Frequency Inverters
SJ700B Series
Powerful Inverter for General Purpose Use

HITACHI
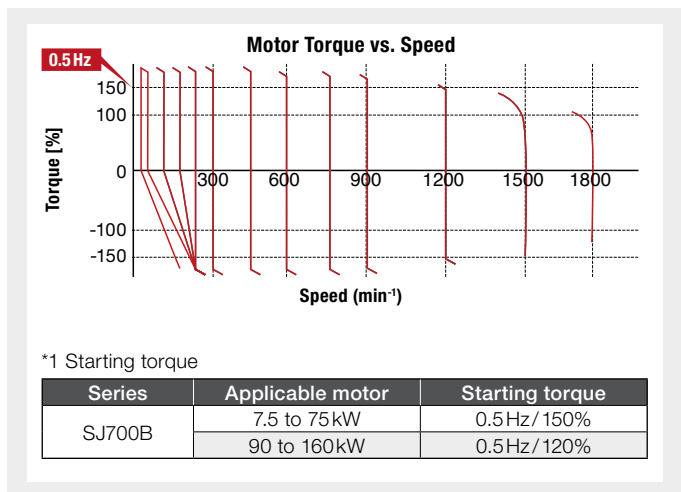## Inspire the Next

HITACHI

SJ700B

SJ700B Series
Powerful Inverter for General Purpose Use

High performance, powerful functions, user friendly.

■ A powerful drive with high starting torque and easy configuration

Improved Sensorless Vector Control and Auto Tuning allow for the easy setup of motor constants and enable a high starting torque of 150% or more at 0.5Hz.

The SJ700B inverter is a general purpose inverter which can also be applied to high torque applications.

Motor Torque vs. Speed

*1 Starting torque

Series	Applicable motor	Starting torque
SJ700B	7.5 to 75 kW	0.5 Hz / 150%
	90 to 160 kW	0.5 Hz / 120%

## Trip avoidance functions

■ Over current suppression

Higher internal calculation speed improves Current control performance.

Over-current suppression helps to avoid an inverter trip during acceleration, deceleration and impact loads.

Over-current suppression OFF

Over-current suppression ON

Suppresses over current and continues running
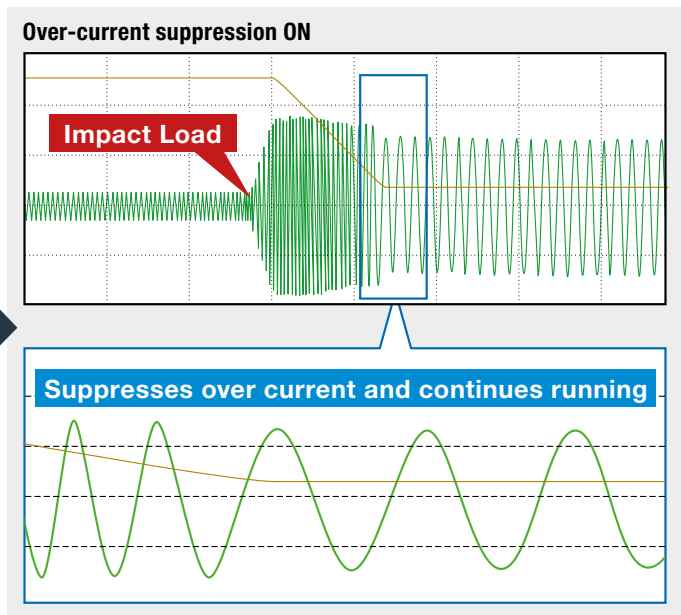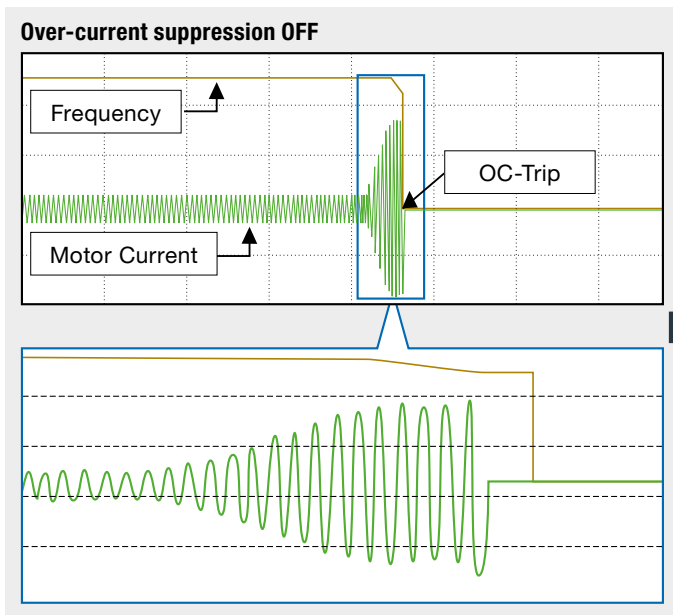
■ Over voltage suppression

