HITACHI

QUICK REFERENCE GUIDE

Hitachi Inverter

J300 Series

Hitachi Europe GmbH

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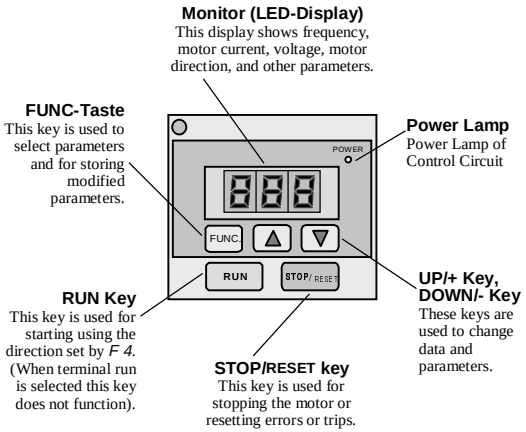
HITACHI INVERTER

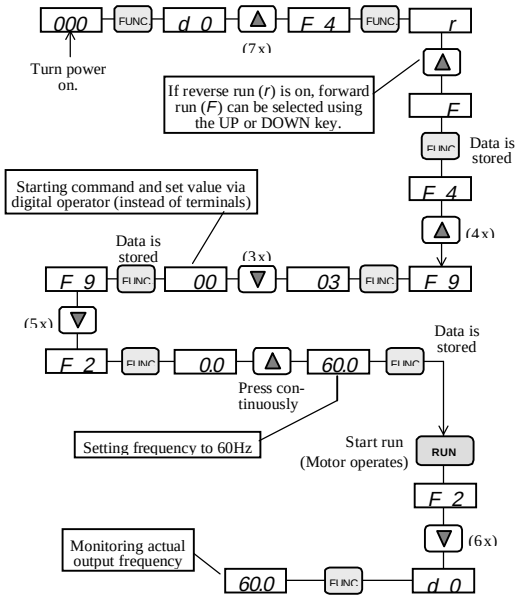
J300 SERIES

QUICK REFERENCE GUIDE (Part 1/2)

Three phase input 400V

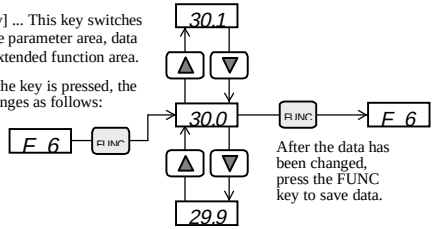


Operation procedure (example for the digital operator)

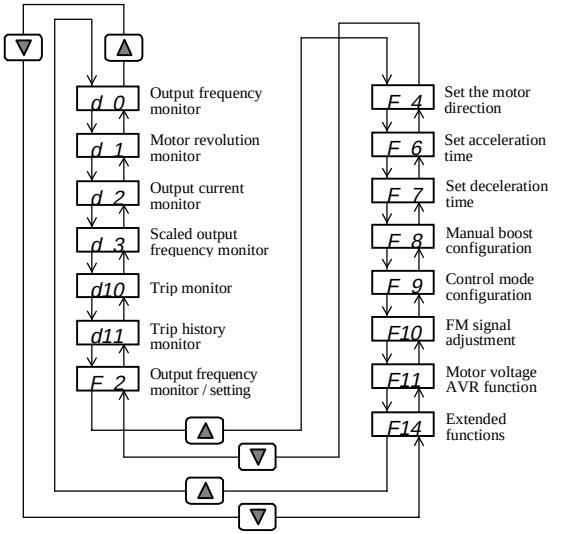


FUNC. [FUNC key] ... This key switches between the parameter area, data area, and extended function area.

