Specifications

Single-phase models（for short reverse power flow）(1.6 kVA / 42 kVA / 48 kVA)

Specifications are valid under the following settings and conditions, unless otherwise noted.
Load : Resistance load of power factor 1, Signal source : INT (internal signal source),
Output voltage waveform : Sine wave, Remote sensing : Off, AGC/Autocal : Off,
Current limiter : Factory default setting, warm-up : 30 min.

- [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.
- A value without the accuracy is the nominal value or representative value (shown as typ.) .
- 1P2W: Single-phase, 1P3W: Single-phase, Three-wire, 3P3W: Three-phase, Three-wire, 3P4W: Three-phase, Four-wire

AC/DC Mode, Signal Source

	Single-phase models	Polyphase system
AC/DC mode	AC, ACDC, DC	AC, ACDC
Signal source	INT, VCA, SYNC, EXT, ADD	INT, VCA, SYNC

Power Output

	Model name	DP160LS		DP420LS		DP480LS	
		Single-phase	Polyphase	Single-phase	Polyphase	Single-phase	Polyphase
AC output	Output power	16 kVA	1P3W : 32 kVA 3P4W : 48 kVA	42 kVA	1P3W : 84 kVA 3P4W : 126 kVA	48 kVA	1P3W : 96 kVA 3P4W : 144 kVA
AC output	Mode	1P2W Floating output, the Lo terminal can be grounded.	1P3W 3P4W (Y-connection) Floating output, the N-terminal can be grounded.	1P2W Floating output, the Lo terminal can be grounded.	1P3W 3P4W (Y-connection) Floating output, the N-terminal can be grounded.	1P2W Floating output, the Lo terminal can be grounded.	1P3W 3P4W (Y-connection) Floating output, the N-terminal can be grounded.
AC output	Setting mode*1	—	Balanced, Unbalanced	—	Balanced, Unbalanced	—	Balanced, Unbalanced
AC output	Rated output voltage	100 V / 200 V					
AC output	Voltage setting range*2	0.0 V to 160.0 V / 0.0 V to 320.0 V, Arbitrary wave : 0.0 Vp-p to 454.0 Vp-p / 0.0 Vp-p to 908.0 Vp-p(arbitrary), Setting resolution : 0.1 V					
AC output	Voltage accuracy*3	± (0.5 % of set + 0.6 V / 1.2 V)					
AC output	Line voltage setting range *4	—	1P3W : 0.0 V to 320.0 V / 0.0 V to 640.0 V 3P4W : 0.0 V to 277.2 V / 0.00 V to 554.2 V Setting resolution : 0.2 V	—	1P3W : 0.0 V to 320.0 V / 0.0 V to 640.0 V 3P4W : 0.0 V to 277.2 V / 0.00 V to 554.2 V Setting resolution : 0.2 V	—	1P3W : 0.0 V to 320.0 V / 0.0 V to 640.0 V 3P4W : 0.0 V to 277.2 V / 0.00 V to 554.2 V Setting resolution : 0.2 V
AC output	Max. current *5	160 A / 80 A		420 A / 210 A		480 A / 240 A	
AC output	Max. peak current *6	Peak value (Apk) which is four times of the maximum current		Peak value (Apk) which is three times of the maximum current			
AC output	Short reverse power flow*7 *8	100 % or less of maximum current (RMS) (reverse power flow time ≤ 20 ms, discontinuous, 40°C or lower)					
AC output	Load power factor*8	0 to 1 (phase lead or phase lag, 45 Hz to 65 Hz)					
AC output	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					
AC output	Frequency accuracy	±0.01 % of set (23°C ±5°C)					
AC output	Frequency stability *9	±0.005%					
AC output	Voltage frequency characteristic*10	±1%					
AC output	Output waveform	Sine wave, arbitrary wave (16 types) , clipped sine wave (3 types)					
AC output	Output on phase setting range*11	0.0° to 359.9° variable, Setting resolution : 0.1°					
AC output	Output off phase setting range*11	0.0° to 359.9° variable (active/inactive selectable) , Setting resolution : 0.1°					
AC output	Phase angle setting range *12	—	1P3W L2 phase : 0.0° to 359.9° 3P4W L2 phase : 0.0° to 359.9° L3 phase : 0.0° to 359.9° Setting resolution : 0.1°	—	1P3W L2 phase : 0.0° to 359.9° 3P4W L2 phase : 0.0° to 359.9° L3 phase : 0.0° to 359.9° Setting resolution : 0.1°	—	1P3W L2 phase : 0.0° to 359.9° 3P4W L2 phase : 0.0° to 359.9° L3 phase : 0.0° to 359.9° Setting resolution : 0.1°
AC output	Phase angle accuracy *13	—	45 Hz to 65 Hz : ±1.0° 40 Hz to 550 Hz : ±2.0°	—	45 Hz to 65 Hz : ±1.0° 40 Hz to 550 Hz : ±2.0°	—	45 Hz to 65 Hz : ±1.0° 40 Hz to 550 Hz : ±2.0°
AC output	DC offset *14	Within ± 20 mV (typ.), fine adjustment available					
DC output	Output power	16 kW	—	42 kW	—	48 kW	—
DC output	Mode	Floating output, the Lo terminal can be grounded.	—	Floating output, the Lo terminal can be grounded.	—	Floating output, the Lo terminal can be grounded.	—
DC output	Rated output voltage	100 V / 200 V	—	100 V / 200 V	—	100 V / 200 V	—
DC output	Voltage setting range	−227.0 V to +227.0 V / −454.0 V to +454.0 V, Setting resolution : 0.1 V	—	−227.0 V to +227.0 V / −454.0 V to +454.0 V, Setting resolution : 0.1 V	—	−227.0 V to +227.0 V / −454.0 V to +454.0 V, Setting resolution : 0.1 V	—
DC output	Voltage sccuracy *15	± (I 0.5% of set I + 0.6 V / 1.2 V)	—	± (I 0.5% of set I + 0.6 V / 1.2 V)	—	± (I 0.5% of set I + 0.6 V / 1.2 V)	—
DC output	Maximum source current *16	160 A / 80 A	—	420 A / 210 A	—	480 A / 240 A	—
DC output	Maximum instantaneous source current *17	Peak value (Apk) which is four times of the maximum current	—	Peak value (Apk) which is three times of the maximum current	—	Peak value (Apk) which is three times of the maximum current	—
DC output	Short sink current *18	100 % or less of maximum source current (reverse power flow time ≤ 20 ms, discontinuous, 40°C or lower)	—	100 % or less of maximum source current (reverse power flow time ≤ 20 ms, discontinuous, 40°C or lower)	—	100 % or less of maximum source current (reverse power flow time ≤ 20 ms, discontinuous, 40°C or lower)	—

