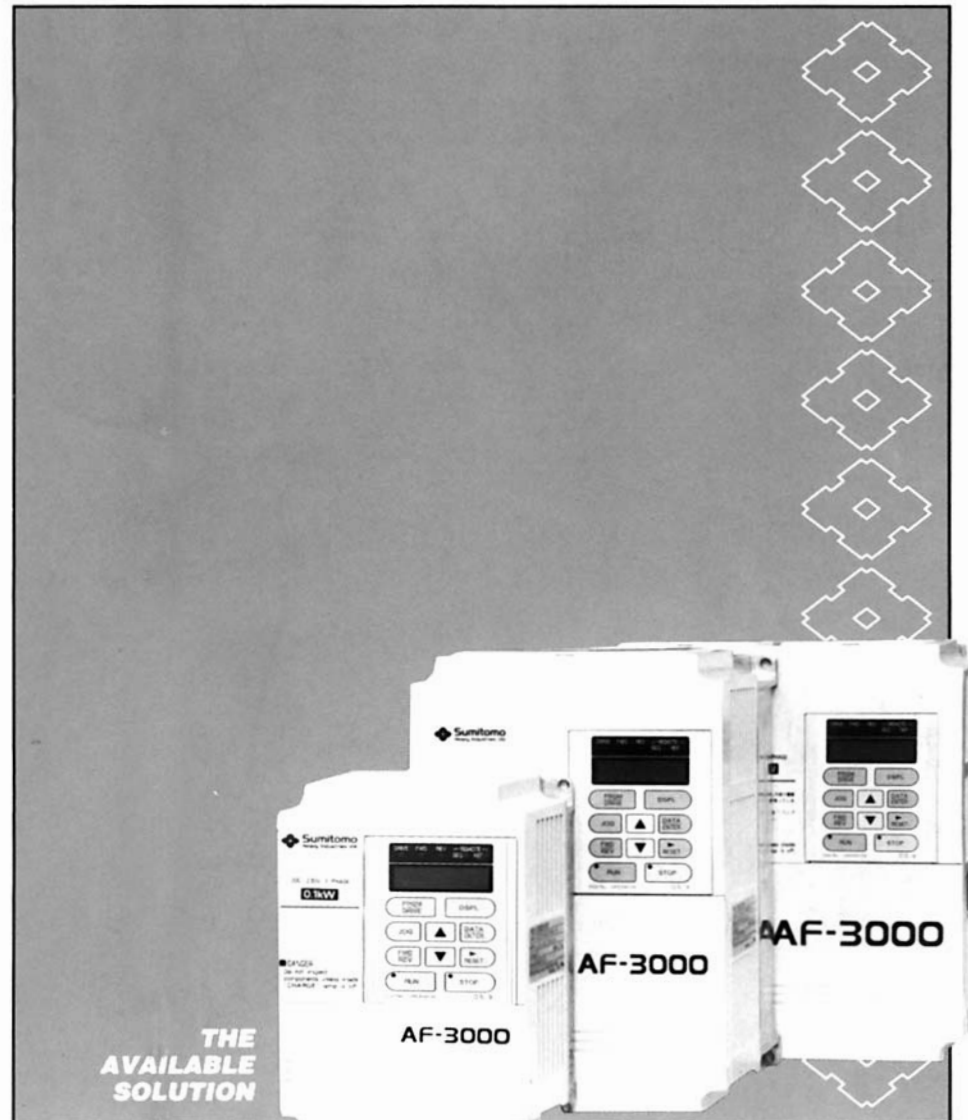
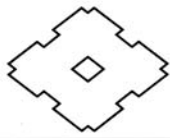


<sup>®</sup>  
**AF-3000**  
Compact AC Inverter  
Operating & Maintenance Manual



**THE  
AVAILABLE  
SOLUTION**



### **DANGER**

Voltage is present on capacitors for five minutes after input circuit is open. Risk of electric shock and/or electrical energy-high current levels.

### **WARNING**

Disconnect electrical supply before servicing the electrical system.

Do not change the wiring while power is applied to the circuit.

Do not check signals during operation.

### **WARNING**

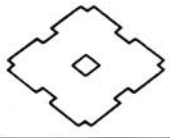
Refer to this manual for connection of circuits and the rating of auxiliary circuits.

Be sure to ground AF-3000 using the ground terminal G(E).

Never connect main circuit output terminals T1(U), T2(V), T3(W) to AC main circuit power supply.

### **CAUTION**

Separate motor overcurrent, overload and overheating protection is required to be provided in accordance with CANADIAN ELECTRICAL CODE, PART I and NEC.



This instruction manual is composed of 2 sections: The first section describes handling, wiring, operation, maintenance/inspection, troubleshooting and specifications of the AF-3000 Digital Compact Inverter. The second outlines the digital operator performance, constants, operation, etc.

Before using the AF-3000, a thorough understanding of this manual is recommended for daily maintenance, inspection and troubleshooting.

In this manual, "constant (No. [ ])" indicates the item number of control constant set by digital operator.

### DANGER

Voltage is present on capacitors for five minutes after input circuit is open. Risk of electric shock and/or electrical energy-high current levels.

### WARNING

Disconnect electrical supply before servicing the electrical system.

Do not change the wiring while power is applied to the circuit.

Do not check signals during operation.

### WARNING

Refer to this manual for connection of circuits and the rating of auxiliary circuits.

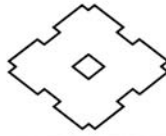
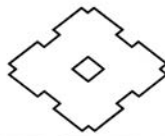
Be sure to ground AF-3000 using the ground terminal G.

Connect the motor to output terminals T1, T2, T3. Connect an AC power supply to input terminals L1, L2, L3 (for 240 V single-phase series, connect only to L1 and L2).

### CAUTION

Separate motor overcurrent, overload and overheating protection is required to be provided in accordance with CANADIAN ELECTRICAL CODE, PART I and NEC.

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### CAUTION

All the potentiometers of AF-3000 have been adjusted at the factory. Do not change their settings unnecessarily.