Each time the key is pressed, the display changes as follows:



[UP key, DOWN key] ... These keys change the values of data area, and parameters:



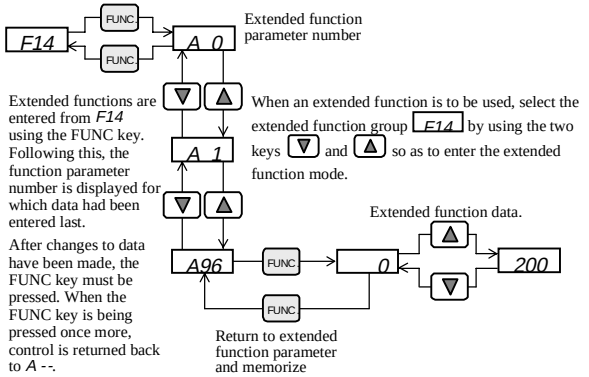
RUN [START key] ... This key starts the J300 inverter.

Set forward or reverse run using *F 4*.

STOP/ RESET [STOP key] ... This key stops the J300 inverter.

When a trip occurs, this key becomes the RESET key

Setting extended functions



Explanation of display at power on

When the inverter is turned on, the display returns to what was displayed when the power was last turned off (except in the extended function mode).

Protective Functions

The SJ100 series inverter will trip on overcurrent, overvoltage and undervoltage to protect the inverter.The output is shut down and the motor runs free. This condition is held until it is reset.

Trip	Contents	Display
Overcurrent protection	When the output of the inverter is short circuited, the motor is locked, or a heavy load is suddenly applied, and the inverter output current exceeds a predetermined level, the inverter is shut off.	Const. speed:*E 1/31* At decelerat.:*E 2/32* At accelerat.:*E 3/33* At the others:*E 4/34*
Overload protection	When a motor overload is detected by the electronic thermal function, the inverter is shut off.	*E 5*
Braking resistor overload	When regenerative braking resistor exceeds the usage time duration an overvoltage caused by the stop of the BRD function is detected, and inverter output is cut off.	*E 6*
Overvoltage protection	When the inverter DC bus voltage exceeds a predetermined level due to regenerative energy from the motor, this trip occures and the inverter is shut off.	*E 7*
EEPROM error (*NOTE 1*)	When the inverter memory has a problem due to noise or excessive temperature rise, this trip occurs and the inverter is shut off.	*E 8*
Undervoltage protection	A decrease of DC bus voltage may result in improper function of the control unit. It may also cause motor heating and low torque. The inverter is shut off when the DC bus voltage goes below a certain level.	*E 9*
CT error	When a large noise source is near the inverter or an abnormality occurs on built-in CT, inverter output is cut off.	*E10*
CPU error	Malfunction or abnormality of the CPU. The inverter is shut off.	*E11*
External trip	A trip signal from external equipment shuts off the inverter. It is necessary to assign the external trip to an intelligent terminal.	*E12*
USP error	Indicates an error when power is turned on while the inverter run is enabled (with USP function selected).	*E13*
Ground fault protection	The inverter is protected by detection of ground faults between the drive output and the motor at power on. Protection is for the inverter only and not for humans.	*E14*
Input overvoltage	When the input voltage is higher than a specified value, it is detected and 100 seconds after power is turned on, the inverter is shut off.	*E15*
Short power down	A short input voltage interruption (>15ms) occured. The inverter is shut off.	
Error in link to option1 (option 2)	There is an error in the link to the extension card in slot 1 (2). The inverter is shut off.	Slot 1: *E17* Slot 2: *E18*
Error option 1 (option 2)	There is an error in the extension card in slot 1 (2). The inverter is shut off.	Slot 1: *E19* Slot 2: *E20*
Phase failure	One of the power supply phases has broken down. The inverter is shut off.	*E24*

NOTE 1: If an EEPROM error occurs, be sure to observe ist value. If power is turned off while the [RS] input terminal is held ON, the EEPROM error occurs when power is turned back on.

J300 data setting values J300 inverters provide many functions whose parameters can be set by the user. It is recommended that the parameters that have been set by the user be recorded in order to speed the investigation and repair in the event of a failure.

J300 _____

Mfg.No. _____

This information is written on the nameplate located on one of the sides of the J300 inverter.

