HITACHI
Inspire the Next

Variable Frequency Drives

SJ Series IN1

NEW

Intuitively innovative!

At the point where ease of use meets high performance

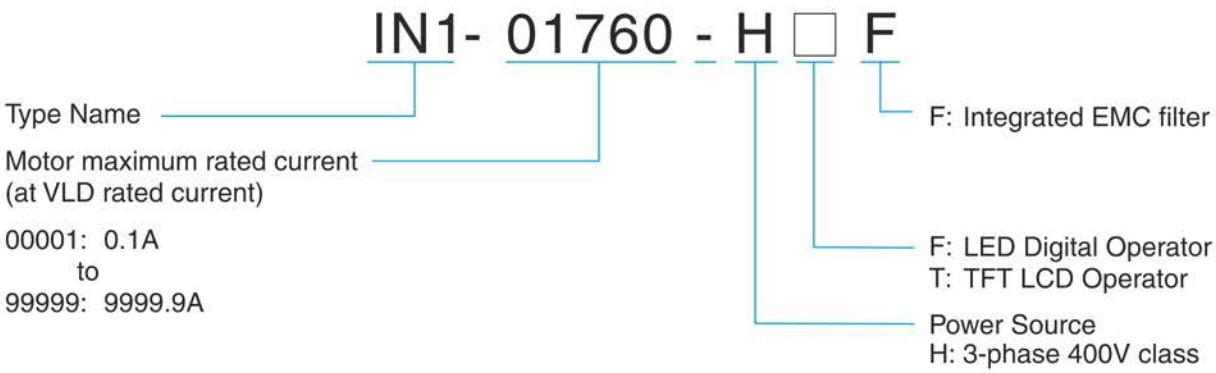
BE THE NEXT STANDARD

IN1

Hitachi Hi-Rel Power Electronics Private Limited

Model configuration

- SJ series model name indication



Standard Specifications

- 400V class specifications

Model name (IN1-□□□□□-H)				01760	02130	02520	03160
Applicable motor capacity (4 poles) (kW) (*1)			VLD	90	110	132	160
			LD	90	110	132	160
			ND	75	90	110	132
Output	Rated output current (A)		VLD	176	213	252	316
			LD	160	195	230	290
			ND	150	180	217	260
	Overload current rating (*2)		VLD	110% 60sec / 120% 3sec			
			LD	120% 60sec / 150% 3sec			
			ND	150% 60sec / 200% 3sec			
	Rated output voltage			3-phase (3-wire) 380 to 500V (corresponding to input voltage)			
	Rated capacity (kVA)	400V	VLD	121.9	147.6	174.6	218.9
			LD	110.9	135.1	159.3	200.9
			ND	103.9	124 7	150 3	180 1
		500V	VLD	152.4	184.5	218.2	273.7
			LD	138.6	168.9	199.2	251.1
			ND	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	159.7	193.2	228.6	286.7
			LD	145.2	176.9	208.7	263.1
			ND	136.1	163.3	196.9	235.9
Carrier frequency range (*5)			VLD	0.5 to 8.0kHz			
			LD	0.5 to 8.0kHz			
			ND	0.5 to 10.0kHz			
Starting torque (*6)				180% / 0.3Hz			
Braking	Regenerative Braking			Ext. regen. Braking unit			
	Minimum resistance value (Ω)			-	-	-	-
Protective structure				IP00			
Aprox. weight (kg)				41	41	53	53

*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. 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 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.

