

## SJ700 Series Low Voltage Inverter 415 V Class

0.75 kW to 22 kW



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## HITACHI SJ700 SERIES VARIABLE FREQUENCY DRIVES

Hitachi SJ700 series drives are designed to meet the production and performance needs of OEMs and machine builders, system integrators, panel builders and end users across all industry segments to serve wide range of applications.

The drive comes with many standard features and capabilities and can be augmented with various communications and I/O options. With wide-range of options for I/Os and communications, Hitachi SJ700 series drives can be easily configured to meet the requirements of wide-range of applications like pumps, fans, compressors, OEM machinery, material handling cranes, hoists, conveyors, etc. across various industry segments i.e. steel & metal, plastics, paper, etc.

With the full range of harmonics filters, Hitachi provides very cost-effective and efficient solutions to customers to manage the harmonics generated by the drives not only to meet the IEEE 519 harmonics guidelines but also to make the Drive system much more energy efficient and eco friendly.

### Wide Range of Options and Accessories

Hitachi SJ700 series drive provides wide range of I/Os, communication options and complete range of harmonics filters, sinusoidal filters which can give highly efficient, cost effective and powerful solutions for all applications. In addition to this, the programmability in the drives makes it very easy and flexible to customize for different applications and requirements.

### High Performance

Hitachi SJ700 series drives are designed for high torque demanding applications that have high overload requirements. At the heart of the drive, there are the high-performance motor control modes like special 0 Hz.Sensorless Vector Control Mode (SLV), closed loop vector control that provide ultimate performance for the drive to deliver high performance.

### Ease of Maintenance and Operation

Hitachi SJ700 series drives are very easy to maintain and operate. The design and construction of the drives is such that replacement of failed components like fans and capacitors can be accomplished within the field in fraction of minutes. The components in the drive are designed for long life without any failures. Various preventive maintenance functions are incorporated in the drive to make it extremely simple for maintenance personnel to maintain the drives in the field.

The drives come with very powerful and graphical drive programming software which makes it very simple for engineers and technicians to manage various parameter sets in the drive and analyze drive performance very easily.

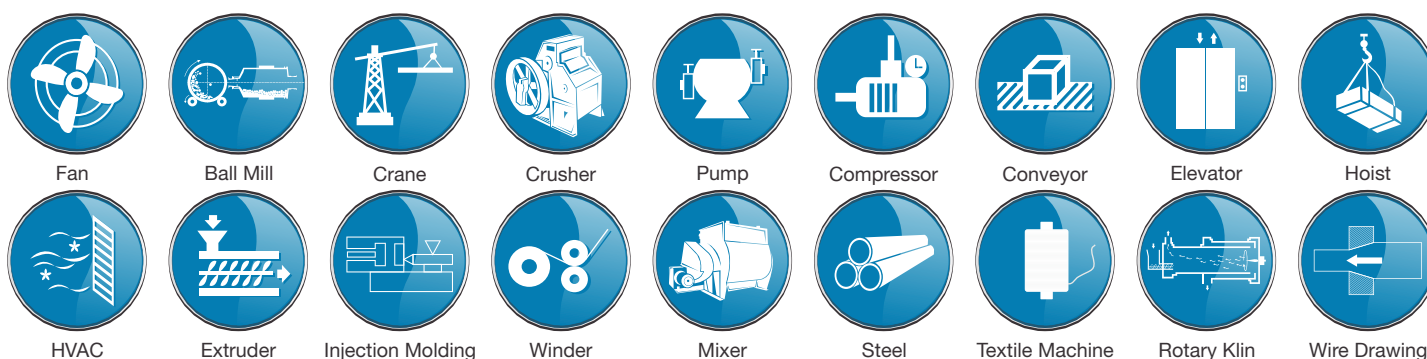
### Robust and Rugged Construction

It offers enhanced reliability and longer MTBF.

## CERTIFICATIONS



## APPLICATION SEGMENTS



## TECHNICAL FEATURES AND BENEFITS

### High starting torque offers

#### SMOOTH START/STOP & JERK FREE MOTION CONTROL

High starting torque of 200%\*\*\*, achieved with Sensor less Vector control mode at minimum speed of 0.3 Hz\*\* is ideal for applications like cranes, hoists and elevators.