Drive keypad display sequence

Display	Function	Standard Setting	Set Value
d 0 .. d 3 *d10, d11*	Display functions	*Refer to page 4*	
F 2	Set output frequency (Hz)	0.0	
F 4	Set motor direction	F (forward)	
F 6	Acceleration time (s)	30.0	
F 7	Deceleration time (s)	30.0	
F 8	Configure manual boost	31	
F 9	Configure control mode	03	
F10	FM signal adjustment	72	
F11	Motor voltage AVR function	380	
F14	Extended function group	*Refer to pages 6 and 7*	

Display	Function	Standard Setting	Set Value
A 0	Characteristic V/F curve setting 0-constant torque 1-M ~ $n^{1.5}$ 2-M ~ $n^{1.7}$ 3-M ~ n^{2} 4-SLV 5-SLV + feedback	0	
A 1	Motor capacity setting	*Cf. nameplate*	
A 2	Motor poles: 2, 4, 6, 8	4	
A 3	ASR constant	2	
A 4	Start frequency setting	0.5	
A 5	Maximum operating frequency setting	0	
A 6	Minimum operating frequency setting	0	
A 7 A 8 A 9	Jump frequency setting	0	
A10	Carrier frequency (in kHz)	*Depends on model*	
A11	Time constant of the filter for analog inputs	8	
A12 A13 A14	Multispeed frequency setting	All are 0	
A23	Level of electronic thermal setting (in % of the inverter rated current)	100	
A24	Selection of electronic thermal characteristic 00-Constant torque 01-Reduced torque 02-Freely configurable (using remote)	0	
A25	Motor pole count for rpm monitor via *d 1*	4	
A26	External frequency setting start point	0	
A27	External frequency setting end point	0	
A34	Selection of restart mode 00-Alarm 01-Motor speed match restart /decel to stop 02-Motor speed match restart 03-Start frequency restart after waiting time	0	
A38	Rate of use (in %) of the regenerative braking resistor (00= braking resistor not active)	0	
A39	Arrival frequency setting for acceleration (Hz)	0	
A40	Arrival frequency setting for decelerat. (Hz)	0	
A44	Function of FM terminal 00-Frequency 01-Current 02-Torque 03-Frequency (digital)	0	
A47	Factor for *d 3* monitor	1	
A48	Frequency set value range 0-Range 0-5V 1-Range 0-10V	1	
A49	FA1 signal characteristic: output signal ... 0-on arrival of set value 1-above frequencies set via *A39/A40* 2-on crossing frequencies set via *A39/A40*	0	
A54	Selection of operation when FRS signal is cancelled: 00-Restart at motor speed 01-Restart at 0 Hz	01	
A58	Step count on RV start (0= RV not active)	6	
A59	Operating mode: 0-Normal mode 1-Energy saving mode 2-Shortest possible accel./decel.times	0	
A61	Jog frequency setting	1.0	
A62	Base frequency setting	50	
A63	Maximum frequency setting	50	
A64	Selection of largest settable frequency (120Hz, 400Hz)	120	
A80	Frequency command adjustment (terminal O)	*Depends on model*	
A81	Frequency command adjustment (terminal OI)		
A86	RS terminal reset signal: 0-Rising edge 1-Falling edge	0	
A90	P (proportional) gain setting	1.0	
A91	I (integral) gain setting	1.0	
A92	D (differential) gain setting	1.0	

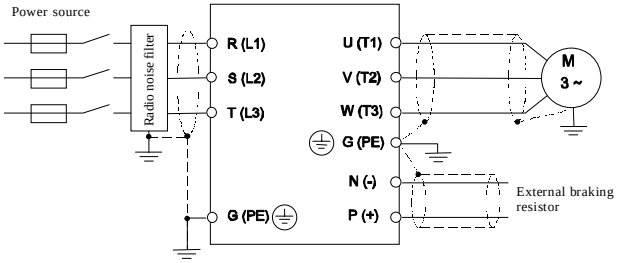
(Table to be continued on next page)

(Continued from previous page)

