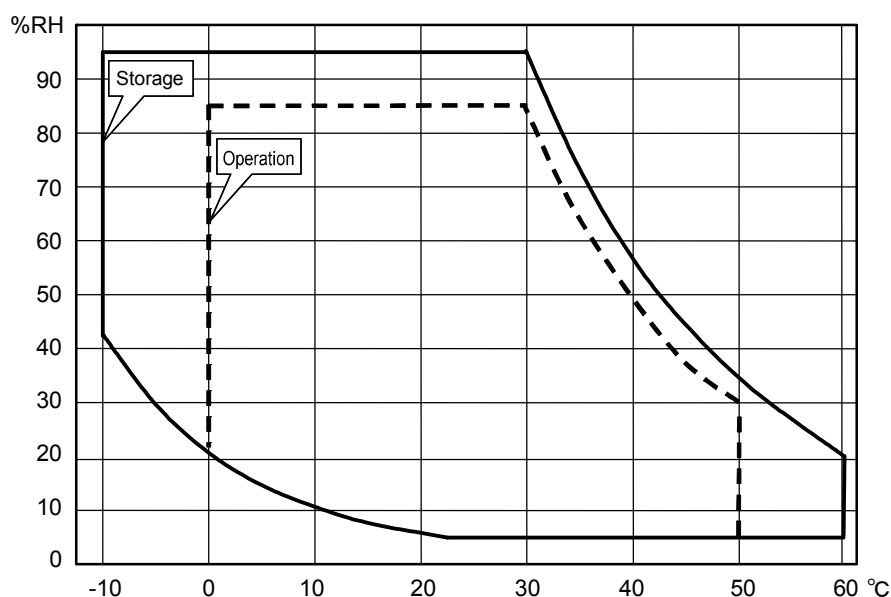Figure 10-2 shows the ranges of the ambient temperature and the humidity.

Figure 10-2 Range of Ambient Temperature/Humidity

10.32 Externals, Weight, and Terminal Block

	Single-phase model, Polyphase model			
DP series	015S	030S,030D	045S, 045T	060S, 060D
Dimensions (W×H×D) (Excluding projections)	430×398×562 mm		430×665×562 mm	
Weight	38 kg approx.	50 kg approx.	70 kg approx.	82 kg approx.
Power input terminal (rear)	Single-phase, three-phase three-wire, three-phase four-wire input: M6 screw			
Output terminal (rear)	M6 screw			
Outlet (Only for the single-phase model) (Front, 15 Amax)	For Japan/North America (NEMA 5-15, 100 V range only) Or for Europe (CEE 7)			
Sensing input terminal (rear)	M4 screw			

	Single-phase model, Polyphase model			
DP series	075S	090S,090D,090T	105S	120S, 120D
Dimensions (W×H×D) (Excluding projections)	430×1021×562 mm		430×1287×562 mm	
Weight	110 kg approx.	125 kg approx.	140 kg approx.	155 kg approx.
Power input terminal (rear)	Single-phase input: M8 upset bolt Three-phase three-wire, three-phase four-wire input: M6 screw			
Output terminal (rear)	Single-phase model: M8 upset bolt Polyphase model: M6 screw			
Outlet (Only for the single-phase model) (Front, 15 Amax)	For Japan/North America (NEMA 5-15, 100 V range only) Or for Europe (CEE 7)			
Sensing input terminal (rear)	M4 screw			

