HITACHI Inspire the Next

Low Voltage Variable Frequency Drive Range: 75 kW to 315 kW





A High Performance drive for the most demanding applications

"Smooth operation" in high demanding applications such as vertical lift

High starting torque at low speed range while in control of heavy loads. (ND rating). [Sensor less vector control (SLV)] [OHz sensor less vector control]



Cog-less motor operation for crane, lift, transport, etc.

Trip-less operation for better productivity.







Reduce costs for spare controllers

Our multi-mode inverter can control both induction motors and permanent magnet AC motors.

Over current detection parameter can be set lower to protect from demagnetizing PM motor.

Available in all Complicated tuning procedures are avoided

procedures are avoided through the use of our auto-tuning function to optimize motor performance.



By SJ-IN1

For long-time operation (fans, pumps)

Previously…

Significant energy savings can be obtained in comparison to an induction motor, even in 24 hours 365 days operation.







Reduce trips on acceleration and deceleration

Automatic speed adjustment manages ideal acceleration / deceleration speed to reduce the trip

Over magnetization function





possibility from over current, over voltage, and impact load.

Over current suppress function



Options List

PROFIBUS-DP

Analog input and output

Ethernet

EtherCAT

PROFINET

Feedback

*Turn off this function for lifting equipment.

3 Option Slots

Easy customization with "Slot-in" option cassette

Cassette type option boards for intuitive installation

- Visible indicators on the option cassettes allow users to verify the status with ease.
- Simple station number setting with the rotary switch.
- Replacement is also simplified by the cassette design.

Network options are available for system expansion

- Option communication and standard Modbus-RTU can be used together
- Following fieldbus networks are available with option cassette. (PROFIBUS-DP, PROFINET, EtherCAT, Ethernet, Device Net, CC-Link)

Model Configuration

SJ Series Model Name Indication



Hitachi's Pro Drive Next Software

Pro Drive Next supports various functions.



Inverter-to-Inverter communication

SJ-IN1 makes it possible to have Inverterto-Inverter communication without a PLC or PC. [EzCOM function]

It is easy to build a small synchronous system between multiple inverters by using EzCOM. Since SJ-IN1 can use EzCOM and external communication options together, you can create complicated control systems with simple wiring. (The maximum connectable number of inverters by EzCOM is 8)



By simple wiring and easy parameter settings, the synchronous operation can be achieved without the host controller (Resulting in cost and wiring savings).

Standard Specifications

Model	Name (IN1	-00000	-H)	01760	02130	02520	03160	03720	05200	05500	06600
Applicable MotorVICapacity (4 Poles)L(kW) (*1)N			VLD	90	110	132	160	185	250	-	-
			LD	90	110	132	160	185	250	280	355
			ND	75	90	110	132	160	220	250	315
Output	Rated Output Current (A) (*2)		VLD	176	213	252	316	372	520	-	-
			LD	160	195	230	290	341	481	550	660
			ND	150	180	217	260	310	450	500	600
	Overload Current Rating		VLD	110% 60 sec / 120% 3 sec							
			LD	120% 60 sec / 150% 3 sec							
			ND	150% 60 sec / 200% 3 sec							
	Rated Output Voltage			Three-phase (3-wire) 380 to 500V (Corresponding to input voltage)							
	Datad		VLD	122	148	175	219	258	360	-	-
		400V	LD	111	135	159	201	236	333	381	457
	Capacity		ND	104	125	150	180	215	312	346	416
	(kVA)		VLD	152	184	218	274	322	450	-	-
		500V	LD	139	169	199	251	295	417	476	572
			ND	130	156	188	225	268	390	433	520
Input	Rated Input AC Voltage (*3)			Main circuit power supply: Three-Phase (3 wire) 380 to 500V 50 / 60 Hz, Control power supply: Single-phase supply 380 to 500V 50 / 60 Hz							
	Permissible AC Voltage Frequency Fluctuation (*3)			AC voltage: 323 to 550V 50 / 60 Hz, Frequency: ±5%							
	Power Supply Capacity (kVA) (*4)		VLD	160	193	229	287	338	472	-	-
			LD	145	177	209	263	310	436	499	599
			ND	136	163	197	236	281	408	454	544
Carrior	Froquono		VLD	0.5 to 8.0 kHz							
Carrier Frequency Bange (*5)			LD	0.5 to 8.0 kHz							
	()		ND				0.5 to 1	0.0 kHz			
Starting Torque (*6)				180% / 0.3 Hz							
Braking	Regenerat	Regenerative			External Regenerative Braking Unit						
	Minimum Resistance Value (Ω)		ce	-	-	-	-	-	-	-	-
Height (mm)			וm)	700	700	740	740	995	995	995	1200
Dimensions		Width (mm)		390	390	480	480	480	680	680	580
	Depth (mr		ım)	270	270	270	270	370	370	370	450
Protective Structure				IP20 - UL Open Type							
Aprox. Weight (kg)				41	41	53	53	95	125	125	170