Do not make withstand voltage tests on any part of the AF-3000 unit. It is electronic equipment using semiconductors and vulnerable to high voltage.

Make sure to tighten screws on the main circuit and control circuit terminals. Refer to installation instructions for torque values. See par. 1.53 “(5) Wire and terminal screw sizes.”

Handle with care so as not to damage the inverter during transportation.

Do not pick up by the front cover or the unit cover (plastic portion). Use the die-cast portion.

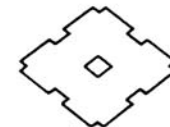
### ADVERTISSEMENT

Des tensions subsistent aux bornes des condensateurs pendant cinq minutes après l'ouverture de circuit d'entrée.

Couper l'alimentation avant d'entreprendre le dépannage du système électrique.

### ATTENTION

Une protection distincte contre les surintensités, la surcharge et la surchauffe de moteur doit être fournie conformément AU CODE CANADIAN DE L'ÉLECTRICITÉ PREMIER PARTIE et LE NATIONAL DE L'ÉLECTRICITE.



### WARNING

Twist wires together before inserting in grounding terminal.

### CAUTION

Separate motor overcurrent, overload and overheating protection is required to be provided in accordance with CANADIAN ELECTRICAL CODE, PART I and NEC.

Use 75°C copper wires only.

Low voltage terminals shall be wired with Class I Wiring.

When mounting units in an enclosure, remove the top, bottom and terminal covers.

### ADVERTISSEMENT

Enroulez les fils ensemble avant de les introduire dans la borne.

Des tensions subsistent aux bornes des condensateurs pendant cinq minutes après l'ouverture de circuit d'entrée.

Couper l'alimentation avant d'entreprendre le dépannage du système électrique.

### ATTENTION

Une protection distincte contre les surintensités, la surcharge et la surchauffe de moteur doit être fournie conformément AU CODE CANADIEN DE L'ÉLECTRICITÉ PREMIER PARTIE et LE NATIONAL DE L'ÉLECTRICITE.

The AF-3000 is an ultra-compact, all-digital inverter which provides low noise operation.

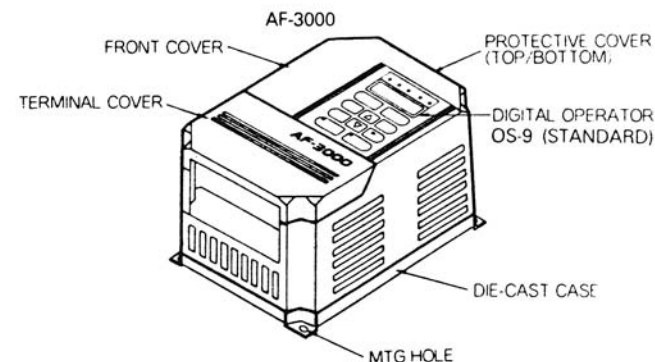
Two types are available : 1) with digital operator or 2) with drive status indicating plate (indicating plate).

The digital operator allows maximum utilization of the drive by providing access to the inverter's program constants and operation variables.

The model with the indicating plate provides status and fault codes while preventing unauthorized access to the programming constants. It is also useful for those applications where the programming operator can be moved from one unit to another.

### 1.1 PARTS NAMES OF AF-3000

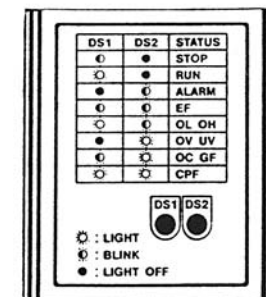
- With digital operator

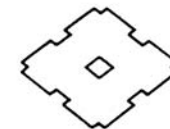


- With indicating cover

The indicating cover shown to the right will be mounted in place of the digital operator which is installed in the unit.

INDICATING COVER





# MAINTENANCE

## 1.6 MAINTENANCE

### 1.6.1 Periodic Inspection

AF-3000 requires very few routing checks. It will function longer if it is kept clean, cool and dry, while observing the precautions listed in "Location" (Par. 1.3.3). Check for tightness of electrical connections, discoloration or other signs of overheating. Use Table 1.7 as the inspection guide. Before servicing, turn OFF AC main circuit power and be sure that CHARGE lamp is OFF.

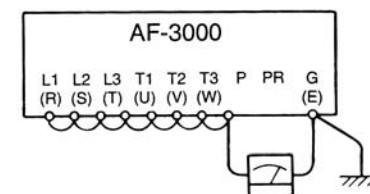
Table 1.7 Periodical Inspection

Component	Check	Corrective Action
External Terminals, Unit Mounting Bolts, Connectors, etc.	Loosened screws	Tighten
	Loosened connectors	Tighten
Cooling Fins	Build-up of dust or dirt	Blow with dry compressed air of $39.2 \times 10^4$ to $58.8 \times 10^4$ Pa [57 to 85 psi (4 to 6 kg·cm <sup>2</sup> )] pressure.
Printed Circuit Board	Accumulation of conductive dust or oil mist	Clean the board. If dust and oil cannot be removed, replace the inverter unit.
Cooling Fan	Abnormal noise or vibration. Whether the cumulative operation time exceeds 20,000 hours or not.	Replace the inverter unit.
Power Elements	Accumulation of dust or dirt	Blow with dry compressed air of $39.2 \times 10^4$ to $58.8 \times 10^4$ Pa [57 to 85 psi (4 to 6 kg·cm <sup>2</sup> )] pressure.
Smoothing Capacitor	Discoloration or odor	Replace the inverter unit.

### 1.6.2 High Voltage Test

Use an insulation resistance tester (500 V) to conduct insulation resistance test (high voltage test) on the main control circuit as described below.

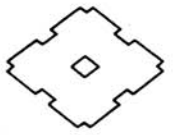
- (1) Remove the inverter main circuit and control circuit terminal wiring and execute the test only between the main circuit terminals and ground [ground terminal (G/E)] as shown in Fig. 1.9.
- (2) The equipment is normal with the insulation resistance tester indicating  $1M\Omega$  or more.



Note : Do not conduct high voltage test on the control circuit terminals.