Stability and Distortion

Model name	DP160LS		DP420LS		DP480LS	
Output voltage stability (phase voltage)	Fluctuation with input voltage *19 : Within ±0.15%					
	Fluctuation with output current *20					
	±0.15 V / ±0.30 V(DC) ±0.15 V / ±0.30 V (45 Hz to 65 Hz) ±0.5 V / ±1.0 V (40 Hz to 550 Hz)	±0.15 V / ±0.30 V (45 Hz to 65 Hz) ±0.5 V / ±1.0 V (40 Hz to 550 Hz)	±0.15 V / ±0.30 V(DC) ±0.15 V / ±0.30 V (45 Hz to 65 Hz) ±0.5 V / ±1.0 V (40 Hz to 550 Hz)	±0.15 V / ±0.30 V (45 Hz to 65 Hz) ±0.5 V / ±1.0 V (40 Hz to 550 Hz)	±0.15 V / ±0.30 V(DC) ±0.15 V / ±0.30 V (45 Hz to 65 Hz) ±0.5 V / ±1.0 V (40 Hz to 550 Hz)	±0.15 V / ±0.30 V (45 Hz to 65 Hz) ±0.5 V / ±1.0 V (40 Hz to 550 Hz)
	Fluctuation with ambient temperature*21 : Within ±0.01 %/°C (typ.)					
Distortion of output voltage waveform*22	0.5 % or lower					

