SYSDRIVE 3G3IV

High-performance/Low noise
General-purpose Inverter

Complete Digital Features for Advanced Performance

The continuing demands for flexible production and advanced factory automation have created the need for greater functionality in machine tools, conveyors, and other on-site production equipment.To meet this need, OMRON offers the SYSDRIVE 3G3IV Series of Inverters.

Developed through the latest custom LSI and control technologies, these General-purpose models represent a new generation in Inverters. All models feature insulated gate bipolar transistors (IGBT) for greater performance, higher torque, and lower noise. And a large selection of software applications and special features ensures ease of operation.

If advanced machine performance and digital functionality is what you are looking for, the SYSDRIVE 3G3IV is waiting for you.

Innovation

IGBT Employed as the Switching Element for Higher Torque, Lower Noise, and Smoother Operation.

SYSDRIVE 3Is Concept

Intelligence

Special Features and Software Capabilities to Suit a Wide Array of Needs.

Interface

Network Capability Made Possible via SYSMAC Programmable Controllers: Complete Compatibility

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INNOVATION

Optimum Machine Operation for Today's Diverse Needs

All SYSDRIVE 3G3IV series models employ IGBT for switching. The high-speed switching of the IGBT has changed the very concept of inverter control. Precise waveform control coupled with the high performance of the IGBT provides numerous advantages such as quiet operation, high starting torque, smoother shaft rotation and improved reliability.

Current Wave Example at 10 Hz

3G3IV

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CONVENTIONAL PWM INVERTER

IGBT...

Insulated **G**ate **B**ipolar **T**ransistor

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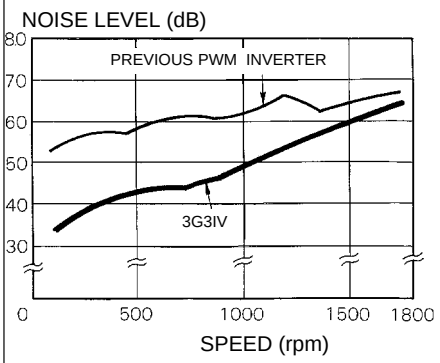
Features of IGBT (Insulated Gate Bipolar Transistor)

- Minimal-loss, high-speed switching up to larger ampere ratings
- Direct drive through logic circuitry because of voltage-driven element
- Can accommodate 460-V power supply

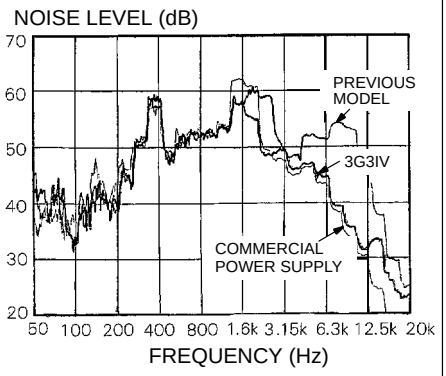
As Quiet as Running with Commercial Power

Employing our original asynchronous high-carrier technique for sine wave PWM control, we have succeeded in eliminating the motor noises that plagued conventional PWM inverters.
Running noise has been reduced by approximately 20 dB as compared to conventional PWM inverters. This quiet operation assures a more comfortable working environment.

Motor Noise Comparison



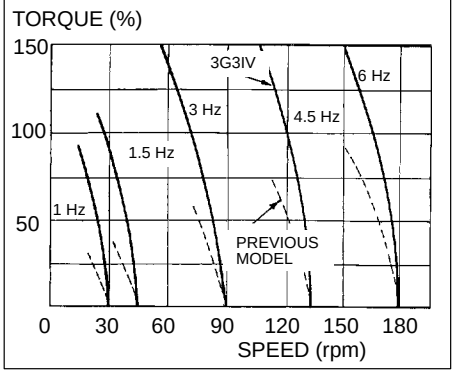
Motor Noise Analysis when Controlled by Inverters (at 60 Hz)



High Torque at Low Speeds Ensures Tripless Operation

The full-automatic torque boost feature based on our unique torque control operation and exact sine wave drive achieves 150% or greater torque even at 1/20 speed. This ensures maximum performance whenever it is needed. This tough, no-stall inverter won't trip even if overloaded.

High Torque Assured Even at Low Speeds

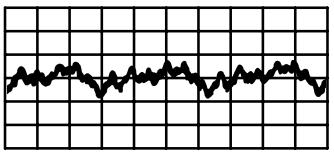


INNOVATION

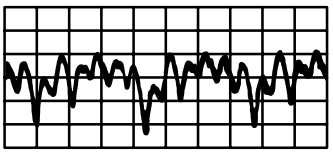
Smooth Rotation at Extra Low Speeds

The OMRON sine wave control greatly reduces torque ripple and assures smooth operation at very low speeds. This allows maximum utilization of the driven machine's speed range.

Smooth Rotation Realized (4.5 rpm/DIV., 1.5 Hz)



3G3IV



Previous Model

Tough, Reliable Inverters

Standard control circuits, custom LSI with original high integration design, state-of-the-art surface mounting technology (SMT), and IGBT direct drive technique all combine to provide a compact and highly reliable inverter.

Compact, Highly Reliable Control Board with SMT

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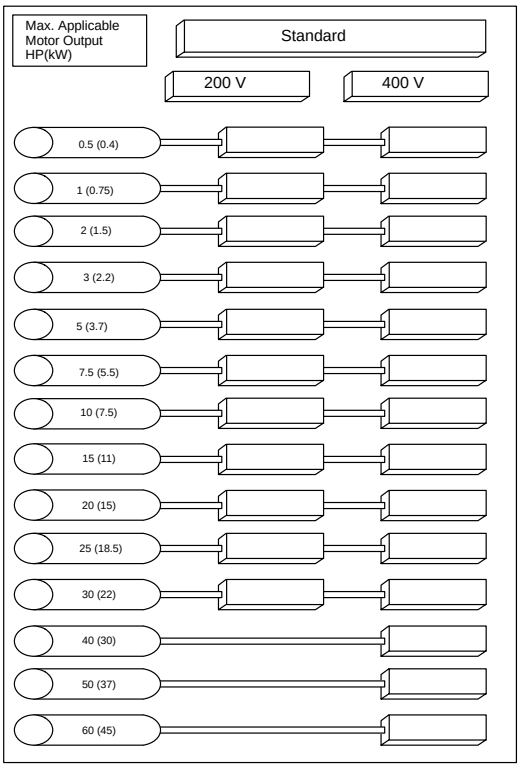
A Variety of Models

The low-noise series consists of a variety of inverters from which you can select the optimum model for your machine.



INTELLIGENCE

The versatility of the new fully-digital software inverter satisfies numerous needs and enables you to up-grade your machines. A broad function selection allows rapid and significant changes in your machine's performance.

Advanced Functions through a Wide Range of

Consolidated Monitoring Functions for Operating State

In addition to the conventional monitoring items, frequency input, output frequency, output current, output voltage, DC voltage, output power, and I/O terminal state are also indicated digitally to facilitate monitoring of machine operation. Alarm contents are retained in memory even at power off.

Output Frequency Indication Example

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Digital indication of operating frequency makes checking of operating state easy.

Motor Current Indication Example

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Direct indication of motor current allows easy verification of loads.

DC Voltage Indication Example

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Input power can be checked by one-touch operation. The rectified value of input voltage can be read directly.

Alarm Message Indication Example

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Should an error occur, the cause is indicated and kept in memory. Error history is retained for troubleshooting.

Output Power Display Example

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Output power is read on digital display or output terminals so that load status is clear. Energy savings can be easily monitored with the output power display.

Input Terminal Status Display Example

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Contact states "open"and "closed" are read directly from the display to simple system troubleshooting.

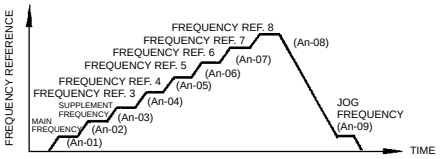
Basic and Application Functions Ready to Use

Over 200 intelligent functions including overtorque detection, reverse prevention, and frequency upper and lower limiter are supplied as standard. The following new functions are also provided:

- External control of accel/decel (by switching or analog input)
- External signal to change bias value for frequency commands.

Simple Multi-step Operation

Operation speed can be set by up to nine steps by switching four-contact input signals. Various sequence operations can also be easily set.

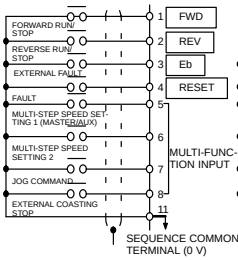


High-grade I/O Functions

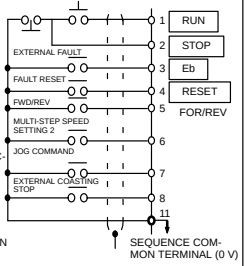
The advanced multi-function I/O terminals adapt the inverter to each machine. Just set system constants with the digital operator to customize the I/O terminals.

Input Signal

Standard Setting (2 Wire Sequence)



Customized Setting Example (3 Wire Example)

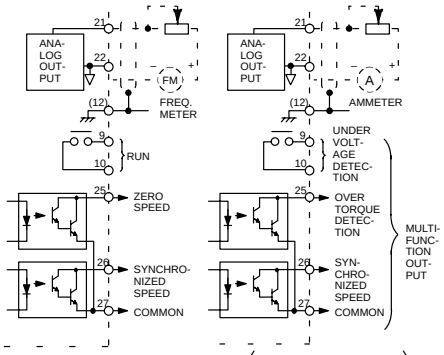


Note: (Sn-15 = 00)

Output Signal

Standard Setting

Customized Setting Example



Note: Sn-05 = 1XXX
Sn-20 = 07
Sn-21 = 0B

For other options refer to pages 12 and 13.

INTELLIGENCE

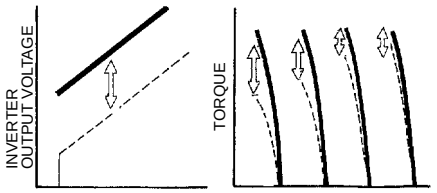
Software Support

A Well-stocked Software Library Customizes the Inverter for Each Machine

A complete software library enables optimum machine utilization.

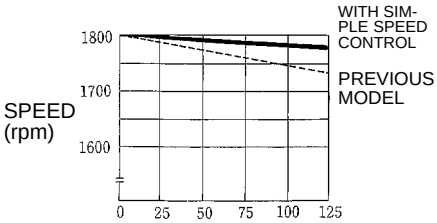
- Adjusts the motor voltage to the optimum level by exact calculation of torque required for the load. This assures continuous operation even under overload conditions.

Full-range, Fully Automatic Torque Boost



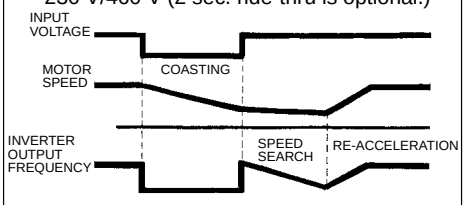
- Guarantees high-precision and constant operation regardless of load fluctuations. Slip compensation circuit reduces motor slip to less than 1%.

Example: 200 V, 10 HP (7.5 kW), 4-pole Motor



Quickly Recovers from External Problems and Continues Operation to Assure Final Product Quality

- Two seconds momentary power loss ride-thru.
  0.5 to 1 sec. for less than 3 HP (2.2 kW), 230 V/460 V (2 sec. ride-thru is optional.)



(OPERATION CONTINUATION AFTER MOMENTARY POWER LOSS)

- Automatic restart after fault
  After a fault occurs, the microcomputer performs self diagnosis and restarts automatically without stopping motor. (Up to 10 retries)
- Accel/deccel
  The stall prevention at running function ensures tripless operation.

Output Frequency and Motor Current Monitors

A scaleable analog output for frequency or current measurement is provided as a standard. Changing the ammeter output is also possible by setting system constants. For applications requiring more feedback, an optional 3G3IV-PAO08 board allows three signals to be output. If two analog output signals are required, use option 3G3IV-PAO08 or 3G3IV-PAO12.

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Output Frequency Meter

Enhanced Output Interface

Two new open collector output signals (a total of three output signals including the contact output) together with the multi-function output selection make possible more enhanced control of machines.

- At zero-speed, at set speed, at set speed with hysterisis on decel ramp or accel ramp. (as standard)
- Frequency detection (detects a set frequency, below or above)
- Overtorque detected (machine overloaded)
- Low voltage detected (Input voltage insufficient)
- Others

Load Operation Indication

The output frequency can be scaled such that many units such as motor speed, load axis speed (rpm), line speed (m/min), and flow (m^3/min) may be indicated.

Motor Speed Display (1800 rpm)

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Easy Set-up

Accel/decel time, frequency reference, and frequency meter scale, among others, can be adjusted while the machine is running. This speeds start-up and reduces down time for system tuning.

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Easy Link with PC by Digital Setting

Easy to Link with PC (Programmable Controller)

Motor speed can be precisely set with an external signal. Either 4 BCD digits (binary code decimal) or eight binary bits can be used (on-board option).

Digital Reference Card 3G3IV-PDI08

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Remote Controlled Operation

Operation can be controlled at the machine side or from a remote control panel. (within 3 m)

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A Variety of Options

The frequency input options and output monitoring options allow high-precision control and monitoring.

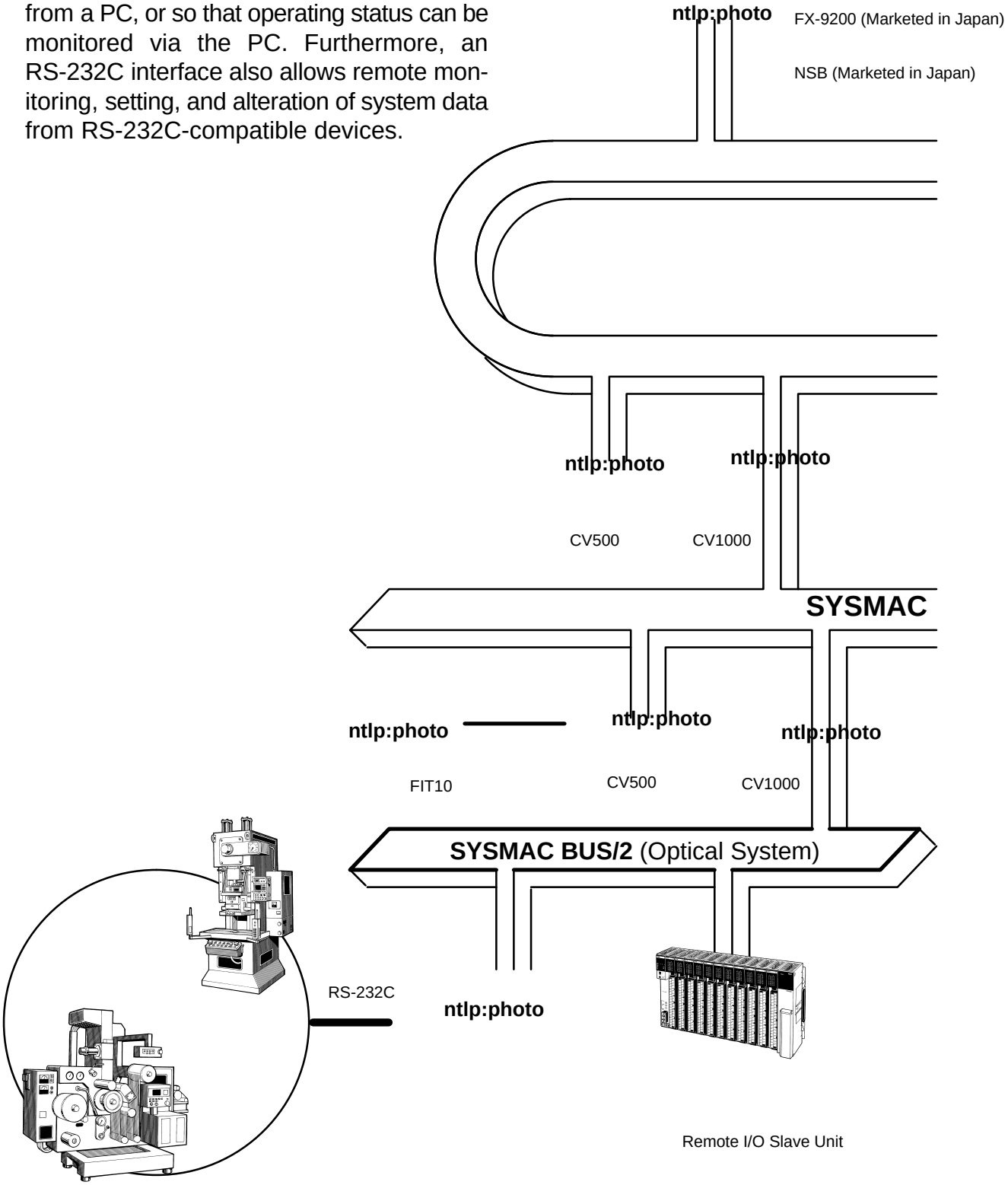
- Frequency reference option cards:
  High-precision analog input
  3G3IV-PAI14U (14 bits)
  3G3IV-PAI14B (13 bits with direction)
  General-purpose digital input
  3G3IV-PDI08 (two BCD digits or eight binary bits)
- Monitoring option card
  Analog monitor
  3G3IV-PAO08 (0 to 10 VDC, 8 bits, 2-point output)
  3G3IV-PAO12 (0 to 10 VDC, 12 bits, 2-point output)
  Pulse monitor
  3G3IV-PPO36F (1F, 6F, 10F, 36F, +12 V)

Braking option, AC reactor, and noise filter are offered as options.

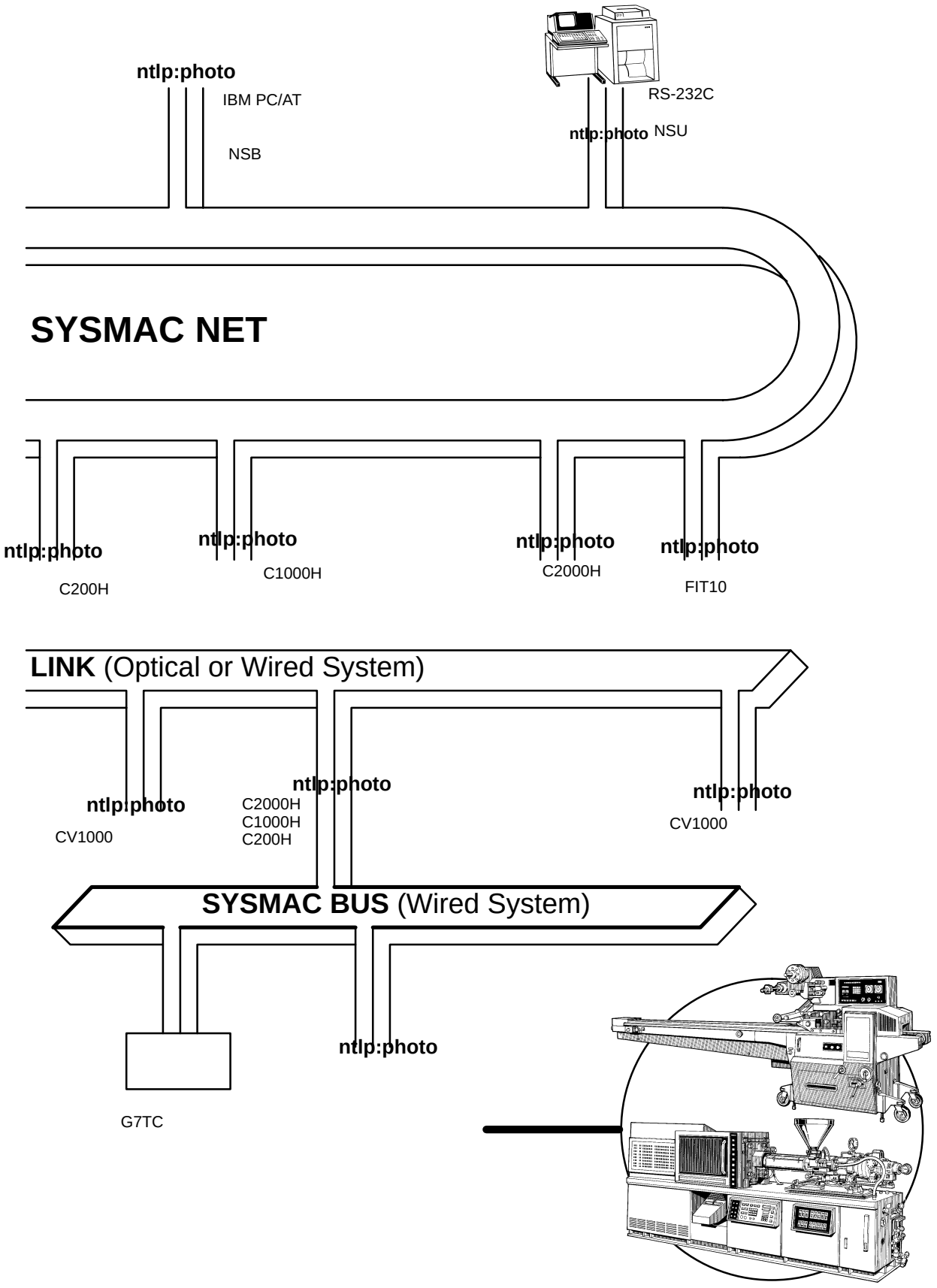
INTERFACE

SYSMAC Compatibility for Network Configurations

Interface Cards for both Optical and Wired SYSMAC BUS/2* and Wired SYSMAC BUS* Remote I/O Systems enable communications with SYSMAC C-series and CV-series PCs so that data can be transferred from a PC, or so that operating status can be monitored via the PC. Furthermore, an RS-232C interface also allows remote monitoring, setting, and alteration of system data from RS-232C-compatible devices.