Common specifications

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 ℃)	
Frequency resolution			Digital: 0.01Hz, Analogue: Max. frequency / 4000 (Ai1 terminal / Ai2 terminal: 12 bit / 0 to +10V or 0 to +20 mA, Ai3 terminal: 12 bit / -10 to +10V)	
Control system (*2)			IM	V/f control (constant torque / reduced torque / free), Automatic boost control,V/f control with encoder (constant torque / reduced torque / free), Automatic boost control with encoder, Cascade type sensorless vector control, 0Hz sensorless vector control, Cascade type vector control with encoder (position and torque).
			SM/PMM	Methods of synchronous startup for vectorless smart control / Methods of IVMS startup for vectorless smart control
Speed fluctuation (*3)			±0.5% (sensorless vector control)	
Acceleration/deceleration 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 function, input/output power (*4), PN voltage, etc.	
Start functions			DC braking after the start, matching frequency after the start, active frequency matching start, Low-voltage start, retry restart.	
Stop functions			After free run stop, deceleration stop; DC braking or external DC braking operation (Braking force, time, adjustment of operation speed)	
Stall prevention function			Overload limit function, overcurrent supression, overvoltage suppresion function	
Protection functions (*5)			Overcurrent error, overload error, brake resistor overload, overvoltage error, memory error, undervoltage error, current detector error, CPU error, external trip error, USP error, ground error, supply overvoltage error, power loss error, temperature detector error, Cooling-fan rotation speed decrease, temperature error, phase input error, IGBT error, phase output error, thermistor error, brake error, low-speed range overload error, inverter overload, RS485communication error, RTC error etc.	
Other functions			V/f free setting (7 points), upper and lower frequency limit, frequency jump, curve acceleration and deceleration, manual torque boost, energy-saving operation, analogue output adjustment, minimum speed, carrier frequency adjustment, motor electronic 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 control, auto-decel at shut-off, brake control function, commercial switching function, auto-tuning (on/offline) etc.	
Input	Frequency setting	Panel	Up, down left and right keys to the set parameter.	
		External signal (*6)	Ai1 / Ai2 terminal (Current and Voltage is able to switched.)	0 to 10Vdc (input impedance: 10kΩ) / 0 to 20mA (input impedance: 100Ω)
			Ai3 terminal	-10 to +10Vdc (Input impedance: 10kΩ)
			Multi-speed terminal	16multi-speed (With the use of the intelligent input terminal)
			Pulse train-input	Maximum 32 kHz ×2
		External port	RS485serial communication (Protocol: Modbus-RTU, Maximum: 115.2kbps)	
	Forward / reverse Start / stop	Panel	By RUN / Stop key (With the set parameter, forward / reverse can be switched)	
		External signal	Forward (FW) / Reverse (RV) / 3-wire input allowed (STA,STP,FR) (When input terminal functions are assigned)	
		External port	RS485serial communication (Protocol: Modbus-RTU, Maximum: 115.2kbps)	
	Intelligent input terminals		11 terminals (A or B terminal accept a pulse train)	
			FW (Forward rotation) / RV (Reverse rotation), CF1 to 4 (Multi-speed 1 to 4), SF1 to 7 (Multi-speed bit 1 to 7), ADD (Trigger for frequency addition), SCHG (Command change), STA (3-wire start) / STP (3-wire stop) / FR (Forward / reverse by 3-wire), AHD (Analogue command holding), FUP (Remote control up) / FDN (Remote control down), UDC (Remote data clearance), F-OP(Forcible operation), SET (2nd-motor), RS (Reset), JG (Jogging), DB (External DC braking), 2CH (2-stage acc / decel), FRS (Free-run stop), EXT (External trip), USP (Unattended start protection), CS (Commercial power supply switching), SFT (Software lock), BOK (Braking confirmation), OLR (Overload restriction selection), KHC (Accumulated input power clear), OKHC (Accumulated input), PID (PID1 disable), PIDC (PID1 integration reset), PID2 (PID2 disable), PIDC2 (PID2 integration reset), SVC1 to 4 (PID1 multistage target value 1 to 4), PRO (PID gain change), PIO1 (PID output change), SLP (SLEEP trigger) / WAKE (WAKE trigger), TL (Enable torque limit), TRQ1/2 (Torque limit 1/2), PPI (P/PI switching), CAS (Control gain switching), FOC (Forcing), ATR (Enable torque command input), TBS (Enable torque bias), LAC (Acceleration / Deceleration cancellation), Mi1 to 11 (General-purpose input1 to 11), PCC (Pulse counter clearance), ECOM (EzCOM activation), PRG (EzSQ programme start), HLD (Acc / decel stop), REN (Motion enable signal), DISP (Display lock), PLA (Pulse train input A), PLB (Pulse train input B), DTR (Data trace start), DISP (Display lock), SON (servo on), ORT (orientation), PCLR (Clearance of position deviation), STAT (pulse train position command input enable), PUP (Position bias (ADD)), PDN (Position bias (SUB)), CP1 to 4 (Multistage position settings selection 1 to 4), ORL (Limit signal of Homing function), ORG (Start signal of Homing function), FOT (Forward Over Travel), ROT (Reserve Over Travel), SPD (speed / position switching), PSET (Position data presetting),	
	Backup supply terminal		P+ / P-: DC24V input (Input allowable voltage: 24V±10%)	
	Thermistor input terminal		1 terminal (PTC / NTC resistor allowed)	
Output	Intelligent output terminals		Transistor output terminal 5, 1a contact relay 1 point, 1c contact relay 1 point	
	Intelligent alarm relay (1a, 1c)		RUN (While in run), FA1 to 5 (Reached frequency signal), IRDY (Inverter ready), FWR (Forward rotation), RVR (Reverse rotation), FREF (panel frequency reference), REF (panel motion operation), SETM (2nd-motor selected), AL (Alarm signal), MJA (Major failure signal), OTQ (Over-torque), IP (Power loss), UV (Undervoltage), TRQ (Torque limited), IPS (Decel. Power loss), RNT (RUN time exceeded), ONT (ON time exceeded), THM (Motor electronic thermal warning), THC (Electronic thermal warning), WAC (Capacitor life warning), WAF (Cooling-fan life warning), FR (Operation signal), OHF (heat sink overheat warning), LOC / LOC2 (Low-current indication signal), OL / OL2 (Overload warning signal 1/2), BRK (Brake release), BER (Brake error), ZS (0Hz detection signal), OD / OD2 (Output deviation for PID control), FBV / FBV2 (PID feedback comparison), NDc (Communication disconnection), Ai1Dc / Ai2Dc / Ai3Dc (Analogue Ai1 / Ai2 / Ai3 disconnection), WCAi1 / WCAi2 / WCAi3 (Window comparator Ai1 / Ai2 / Ai3), LOG1 to 7 (logical operation result 1 to 7), MO1 to 7 (General-output 1 to 7), OVS (Over-Voltage power supply), PCMP (Pulse counter compare output), WFT (Trace function waiting for trriger), TRA (Trace function data logging), PDD (Position deviation over), POK (Positioning completed),etc.	
	Output terminal monitor (*7)		The data of the monitor can be selected by the parameter of the output.	
EMC filter activation (*8)			EMC filter can be activated (method to switch bares)	
PC external access			USB Micro-B	
Environment	Ambient temperature (*9)		-10 to 50 ℃ (ND), -10 to 45 ℃ (LD), -10 to 40 ℃ (VLD)	
	Storage temperature(*10)		-20 to 65 ℃	
	Level of humidity		20 to 90%RH(No condensation allowed)	
	Vibration tolerance (*11)		2.94m/s^2 (0.3G), 10 to 55Hz	
	Installation Place (*12)		A maximum altitude of 1000 m, without gases or dust.	
Components life span			Main circuit smoothing capacitors is 10 years. / Cooling-fan is 10 years.	
Optional slots			3 ports	
Option	Input / ouput		Analog I/O (available soon)	
	Communication		Ethernet (Modbus TCP), EtherCAT, PROFIBUS-DP, PROFINET(available soon)	
	Feedback		Line driver input (RS422)	
Other optional components			Braking resistor, AC reactor, noise filter, operator cable, harmonics suppresion unit, noise filter, LCRfilter, analog panel, regenerative braking unit, PC software ProdriveNext, Screw type terminal block(P1-TM2)	