*1 : Can be set only when the polyphase system is configured.
*2 : For phase voltage setting in the polyphase output. In balanced mode all phases are collectively set and in unbalanced mode each phase is individually set .
*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±5C. For phase voltage setting in the polyphase output.
*4 : Line voltage can be set only in balanced mode and with sine wave.
*5 : 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 ACDC 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.
For phase current setting in the polyphase output.
*6 : For the capacitor input type rectified load (crest factor=3), the rated output voltage, and 45 Hz to 65 Hz.
*7 : In the case rated output voltage, 50 Hz or 60 Hz. If the output voltage is higher than the rated value, this is limited to satisfy the power capacity. It may reduce short reverse power flow if ambient temperature is 40°C or higher or repeated interval of reverse power flow is 15 minutes or less.
*8 : External power injection or regeneration which is over short reverse power flow capacity is not available.
*9 : For 45 Hz to 65 Hz, the rated output voltage, no load and the resistance load for the maximum current, and the operating temperature.
*10: 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.
*11: Setting for the L1 phase in the polyphase ouput. The component of the phase angle setting is added for the other phases.
*12: Can be set only with unbalance mode in the polyphase output.
*13: In the case of 50 V or higher, sine wave, and same load condition and voltage setting for all phases.
*14: In the case of the AC mode and 23°C±5°C.
*15: 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.
*16: 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.
*17: Instantaneous = within 2 ms, at the rated output voltage.
*18: In the case rated output voltage. If the output voltage is higher than the rated value, this is limited to satisfy the power capacity. It may reduce short reverse power flow if ambient temperature is 40°C or higher or repeated interval of reverse power flow is 15 minutes or less.
*19: For power input 170 V to 250 V (3P3W) or 323 V to 433 V (3P4W), power input 200 V reference (3P3W) or 380 V reference (3P4W), the resistance load at the maximum current, the rated output voltage, DC (only single-phase output) or 45 Hz to 65 Hz. Transition state immediately after a change of the input power-supply voltage is not included.
*20: 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.
*21: For power input 200 V (3P3W) or 380 V (3P4W), no load, the rated output voltage, DC (only single-phase output) or 45 Hz to 65 Hz.
*22: 40 Hz to 550 Hz, 50 % or higher of the rated output voltage, the maximum current or lower, AC and ACDC modes, THD+N.

Power Input

Model name	DP160LS		DP420LS		DP480LS	
Voltage/Phase (Specify when ordering)	Overvoltage Category II					
	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*23	0.90 or higher (typ.)					
Efficiency*23	77% or higher (typ.)					
Maximum power consumption	24 kVA or lower	3P3W : 48 kVA or lower 3P4W : 72 kVA or lower	63 kVA or lower	3P3W : 126 kVA or lower 3P4W : 189 kVA or lower	72 kVA or lower	3P3W : 144 kVA or lower 3P4W : 216 kVA or lower

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

Specifications

Single-phase models (for short reverse power flow) (1.6 kVA / 42 kVA / 48 kVA)

Measurement Function

Model name			DP160LS		DP420LS		DP480LS	
			Single-phase	Polyphase	Single-phase	Polyphase	Single-phase	Polyphase
Display		Normal mode	Displays almost all measured and setting values (except harmonic current value)					
		Simple mode	Displays three measurement values (except harmonic current value) enlarged.					
Voltage *24	RMS value	Full scale	250.0 V / 500.0 V	Line voltage (sine only) 1P3W : 500.0 V / 1000.0 V 3P4W : 433.0 V / 866.0 V	250.0 V / 500.0 V	Line voltage (sine only) 1P3W : 500.0 V / 1000.0 V 3P4W : 433.0 V / 866.0 V	250.0 V / 500.0 V	Line voltage (sine only) 1P3W : 500.0 V / 1000.0 V 3P4W : 433.0 V / 866.0 V
		Resolution	0.1 V					
	DC average (avg)	Full scale	±250.0 V / ±500.0 V	—	±250.0 V / ±500.0 V	—	±250.0 V / ±500.0 V	—
		Resolution	0.1 V	—	0.1 V	—	0.1 V	—
	Peak value (pk) each of max/min	Full scale	±250.0 V / ±500.0 V					
		Resolution	0.1 V					
Current *25	RMS Value	Full scale	213.3 A / 106.7 A		560 A / 280 A		640 A / 320 A	
		Resolution	0.1 A					
	DC average (avg)	Full scale	±213.3 A / ±106.7 A	—	±560 A / ±280 A	—	±640 A / ±320 A	—
		Resolution	0.1 A	—	0.1 A	—	0.1 A	—
	Peak value (pk) each of max/min	Full scale	±853.3 A / ±426.7 A		±2240 A / ±1120 A		±2560 A / ±1280 A	
		Resolution	0.1 A					
		Hold	Hold the maximum values of I max I and I min I with the polarity (with the clear function)					
Power *26	Active (W)	Full scale	19200 W		50400 W		57600 W	
		Resolution	1 W					
	Apparent (VA) *27	Full scale	24000 VA		63000 VA		72000 VA	
		Resolution	1 VA					
	Reactive (var) *27	Full scale	24000 var		63000 var		72000 var	
		Resolution	1 var					
Load power factor *27		Range	0.00 to 1.00					
		Resolution	0.01					
Load crest factor		Range	0.00 to 50.00					
		Resolution	0.01					
Synchronization frequency		Range	38.0 Hz to 525.0 Hz					
		Resolution	0.1 Hz					
Harmonic current *28		Range	Up to 40th order.					
		Full scale	213.3 A / 106.7 A, 100%		560 A / 280 A, 100%		640 A / 320 A, 100%	
		Resolution	0.1 A or 0.1%					

