HITACHI
Inspire the Next

SJ-P1 Variable Frequency Drives

The SJ-P1 model is rated for single-phase applications, so even the most remote environments are now accessible.

Add a New Level of Control with a Hitachi SJ-P1

Hitachi drives eliminate the expense and complexity of additional equipment. Our SJ-P1 model has received approval for single-phase installations, so even the most remote environments are now accessible. The Hitachi-exclusive IVMS feature keeps your PMAC motors running in high torque at slow speeds—saving you both energy and operational costs.

HIGH PERFORMANCE

High torque at low speed resulting in a smoother operation

Sensorless vector control with ND rating

High speed rotation—up to 590 Hz

Trip reduction during acceleration and deceleration

EASY TO USE

Color TFT Display

Easily monitor, set or review operation data and parameters

Effortless data transfer

Error in spoken language

FLEXIBLE

Multimode operation - PMAC motors with IVMS feature

Customizable with slot-in cassettes Certified functional safety

EZSQ text editor

Allows users to develop custom solutions

Be Confident with the SJ-P1 Series from Hitachi

Hitachi continues to expand on the reliability of the latest SJ-P1 drives and now has received UL approval for use in single-phase input applications. Many of these applications exist in rural or remote locations where a three-phase power source is not economically accessible. The SJ-P1 series drives can help you get all the benefits of a variable frequency drive without adding additional hardware or modification of your equipment. Please review the other side for the correct size drives to operate the load requirement, and get the peace of mind that it is a UL-rated inverter.

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or call 980-500-7141

Hitachi Industrial Equipment & Solutions America, LLC
HAL-SJP1_030819-4.1.2021

200V Class Specifications

Model name (P1- _ _ _ -L)			00044	00080	00104	00156	00228	00330	00460	00600	00800	00930	01240	01530	01850	02290	02950
Applicable motor capacity (4 poles) (kW) (*1)		VLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
		ND	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55
Output	Rated output current (A)	VLD	4.4	8.0	10.4	15.6	22.8	33.0	46.0	60.0	80.0	93.0	124	153	185	229	295
		LD	3.7	6.3	9.4	12.0	19.6	30.0	40.0	56.0	73.0	85.0	113	140	169	210	270
		ND	3.2	5.0	8.0	11.0	17.5	25.0	32.0	46.0	64.0	76.0	95.0	122	146	182	220
	Overload current rating (*2)	VLD	110% 60sec / 120% 3sec														
		LD	120% 60sec / 150% 3sec														
		ND	150% 60sec / 200% 3sec														
	Output Current Rating Using Single-Phase Source	ND (A)						12.0	15.5	22.0	31.0	36.5	46.0	60.0	70.0	88.0	105.0
	Rated capacity (kVA) 200V	VLD	1.5	2.8	3.6	5.4	7.9	11.4	15.9	20.8	27.7	32.2	43.0	53.0	64.1	79.3	102.2
		LD	1.3	2.2	3.3	4.2	6.8	10.4	13.9	19.4	25.3	29.4	39.1	48.5	58.5	72.7	93.5
		ND	1.1	1.7	2.8	3.8	6.1	8.7	11.1	15.9	22.2	26.3	32.9	42.3	50.6	63.0	76.2
	Rated capacity (kVA) 240V	VLD	1.8	3.3	4.3	6.5	9.5	13.7	19.1	24.9	33.3	38.7	51.5	63.6	76.9	95.2	122.6
		LD	1.5	2.6	3.9	5.0	8.1	12.5	16.6	23.3	30.3	35.3	47.0	58.2	70.3	87.3	112.2
		ND	1.3	2.1	3.3	4.6	7.3	10.4	13.3	19.1	26.6	31.6	39.5	50.7	60.7	75.7	91.5
Input	Rated input AC voltage (*3)		Main circuit power supply: 3-phase 200 to 240V 50/60 Hz, Control power supply: 1-phase 200 to 240V 50/60 Hz														
	Permissible AC voltage/ Frequency fluctuation		AC voltage : 170 to 264V 50/60 Hz, Frequency : ± 5%														
	Power supply capacity (kVA) (*4)	VLD	2.0	3.6	4.7	7.1	10.3	15.0	20.9	27.2	36.3	42.2	56.3	69.4	83.9	103.9	133.8
		LD	1.7	2.9	4.3	5.4	8.9	13.6	18.1	25.4	33.1	38.6	51.3	63.5	76.7	95.3	122.5
		ND	1.5	2.3	3.6	5.0	7.9	11.3	14.5	20.9	29.0	34.5	43.1	55.3	66.2	82.6	99.8
Carrier frequency range (*5)		VLD	0.5 to 10.0kHz														
		LD	0.5 to 12.0kHz														
		ND	0.5 to 16.0kHz														