Using the DC bus AVR Function the deceleration time is controlled in order to avoid exceeding the over-voltage trip level. This enables trip-less operation.
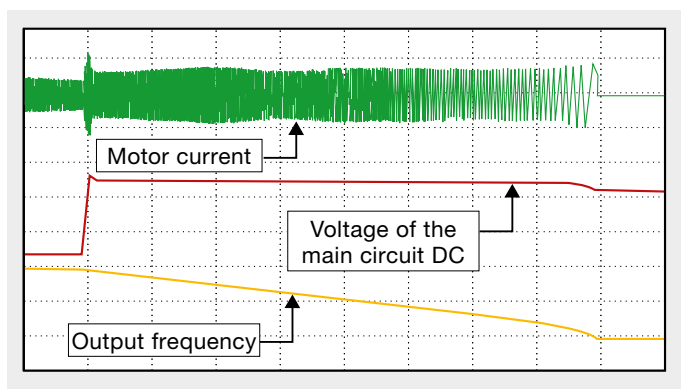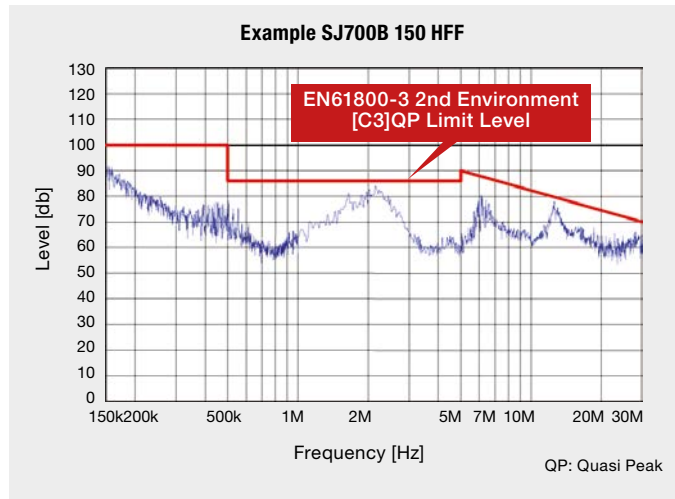
EMC Filter & Brake Circuit integrated as standard

■ Built-in EMC Filter

Cost and space can be reduced when compared to use of an external EMC Filter.

Example SJ700B 150 HFF

EN61800-3 2nd Environment [C3]QP Limit Level

Level [db] — vertical axis: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130

Frequency [Hz] — horizontal axis: 150k 200k, 500k, 1M, 2M, 5M, 7M, 10M, 20M, 30M

QP: Quasi Peak

■ Brake Circuit up to 30kW

Cost and Space reduction compared with external Braking Controller.

■ Model Name Indication

SJ700 B- 110 H F F

Series Name

Applicable Motor Capacity:

075: 7.5 kW

1600: 160 kW

Power Source:

H: 3-phase 400V class

F: With keypad

F: Integrated EMC filter

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Easy Maintenance

■ Easy-removable components

Cooling fan(s) and DC bus capacitors can be easily removed for cleaning or replacement.
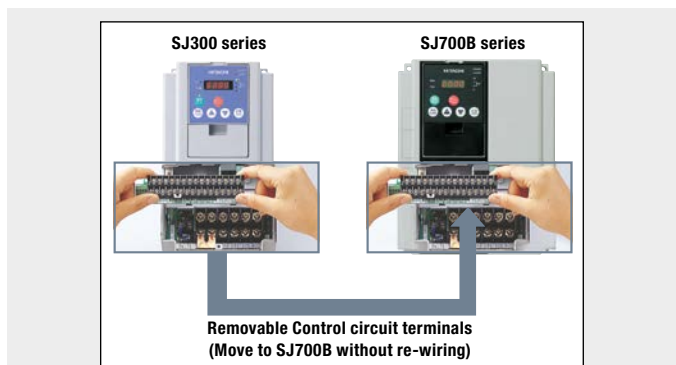