- No need to over-size the drive for providing high starting torque/current during lifting of load
- Provides fast cyclic starts and stops of the load without violating current limits of the drive.
- Provides very fast acceleration of the motor without much jerk
- Ideal Industry Applications - Cranes, Hoists, Elevators, Steel/Metals, Paper, Ball-Mills, Extruders, Oil & Gas etc.

### 0 Hz. sensorless vector control mode offers

#### IMPROVED SYSTEM RELIABILITY

Hitachi SJ700 drives offers 150%\* holding torque on motor shaft at 0 Hz speed. with such high starting torque, there is no need for any external mechanical braking to hold the motor at zero speed.

- Helps in reducing overall cost of the system.
- Improves reliability of the system by eliminating mechanical components which are prone to failure.
- Ideal Industry Applications - Ball-Mills, Cranes, Hoists, Elevators, Steel/Metals, Paper, Centrifuges, Oil and Gas etc.

\*One over-size drive against motor

### Trip Avoidance function offers

#### NEAR CONTINUOUS OPERATION OF THE DRIVE WITHOUT NUISANCE TRIPS

- Provides trip avoidance in the drive during full load operation and prevents nuisance trips.
- Monitor and control the drive output power not to exceed the configured DC bus Voltage limit during deceleration
- Control output current during acceleration/starting conditions to prevent trips.
- Prevents nuisance trips in the drive for applications where load fluctuations on the motor are quite frequent like Centrifuges, mixtures, crushers etc.
- Functions like Over-current suppression function, minimum deceleration time function and DC bus AVR function are in the Drives.
- Ideal Industry Applications - Ball-Mills, Centrifuges, Crushers, Mixtures, Winders/Unwinders, extruders, Steel/Metals, Oil and Gas etc.

### Closed-loop vector control mode offers\*\*

#### HIGH SPEED CONTROL ACCURACY

- Availability of External encoder provides very high degree of accuracy and performance in the drive
- Provides high-speed synchronization and speed matching between multiple motors
- Provides very high speed control accuracy using this mode.
- Ideal Industry Applications - Textiles, Paper, Steel/Metals, Printing, extruders, Winders/Unwinders, Oil and Gas etc.

### Torque control mode offers\*\*

#### PRECISE CONTROL OF OUTPUT TORQUE

- High speed Torque reference sharing mode in the drive for precise control of output torque delivered to the motor.
- Direct sharing of Torque signals between Drive to Drive

- Provide ability to control Tension with very high accuracy for Winders and Unwinder applications.
- Ideal Industry Applications - Steel/Metals, Paper, Textiles, Plastics, Winders/Unwinders, Oil and Gas etc.

### Speed/ Position Control Mode offers

#### PRECISE POSITION CONTROL OF THE MOTOR

- Uses external encoder and pulse train input signal to precisely control position of the motor
- Servo-like capabilities in the drive to control position of the motor with high-level accuracy without needing special servo drive.
- Ideal Industry Applications - Textiles, Packaging, Steel/metals etc.

### Energy savings mode offers

#### ENERGY COST SAVINGS

- Provides the capability for the Drive to operate in a special Energy savings mode to help reduce over-all Energy consumption in the system.
- For applications such as Fans, Pumps, HVAC etc. the load demand varies due to process fluctuations.
- When load demand from the drive is low, the drive can be operated in a Energy savings mode in such a way that output power of the drive is reduced to match the load demand and thus helps in conserving Energy in the system.
- Ideal Industry Applications - Pumps, Fans, HVAC, Oil and Gas etc.

### Acceleration and deceleration profiles offer

#### SMOOTH MOTOR START/STOP WITH FULL LOAD

- Special Acceleration/Deceleration profile for hoist application like elevator, crane, industrial lift, escalator etc.
- Linear, S-curve, U-curve, Inverted U-curve, and Elevator/Crane S-curve
- This helps in smooth and Jerk Free motion of the Hoist system.

### Power utilization monitor function offers

#### MONITORING OF ENERGY SAVINGS

- Input electric power (kW) and integrated input electric power for monitoring energy saving.