INTERFACE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IBM PC/AT
NSB
RS-232C
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SYSMAC NET
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C200H
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C1000H
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C2000H
ntlp:photo
FIT10
LINK (Optical or Wired System)
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CV1000
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C2000H
C1000H
C200H
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CV1000
SYSMAC BUS (Wired System)
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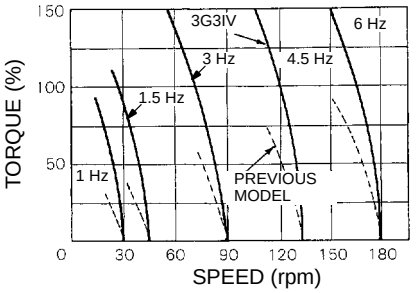
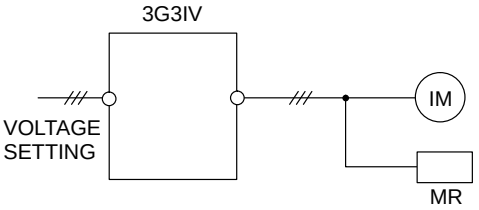
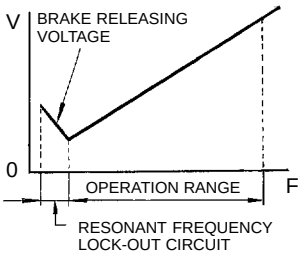
G7TC

Solving Customer Problems via the 3I Concept

<table>
<tr><th>Conventional Inverter Shortcomings</th><th>SYSDRIVE 3G3IV Solutions</th></tr>
<tr><td>Low starting torque
Inverter of the next higher capacity must be employed for applications requiring high starting torque.</td><td>150% torque established at 1/20 of the rated speed.
Motor torque increases up to 150% over full-speed range due current waveform correction by asynchronous PWM method and automatic torque compensation.
 

Torque characteristics of 5HP (3.7 kW) IM driven by model 3G3IV-A2037-E</td></tr>
<tr><td>Typical Problem:
Cannot vary speeds of the excitation release type motor with a brake.</td><td>3G3IV solution:
Easily starts motor with a brake. The brake can be securely tripped.
 



The brake trip voltage can be controlled externally.</td></tr>
<tr><td>Difficult to vary speeds of the vibrating type URAS motor.
Inverter of one or two classes greater capacity is applied for the eccentric-weight-incorporating type motor.</td><td>Automatic torque boost effectively solves the eccentric torque problem.
Inverter of the same capacity as the motor can be used for cost-savings.
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 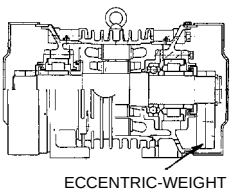
ECCENTRIC-WEIGHT</td></tr>
<tr><td>Frequent overcurrent when starting a high frequency motor.
Because of very low inductance of a high frequency motor, ripple current tends to be high and overcurrent may frequently occur. To compensate for this, an inverter of one or two classes greater capacity and output AC reactor is normally used.</td><td>Original, asynchronous, high-carrier frequency, PWM technique improves the motor characteristics.
This eliminates the need for an AC reactor to reduce ripple current.
Current waveform example
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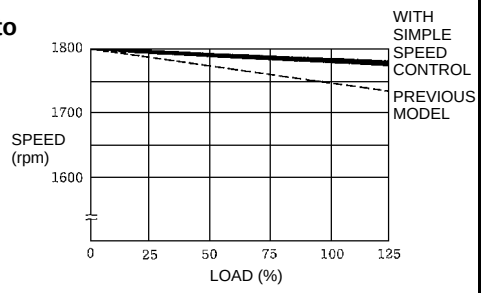
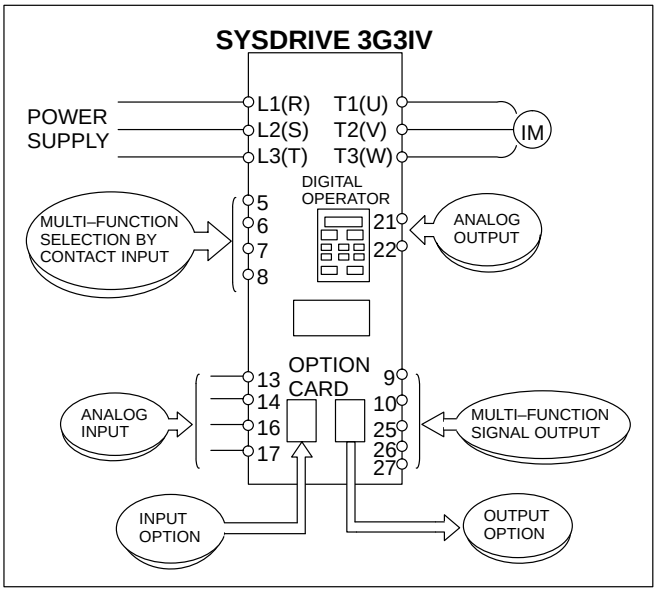
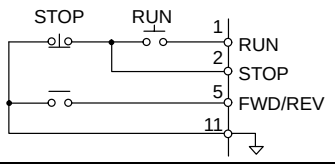
</table>

Conventional Inverter Shortcomings	SYSDRIVE 3G3IV Solutions
Motor speed control cannot be improved beyond the SYSDRIVE 3G3IV's performance without using PG or TG feedback (closed-loop).	**Built-in sensorless speed control function reduces speed fluctuations to 1/3 to 1/5 of rated speed.** Precisely calculates load from motor current and corrects slip. For precise slip correction by this function, motor rated current, no load current, and rated slip are required. 
Operation cannot continue after momentary power loss.	**Continues operation during a momentary power loss of less than 2 seconds.** **ntlp:photo** **OPERATION CONTINUATION AFTER MOMENTARY POWER LOSS**
Hard to adjust starting time. Setting a shorter time that determined by motor torque and load WK^2 (GD^2) may cause acceleration failure resulting in OC or OL activation.	**Stall prevention during acceleration** Automatically adjusts the acceleration rate according to the current of the accelerating motor to prevent stalling or overcurrent condition. **ntlp:photo** **STALL PREVENTION DURING ACCELERATION**
Stall by overload in operation. Momentary overload condition during inverter operation causes pull-out condition, resulting in motor torque reduction operation failure due to overcurrent or overload protection activation.	**Stall prevention during operation** If overloaded during operation, automatically reduces frequency. In this case, motor outputs the maximum torque. When the load returns to normal, frequency accelerates to the previous set value and operation continues. **ntlp:photo** **STALL PREVENTION DURING OPERATION**

The SYSDRIVE 3G3IV flexible inverter incorporates a variety of application know-how. Select special functions from a multitude of possibilities to perfectly match your machine.



Function name	Target market	Application	Operation, advantages	SYSDRIVE 3G3IV setting			
				Contact input	Analog I/O	Signal output	Control constant setting
Speed search operation	Inertia load drive such as blower, winder, etc.	Synchronize with the coasting motor	Starts the inverter at the specified frequency, automatically detects the synchronization point, and leads the operation to the operation frequency. No speed detector is required. It is no longer necessary to stop the motor before starting, the operation efficiency for the customer is greatly improved.	YES			Sn-15 to 18
DC injection braking before operation	Blower, pump, etc. which have wind-mill effects	Starting the free running motor	When the direction of the free running motor is unfixed, the above speed search operation function is difficult to use. In these, the motor can be stopped by DC injection braking, and be restarted by the inverter. The operation is completely automatic.	YES			Cn-11 Cn-13
Commercial power source/ inverter switch-over operation	Blower, pump, mixer, extruder, etc.	Automatic switching between commercial power source and inverter	Switching of commercial power source to inverter or inverter to commercial power source is done without stopping the motor. The operation efficiency for the customer is improved. When the inverter size is decided by the starting capacity (as in the extruder), this function can be used to reduce the inverter capacity.	YES			Sn-15 to 18
Energy saving operation	Precision machine tool	Energy saving, Low vibration	Full power is output during accel/decel. When it reaches a constant speed, the output voltage is automatically reduced to the preset value. Mainly applied to reduce the vibration in precision machine tools.	YES			Sn-15 to 18 bn-09
Multi-step speed operation	Transportation machine, etc.	Schedule operation under fixed speed command and positioning stop	Multi-stop operation can be set by setting the contact combinations, so the connection with PC becomes very easy. When combined with jog speed can also allow simple positioning.	YES			Sn-15 to 18 An-01 to 09
Accel/decel time changeover operation	Machine tool, etc.	The accel/decel time changeover with an external signal	The two kinds of accel/decel times are switched by an external contact signal. Necessary for switching operation of 2 machines with different functions by a single inverter. Also used in emergency stopping applications.	YES			Sn-15 to 18 bn-01, 02 bn-03, 04
3-wire sequence	General	Simple configuration of control circuit	Operation can be accomplished using a momentary push-button switch. 	YES			Sn-15 to 18
Operating site selection	General	Operability	Operation and settings can be selected while the inverter is online. (digital operator/external instruction, signal input/output).	YES			Sn-04 Sn-15 to 18
Fault trip retry operation	Air conditioner, etc.	Improvement of operation reliability	When the inverter trips, it first begins to coast, and then it immediately is diagnosed by computer, resets automatically, and returns to the original operation speed by speed search operation. Up to 10 retry counts can be selected.				Sn-04 Sn-15 to 18
Quick stop without braking resistor (DC injection braking stop)	High-speed router, etc.	DC injection braking of induction motor	DC injection braking is performed from top speed. The duty is 5% or less. Can generate 50% to 70% of the braking torque. Economic, because a braking resistor is not necessary. Has advantage of mounting in completely closed cabinets.				Sn-04 Cn-11 Cn-12

Function name	Target market	Application	Operation, advantages	SYSDRIVE 3G3IV setting			
				Contact input	Analog I/O	Signal output	Control constant setting
Excess torque detect setting operation	Blower, cutter, extruder, etc.	Protection of machine Improvement of continuous operation reliability Torque limit	The inverter can be switched to coasting or motor speed reducing mode as soon as it reaches a certain preset torque level. Machine (especially cutter) protection can be done without using special peripheral devices. When used in a blower application the operation frequency can be automatically reduced to the load balancing point, according to the overload condition, and prevent overload tripping.			YES	Sn-07, 10 Cn-26, 27 Cn-30
Upper/lower frequency limit operation	Pump, blower	Motor speed limit	The upper and lower limits of the motor speed can be set independently. No peripheral operation units. The command signal bias and gain can also be set independently.				Cn-14, 15
Prohibit setting of specific frequency (frequency jump control)	General machines	Prevent mechanical vibration in the equipment	The motor simply passes through the preset speed, and continuous running cannot be done at this speed. This function is used to avoid the mechanical resonance point of the equipment.				Cn-16, Cn-19
Carrier frequency setting	General machines	Lower noise, eliminates resonance	The carrier frequency can be set to reduce the acoustic noise from the motor and machine system.				Cn-23 to 25
Load speed display	General	Monitor function enhancement	Can indicates motor speed (rpm), machine speed loaded (rpm), line speed (m/min), etc.				Cn-20
Run signal	General	Motor with mechanical brake operation	“Closed” during operation. “Open”during coasting to a stop. Can be used as interlock contact point during stop.			YES	Sn-20 to 22
Zero-speed signal	Machine tools	Zero-frequency interlock	Can be used as tool exchange signal.			YES	Sn-20 to 22
Speed agreed signal	Machine tools	Command speed reach interlock	The contact closes when inverter output frequency reaches the set value. Can be used as an interlock for lathes, etc.			YES	Sn-20 to 22
Excess torque signal	Blower, cutter, extruder, etc.	Protection of machine, improvement of operation continuation reliability	Works when “overtorque setting operation” is accomplished. Can be used as a torque limiter.			YES	Sn-07 Sn-20 to 22 Cn-26, 27
Low voltage signal	General	System protection for undervoltage	This contact is “closed” only when tripped by low voltage. Can be used as power loss detection relay for the system power loss countermeasure.			YES	Sn-20 to 22
Free unintentionally speed agreed signal	General	Command speed agreed interlock	The contact closes when the speed agrees at arbitrary frequency command.			YES	Cn-21, 22
Output frequency detection 1	General	Gear change interlock etc.	The contact closes at an arbitrary output frequency and above.			YES	Sn-20 to 22 Cn-21, 22
Output frequency detection 2	General	Gear change interlock etc.	The contact closes at an arbitrary output frequency and below.			YES	Sn-20 to 22 Cn-21, 22
Base block signal	General	Operation interlock, etc.	Always “close” when the inverter output is off.			YES	Sn-20 to 22
Damping resistor protection	General	Preventive maintenance	“Close” when an overheat of a built-in braking resistor or a braking transistor error is detected.			YES	Sn-11
Analog input signal	General	Operability	Functions as supplementary frequency reference. Also used for fine control of input reference, external control of accel/decel time.		YES		Sn-19
Analog output signal	General	Monitor function enhancement	Either a frequency meter or ammeter can be used.		YES		Sn-05
Analog input	General	Operability	Enables external operation with high resolution instructions. Also enables normal and reverse operation using positive or negative voltage signals.	Option card is used.			Sn-25
Digital input	General	Operability	Enables operation with 8-bit digital signals. (Two digit BCD or eight binary bits. Easily connects to NC or PC.)				Sn-26
Analog output	General	Monitor function enhancement	Monitors the output frequency, motor current, output voltage, and DC voltage.				Sn-28
Digital output	General	Operation enhancement	Indicates output frequency using a pulse counter. Indicates error through discrete output.				Sn-27

Standard Specifications

Inverter Model 3G3IV		200 to 230 V															
		A2004	A2007	A2015	A2002	A2037	A2055	A2075	B2110	B2150	B2180	B2220	B2300	B2370	B2450	B2550	B2750
Max. Applicable Motor Output HP (kW)*	Rated output	0.5 (0.4)	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)
	Max. continuous output	---	---	---	---	---	---	---	---	---	---	---	50 (37)	60 (45)	75 (55)	100 (75)	125 (90)
Output Characteristics	Inverter Capacity KVA	1.4	2.1	2.7	4.1	6.9	10.3	13.7	20.6	27.4	34	41	54	68	78	95	130
	Rated Output Current A	3.2	4.8	6.4	9.6	16	24	32	48	64	80	96	130	160	183	224	300
	Max. Continuous Output Current *2 A	3.6	5.4	7.2	10.8	18	27	36	54	72	90	108	146	180	205	252	337
	Max. Output Voltage	3-Phase, 200/208/220/230 V (Proportional to input voltage)															
	Rated Output Frequency	50, 60, 72, 90, 120, 180 Hz (up to 400 Hz available)															
Power Supply	Rated Input Voltage and Frequency	3-Phase, 200/208/220 V, 50 Hz 200/208/220/230 V, 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	Digital command: 0.01% (+14° to 104°F/–10° to 40°C) Analog command: 0.1% (77° ±18°F/25° ±10°C)															
	Frequency Resolution	Digital operator reference: 0.1 Hz. Analog reference: 0.06 Hz/60 Hz															
	Output Frequency Resolution	0.01 Hz (1/30000)															
	Overload Capacity	150% rated output current for one minute											150% rated output current for one minute/ 110% max. continuous output current for 1 minute				
	Frequency Setting Signal	0 to 10 VDC (20 kΩ), 4 to 20 mA (250 Ω) 0 to ±10 V (OPTIONAL)															
	Accel/Decel Time	0.1 to 6000 sec (Accel/Decel time setting independently)															
	Braking Torque	Approx. 20%															
	No. of V-f Patterns (Total of 16)	4: For general purpose 4: For high starting torque 1: For adjustable pattern 4: For fans and pumps 3: For machine tools.											4: For general purpose 4: For high starting torque 4: For fans and pumps 3: For machine tools.				
Protective Functions	Motor Overload Protection	Electronic thermal overload relay															
	Instantaneous Overcurrent	Motor coasts to stop at approx. 200% rated current.															
	Blown Fuse Protection	Motor coasts to a stop by blown-fuse.															
	Overload	Motor coasts to a stop after 1 minute at 150% rated output current.											Motor coasts to a stop for 1 minute at 150% rated output current/motor coasts to a stop for 1 minute at 110% max. continuous output current.				
	Overvoltage	Motor coasts to a stop if converter output voltage exceeds 400 V.															
	Undervoltage	Motor coasts to a stop if converter output voltage drops to 210 V or below.															
	Momentary Power Loss	Immediately stop by 15 ms and above longer power loss. (Continuous system operation during power loss less than 2 sec is equipped as standard.)*3 Setting mode before shipment.															
	Fin Overheat	Thermostat															
	Stall Prevention	Stall prevention at acceleration/deceleration and constant speed operation															
	Ground Fault	Provided by electronic circuit															
	Power Charge Indication	Charge lamp stays ON until bus voltage drops below 50 V.															
Environmental Conditions	Location	Indoor (protected from corrosive gases and dust)															
	Ambient Temperature	+14° to 104°F (–10° to +40°C) (not frozen)											Enclosed type, totally-enclosed type: +14° to 104°F (–10° to +40°C) Open chassis type: +14° to 122°F (–10° to +50°C) (not frozen)				
	Storage Temperature *4	–4° to 140°F (–20° to +60°C)															
	Humidity	90% RH (non-condensing)															
	Vibration	9.81 m/s^2 (1 G) less than 20 Hz, up to 0.2 G at 20 to 50 Hz															

* Standard 4-pole motor is used for max applicable motor output.

*2 Allowable values for the applications not requiring overload.

*3 For Models of 4.1 kVA or less, continuous system operation during power loss less than 1 sec. Two seconds ride-thru available as option.