Easy-removable Cooling Fan

Easy-removable DC bus capacitors (SJ700B: above 18.5kW)

The removable Logic terminal block of SJ300/L300P are compatible with SJ700B. Re-wiring is not necessary.

SJ300 series   SJ700B series

Removable Control circuit terminals
(Move to SJ700B without re-wiring)

*1 Control circuit terminals comparison table

Series	Input terminals	Output terminals
SJ700B	9 terminals (Intelligent 8 terminals, FW)	5 terminals (Open collector outputs)
SJ300		
L300P	6 terminals (Intelligent 5 terminals, FW)	2 terminals (Relay outputs)

Network compatibility

■ Various Fieldbus options available

The SJ700B inverters are fitted with a serial RS-485 Modbus-RTU port as standard. The inverters can be connected to the following fieldbus networks, using separately available option boards:

- PROFIBUS-DB
- CanOPEN
- DeviceNet
- and other networks

Easy Operation

■ User defined display parameters

The user can select from a number of parameter display modes.

- Data comparison function
  Displays only those parameters, which have been changed from the default.
- User selected function
  Displays up to 12 user defined parameters (U001-U012)
- Basic mode (default)
  Displays commonly used parameters

Chose Basic Parameter

Basic Mode

Indication only Basic Parameter

Long Life time

■ Long life time components

The advanced design of the cooling fan(s) and the DC bus capacitors results in a calculated life time of 10 years*. The ON/OFF control function can extend the life time of the fan(s) even further.

*Ambient temperature: SJ700B: 30° C (no corrosive gases, oil mist or dust)
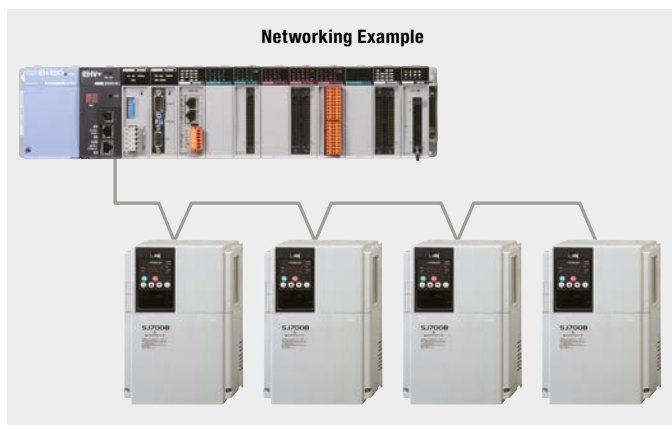
■ Life time warning function

Through monitoring of the lifetime warning and other functions, preemptive component maintenance can be carried out to avoid unexpected system failures.

Networking Example

Versatile Functions

■ Intelligent IO terminals – ON/OFF Delay (Timer) function

Timer function can reduce the need for external timer circuits.

■ Instantaneous Power Failure - mask function

The SJ700B ignores instantaneous fluctuations in input power, as long as the DC bus voltage remains higher than the under-voltage trip level.

■ Active frequency matching

Effective matching of output frequency and motor speed at restart, even without motor residual voltage.

■ Controlled deceleration and stop at power loss

■ Analog Input Disconnection - detection function

The SJ700B outputs a disconnection signal when the frequency command via the analog input is lost.

■ Acceleration/Deceleration curve function

Various acceleration/deceleration curves can be selected depending on application requirements.

■ Analog Command – hold function

When AHD signal is switched on, output frequency set by the Analog signal is held constant. While AHD is on, frequency can be adjusted using the UP/Down function.

In this mode, set frequency can be maintained after power shut down.

■ Integrated Input Power Monitor

Instantaneous input power (kW) can be monitored. Useful for monitoring energy savings.

■ Automatic Carrier Frequency Adjustment

The SJ700B detects motor current and automatically reduces the carrier frequency accordingly.