*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: Some models require current derating depending on the carrier frequency setting and ambient temperature. *3: In order to comply with the Low Voltage Directive (LVD), it must be connected to a neutral grounding supply. Pollution degree 2 - Over voltage category 3 (for 380 to 460VAC input supply) - Over voltage category 2 (for over 460VAC Input Supply). *4: The power supply capacity is the value of the output rated current at 440V. The value of impedance at the supply side changes due to the wiring, breaker, input reactor, etc. *5: The carrier frequency may be limited depending on how the drive is being used. *6: The value is specified for the Hitachi standard motor controlled by the sensor-less vector control when ND rating. Torque characteristics may vary by the control system and the use of the motor.



Items			General Specifications							
PWM system			Sine-wave PWM system							
Output frequency range (*1)			0.00 to 590.00Hz							
Frequency	accuracy		For the highest frequency, digital ±0.01%, analogue ±0.2% (25±10 °C)							
Frequency	resolution		Digital: 0.01Hz, Analog: A11 terminal / Al2 terminal:12bit / 0 to +10V or 0 to +20mA, Al3 terminal:12bit / -10 to +10V							
Control system (*2) IM		IM	 v / control (constant torque / reduced torque / ree / automatic boost control) V / f with encoder (constant torque / reduced torque / free / automatic boost control) Cascade type sensoriess vector control, 0Hz sensoriess vector control, Vector control with encoder 							
		SM / PMM	Synchronous startup for smart sensoriess vector control, IVMS start type sensoriess vector control							
Speed fluct	uation (*3)		±0.5% (sensorless vector control)							
Acceleratio	n / deceleratio	n time	0.00 to 3600.00s (Linear, S-curve, U-curve, Inverted-U-curve, EL-S-curve)							
Display			Output frequency, Output current, Output torque, Trip history, Input / Output terminal status, Input / Output terminal function, Input / Output power (*4), PN voltage, etc.							
Start function	ons		DC braking after the start, matching frequency after the start, active frequency matching start, Low-voltage start, retry restart.							
Stop function	ons		After free run stop, deceleration stop; DC braking or external DC braking operation (Braking force, time, adjustment of operation speed)							
Stall prever	ition function		Uveroicaa iimit runction, overcurrent suppression, overvoitage suppression function Duencurrent entry. Moto coverdad entry. Overolated entry Management (Indexedue and Carlot de ante CPU) and Estab							
Protection functions (*5)			Understanding error, motor overload error, Overvoltage error, Immeroy error, Undervoltage error, Current detector error, UPU error, External inp error, UPS error, Ground fault error, Power supply overvoltage error, Instantaneous power failue error, Temperature detector error, Cooling fan notation speed eduction temperature error, Temp							
Other functions			V / f free setting (7 points), upper and lower speed limit, speed jump, curve acceleration and deceleration, manual toque boost, energy-saving operation, analog output adjustment, minimum speed, carrier frequency adjustment, motor electonic thermal function (free is possible), inverter thermal function, external start-end (speed and rate), frequency input selection, trip retry, restart stop, various signal output, Initialization setting, PID contol, auto-decel at shut-off, brake control function, commercial power switching function, auto-tuning (on / offline), etc.							
		Keypad	The parameters for the command value (Set by operating the arrow keys on the keypad)							
		Extornal sizes	AI1 / AI2 terminal (Current and Voltage is able to switched.)	U to 10Vdc (input impedance: $10k\Omega$) / 0 to 20mA (input impedance: 100Ω)						
	Frequency	(*6)	Als terminal Multi-speed terminal	16multi-speed (With the use of the intelligent input terminal)						
	Reference		Pulse train-input	Maximum 32 kHz ×2						
		Communication	RS485serial communication (Protocol: Modbus-RTU)							
		Keynad	By BLIN / Stop key (With the set parameter forward / reverse (can be switched)						
	RUN / Stop	External signal	by not 7 dop key (with the set paraliteter, norward 7 feetse can be smitched) Forward (FW) / Beverse (BW) / Swite input (Mhen input ferminal functions are allocated) FORWARD (FW) / Swite input (Mhen input ferminal functions are allocated) FORWARD (FW) / Swite input (Mhen input ferminal functions are allocated) FORWARD (FW) / Swite input (Mhen input ferminal functions are allocated) FORWARD (FW) / Swite input ferminal functions are allocated) FORWARD (FW) /							