Fig. 1.9 High Voltage Test





# FAULT DISPLAY & TROUBLESHOOTING

## 1.7 FAULT DISPLAY AND TROUBLESHOOTING

If a fault occurs and the inverter functions are lost, check for the causes and provide proper corrective actions, referring to the following checking method.

Contact your Sumitomo representative if any fault other than described below occurs, if the inverter itself malfunctions, if any parts are damaged, or if you have any other problems. A list of the Sumitomo representatives is available on the last page.

### 1.7.1 Checking of Causes

The inverter has protective functions to protect it from faults such as overcurrent or overvoltage. If a fault occurs, the protective functions operate to shut off the inverter output and the motor coasts to a stop. All the same time, the fault contact signal is output.

When the protective functions operate in models with indicating cover, the digital display unit displays a fault shown in Table 1.8. Also when the digital operator is used, the fault display is provided.


Operation can be restarted by turning ON the fault reset input signal (or  key of the digital operator) or turning OFF the power supply and ON again.

Table 1.8 Fault Display and Contents

Fault Display			Contents	Possible Cause/ Corrective Actions
Digital Operator	Inverter LED Display*			
	DS1 (GR)	DS2 (RD)		
OC (Over-current) oC			Inverter output current exceeds 200% of rated current. (Momentary action)	The following causes can be considered: inverter output side short-circuit, excessive load inertia ( J ), excessively short setting of accel/decel time, [constant (No. 09 to 12)] special motor use, motor start during coasting, start of motor with larger capacity than inverter, inverter output side magnetic contactor ON/OFF. Reset after finding the cause.
GF (Ground Fault) GF			Inverter output side is grounded.	Check that the motor or load side wiring is not grounded.
OV (Over-voltage) oV			Main circuit DC voltage exceeds 410 V or more for 230 V class, 820 V or more for 460 V class because of excessive regenerative energy from motor. (Exceeds overvoltage protection level.)	Decel time setting is not sufficient. [constant (No. 10, 12)] or minus load (cranes, etc.) is decreasing. Increase decel time or connect a braking resistor (option).
UV (Under-voltage) uV			Undervoltage occurred is entered. [Main control DC voltage becomes approx. 210 V or less (230 V class 3-phase), 170 V or less (240 V class single-phase) or 420 V or less (460 V class 3-phase)].	Input power supply voltage is reduced, phases are opened or momentary power loss occurs, etc. Check the power supply voltage, or check that main circuit power supply wiring is connected properly or terminal screws are tightened well.
OH (Cooling Fin Overheat) oH			Temperature rise caused by inverter overload operation, or intake air temperature rise. Cooling fan r/min is decreased.	Load is too large, V/f characteristics are not proper, accel time is too short or intake air temperature exceeds 113° F (45°C), etc. Correct load size, V/f set value [constant No. 02 to 08] or intake air temperature. Check the cooling fan.

\* LED display light light off

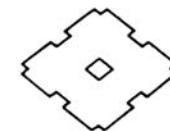


Table 1.8 Fault Display and Contents (Cont'd)

Fault Display			Contents	Possible Cause/ Corrective Actions
Digital Operator	Inverter LED Display*			
	DS1 (GR)	DS2 (RD)		
OL1 (Motor Overload) OL1			Motor overload protection operates because of electronic thermal overload.	Correct load size, operation pattern or V/f set value [constant (No. 02 to 08)]. Set the rated current value described in the motor nameplate to constant (No. 19).
OL2 (Inverter Overload) OL2			Inverter overload protection operates because of electronic thermal overload.	Correct load size, operation pattern or V/f set value [constant (No. 02 to 08)]. Recheck the inverter capacity.
OL3 † (Overtorque Detection) OL3			Motor current exceeding set value is applied because of machine fault or overload.	Check the machine using status and remove the cause. Or increase the set value up to the machine allowable value [constant (No. 38)].
EF4, 5 ‡ (External Fault) EF4, EF5			Inverter accepts external fault input from external circuit.	Check the external circuitry (sequence).
CPF# (Control Function Fault) CPF#			Inverter control functions are broken down.	Turn OFF the power supply once and then turn it ON again. Or initialize the control constant by using the digital operator. If the fault still exists, replace the inverter.
Digital display is extinguished.			· Main circuit fuse is blown. (for 460 V class only) · Control power supply fault · Hardware fault	Replace the inverter.

\* LED display : light : blink : light off

† For OL3 (overtorque detection), fault display or alarm display can be selected according to the constant (No.37) setting. For details, refer to "OVERTORQUE DETECTION FUNCTION" on page 108.

‡ EF4 shows external fault input from multifunction contact input terminal (ES), EF5 from terminal (DF).

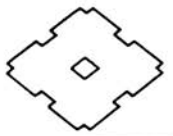
# For details of CPF (control function faults), refer to Table 1.9, "Details of CPF Display".

Table 1.9 Details of CPF Display

Fault Display			Contents	Corrective Actions
Digital Operator	Inverter LED Display*			
	DS1 (GR)	DS2 (RD)		
CPF-00 CPF00			Initial memory fault is detected.	Turn OFF the power supply once and turn it ON again. If the fault still exists, replace the inverter.
CPF-01 CPF01			ROM fault is detected.	Turn OFF the power supply once and turn it ON again. If the fault still exists, replace the inverter.
CPF-04 CPF04			Constant fault is detected.	Record all data, and then make initialization. Turn OFF the power supply once and turn it ON again. If the fault still exists, replace the inverter. For initialization of constants, refer to Par. 2.5.1 "Constant Initialization" on page 62.
CPF-05 CPF05			AD converter fault is detected.	

\* LED display : light : light off





## 1.7.2 Alarm Display and Contents

Alarms, among inverter protective functions, do not operate fault contact output and returns to the former operation status automatically when the factor is removed.

The following shows the types and contents.