### External mechanical brake control offers

#### CAPABILITY TO CONTROL MECHANICAL BRAKES

- SJ700 series drives provide capabilities to control mechanical brakes connected to the motor using standard inputs and outputs on the drive.
- Multiple options are provided in the drive to configure and control the external mechanical brake operation connected to the motor by using standard drive parameters.

### Dynamic braking offers

#### BETTER RAMP CONTROL IN THE DRIVE DURING FAST STOPS AND DECELERATION.

- SJ700 series drives provide capability to connect external braking resistor to allow excess DC bus energy to be dissipated through this external resistor in the form of heat.
- This function allows the VFD to quickly stop motor with full load without getting over voltage trip. It is required when the motor is required to be stopped within a certain desired time period and the motor is loaded.

\*\*Applicable to heavy duty operation of drive

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## Extensive standard I/O offers FLEXIBILITY IN USAGE

- Extensive set of standardized Analog and Digital I/Os
- One need to install few parts and components in the drive panel for interfacing with field signals
- Reduces Total Cost of ownership using Hitachi's SJ700 series drives and its various options.

## Easy-Removable Construction offers EASE OF MAINTENANCE

- Field replacement of cooling fan(s) and DC bus capacitors can be accomplished in a fraction of the time.

## Standard modbus communication offers HIGH SPEED COMMUNICATION FOR REAL TIME CONTROL

- In-built High-speed RS 485 Modbus communications
- Provides high-speed communications with Automation Systems for real-time control
- No need of any additional communications modules
- Drives can be plugged easily with existing systems without any additional cost.
- Reduces Total Cost of ownership using Hitachi's SJ700 series drives and its various options.



Easy-Removable cooling fan



Easy-Removable DC BUS capacitors

## DRIVE I/Os AND OPTIONS

### Standard I/O and Communications

Standard I/O

I/O Signal Type	Total Number	Remarks
Digital Inputs	9	Standard
Analog Inputs	3	Standard (4-20 mA, 0 to 10 V, -10 V to 10 V)
Digital Outputs	5	Standard
Analog Outputs	2	Standard (4-20 mA, 0 to 10 V)
Pulse Train Outputs	1	Standard
Relay Outputs	1	Standard
Temperature / Thermistor	1	Standard

### Standard Communications

RS 485 Modbus RTU Interface - Standard- 115.2 Kbps communications speed

### I/O and Communications Options

I/O Signal Type	Total Number	Remarks
Digital Input Expansion	16	Expansion Slot 1 or 2
Motor Encoder Feedback Interface Card Option	1	Expansion Slot 1 or 2. TTL Type encoder interface up to 65535 PPR resolution.

### Communication

Communications Option	Total Number	Remarks
Profibus DP Communications Interface Option	1	Expansion Slot 1 or 2
DeviceNet Communications Interface Option	1	Expansion Slot 1 or 2



Feature	Description	Benefits
<b>Optional Communications Cards</b>	Optional Profibus, DeviceNet Communication modules for communications with Automation systems and real-time control.	Provides ability to interface with user's existing automation and control system without making major changes in the system.
<b>Optional Encoder Feedback Interface Module</b>	Optional Encoder feedback interface module available in the drive for doing high-performance applications with the drive. Provides ability to precisely synchronize speeds of multiple drives and motors using the optional Encoder Feedback interface module.	Higher-performance from the system with minimal investment of optional Encoder Feedback interface module in the drive.
<b>Optional Digital Input I/O cards</b>	Optional I/O cards for Digital Inputs to be able to do many more functions using the Drive.	Lowers overall-cost of the system. Minimize usage of additional components for additional I/O requirements, thereby minimizing the overall-all system cost.

## Optional Filters

### Passive Harmonic Filter

- Passive Harmonic Filters maintain THDi for motor loads from 40% to 100% between 5% to 6% at the input side of the VFD.
- Provides complete IEEE 519 Harmonics Compliance at the VFD input at highly optimized cost to customers.

### Sinusoidal Filter

- Provides users with the flexibility during plant construction and engineering to have cable distances between motors and VFD greater than 500 meter.
- Optional Sinusoidal Filters convert the PWM output from the VFD to Sinusoidal Output signal.