■ High resolution Analog output (10 bits)

Environmental Friendliness

■ Micro surge voltage suppress function

Hitachi original PWM control method limits motor terminal voltage to less than twice the inverter DC bus voltage.

■ EU RoHS compliant

Environment-friendly inverter meets RoHS requirements

■ Improvement of environment

Varnish coating of internal PC board & plating of main circuit copper bus bar are standard.

Global standards

■ Conformity to global standards

CE, UL, c-UL, c-Tick approvals.

■ Logic input & output Terminal apply sink & source logic

Logic input and output terminals can be configured for sink or source logic.

■ Wide input power voltage range
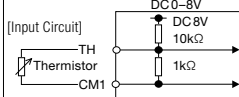
Input voltage 480V for 400V class as standard.

SJ700B Series

Control Circuit Terminals

■ Terminal Description

		Symbol	Name	Explanation of Terminals	Ratings
Analog	Power Supply	L	Common Terminal for Analog Power Source	Common terminal for H, O, O2, OI, AM, and AMI. Do not ground.	–
Analog	Power Supply	H	Power Source for Frequency Setting	Power supply for frequency command input	DC 10V, 20mA max.
Analog	Frequency Setting	O	Frequency Command Terminal	Maximum frequency is attained at DC 10V in DC 0-10V range. Set the voltage at A014 to command maximum frequency below DC 10V.	Input impedance: 10kΩ, Allowable input voltage range: DC -0.3-+12V
Analog	Frequency Setting	O2	Frequency Command Extra Terminal	O2 signal is added to the frequency command of O or OI in DC 0-±10V range. By changing configuration, frequency command can be input also at O2 terminal.	Input impedance:10kΩ, Allowable input voltage range: DC 0-±12V
Analog	Frequency Setting	OI	Frequency Command Terminal	Maximum frequency is attained at DC 20mA in DC 4-20mA range. When the intelligent terminal configured as AT is on, OI signal is enabled.	Input impedance: 100Ω, Allowable input voltage range: DC 0-24mA
Analog	Monitor Output	AM	Analog Output Monitor (Voltage)	Selection of one function from: Output frequency, output current, torque, output voltage, input power, electronic thermal load ratio, and LAD frequency. [DC0-10V output (PWM output)] Selection	DC 0-10V, 2mA max.
Analog	Monitor Output	AMI	Analog Output Monitor (Current)		DC 4-20mA, 250Ω max.
Digital	Monitor Output	FM	Digital Monitor (Voltage)	[DC0-10V output (PWM output)] Selection of one function from: Output frequency, output current, torque, output voltage, input power, electronic thermal load ratio, and LAD frequency. [Digital pulse output (Pulse voltage DC 0/10V)] Outputs the value of output frequency as digital pulse (duty 50%)	Digital output frequency range: 0-3.6kHz, 1.2mA max.
Digital	Power Supply	P24	Power Terminal for Interface	Internal power supply for input terminals. In the case of source type logic, common terminal for contact input terminals.	DC 24V, 100mA max.
Digital	Power Supply	CM1	Common Terminal for Interface	Common terminal for P24, TH, and FM. In the case of sink type logic, common terminal for contact input terminals. Do not ground.	–
Digital	Contact Input / Run Command	FW	Forward Command Input	The motor runs forward when FW terminal is ON, and stops when FW is OFF.	[Input ON condition] Voltage between each terminal and PLC: DC 18V min. [Input OFF condition] Voltage between each terminal and PLC: DC 3V max. Input impedance between each terminal and PLC: 4.7Ω Allowable maximum voltage between each terminal and PLC: DC 27V
Digital	Contact Input / Functions	1 2 3 4 5 6 7 8	Intelligent Input Terminals	Assign 8 functions to terminals. (Refer to the standard specifications for the functions.)	
Digital	Contact Input / Common Terminal	PLC	Common Terminal for Intelligent Input Terminals, Common Terminal for External Power Supply for PLCs, etc.	Select sink or source logic with the short-circuit bar on the control terminals. Sink logic: Short P24 to PLC / Source logic: Short CM1 to PLC. When applying external power source, remove the short-circuit bar and connect PLC terminal to the external device.	
Digital	Open Collector Output / State	11 12 13 14 15	Intelligent Output Terminals	Assign 5 functions to open collector outputs. When the alarm code is selected at C062, terminal 11-13 or 11-14 are reserved for error codes of inverter trip. (Refer to the standard specifications for the functions.) Both sink and source logic are always applicable between each terminal and CM1.	Decrease in voltage between each terminal and CM2: 4V max. during ON Allowable maximum voltage: DC 27V Allowable maximum current: 50mA
Digital	Open Collector Output	CM2	Common Terminal for Intelligent Output Terminals	Common terminal for intelligent output terminal 11-15.	
Analog	Analog Input / Sensor	TH	Thermistor Input Terminals	The inverter trips when the external thermistor detects abnormal temperature. Common terminal is CM1. [Recommended thermistor characteristics] Allowable rated power: 100mW or over. Impedance in the case of abnormal temperature: 3kΩ Note: Thermal protection level can be set between 0 and 9999Ω.	Allowable input voltage range
Digital	Relay Output / State/ Alarm	AL0 AL1 AL2	Alarm Output Terminals	In default setting, an alarm is activated when inverter output is turned off by a protective function.	Maximum capacity of relays AL1-AL0: AC 250V, 2A (R load)/0.2A(L load) DC 30V, 8A (R load)/0.6A(L load) AL2-AL0: AC 250V, 1A (R load)/0.2A(L load) DC 30V, 1A (R load)/0.2A(L load) Minimum capacity of relays AL1-AL0, AL2-AL0: AC100V, 10mA DC5V, 100mA