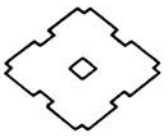
Table 1.10 Alarm Display and Contents

Alarm Display			Contents	Possible Cause/ Corrective Actions
Digital Operator	Inverter LED Display*			
	DS1 (GR)	DS2 (RD)		
EF (Simultaneous Input of FWD and REV commands) EF blinks.	●	⦿	Both FWD and REV commands are "closed" for 500 ms or larger. Inverter stops according to constant No. 01.	Check the control interface circuit.
BB (External Baseblock) bb blinks.	●	⦿	External baseblock is input. Inverter output shuts off. (Operation restarts when the external baseblock signal is removed. For the external baseblock signal, refer to "MULTIFUNCTION CONTACT INPUT FUNCTION SELECTION" on page 94.	Check the control interface circuit.

Alarm Display			Contents	Possible Cause/ Corrective Actions
Digital Operator	Inverter LED Display*			
	DS1 (GR)	DS2 (RD)		
UV (Main Circuit Under-voltage) uu blinks.	●	⦿	Main circuit DC voltage is reduced less than detection level when inverter is not outputting.	Check the power supply voltage, main circuit power supply wiring connection or terminal screw tightening.
OL3 (Overtorque Detection) † ol3 blinks.	●	⦿	Motor current exceeding the set value flows due to machine fault or overload. Inverter continues operation.	Check the machine using status and remove the cause of the fault. Or increase the set value [constant (No. 38)] up to the machine allowable value.
OV	●	⦿	Main circuit DC voltage is more than over-voltage detection level. When inverter is not outputting.	Check the power supply voltage.
OH	●	⦿	Intake air temperature rises when inverter is not outputting.	Check the intake air temperature.

\* LED display ⦿: blink ●: light off

† For OL3 (overtorque detection), fault display can be selected according to the constant (No. 37) setting. For details, refer to "OVERTORQUE DETECTION FUNCTION" on page 101.



### 1.7.3 Corrective Action for Motor Faults

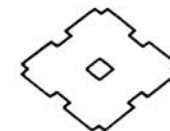
Table 1.11 shows the check points and corrective actions of motor faults.

Table 1.11 Motor Faults and Corrective Actions

Fault	Check Point	Corrective Action
Motor does not rotate.	Power supply voltage is applied to power supply terminals L <sub>1</sub> /R, L <sub>2</sub> /S, L <sub>3</sub> /T. (Check that charge lamp is ON.)	<ul style="list-style-type: none"> <li>· Turn ON the power supply.</li> <li>· Turn OFF the power supply and then ON again.</li> <li>· Check power supply voltage.</li> <li>· Check that terminal screws are tight.</li> </ul>
	Voltage is output to output terminals T <sub>1</sub> /U, T <sub>2</sub> /V, T <sub>3</sub> /W. (Use rectifier type voltmeter.)	· Turn OFF the power supply and then ON again.
	Load is excessively large. (Motor is locked.)	Reduce the load. (Release the lock.)
	Fault is displayed.	Check according to Par. 1.7.1
	FWD or REV run command is entered.	Correct the wiring.
	Frequency setting voltage is entered.	<ul style="list-style-type: none"> <li>· Correct the wiring.</li> <li>· Check frequency setting voltage.</li> </ul>
	Operation (method selection) mode setting is proper.	Check the operation method selection mode [constant (No. 01)] by using the digital operator.
Motor rotating direction is reversed.	Wiring of output terminals T <sub>1</sub> /U, T <sub>2</sub> /V, and T <sub>3</sub> /W is correct.	Match them to the phase order of motor T <sub>1</sub> /U, T <sub>2</sub> /V, and T <sub>3</sub> /W.
	Wiring of FWD and REV run signals is correct.	Correct the wiring.

Fault	Check Point	Corrective Action
Motor rotates but variable speed is not available.	Wiring of frequency setting circuit is correct.	Correct the wiring.
	Operation (method selection) mode setting is correct.	Check operation method selection mode [constant (No. 01)] by digital operator.
	Load is not excessively large.	Reduce the load.
Motor r/min is too high (low).	Motor ratings (number of poles, voltage) are proper.	Check the specifications and nameplate.
	Maximum frequency set value is correct.	Check the maximum frequency set value [constant (No.02)]
	Voltage between motor terminals is not excessively reduced. (Use rectifier type voltage.)	Check V/f characteristic set value [constant (No 02 to 08)].
Motor r/min is not stable during operation*	Load is not excessively large.	Reduce the load.
	Load variation is not excessively large.	<ul style="list-style-type: none"> <li>· Reduce the load variation.</li> <li>· Increase the inverter or motor capacity.</li> </ul>
	3-phase power supply is used.	Connect an AC reactor to the power supply if single-phase power supply is used.

\* Because of motor and load (geared machine) characteristics, motor r/min becomes unstable or motor current ripples. To correct these problems, changing the inverter control constants may be effective. Refer to "CONSTANTS EFFECTIVE FOR REDUCTION OF MACHINE VIBRATION OR SHOCK" on page 106 for details of control constants to be changed.