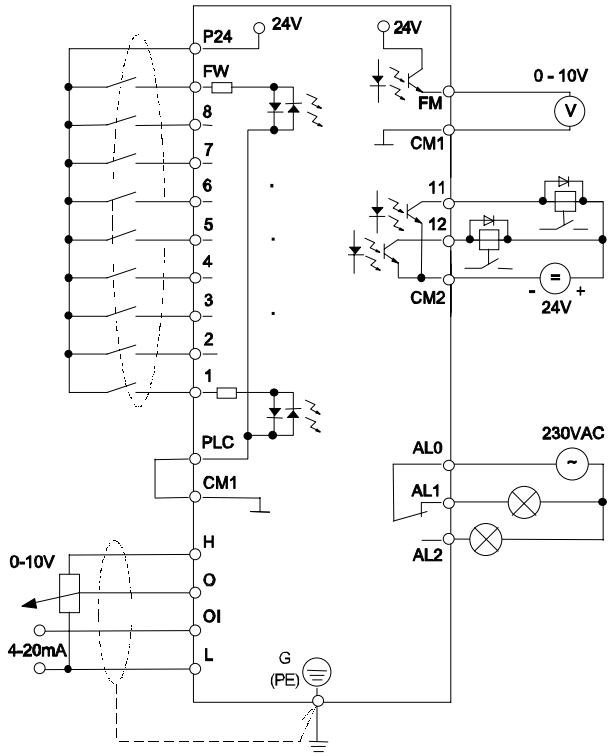
Display	Function	Standard Setting	Set Value
A94	PID feedback signal location / I gain setting 0-PID control not active 1-Terminal OI / 1 2-Terminal O / 1 3-Terminal OI / 10 4-Terminal O / 10	0	
A95	PID control set value setting 0-Via *A96* 1-Via *A 9*	0	
A96	PID control internal set value (in %)	0	
A97	Autotuning mode: 0-Autotuning off 1-Autotuning on 2-Autotuning / static	0	
A98	Motor data: 0- Standard Hitachi 1-Hitachi-special motors 2-Read in motor data	0	
A99	Power supply phase breakdown will cause trip *E24*: 0-Yes 1-No	0	

Display	Function	Standard Setting	Set Value
C 0	Function of input terminal 1 0-REV (Reverse run) 1-CF1 (Multispeed 1) 2-CF2 3-CF3 5-JG (Jogging) 6-DB (External DC braking) 7-STN (factory setting) 8-SET (Use 2. setting) 9-CH1 (2. stage acceleration/deceleration) 11-FRS (free run mode) 12-EXT (external trip) 13-USP (USP function) 14-CS (Motor free run) 15-SFT (Software lock) 16-AT (Use analog input OI) 18-RS (Reset) 27-UP (Remote control acceleration) 28-DWN (Remote control deceleration)	18	
C 1	Function of input terminal 2 (See *C 0*)	16	
C 2	Function of input terminal 3 (See *C 0*)	5	
C 3	Function of input terminal 4 (See *C 0*)	11	
C 4	Function of input terminal 5 (See *C 0*)	9	
C 5	Function of input terminal 6 (See *C 0*)	2	
C 6	Function of input terminal 7 (See *C 0*)	1	
C 7	Function of input terminal 8 (See *C 0*)	0	
C10	Function of output terminal 11: 0-FA1 (frequency arrival) 1-RUN signal (Motor running) 2-OTQ (torque alarm; only usable when SLV mode is active)	0	
C11	Function of output terminal 12 (See *C10*)	1	
C20	Digital input type 1-4: Normally open (no) or Normally closed (nc) Input1 Input2 Input3 Input 4 00 no no no no 01 nc no no no 02 no nc no no 03 nc nc no no 04 no no nc no 05 nc no nc no 06 no nc nc no 07 nc nc nc no 08 no no no nc 09 nc no no nc 0A no nc no nc 0B nc nc no nc 0C no no nc nc 0D nc no nc nc 0E no nc nc nc 0F nc nc nc nc	08	
C21	Digital output type 11, 12 and alarm output: Normally open (no) or Normally closed (nc) 07 06 05 04 03 02 01 00 Output 11 nc no nc no nc no nc no Output 12 nc nc no no nc nc no no Alarm nc nc nc nc no no no no	04	

Wiring example: power terminals



Wiring example: control terminals



HITACHI INVERTER

J300 SERIES

QUICK REFERENCE GUIDE (Part 2/2)

Three phase input 400V

CE-EMC Installation

This instruction describes the electromagnetically compatible setup of your drive system.