*24 : For the polyphase system, this specification is for the phase voltage and the DC average value display cannot be selected.
*25 : In the case that output current is 5% to 100% of maximum current.
For the polyphase system, these are the specifications for the phase current. The DC average value display cannot be selected.
*26 : In the case of sine wave, 50 V or higher output voltage, and that output current is 10% or higher of maximum current.
*27 : Excluding DC mode
*28 : AC-INT mode, fundamental wave 50 Hz/60 Hz only, phase current.
This measurement does not conform to IEC or other standards.

Current Limiter

Model name			DP160LS	DP420LS	DP480LS
Peak current limiter	Positive current	Setting range (peak value)	+80.0 A to +672.0 A / +40.0 A to +336.0 A	+210.0 A to +1323.0 A / +105.0 A to +661.5 A	+240.0 A to +1512.0 A / +120.0 A to +756.0 A
	Negative current	Setting range (peak value)	-672.0 A to -80.0 A / -336.0 A to -40.0 A	-1323.0 A to -210.0 A / -661.5 A to -105.0 A	-1512.0 A to -240.0 A / -756.0 A to -120.0 A
	Resolution		0.1A		
	Limiter operation		Automatic recovery (continuous) or output turn-off when the limited state continues over the specified time (1 s to 10 s, resolution 1 s)		
RMS current limiter	Setting range (RMS)		8.0 A to 168.0 A / 8.0 A to 84.0 A	21.0 A to 441.0 A / 21.0 A to 220.5 A	24.0 A to 504.0 A / 24.0 A to 252.0 A
	Resolution		0.1A		
	Limiter operation		Automatic recovery (continuous) or output turn-off when the limited state continues over the specified time (1 s to 10 s, resolution 1 s)		

Note: 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.

Power Unit Energization Setting

Model name	DP160LS		DP420LS		DP480LS	
	Single-phase	Polyphase	Single-phase	Polyphase	Single-phase	Polyphase
Maximum output power per unit	2 kVA		6 kVA			
Working unit number setting range	1 to 8		1 to 7		1 to 8	

Sequence Function

Number of memories	5 (nonvolatile)
Number of steps	255 max. (for each sequence)
Setting range of step time	0.0010 s to 999.9999 s
Operation within step	Constant, keep, linear sweep
Parameters	Output range , AC/DC mode, 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 (2 bit), specification of the branch step, trigger output
Sequence control	Start, stop, hold, resume, branch 1, branch 2
Others	1) Sequence function works with AC-INT, ACDC-INT and DC-INT. 2) AC voltage, frequency, waveform, start phase and stop phase cannot be set with DC-INT. 3) Phase angle setting is only for polyphase system. 4) Also, the start phase and the stop phase are set for L1 phase and the setting value is added to each phase angle of L2 and L3 phase.

Simulation

Number of memories	5 (nonvolatile).
Number of steps	6 (initial, normal 1, transition 1, abnormal, transition 2, normal 2).
Step time setting range	0.0010 s to 999.9999 s (0 s can be set for transition steps only).
Operation within step	Constant, keep, linear sweep
Parameters	Output range, AC voltage, frequency, waveform (sine wave only), start phase (excluding transition steps), stop phase (excluding transition steps), synchronous step (2 bit), trigger output, repeat count (1-9999 times or infinite).
Simulation control	Start, stop.
Others	In simulation function, only AC and sine wave, fixed for ACDC-INT.