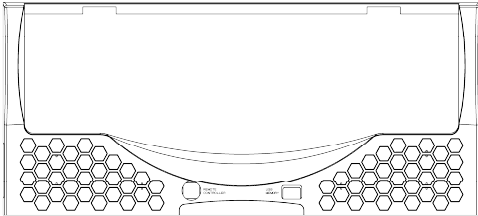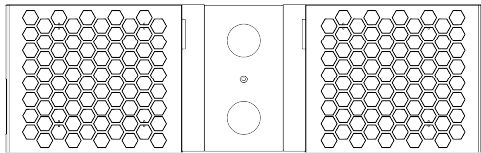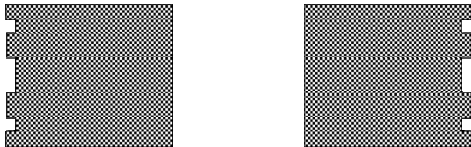|	Multi-phase model	
DP series	045M	090M
Dimensions (W×H×D) (Excluding projections)	430×665×562 mm	430×1287×562 mm
Weight	75 kg approx.	130 kg approx.
Power input terminal (rear)	Single-phase, three-phase three-wire, three-phase four-wire input: M6 screw	Single-phase input: M8 upset bolt Three-phase three-wire, three-phase four-wire input: M6 screw
Single-phase Output terminal (rear)	M6 screw	M8 screw
Polyphase Output terminal (rear)	M6 screw	
Sensing input terminal (rear)	M4 screw	

DP series Type R	Single-phase model, Polyphase model		
	015RS	030RS, 030RD	045RS, 045RT
Dimensions (W×H×D) (Excluding projections)	430×398×562 mm	430×665×562 mm	
Weight	50 kg approx.	80 kg approx.	90 kg approx.
Power input terminal (rear)	Single-phase, three-phase three-wire, three-phase four-wire input: M6 screw		
Output terminal (rear)	M6 screw		
Outlet (Only for the single-phase model) (Front, 15 Amax)	For Japan/North America (NEMA 5-15, 100 V range only) Or for Europe (CEE 7)		
Sensing input terminal (rear)	M4 screw		

DP series Type R	Single-phase model, Polyphase model		
	060RS, 060RD	075RS	090RS,090RD, 090RT
Dimensions (W×H×D) (Excluding projections)	430×1021×562 mm	430×1287×562 mm	
Weight	130 kg approx.	150 kg approx.	170 kg approx.
Power input terminal (rear)	Single-phase, three-phase three-wire, three-phase four-wire input: M6 screw	Single-phase input: M8 upset bolt Three-phase three-wire, three-phase four-wire input: M6 screw	
Output terminal (rear)	Single-phase model: M8 upset bolt Polyphase model: M6 screw		
Outlet (Only for the single-phase model) (Front, 15 Amax)	For Japan/North America (NEMA 5-15, 100 V range only) Or for Europe (CEE 7)		
Sensing input terminal (rear)	M4 screw		

10.33 Option

Option name	Description	Remarks
Remote Controller DP008	Multifunctional remote controller with numeric keypad and jog shuttle.	On order and after purchase
System Cable (1P3W) PA-001-1720	Allows you to configure the Single-phase three-wire system by using two of the configurable single-phase models.	On order and after purchase
System Cable (3P4W) PA-001-1721	Allows you to configure the Three-phase system by using three of the configurable single-phase models.	On order and after purchase

Rack-Mount Adapter
EIA (inch)
    PA-001-1728 (Type1)
    PA-001-1729 (Type2)
    PA-001-1730 (Type3)
    PA-001-1731 (Type4)
JIS (mm)
    PA-001-1732 (Type1)
    PA-001-1733 (Type2)
    PA-001-1734 (Type3)
    PA-001-1735 (Type4)
	The rack-mount adapter is a set of brackets used to mount the product on the EIA or JIS standard compliant rack. Provided for each cabinet size.	On order and after purchase

Replacement Air Filter
    PA-001-1736 (grill 1)
    PA-001-1737 (grill 2)
	Replacement air filters. Two types, double filters.	On order and after purchase

Power Cable (3 m)
    PA-001-3251
    PA-001-3252
    PA-001-3253
    PA-001-3254
    PA-001-3255
    PA-001-3256
    PA-001-3257
    PA-001-3263
    PA-001-3264
	Cables for the power input.
	Please refer to the correspondence table.
		On order and after purchase