# SPECIFICATIONS

## 1.8 SPECIFICATIONS

### 1.8.1 Specifications

Voltage Class		230 V 3-phase						
Inverter Model AF-3002-		A10	A20	A40	A75	1A5	2A2	3A7
Max. Applicable Motor Output HP (kW)*		0.13 (0.1)	0.25 (0.2)	0.5 (0.4)	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)
Output Characteristics	Inverter Capacity kVA	0.3	0.6	1.1	1.9	2.5	4.2	6.7
	Rated Output Current A	0.8	1.5	3	5	6.5	11	17.5
	Max. Output Voltage V	3-phase, 200 to 230 V (proportional to input voltage)						
Max. Output Frequency Hz		400 Hz (available with constant setting)						
Power Supply	Rated Input Voltage and Frequency	3-phase 200 to 230 V, 50/60 Hz						
	Allowable Voltage Fluctuation	± 10%						
	Allowable Frequency Fluctuation	± 5%						
Control Characteristics	Control Method	Sine wave PWM						
	Frequency Control Range	0.1 to 400Hz						
	Frequency Accuracy (Temperature Change)	Digital command : 0.01% (+14 to 104°F, -10 to +40°C), Analog command : 0.1% (77±50°F, 25±10°C)						
	Frequency Setting Resolution	Digital operator reference : 0.1 Hz, Analog reference : 0.06/60 Hz						
	Output Frequency Resolution	0.1Hz						
	Overload Capacity	150% rated output current for one minute						
	Frequency Setting Signal	0 to 10 VDC (20kΩ), 4 to 20mA (250Ω)						
	Accel/Decel Time	0.1 to 600 sec (accel/decel time set independently)						
	Braking Torque	Approx. 20% (up to 150% possible with optional braking resistor externally mounted, braking transistor built-in)						
	V/f Characteristic	Possible to set any V/F pattern						
Stall Prevention Level	Possible to set operating current							
Protective Functions	Instantaneous Overcurrent	Motor coasts to a stop at approx. 200% of inverter rated current.						
	Overload	Motor coasts to a stop after 1 minute at approx. 150% of inverter rated output current						
	Ground Fault	Protected by electronic circuit.						
	Motor Overload Protection	Electronic thermal overload relay						
	Overvoltage	Motor coasts to a stop if main circuit DC voltage exceeds 410 VDC						
	Undervoltage	Activated when DC voltage drops below 210 VDC						
	Momentary Power Loss	Stops if power loss is 15 ms or longer (preset prior to shipping) (operation can automatically restart after recovery from momentary power loss of up to approx. 2 seconds.) †						
	Cooling Fin Overheat	Protected by thermoswitch (only for units with fan)						
	Power Charge Indication	Charge lamp stays ON until main circuit DC voltage drops below 50 V.						

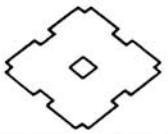
\* Our standard 4-pole motor is used to determine max. applicable motor output.

† To select "automatic restart after momentary power loss," set the 1st digit of constant (No. 46) to \*1. Automatic restart is available for up to 1 second for models of 1HP (0.75 kW) or less or up to 2 seconds for models of 2 HP (1.5 kW) or greater.

Voltage Class		240 V Single-phase						
Inverter Model AF-300S-		A10	A20	A40	A75	1A5	2A2	3A7
Max. Applicable Motor Output HP (kW)*		0.13 (0.1)	0.25 (0.2)	0.5 (0.4)	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)
Output Characteristics	Inverter Capacity kVA	0.3	0.6	1.1	1.9	2.5	4.2	6.7
	Rated Output Current A	0.8	1.5	3	5	6.5	11	17.5
	Max. Output Voltage V	3-phase, 200 to 240 V (proportional to input voltage)						
Max. Output Frequency Hz		400 Hz (available with constant setting)						
Power Supply	Rated Input Voltage and Frequency	Single-phase 200 to 240 V, 50/60 Hz						
	Allowable Voltage Fluctuation	± 10%						
	Allowable Frequency Fluctuation	± 5%						
Control Characteristics	Control Method	Sine wave PWM						
	Frequency Control Range	0.1 to 400Hz						
	Frequency Accuracy (Temperature Change)	Digital command : 0.01% (+14 to 104°F, -10 to +40°C), Analog command : 0.1% (77±50°F, 25±10°C)						
	Frequency Setting Resolution	Digital operator reference : 0.1 Hz, Analog reference : 0.06/60 Hz						
	Output Frequency Resolution	0.1Hz						
	Overload Capacity	150% rated output current for one minute						
	Frequency Setting Signal	0 to 10 VDC (20kΩ), 4 to 20mA (250Ω)						
	Accel/Decel Time	0.1 to 600 sec (accel/decel time set independently)						
	Braking Torque	Approx. 20% (up to 150% possible with optional braking resistor externally mounted, braking transistor built-in)						
	V/f Characteristic	Possible to set any V/F pattern						
Stall Prevention Level	Possible to set operating current							
Protective Functions	Instantaneous Overcurrent	Motor coasts to a stop at approx. 200% of inverter rated current.						
	Overload	Motor coasts to a stop after 1 minute at approx. 150% of inverter rated output current						
	Ground Fault	Protected by electronic circuit.						
	Motor Overload Protection	Electronic thermal overload relay						
	Overvoltage	Motor coasts to a stop if main circuit DC voltage exceeds 410 VDC						
	Undervoltage	Activated when DC voltage drops below 170 VDC						
	Momentary Power Loss	Stops if power loss is 15 ms or longer (preset prior to shipping) (operation can automatically restart after recovery from momentary power loss of up to approx. 2 seconds.) †						
	Cooling Fin Overheat	Protected by thermoswitch (only for units with fan)						
	Power Charge Indication	Charge lamp stays ON until main circuit DC voltage drops below 50 V.						

\* Our standard 4-pole motor is used to determine max. applicable motor output.

† To select "automatic restart after momentary power loss," set the 1st digit of constant (No. 46) to \*1. Automatic restart is available for up to 1 second for models of 1HP (0.75 kW) or less or up to 2 seconds for models of 2 HP (1.5 kW) or greater.

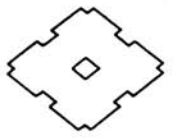


Voltage Class		230 V 3-phase						
Inverter Model AF-3002-		A10	A20	A40	A75	1A5	2A2	3A7
Operation conditions	Input Signals	Operation Signal		Forward run/reverse run by separate commands				
		Fault Reset		Releases protection while the function is operating.				
		Multifunction Input Selection		<b>Multifunction contact input : 2 of the following signals available to select.</b> External fault, multispeed command, jog operation, accel/decel time select, 3-wire sequence, external baseblock, speed search command				
	Output Signals	Operation State	Photo-coupler Output	<b>Multifunction output: two of the following signals available to select. (48 VDC, 50 mA or less)</b> (During running output, zero speed, frequency agreement, output frequency $\geq$ set value, during overtorque detection)				
			Fault Contact	1 NO/NC contact output (250 VAC 1 A, 30 VDC 1 A or less)				
	Built-in Function		The following setting-up is available : frequency reference bias/gain, upper/lower frequency limit. DC injection braking current/time at starting/stopping, full-automatic torque boost, frequency meter calibrating gain, fault retry, frequency jump, S-curve accel/decel.					
	Monitor Display Function	LED Status Display	Displays contents at RUN/STOP and protective function operation.					
		Digital Operator	Displays set frequency, output frequency, output current, direction of rotation, and the fault status.					
		Analog Output Monitor	Analog output (0 to 10 VDC). Possible to select output frequency or output current.					
	Protective Configuration		Enclosed wall-mounted type NEMA 1 (Open chassis type is also available.)					
Cooling Method		Self-cooling				Forced cooling		
Weight lb (kg)		2.4 (1.1)		4.4 (2)		7.28 (3.3)		
Environmental Conditions	Location		Indoor (protected from corrosive gases and dust)					
	Ambient Temperature		+14 to 104°F (-10 to +40°C) (not frozen)					
	Storage Temperature *		-4 to 140°F (-20 to +60°C)					
	Humidity		90% RH or less(non-condensing)					
	Vibration		Up to 9.8 m/s <sup>2</sup> (1G) at less than 20 Hz, Up to 2 m/s <sup>2</sup> (0.2 G) at 20 to 50 Hz.					