*4 Temperature during shipping (for short period)

Inverter Model 3G3IV		380 to 460 V																				
		A4004	A4007	A4015	A4022	A4037	A4055	A4075	B4110	B4150	B4180	B4220	B4300	B4370	B4450	B4550	B4750	B411K	B416K	B418K	B422K	B430K
Max. Applicable Motor Output HP (kW)*	Rated output	0.5 (0.4)	1 (0.75)	2 (1.5)	3 (2.2)	5 (3.7)	7.5 (5.5)	10 (7.5)	15 (11)	20 (15)	25 (18.5)	30 (22)	40 (30)	50 (37)	60 (45)	75 (55)	100 (75)	150 (110)	200 (160)	250 (185)	300 (220)	400 (300)
	Max. continuous output	---	---	---	---	---	---	---	---	---	---	---	---	---	---	100 (75)	150 (110)	200 (160)	250 (185)	300 (220)	400 (300)	500 (355)
Output Characteristics	Inverter Capacity KVA	1.4	2.2	3.4	4.1	6.9	10.3	13.7	20.6	27.4	34	41	54	68	82	110	140	200	250	290	380	510
	Rated Output Current A	1.6	2.6	4.0	4.8	8	12	16	24	32	40	48	64	80	96	128	165	224	300	340	450	600
	Max. Continuous Output Current *2 A	1.8	2.9	4.5	5.4	9	13.5	18	27	36	45	54	72	90	108	144	180	252	337	380	506	675
	Max. Output Voltage	3-Phase, 380/400/415/440/460 V (Proportional to input voltage)																				
	Rated Output Frequency	50, 60, 72, 90, 120, 180 Hz (up to 400 Hz available)																				
Power Supply	Rated Input Voltage and Frequency	3-Phase, 380/400/415/440/460 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	Digital command: 0.01% (+14° to 104°F/–10° to 40°C) Analog command: 0.1% (77° ±18°F/25° ±10°C)																				
	Frequency Resolution	Digital operator reference: 0.1 Hz. Analog reference: 0.06 Hz/60 Hz																				
	Output Frequency Resolution	0.01 Hz (1/30000)																				
	Overload Capacity	150% rated output current for one minute														150% rated output current for one minute/110% max. continuous output current for one minute						
	Frequency Setting Signal	0 to 10 VDC (20 kΩ), 4 to 20 mA (250 Ω) 0 to ±10 V (OPTIONAL)																				
	Accel/Decel Time	0.1 to 6000 sec (Accel/Decel time setting independently)																				
	Braking Torque	Approx. 20%																				
	No. of V-f Patterns (Total of 16)	4: For general purpose 4: For high starting torque 1: For adjustable pattern 4: For fans and pumps 3: For machine tools.														4: For general purpose 4: For high starting torque 4: For fans and pumps 3: For machine tools.						
Protective Functions	Motor Overload Protection	Electronic thermal overload relay																				
	Instantaneous Overcurrent	Motor coasts to stop at approx. 200% rated current.																				
	Blown Fuse Protection	Motor coasts to a stop by blown-fuse.																				
	Overload	Motor coasts to a stop after 1 minute at 150% rated output current.														Motor coasts to a stop for 1 minute at 150% rated output current/motor coasts to a stop for 1 minute at 110% max. continuous output current.						
	Overvoltage	Motor coasts to a stop if converter output voltage exceeds 800 V (700 V).*3																				
	Undervoltage	Motor coasts to a stop if converter output voltage drops to 420 V or below.																				
	Momentary Power Loss	Immediately stop by 15 ms and above momentary power loss. (Continuous system operation during power loss less than 2 sec is equipped as standard.)*4 Setting made before shipment.																				
	Fin Overheat	Thermostat																				
	Stall Prevention	Stall prevention at acceleration/deceleration and constant speed operation																				
	Ground Fault	Provided by electronic circuit																				
	Power Charge Indication	Charge lamp stays ON until bus voltage drops below 50 V.																				
Environmental Conditions	Location	Indoor (protected from corrosive gases and dust)																				
	Ambient Temperature	+14° to 104°F (–10° to +40°C) (not frozen)														Enclosed type, totally-enclosed type: +14° to 104°F (–10° to +40°C) Open chassis type: +14° to 122°F (–10° to +50°C) (not frozen)						
	Storage Temperature *5	–4° to 140°F (–20 to +60°C)																				
	Humidity	90% RH (non-condensing)																				
	Vibration	9.81 m/s^2 (1 G) less than 20 Hz, up to 0.2 G at 20 to 50 Hz																				

* Standard 4-pole motor is used for max applicable motor output.

*2 Allowable values for the applications not requiring overload.

*3 800 V for input voltage (Cn-01) more than 400 V and 700 V for less than 400 V.

*4 For Models of 4.1 kVA or less, continuous system operation during power loss less than 1 sec. Two seconds ride-thru available as option.

*5 Temperature during shipping (for short period)

Protective Enclosures

Voltage	Max. Applicable Motor Output HP (kW)	SYSDRIVE 3G3IV		Enclosures (Specify the enclosure type when ordering.)	
		Inverter Capacity kVA	Model	Open Chassis Type (IEC IP00)	Enclosed Type (NEMA 1)
200 to 230 V	0.5 (0.4)	1.4	3G3IV-A2004-□	Available by removing the upper and lower cover of enclosed type.	Conform to NEMA 1.
	1 (0.75)	2.1	3G3IV-A2007-□		
	2 (1.5)	2.7	3G3IV-A2015-□		
	3 (2.2)	4.1	3G3IV-A2022-□		
	5 (3.7)	6.9	3G3IV-A2037-□		
	7.5 (5.5)	10.3	3G3IV-A2055-□		
	10 (7.5)	13.7	3G3IV-A2075-□		
	15 (11)	20.6	3G3IV-B2110-□	Conform to IEC IP00.	---
	20 (15)	27.4	3G3IV-B2150-□		
	25 (18.5)	34	3G3IV-B2185-□		
	30 (22)	41	3G3IV-B2220-□		
	40 (30)	54	3G3IV-B2300-□		
	50 (37)	68	3G3IV-B2370-□		
	60 (45)	78	3G3IV-B2450-□		
	75 (55)	95	3G3IV-B2550-□		
	100 (75)	130	3G3IV-B2750-□		
380 to 460 V	0.5 (0.4)	1.4	3G3IV-A4004-□	Available by removing the upper and lower cover of enclosed type.	Conform to NEMA 1.
	1 (0.75)	2.2	3G3IV-A4007-□		
	2 (1.5)	3.4	3G3IV-A4015-□		
	3 (2.2)	4.1	3G3IV-A4022-□		
	5 (3.7)	6.9	3G3IV-A4037-□		
	7.5 (5.5)	10.3	3G3IV-A4055-□		
	10 (7.5)	13.7	3G3IV-A4075-□		
	15 (11)	20.6	3G3IV-B4110-□	Conform to IEC IP00.	---
	20 (15)	27.4	3G3IV-B4150-□		
	25 (18.5)	34	3G3IV-B4185-□		
	30 (22)	41	3G3IV-B4220-□		
	40 (30)	54	3G3IV-B4330-□		
	50 (37)	68	3G3IV-B4370-□		
	60 (45)	82	3G3IV-B4450-□		
	75 (55)	110	3G3IV-B4550-□		
	100 (75)	140	3G3IV-B4750-□		
	150 (110)	200	3G3IV-B411K-□		
	200 (160)	250	3G3IV-B416K-□		
	250 (185)	290	3G3IV-B418K-□		
	300 (220)	380	3G3IV-B422K-□		
	400 (300)	510	3G3IV-B430K-□		

ENCLOSURES

Open Chassis Type (IEC IP00)

Mounted in a customer's enclosure. Constructed so that openings do not permit direct or inadvertent access to live parts by personnel.

Enclosed Type (NEMA 1)

Provides a clean, and ventilated environment within the enclosure. Front and rear panels are firmly secured (e.g. front, rear, right, left, top, bottom). Openings provided for ventilation, etc. are small enough to prevent inadvertent access by personnel

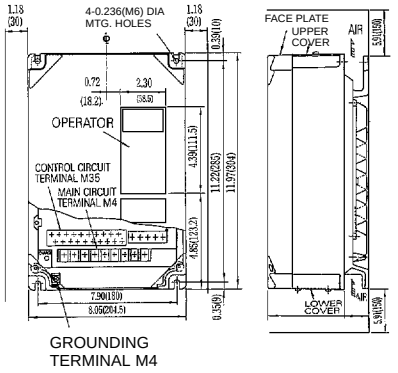
MODEL DESIGNATION

3G3IV-A2004-EV1

- Inverter
- Specifications
  A: Enclosed wall-mounting
  B: Panel-mounting
  P: Option
- Voltage
  2: 200 V
  4: 400 V
- Applicable maximum motor output
  004: 0.4 kW
  007: 0.75 kW
  to
  30K: 300 kW
- E: European specifications
  blank: Japanese specifications
- V2: Version capable of communicating with PC (optional card required)

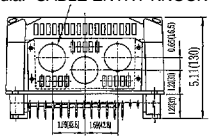
200 to 230 V

0.5 to 2 HP (0.4 to 1.5 kW) (Model 3G3IV-A2004-□ to A2015-□) Enclosed Wall-mounted Type



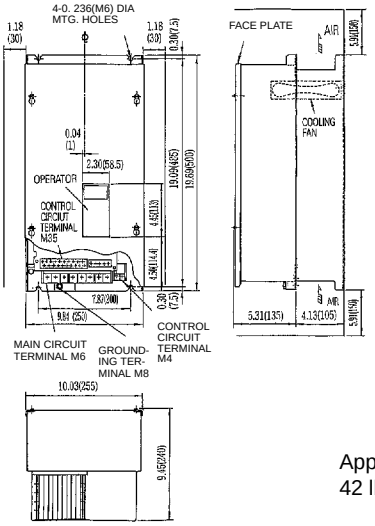
Approx. Weight 9 lb (4 kg)

3-35 dia: CABLE ENTRY KNOCK OUT



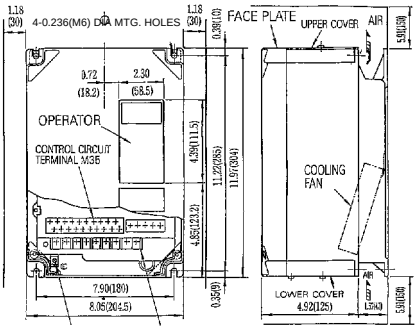
Note: To use the unit in the panel, remove the upper and lower covers.

15 HP (11 kW) (Model 3G3IV-B2110-□) Open Chassis Type



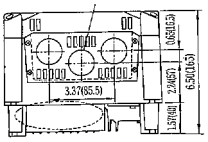
Approx. Weight: 42 lb (19 kg)

3 to 5 HP (2.2 to 3.7 kW) (Model 3G3IV-A2022-□ to A2037-□) Enclosed Wall-mounted Type



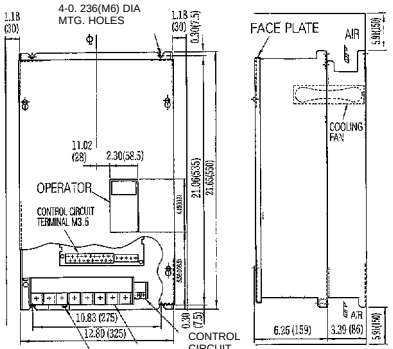
Approx. Weight 15 lb (7 kg)

3-35 dia: CABLE ENTRY KNOCK OUT



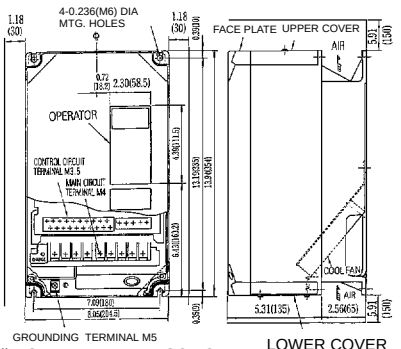
Note: To use the unit in the panel, remove the upper and lower covers.

20 HP (15 kW) (Model 3G3IV-A2150-□) Open Chassis Type



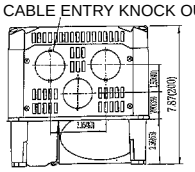
Approx. Weight: 53 lb (24 kg)

7.5 to 10 HP (5.5 to 7.5 kW) (Model 3G3IV-A2055-□ to A2075-□) Enclosed Wall-mounted Type



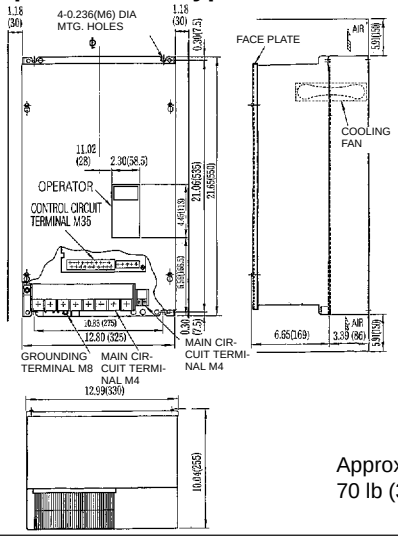
Approx. Weight: 22 lb (10 kg)

3-44 dia. CABLE ENTRY KNOCK OUT



Note: To use the unit in the panel, remove the upper and lower covers.

25 to 30 HP (18.5 to 22 kW) (Model 3G3IV-A2185-□ to A2220-□) Open Chassis Type

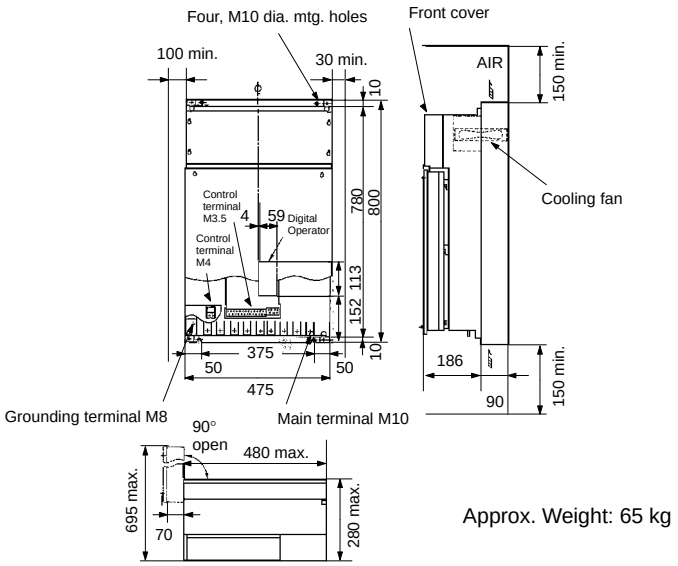


Approx. Weight: 70 lb (32 kg)

DIMENSIONS: INCH (mm)

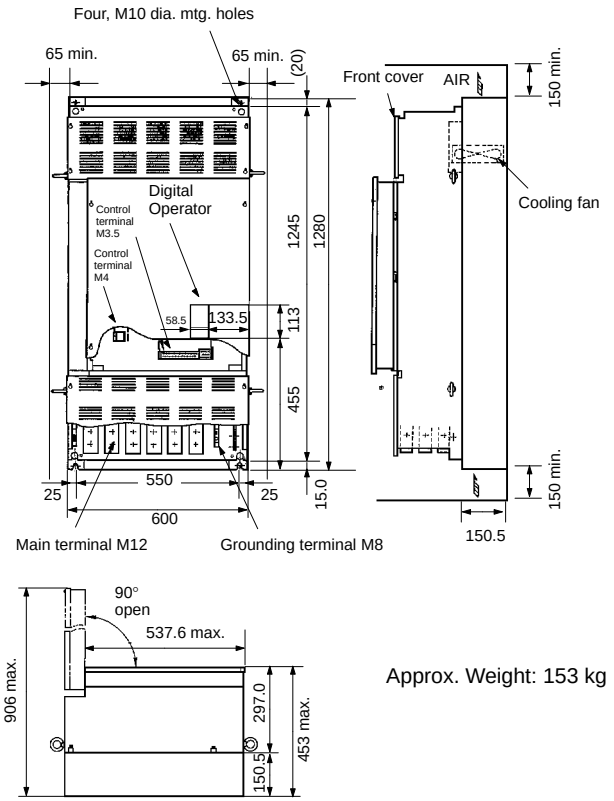
200 to 230 V

60/75 HP (45/55 kW) (Model 3G3IV-B2450-E to B2550-E) Open Chassis Type



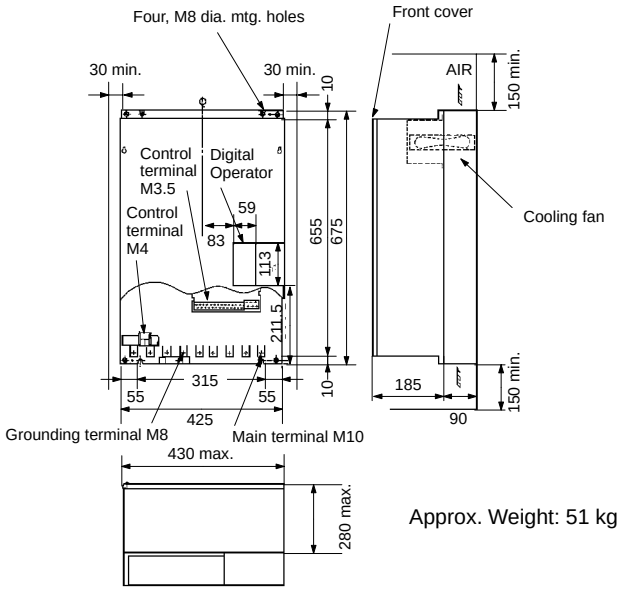
Approx. Weight: 65 kg

100 HP (75 kW) (Model 3G3IV-B2750-E) Open Chassis Type



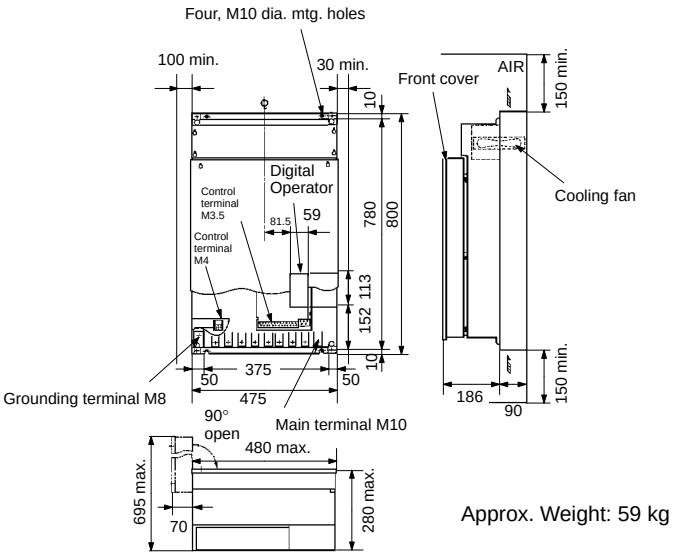
Approx. Weight: 153 kg

40 HP (30 kW) (Model 3G3IV-B2300-E) Open Chassis Type



Approx. Weight: 51 kg

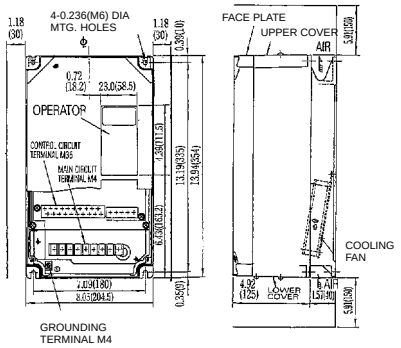
50 HP (37 kW) (Model 3G3IV-B2370-E) Open Chassis Type



Approx. Weight: 59 kg

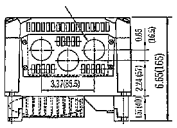
380 to 460 V

0.5 to 3 HP (0.4 to 2.2 kW) (Model 3G3IV-A4004-□ to A4022-□) Enclosed Wall-mounted Type



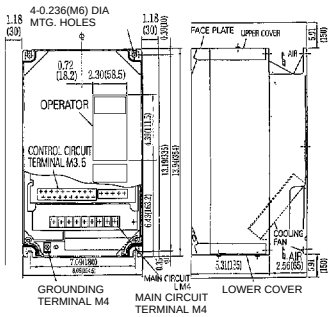
Approx. Weight: 15 lb (7kg)

3-44 dia. CABLE ENTRY KNOCK OUT



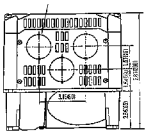
Note: To use the unit in the panel, remove the upper and lower covers.