Cable Holder
    PA-001-3245
    PA-001-3246
    PA-001-3247
    PA-001-3248
    PA-001-3249
	Allows you to fix power cables and/or output cables by mounting it to this product.
	Please refer to the correspondence table.
		On order and after purchase

Correspondence table of air filter

Front grill 1	Front grill 2
Replacement Air Filter grill1	Replacement Air Filter grill2

Correspondence table of power cable

	Single-phase model, Polyphase model, Multi-phase model			
DP series	015S	030S, 030D	045S, 045T, 045M	060S, 060D
DP series Type R	015RS	030RS, 030RD	045RS, 045RT	060RS, 060RD
Single-phase input	PA-001-3251	PA-001-3252		060S,060D PA-001-3247 060RS,060RD PA-001-3249
Three-phase three-wire input			PA-001-3255	PA-001-3256
Three-phase four-wire input			PA-001-3263	

	Single-phase model, Polyphase model, Multi-phase model			
DP series	075S	090S,090D, 090T,090M	105S	120S,120D
DP series Type R	075RS	090RS,090RD, 090RT		
Single-phase input	PA-001-3253		PA-001-3254	
Three-phase three-wire input	PA-001-3256		PA-001-3257	
Three-phase four-wire input	PA-001-3264			

Correspondence table of cable holder

Power input side

	Single-phase model, Polyphase model, Multi-phase model			
DP series	015S	030S, 030D	045S, 045T, 045M	060S, 060D
DP series Type R	015RS	030RS, 030RD	045RS, 045RT	060RS, 060RD
Single-phase input	PA-001-3246	PA-001-3247		
Three-phase three-wire input			PA-001-3245	PA-001-3249
Three-phase four-wire input			PA-001-3245	

	Single-phase model, Polyphase model, Multi-phase model			
DP series	075S	090S,090D, 090T,090M	105S	120S,120D
DP series Type R	075RS	090RS,090RD, 090RT		
Single-phase input	PA-001-3248			
Three-phase three-wire input	PA-001-3249			
Three-phase four-wire input				

Output side

	Single-phase model, Polyphase model		
DP series	015S,030S,030D, 060D,045T,090T	045S,060S,090D, 120D	075S,090S,105S, 120S
DP series Type R	015RS,030RS, 030RD,060RD, 045RT,090RT	045RS,060RS, 090RD	075RS,090RS
Output	PA-001-3245	PA-001-3249	PA-001-3248

	Multi-phase model	
DP series	045M	090M
Single-phase output	PA-001-3249	PA-001-3248
Polyphase output	PA-001-3245	

PROGRAMMABLE AC POWER SOURCE

10.34 Outline Dimensional Drawing

The outlet of the single-phase model and the phase configuration setting switch of the multi-phase are omitted.