	Forward / Reverse	Communication	Set by B2485 communication (Maximum: 115 2kbns)							
		port	Cit Cay in the contraction (maximum cateria) (1) (1) (1) (1) (1) (1) (1) (1) (1) (1							
Input			i i terminais (A or 6 terminai accept a puise train)							
	Intelligent input terminals		charge), STA (3-wire start) / STP (3-wire stor) / FR (3-wire Forward Reverse), AHD (Analog command holding), FUP (Remote speed up) / FDN (Remote speed down), UDC (Remote speed data clearing), F-OP (Force operation), SET (2nd-motor), RS (Reset), G (Agost), UBC (External Dynamic brake), CH2 (-stage Accel / Decel), FRS (Free-run stop), EXT (External trip), USP (Unattended start protection), CS (Commercial power supply charge), SFT (Software lock), BOK (Answer back from Brake), OLR (Overload restriction solection), KHC (Accumulation input power clearance), NHC (Alcumercial power supply charge), SFT (Software lock), BOK (Answer back from Brake), OLR (Overload restriction solection), KHC (Accumulation input power clearance), NHC (12 (PID tot pUD (PID) to PID4 (PID) to PID4 (PID) to PID4 (PID) to PID4 integration reset), SVC1 to 4 (PID1 Multi set-point 1 to 4), PPR (PI) gain charge), PIC (2 (PID to tript) witching 17), SLEP (SLEP condition activation), VWAKE (WAKE condition activation), TL (Groue limit selection 1/2), PPI (P / PI control mode selection), CAS (Contol gain change), SON (Servo-ON), FOC (Forcing), ATR (Permission of torque control), TBS (forque bias enable), ONT (Home search function), LAC (Accel / Decel cancellation), PCL (Clearance of position deviation), STAT (Pulse train position reference input enable), PDD (P) (Position bias (ADD)), PON							
	Backup supp	oly terminal	P+/P-: 24 VDC input (Input allowable voltage: 24 VDC ±10%)							
	Thermistor input terminal		1 terminal (PTC / NTC resistor allowed)							
Output	t Relay / Alarm relay (1a, 1c) function		RUN (Running), FA1 to 5 (Frequency reached signals), IRDY (Inverter ready), FWR (Forward rotation), RVR (Reverse rotation), FREF (Frequency reference = Keypad is selected), REF (Run command = Keypad is selected), SETM (2nd-motor selected), OPO (Option Output), AL (Alarm), MJA (Major failure), OTO (Over torque) ("7), IP (Instantaneous power failure), UV (Undervoltage), TRO (Torque limited), IPS (IP-Non stop function is active), RNT (Accumulated RUN time over), ONT (Accumulated power-on time over), THM (Electronic thermal alar (Motor)), THC (Electronic thermal alarm (Inverter)), WAC (Cognactor If/ewarming), WAF (Cooling-fan speed drop), FR (RUN command active), OHT (Heartish overheart warming), COC/LOC2 (Low-current indication 1/2), OL / OL2 (Overload warming notice 1/2), BRK (Brake release), BER (Brake error), CON (Contactor control), ZS (Zero speed detection), DSE (Speed deviation over), PDD (Position deviation over), POK (Positioning completed), PCMP (Pulse counter command to Uput), OJ / OD2 / OD3 / OD4 (Over deviation for PID1 to 4 control), FRV / FBV2 / FBV3 / FBV4 (PID 1 to 4 feedback comparison), NDc (Communication line disconnection), A11Dc / Ai2Dc / Ai3Dc / Ai4Dc / Ai5Dc / Ai3Dc /							
	Output termi	nal monitor (*8)	The data of the monitor can be selected by the parameter of the output.							
EMC filter (*	*9)		EMC filter can be enable (The filter exchange method can alter depending on the model)							
PC external access			USB Micro-B							
Operating	Ambient temperature (*10)		-10 to 50°C (ND), -10 to 45°C (LD), -10 to 40°C (VLD) -20 to 55°C							
Environment	Level of hum	idity	20 to 90% RH (No condensation allowed)							
	Installation P	lace (*12)	1000m altitude or lower (location free from corrosive gas, oil mist, and dust).							
Components life span			The design life of the electrolytic capacitor on the board and the main circuit smoothing capacitor is 10 years. The design life of the cooling fan is 10 years (models with cooling fan). But no dust. Non-volatile memory parts on control circuit board. The design life of the LCD backlight in Keypad (VOP) is 10 years (8hr / day at 100% dimming, 30% brightness reduction)							
Optional slo	ots		3 ports							
Option cassettes (*13)			Communication option: Ethernet (Modbus-TCP) (P1-EN), EtherCAT® (P1-ECT), PROFINET® (P1-PN), PROFIBUS® (P1-PB), CC-Link® (P1-DN) (P1-CL), DeviceNet® (P1-DN)							
			Encoder Feedback option (Line driver input (RS422)) (P1-FB) • Analog input / output option (P1-AG)							
Other optional components		ts	Braking Resistor, AC reactor, Noise Filter, Operator Cable, Harmonic Suppression Unit, LCR Filter, Analog operation panel, Inverter Configuration Software ProDriveNext.							