5 to 10 HP (3.7 to 7.5 kW) (Model 3G3IV-A4037-□ to A4075-□) Enclosed Wall-mounted Type



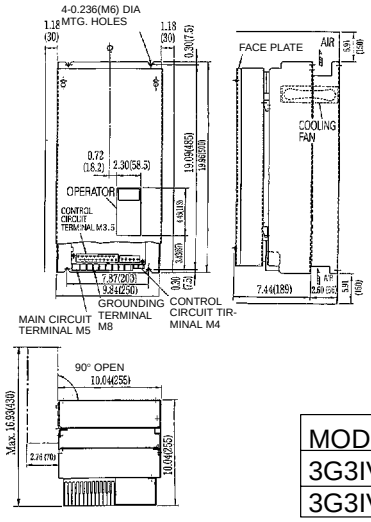
Approx. Weight: 22 lb (10 kg)

THREE, 44DIA. CABLE ENTRY KNOCK OUT



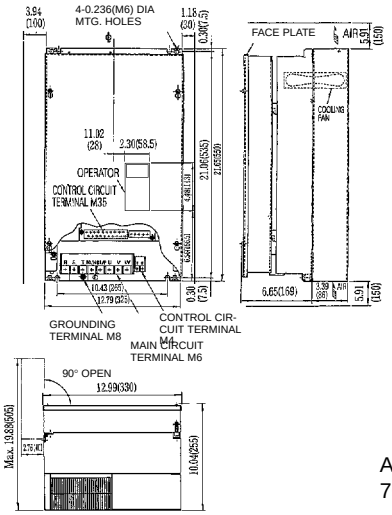
Note: To use the unit in the panel, remove the upper and lower covers.

15 to 20 HP (11 to 15 kW) (Model 3G3IV-B4110-□ to B4150-□) Enclosed Wall-mounted Type



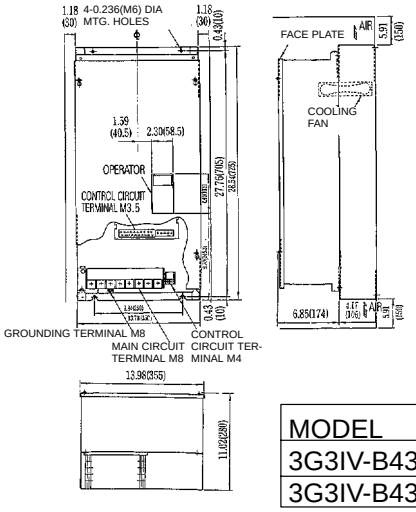
MODEL	WEIGHT
3G3IV-B4110-□	46 lb (21 kg)
3G3IV-B4150-□	48 lb (22 kg)

25 to 30 HP (18.5 to 22 kW) (Model 3G3IV-B4185-□ to B4220-□) Open Chassis Type



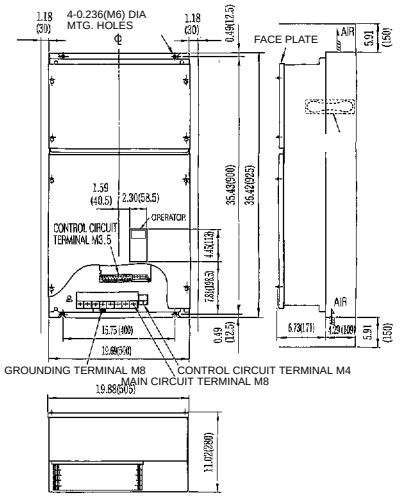
Approx. Weight: 70 lb (32 kg)

40 to 50 HP (30 to 37 kW) (Model 3G3IV-B4300-□ to B4370-□) Open Chassis Type



MODEL	WEIGHT
3G3IV-B4300-□	93 lb (42 kg)
3G3IV-B4370-□	99 lb (45 kg)

60 HP (45 kW) (Model 3G3IV-B4450-□) Open Chassis Type

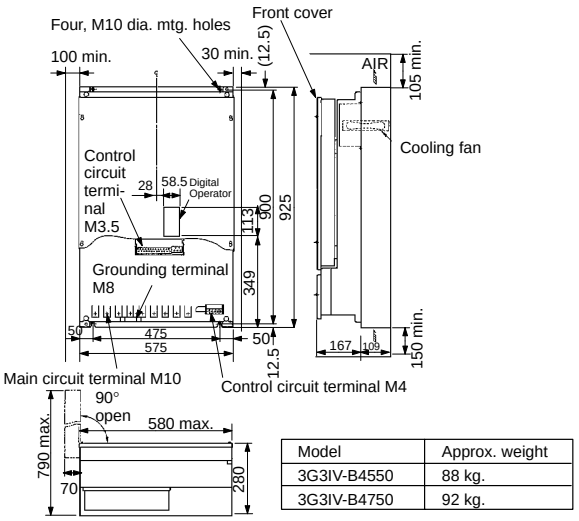


Approx. Weight: 165 lb (75 kg)

DIMENSIONS: INCH (mm)

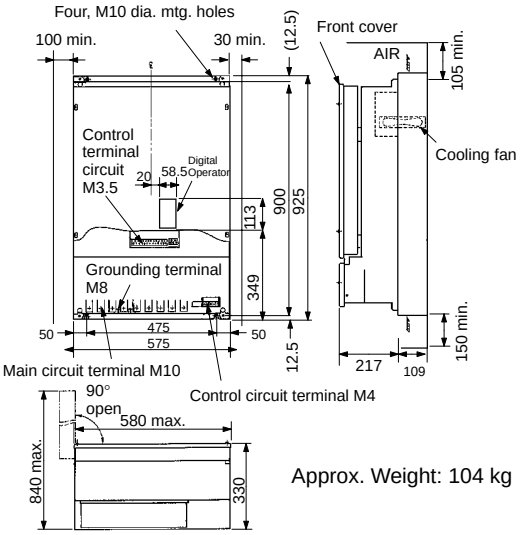
380 to 460 V

75 to 100 HP (55 to 75 kW) (Model 3G3IV-B4550-E to B4750-E) Open Chassis Type



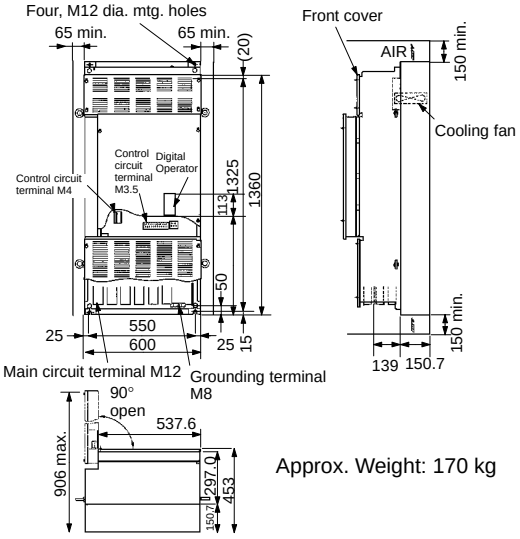
Model	Approx. weight
3G3IV-B4550	88 kg.
3G3IV-B4750	92 kg.

150 HP (110 kW) (Model 3G3IV-B411K-E) Open Chassis Type



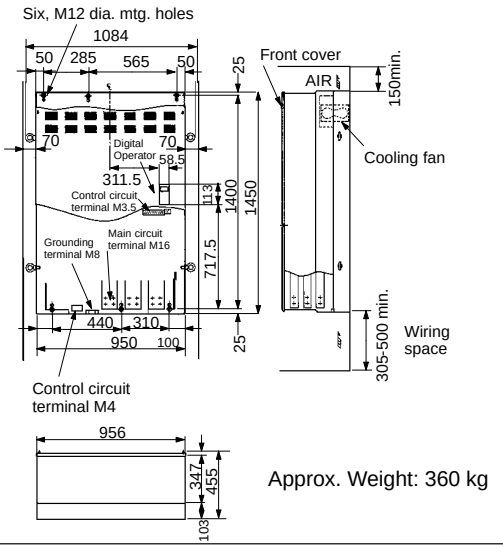
Approx. Weight: 104 kg

200 HP (160 kW) (Model 3G3IV-B416K-E) Open Chassis Type



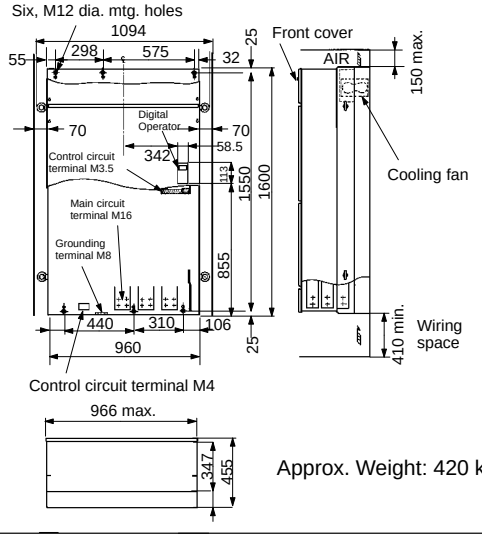
Approx. Weight: 170 kg

250/300 HP (185/220 kW) (Model 3G3IV-B418K-E to B422K-E) Open Chassis Type



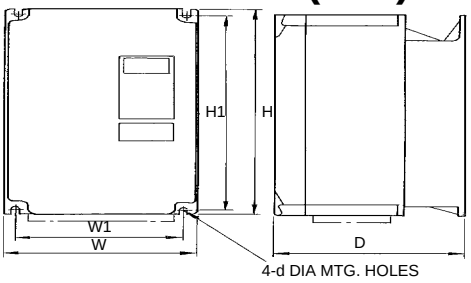
Approx. Weight: 360 kg

400 HP (300 kW) (Model 3G3IV-B430K-E) Open Chassis Type



Approx. Weight: 420 kg

Dimensions: Inch (mm)



*The dimensions to the left shows Model 3G3IV-A2075-E

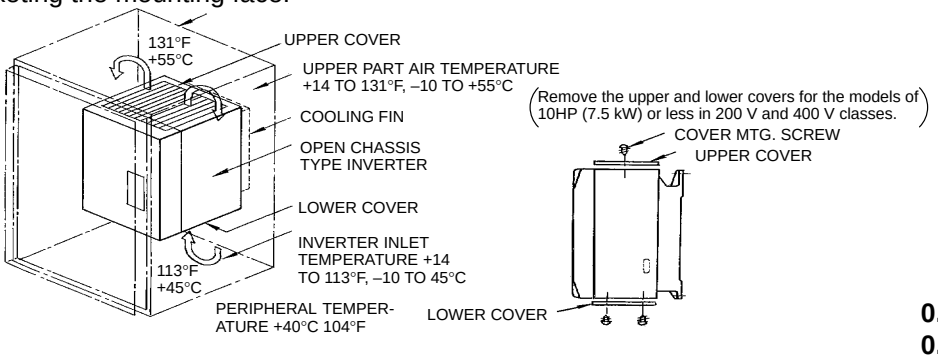
**Remove the upper and lower covers of the enclosed type units for the shaded areas.

LIST OF MAIN DIMENSIONS

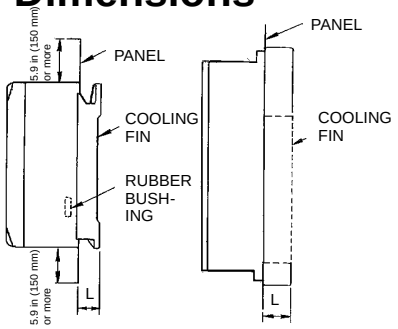
Voltage	Enclosure	Model 3G3IV-□□□□-□	Dimensions in mm (inch)						Approx. weight kg (lb)
			W	H	D	W1	H1	d	
200 to 230 V	Open chassis type	A2004, A2007, A2015	205 (8.07)	305 (12.01)	130 (5.12)	180 (7.09)	285 (11.22)	M6	4 (9)
		A2022, A2037	205 (8.07)	305 (12.01)	165 (6.50)	180 (7.09)	285 (11.22)	M6	7 (15)
		A2055, A2075	205 (8.07)	355 (14.00)	200 (7.87)	180 (7.09)	335 (13.19)	M6	10 (22)
		B2110	250 (9.84)	500 (19.69)	240 (9.45)	200 (7.87)	485 (19.09)	M6	19 (42)
		B2150	325 (12.79)	550 (21.65)	245 (9.65)	275 (10.83)	535 (21.06)	M6	24 (53)
		B2185, B2220	325 (12.79)	550 (21.65)	255 (10.04)	275 (10.83)	535 (21.06)	M6	32 (70)
		B2300	425 (16.73)	675 (26.57)	280 (11.02)	315 (12.40)	655 (25.79)	M8	51 (112)
		B2370	475 (18.70)	800 (31.50)	280 (11.02)	375 (14.76)	780 (30.71)	M10	59 (130)
		B2450, B2550	475 (18.70)	800 (31.50)	280 (11.02)	375 (14.76)	780 (30.71)	M10	65 (143)
		B2750	600 (23.62)	1,280 (50.39)	453 (17.83)	550 (21.65)	1,245 (49.02)	M12	153 (337)
	Enclosed type (NEMA 1)	A2004, A2007, A2015	205 (8.07)	305 (12.01)	130 (5.12)	180 (7.09)	285 (11.22)	M6	4 (9)
		A2022, A2037	205 (8.07)	305 (12.01)	165 (6.50)	180 (7.09)	285 (11.22)	M6	7 (15)
		A2055, A2075	205 (8.07)	355 (14.00)	200 (7.87)	180 (7.09)	335 (13.19)	M6	10 (22)
380 to 460 V	Open chassis type	A4004, A4007, A4015, A4022	205 (8.07)	355 (14.00)	165 (6.50)	180 (7.09)	335 (13.19)	M6	7 (15)
		A4037, A4055, A4075	205 (8.07)	355 (14.00)	200 (7.87)	180 (7.09)	335 (13.19)	M6	10 (22)
		B4110, B4150	250 (9.84)	500 (19.69)	255 (10.04)	200 (7.87)	485 (19.09)	M6	22 (48)
		B4180, B4220	325 (12.79)	550 (21.65)	255 (10.04)	265 (10.43)	535 (21.06)	M6	32 (70)
		B4300, B4370	350 (13.78)	725 (28.54)	280 (11.02)	250 (9.84)	705 (27.76)	M8	45 (99)
		B4450	500 (19.69)	925 (36.42)	280 (11.02)	400 (15.75)	900 (35.43)	M10	75 (165)
		B4550	575 (22.64)	925 (36.42)	280 (11.02)	475 (18.70)	900 (35.43)	M10	88 (194)
		B4750	575 (22.64)	925 (36.42)	280 (11.02)	475 (18.70)	900 (35.43)	M10	92 (203)
		B411K	575 (22.64)	925 (36.42)	330 (12.99)	475 (18.70)	900 (35.43)	M10	104 (229)
		B416K	600 (23.62)	1,360 (53.54)	453 (17.83)	550 (21.65)	1,325 (52.17)	M12	170 (374)
		B418K, B422K	950 (37.40)	1,450 (57.09)	435 (17.13)	---	1,400 (55.12)	M12	360 (793)
		B430K	960 (37.97)	1,600 (62.99)	455 (17.91)	---	1,550 (61.02)	M12	420 (925)
	Enclosed type (NEMA 1)	A4004, A4007, A4015, A4022	205 (8.07)	355 (14.00)	165 (6.50)	180 (7.09)	335 (13.19)	M6	7 (15)
		A4037, A4055, A4075	205 (8.07)	355 (14.00)	200 (7.87)	180 (7.09)	335 (13.19)	M6	10 (22)

Easy Modification to Gasketed Cabinet

Open chassis cabinet incorporating heat sink can be easily changed to gasketed enclosure by relocating the heat sink outside the casting and gasketing the mounting face.



Inverter Unit Cooling Fin Dimensions



0.5 to 2 HP **25 to 400 HP**
0.4 to 15 kW **18.5 to 300 kW**

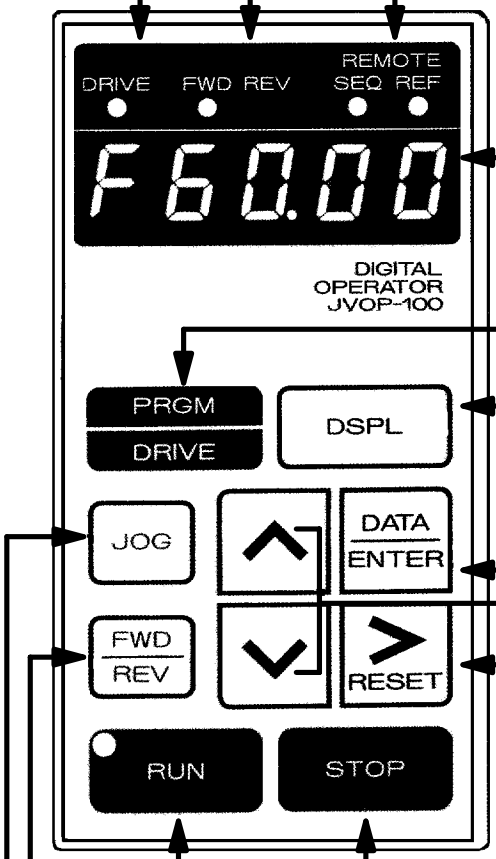
200 to 230 V

Model 3G3IV-□□□□-□	A2004 A2007	A2015	A2022 A2037	A2055 A2075	B2110	B2150 to B2220	B2030 to B2055	B2075
Cooling fin Dimensions L max. mm (inch)	31 (1.22)	31 (1.22)	40 (1.57)	65 (2.56)	105 (4.13)	86 (3.39)	90 (3.54)	150.7 (5.93)
Number of rubber bushings	---	4	6	2	---	---	---	---

200 to 230 V

Model 3G3IV-□□□□-□	A4004 to A4022	A4037 to A4075	B4110 B4150	B4185 B4220	B4300 B4370	B4450	B4550 to B411K	B416	B418K to B430K
Cooling fin Dimensions L max. mm (inch)	40 (1.57)	65 (2.56)	66 (2.60)	86 (3.39)	106 (4.17)	109 (4.29)	109 (4.29)	150.7 (5.93)	103 (4.06)
Number of rubber bushings	---	2	---	---	---	---	---	---	---

Note: For installation on a totally-enclosed type control panel, rubber bushing may be required depending on the model. Procure necessary rubber bushings separately.



Mode Display LED

Red lamp lights in DRIVE mode and goes out in PRGM mode.

Red lamp lights at FWD run.

Red lamp lights at REV run.

Red lamp lights when controlled by external terminal commands.
SEQ: When RUN/STOP signal is through terminals.
REF: When frequency ref. is through terminals.

Display

Displays set value of each function or monitoring values such as frequency and output current. (5 digits)

Mode Selection Key

Depressing this key changes mode. (DRIVE or PRGM)

Display Selection Key

Depressing this key changes the display.
See next page for explanation.

Read/Write Key

Depressing this key recalls and displays indicated data from memory.
Depressing the second time enters displayed data into memory.

Numeral Change Key

Changes numeral such as set values and constant signals.
∧ : Increment key
∨ : Decrement key

Digit Selection Key

Selects numerical digits.
This key resets operation at faults.

Run Command Key

Run command key to operate by digital operator.
Effective only in drive mode.

STOP command is input. (Motor stops in either mode.)

Red lamp lights by depressing STOP.