1. **As an enduser you must ensure that the HF impedance between frequency inverter, filter and ground is as small as possible.**

   - See to it that the connections are metallic and have the largest possible areas (zink-plated mounting plates)

2. **Conductor loops act like antennas, especially when they encompass large areas. Consequently:**

   - Avoid unnecessary conductor loops
   - Avoid parallel arrangement of „clean“ and interference-prone conductors

3. **Lay the motor cable and all analog and digital contol lines shielded.**

   - You should allow the effective shield area of these lines to remain as large as possible; i.e., do not move the shield further away than absolutely necessary.
   - With compact systems, if for example the frequency inverter is communicating with the steering unit, in the same control cabinet connected at the same PE-potential, the screen of control lines should be put on, on both sides with PE. With branch systems, if for example the communicating steering unit is not in the same control cabinet and there is a distance between the systems, we recommend to put on the screen of control lines only on the side of the frequency inverter. If it is possible, direct in the cable entry section of the steering unit. The screen of Motor cabels always must be put on, on both sides with PE.
   - The large area contact between shield and PE-potential you can realise with a metal PG screw connection or a metallic mounting clip.
   - Use only copper mesh cable (CY) with 85% coverage
   - The shielding should not be interrupted at any point in the cable. If the use of reactors, contactors, terminals or safety switches in the motor output is necessary, the unshielded section should be kept as small as possible.
   - Some motors have a rubber gasket between terminal box and motor housing. Very often, the terminal boxes, and particularly the threads for the metal PG screw connections, are painted. Make sure there is always a good metallic connection between the shielding of the motor cable, the metal PG screw connection, the terminal box and the motor housing, and carefully remove this paint if necessary.

4. **Very frequently, interference is coupled in through installation cables. This influence you can minimize:**

   - Lay interfering cables separately, a minimum of 0.25 m from cables susceptible to interference.A particularly critical point is laying cables parallel over larger distances. If two cables intersect, the interference is smallest if they intersect at an angle of 90°. Cables susceptible to interference should therefore only intersect motor cables, intermediate circuit cables, or the wiring of a rheostat at right angles and never be laid parallel to them over larger distances.

5. **The distance between an interference source and an interference sink (interference-threatened device) essentially determines the effects of the emitted interference on the interference sink.**

   - You should use only interference-free devices and maintain a minimum distance of 0.25 m from the drive.

6. **Safety measures**

   - Ensure that the protective conductor terminal (PE) of the filter is properly connected with the protective conductor terminal of the frequency inverter. An HF ground connection via metal contact between the housings of the filter and the frequency inverter, or solely via cable shield, is not permitted as protective conductor connection. The filter must be solidly and permanently connected with the ground potential so as to preclude the danger of electric shock upon touching the filter if a fault occurs. You can achieve this by:
     - connecting it with a grounding conductor of at least 10 mm^2;
     - connecting a second grounding conductor, connected with a separate grounding terminal, parallel to the protective conductor (The cross section of each single protective conductor terminal must be designed for the required nominal load)