The rear I/O terminal panel of the multi-phase consists of the upper and lower sections. (Upper: polyphase output terminal, Lower: power input terminal, sensing input terminal, single-phase output terminal)
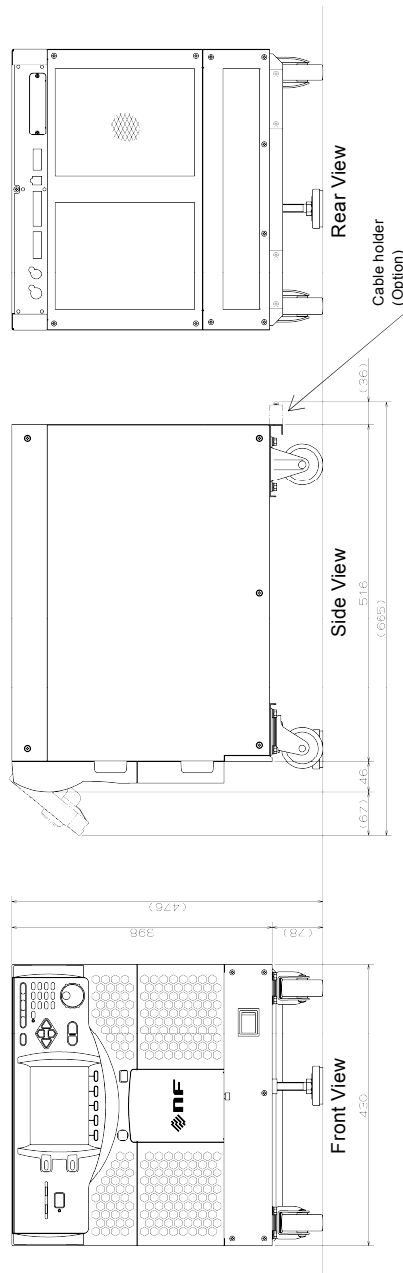