400V Class Specifications

Model name (P1- _ _ _ -H)			00041	00054	00083	00126	00175	00250	00310	00400	00470	00620	00770	00930	001160	01470	01760	02130	02520	03160
Applicable motor capacity (4 poles) (kW) (*1)		VLD	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
		LD	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
		ND	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132
Output	Rated output current (A)	VLD	4.1	5.4	8.3	12.6	17.5	25.0	31.0	40.0	47.0	62.0	77.0	93.0	116	147	176	213	252	316
		LD	3.1	4.8	6.7	11.1	16.0	22.0	29.0	37.0	43.0	57.0	70.0	85.0	105	135	160	195	230	290
		ND	2.5	4.0	5.5	9.2	14.8	19.0	25.0	32.0	39.0	48.0	61.0	75.0	91.0	112	150	182	217	260
	Overload current rating (*2)	VLD	110% 60sec / 120% 3sec																	
		LD	120% 60sec / 150% 3sec																	
		ND	150% 60sec / 200% 3sec																	
	Output Current Rating Using Single-Phase Source	ND (A)					6.0	8.0	12.0	16.0	19.0	24.0	30.0	37.0	45.0	56.0				
	Rated capacity (kVA) 400V	VLD	2.8	3.7	5.8	8.7	12.1	17.3	21.5	27.7	32.6	43.0	53.3	64.4	80.4	101.8	121.9	147.6	174.6	218.9
		LD	2.1	3.3	4.6	7.7	11.1	15.2	20.1	25.6	29.8	39.5	48.5	58.9	72.7	93.5	110.9	135.1	159.3	200.9
		ND	1.7	2.8	3.8	6.4	10.3	13.2	17.3	22.2	27.0	33.3	42.3	52.0	63.0	77.6	103.9	124.7	124.7	180.1
	Rated capacity (kVA) 500V	VLD	3.6	4.7	7.2	10.9	15.2	21.7	26.8	34.6	40.7	53.7	66.7	80.5	100.5	127.3	152.4	184.5	218.2	273.7
		LD	2.7	4.2	5.8	9.6	13.9	19.1	25.1	32.0	37.2	49.4	60.6	73.6	90.9	116.9	138.6	168.9	199.2	251.1
		ND	2.2	3.5	4.8	8.0	12.8	16.5	21.7	27.7	33.8	41.6	52.8	65.0	78.8	97.0	129.9	155.9	187.9	225.2
Input	Rated input AC voltage (*3)		Main circuit power supply: 3-phase 380 to 500V 50/60 Hz, Control power supply: 1-phase 380 to 500V 50/60 Hz																	
	Permissible AC voltage/ Frequency fluctuation		AC voltage : 323 to 550V 50/60 Hz, Frequency : ± 5%																	
	Power supply capacity (kVA) (*4)	VLD	3.7	4.9	7.5	11.4	15.9	22.7	28.1	36.3	42.6	56.3	69.9	84.4	105.2	133.4	159.7	193.2	228.6	286.7
		LD	2.8	4.4	6.1	10.1	14.5	20.0	26.3	33.6	39.0	51.7	63.5	77.1	95.3	122.5	145.2	176.9	208.7	263.1
		ND	2.3	3.6	5.0	8.3	13.4	17.2	22.7	29.0	35.4	43.5	55.3	68.0	82.6	101.6	136.1	163.3	196.9	235.9
Carrier frequency range (*5)		VLD	0.5 to 10.0kHz														0.5 to 8.0kHz			
		LD	0.5 to 12.0kHz														0.5 to 8.0kHz			
		ND	0.5 to 16.0kHz														0.5 to 10.0kHz			

