Hitachi L100 Series Introduction

The Hitachi L100 series drive is our most affordable unit with the smallest footprint. The L100 Series offers V/F control with advanced application features.

L100 Series Drives									
Motor Rating	*kW*	*0.2*	*0.4*	*0.75*	*1.5*	*2.2*	*3.7*	*5.5*	*7.5*
	hp	*0.25*	*0.5*	*1*	*2*	*3*	*5*	*7.5*	*10*
Single/three-phase 230V		✔	✔	✔	✔	✔			
Three-phase 230V							✔	✔	✔
Three-phase 460V			✔	✔	✔	✔	✔	✔	✔

Features

- 16-stage multi-speed operation mode
- PID control
- Use of integrated potentiometer or programming keypad for local speed setting; keypad also sets up parameters
- External analog input (0-10VDC or 4-20mA) for remote frequency control
- Output frequency range of 0.5 to 360 Hz
- Electronic overload protection
- Ability to locate a keypad remotely
- Motor thermistor input (PTC input)
- Automatic voltage regulation (AVR)
- Five programmable digital inputs
- Two programmable digital outputs
- Serial communications (with optional SC-OPE3I).

Configuration methods

The L100 Series drives can be configured multiple ways. The drive can be configured using the built-in digital keypad, the remote operator interface (SRW-0EX), the remote digital keypad with serial communications (SC-OPE3I), or the optional Windows-based software (DOP-PRO, *recommended*).

Control and monitoring

There are a variety of choices for controlling and monitoring your L100 drive. Some of your choices are listed below.

Digital Keypad — A built-in digital keypad comes standard with every Hitachi drive. This keypad allows you to program your drive as well as monitor specific parameters during operation.

Intelligent Terminal System — The built-in intelligent terminal system allows you to connect a sourcing 4-20mA/0-10VDC device, such as a PLC, to control the frequency and run/stop functions of the drive.

Remote Operator Interface — The SRW-0EX operator interface has a 2 line, 16-character back-lit display and built-in EEPROM program storage. This operator interface can be used to program your drive and monitor specific parameters during drive operation. The SRW-0EX must be remote mounted when used with the L100 Series.

Remote Digital Keypad with Serial Communications — The SC-OPE3I has a 4 line, 20-character back-lit LCD display and built-in EEPROM program storage. The SC-OPE3I gives your drive RS232-RS422/485 connectivity and enables you to communicate with your drive using multiple serial protocols. The SC-OPE3I has complete programming and monitoring functionality. The SC-OPE3I must be remote mounted when using it with the L100 Series.

Accessories

- DC chokes
- AC line reactors
- Filters
- Remote display
- Remote digital keypad with serial communications
- Windows configuration software

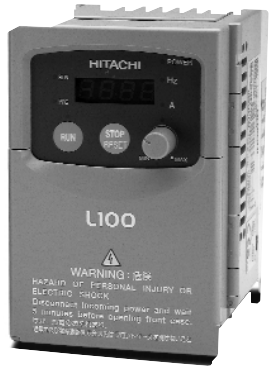
The detailed descriptions and specifications for the L100 accessories are available later in this section.

Typical applications

- Medium speed conveyors
- HVAC
- Pumps
- Material handling
- Conveyor
- Fan

L100 Specifications – Ratings

L100-002NFU



200V Class, Single/Three-phase input						
Model (L100-)		002NFU	004NFU	007NFU	015NFU	022NFU
Motor Rating [1]	kW	0.2 kW	0.4 kW	0.75 kW	1.5 kW	2.2 kW
	Hp	1/4Hp	1/2Hp	1Hp	2Hp	3Hp
Rated Capacity (240V) kVA		0.5	1.0	1.6	2.9	4.1
Rated Input Voltage		Single phase: 240V +5/-10% Three phase: 230V ±10%				
Rated Output Voltage [2]		Corresponds to input voltage				
Rated Output Current (A)		1.4	2.6	4.0	7.1	10.0
Weight, kg (lb)		0.8 (1.8)	0.8 (1.8)	1.3 (2.9)	2.3 (5)	2.8 (6.2)

L100-037NFU

200V Class, Three phase input				
Model (L100-)		037LFU	055LFU	075LFU
Motor Rating [1]	kW	3.7 kW	5.5kW	7.5kW
	Hp	5Hp	7.5Hp	10Hp
Rated Capacity (240V) kVA		6.3	9.6	12.7
Rated Input Voltage		three-phase: 230V ±10%		
Rated Output Voltage [2]		Corresponds to input voltage		
Rated Output Current (A)		15.9	24	32
Weight, kg (lb)		2.8 (6.2)	5.5(12.1)	5.7(12.5)

L100-075NFU

400V Class, three-phase input								
Model (L100-)		004HFU	007HFU	015HFU	022HFU	040HFU	055HFU	075HFU
Motor Rating [1]	kW	0.4 kW	0.75 kW	1.5 kW	2.2 kW	4.0 kW	5.5kW	7.5kW
	Hp	1/2Hp	1Hp	2Hp	3Hp	5Hp	7.5Hp	10Hp
Rated Capacity (460V) kVA		1.1	1.9	3.0	4.3	6.8	10.4	12.7
Rated Input Voltage		380 to 460V ±10%						
Rated Output Voltage [2]		Corresponds to input voltage						
Rated Output Current (A)		1.5	2.5	3.8	5.5	8.6	13	16
Weight, kg (lb)		1.3(2.9)	1.7(3.7)	1.7(3.7)	2.8(6.2)	2.8(6.2)	5.5(12.1)	5.7(12.5)

Notes:

1: The applicable motor refers to Hitachi standard 3-phase motor (4 pole). To use another motor, the rated motor current must NOT exceed the rated output current of the inverter

2: The output voltage decreases as the main power supply voltage decreases. (Except when using the AVR function.) Output voltage cannot exceed input voltage.