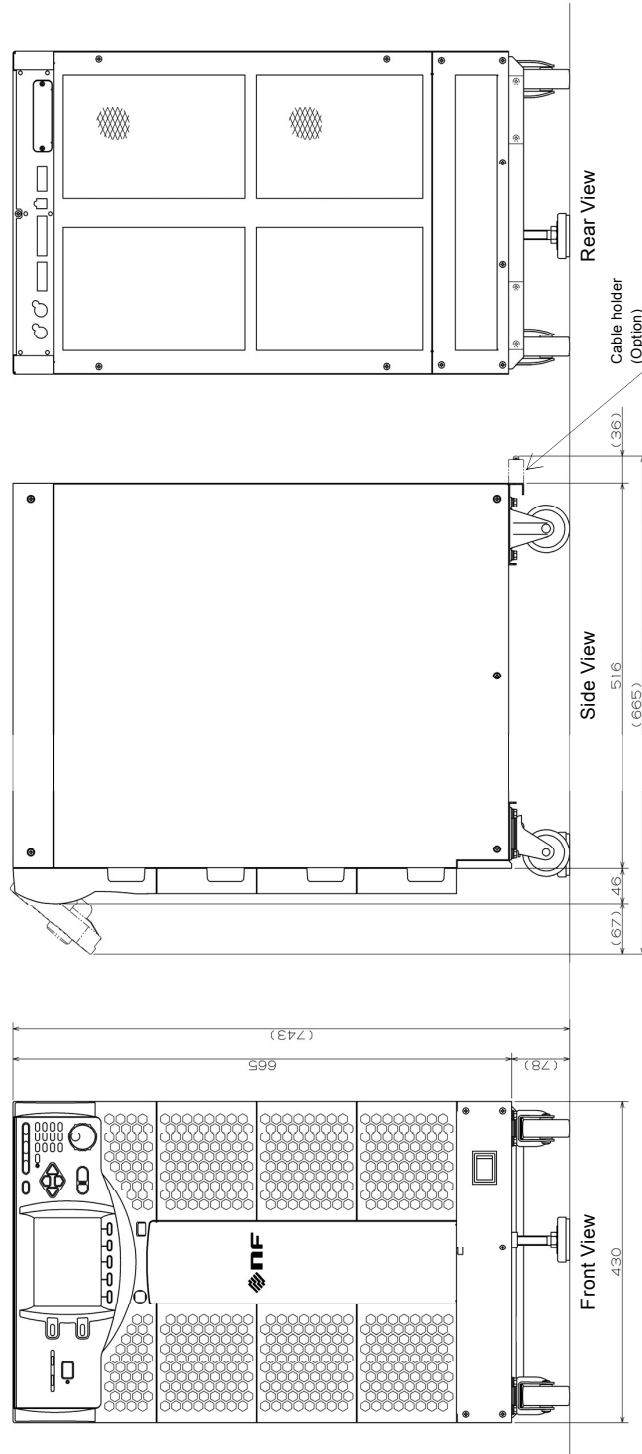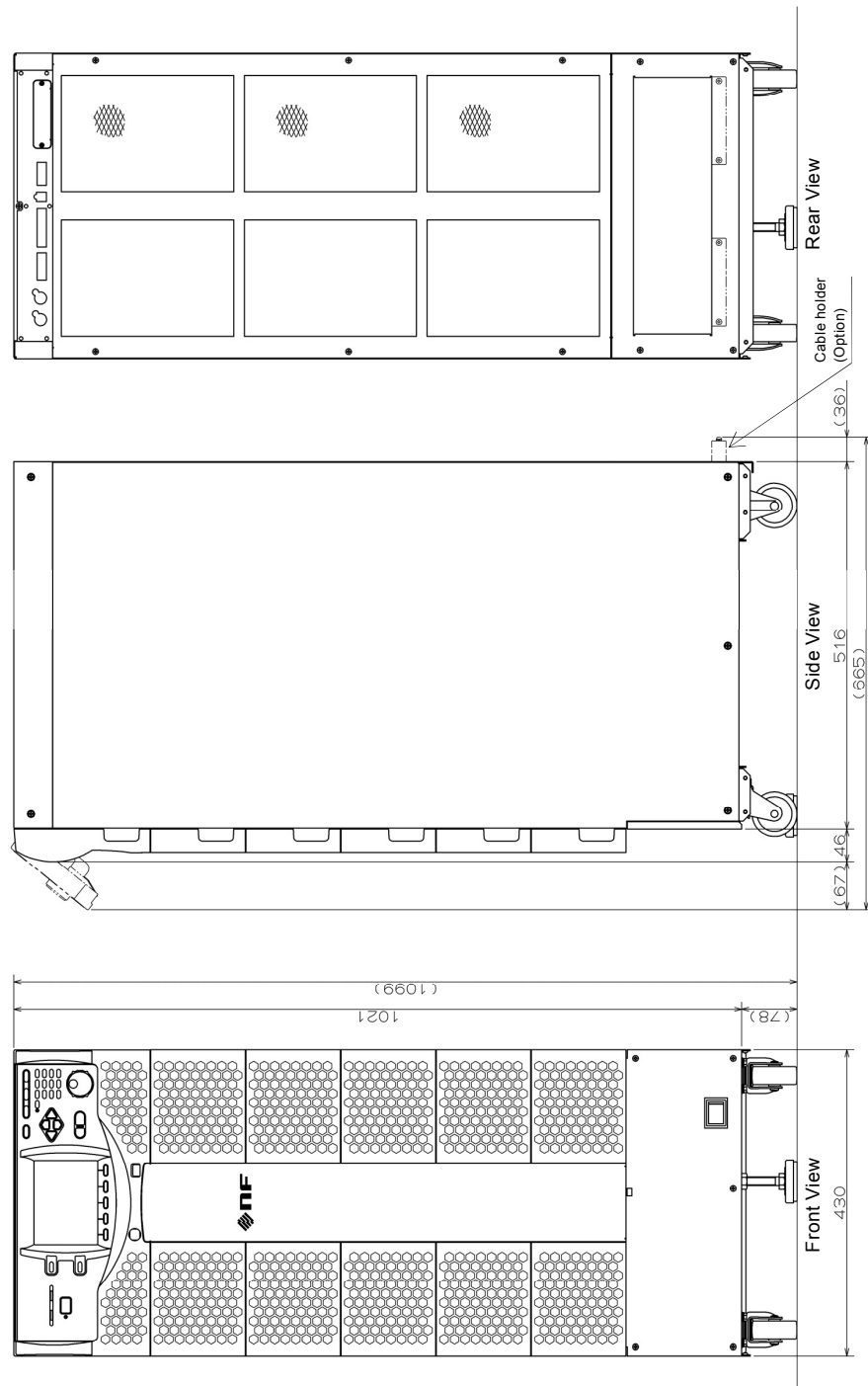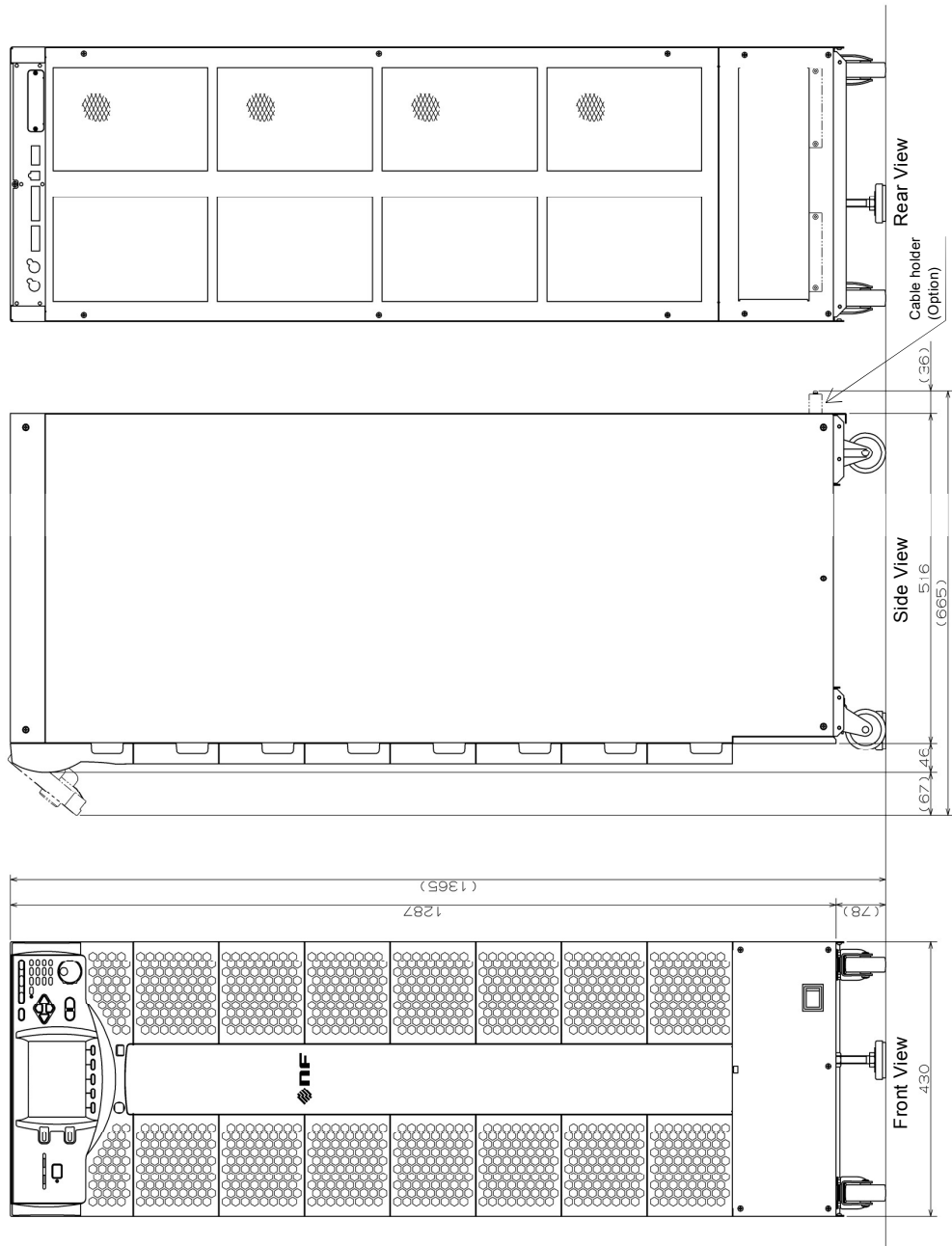