■ Terminal Arrangement

H	O2	AM	FM	TH	FW	8	CM1	5	3	2	14	13	11	AL1
L	O	OI	AM1	P24	PLC	CM1	7	6	4	2	15	CM2	12	AL0	AL2

Screw diameter: M3   Terminal Width: 6.4 mm

Standard Specifications SJ700B Series

■ 3-phase 400V class

Model SJ700B-			075HFF	110HFF	150HFF	185HFF	220HFF	300HFF	370HFF	450HFF	550HFF	750HFF	900HFF	1100HFF	1320HFF	1600HFF
Enclosure (1)			IP20										IP00			
Applicable motor (4-pole, kW(HP)) (2)			7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
Output Ratings	Rated capacity (kVA)	400V	11.0	15.2	20.0	25.6	29.7	39.4	48.4	58.8	72.7	93.5	110.8	135.1	159.3	200.9
		480V	13.3	18.2	24.1	30.7	35.7	47.3	58.1	70.6	87.2	112.2	133	162.1	191.2	241.1
	Rated output current (A)		16	22	29	37	43	57	70	85	105	135	160	195	230	290
	Overload capacity (output current)		120%, 60sec													
	Rated output voltage (*3)		3-phase (3-wire) 380 to 480V (corresponding to input voltage)													
Input Rating	Rated input voltage (V)		3-phase 380 to 480V +10%, -15%, 50/60Hz±5%													
	Rated input current (A)		18	24	32	41	47	63	77	94	116	149	176	199	253	300
Braking	Dynamic braking (Short-time) (*4)		Built-in BRD circuit (optional resistor)						External dynamic braking unit (option)							
	Minimum value of resistor (Ω)		70	35	35	24	24	20	–							
Vibration (*5)			5.9m/s² (0.6G), 10-55Hz						2.9m/s² (0.3G), 10-55Hz							
EMC filter			Built-in (EN61800-3 category C3)													
Zero-phase Reactor			Built-in													
Weight (lbs.)			6			14			22			30		55		70