*1: Output frequency range will depend on the motor control method and the motor used. Consult the motor manufacturer for the maximum allowable frequency of the motor when operating beyond 60Hz. *2: In case of the control mode is changed and the motor constant is not set appropriately, the desired starting torque cannot be obtained and also exists the possibility of tripping. *3: Regarding the speed range regulation of motor, the variable range depends on the client system and the environment in which the motor is used. Please contact Hitachi inverter distributers for more information. *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: If the IGBT error [E030] occurs by the protective function, it may have happened by the short-circuit protection, but also can occur if the IGBT is damaged. Depending on the operation status of the inverter, instead of the IGBT error, the overcurrent error [E001] may also occur. *6: At factory setting, the maximum output frequency for analog input signal Ai1 / Ai2 is adjusted to 9.8 VDC for voltage input and 19.8mA for current input. *7: The threshold for signal output varies depending on the motor to be combined with the inverter, parameter adjustment, etc. *8: The analog voltage output circuit. If you want to change the characteristics, adjust the Ao1 and Ao2 adjustment functions. There are some monitor data that cannot be output. *9: In order to enable the EMC filter, connect to the neutral grounding supply. Otherwise, the leakage current may increase. *10: Use the 400V class inverter at an input voltage of 500 VAC or below. The inverter distributer. *11: Storage temperature is the temperature during transport. *12: In case of utilization at an altitude of 1000m or more, take into account that the atmospheric pressure is reduced by 1% for every 100m up. Apply 1% current derating from the rated current by increasing every 100m, and