L100 Specifications – General

The following table contains specifications common to all L100 Series drives.		
L100 Series General Specifications		
Series Ratings (kW) (1) *Applicable Motor Rating*		230V single and three phase: 0.2-7.5kW 460V three phase: 0.4-7.5kW
Series Ratings (Hp) *Applicable Motor Horsepower*		230V single and three phase: 0.25-10Hp 460V three phase: 0.5-10Hp
Control Method		Sine-wave pulse width modulation (PWM) control
Volt/Freq. Characteristic		Setting available for constant torque, reduced torque
Overload Current Rating		150%, 60 seconds
Acceleration/deceleration Time		0.1-3000 sec. (linear acceleration/deceleration), second acceleration/deceleration setting available
Output Frequency Range (2)		0.5 to 360 Hz
Frequency Accuracy		Digital command: ±0.01% of the Max. frequency Analog command: ±0.2% (25°C ± 10°C) of the Max. frequency
Frequency Setting Resolution		Digital: 0.1 Hz, Analog: Max. frequency/1000
Control Input Signal		
Frequency Setting	***Digital Operator Panel***	Up and Down keys and Value setting
	Potentiometer	Analog setting
	External Signal (3)	0 to 10VDC (input impedance 10kΩ) 4-20mA (input impedance 250Ω), Potentiometer: 1kΩ to 2kΩ(2W) Variable resistor
Forward/ Reverse Run	***Digital Operator Panel***	Run/Stop (Forward/reverse run change by command)
	External Signal	Forward run/stop (1a contact) Reverse operation command available at terminal assignment (1a/1b selectable)
Intelligent Input Terminals		FW (Forward run command), RV (reverse run command), CF1 to CF4 (multi-stage speed setting), JG (Jogging command), 2CH (2-stage acceleration/deceleration command), FRS (Free run stop command), EXT (External trip), USP (USP function), SFT (Soft lock), AT (Analog current input select signal), RS (Reset), PTC (Thermal protection)
Control Output Signal		
Intelligent Output Terminal		RUN (running signal), FA1,2 (frequency arrival signal), OL (overload advance notice signal), OD (deviation signal at PID control), AL (alarm signal)
Frequency Monitor		PWM output; Select analog output frequency monitor, analog output current monitor or digital output frequency monitor
Alarm Output Contact		ON for the inverter alarm (1C contact output) (possible to change to OFF for the alarm)
Other Functions		AVR function, upper/lower limiter, PID control, carrier frequency change, frequency jump, electronic thermal level adjustment, gain/bias setting function, retry function
Protective Functions		Overcurrent, overvoltage, undervoltage, overload, extreme high/low temperature, CPU error, memory error, ground fault detection at startup, internal communication error

Notes:

1: The applicable motor refers to Hitachi standard 3-phase motor (4 pole). To use another motor, the rated motor current must NOT exceed the rated output current of the inverter

2: To operate the motor above 60 Hz refer to the motor manufacturer's specification of maximum rotation speed.

3: The frequency command is the maximum frequency at 9.8 V for input voltage 0-10 VDC, or at 19.6 mA for input current 4-20 mA.

L100 Specifications – Installation

It is important to understand the installation requirements for your L100 drive. This will help to ensure that the L100 Series drives operate within their environmental and electrical limits.

Never use only this catalog for installation or operation of equipment.

Environmental Specifications	
Protective Structure [1]	IP20
Ambient operating temperature [2]	-10 to 50°C (14-122°F)
Storage temperature [3]	-10 to 70°C (14-158°F)
Humidity	20 to 90% (no condensation)
Vibration [4]	5.9 m/S² (0.6G), 10 to 55 Hz
Location	Altitude 1,000 m or less, indoors (no corrosive gases or dust)
Coating Color	Light Purple

1: Protective structure is based upon EN60529

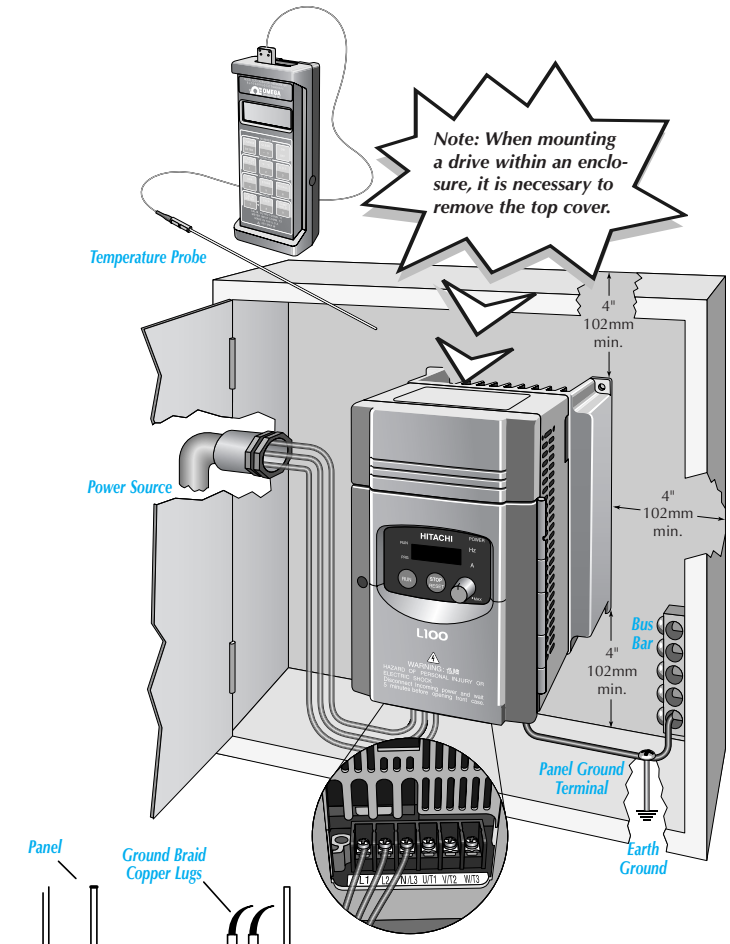
2: The ambient temperature must be in the range of -10° to 40° C. If the range will be up to 50° C, you will need to set the carrier frequency to 2.1 kHz or less and derate the output current to 80% or less. See website for derating curves.