\*Temperature during shipping (for short period)

Voltage Class		240 V Single-phase						
Inverter Model AF-300S-		A10	A20	A40	A75	1A5	2A2	3A7
Operation conditions	Input Signals	Operation Signal		Forward run/reverse run by separate commands				
		Fault Reset		Releases protection while the function is operating.				
		Multifunction Input Selection		<b>Multifunction contact input : 2 of the following signals available to select.</b> External fault, multispeed command, jog operation, accel/decel time select, 3-wire sequence, external baseblock, speed search command				
	Output Signals	Operation State	Photo-coupler Output	<b>Multifunction output: two of the following signals available to select. (48 VDC, 50 mA or less)</b> (During running output, zero speed, frequency agreement, output frequency $\geq$ set value, during overtorque detection, etc.)				
			Fault Contact	1 NO/NC contact output (250 VAC 1 A, 30 VDC 1 A or less)				
	Built-in Function		The following setting-up is available : frequency reference bias/gain, upper/lower frequency limit. DC injection braking current/time at starting/stopping, full-automatic torque boost, frequency meter calibrating gain, fault retry, frequency jump, S-curve accel/decel.					
	Monitor Display Function	LED Status Display	Displays contents at RUN/STOP and protective function operation.					
		Digital Operator	Displays set frequency, output frequency, output current, direction of rotation, and the fault status.					
		Analog Output Monitor	Analog output (0 to 10 VDC). Possible to select output frequency or output current.					
	Protective Configuration		Enclosed wall-mounted type NEMA 1 (Open chassis type is also available.)					
Cooling Method		Self-cooling				Forced-cooling		
Weight lb (kg)		4.9 (2.2)		6.6 (3)		11.0 (5)		
Environmental Conditions	Location		Indoor (protected from corrosive gases and dust)					
	Ambient Temperature		+14 to 104°F (-10 to +40°C) (not frozen)					
	Storage Temperature *		-4 to 140°F (-20 to +60°C)					
	Humidity		90% RH or less(non-condensing)					
	Vibration		Up to 9.8 m/s <sup>2</sup> (1G) at less than 20 Hz, Up to 2 m/s <sup>2</sup> (0.2 G) at 20 to 50 Hz.					

\*Temperature during shipping (for short period)



Voltage Class		460 V 3-phase		
Inverter Model AF3004-		A20	A40	A75
Max. Applicable Motor Output HP (kW)*		0.25 (0.2)	0.5 (0.4)	1 (0.75)
Output Characteristics	Inverter Capacity kVA	0.9	1.4	2.2
	Rated Output Current A	1	1.6	2.6
	Max. Output Voltage V	3-phase, 380 to 460 V (proportional to input voltage)		
	Max. Output Frequency Hz	400 Hz (available by programming)		
Power Supply	Rated Input Voltage and Frequency	3-phase 380 to 460 V, 50/60 Hz		
	Allowable Voltage Fluctuation	± 10%		
	Allowable Frequency Fluctuation	± 5%		
Control Characteristics	Control Method	Sine wave PWM		
	Frequency Control Range	0.1 to 400 Hz		
	Frequency Accuracy (Temperature Change)	Digital command : 0.01% (+14 to 104°F, -10 to +40°C), Analog command : 0.1% (77±50°F, 25±10°C)		
	Frequency Setting Resolution	Digital operator reference : 0.1 Hz, Analog reference : 0.06/60 Hz		
	Output Frequency Resolution	0.1Hz		
	Overload Capacity	150% rated output current for one minute		
	Frequency Setting Signal	0 to 10 VDC (20kΩ), 4 to 20mA (250Ω)		
	Accel/Decel Time	0.1 to 600 sec (accel/decel time set independently)		
	Braking Torque	Approx. 20% (up to 150% possible with optional braking resistor externally mounted, braking transistor built-in)		
	V/f Characteristic	Possible to set any V/F pattern		
Stall Prevention Level	Possible to set operating current			
Protective Functions	Instantaneous Overcurrent	Motor coasts to a stop at approx. 200% of inverter rated current.		
	Ground Fault	Protected by electronic circuit.		
	Overload	Motor coasts to a stop after 1 minute at approx. 150% of inverter rated output current		
	Motor Overload Protection	Electronic thermal overload relay		
	Overvoltage	Motor coasts to a stop if main circuit DC voltage exceeds 820 VDC		
	Undervoltage	Activated when DC voltage drops below 420 VDC		
	Momentary Power Loss	Stops if power loss is 15 ms or longer (setting prior to shipping) (operation can automatically restart after recovery from momentary power loss of up to approx. 2 seconds.) <sup>†</sup>		
	Cooling Fin Overheat	Protected by thermosthich (only for fan cooled type)		
	Power Charge Indication	Charge lamp stays ON until main circuit DC voltage drops below 50 V.		

\*Our standard 4-pole motor is used to determine applicable motor output.

<sup>†</sup> To select "automatic restart after momentary power loss," set the 1st digit of constant (No. 46) to "1."

Automatic restart is available for up to 1 second for models of 1HP (0.75 kW) or less or up to 2 seconds for models of 2HP (1.5 kW) or greater.