Notes:
*1: The applicable motor refers to Hitachi standard 3-phase motor (4-pole). To use other motors, be sure to prevent the rated motor current (50Hz) from exceeding the rated output current of the inverter.
*2: Electronic thermal protection is valid in accordance to derating. *3: In order to comply with the Low Voltage Directive (LVD), it must be connected to a neutral grounding supply. 200V class: -Pollution degree 2 -Overvoltage category 3. 400V class: -Pollution degree 2 -Overvoltage category 3 (In the case the input supply is 380 to 460Vac) -Overvoltage category 2 (If the input supply is 460Vac or more). *4: The power supply capacity is the value of the output rated current at 220V / 440V. The impedance at the supply side may be affected by the wiring, breaker, input reactor, etc. *5: Carrier frequency may be limited in the range according to the use of drive. *6: The values for the sensorless vector control are assigned according to the values in the ND rating in the Hitachi standard motor table. Torque characteristics may vary by the control system and the motor in use. *7: Usually, an external regenerative braking is necessary. By your order it is possible to include the built-in braking circuit. By attaching the braking resistor the regenerative braking unit is no longer required.

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Common Specifications

Control mode (output to the motor)			Sine wave PWM control voltage output (line sine wave modulation)	
Output frequency range *1)			0.00~590.00Hz	
Frequency accuracy			Digital command ±0.01% and analog command ±0.2% (25±10°C) against the maximum frequency	
Frequency resolution			Digital setting: 0.01Hz Analog setting: maximum frequency/4000 (Ai1 terminal/Ai2 terminal: 12bit/0 - +10V or 0 - +20mA, Ai3 terminal 12bit/-10 - +10V)	
Control mode (frequency/voltage calculation) *2)			IM	V/f control (fixed torque/reduced torque/free), automatic boost control, cascade model sensorless vector control, 0 Hz range sensorless vector control, vector control with sensor.
			SM/PMM	Synchronous starting sensorless vector control, IVMS starting smart sensorless vector control
Speed fluctuation *3)			±0.5% (during sensorless vector control)	
Acceleration or deceleration time			0.00-3600.00sec (linear, S-shaped, U-shaped, reverse U-shaped, EL-S shaped)	
Display monitor			Output frequency, output current, output torque, trip history, I/O terminal status, I/O power *4), P-N voltage and others described in "Chapter 13 Information Monitoring Functions".	
Starting functions			Start after DC braking, frequency collection start, frequency entrainment start, reduced voltage start, retry start	
Stopping functions			Free-run stop, DC braking after deceleration stop or terminal DC braking (braking power, operating speed adjustment)	
Stall prevention function			Overload restraining function, overcurrent suppression function, overvoltage suppression function	
Protective function *5)			Overcurrent error, Motor overload error, Braking resister Overload error, Overvoltage error, Memory error, Undervoltage error, Current detector error, CPU error, External trip error, USP error, Ground fault error, Excessive voltage of accepted power error, Instantaneous power failure error, Temperature detector error, Reduction of revolutions of cooling fan, Temperature error, Input phase loss error, IGBT error, Output phase loss error, Thermistor error, Brake error, Low-speed range overload error, Inverter overload error, RS485 communication error, and others described in "Chapter 18 Tips/FAQ/Troubleshooting".	