Drive I/O Terminal



Profibus Card



Digital I/O Card



Encoder Card

## USER INTERFACE AND PROGRAMMING

### In-built PLC programming capability offers HIGH FLEXIBILITY & ULTIMATELY COST SAVING

- External Relays and control contactors can be replaced by in built PLC functionality in the drives.

### Copy unit option offers LESSEN MANUAL CONFIGURATION & CHANCE OF ERROR

- Optional Copy Unit in the drive to allow copying of drive settings and parameters onto the display unit.
- Fast and easy replacement of drives and copying of parameters from one drive to another.
- Drives can be easily replaced without need of manual re-programming.

### Intuitive user interface offers EASY & FASTER CONFIGURATION AND ULTIMATELY OPERATION TOO

- Intuitive alpha-numeric display on the drive with up to 4 line of display for fast and easy operation of the drive.

### Powerful PC configuration tool offers FASTER DIAGNOSE & TROUBLESHOOT PROBLEMS

- Powerful PC tool for configuration of drive parameters, diagnostics and programming.

# SJ700 Series Low Voltage Inverter 415 V Class

## DRIVE PROGRAMMING AND CONFIGURATION SOFTWARE

ProDrive Next Software provides Drive Programming and Commissioning Tools and Features to seamlessly configure and commission SJ700 series drives.

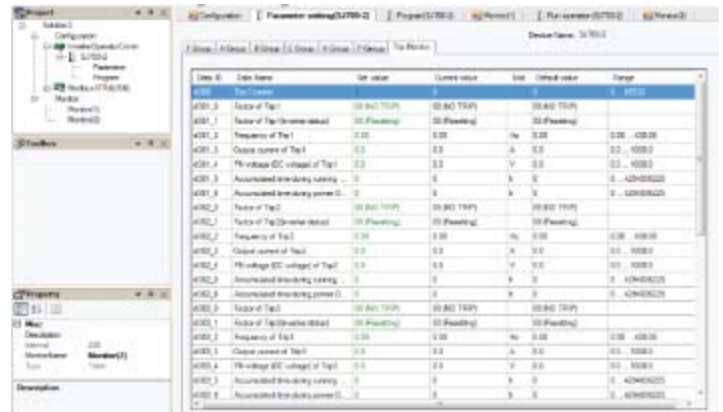
Major features of the Pro Drive Next Software :

- Easy drive parameter navigation
- Fast and easy configuration of drive parameters

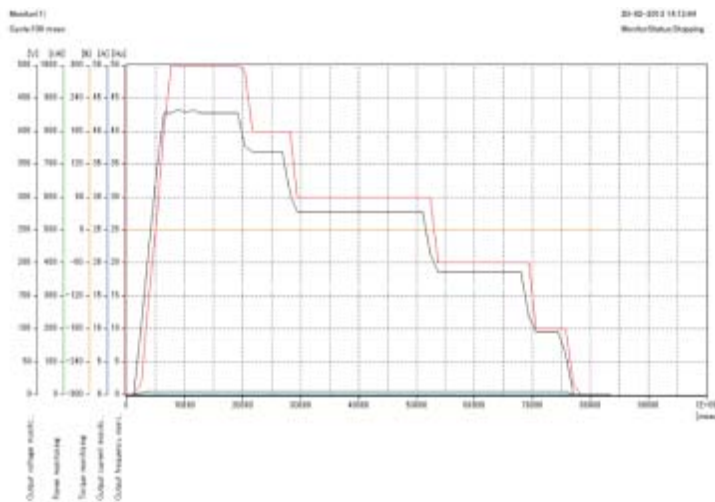
- Upload and download of drive parameters for fast and easy programming
- EzSQ Drive PLC programming to customize functionality of drive for different applications
- Data logging and trending of multiple drive signals simultaneously
- Overview of drive performance and status