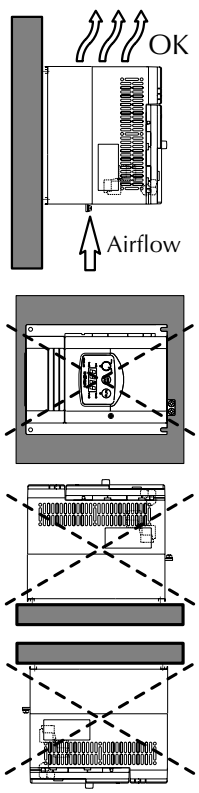
3: The storage temperature refers to the short-term temperature during transport.

4: Conforms to the test method specified in JIS CO911 (1984).

Watt-loss Chart		
L100 Drive Model	***100% In****	***70% In****
002NFU	17	13
004NFU	29	21
007NFU	41	31
015NFU	70	50
022NFU	97	71
037LFU	166	118
055LFU	216	152
075LFU	288	204
004HFU	32	25
007HFU	44	33
015HFU	65	48
022HFU	92	68
040HFU	151	108
055HFU	219	156
075HFU	261	186

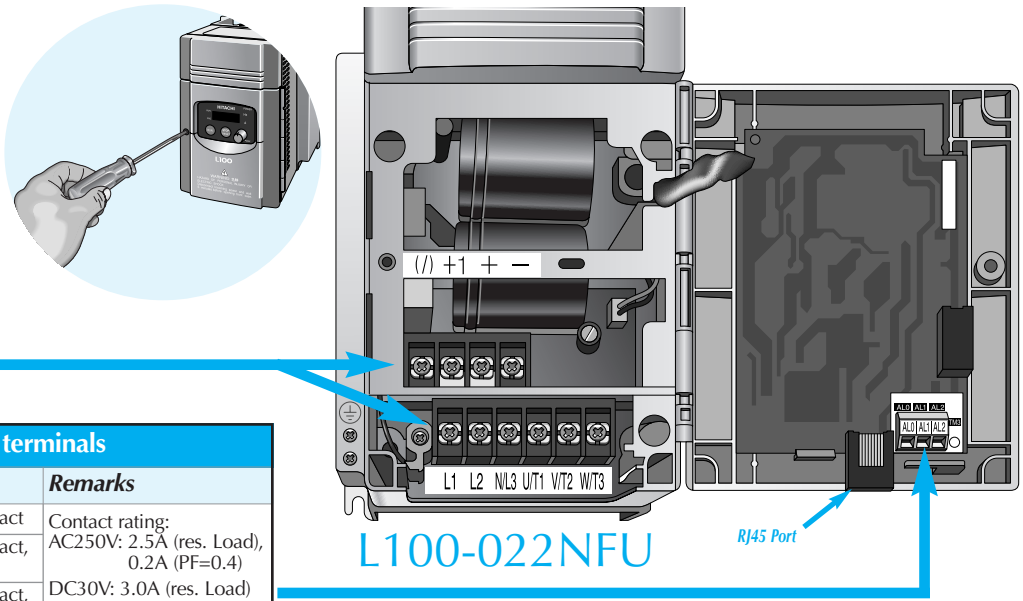
**** Rated Output Current (In)***
Based Output Frequency 50Hz or 60Hz
Carrier Frequency 5kHz



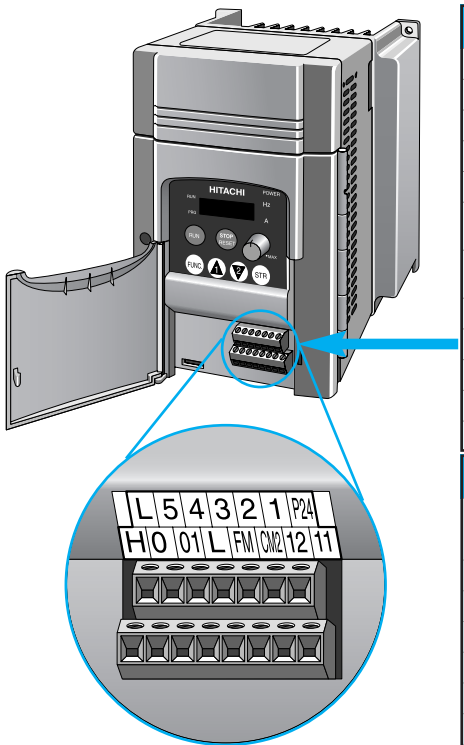


L100 Specifications – Wiring

Main circuit terminals	
Symbol	*Terminal Name*
L1,L2,L3	Main power supply input terminals
T1,T2,T3	Inverter output terminals
+, +1	DC choke (HDC) connection terminals
G or ⏚	Ground terminal
(/)	Not used



Alarm circuit terminals		
Symbol	*Terminal Function*	*Remarks*
AL0	Alarm relay common contact	Contact rating: AC250V: 2.5A (res. Load), 0.2A (PF=0.4) DC30V: 3.0A (res. Load) 0.7A (PF=0.4)
AL1	Alarm relay common contact, normally closed	
AL2	Alarm relay common contact, normally open	