Figure 10-3 DP015S, DP030S, DP030D, DP015RS (Type 1 cabinet)

Figure 10-4 DP045S, DP045T, DP045M, DP060S, DP060D,
DP030RS, DP030RD, DP045RS, DP045RT
(Type 2 cabinet)

Figure 10-5 DP075S, DP090S, DP090D, DP090T,

DP060RS, DP060RD

(Type 3 cabinet)

Figure 10-6 DP090M, DP105S, DP120S, DP120D,
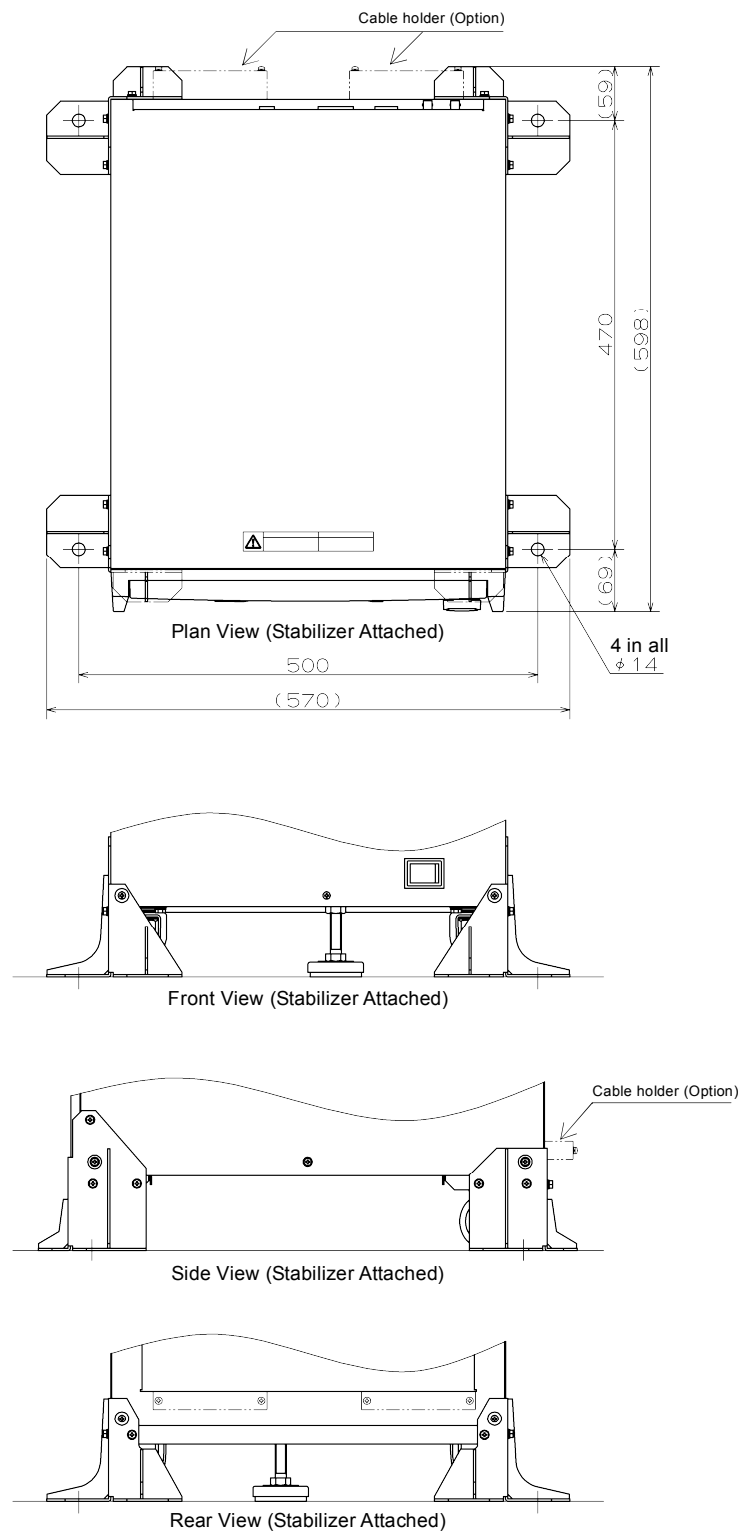**DP075RS, DP090RS, DP090RD, DP090RT**
(Type 4 cabinet)

Figure 10-7 Stabilizer Installation Drawing (Type 3, Type 4 cabinet only)