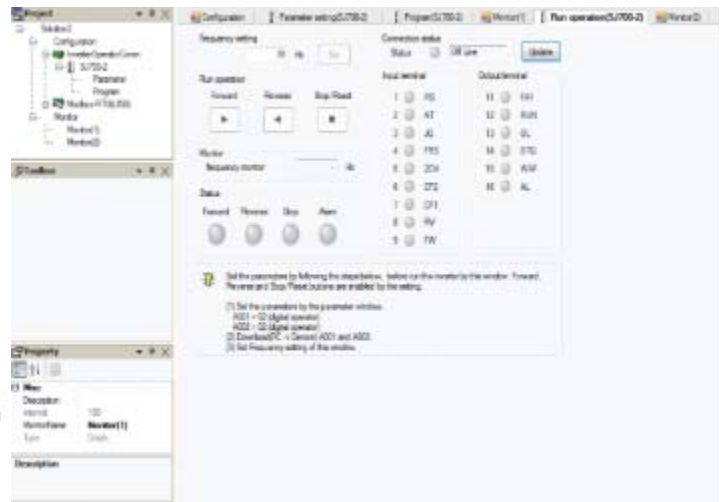
Drive Model Configuration



Parameterization of Drive



Display Parameter Monitoring in Scope



Start/Stop and Status Monitoring

## GENERAL TECHNICAL SPECIFICATIONS

Main Connection	
Supply Voltage	380 V AC to 480 V AC ± 10%
Frequency	50 Hz./60 Hz. ± 5%
Motor Connection	
Motor Types	AC Induction Motor, Aysnchronous Motors
Output Frequency	0 Hz to 400 Hz* <sup>1</sup>
Motor Control	V/F Control, Sensorless Vector Control, Closed Loop Vector control* <sup>3</sup>
Torque Control	
Output Torque Level	Output Torque Range: 200%
Starting Torque / Holding	200% at 0.3 Hz for Frames A1 to B using Sensorless Vector Control mode* <sup>3</sup> / 150% at 0.5 Hz* <sup>6</sup>
Speed Control	
Output Frequency Range	0.1 Hz to 400 Hz* <sup>1</sup>
Frequency Resolution	0.01 Hz
Frequency Accuracy	Output Frequency Accuracy ± 0.01% of Maximum Frequency using V/F control mode (for digital input).
Slip Compensation	Yes
Speed Control Accuracy	Open Loop: ± 0.5% using Sensorless Vector Control Mode
Operating Conditions	
Protection Class	IP 20* <sup>5</sup> for All Frames
Operating Temperature	-10°C to 50°C - Frames A1 to B.
Storage Temperature	-20°C to 65°C
Installation Altitude	1000 meter or Less
Relative Humidity	Maximum 90% RH with no condensation
Vibration	5.9 m/s <sup>2</sup> for Frame A to B (10 Hz to 55 Hz)
EMC	In-built EMC filter according to EN-61800-3 Catagory C3 for Frame A to B
Compliance	CE, UL, C-tick, C-UL, ROHS

\*1. Applicable for Frames A to B.

\*2. Applicable for Frames A to B.

\*3. Applicable for Heavy-Duty Operation of the Drive.

\*4. Starting Torque applicable for upto 10 sec. maximum

\*5. Protection Class applicable to Drive Modules only. Drive with Panel protection class can be different.

\*6. Applicable for Normal-Duty Operation of the Drive.

## DRIVE RATINGS AND DIMENSIONS

Drive Model No.	Heavy Duty Use - 150% OL for 1 min.		Normal Duty Use - 120% OL for 1 min.		Frame Size
	*I <sub>HD</sub> (A)	**Indicative Motor Power at 415 V AC (kW)	*I <sub>ND</sub> (A)	**Indicative Motor Power at 415 V AC (kW)	
SJ700D-007-HFEF3	2.5	0.75	3.1	1.5	A1
SJ700D-015-HFEF3	3.8	1.5	4.8	2.2	
SJ700D-022-HFEF3	5.3	2.2	6.7	3.7	
SJ700D-040-HFEF3	9	4	11.1	5.5	
SJ700D-055-HFEF3	14	5.5	16	7.5	A
SJ700D-075-HFEF3	19	7.5	22	11	
SJ700D-110-HFEF3	25	11	29	15	
SJ700D-150-HFEF3	32	15	37	18.5	B
SJ700D-185-HFEF3	38	18.5	43	22	
SJ700D-220-HFEF3	48	22	57	30	

\*I<sub>ND</sub> (A) Continuous Current capacity of the drive with 120% Over-Load for 1 min. every 10 mins.