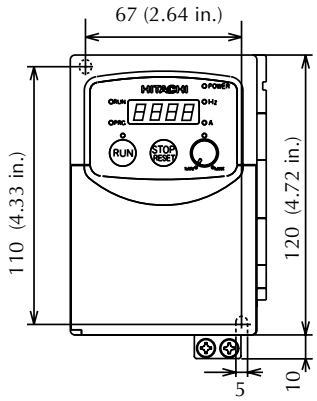


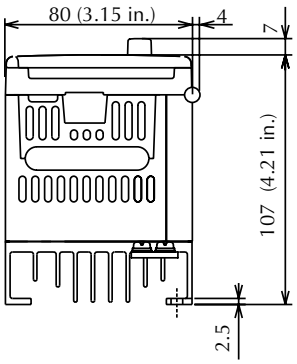
Control circuit terminals		
Symbol	*Terminal Function*	*Remarks*
L	Common terminal for intelligent input terminals	—
5, 4, 3, 2, 1	Intelligent input terminals	27VDC max.
P24	+24V for intelligent input terminals	24 VDC
H	+10VDC input for frequency command	10VDC, 10mA max.
O	Frequency command input, voltage command	0 to 10VDC; Input impedance 10kΩ
OI	Frequency command input, current	4 to 20mA; Input impedance 250Ω
L	Common terminal for frequency command	—
FM	Monitor terminal (frequency, current, etc.)	PWM output
CM2	Common terminal for intelligent output terminals	100mA
12	Intelligent output terminals	Open collector output L level at operation (ON)
11		

Standard wiring						
Motor (Hp)	*Motor (KW)*	*L100 Inverter model*	*Wiring*		*Fuse (class J rated 600V)*	
			Power wires	*Control wires*	1Ø	3Ø
1/4	0.2	002NFU	AWG 16	18-28AWG/. 14 to 0.75 mm² shielded wire (Use 18 AWG/ 0.75mm² wire for the alarm signal wire	10A	5A
1/2	0.4	004NFU				
1	0.75	007NFU	AWG 14		15A	10A
2	1.5	015NFU	AWG 12		20A	15A
3	2.2	022NFU	AWG 10		30A	20A
5	3.7	037LFU	AWG 12		N/A	30A
7.5	5.5	055LFU	AWG 10			40A
10	7.5	075LFU	AWG 8			50A
1/2	0.4	004HFU	AWG 16			3A
1	0.75	007HFU				6A
2	1.5	015HFU				10A
3	2.2	022HFU				
5	4.0	040HFU	AWG 14			15A
7.5	5.5	055HFU	AWG 12			20A
10	7.5	075HFU				25A