Other functions			V/f free settings (7 points), Upper/lower limit frequency limiter, Frequency jump, Curve acceleration/deceleration, Manual torque boost, Energy-saving operation, Analog output adjustment function, Minimum frequency, Carrier frequency adjustment, Motor electronic thermal function (free setting is also possible), Inverter electronic thermal function, External start/end (volume/ratio), Frequency input selection, Trip retry, Restart after instantaneous stop, Output of signals, Initialization settings, PID control, Automatic deceleration at power shut-off, Brake control function, Auto-tuning for commercial switching function (online/offline), and others described in "Chapter 12 Inverter Functions".	
Input	Frequency setting	Standard operator keypad	Parameter setting using arrow keys	
		External signals *6)	Ai1/Ai2 terminal (when changing voltage)	Setting through input of 0-10VDC voltage (input impedance: 10kΩ)
			Ai1/Ai2 terminal (when changing current)	Setting through input of 0-20mA current (input impedance: 100Ω)
			Ai3 terminal	Setting through input of -10-+10VDC voltage (input impedance: 10kΩ)
			Multistage speed terminal (use of input terminal function)	15th speed
			Pulse string input (A/B terminal, use of input terminal function)	32kHz×2 at maximum
		External port	Setting via RS485 serial communication (protocol: Modbus-RTU)	
	Normal rotation/ reverse rotation Run/stop	Standard operator keypad	Execution with the RUN /STOP key (normal rotation/reverse rotation can be switched by setting parameters)	
		External signals	Normal rotation operation (FW)/reverse rotation (RV) (when an input terminal function is assigned) 3-wire input available (when an input terminal function is assigned)	
		External port	Setting via RS485 serial communication (protocol: Modbus-RTU (maximum: 115.2kbps)	
	Input terminal function		11 terminals (input of pulse string is available on terminal A and B)	
			FW (Normal rotation)/RV (Reverse rotation), CF1-4(Multistage speed 1-4), SF1-7 (Multistage speed bit 1-7), ADD (Addition of frequency), SCHG (Switching of frequency command), STA (3-wire start)/STP (3-wire stop)/F_R (3-wire normal/reverse), AHD (Retention of analog command), FUP (Increase of speed via remote operation/FDN (Deceleration via remote operation), UDC (Deletion of data via remote operation), F-OP (Forced command switching), SET (Second control), RS (Reset), JG (Jogging), DB (External current braking), 2CH (2-stage acceleration/deceleration), FRS (Free-run stop), EXT (External abnormality), USP (Prevention of restart after restoration of power), CS (Commercial switching), SFT (Soft-lock), BOK (Brake check), OLR (Overload restriction switching), KHC (Clearance of integrated input power), OKHC (Clearance of integrated output power), PID (PID1 disabled), PIDC (PID1 integration reset), PID2 (PID2 disabled), PIDC2 (PID2 integration reset), SVC1-4 (PID1 multistage target values 1-4), PRO (PID gain switching), PIO (PID output switching), SLEP (SLEEP condition satisfied)/WAKE (WAKE condition satisfied), TL (Torque restriction enabled), TRQ1, 2 (Switching of torque limit 1,2), PPI (Switching of P/PI control), CAS (Switching of control gain), FOC (Preparatory excitation), ATR (Torque control enabled), TBS (Torque bias enabled), LAC (Cancellation of acceleration/deceleration), Mi1-11 (General-purpose input 1-11), PCC (Clearance of pulse counter), ECOM (Start of EzCOM), PRG (Program run), HLD (Acceleration/deceleration stop), REN (Operation permission signal), PLA (Pulse string input A, PLB (Pulse string input B), and others described in "12.24.1 Using the input signal function externally"	
	Backup power supply terminal		P+/P-: DC24V input (allowable input voltage: 24V±10%)	
	STO input terminal		2 terminals (simultaneous input)	
	Thermistor input terminal		1 terminal (possible to switch between positive temperature coefficient/negative temperature coefficient resistance element)	