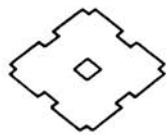
Voltage Class		460 V 3-phase		
Inverter Model AF-3004-		1A5	2A2	3A7
Max. Applicable Motor Output HP (kW)*		2 (1.5)	3 (2.2)	4 (3.7)
Output Characteristics	Inverter Capacity kVA	3.4	4.1	6.9
	Rated Output Current A	4	4.8	8
	Max. Output Voltage V	3-phase, 380 to 460 V (proportional to input voltage)		
	Max. Output Frequency Hz	400 Hz (available by programming)		
Power Supply	Rated Input Voltage and Frequency	3-phase 380 to 460 V, 50/60 Hz		
	Allowable Voltage Fluctuation	± 10%		
	Allowable Frequency Fluctuation	± 5%		
Control Characteristics	Control Method	Sine wave PWM		
	Frequency Control Range	0.1 to 400 Hz		
	Frequency Accuracy (Temperature Change)	Digital command : 0.01% (+14 to 104°F, -10 to +40°C), Analog command : 0.1% (77±50°F, 25±10°C)		
	Frequency Setting Resolution	Digital operator reference : 0.1 Hz, Analog reference : 0.06/60 Hz		
	Output Frequency Resolution	0.1Hz		
	Overload Capacity	150% rated output current for one minute		
	Frequency Setting Signal	0 to 10 VDC (20kΩ), 4 to 20mA (250Ω)		
	Accel/Decel Time	0.1 to 600 sec (accel/decel time set independently)		
	Braking Torque	Approx. 20% (up to 150% possible with optional braking resistor externally mounted, braking transistor built-in)		
	V/f Characteristic	Possible to set any V/F pattern		
Stall Prevention Level	Possible to set operating current			
Protective Functions	Instantaneous Overcurrent	Motor coasts to a stop at approx. 200% of inverter rated current.		
	Ground Fault	Protected by electronic circuit.		
	Overload	Motor coasts to a stop after 1 minute at approx. 150% of inverter rated output current		
	Motor Overload Protection	Electronic thermal overload relay		
	Overvoltage	Motor coasts to a stop if main circuit DC voltage exceeds 820 VDC		
	Undervoltage	Activated when DC voltage drops below 420 VDC		
	Momentary Power Loss	Stops if power loss is 15 ms or longer (setting prior to shipping) (operation can automatically restart after recovery from momentary power loss of up to approx. 2 seconds.) <sup>†</sup>		
	Cooling Fin Overheat	Protected by thermosthich (only for fan cooled type)		
	Power Charge Indication	Charge lamp stays ON until main circuit DC voltage drops below 50 V.		

\*Our standard 4-pole motor is used to determine applicable motor output.

<sup>†</sup> To select "automatic restart after momentary power loss," set the 1st digit of constant (No. 46) to "1."

Automatic restart is available for up to 1 second for models of 1HP (0.75 kW) or less or up to 2 seconds for models of 2HP (1.5 kW) or greater.





Voltage Class		460 V 3-phase			
Inverter Model AF-3004-		A20	A40	A75	
Operation Conditions	Input Signals	Operation Signal			Forward operation/Reverse operation by separate commands
		Fault Reset			Release protection while the function is operating.
		Multifunction Setting Input Selection			Multifunction contact input : 2 of the following signals available to select. External fault, multispeed command, jog operation, accel/decel time select, 3-wire sequence, external baseblock, speed search command
	Output Signals	Operation State	Photo-coupler Output		Multifunction output: two of the following signals available to select. (48 VDC, 50 mA or less) (During running output, zero speed, frequency agreement, output frequency $\geq$ set value, during overtorque detection, etc.)
			Fault Contact		1 NO/NC contact output (250 VAC 1 A, 30 VDC 1 A or less)
	Built-in Function		The following setting-up is available : frequency reference bias/gain, upper/lower frequency limit, DC injection braking current/time at starting/stopping, full-automatic torque boost, frequency meter calibrating gain, fault retry, frequency jump, S-curve accel/decel.		
	Monitor Display Function	LED Status Display		Displays contents at RUN/STOP and protective function operation.	
		Digital Operator (Option)		Displays set frequency, output frequency, output current, direction of rotation and the fault status.	
		Analog Output Monitor		Analog output (0 to 10 VDC). Possible to select output frequency or output current.	
	Protective Configuration		Enclosed wall-mounted type NEMA1 (open chassis type is also available.)		
Cooling Method		Self-cooling			
Weight		lb (kg)	4.41 (2.0)	4.4 (2.0) 6.6 (3)	
Environmental Conditions	Location		Indoor (protected from corrosive gases and dust)		
	Ambient Temperature		+14 to 104° F (-10 to +40°C) (not frozen)		
	Storage Temperature *		-4 to 140° F (-20 to +60°C)		
	Humidity		90% RH or less (non-condensing)		
	Vibration		Up to 9.8 m/s <sup>2</sup> (1G) at less than 20 Hz, Up to 2 m/s <sup>2</sup> (0.2G) at 20 to 50 Hz.		

\* Temperature during shipping (for short period)