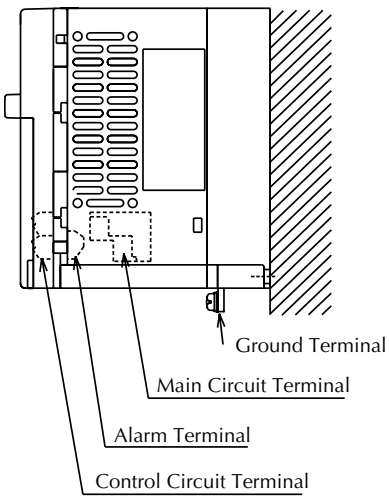
L100 Specifications – Dimensions

L100 -002NFU, 004NFU

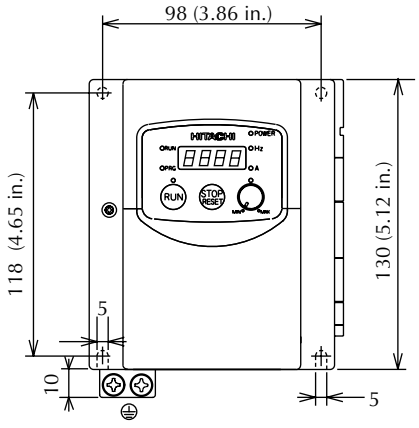


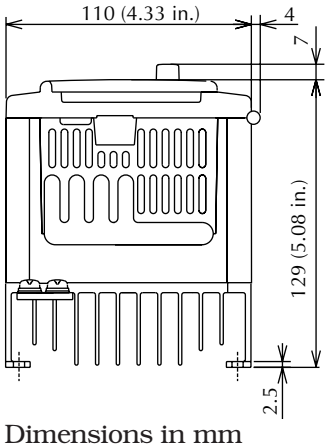


Dimensions in mm

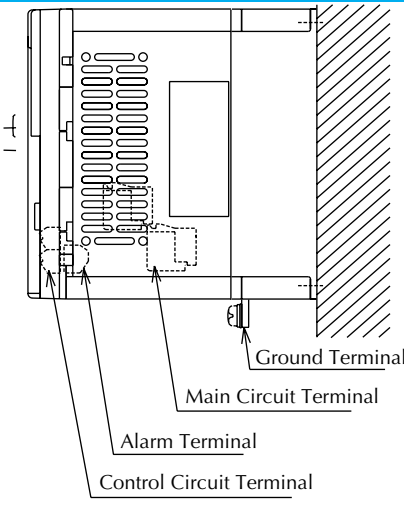


L100 -007NFU, 004HFU

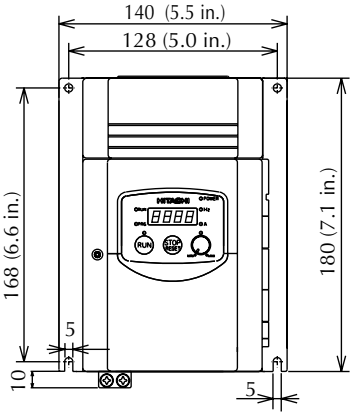


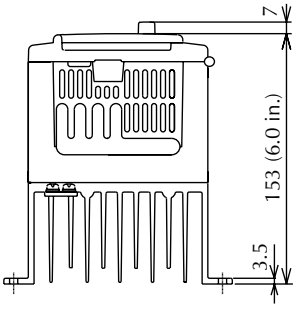


Dimensions in mm

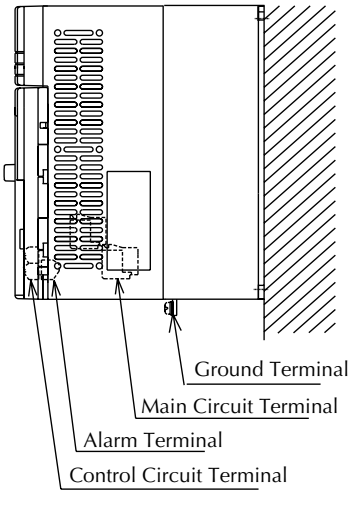


L100 -015NFU



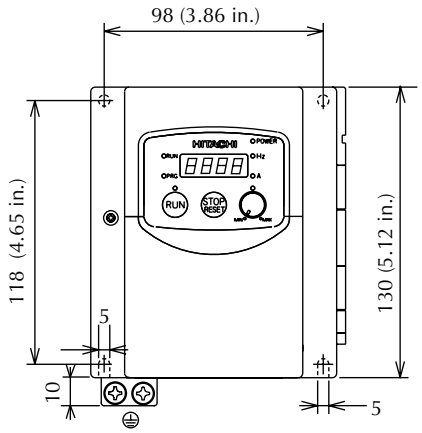


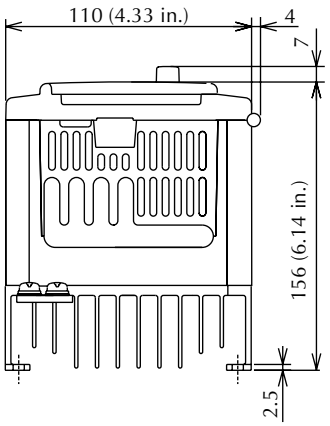
Dimensions in mm



L100 Specifications – Dimensions

L100 -007HFU, 015HFU





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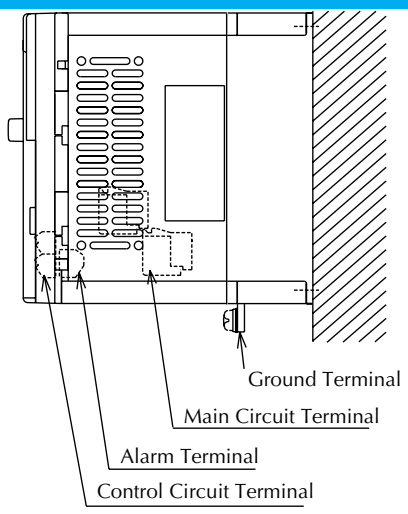
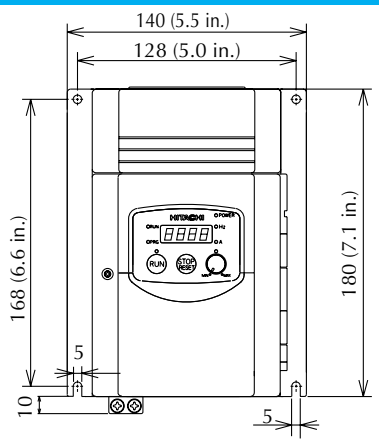
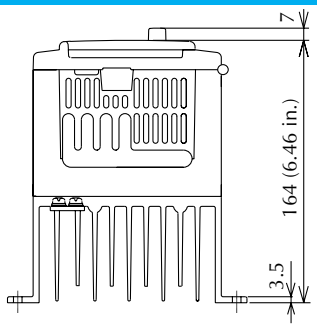
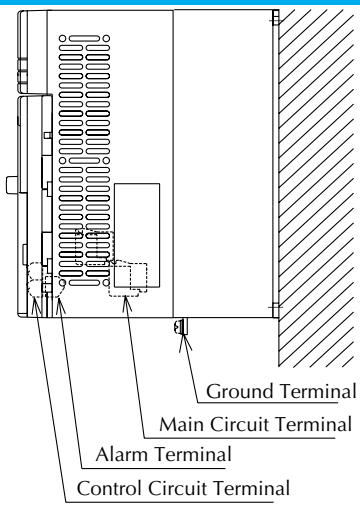


L100 -022NFU, 037LFU, 022HFU, 040HFU

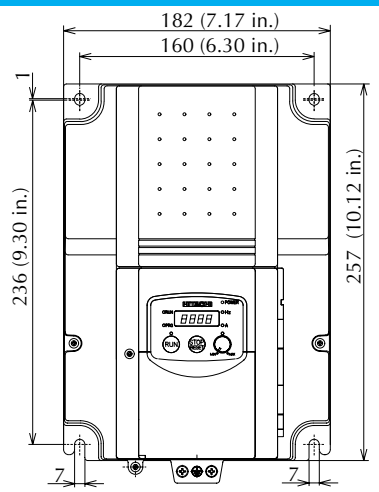


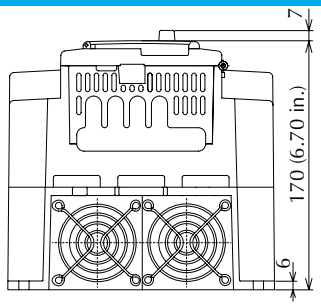


Dimensions in mm



L100 -055LFU, 075LFU, 055HFU, 075HFU





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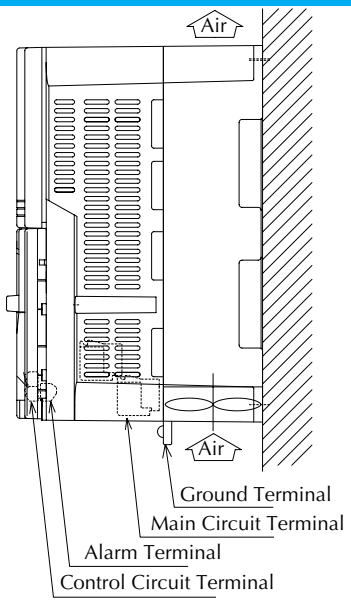