\*I<sub>HD</sub> (A) Continuous Current capacity of the drive with 150% Over-Load for 1 min. every 10 mins.

\*\*Indicative Motor Power in kW at 415 V AC. Actual Motor Power (kW) can vary depending on actual motor selection

Frame Size	Dimensions (WxDxH) (mm)	Weight (Kg)
A1	150 x 140 x 255	3.5
A	210 x 170 x 260	6
B	250 x 190 x 390	14

## Main Line Chokes

Main Line chokes are typically used for reducing Harmonics in the Input main circuit on supply side.

For Frames A1 to B, main line choke can be ordered separately as per the table below.

AC Line Choke - IP00 Unprotected			
Motor Power (kW)	Frame Size	Choke Model No.	Dimensions (W x D x H) mm
0.75	A1	CHK-007-HHI	270 x 180 x 180
1.5	A1	CHK-015-HHI	270 x 180 x 180
2.2	A1	CHK-022-HHI	270 x 180 x 180
4	A1	CHK-040-HHI	270 x 180 x 180
5.5	A	CHK-055-HHI	300 x 180 x 260
7.5	A	CHK-075-HHI	300 x 180 x 260
11	A	CHK-110-HHI	270 x 220 x 180
15	B	CHK-150-HHI	270 x 220 x 180
18.5	B	CHK-185-HHI	320 x 160 x 200
22	B	CHK-220-HHI	320 x 160 x 200

## Output Choke (du/dt Filter)

du/dt filters suppress the inverter output voltage spikes and rapid output voltage changes to prevent motor terminal bearings from being over-heated and fail prematurely. When the Motor cable connection between drive and Motor are larger than 200 meters, due to the capacitance effect in the cable, the drive output signal can develop large spikes that can cause damage to the motor

terminal bearings and can cause premature failure of the motor.

When the motors are old and are more prone to such failures, du/dt filter is required which can be selected as per the table below for the different drive ratings.

Output Choke (du/dt Filter) - IP00 Unprotected		
Drive Model no.	du/dt Filter	Dimensions (W x D x H) mm
SJ700D-007-HFEF3	CHK-007-HHO	290 x 160 x 180
SJ700D-015-HFEF3	CHK-015-HHO	290 x 160 x 180
SJ700D-022-HFEF3	CHK-022-HHO	290 x 160 x 180
SJ700D-040-HFEF3	CHK-040-HHO	270 x 180 x 180
SJ700D-055-HFEF3	CHK-055-HHO	280 x 190 x 200
SJ700D-075-HFEF3	CHK-075-HHO	280 x 190 x 200
SJ700D-110-HFEF3	CHK-110-HHO	270 x 410 x 275
SJ700D-150-HFEF3	CHK-150-HHO	270 x 410 x 275
SJ700D-185-HFEF3	CHK-185-HHO	320 x 450 x 225
SJ700D-220-HFEF3	CHK-220-HHO	320 x 450 x 225

## ABOUT US

Founded & established in 1983 as Hi-Rel Electronics Pvt. Ltd., we are now a Hitachi group company - Hitachi Hi-Rel Power Electronics Pvt. Ltd., recognized as a pioneer in power electronics. With 3 decades of experience, we have garnered a significant level of trust in our market segment and continue to offer world class power electronics products, value added services & customized solutions.

Our product portfolio includes UPS (uninterruptible power supply) for industrial, commercial & enterprise applications, medium voltage & low voltage variable frequency drives, steel automation & engineered drives for customized applications, industrial automation & control products like PLC, SCADA & DCS, solar inverters, railway products and other customized products like UMPS, I-dip (dip ride through solutions).

- Leading manufacturer of UPS, drives & automation products and solar inverters
- State-of-the-art manufacturing facility at Gandhinagar & Sanand in Gujarat, India
- In-house R&D facility recognized by DSIR, Government of India
- ISO 9001:2008, ISO 14001:2004 & BS OHSAS 18001:2007 certified company with export house status
- Approved by leading consultants and EPC vendors
- Pan India & global presence
- Serving entire gamut of industries
- Rich experience in "mission critical" applications
- Dedicated & decentralized 24x7 after-sales-service
- Offers products with greater energy efficiency & lower carbon footprint

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