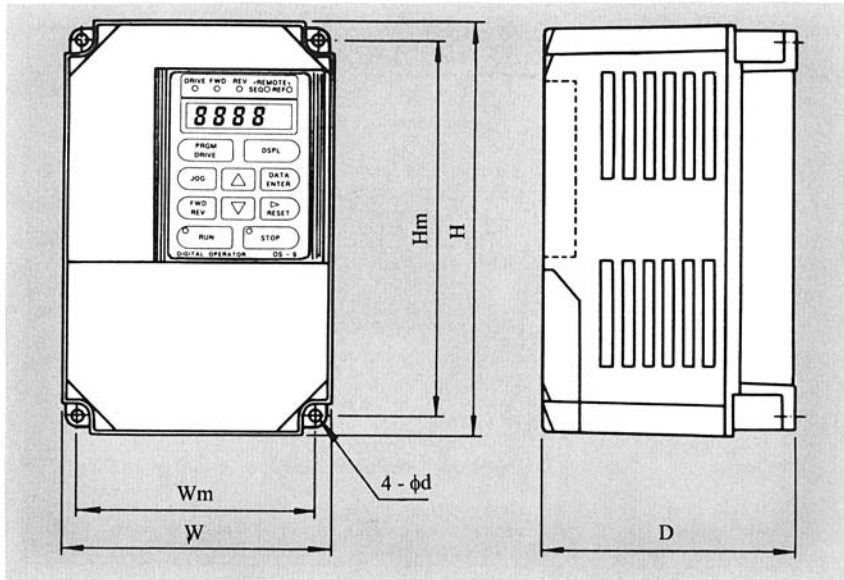
Voltage Class		460 V 3-phase			
Inverter Model AF-3004-		1A5	2A2	3A7	
Operation Conditions	Input Signals	Operation Signal			Forward operation/Reverse operation by separate commands
		Fault Reset			Release protection while the function is operating.
		Multifunction Setting Input Selection			Multifunction contact input : 2 of the following signals available to select. External fault, multispeed command, jog operation, accel/decel time select, 3-wire sequence, external baseblock, speed search command
	Output Signals	Operation State	Photo-coupler Output		Multifunction output: two of the following signals available to select. (48 VDC, 50 mA or less) (During running output, zero speed, frequency agreement, output frequency $\geq$ set value, during overtorque detection, etc.)
			Fault Contact		1 NO/NC contact output, (250 VAC 1 A, 30 VDC 1 A or less)
	Built-in Function		The following setting-up is available : frequency reference bias/gain, upper/lower frequency limit, DC injection braking current/time at starting/stopping, full-automatic torque boost, frequency meter calibrating gain, fault retry, frequency jump, S-curve accel/decel.		
	Monitor Display Function	LED Status Display		Displays contents at RUN/STOP and protective function operation.	
		Digital Operator (Option)		Displays set frequency, output frequency, output current, direction of rotation and the fault status.	
		Analog Output Monitor		Analog output (0 to 10 VDC). Possible to select output frequency or output current.	
	Protective Configuration		Enclosed wall-mounted type NEMA1 (open chassis type is also available.)		
Cooling Method		Self-cooling	Forced-cooling		
Weight		lb (kg)	6.6 (3)	10.14 (4.6)	
Environmental Conditions	Location		Indoor (protected from corrosive gases and dust)		
	Ambient Temperature		+14 to 104° F (-10 to +40°C) (not frozen)		
	Storage Temperature *		-4 to 140° F (-20 to +60°C)		
	Humidity		90% RH or less (non-condensing)		
	Vibration		Up to 9.8 m/s <sup>2</sup> (1G) at less than 20 Hz, Up to 2 m/s <sup>2</sup> (0.2G) at 20 to 50 Hz.		

\* Temperature during shipping (for short period)

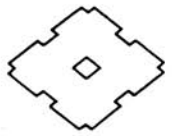


# SPECIFICATIONS

## 1.8.2 Dimensions in inches (mm)



Voltage	Ratings			Dimensions						Weight
	HP	kW		H	Hm	W	Wm	D	d	
200-230 3-Phase Input	1/8-1/2	0.1-0.4	in mm	5.91 150	5.43 138	4.13 105	3.66 93	3.94 100	0.20 5.0	2.43 lb 1.1 kg
	1-2	0.75-1.5	in mm	5.91 150	5.43 138	5.51 140	5.04 128	5.47 139	0.20 5.0	4.41 lb 2.0 kg
	3-5	2.2-3.7	in mm	7.87 200	7.32 186	5.51 140	4.96 126	6.69 170	0.22 5.5	7.28 lb 3.3 kg
200-230 1-Phase Input	1/8-1/2	0.1-0.4	in mm	5.91 150	5.43 138	5.51 140	5.04 128	5.47 139	0.20 5.0	4.9 lb 2.2 kg
	1-2	0.75-1.5	in mm	7.87 200	7.32 186	5.51 140	4.96 126	6.69 170	0.22 5.5	6.6 lb 3.0 kg
	3-5	2.2-3.7	in mm	7.87 200	7.28 185	7.48 190	6.89 175	7.48 190	0.24 6.0	11.0 lb 5.0 kg
380-460 3-Phase	1/8-1/2	0.2-0.4	in mm	7.87 200	7.32 186	5.51 140	4.96 126	4.72 120	0.22 5.5	4.41 lb 2.0 kg
	1-2	.75-1.5	in mm	7.87 200	7.32 186	5.51 140	4.96 126	6.69 170	0.22 5.5	6.61 lb 3.0 kg
	3-5	2.2-3.7	in mm	7.87 200	7.28 185	7.48 190	6.89 175	7.48 190	0.24 6.0	10.14 lb 4.6 kg



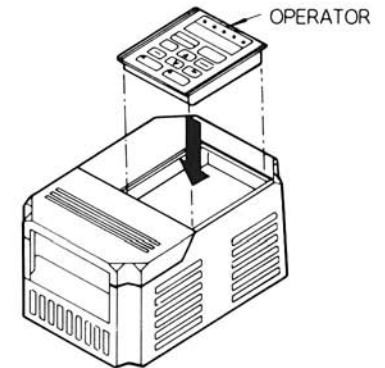
# DIGITAL OPERATOR

## 2. DIGITAL OPERATOR (OS-9)

The digital operator (OS-9), mounted directly on the inverter, is an AF-3000 exclusive use operation panel which can perform operation, change the control constants and monitor operation status.

### 2.1 DIGITAL OPERATOR MOUNTING/REMOVING

The digital operator can be mounted and removed in the following procedures. It cannot be mounted or removed during current conduction. Be sure to turn off the inverter power supply and mount/remove it after the charge lamp is extinguished. Unless otherwise, it may cause malfunction.



#### How to mount operator

Insert the operator in the direction of the arrow mark until it goes to the end.

#### How to remove operator

(1) Press in the direction of ① and, at the same time, lift it in the direction of ③ to remove the terminal cover.

(2) Lower the lever in the direction of ② and insert the minus driver in section A. Then lift the operator in the direction of ④ to remove it.