PLC Module Compatibility to Drives

*Direct*Logic PLC Modules for Use with Hitachi Drives	
DL205 DC Output Module	***Description***
D2-16TD2-2	16 pt. 12-24 VDC current sourcing output module, 1 common (2 common terminals), 0.1A/point, 1.6A/module, no fuse, European type removal terminal
DL205 Relay Output Modules	***Description***
D2-04TRS	4 pt. 5-30 VDC or 5-240 VAC isolated relay output module, 4 Form A (SPST) relays, 4 commons, 4A/point, 8.0A/module, replaceable fuse, removable terminal
D2-08TR	8 pt. 5-30 VDC or 5-240 VAC output module, 8 Form A (SPST) relays, 1 common (2 common terminals), 1A/point, 4.0A/module, replaceable fuse, removable terminal
F2-08TR	8pt relay output, 10A/common, 5-30VDC or 5-240VAC
F2-08TRS	8 pt. 12-28 VDC or 12-240 VAC output module, 5 Form A (SPST) relays, 3 Form C (SPDT) relays, 8 isolated commons, 7A/point max., no fuses, removable terminal
D2-12TR	12 pt. 5-30 VDC or 5-240 VAC output module, 12 Form A (SPST) relays, 2 commons, 1.5A/point max., 3.0A/common, 2 replaceable fuses, removable terminal
DL205 DC Input Modules	***Description***
D2-08ND3	8 pt. 12-24 VDC current sinking/sourcing, 1 common (2 common terminals), removable terminal
D2-16ND3-2	16 pt. 24 VDC current sinking/sourcing 2 commons (isolated), European type removable terminal
DL205 Analog Output Module	***Description***
F2-02DAS-1	2 channel, 16 bit, Isolated 4-20mA sourcing (2 isolated commons)
F2-02DAS-2	2 channel analog output, 16 bit resolution, isolated, range: 0-5V, 0-10V
DL205 Analog Input Modules*	***Description***
F2-04AD-2	4 channel, 12 bit, 0-10V. Designed to operate with a 24VDC user supplied power supply.
F2-04AD-2L	4 channel, 12 bit, 0-10V. Designed to operate with a 12 VDC user supplied power supply.
F2-08AD-2	8 channel, 12 bit, 0-10V. Designed to operate with a 24VDC user supplied power supply.
DL305 DC Output Modules	***Description***
D3-08TD2	8 pt. 5-24 VDC current sourcing output module, 0.5A/point, 2 commons (internally connected), non-removable terminal, 2 non-replaceable fuses
D3-16TD2	16 pt. 5-24 VDC current sourcing output module, 0.5A/point, 2 commons (isolated), removable terminal, 2 non-replaceable fuses
DL305 Relay Output Modules	***Description***
D3-08TR	8 pt. 5-30 VDC or 5-220 VAC output module, 5A/point DC or 4A/point AC, 8 Form A relays (SPST), 2 commons (isolated), non-removable terminal, 2 user replaceable fuses
F3-08TRS-1	8 pt. 12-30 VDC or 12-220 VAC output module, 10A/point, 2 Form C (SPDT) relays and 6 Form A (SPST) relays, 8 commons (isolated), removable terminal, 8 non-replaceable fuses
D3-16TR	16 pt. 5-30 VDC or 5-220 VAC output module, 2A/point, 16 Form A relays (SPST), 2 commons (isolated), removable terminal, no internal fuses
DL305 DC Input Modules	***Description***
D3-08ND2	8 pt. 24 VDC current sourcing input module, 2 commons (internally connected), non-removable terminal
D3-16ND2-1	16 pt. 24 VDC current sourcing input module, 2 commons (internally connected), removable terminal
D3-16ND2-2	16 pt. 24 VDC, current sourcing input module, 8 commons (internally connected), 24 Pin removable connector (solder type connector included)
D3-16ND2F	16 pt. 24 VDC fast response (0.8 ms) current sourcing input module, 2 commons (internally connected), removable terminal
F3-16ND3F	16 pt. 5 VDC/12-24 VDC fast response (1 ms) current sinking/sourcing input module, 2 commons (internally connected), removable terminal

Use these modules with FA-4PWM

PLC Module Compatibility to Drives

*Direct*Logic PLC Modules for Use with Hitachi Drives	
DL305 Analog Output Modules	***Description***
F3-04DAS	4 channel isolated analog output module, 12 bit resolution, ranges: 0 to 10V,±750VDC channel to channel isolation
DL305 Analog Input Modules*	***Description***
F3-04ADS	4 channel isolated analog input module, 12 bit resolution, 0 to 10 V
F3-16AD	16 channel analog input module, 12 bit resolution, 0 to 10 V
DL405 DC Output Modules	***Description***
D4-16TDS	16pt. 12-24 VDC current sourcing output module, 2 commons (isolated), 0.5A/point, 3A/common, removable terminal
D4-32TD2	32 pt. 12-24 VDC current sourcing output module, 4 commons (isolated), 0.2A/point, 1A/common. Connectors sold separately. Requires 1 connector.
DL405 Relay Output Modules	***Description***
D4-08TR	8 pt. 5-30 VDC or 5-250 VAC output module, 8 Form A (SPST) relays, 2 commons (isolated), 2A/point, 5A/common, removable terminal
F4-08TRS-1	8 pt. 12-30 VDC or 12-250 VAC isolated output module, 4 Form A (SPST) and 4 Form C (SPDT) relays, 8 commons (isolated), 10A/point, 40A/module, removable terminal
F4-08TRS-2	8 pt. 12-30 VDC or 12-250 VAC isolated output module, 4 Form A (SPST) relays and 4 Form C (SPDT) relays, 8 commons (isolated), 5A/point, 40A/module, replaceable fuses, removable terminals
D4-16TR	16 pt. 5-30 VDC or 5-250 VAC output module, 8 Form A (SPST) relays, 2 commons (isolated), 1A/point, 5A/common, removable terminals
DL405 DC Input Modules	***Description***
D4-08ND3S	8 pt. Input module 24-48 VDC, sink/source, 8 commons (isolated), removable terminal
D4-16ND2	16 pt. 12-24 VDC current sourcing input module, 2 commons (isolated), removable terminal
D4-16ND2F	16 pt. 12-24 VDC current sourcing input module, fast response (1 ms), 2 commons (isolated), removable terminal
D4-32 ND3-1	32 pt. 24 VDC current sinking/sourcing input module, 4 commons (isolated). Connectors sold separately. Requires one connector.
D4-64ND2	64 pt. Input module 20-28 VDC, sourcing input, 8 commons (isolated). Connectors sold separately. Requires two connectors.
DL405 Analog Output Modules	***Description***
F4-04DAS-1	4 channel, 16 bit, isolated 4-20mA sourcing (4 isolated commons)
F4-04DAS-2	4 channel analog output module, 16 bit resolution, isolated, ranges: 0-5V, 0-10V
DL405 Analog Input Modules*	***Description***
F4-04AD	4 channel analog input module, 12 bit resolution, 0 to 10 V
F4-04ADS	4 channel isolated analog input module, 12 bit resolution, 0 to 10 V
F4-08AD	8 channel analog input module, 12 bit resolution, 0 to 10 V
F4-16AD-2	16 channel analog input module, 12 bit resolution, ranges: 0-5V, 0-10V
Use these modules with FA-4PWM	