Control Software

Functions	Remote control	Parameter setting, saving, loading, and others.
	Status monitor	Monitors and displays status of connected equipment.
	Logging	Reads and saves measured values.
	Arbitrary waveform	Waveform creation and edit, transfer, display and file operations
	Sequence simulation	Sequence data creation, edit, save, transfer, preview, execution control, monitor/display during execution, and others.
Operating environment	CPU	300 MHz min. (1.6 GHz min. recommended)
	Memory	128 MB or more. (512 MB min. recommended)
	Free hard disk space	64 MB or more.
	Display	Can display 1024 × 768 pixels or more, and 256 colors or more
	OS	Windows XP (32-bit) / Windows 7 (32-bit / 64-bit) (made by Microsoft)
	Disk drive	CD-ROM drive
	Interface	USB 1.1 full-speed

Other Functions

Setting limitation	Voltage (RMS)	Phase voltage, line to line voltage (1P3W, 3P4W)
	Frequency	Upper limit or lower limit.
Remote sensing		Voltage detection point is output terminal or sensing input terminal. (switchable)
AGC		Function for continuously performing automatic correction so that the RMS value of the detection point is equal to the voltage setting value. Response time less than 100 ms (typ.) (At DC/50 Hz/60 Hz, rated output voltage)
Autocal (Automatic calibration)		When the Autocal is on, the detection point is always measured, and the output voltage is continuously corrected so that its RMS value is equal to the output setting value.
Clipped sine wave	Number of memories	3 (nonvolatile)
	CF	Variable range: 1.10 to 1.41; setting resolution: 0.01; RMS value correction: yes
	Clipping rate	Variable range 40.0% to 100.0%; setting resolution: 0.1%; RMS value correction: no
Arbitrary wave	Number of memories	16 (nonvolatile)
	Waveform length	4096 words
	Amplitude resolution	16-bit
External signal input	External sync input	Sync signal source switching: external sync signal (EXT) or power input (LINE)
	VCA input	Gain setting range: 0.0 to 227.0 times / 0.0 to 454.0 times Resolution: 0.1
	External signal input (EXT / ADD)	Gain setting range: 0.0 to 227.0 times / 0.0 to 454.0 times, Resolution: 0.1 Input frequency range: DC to 550 Hz (sine wave), DC to 100 Hz (not sine wave).
Memory function		Store and recall settings from nonvolatile memory
	Number of memories	Basic settings: 30; sequences: 5; simulations: 5; clipped sine waves: 3; arbitrary waves: 16
Protections		Protective operation for abnormal output (output overvoltage, output over current, etc.), power unit error, and internal control error (internal communication error, etc.)
External control I/O		Enables control of the system using external signals (or no-voltage contacts) and state output.
Interface (GPIB / LAN select on order)		USB interface [USB1.1, USBTMC], RS-232 interface (not capable of binary transfer), GPIB interface (IEEE 488.1 std 1987) (not capable of binary transfer or serial polling), LAN interface (LXI 1.4)
USB memory		Usable memory: conforms to USB 1.1 or USB 2.0, Connector: USB-A (front panel) Readable/writable content: basic setting memory, sequence, AC line simulation, arbitrary wave.
Output relay control		Selects either ON/OFF using output relay, or high-impedance without using output relay.
Output waveform monitor		Monitors waveform of output voltage or output current. (switchable)
LCD display		5.7 inch, contrast 0 to 99, blue or white base color.
Others		Beep, key lock, output setting at power-on, trigger output setting, time unit setting (for sequence and simulation), reset function.

General Information

Model name	DP160LS	DP420LS	DP480LS
Withstanding voltage	AC 1500 V or DC 2130 V 1 minute		
Insulation resistance	30 MΩ or higher (DC 500 V), (inputs vs. outputs/chassis, inputs/chassis vs. outputs)		
Operating temperature / humidity	0°C to +50°C, 5% to 85%RH (absolute humidity : 1 to 25 g/m³, without condensation) Some specifications are limited by the temperature range		
Dimensions (W×H×D) mm(no protrusions)	455×1407×803	1365×1580×803	
Weight (approx.)	Approx. 230 kg	Approx. 600 kg	Approx. 650 kg
Power input terminal (rear)	M8 upset bolt (3P3W), M6 screw (3P4W)	M10 upset bolt	
Output terminal	M8 upset bolt	M16 upset bolt	
Sensing input terminal (rear)	M4 screw		
Accesories	Instruction Manual, CD-ROM (Control Software, LabVIEW Driver, Instruction Manual for Remote Control and Control Software) Control cable (D-sub 25 pin connector), Stabilizer (DP160LS only)		

Note : The contents of this catalog are current as of January 30th, 2020
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