*1) The output frequency range depend on the control and motor used. When running the inverter exceeding 60Hz, check the maximum allowable frequency with the manufacturer of the motor.

*2) When the control mode is changed, unless the motor constant is appropriately configured, you cannot obtain the desired starting torque or the inverter may trip.

*3) The variable range of motor speed may vary depending on your system or the environment where the motor is used. Please contact us for details.

*4) Both the input power and output power are reference values, which are not appropriate for use in calculation of efficiency values, etc. To obtain an accurate value, use an external device.

*5) The IGBT error [E030] is generated by the protective function not only for short circuit protection but also when IGBT is damaged. Depending on the operating conditions of the inverter, the overcurrent error [E001] may occur, instead of the IGBT error.

*6) At the factory default setting, when voltage and current on Ai1/Ai2 terminal is changed using a switch, with input of voltage at 9.8V and current at 19.8mA, the maximum frequency is commanded. To change characteristics, make adjustments using the analog start/end function.

Common specifications (continued)

Output	Output terminal function	Transistor output 5 terminal, 1a contact relay 1 point, 1c contact relay 1 point	
	Relay and alarm relay (1a, 1c)	RUN (During operation), FA1-5 (Reached signal), IRDY (Operation ready completion), FWR (During normal rotation operation), RVR (During reverse rotation operation), FREF (Frequency command operator keypad), REF (Operation command operator keypad), SETM (Second control under selection), AL (Alarm signal), MJA (Severe failure signal), OTQ (Over torque)*7), IP (During instantaneous power failure), UV (Under insufficient voltage), TRQ (During torque limitation), IPS (During power failure deceleration), RNT (RUN time over), ONT (Power on time over), THM (Electronic thermal warning), THC (Electronic thermal warning), WAC (Capacitor life advance notice), WAF (Fan life advance notice), FR (Operation command signal), OHF (Cooling fin heating advance notice), LOC/LOC2 (Low-current signal), OL/OL2 (Overload advance notice), BRK (Brake release), BER (Brake abnormality), ZS (Zero-speed detection signal), OD/OD2 (PID deviation excessive), FBV/FBV2 (PID feedback comparison), NDc (Communication disconnection), Ai1Dc/Ai2Dc/Ai3Dc (Analog disconnection Ai1/Ai2/Ai3), WCAi1/WCAi2/WCAi3 (Window comparator Ai1/Ai2/Ai3), LOG1-7 (Logical operation result 1-7), MO1-7 (General output 1-7), OVS (Receiving overvoltage) and others described in "12.25.1 Using the output signal function externally".	
	EDM output terminal	Output for STO diagnosis	
	Monitor output terminal *8)	Possible to output through selection from monitor data of parameters	
EMC filter switching *9)		Possible to enable the EMC noise filter (switching method is different depending on the model)	
External access to PC		USB Micro-B	
Use environment	Ambient temperature *14)	ND (normal duty)	-10~50°C
		LD (low duty)	-10~45°C
		VLD (very low duty)	-10~40°C
	Storage temperature *10)	-20~65°C	
	Humidity	20-90%RH (location free of condensation)	
	Vibration *11)	5.9m/s^2 (0.6G), 10~55Hz	
	Use location *12)	1000 altitude or lower (location free from corrosive gas, oil mist, and dust)	
Consumable components		Designed life of main circuit smoothing capacitor 10 years	
		Designed life of cooling fan 10 years (models equipped with a cooling fan) free from dust	
		Memory element on the control circuit board	
Applicable standards *13)		Compliance with UL/cUL/CE standards, RCM, Functional Safety SIL3/PLe (to be obtained)	
Painting color		Black	
Number of option slots		3 ports	
Option	I/O option	Analog I/O option	
	Communication option *15)	Ethernet(Modbus-TCP), EtherCAT, PROFINET	
	Feedback option	For line driver	
	Function safety option	Function safety option	
Other options		Braking resistor, AC reactor, DC reactor, noise filter, cables for each operator Harmonic suppression unit, noise filter, LCR filter, analog control panel, regenerative braking unit, power supply regenerative converter, applied control devices Computer software ProDriveNext, relay extension terminal board, SJ300/SJ700 terminal connection board	

*7) The threshold for signal output varies depending on the motor to be combined with the inverter, parameter adjustment, etc.

*8) The output data of analog voltage monitor and analog current monitor are reference values for connecting an analog meter. Due to the meter to be connected and variation in analog output circuit, the maximum output value may slightly vary from 10V or 20mA. To change characteristics, make adjustments using the Ao1 adjustment and Ao2 adjustment functions. Some monitor data cannot be output.

*9) To enable the EMC filter, connect with a power supply grounded at a neutral point. Otherwise, the leakage current may increase.

*10) The storage temperature is the temperature during transport.

*11) To be in accordance with the testing method specified in JIS C 60068-2-6: 2010 (IEC 60068-2-6:2007)

*12) When the inverter is used in a location at 1000m or higher altitude, air pressure reduces approximately 1% every 100m elevation. Perform 1% current derating and conduct evaluation for every 100m elevation. Please contact us for use in 2500m or higher environments.

*13) For insulation distance, comply with UL and CE standards

*14) Use the 400V class inverter at an input voltage of 500VAC or below. If input voltage exceeds 500VAC due to fluctuation of power, use the inverter at 40°C or lower ambient temperature.

*15)

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