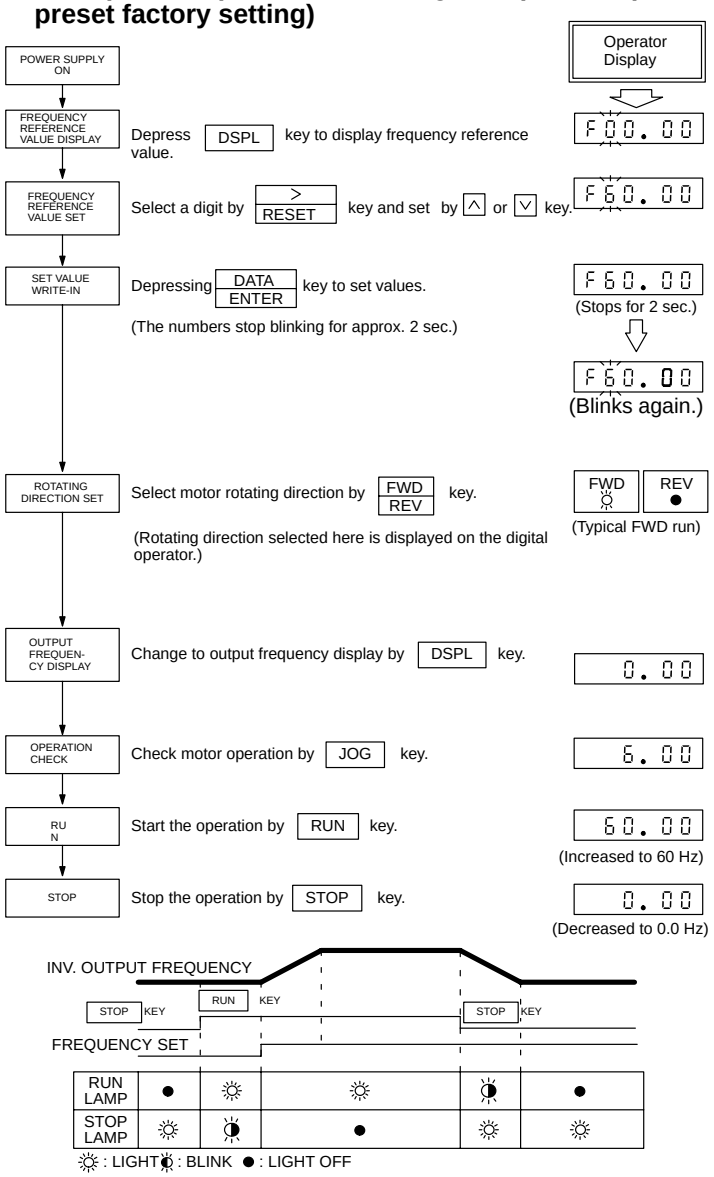
Selects FWD or REV run.
Effective only in DRIVE mode.

While depressing this key, jog speed is selected.
Effective only in DRIVE mode.

- **Integrated monitoring facility guarantees safe operation**

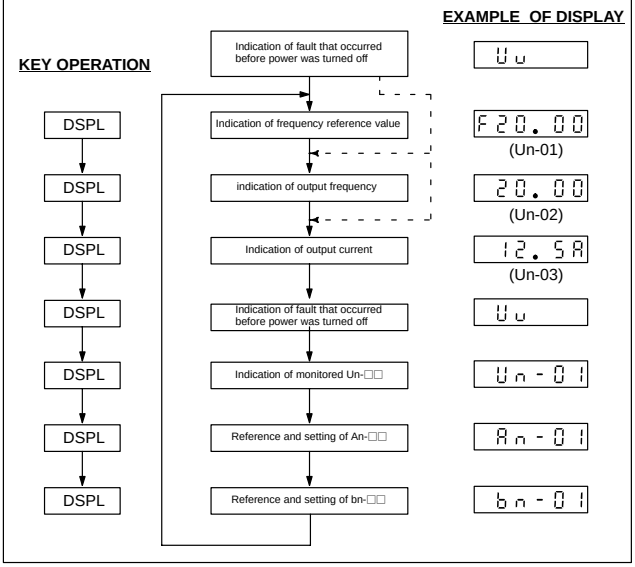
Un-□□	Monitor Item	LED Indication
01	Frequency Reference	20. 00
02	Output Frequency	20. 00
03	Output Current	12. 5a
04	Voltage Command	200U
05	DC Voltage (VPN)	pn270
06	Output Power (±display)	– 2. 5
07	Status of Input Terminal	(11111111
08	Status of Output Terminal	% 111
09	Check of LED	88888
10	PROM No.	10013

- **Example of operation with digital operator (with preset factory setting)**

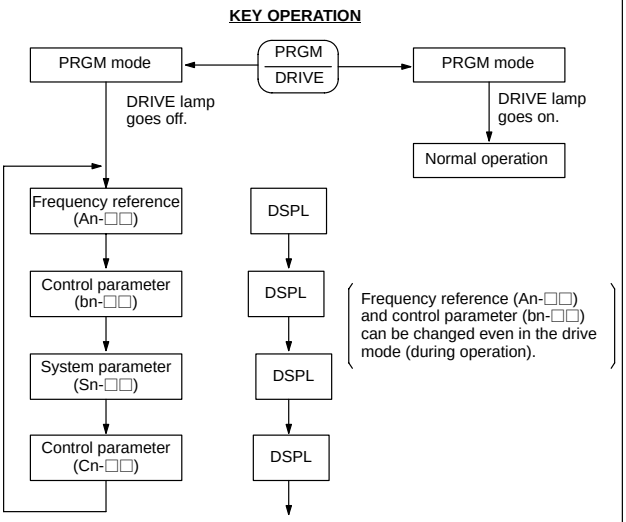


The RUN and STOP lamps goes on/off and blinks according to operation state.

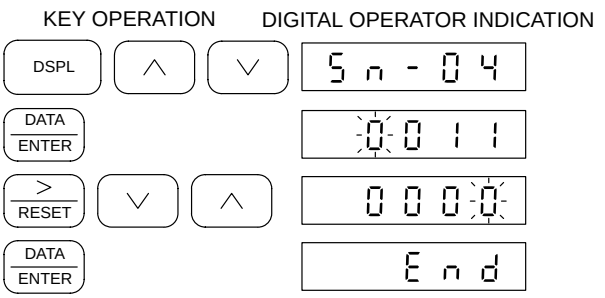
- **Monitor Items Display Procedure**



- **Switching between the DRIVE/PRGM (program) Mode** (The mode can be switched only when the machine is stopped.)



- **Changing the Control Parameter**
  Example of change of system parameter Sn-04



SYSTEM CONSTANTS Sn-□□

Function	Sn-□□	Data Name	Function					Factory Setting			
				4th digit	3rd digit	2nd digit	1st digit	4th-digit	3rd-digit	2nd-digit	1st-digit
Reference Set Constant	01	Inverter Capacity	Inverter capacity selected*					--			
	02	V/f	V/f pattern selected							0	1
Operator status	03	Display of Operator	0000 Setting and reading of An-□□, bn-□□, Sn-□□, Cn-□□ enabled 0101 Setting and reading of An-□□,: reading of bn-□□, Sn-□□, Cn-□□ enabled					0	0	0	0
		Constants Initialization	1110 NVRAM initialization (Multi-function terminals are set prior to shipping) 1111 NVRAM initialization (3 WIRE sequence)								
Run Mode Selection 1	04	Operation Method Select	Master frequency reference by analog input of external terminals 13, 14	---	---	---	0	0	0	1	1
			Master frequency reference from keypad	---	---	---	1				
			External terminal operation effective (start/stop, etc)	---	---	0	---				
			Keypad operation effective	---	---	1	---				
		Stopping Method select	RAMP stop	0	0	---	---				
			Coasting to stop	0	1	---	---				
			Full-range DC injection braking stop	1	0	---	---				
			Coasting stop (timer function provided)	1	1	---	---				
Run Mode Selection 2	05	Priority of stopping	Keypad STOP key effective during operation.	---	---	---	0	0	0	0	0
			Keypad STOP key not effective during operation.	---	---	---	1				
		Prohibition of REV run	REV run enabled	---	---	0	---				
			REV run disabled	---	---	1	---				
		Analog Monitor Output	Analog output at terminals 21, 22 is proportional to output frequency.	0	---	---	---				
			Analog output at terminals 21, 22 is proportional to output current.	1	---	---	---				
Run Mode Selection 3	06	S-curve at accel/decel time	0.2 sec. S-curve	---	---	0	0	0	0	0	0
			No S-curve	---	---	0	1				
			0.5 sec. S-curve	---	---	1	0				
			1.0 sec. S-curve	---	---	1	1				
Run Mode Selection 4	07	Overtorque Detection	Overtorque detection not enabled	---	---	---	0	0	0	0	0
			Overtorque detection enabled	---	---	---	1				
			Enable only if at set speed	---	---	0	---				
			Enable during operation (except during DC injection)	---	---	1	---				
			Operation continued after overtorque is detected	---	0	---	---				
			Coasts to stop of overtorque is detected	---	1	---	---				
			Not used	0	---	---	---				
Operation Mode Select	08	Priority of Frequency Reference (When input option card is used)	Run by option card frequency reference input	---	---	---	0	0	0	0	0
			Run by inverter operator or control circuit terminal input run command input	---	---	---	1	0	1	0	0
		Priority of Run Command (When input option card is used)	Run by option card run command input	---	---	0	---				
			Run by inverter operator or control circuit terminal input run command input	---	---	1	---				
		Stopping Method Selection at Communication Interface Card (SI-B) Communication Error	Ramp to a stop (decel time: bn-02)	0	0	---	---				
			Coasting to stop	0	1	---	---				
			Ramp to a stop (decel time: bn-04)	1	0	---	---				
			Operation to continue	1	1	---	---				
Operation Mode Select	09	Analog Output Selection Method	Item to analog output (terminals 21-22) depends on Sn-05 4th digit and Sn-09 2nd digit	---	---	---	0	0	0	0	0
			Item to analog output (terminals 21-22) is set by communication interface card (SI-B).	---	---	---	1				
		Analog Monitor Selection	Selection of item to analog output (terminals 21-22) See note.	---	---	0	---				
			Selection of item to analog output (terminals 21-22) See note.	---	---	1	---				
		---	---	0	0	---	---				
Protection Section 1 (stall prevention)	10	Stall Prevention	Stall prevention during acceleration enabled	---	---	---	0	0	0	0	0
			Stall prevention during acceleration disabled	---	---	---	1				
			Stall prevention during deceleration enabled	---	---	0	---				
			Stall prevention during deceleration disabled	---	---	1	---				
			Stall prevention during running enabled	---	0	---	---				
			Stall prevention during running disabled	---	1	---	---				

All items shaded must be set before starting operation.

Note: 1. Differs according to an Inverter capacity.

2. Initialization (Sn-03=1110, 1111)
After depressing the ENTER key, input the initial value of An-□□, bn-□□, Sn-□□, Cn-□□ (except Sn-01, Sn-02) into NV-RAM. When the value is written without an error, End is displayed. When the value is written with an error, Err is displayed. The values of Sn-15 to Sn-18 differs shown below between initializations with Sn-03=1110 and with Sn-03=1111.
Operation when transmission error is detected (when option card is installed.

Function		Sn–□□	Data Name	Function		4th digit	3rd digit	2nd digit	1st digit	Factory Setting 4th-digit	3rd-digit	2nd-digit	1st-digit
Protection Section 2		11	DB resistor	No DB protection calculated or provided by inverter		---	---	---	0	0	0	0	0
				Protection provided for OMRON internal DB resistor only, if installed		---	---	---	1				
			Fault Contact during Auto Reset/Restart Operation	Fault contact is not energized during auto reset/restart operation		---	---	0	---				
				Fault contact is energized during auto reset/restart operation		---	---	1	---				
			Momentary Power Loss Protection	Operation stopped by momentary power loss detection		---	0	---	---				
				Operation continues during momentary power loss		---	1	---	---				
			---	Not used		0	---	---	---				
Protection Section 3		12	External Fault Signal Level	External fault input; Normal open-contact input		---	---	---	0	0	1	0	0
				External fault input; Normal close-contact input		---	---	---	1				
			Receiving External Fault Signal	External fault signal; always detected		---	---	0	---				
				External fault signal; detected while running only		---	---	1	---				
			Processing at External Fault Detection	Ramp stop (major fault)		0	0	---	---				
				Coasting to stop (major fault)		0	1	---	---				
				Emergency stop (major fault): decelerates to stop by emergency stop time (bn-04 set value)		1	0	---	---				
				Operation to continue (minor fault)		1	1	---	---				
---		13	---	Not used		---	---	---	---	0	0	0	0
Protection Section 5		14	Motor Protection (Electronic Thermal)	Electronic thermal motor protection effective		---	---	---	0	0	0	0	0
				Electronic thermal motor protection ineffective		---	---	---	1				
				Electronic thermal characteristics are in accordance with standard motor		---	---	0	---				
				Electronic thermal characteristics are in accordance with constant torque motor		---	---	1	---				
Multi-function Section				Set Data									
	Input Signal	15	Terminal 5 Function	00-FF	Selects terminal 5 function (factory set for multi-step speed reference 1)					0	3		
		16	Terminal 6 Function	00-FF	Selects terminal 6 function (factory set for multi-step speed reference 2)					0	4		
		17	Terminal 7 Function	00-FF	Selects terminal 7 function (factory set for jog frequency reference)					0	6		
		18	Terminal 8 Function	00-FF	Selects terminal 8 function (factory set for internal base block by NO contact input)					0	8		
	Analog Input	19	Multi-function Analog Input	00-FF	Selects multi-function analog input (terminal 16) function					0	F		
	Output Signal	20	Multi-function Output 1	00-FF	Selects multi-function contact output (terminals 9, 10) function (factory set for during running)					0	0		
		21	Multi-function Output 2	00-FF	Selects multi-function open collector (terminal 25) function (factory set for zero speed)					0	1		
		22	Multi-function Output 3	00-FF	Selects multi-function open collector (terminal 26) function (factory set for speed agreed setting)					0	2		
Option Card Function Section		25	Analog Reference Card (PAI14B)	Positive/negative values of frequency reference determine FWD/REV operation		---	---	---	0	0	0	0	0
				Positive frequency reference value determine forward operation: negative = 0 output		---	---	---	1				
				Not used		0	0	0	---				
		26	Digital Reference Card (PDI08) (Frequency reference set mode)	BCD input 1% Resolution		0	0	0	0	0	0	0	0
				BCD input 0.1% Resolution		0	0	0	1				
				BCD input 0.01% Resolution		0	0	1	0				
				BCD input 1 Hz Resolution		0	0	1	1				
				BCD input 0.1 Hz Resolution		0	1	0	0				
				BCD input 0.01 Hz Resolution		0	1	0	1				
				BINARY input 255/100%		0	1	1	1				
				BINARY input (input value displayed in decimal on operator)		1	0	0	0				
		27	Pulse Monitor Card (PPO36F) (No. of output pulses)	1 F		0	0	0	0	0	0	1	0
				6 F		0	0	1	0				
				10 F		0	1	0	0				
				12 F		0	1	1	0				
				36 F		1	0	0	0				
		28	Analog Monitor Card (PAO08, PAO12)	Channel 1 output	Output frequency (max. frequency/100%)	---	---	0	0	0	1	0	0
					Output current (rated current/ 100%)	---	---	0	1				
					Output voltage ref. (Input voltage/ 100%)	---	---	1	0				
					DC voltage (400 V/100% for 200 V class, 800 V/100% for 400 V class)	---	---	1	1				
				Channel 2 output	Output frequency (max. frequency/100%)	0	0	---	---				
					Output current (rated current/ 100%)	0	1	---	---				
					Output voltage ref. (Input voltage/ 100%)	1	0	---	---				
					DC voltage (400 V/100% for 200 V class, 800 V/100% for 400 V class)	1	1	---	---				

All items shaded must be set before starting operation.

CONTROL CONSTANTS Cn-□□

Function	Cn-□□	Data Name	Set Unit	Set Range	Factory Setting
V/f pattern Setting	01	Input voltage	0.1 V	0.0 to 255.0 V (200 V) 0.0 to 510.0 V (400 V)	200.0 V (200 V) 400.0 V (400 V)
	02	Max. frequency	0.1 Hz	50.0 to 400.0 Hz	60.0 Hz*2
	03	Max. voltage	0.1 V	0.0 to 255.0 V (200 V) 0.0 to 510.0 V (400 V)	200.0 V*2
	04	Max. voltage frequency	0.1 Hz	0.0 to 400.0 Hz	60.0 Hz*2
	05	Mid. output frequency	0.1 Hz	0.0 to 400.0 Hz	3.0 Hz*2
	06	Mid. output frequency voltage	0.1 V	0.0 to 255.0 V (200 V) 0.0 to 510.0 V (400 V)	15.0 Hz*2
	07	Min. output frequency	0.1 Hz	0.0 to 400.0 Hz	1.5 Hz*2
	08	Min. output frequency voltage	0.1 V	0.0 to 255.0 V (200 V) 0.0 to 510.0 V (400 V)	10.0 V*2
Electronic thermal Over-load relay ref. Current	09	Motor rated current	0.1 A	*4	*1
DC Injection Braking	10	DC injection braking start frequency	0.1 Hz	0.0 to 10.0 Hz	1.5 Hz
	11	DC injection braking current	1%	0 to 100%*6	50%
	12	DC injection braking time at stopping	0.1 sec	0.0 to 25.5 sec	0.5 sec
	13	DC injection braking time at starting	0.1 sec	0.0 to 25.5 sec	0.0 sec
Frequency Limit Control	14	Frequency (speed) reference upper limit	1%	0 to 109%	100%
	15	Frequency (speed) reference lower limit	1%	0 to 109%	0%
Frequency Jump	16	Setting prohibit frequency 1	0.1 Hz	0.0 to 400.0 Hz	0.0 Hz
	19	Setting prohibit frequency range	0.1 Hz	0.0 to 25.5 Hz	1.0 Hz
Operator Display Change	20	Operator display mode	1	0 to 39999	0
Speed Agreed Detection	21	Up-to desired frequency setting	0.1 Hz	0.0 to 400.0 Hz	0.0 Hz
	22	Up-to frequency setting detection width/2	0.1 Hz	0.0 to 25.5 Hz	2.0 Hz
Carrier Frequency Adjustment	23	Carrier frequency upper limit	0.1 kHz	0.4 to 15.0 kHz	*3
	24	Carrier frequency lower limit	0.1 kHz	0.4 to 15.0 kHz	*3
	25	Carrier frequency proportional gain	1	0 to 99	*3
Overtorque Detection	26	Overtorque detection level	1%	30 to 200%	160%
	27	Overtorque detection time	0.1 sec	0.0 to 25.5 sec	0.1 sec
Stall Prevention	28	Stall prevention level during acceleration	1%	30 to 200%	170%
	29	Constant HP area stall prevention limiter	1%	30 to 200%	50%
	30	Stall prevention level during running	1%	30 to 200%	160%
Automatic reset & restart operation	36	No. of auto restart attempt	1	0 to 10	0
Momentary Power Loss	37	Momentary power loss ride through time	0.1 sec	0.0 to 2.0 sec	*1
Speed Search Control	38	Speed search deactivation current level	1%	0 to 200%	150%
	39	Speed search decel time*7	0.1 sec	0.0 to 25.5 sec	2.0 sec

*1 Factory setting differs depending on inverter capacity (Sn-01 set value).
*2 Initial value differs depending on V/f (Sn-02 set value).
*3 Factory setting differs depending on main circuit transistors.
*4 Set in a range of 10 to 200% of inverter rated current.
*5 Motor rated current (Cn-09) is set as 100% level.
*6 For set value ≤ 50%: carrier frequency = 8 kHz For set value > 50%: carrier frequency = 1 kHz
*7 If set to zero, speed search will be disabled.

All items shaded must be set before starting operation.

FREQUENCY REFERENCES An-□□

These references are used during multi-speed operation. Set values of An-□□ can be changed or read during running in DRIVE mode.

List of An-□□

An-□□	Data Name	Unit	Setting Range	Factory Setting
01	Frequency reference 1	0.01 Hz	0.00 Hz to 400.00 Hz	0.00 Hz
02	Frequency reference 2	0.01 Hz	0.00 Hz to 400.00 Hz	0.00 Hz
03	Frequency reference 3	0.01 Hz	0.00 Hz to 400.00 Hz	0.00 Hz
04	Frequency reference 4	0.01 Hz	0.00 Hz to 400.00 Hz	0.00 Hz
05	Frequency reference 5	0.01 Hz	0.00 Hz to 400.00 Hz	0.00 Hz
06	Frequency reference 6	0.01 Hz	0.00 Hz to 400.00 Hz	0.00 Hz
07	Frequency reference 7	0.01 Hz	0.00 Hz to 400.00 Hz	0.00 Hz
08	Frequency reference 8	0.01 Hz	0.00 Hz to 400.00 Hz	0.00 Hz
09	Jog frequency reference	0.01 Hz	0.00 Hz to 400.00 Hz	6.00 Hz

Note: An-□□ setting/reading units can be changed according to operator display mode (Cn-20) set values. The set unit at factory setting is 0.01 Hz.