General Specifications

| Item			General Specifications
Control	Control method		Line to line sine wave pulse-width modulation (PWM) control
	Output frequency range		0.1-400.0Hz
	Frequency accuracy		Digital: ±0.01% of the maximum frequency, Analog: ±0.2%(25±10°C)
	Frequency resolution		Digital setting: 0.01Hz, Analog setting: (Maximum frequency)/4,000 (O terminal: 12bit 0-10V, O2 terminal: 12bit -10-+10V)
	V/f characteristics		V/f optionally variable (30-400Hz of base frequency), V/f control (constant torque, reduced torque), Sensorless vector control, 0Hz domain sensorless vector control, vector control (SJ-FB card option)
	Speed fluctuation		±0.5% (sensorless vector control)
	Acceleration/deceleration time		0.01-3,600sec. (Linear/curve, accel./decel. selection), Two-stage accel./decel.
	Starting Torque		150% at 0.5 Hz / 90 kW and over: 120% at 0.5 Hz (With Sensorless vector control)
	Carrier frequency range		0.5-12.0kHz (90kW and over: 0.5-8.0kHz)
	DC braking		Performs at start: under set frequency at deceleration, via an external input (braking force, time, and operating frequency).
Frequency setting	Operator		Up and Down keys
	External signal		DC 0-10V, -10-+10V (input impedance 10k Ohmn), 4-20mA (input impedance 100 Ohmn)
	External port		Setting via RS485 Modbus-RTU communication
Forward /reverse Start /stop	Operator		Start/stop commands (forward/reverse switching by parameter setting)
	External signal		Forward-operation start/stop commands (reverse-operation start/stop possible when relevant commands are assigned to intelligent input terminals) 3-wire start possible (when relevant commands are assigned to control circuit terminals)
	External port		Setting via RS485 Modbus-RTU communication
Input signal	Intelligent input terminals	Terminals	8 terminals, NO/NC switchable, sink logic/source logic switchable
		Functions	70 functions assignable to each terminal (for detail, refer to the instruction manual)
	Thermistor input		1 terminal (PTC characteristics)
Output signal	Intelligent output terminals	Terminals	5 open-collector output terminals, NO/NC switchable, sink logic/source logic switchable 1 relay (1c-contact) output terminal: NO/NC switchable
		Functions	51 functions assignable to each terminal (for detail, refer to the instruction manual)
	Analog / Pulse output	Terminals	Analog voltage output / Analog current output / Pulse-string output (PWM / Pulse train)
		Functions	12 monitor functions assignable to each terminal
Monitoring on display			Output frequency, output current, output torque, frequency conversion data, trip history, input/output terminal status, electric power, and others
Other functions			Free V/f setting (7 breakpoints), frequency upper/lower limit, jump (center) frequency, acceleration/deceleration according to characteristic curve, manual torque boost level/breakpoint, energy-saving operation, analog meter adjustment, start frequency setting, carrier frequency adjustment, electronic thermal function (available also for free setting), external start/end frequency/frequency rate, analog input selection, retry after trip, restart after instantaneous power failure, output of various signals, starting with reduced voltage, overload restriction, initial-value setting, automatic deceleration at power failure, AVR function, fuzzy acceleration/deceleration, online/offline auto-tuning, high-torque multi-motor operation (sensorless vector control of two motors by one inverter)
Protective functions			Overcurrent protection, overvoltage protection, undervoltage protection, electronic thermal protection, temperature error protection, instantaneous power failure protection, phase loss input protection, braking-resistor overload protection, ground-fault current detection at power-on, USP error, external trip, emergency stop trip, CT error, communication error, option board error, and others
Environmental conditions	Ambient operating/storage temperature/ humidity		Operating (ambient): -10-45°C / Storage: -20-65°C / Humidity: 20-90%RH (No condensation)
	Location		Altitude 1,000m or less, indoors (no corrosive gases or dust)
Options	Digital input expansion card		SJ-DG (4digits BCD, 16bits binary)
	Feedback expansion card		SJ-FB (vector control loop speed sensor)
	Network interface card		SJ-DN2(DeviceNet(TM)), SJ-PB(T)2(PROFIBUS), SJ-CO (CANopen)
	Others		EMI filters, input/output reactors, braking resistors, braking units, communication cables

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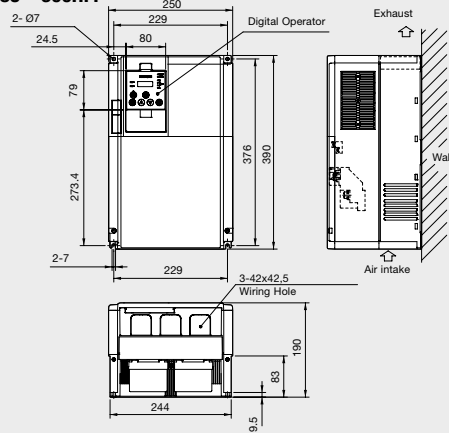
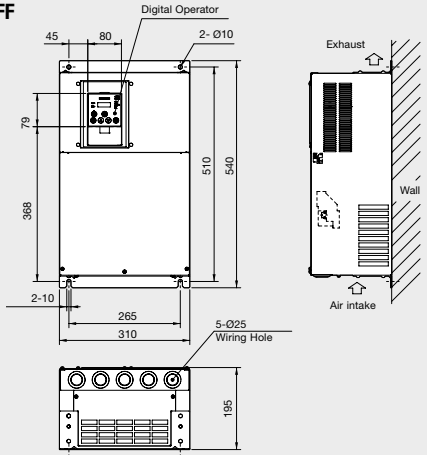## All features at a glance
Dimensions