*1: To operate the motor beyond 50/60Hz, please consult with the motor manufacturer about the maximum allowable rotation speed. *2: If the setting of the motor constant is not appropriate, there is a case when the starting torque is not sufficient or unstable. *3: Speed fluctuation will vary depending on your system and the motor of the use environment. Please contact us for more information. *4: Both Input power and the output power are reference (not actual) value. Not suitable for calculations for such as the actual efficiency. *5: IGBT error [E030] also occurs by IGBT damage not only by short-circuit protection. Depending on the operating status of the inverter, Overcurrent error [E001] occurs instead of the IGBT error [E030]. *6: The frequency command is the maximum frequency at 9.8V for input voltage 0 to 10Vdc, or at 19.8 mA for input current 4 to 20 MA. Characteristic change is adjusted by using external start-end function. *7: The analogue voltage and analogue current monitor are estimated outputs of the analogue meter connection. Maximum output value might deviate slightly from 10V or 20 mA by variation of the analogue output circuit. If you want to change the characteristics, adjust the Ao1 and Ao2 adjustment functions. There is monitor data that cannot be part of the output. *8: When the EMC filter is enabled, please connected to the power supply with neutral grounding. Otherwise, it may increase leakage current. *9: Derating is set in accordance to carrier frequency. *10: Storage temperature is the temperature during transport. *11: In accordance with the test methods of JIS C 60068-2-6: 2010 (IEC 60068-2-6:2007). *12: In case of utilization at an altitude of 1000 m or more, take into account that the atmospheric pressure is reduced by 1% for every 100 m up. Please apply a derating of a 1% from the rated current every 100 m. Conduct and evaluation and contact us if you plan on using it above 2500 m. *13: Insulation distance is in accordance with the UL and CE standards.

PC setting Software

Hitachi's ProDriveNext Software

Easy configuration, such as start/stop and fault diagnosis.

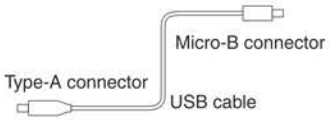
ProDriveNext(PC setting software)

ProDriveNext supports various functions.

Easy Setup & Easy data management.
Parameter comparison is also enhanced.

Easy connection via USB

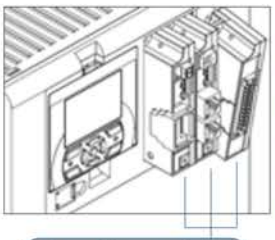
Ethernet is also available (optional)



Easy customize with "Slot-in" option cassette

Cassette type option boards for intuitive installation.

- Visible indicators on the various option boards allow for user to verify functionality with ease.
- Tasks such as setting a station number is simplified by use of a rotary selection switch.
- Replacement is also simplified by the cassette design. Replacement after failure is also easy.



3 option slots

Option List
Ethernet
EtherCAT
PROFIBUS-DP
PROFINET※
Feedback
Safety※
Analog input and output

※Contact Sales Office for availability

Network options available for system expansion.

- Option communication and standard Modbus-RTU can be used together.
- Following fieldbus network available with option on slot (PROFIBUS-DP, PROFINET, EtherCAT, Ethernet)

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