CONSTANTS TO CHANGE DURING RUNNING bn-□□

Set values of bn-□□ can be changed or read during running in DRIVE mode.

List of bn-□□

bn-□□	Data Name	Unit	Setting Range	Factory Setting
01	Acceleration time 1	0.1 sec	0.0 to 6000.0 sec	10.0 sec
02	Deceleration time 1	0.1 sec	0.0 to 6000.0 sec	10.0 sec
03	Acceleration time 2	0.1 sec	0.0 to 6000.0 sec	10.0 sec
04	Deceleration time 2	0.1 sec	0.0 to 6000.0 sec	10.0 sec
05	Frequency reference gain	0.1%	0 to 1000.0%	100%
06	Frequency reference bias	1%	–100 to 100%	0%
07	Torque compensation gain	0.1	0.0 to 9.9	1.0
08	Motor rated slip	0.1%	0.0 to 9.9%*	0.0%
09	Energy-saving level gain	1%	0 to 200%	80%
10	Monitor No. after turning on power supply	---	1 to 3	1
11	Gain of analog output (ter. 21 and 22) and gain of channel 1 of option card if installed	0.01	0.00 to 2.55	1.00
12	Gain of channel 2 of option card if installed**	0.01	0.00 to 2.55	0.5

*Cn-04 is regarded as 100% level

**Effective for the installation of option 3G3IV-PAO08 and 3G3IV-PAO12

All items shaded must be set before starting operation.

Operation Mode Selection

Item name	Parameter to be set	Factory Preset
Parameter write disable	Sn-03	0000
Start/stop procedure	Sn-04	0011
Reverse rotation prevention	Sn-05	0000

- **Parameter write disable**
  Prevents operation error.

  Sn-03 = 0101

- **Start/stop procedure**
  Control input can be selected from the digital operator or the terminal strip.

  Sn-04 = xx00
  - 0: Frequency command from external terminal
  - 1: Frequency command from the operator
  - 0: Start/stop control from external terminal
  - 1: Start/stop control by the operator

- **Stop procedure**
  Stopping mode can be selected according to the application.

  Sn-04 = 00xx
  - 00: Ramp to stop
  - 01: Coasting to a stop
  - 10: Full-range DB stop
  - 11: Coasting stop with timer (Restartable after the deceleration time set in bn-02 elapses.)

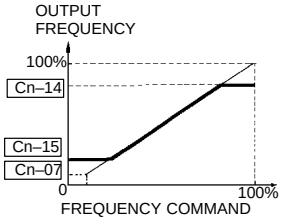
- **Reverse rotation prevention**
  Prevents accidental selection of reverse rotation.

  Sn-05 = xx1x

Output Frequency Limit

Item name	Parameter to be set	Factory Preset
Frequency (speed) command upper limit	Cn-14	100%
Frequency (speed) command lower limit	Cn-15	0

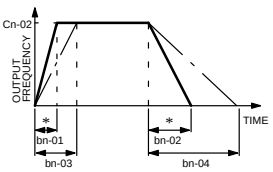
The upper and lower limits for the output frequency can be clamped. When the lower limit is not 0, acceleration to that lower limit set point begins immediately when the start command is input.



Accel/Decel Time and Patterns

Item name	Parameter to be set	Factory Preset
Acceleration time 1	bn-01	10.0 s
Deceleration time 1	bn-02	10.0 s
Acceleration time 2	bn-03	10.0 s
Deceleration time 2	bn-04	10.0 s
V/f Pattern choice	Sn-06	0000

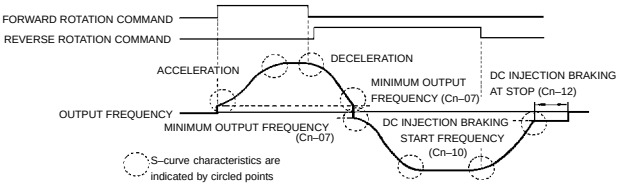
- **Each item can be set from 0.0 sec to 6000.0 sec.**
  The set time indicates the interval required before the maximum output frequency (Cn-02) is reached.



Time marked with * can be set for two-step switching using an external contact: Select "3" as value for anyone of Sn-15 thru Sn-18.
[Example] Sn-18 = 7
- Open: bn-01 and bn-02 are selected.
- Closed: bn-03 and bn-04 are selected.

- **S curve non-linear accel/decel is possible.**

  Sn-06 = xx00
  - 00: 0.2 sec of non-linear accel/decel
  - 01: 0 sec of non-linear accel/decel
  - 10: 0.5 sec of non-linear accel/decel
  - 11: 1.0 sec of non-linear accel/decel



Note: S-curve characteristics are not enabled at completion of deceleration when the first and second digits are 00.

ElectronicThermalOverloadFunction

Item name	Parameter to be set	Factory Preset
Motor type	Sn-14	0000
Motor rated current	Cn-09	1.9 A*

The electronic thermal overload function prevents standard motors from overloading when the speed is reduced by the inverter. (No external thermal switch is necessary.) Set as follows:

Sn-14 = xx0x
- 0: Standard motors
- 1: Inverter duty motors

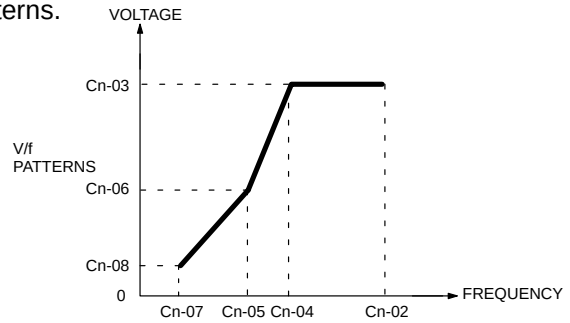
Electronic thermal protection can be disabled by setting "Sn-14 = xxx1."

* The example represents YASKAWA 0.5 HP (0.4 kW), 200 V, 4-pole motor. For a motor of another manufacturer, set the nameplate value of the motor.

V/F Characteristics

Item name	Parameter to be set	Factory Preset
V/F selection 3	Sn-14	0000
V/f parameter	Cn-02 to 08	See p. 26

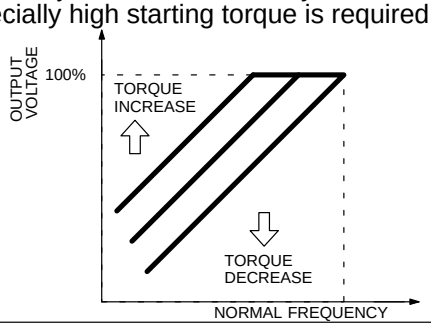
15 patterns are offered. Optimum selection requires consideration of the load characteristics optional V/f pattern setting (F for Sn-02) allows programming of custom V/f patterns.



Full-range Automatic Torque Boost

Item name	Parameter to be set	Factory Preset
Torque compensation gain	bn-07	1.0

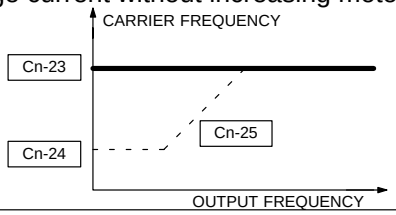
Automatic control of V/f ratio according to the load torque ensures tripless operation and optimum output current. Normally, no adjustment is necessary. Use this function when especially high starting torque is required.



Carrier Frequency

Item name	Parameter to be set	Factory Preset
Carrier frequency upper limit	Cn-23	15.0 kHz
Carrier frequency lower limit	Cn-24	15.0 kHz
Carrier frequency proportional gain	Cn-25	0

Changing the carrier frequency reduces RFI noise and leakage current without increasing motor noise.



Rpm Indication (Monitoring)

Item name	Parameter to be set	Factory Preset
Operator monitor indication	Cn-20	0

The unit of speed indicated on the operator can be switched from the following: Hz, rpm, m/min, %, or any other directly proportional value.

[Example] Cn-20 = 0: Hz display
1: % display
Number of motor poles: rpm display
Other units with an arbitrary number of digits such as m/min and m^3/min can be used.

Application Load Characteristic

Item name	Parameter to be set	Factory Preset
V/f selection	Sn-02	01

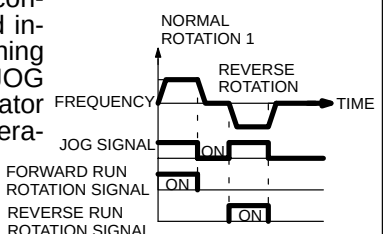
Select the following choice according to the purpose.

Sn-02 = 00: 50 Hz constant torque load
01: 60 Hz constant torque load (factory setting)
05: 50 Hz variable torque load
07: 60 Hz variable load
09: 50 Hz high starting torque load
0B: 60 Hz high starting torque load

Jog Operation

Item name	Parameter to be set	Factory Preset
Jog frequency	An-09	6.00 Hz

Select the jog mode (connect terminals 11-7) and input the start signal. Inching starts. Depressing the JOG key on the digital operator performs the same operation.

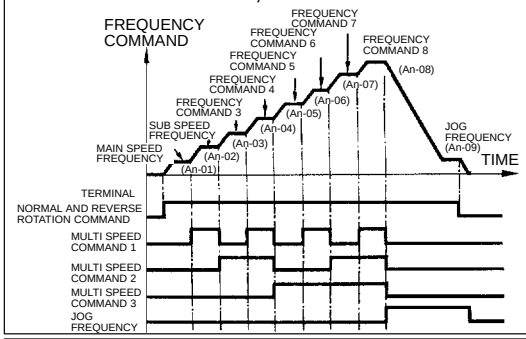


9-step Speed Change

Item name	Parameter to be set	Factory Preset
Multi-speed frequency command	An-01 to 09	See p. 29
Multi-function command	Sn-15 to 18	See p. 27
Run selection	Sn-04	0011
Multi-function analog input	Sn-19	00

Up to 9 steps of speeds can be set using signals from external terminals 5 to 8. This eliminate the need for an analog signal thereby enabling operation simplified external control. See the following example.

- Set An-01 to -09 according to run specifications.
- Set Sn-04 = xxx1, Sn-19 = OF.



For 9-step speed

Sn-04 = xxx1
Sn-15 = 03
Sn-16 = 04
Sn-17 = 05
Sn-18 = 06
Sn-19 = 0F

DC Injection Braking

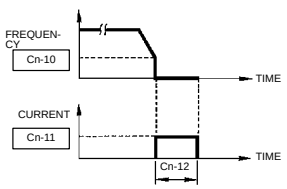
Item name	Parameter to be set	Factory Preset
DC injection during stop	Cn-10, 12	See p. 28
DC injection at start	Cn-07, 11, 13	See p. 28

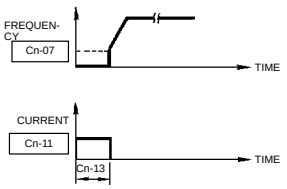
- **DC injection braking during stop**

Prevents overrun at stop. (Exact position stop)

- **Starting DC injection braking during start**

Stops a coasting motor without tripping even when the direction of rotation is unknown.

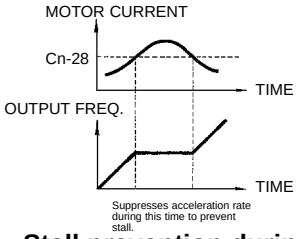




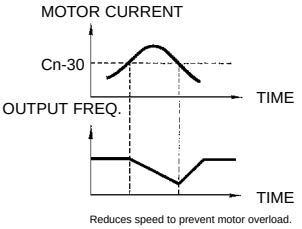
Motor Stall Prevention Function

Item name	Parameter to be set	Factory Preset
Operation level for stall prevention during acceleration	Cn-28	170%
Operation level for stall prevention during operation	Cn-30	160%
Operation level for stall prevention during deceleration	Sn-10	0000

- **Stall prevention during acceleration**



- **Stall prevention during operation**



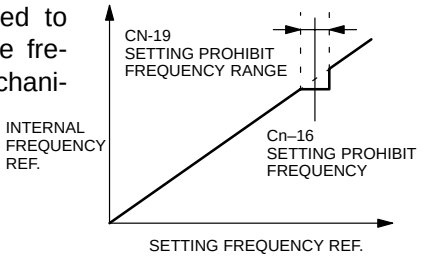
- **Stall prevention during deceleration**

Sn-10 = xx0x
- 0: Stall prevention during deceleration enabled
- 1: Stall prevention during deceleration disabled

Resonant Frequency Jump Control

Item name	Parameter to be set	Factory Preset
Prohibited frequency 1	Cn-16	0.0 Hz
Prohibited frequency range	Cn-19	1.0 Hz

Operation at the preset frequency will be eliminated. The inverter will accel/decel through the prohibited region. This function is used to avoid the resonance frequencies in the mechanical systems.



Built-in Braking Resistor Protection

Item name	Parameter to be set	Factory Preset
Regenerative braking resistor protection	Sn-11	0000

Built-in braking resistors are protected by thermal simulation. When a built-in braking resistor is used, select xxx1 (protection effective). When an external braking resistor unit is used, set xxxx0, and protect the resistor unit with the built-in thermal relay. The thermal relay should be wired in series with the inverter run command or the external fault circuit.

Sn-11 = xxx0
- 0: Not protected
- 1: Protected

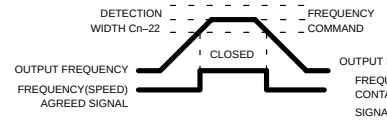
Speed Agreed Signal Output

Item name	Parameter to be set	Factory Preset
Desired frequency	Cn-21	0.0 Hz
Band width	Cn-22	2.0 Hz
Multi-function contact output function	Sn-20 to 22	See p. 27

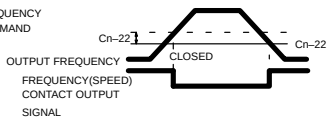
This function is used when operation at an arbitrary speed must be indicated. Set the multi-function contact output (Sn-20 to Sn-22) as follows:

[Example] With setting Sn-20 = 02 sets external output terminals 9 and 10 to indicate “speed agreed” (output frequency = input reference)

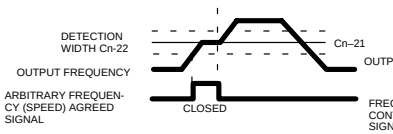
(1) Set value = 2: “Speed agreed” detection



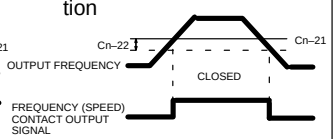
(1) Set value = 4: “Below set point” detection



(2) Set value = 3: “Medium speed” detection



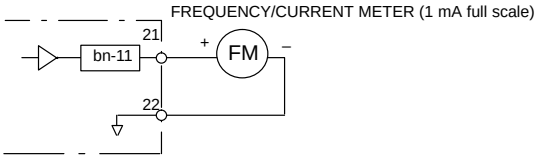
(4) Set value = 5: “Above set point” detection



Frequency/CurrentMeterCalibration

Item name	Parameter to be set	Factory Preset
Analog output gain	bn-11	1.00
Analog output selection	Sn-05	0000

Frequency/current meter connected to the inverter can be calibrated without using a resistor for calibration.

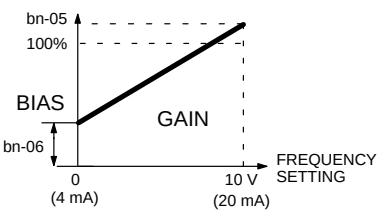


Sn-05 = 0xxx
- 0: Output frequency meter
- 1: Output current meter

OutputFrequencyControl(Gain/Bias)

Item name	Parameter to be set	Factory Preset
Frequency command gain	bn-05	100%
Frequency command bias	bn-06	0%

Output frequency (gain/bias) can be set freely according to frequency setting (0 to 10 V or 4 to 20 mA)

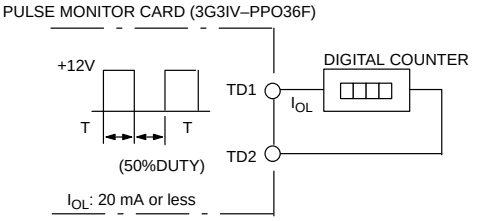


PulseMonitorFunction(Option)

Item name	Parameter to be set	Factory Preset
Pulse frequency selection	Sn-27	0000

With a digital counter connected, speed can be indicated as a pulsed output. The following output pulse frequencies can be selected:

Sn-27 = 0000
- 000: Output frequency x 1
- 001: Output frequency x 6
- 010: Output frequency x 10
- 011: Output frequency x 12
- 100: Output frequency x 36



Operation During Momentary Power Loss

Item name	Parameter to be set	Factory Preset
Function enabled/disabled	Sn-11	0000
Compensating time for momentary power loss	Cn-37	0.7 s*

Operation can be continued even when a momentary power loss occurs.

*3G3IV-A2004-E

Sn-11 = x0xx
- 0: Continuation function disabled
- 1: Continuation function enabled

Set a compensation time (up to 2 sec) for Cn-37. For motors of 2.2 kW capacity or below (of 200 V or 400 V class), the compensating time is 0.5 sec to 1 sec.
If longer momentary power loss ride-thru is required, install back-up capacitor unit (option for small unit).

Speed Search Function

Item name	Parameter to be set	Factory Preset
Speed search function	Sn-15 to 18	See p. 27

The speed search function is used to start a free spinning motor without tripping the inverter. Set “61” into any constant from Sn-15 to Sn-18.

61: Search function from max. frequency

Multi-function Input Function

Item name	Parameter to be set	Factory Preset
Multi-function input function	Sn-15 to18	See p. 27

Functions of external input terminals 5 to 8 can be switched. Set Sn-15 to Sn-18 in an ascending order, or an OPE (parameter error) occurs. (i.e. the lowest value programmed in must be set into the lowest number Sn constant)

Function of terminal 5: set into Sn-15
Function of terminal 6: set into Sn-16
Function of terminal 7: set into Sn-17
Function of terminal 8: set into Sn-18

Set value	Function
00	FWD/REV RUN select
01	Operation signal select Local/ Remote
02	Option/inverter reference select
03	Multi-step speed command 1
04	Multi-step speed command 2
05	Multi-step speed command 3
06	Jog frequency reference select
07	Accel/decel time select
08	External base block (NO-contact input)
09	External base block (NC-contact input)
10	UP command
11	DOWN command
12	FJOG command
13	RJOG command
0A	Not used

Set value	Function
0B	Not used
0C	Multi-function analog input enabled (AUX)
0D to 1F	Not used
20 to 2F	External fault 1
30 to 3F	External fault 2
40 to 4F	External fault 3
50 to 5F	External fault 4
60	DC injection braking command (JOG with priority)
61	Search 1
62	Search 2
63	Energy-saving operation
64 to 6F	Not used

Multi-function Output Function

Item name	Parameter to be set	Factory Preset
Multi-function output function	Sn-20 to 22	See p. 27

Functions of external output terminals 9-1, 25-27, and 26-27 can be switched

Function of terminal 9 and 10: set into Sn-20
Function of terminal 25 and 27: set into Sn-21
Function of terminal 26 and 27: set into Sn22

Set value	Function
00	In operation*
01	Zero speed*
02	Speed agreed*
03	Free speed agreed
04	Speed agreed detection (less than set value)
05	Speed agreed detection (more than set value)
06	Inverter operation ready

Set value	Function
07	Low voltage detected
08	Base blocked
0B	Over torque detected
0D	Braking resistor failure
0E	Fault

(*: Factory setting prior to shipment)

Multi-functionAnalogOutputMonitor

Item name	Parameter to be set	Factory Preset
Operation signal selection 2	Sn-05	0000

Output frequency or motor current can be monitored. (Standard function)

Sn-05 = 0xxx
0: Output frequency is monitored.
1: Motor current is monitored.