Name	Cause (s)	Trip Code
Overcurrent error	The inverter output was short-circuited, or the motor shaft is locked or has a heavy load. These conditions cause excessive current for the inverter, so the inverter output is turned OFF. The protection circuit operates at approximately 220% (Parameter setting changeable) of the rated output current (ND rated).	E001
Motor overload error (*1)	When a motor overload is detected by the electronic thermal function, the inverter trips and turns off its output.	E005
Overvoltage error	When the DC bus voltage exceeds a threshold, due to regenerative energy from the motor, the inverter trips and turns off its output.	E007
Memory error (*2)	When the built-in memory element has problems due to noise or excessive temperature, the inverter trips and turns off its output.	E008
Under-voltage error (*3)	In case the inverter DC voltage drops under the specified threshold voltage, the output will be shut down since the control circuit functions may not work properly. This trip will occur when the DC Voltage drops under 320VDC.	E009
Current sensor error	If a strong source of electrical interference is close to the inverter or abnormal operations occur in the built-in CT, the inverter trips and turns off its output.	E010
CPU error (*4)	When a malfunction in the built-in CPU has occurred, the inverter trips and turns off its output.	E011
External trip error	When a signal to an intelligent input terminal configured as EXT has occurred, the inverter trips and turns off its output.	E012
USP error	This trip will occur if the inverter is in RUN mode when it is turned on (Only when the USP function is enabled).	E013
Ground fault error (*4)	The inverter is protected by the detection of ground faults between the inverter output and the motor during power-up tests. This feature protects the inverter only.	E014
Input overvoltage error	When the input voltage is higher than the specified value, it is detected in 100 seconds after power-up and then the inverter trips and turns of its output. The Overvoltage detection level is about 780VC between PN. (Parameter changeable).	E015
Instantaneous power failure error	When the inverter power is cut for more than 15ms, the inverter trips and its output is turned off. Also in case the inverter is configured to restart after recovering from this trip and the RUN command still on, then the inverter output will restart automatically after recovery. Additionally, in case the power is cut for a long time then it will be considered as the inverter was normally shut down.	E016
Temperature sensor error	This trip will occur in case abnormalities in the temperature sensor circuit are detected.	E019
Temperature error due to cooling fan low speed	This trip will occur in case the temperature error (high temperature) is detected when the cooling fan rotation is low.	E020
Temperature error	When the inverter internal temperature is higher than the specified value, the thermal sensor in the inverter module detects the higher temperature of the power devices and trips, turning off the inverter output.	E021
Input open-phase error (*5)	One of three lines of 3-phase power supply is missing. Decision time is about 1s. (When the input phase loss effective function is enabled.)	E024
IGBT error (*6)	When an instantaneous over-current has occurred, the inverter trips and turns off its output to protect main circuit element.	E030
Output open-phase error (*7)	One of three lines of 3-phase power output is missing. Decision time is about 1s. (When the output phase loss effective function is enabled.	E034
Thermistor error	When the thermistor inside the motor detects temperature higher than the specified value, the inverter trips and turns off its output.	E035
Brake error	The inverter turns off its output when it can not detect whether the braking is ON or OFF within waiting time after it has released the brake. (When braking function is enabled.)	E036
Low-speed overload error	If overload occurs during the motor operation at a very low speed at 0.2 Hz or less, the electronic thermal protection function in the inverter will detect the overload and shut off the inverter output. (Note that a high frequency may be recorded as the error history data.)	E038
Controller overload error (1)	When the inverter itself overload is detected by the electronic thermal function, the inverter trips and turns off its output.	E039
RS-485 communication error	If timeout occurs because of line disconnection during the communication in Modbus - RTU mode, the inverter will display the error code shown on the right.	E041
EzSQ invalid instruction	This trip occurs when an invalid instruction is detected in EzSQ program.	E043
EzSQ nesting count error	This trip will occur when an EzSQ program exceeded the maximum allowed nesting count number.	E044
EzSQ instruction error	This trip occurs when an impossible instruction is detected in EzSQ program.	E045
EzSQ user-assigned error (0 to 9)	These trips occur when a user specified trip instruction is executed in the program.	E050 to E059