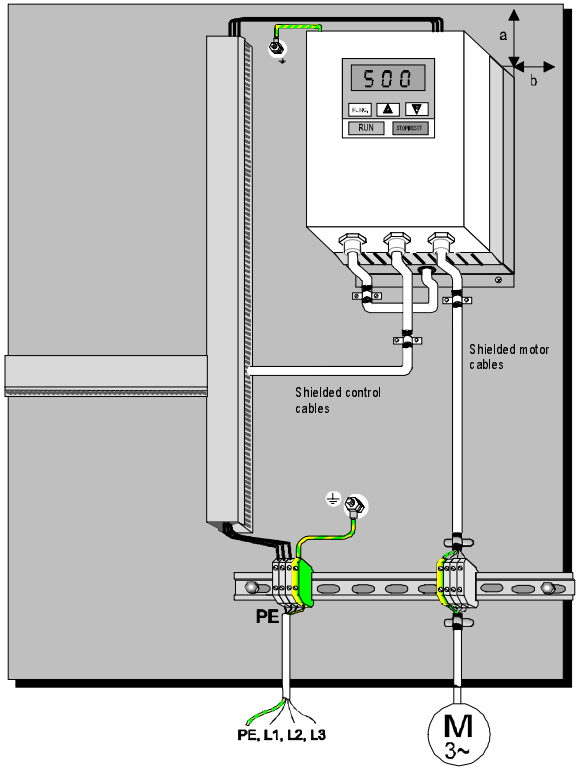
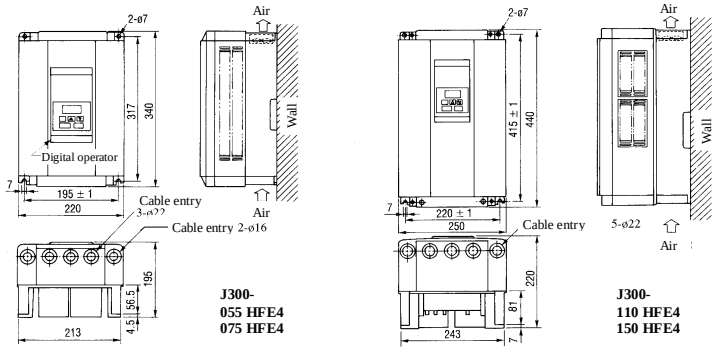
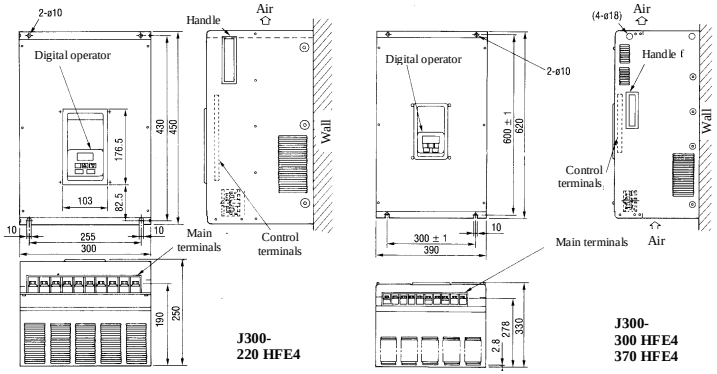
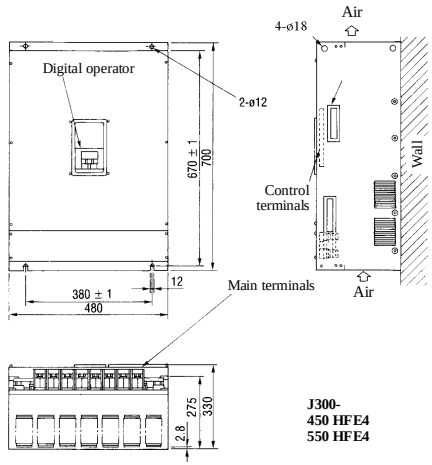


Figure: Hitachi frequency inverter with footprint filter

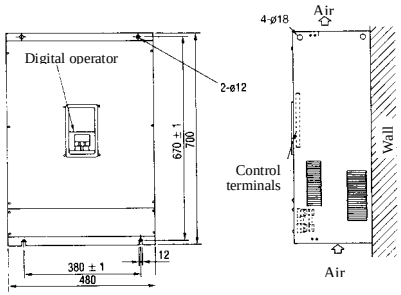
External dimensions and terminal positions part 1/2 (*part 2/2 on next page*)



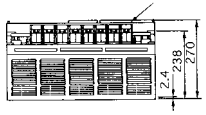




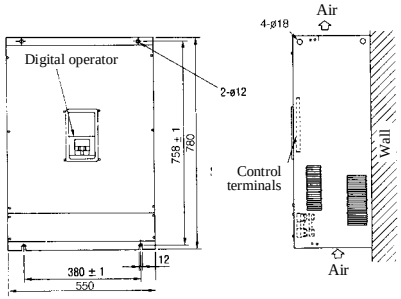
External dimensions and terminal positions part 2/2 (*part 1/2 on previous page*)