[Unit: mm]

• SJ700B-075 – 150HFF
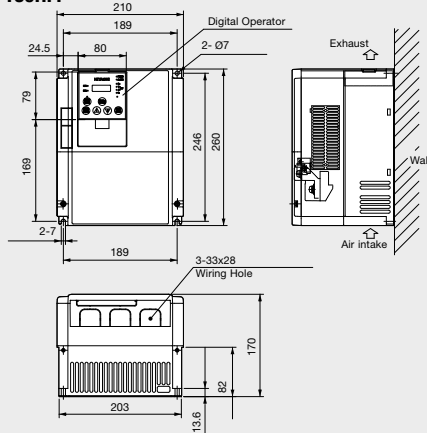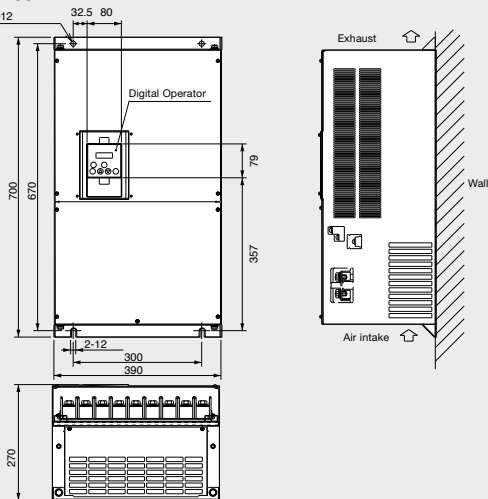

• SJ700B-185 – 300HFF
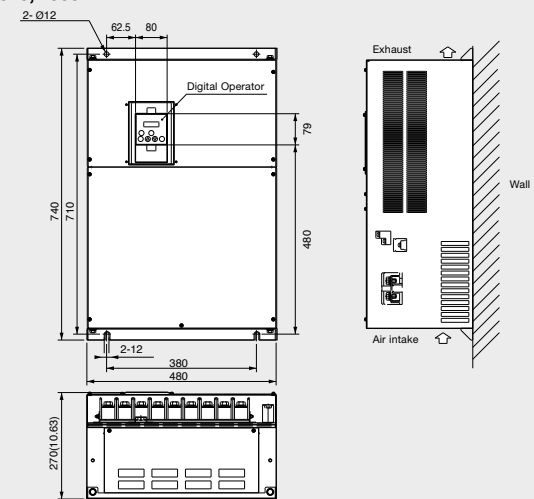

• SJ700B-370HFF

• SJ700B-450 – 750HFF
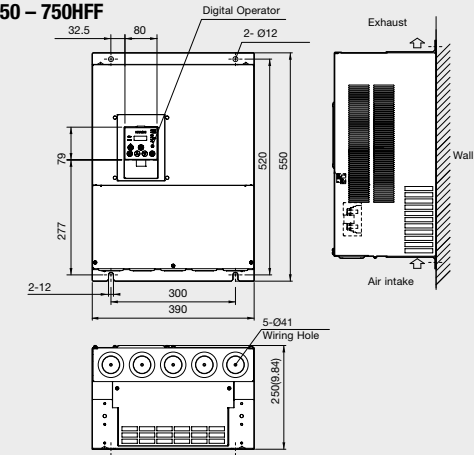
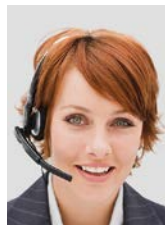### • SJ700B-900, 1100HFF

• SJ700B-1320, 1600HFF

For more information about SJ700B Frequency Inverters, please scan this QR-Code with your smartphone.

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