*1: The inverter can only be reset 10 seconds after the overload protection trip occurred (The occurrence of this trip will also depend on the parameter settings). *2: Reset operation by reset terminal or STOP / RESET key is not accepted. Since memory element failure or parameter may not be stored correctly, Please initialize memory after turning on the power supply again. And Please re-setting parameters. *3: Undervoltage error output may take up to about 1 sec. *4: Reset operation by reset terminal or STOP / RESET key is not accepted. Please turn off the power of the inverter. *5: When the input power supply waveform is distorted, error detection may not be performed correctly. *6: This protection does not protect the output short circuit, so there is a risk of IGBT damage. *7: Depending on the state of the output current, it may not be detected correctly. *8: Inverter repair is necessary when this error occurs. Please contact your service or sales dept.





Note1: Common to each terminal varies. Note2: Disconnect J51 when to supply RO-TO separately. UV error is issued when main supply is off while in operation. Note3: Sink or source logic for input terminal is switched by SW6.

Serving Entire Gamut of Industries

We have rich experience in supplying power electronics products for mission critical applications in various



Power

- ID Fan, FD Fan, Conveyors Cooling PA Fan
- Pump Tower
- Compressor



Plastic

- Extruder
- Compressor
- Injection moulding
- Tape Line Machin

industries for critical data processing applications and back-up technology for demanding applications.



Cement Fan Mixture Ball mill • Kiln

- Crusher
- Conveyors



Water

- Centrifugal pump
- Submersible pump



Oil & Gas

- Pump
- Compressor
- Fan



- Steel & Mining

- Roller Table

• Wire Drawn

- Conveyors
- Crusher
- Crane

Ceramic

- Ball mill & Blunger
- Compressor
- Spray dryer blower Conveyors
- Kiln blowers



Pulp & Paper

- Agitator motor • Pump Hydraulic press
 - Dryer
 - Pop reel
 - Press

Sectional roll

Rewinder

Refiner

Pulper

and many more...



Textile

- Ring frame
- Compressor
- Spinning mill
- Winder

- Cooling fan
- Doubling machine
- Stenter Machine

- Fan
- Ball mill
- Pump
- Machine
- Vibro Feeder



Customer Support

"Have peace of mind with flexible and nimble footed, 24 X 7 service"

Our Service program includes:

On Site Installation supervision and commissioning

- Provides Comprehensive check at user site to ensure trouble free installation of product
- Our technical experts give recommendations to the site engineer or electrical contractor and supervise for our supplied products (LV-VFD, MVD, I-dip, UMPS & Steel Automation VFD) installation before load power-up
- Offers commissioning services along with site acceptance test report & PG test.

Training

- On Site Training for safe & efficient operation of equipment
- Training at Factory (Optional)
 - Course-1 : Operation, system principle, hands on training, predictive and preventive maintenance
 3 days training
 - Course-2 : Predictive and preventive Maintenance, Hardware, Settings, System panel & restoration services – 5 days training

Preventive Maintenance Services (AMC, CMAC & Extended warranty)

- Ensures safe and reliable operation
- Contracts includes cleaning, measurements of various parameters, calibrations, functional tests, event log and parameter validation, hardware and software upgrades supported by Field Service Report.
- Maintenance Plan is one of the most cost-effective actions that can preserve initial investment and ensures business continuity.
- Ensure optimal performance and to protect critical application from potential downtime.
- PM is mandatory to avoid down time and process losses.

Break Down Maintenance & EMERGENCY CALL

- In the event of an emergency call, our service expert, located as close to your site as possible, guarantees a quick intervention time with the help of 24x7-365 days.
- With the help of powerful diagnostics software, quick troubleshooting is possible by a service expert, which guarantees a short MTTR (Mean Time to Repair).
- Corrective actions are performed (Part replacement, adjustments and upgrades of software's etc.)
- Timely technology enhancement inputs to customer for optimum performances.
- Helpline Number for Service Support (080) 6112 0800















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In the spirit of innovation, specifications and features are subject to change without notice.