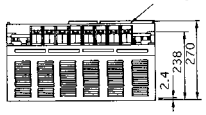
Main terminals



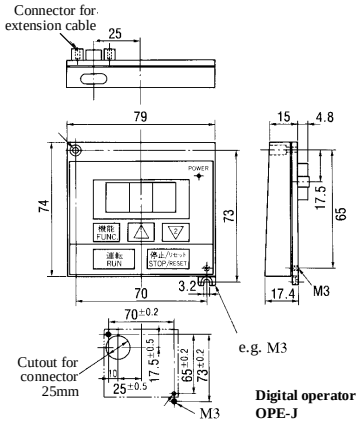
J300-
750 HFE4
900 HFE4



Main terminals



J300-1100 HFE4



Digital operator
OPE-J

Technical Specifications Inverter J300-		055 HFE4	075 HFE4	110 HFE4	150 HFE4	220 HFE4	300 HFE4
Loads having constant torque							
Maximum motor size in kW		5.5	7.5	11	15	22	30
Maximum motor capacity in kVA	400V	9.0	11	16	22	33	40
Rated output current in A		13	16	23	32	48	58
Carrier frequency in kHz		2 – 16				2 – 12	2 – 10
Loads having quadratically rising torque							
Maximum motor size in kW		7.5	11	15	22	30	37
Maximum motor capacity in kVA	400V	11	16	22	30	41	51
Rated output current in A		16	23	32	44	59	74
Carrier frequency in kHz		2 – 8				2 – 4	
General technical specifications							
Protective structure		IP20				IP00	
Rated input voltage		Three phase 380 ~ 460V +/-10%, 50/60Hz +/-5%					
Rated output voltage		Three phase 0 .. 380 ~ 460VAC (Corresponds to input voltage)					
Output frequency range		0.1 ~ 400Hz					
Operating principle		Sensorless Vector Control (SLV), PWM sine coded. Power amplifier: IGBT/IPM					
Overload current capacity		150% during 60s (constant torque) 115% during 30s (quadratically rising torque)					
Frequency accuracy (at 25°C +/-10°C)		Digital command: +/-0.01% of the maximum frequency Analog command: +/-0.1% of the maximum frequency					
V/F characteristics		V/F curves with constant and reduced torque; vector control without feedback; vector control with feedback (optional)					
Autotuning		Automatic adaption to motor characteristics to make best use of the motor driven					
AVR function		Automatic Voltage Regulation usable					
Acceleration/Deceleration		2 times settable between 0.01 and 3000s (using digital remote control); linear, S-curve, U-curve					
Starting torque		150% at 1Hz (constant torque)					
Braking resistor		Models J300-055HFE4 and J300-075HFE4 have a built-in braking resistor. Braking torque approx. 50% to 60% of the rated torque using the built-in braking resistor (the rest of the J300- models have a braking torque of approx. 10% to 15% of the rated torque using braking with feedback to capacitor).					
DC braking		Variable operating frequency, time, and braking force.					
Frequency command		Digital command using the built-in digital operator keys. Analog 0–5V and 0–10V (input impedance 30kOhm) and 4–20mA (input impedance 250Ohm); optional digital input					
Intelligent digital inputs		8 inputs configurable as: Forward run, Reverse run, Free run mode, Reset, Jog, 7 multistage speed settings, Ext. DC braking, 2. Setting, 2. Stage accel/decel, External alarm, USP function, Software lock, frequency command from analog input O or OI, Motor potentiometer, Motor free run, Factory setting, etc.					
Outputs		Analog output current, output frequency, and torque. Transistor output with signals for frequency arrival, motor running, torque alarm; Alarm output					
Other functions		Optimized acceleration and deceleration times using fuzzy logic, engergy saving mode, electronic thermal, jump frequency, upper/lower limits, PID control, etc.					
Protective functions		Overcurrent, overvoltage, undervoltage, overload, excessive temperature, ground fault, braking resistor overload, etc.					
Directives and standards		CE-EMC directive in conjunction with optional radio noise filter and installation according to installation guidelines; CE low voltage directive					
Operating environment		Ambient temperature: -10~50°C with constant torque and -10~40°C with quadratically rising torque. Humidity: 20-90% RH (non condensing); Installation altitude: 1000m or less					
Overall weight (approx.)		7.5	7.5	13	13	21	36