Frequently Asked Questions

What is sensorless vector control?

Sensorless vector control is a technique used in variable frequency drives to rotate the force vector in the motor without the use of a shaft position sensor. The goal of AC sensorless vector technology is to give the user DC like control while making traditional speed or shaft position feedback from the motor unnecessary. The SV control removes a major source of complexity and potential for failure (the tach. feedback), while simplifying many AC drive installations.

How do I connect a resistor (SRB) to an inverter drive?

Connect the resistor leads to "+" and "RB." There are also a set of "overtemperature" contact terminals on the resistor which should be wired to an intelligent input allocated for "trip" purpose. It would also be appropriate to wire any emergency stop contacts in series with this overtemperature contact.

How does Hz correlate to speed on an inverter drive?

Motor base speed divided by 60 Hz = RPM/Hz. Example; 1200RPM divided by 60 = 20 rpm/Hz. This information is useful for scaling the inverter display to display rpm's instead of Hz. Simply place the above result into B86 and then choose D07 to display. The display will read 0 - 1200 rpm.

Do I need to purchase anything else to program my drive?

No, you can program the drives from the front panel using the function keys and by using the appropriate parameters located in the manual.

What is the duty cycle?

The duty cycle is the percent of time a device is on vs. off. It can be the ratio of operating time of a motor to its resting time. This parameter usually is specified in association with the allowable thermal rise for the device.

Can the software be used with Allen-Bradley equipment?

No, the DOP software cannot be used with the Allen-Bradley equipment due to the function blocks capability of the Allen-Bradley equipment.

Can I use a separate power supply for my drive?

Yes, you can use an external 24Vdc power supply to source the voltage for your intelligent input terminals. You will need to connect the common on the remote power supply to the drive's "L" terminal. However, do not connect the "+" terminal of the internal supply to the external one.

I cannot get my intelligent terminal to program with the options I want. It just skips over them. Why?

If the option you wish to use is the default of a different terminal the inverter will not let you program it in two places. You will need to use it at its default location or change it so that you do not have it in two places. Also, if the drive is in Run, items such as Intelligent Terminal Allocation cannot be changed due to safety reasons.

Can I use the 24vdc supply on the inverter for field devices on my machine?

The 24VDC supply on the inverter is for the operation of control terminals and is not recommended for use with other devices.

Will the SJ100 accept encoder feedback?

No, the SJ-100 will not accept encoder feedback. It is a micro drive and does not have the option card, and therefore no encoder feedback.

When I connect the remote operator it gets a Comm 2 error. The cable and connector check out ok, but the error will not go away. Why?

Open the small cover on the back of the unit and check dip switches 1 and 2. Switch 1 should be off and switch 2 should be on.

We are building a panel for our drives. How can we know the heat put out by each drive?

The watt loss chart shows the amount of heat generated by the drive at 70 and 100 percent load of drive. The units are given in watts lost.

What is the main advantage in using an inverter to drive a motor, compared to alternative solutions?

An inverter can vary the motor speed with very little loss of efficiency, unlike mechanical or hydraulic speed control solutions. The resulting energy savings usually pays for the inverter in a relatively short time.

Although the SJ100 inverter is a variable speed drive, can I use it in a fixed-speed application?

A fixed speed application usually is a result of cost-sensitivity or negligible benefits if variable speed were used (consumer products are examples). In those cases, the power source connects directly to the motor (no special drive needed). However, using a variable speed drive can benefit many type of industrial and commercial motor applications, by providing controlled acceleration and deceleration, high torque at low speeds, and energy savings over alternative solutions.

The term "inverter" is a little confusing, since we also use "drive" and "amplifier" to describe the electronic unit that controls a motor. What does "inverter" mean?

The terms inverter, drive, and amplifier are used somewhat interchangeably in industry. But there are subtle differences. A drive can refer to the motor, the control electronics, or both. This term is used particularly when the motor and electronics are integrated in the same housing. The term variable speed drive can include many types of devices such as– anything that has a variable speed output, which includes the Hitachi inverter. Amplifier more commonly refers to a linear amplifier for servo motor control, or a stepper motor driver IC. Finally, we use inverter to describe the Hitachi motor controller because of the way the switching electronics alternately inverts or directly couples its internal DC voltage bus to generate a variable AC output.

Can I use an inverter and AC induction motor in a positioning application?