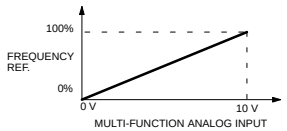
Multi-functionAnalogInputFunction

Item name	Parameter to be set	Factory Preset
Multi-function analog input function	Sn-19	00

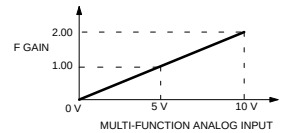
An arbitrary function can be used with external input terminal 16.

<Major functions>

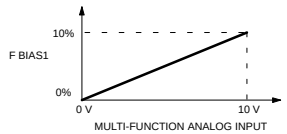
- Aux-frequency switching
- Frequency reference bias
- FIG. (1) Sn-19 = 0



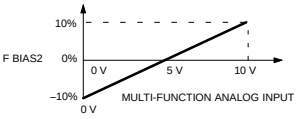
- Accel/decel time reduction coefficient
- FIG. (2) Sn-19 = 1



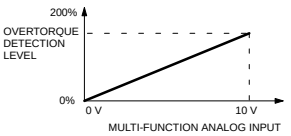
- FIG. (3) Sn-19 = 2



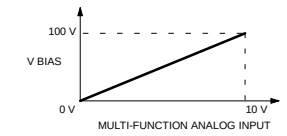
- FIG. (4) Sn-19 = 3



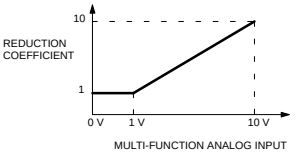
- FIG. (5) Sn-19 = 4



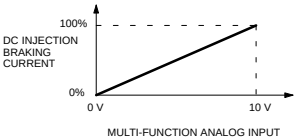
- FIG. (6) Sn-19 = 5



- FIG. (7) Sn-19 = 6



- FIG. (8) Sn-19 = 7

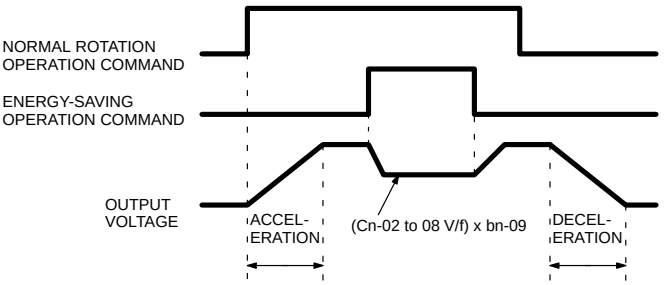


Actual accel/decel time = $\frac{\text{Actual accel/decel time (bn-01 to bn-04)}}{\text{Reduction coefficient}}$

Energy Saving Operation Function

Item name	Parameter to be set	Factory Preset
Energy saving level gain	bn-09	80%

If reduced output voltage is required after acceleration, the energy-saving function can be used to reduce it. This function helps to eliminate motor/system vibration. Set “63” for any constant from Sn-15 to Sn-18.



Automatic Reset and Restart Function

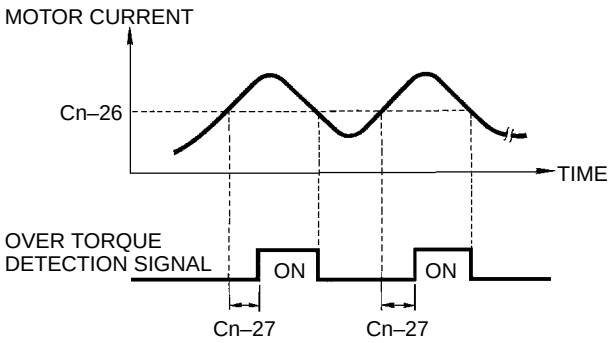
Item name	Parameter to be set	Factory Preset
Retry counts	Cn-36	0

If an inverter error occurs during operation, the inverter performs self diagnosis and automatically restarts.
Up to 10 retry counts can be set for Cn-36.

Overtorque Detection Function

Item name	Parameter to be set	Factory Preset
Overtorque detection level	Cn-26	160%
Overtorque detection time	Cn-27	0.1 s
Overtorque detection signal	Sn-20 to 22	See p. 27
Overtorque detection selection	Sn-07	See p. 26

When excess load is placed on the machine, the increase in motor current is detected and alarm signal can be output.

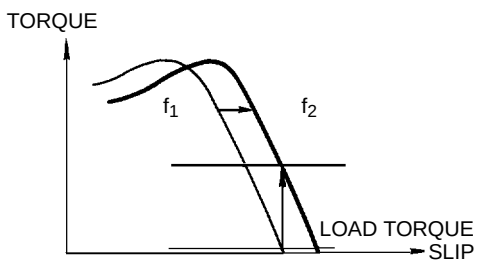


To use this function, set “B” for any constant from Sn-20 to Sn-22.

Slip Compensation Speed Control

Item name	Parameter to be set	Factory Preset
Motor rated slip	bn-08	0.0%
Motor rated current	Cn-09	See p. 28
Motor no-load current	Cn-34	30%
Slip compensation primary delay time	Cn-35	0.0 s*

Simple speed control (slip compensation) is available without motor speed detection (PG or TG). Frequency command from f_1 to f_2 eliminates speed fluctuations caused by varying load.



External Error Stop Mode

Item name	Parameter to be set	Factory Preset
Protection characteristic selection 3	Sn-12	0100

Stop method after external error (when external terminal 3 receives input) can be set as follows:

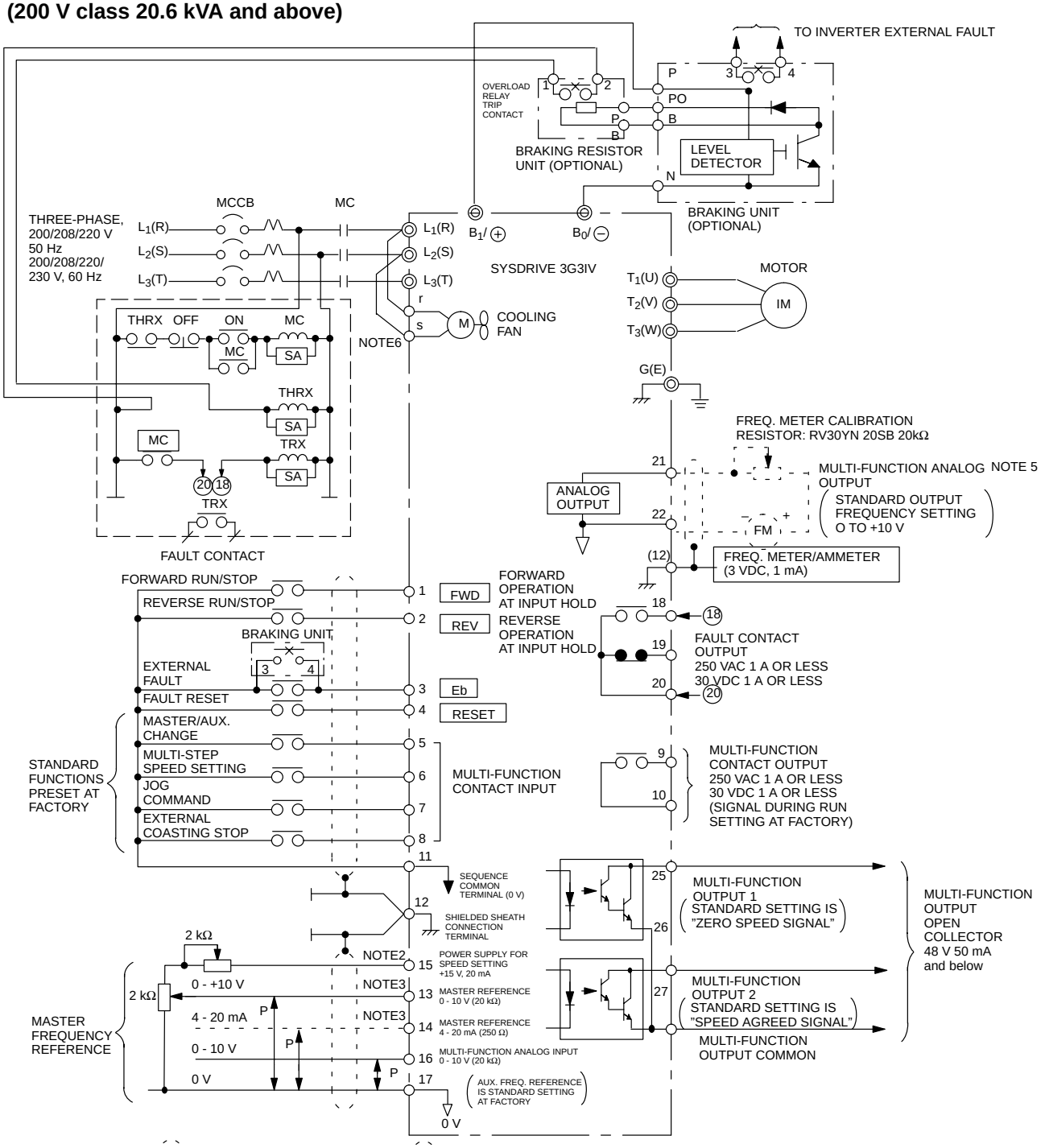
Sn-12 = 00xx
- 00: Frequency deceleration (bn-02)
- 01: Coasting to a stop
- 10: Frequency deceleration (bn-04)
- 11: Operation continued

Built-in Braking Resistor Protection

Following constants are effective for the reduction of machine vibration and shock.

	Effective Method	Constant	Factory Preset
Shock	• For the decrease of generated torque • For the increase of generated torque	Sn-02	01
		bn-07	1.0
		Cn-02 to 08	See p. 26
	For the decrease of shock at accel.	Sn-06	xx00
		bn-01, 03	10.0 s
		Cn-28	170%
		Cn-29	50%
	For the decrease of shock at decel.	Sn-04	0011
		Sn-06	0000
		bn-02, 04	10.0 s
		Cn-10	1.5 Hz
		Cn-11	50%
Vibration	For the decrease of carrier frequency	Cn-23, 24	15.0 kHz
		Cn-25	0
	For the change of speed control characteristics	bn-08	0.0%
		Cn-34	30%
		Cn-35	2.0 s

For Models 3G3IV-B2110-□ to B2220-□
(200 V class 20.6 kVA and above)



Notes: 1. indicates shielded leads and twisted-pair shielded leads.

2. External terminal 15 of +15 V has maximum output current capacity of 20 mA.
3. Either external terminal 13 or 14 can be used.
4. Terminal symbols: ⓞ shows main circuit; ◯ shows control circuit.
5. Multi-function analog output is for use on meters only, and not available for the feed back control system. Use analog monitor cards (Model PAO08 or PAO12) For control system feedback.
6. Never remove the terminal leads r and s of control power supply.
7. Operating power voltage need not be set for motors of 200 V class of 7.5 kW or below and 400 V class 7.5 kW or below.

MAIN CIRCUIT

<table>
<tr><th rowspan="3">Terminal</th><th colspan="3">200 to 230 V</th><th colspan="4">380 to 460 V</th></tr>
<tr><th>20P4 to 27P5</th><th>2011 to 2022</th><th>2030 to 2075</th><th>40P4 to 47P5</th><th>4011, 4015</th><th>4018 to 4045</th><th>4055 to 4300</th></tr>
<tr><th>0.5 to 10 HP
(0.4 to 7.5 kW)</th><th>15 to 30 HP
(11 to 22 kW)</th><th>40 to 100 HP
(30 to 75 kW)</th><th>0.5 to 10 HP
(0.4 to 7.5 kW)</th><th>15 HP (11 kW),
20 HP (15 kW)</th><th>25 to 60 HP
(18.5 to 45 kW)</th><th>75 to 400 HP
(55 to 300 kW)</th></tr>
<tr><td>L_1 (R)</td><td colspan="7" rowspan="3">Main circuit power unit</td></tr>
<tr><td>L_2 (S)</td></tr>
<tr><td>L_3 (T)</td></tr>
<tr><td>T_1 (U)</td><td colspan="7" rowspan="3">Inverter output</td></tr>
<tr><td>T_2 (V)</td></tr>
<tr><td>T_3 (W)</td></tr>
<tr><td>B0/⊖</td><td>---</td><td rowspan="2">Braking unit connector (B1/⊕ – B0⊖)
DC bus (B1/⊕ – B0/⊖)</td><td rowspan="2">---</td><td colspan="2">---</td><td rowspan="2">Braking unit connector (B1/⊕ – B0⊖)
DC bus (B1/⊕ – B0/⊖)</td><td rowspan="2">---</td></tr>
<tr><td>B1/⊕</td><td rowspan="3">Braking resistor unit connector (B1/⊕ – B2)
DC bus (B1/⊕ – ⊖)</td><td rowspan="3">Braking resistor unit connector (B1/⊕ – B2)
DC bus (B1/⊕ – ⊖)</td><td rowspan="3">Braking resistor unit connector (B1/⊕ – B2)
DC bus (B1/⊕ – B0/⊖)</td></tr>
<tr><td>B2</td><td rowspan="2">---</td></tr>
<tr><td>⊖</td><td rowspan="2">Braking unit connector (⊕1 – ⊖)
DC bus (⊕1 – ⊖)
Main circuit capacitor (⊕3 – ⊖)</td><td rowspan="2">Braking unit connector (⊕1 – ⊖)
DC bus (⊕1 – ⊖)
Main circuit capacitor (⊕3 – ⊖)</td></tr>
<tr><td>⊕ 3 (P3)</td><td colspan="2">---</td><td colspan="3">---</td></tr>
<tr><td>⊕ 1 (P1)</td><td colspan="3">---</td><td colspan="3">---</td></tr>
<tr><td>l_1 (r)</td><td>---</td><td>Cooling fan power input</td><td>Cooling fan power input</td><td>---</td><td colspan="2">Cooling fan power input</td><td>---</td></tr>
<tr><td>l_2 (s)</td><td colspan="3">---</td><td colspan="3">---</td><td rowspan="2">Cooling fan power input
$\ell_1 – \ell_2$ 200: 200 to 230 VAC
$\ell_1 – \ell_2$ 400: 380 to 460 VAC</td></tr>
<tr><td>ℓ_2 200 (s 200)</td><td colspan="3">---</td><td colspan="3">---</td></tr>
<tr><td>ℓ_2 400 (s 400)</td><td colspan="3">---</td><td colspan="3">---</td><td rowspan="2">External power supply (220 VAC, 10 VA)</td></tr>
<tr><td>x</td><td colspan="2">---</td><td>External power supply (220 VAC, 10 VA)</td><td colspan="3">---</td></tr>
<tr><td>y</td><td colspan="3">---</td><td colspan="3">---</td><td>External power supply (220 VAC, 10 VA)</td></tr>
<tr><td>G (E)</td><td colspan="7">Grounding (class 3 grounding, 100 Ω or less)</td></tr>
</table>

CONTROL CIRCUIT

Classification	Terminal	Signal Function	Description		Signal Level
Sequence Output Signal	1	Forward operation-stop signal	Forward run at closed, stop at open		Photo-coupler insulation Input +24 VDC 8 mA
	2	Reverse operation-stop signal	Reverse run at closed, stop at open		
	3	External fault input	Fault at closed, normal state at open		
	4	Fault reset input	Reset at closed		
	5	Master/Aux. change (Multi-step speed ref. 1)	Aux. freq. ref. at “closed”	Multi-function contact input: the following signals available to select. Forward/reverse select, run mode select, multi-speed select, jog frequency select, accel/decel time select, external fault, external base block stop, hold command, inverter overheat prediction, DB command, aux. input effective, speed search, energy-saving operation	
	6	Multi-step speed ref. 2	Effective at “closed”		
	7	Jog command	Jog run at “closed”		
	8	External coasting stop	Inv. output stop at “closed”		
	11	Sequence control input common terminal	---		
Analog Input Signal	15	Power supply terminal for speed ref.	Speed ref. power supply		+15 V (Allowable current 20 mA max.)
	13	Master speed frequency ref.	0 to +10 V/100% freq.		0 to +10 V (10 kΩ)
	14		4 to 20 mA/100% freq.		4 to 20 mA (250 Ω)
	16	Aux. frequency ref.	0 to 10 V/100%	Multi-function contact input: one of the following signals available to select, speed command, speed gain, speed bias, overtorque, overvoltage bias, rate of accel/decel DB current	0 to +10 V (10 kΩ)
	17	Common terminal for control circuit	0		---
	12	Connection to shield sheath of signal lead	---		---
Sequence Input Signal	9	During running (NO)	Run at “closed”	Multi-function contact output: one of the following signals available to output. Output during running, zero speed, synchronized speed, arbitrary speed agreed, frequency detection, overtorque, undervoltage, run mode, coasting stop, braking resistor overheat	Dry contact Contact capacity: 250 VAC 1 A or less 30 VDC 1 A or less
	10				
	25	Zero speed detection	Makes at min. freq. (Cn-07) or less		Open collector output +48 V 50 mA or less
	26	Speed agreed detection	Makes when the freq. reaches to ±1% of set freq.		
	27	Open collector output common			---
	18	Fault contact output (NONC)	Fault at closed between terminals 18 and 20 Fault at open between terminals 19 and 20		Dry contact Contact capacity: 250 VAC 1 A or less 30 VDC 1 A or less
	19				
	20				
Analog Output Signal	21	Frequency meter output	0 to 10 V/100% freq.	Ammeter output selection available	0 to 11 V max. 2 mA or less
	22	Common			

Protection Functions

Protection function		Explanation	Monitor display	Fault contact output
Low voltage protection	Main circuit voltage low	When the inverter power voltage drops, torque becomes insufficient and motor is overheated. Inverter output is stopped when the main circuit DC voltage becomes lower than the low voltage detection level for 15 ms or longer, or about 2 seconds or longer if the momentary power loss rede-thru function is used. Detection level: Approximately 210 V or less for 200 V class and 420 V or less for 400 V class	uu1 (UV1)	Operation
	Momentary power loss protection			
	Control circuit low voltage	The inverter output is shut-off when the control circuit voltage drops below the low voltage level.	uu2 (UV2)	Operation
	Main circuit soft charge contactor defective	The inverter output is shut-off when no answer back received from the main circuit soft-start contactor.	uu3 (UV3)	Operation
Overcurrent protection		The inverter output is shut-off when the inverter output current becomes approx. 200% and above of inverter rated current..	%c (OC)	Operation
Ground-fault protection		The inverter output is shut-off when a ground-fault occurs at the inverter output side and the ground-fault current exceeds approx. 50% of the inverter rated current.		Operation
Overvoltage protection		The inverter output is shut-off when the main circuit DC voltage becomes excessive because of regeneration energy caused by motor deceleration and negative load. Detection level: Approx. 800 V for input voltage set 400 V and above Approx. 700 V for input voltage set 400 V or less and approx. 400 V for 200 V class	%u (OV)	Operation
Fuse blown		The inverter output is shut-off when the main circuit transistor fails. The fuse clears to prevent wiring from being damaged by the short-circuit current.	fu (FU)	Operation
Cooling fin overheat		The inverter output is shut-off when the ambient temperature rises and the heat sink fin reaches 90°C. Please check for a defective cooling fan or clogged filter.	%h (OH)	Operation
Overload protection	Motor	Inverter output is stopped when motor overload is detected by the electronic thermal overload in the inverter. Either a inverter duty constant-torque specialized motor or general-purpose motor can be selected. If more than one motor is drive, overload protection should be disabled. Use a thermal relay or thermal protector for each motor.	%l1 (OL1)	Operation
	Inverter	The inverter output is shut-off when the electronic thermal overload reaches or exceeds the inverse time limit of 112% of the inverter's rated current occurs. Maximum rated overload: 150%, 1 min.	%l2 (OL2)	Operation
	Overtorque detection	The motor operates according to a preset mode when the inverter output current exceeds the overtorque detection level. This function is used to protect the machine or to monitor the output torque.	%l3 (OL3)	Operation
Braking transistor fault		Inverter output is shut-off when an error occurs in the braking transistor.	rr (rr)	Operation
Braking resistor overheat		For 5 HP (3.7 kW) or less (200 V), 3 HP (2.2 kW) or less (400 V), an optional dedicated resistor can be installed. The resistor is monitored by the electronic thermal switch for overheating. The inverter output is shut-off when a specified temperature is reached.	rh (rH)	Operation
External fault signal input		When an external alarm signal is input, the inverter operates according to a preset stop method (coasting to a stop, or ramp to stop)	ef□ EF3 to EF8	Operation
Control circuit fault, communication option fault, option fault		The inverter output is shut-off when a transmission error occurs in the control circuit or a component fails. The inverter output is also shut-off when a specialized option such as the digital operator is not properly connected.	cpf00 to cpf05 cpf06 cpf20 err	Operation