Technical Specifications Inverter J300-		370 HFE4	450 HFE4	550 HFE4	750 HFE4	900 HFE4	1100 HFE4
Loads having constant torque							
Maximum motor size in kW		37	45	55	75	90	110
Maximum motor capacity in kVA	400V	52	62	76	103	122	150
Rated output current in A		75	90	110	149	176	217
Carrier frequency in kHz		2 – 10	2 – 6		2 – 3		
Loads having quadratically rising torque							
Maximum motor size in kW		45	55	75	90	110	132
Maximum motor capacity in kVA	400V	61	75	101	122	150	180
Rated output current in A		88	108	146	176	217	260
Carrier frequency in kHz		2 – 4				2	
General technical specifications							
Protective structure		IP00					
Rated input voltage		Three phase 380 ~ 460V +/-10%, 50/60Hz +/-5%					
Rated output voltage		Three phase 0 .. 380 ~ 460VAC (Corresponds to input voltage)					
Output frequency range		0.1 ~ 400Hz					
Operating principle		Sensorless Vector Control (SLV), PWM sine coded. Power amplifier: IGBT/IPM					
Overload current capacity		150% during 60s (constant torque) 115% during 30s (quadratically rising torque)					
Frequency accuracy (at 25°C +/-10°C)		Digital command: +/-0.01% of the maximum frequency Analog command: +/-0.1% of the maximum frequency					
V/F characteristics		V/F curves with constant and reduced torque; vector control without feedback; vector control with feedback (optional)					
Autotuning		Automatic adaption to motor characteristics to make best use of the motor driven					
AVR function		Automatic Voltage Regulation usable					
Acceleration/Deceleration		2 times settable between 0.01 and 3000s (using digital remote control); linear, S-curve, U-curve					
Starting torque		150% at 1Hz (constant torque)					
Braking resistor		Models J300-055HFE4 and J300-075HFE4 have a built-in braking resistor. Braking torque approx. 50% to 60% of the rated torque using the built-in braking resistor (the rest of the J300- models have a braking torque of approx. 10% to 15% of the rated torque using braking with feedback to capacitor).					
DC braking		Variable operating frequency, time, and braking force.					
Frequency command		Digital command using the built-in digital operator keys. Analog 0–5V and 0–10V (input impedance 30kOhm) and 4–20mA (input impedance 250Ohm); optional digital input					
Intelligent digital inputs		8 inputs configurable as: Forward run, Reverse run, Free run mode, Reset, Jog, 7 multistage speed settings, Ext. DC braking, 2. Setting, 2. Stage accel/decel, External alarm, USP function, Software lock, frequency command from analog input O or OI, Motor potentiometer, Motor free run, Factory setting, etc.					
Outputs		Analog output current, output frequency, and torque. Transistor output with signals for frequency arrival, motor running, torque alarm; Alarm output					
Other functions		Optimized acceleration and deceleration times using fuzzy logic, engergy saving mode, electronic thermal, jump frequency, upper/lower limits, PID control, etc.					
Protective functions		Overcurrent, overvoltage, undervoltage, overload, excessive temperature, ground fault, braking resistor overload, etc.					
Directives and standards		CE-EMC directive in conjunction with optional radio noise filter and installation according to installation guidelines; CE low voltage directive					
Operating environment		Ambient temperature: -10~50°C with constant torque and -10~40°C with quadratically rising torque. Humidity: 20-90% RH (non condensing); Installation altitude: 1000m or less					
Overall weight (approx.)		36	46	46	70	70	80