That depends on the required precision, and the slowest speed the motor will must turn and still deliver torque. The SJ100 inverter will deliver full torque while turning the motor at only 0.5 Hz (15 RPM). DO NOT use an inverter if you need the motor to stop and hold the load position without the aid of a mechanical brake (use a servo or stepper motion control system).

Does the optional digital operator interface or the PC software (DOP Plus) provide features beyond what is available from the keypad on the unit?

Yes. However, note first that the same set of parameters and functions are equally accessible from either the unit's keypad or from remote devices. The DOP Plus PC software lets you save or load inverter configurations to or from a disk file. And, the hand-held digital operator provides hard-wired terminals, a safety requirement for some installations.

Why does the manual or other documentation use terminology such as "200V class" instead of naming the actual voltage, such as "230 VAC?"

A specific inverter model is set at the factory to work across a voltage range particular to the destination country for that model. The model specifications are on the label on the side of the inverter. A European 200V class inverter ("EU" marking) has different parameter settings than a USA 200V class inverter ("US" marking). The initialization procedure can set up the inverter for European or US commercial voltage ranges.

Why is there not a 100V class version of the SJ100 inverter, so it would work with a USA 115VAC power source, for example?

Most industrial, commercial, or heavy appliance applications use 230VAC in the USA. Also, a built-in advantage is that using the higher voltage means less current to deliver the same amount of power. This allows you to use smaller diameter (and less expensive) wire for power and motor wiring.

I live in a country where the domestic utility power is 115 VAC. Is there a way to conveniently access a 230 VAC power source for a test bench to develop a motor application?

A 1:2 step-up transformer is available from a number of sources (check your local electrical supply house). The transformer will be designed to develop 230 VAC from 115 VAC, for example. Be sure the power output rating (kW) of the transformer is greater than 1.73 times the three-phase current of the motor you intend to power. We recommend doing this for motors 1/2 horse-power or smaller, with small loads. For 400 V class inverters, we recommend only using a utility power source of the correct voltage.

Some models of Hitachi inverters will accept either single phase or three-phase power input. How do I know which input power type to use?

If three-phase power is conveniently available for your application, we recommend using that (the inverter can develop its three-phase output power most efficiently from three-phase input power). In the absence of three-phase power, you can use a single-phase power source with slightly less efficiency but the power output rating is the same for N models (single or three-phase).

If I decide to use single-phase input power for the inverter, can I also use a single-phase motor?

No. All Hitachi inverters develop a variable three-phase output, requiring the use of a three-phase AC induction motor.

Why doesn't the motor have a neutral connection as a return to the inverter?

The motor theoretically represents a "balanced Y" load if all three stator windings have the same impedance. The Y connection allows each of the three wires to alternately serve as input or return on alternate half-cycles.

Does the motor need a chassis ground connection?

Yes, for several reasons. This is for protection in the event of a short in the motor that puts a live voltage on its housing. Motors and other components exhibit leakage currents that increase with aging. And, a grounded chassis generally emits less electrical noise than an ungrounded one.

What type of motor is compatible with the Hitachi inverters?

Motor type – it must be a three phase AC induction motor. Use an inverter-grade motor that has 800V insulation for 200V class inverters, or 1600V insulation for 400V class. Motor size – In practice, it's better to find the right size motor for your application, then look for the inverter to match the motor.

How many poles should the motor have?

Using a four-pole motor will work for most applications. Hitachi inverters can be configured to operate motors with 2, 4, 6, or 8 poles. The greater the number of poles, the slower the top motor speed will be, but it will have higher torque at the slowest speed.

Will I be able to add dynamic (resistive) braking to my Hitachi SJ100 drive after the initial installation?

Yes. The SJ100 inverter already has a dynamic braking circuit built in. Just add the resistor sized to meet the braking requirements.

How will I know if my application will require resistive braking?

For new applications, it may be difficult to tell before you actually test a motor/drive solution. In general, some applications can rely on system losses such as friction to serve as the decelerating force, or otherwise can tolerate a long decel time. These applications will not need dynamic braking. However, applications with a combination of a high-inertia load and a required short decel time will need dynamic braking. This is a physics question that may be answered either empirically or through extensive calculations.

Several options related to electrical noise suppression are available for the Hitachi inverters. How can I know if my application will require any of these options?

The purpose of these noise filters is to reduce the inverter electrical noise so the operation of nearby electrical devices is not affected. Some applications are governed by particular regulatory agencies, and noise suppression is mandatory. In those cases, the inverter must have the corresponding noise filter installed. Other applications may not need noise suppression, unless you notice electrical interference with the operation of other devices.

The SJ100 features a PID loop feature. PID loops are usually associated with chemical processes, heating, or process industries in general. How could the PID loop feature be useful in my application?

You will need to determine which main variable in your application the motor affects. That is the process variable (PV) for the motor. Over time, a faster motor speed will cause a faster change in the PV than a slow motor speed will. By using the PID loop feature, the inverter commands the motor to run at the optimal speed required to maintain the PV at the desired value for current conditions. Using the PID loop feature will require an additional sensor and other wiring, and is considered an advanced application.

Is it possible to use three phase drives with single phase input? Can you use larger drives with derating to run something like a 5hp motor with a 10 hp drive on single phase?

Generally, this is possible, but doubling the drive hp capacity is not necessarily sufficient. There are several concerns:

1) Higher motor current for single vs. 3 phase - this is about double (x 1.732 to be exact, but double for selection purposes). You must also account for peak motor current (application dependent), and select the proper drive size based on its output current capacity, rather than hp rating.

2) The fact that one input phase is missing means that part of the input bridge is carrying higher current than it normally would. You must make sure that the input current does not exceed the rating of the drive.

3) Since we are only rectifying single phase, the harmonic content is higher, and different in frequency composition. This means that an input line reactor is a definite requirement. Also this impacts on the DC Link, and the higher harmonic content may adversely affect the life expectancy of the DC Link capacitors. There is no easy way to calculate this, but if the drive is sized adequately, this is not a major issue.