Protection function		Error causes	Action to be taken
Low voltage protection	Main circuit voltage low	Inverter capacity is too small. Voltage drop due to wiring Inverter power voltage selection is wrong. A motor of large capacity (11 kW or greater) connected to the same power system has been started. Rapid acceleration with generator power supply Operation sequence when power is off Defective electromagnetic contactor	Check the power capacity and power system. UV display appears when the inverter power is turned off while operation signal is input. Remove the power after stopping the inverter. (Set the third and fourth bits of Sn-04 to 01.)
	Momentary power loss protection		
	Control circuit low voltage		
	Main circuit soft charge contactor defective		
Overcurrent protection		Extremely rapid accel/decel Motor on/off switching at the inverter output side Short-circuit or ground-fault at the inverter output side Motor of a capacity greater than the inverter rating has been started. High-speed motor or pulse motor has been started.	Transistor error may occur. Investigate the error cause, correct it, then restart.
Ground-fault protection		Motor dielectric strength is insufficient. Load wiring is not proper.	Check for ground-fault in motor or load wiring.
Overvoltage protection		Overvoltage Insufficient deceleration time Regenerative load (Motor is turned by the load.) High input voltage compared to motor rated voltage	If braking torque is not proper, extend the decel time or use a braking resistor.
Fuse blown		Repeated overcurrent protection (OC) Repeated overload protection (OL2) power reset Rapid deceleration in excess excitation (improper V/f characteristic setting) External noise	Correct the cause, check the main circuit transistor, replace the fuse, then restart.
Cooling fin overheat		Defective cooling fan Ambient temperature rise Clogged filter	Replace the cooling fan and clean the filter. Ambient temperature: 104°F (40°C) or less for enclosed type 122°F (50°C) or less for open chassis
Overload protection	Motor	Overload, low speed operation or extended acceleration time, improper V/f characteristic setting	Investigate the cause of overload and review the operation pattern, V/f characteristic, and motor/inverter capacities. (If inverter is repeatedly reset after an overload occurs, the inverter may fault. Investigate and correct the cause of overload.)
	Inverter		
	Overtorque detection	Motor current exceeds the preset value because of machine error or overload.	Check the use of the machine. Correct the overload cause or set a higher detection level which is within the allowable range.
Braking transistor fault		Insufficient resistance of braking resistor Short-circuit or ground-fault in braking resistor	Review the resistance of the braking resistor and braking duty cycle. Change the resistance or increase the inverter capacity.
Braking resistor overheat		Frequent operation stop Long-time continuous regeneration Rapid deceleration	Shorten deceleration time or review the braking torque brake duty cycle (%ED). Use optional braking resistor or braking unit.
External fault signal input		External fault condition occurred.	Correct the cause of the fault input. See Un-07 for the state of input signal
Control circuit fault, communication option fault, option fault		External noise Excess vibration or shock	Check data in Sn-01 and Sn-02. Record all data, then use Sn-03 for initializing. Turn off power, then turn on again. If error is persistent, contact your Omron representative.

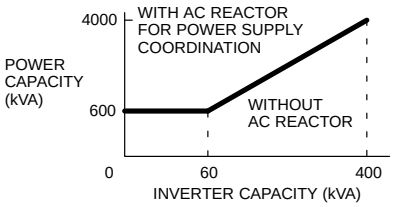
Warning and Self-Diagnosis Functions

Protection function		Explanation	Monitor display	Fault contact output
Low-voltage protection (main circuit voltage insufficient)		Monitor display appears when the main circuit DC voltage drops under the detection level while the inverter output is off.	uu (UV) (Blink)	Non operation
High voltage protection		Monitor display appears when the main circuit DC voltage rises above the detection level while the inverter output is off.	%u (OV) (Blink)	Non operation
Cooling fin overheat warning		Monitor display appears when a separate thermal protector contact is input to the external terminal.	%h2 (OH2) (Blink)	Operation
Overtorque detection		This function is used to protect the machine and to monitor the inverter's output torque. The inverter output reacts in a preset manner when the inverter output current exceeds the over torque detection level. The monitor display blinks when "operation continue" is preset.	%l3 (OL3) (Blink)	Non operation
Stall prevention (Accel/decel is accomplished with maximum capacity of the inverter without tripping on overcurrent or overvoltage.)	During acceleration	Inverter acceleration is stopped when 170% of or more of the inverter rated current is required by the load. This prevents overload protection (OL2) or overcurrent (OC) from occuring. When current is reduced to less than 170%, acceleration is enabled.	---	Non operation
	During normal operation	Output frequency is decreased when 160% of the inverter rated current or greater is required by the load. This prevents motor and inverter overload (OL1, OL2). When current is reduced below 160%, inverter acceleration is then enabled.		
	During deceleration	Deceleration is stopped when the DC voltage is caused to rise by motor regenerative energy. This prevents overvoltage trips (OV). When DC voltage decreases, deceleration to the set value then resumes.		
Simultaneous normal and reverse rotation commands		When forward and reverse rotation commands are simultaneously detected for a period of time exceeding 500 ms, the inverter is stopped according to the preset stop method.	ef (EF) (Blink)	Non operation
External fault signal input (Minor failure)		It is indicated on the monitor when the mode after external signal input is set to "Operation continue."	ef□ EF3 to EF8 (Blink)	Non operation
External base block signal input (main circuit transistor instantaneous shut-off)		When an external base block signal is input, the motor coasts to a stop. When the external base block signal is removed, the inverter output is immediately turned on at the previously set frequency.	bb (BB) (Blink)	Non operation
Invalid parameter setting		when an invalid parameter is set, it is indicated on the monitor at power up or when the inverter is changed from the PRG mode to the DRIVE mode.	%pe01 to %pe11	Non operation

Protection function		Error causes	Action to be taken
Low-voltage protection (main circuit voltage insufficient)		Input voltage drop	Check the main circuit DC voltage in Un-xx. If the voltage is low, adjust the input voltage.
High voltage protection		Input voltage rise	Check the main circuit DC voltage in Un-xx. If the voltage is high, adjust the input voltage.
Cooling fin overheat warning		Overload Cooling fan fault Ambient temperature rise Clogged filter	Replace the cooling fan and clean the filter. Ambient temperature: 104°F (40°C) or less for enclosed type 122°F (50°C) or less for open chassis
Overtorque detection		Motor current exceeded the set value because of machine fault or overload.	Check the driven machine and correct the cause of the fault or set to a higher value.
Stall prevention (Accel/decel is accomplished with maximum capacity of the inverter without tripping on overcurrent or overvoltage.)	During acceleration	Insufficient power for accel/decel Overload Phase loss	Set proper accel/decel time for smooth operation. For stall prevention during normal operation lighten the load or increase inverter capacity.
	During normal operation		
	During deceleration		
Simultaneous normal and reverse rotation commands		Operation sequence error 3-wire/2-wire selection error	Recheck the control sequence. Recheck system constant (Sn-15 to -18).
External fault signal input (Minor failure)		External fault conditions set-up	Take appropriate measurement for the cause of external fault input. Check the state of input signal with Un-07.
External base block signal input (main circuit transistor instantaneous shut-off)			
Invalid parameter setting		Invalid parameter setting	Review the parameter setting range and conditions.

Selection

When the inverter is connected directly to a large-capacity power transformer (1000 kVA or greater with 10 m or less cable length) or when a phase advance capacitor is switched, excess peak current may occur in the power feed circuit and the converter section may be damaged. To avoid this, use an AC reactor (option) on the inverter input side. An AC reactor is also required when a thyristor converter such as a DC drive is connected to the same power system.



When a special motor is used or more than one motor is driven in parallel with a single inverter, select the inverter capacity so that 1.1 times of the total motor rated current does not exceed the inverter rated output current.

The motor starting and accelerating characteristics of the motor driven by an inverter are restricted by the overload current ratings of the inverter. Compared to running with commercial power supply, lower torque output should be expected. If high starting torque is required, use an inverter of higher capacity or increase the capacities of both the motor and the inverter.

When an error occurs, a protective circuit is activated and the inverter output is turned off. However, the motor cannot be stopped immediately. Use a mechanical brake and hold the equipment for an emergency stop if necessary.

Terminals B1/P, B0/N, B2, and N are for Omron options. Do not connect other equipment.

Installation

Avoid oil mist or dust. Place the inverter in a clean area or house it in a totally enclosed case so that no contamination enters. To use the totally enclosed case, select the cooling method and panel dimensions so the inverter ambient temperature will be within the allowable range.

Do not install the inverter on flammable material, such as wood.

Install the inverter on a wall with the longer side in the vertical position.

Setting

The inverter can be driven at an output frequency of up to 400 Hz with the digital operator. Setting errors may create a dangerous situation. Set the upper limit with the upper limit frequency setting function. (Maximum output frequency in external input signal operation is preset to 60 Hz at the factory.)

Large Dc injection braking operating voltages and times may cause motor overheating.

Motor accel/decel time is determined by the motor generating torque, load torque, and load inertia WK^2 (GD^2). If the stall prevention function is activated during accel/decel, set the accel/decel time longer. After the stall prevention function is activated, accel/decel time is extended to a length that the inverter can handle. To shorten the accel/decel time, increase the capacity of the inverter and possibly the motor.

Operation

Applying power to inverter output terminals T_1 (U), T_2 (V), or T_3 (W) will damage the inverter. Double check wiring and sequence before turning the power on.

If magnetic contactor (MC) is used on the primary side of the inverter, do not use the MC for starting and stopping the inverter. Otherwise, the inverter life may be reduced.

After turning power to the inverter off, electric charges in the internal capacitors are retained temporarily. Wait until the charge lamp goes off before touching the inside of the inverter.

Installation and selection of molded-case circuit breaker

On the input power side, a molded case circuit breaker (MCCB) to protect inverter primary wiring should be installed. The inverter power-factor (depending on power voltage, output frequency, and load) must be taken into account for selecting MCCB. If a full electromagnetic MCCB is to be used, select a larger capacity because the operating characteristics are altered by harmonic current. A leakage current breaker threshold of 200 mA and above, or of inverter use is recommended.

Use of input side magnetic contactor

The inverter can be used without an input side magnetic contactor (MC). An input MC can be used to prevent an automatic restart after recovery from an external power loss during remote control operation. However, do not use the MC frequently for start/stop operation, or it will lead to a reduced reliability. When the digital operator is used, automatic restart after power failure is disabled so that MC starting is impossible. Although primary the MC can stop the inverter, regeneration braking is disabled and the motor coasts to stop.

Use of secondary magnetic contactor

In general magnetic contactors on the output of the inverter, for motor control should not be used. Starting a motor with the inverter running will cause large surge currents and the inverter overcurrent protector to trigger. If an MC is used for switching to commercial power supply, switch MC after the inverter and the motor stop. To switch during motor rotation, use the speed search function. (See page 28.)

Use of overload relay

The inverter includes an electronics thermal protective function to protect the motor from overheating. If more than one motor is driven with a single inverter or when a multi-pole motor is used, place a overload relay between the inverter and the motor. Set 1 to the first position of Sn-14 (xxx1), and set the overload relay to the current nameplate value at 50 Hz, or 1.1 times of that at 60 Hz.

Power-factor improvement (elimination of phase advance capacitor)

To improve the power-factor, install an AC reactor on the inverter's primary side. Power-factor improvement capacitor or surge suppressors on the inverter output side will be damaged by the harmonic component in the inverter output. Also, the overcurrent caused in the inverter output will trigger the overcurrent protection. To avoid this, do not use capacitors or surge suppressors in the inverter's output. To improve the power-factor, install an AC reactor on the inverter primary side.

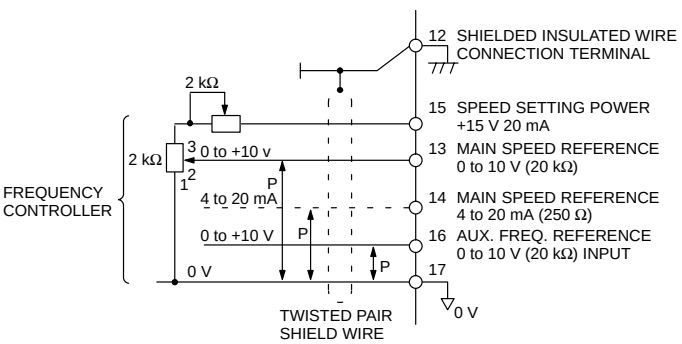
Radio frequency interference

Because the inverter I/O (main circuit) contains a higher harmonics component, it may emit RFI noise to communication equipment (AM radio, etc.) near the inverter. Use a noise filter to decrease the noise. Use of a metallic conduit between the inverter and motor and grounding the conduit is also effective. Proper routing of input and output leads is also recommended.

Wire thickness and cable length

If the inverter is connected to a distant motor, (especially when low frequency is output,) motor torque decreases because of voltage drop in the cable. Use sufficiently heavy wire.

When a digital operator is to be installed separately from the inverter, use the Omron connection cable (option). For remote control with analog signals, connect the operating pot or operating signal terminal and the inverter within 30 m of the inverter. The cable must be routed separately from power circuits (main circuit and relay sequence circuit) so that it is not subjected to inductive interference by other equipment. If frequencies are set not only from the digital operator but also with external frequency controller, use twisted pair shielded wire as shown in the following figure and connect the shielding to terminal 12, not to the ground.



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CARD ANALOG MONITOR PAO08

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ANALOG SPEED REF-ERENCE CARD PAI14U

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DIGITAL MONITOR

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OPERATOR/MONITOR ADAPTER PANEL

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ANALOG MONITOR CARD PA012

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ANALOG REFERENCE CARD PAI14B

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K3F ISOLATOR

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PULSE OUTPUT CARD PPO36F

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DIGITAL REFERENCE CARD PDI08

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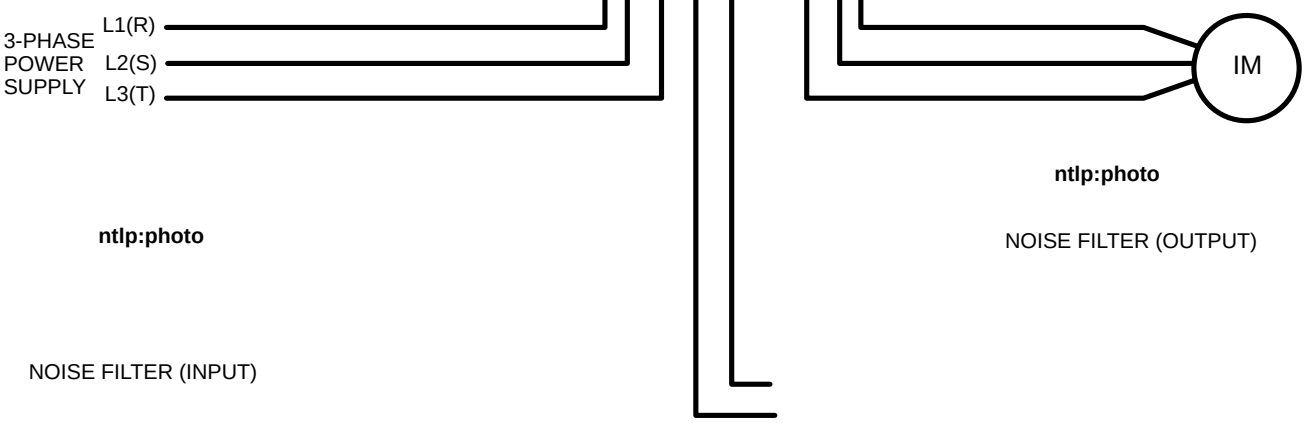
PSIG
SYSMAC BUS (wire) Interface Card

PSIF
SYSMAC BUS II (optical) Interface Card

OPTIONAL CARDS



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NOISE FILTER (OUTPUT)

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NOISE FILTER (INPUT)

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AC REACTOR

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BACKUP CAPACITOR UNIT FOR MOMENTARY POWER LOSS

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BRAKING UNIT

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BRAKING RESISTOR UNIT

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BRAKING RESISTOR (BUILT-IN TYPE)

OPTIONAL UNITS

Type		Name	Model (Code No.)	Function	Page
Built-in Type (Connector Mounted)	Speed (Frequency) Reference Option Card	Analog reference card	3G3IV-PAI14U	Allows high precision, high resolution analog speed reference setting. Input signal level: 0 to +10 VDC (20 KΩ) 1 channel 4 to 20 mA DC (250 Ω) 1 channel Input resolution: 14 bits (1/16384)	45
			3G3IV-PAI14B	Allows bipolar high precision, high resolution analog speed reference setting. Input signal level: 0 to ±10 VDC (20 KΩ) 4 to 20 mA DC (250 Ω) 3 channels Input resolution: 13 bits (1/8192)	45
		Digital reference card	3G3IV-PDI08	Allows 8 bits digital speed reference set. Input signal: binary 8 bits/BCD 2 digits + code Input voltage: +24 V (insulation) Input current: 8 mA	45
	Monitor Option Card	Analog monitor card	3G3IV-PAO08	Outputs analog signal for monitoring inverter output state (output freq., output current etc.). Output resolution: 8 bits (1/256) Output voltage: 0 to +10 V (non isolated) Output channel: 2 channels	45
			3G3IV-PAO12	Outputs analog signal for monitoring inverter output state (output freq., output current etc.). Output resolution: 11 bits (1/2048) Output voltage: 0 to +10 V (non isolated) Output channel: 2 channels	45
		Pulse output card	3G3IV-PPO36F	Outputs pulse train signal corresponding to the inverter frequency Output pulse: 1F, 6F, 10F, 12F, 36F (F: output freq.) Output voltage: ±12 V ±10 % (Insulation) Output current: 20 mA max.	45
Mounted on the Inverter Unit	Option Unit	Digital monitor	3G3IV-PJVOP101	Allows freq. or current digital monitor displays and fault indications. Run/stop operation and constant settings are protected against tampering on site.	46
		Adapter panel for digital operator/ digital monitor	3G3IV-PJVOP109	Adapter panel is capable of mounting on the front of inverter unit with its special cable. Use the adapter panel special cable.	46
		Adapter panel special cable	3G3IV-PCN122 (1 m)	Used for the remote operation of digital operator or monitor with adapter panel (PJVOP109) Cable length: 1m, 3m	46
			3G3IV-PCN322 (3 m)		
		Special cable for digital operator/ digital monitor (with blank cover)	3G3IV-PCN121 (1 m)	Used for the operation of digital operator or monitor when removed from the front of inverter unit Cable length; 1 m, 3 m	46
			3G3IV-PCN321 (3 m)		
Separately mounted Type		Braking unit	3G3IV-PCDBR□□□□	For motor decel tie reduction, use this with braking resistor unit.	47 48
		Braking resistor unit	3G3IV-PLKEB□□□□	Motor regenerative energy dissipation by the resistor reduces the decel time. (duty cycle 10% ED)	47 48
		Braking resistor (built-in type)	3G3IV-PERF150WJ□01	Motor regenerative energy dissipation by the resistor reduces the decel time. (duty cycle 3% ED)	47 48
		Backup capacitor for momentary power loss	3G3IV-PP0010 3G3IV-PP0020	For power loss of less than 2 sec.	48

PERIPHERAL UNITS

Name	Model (Code No.)	Function	Page
AC Reactor	---	Motor noise reduction. Starting torque improvement. For motors exceeding the inverter horsepower.	49
Radio noise Protective Filter	---	Used the radio noise filter to eliminate radio wave interference. It is provided at input terminals of the inverter main circuit.	50
Isolator	K3F	Isolates the inverter's input and output signals to reduce induced noise.	53

BUILT-IN TYPE OPTION CARD

ANALOG REFERENCE CARD
Unidirectional-type

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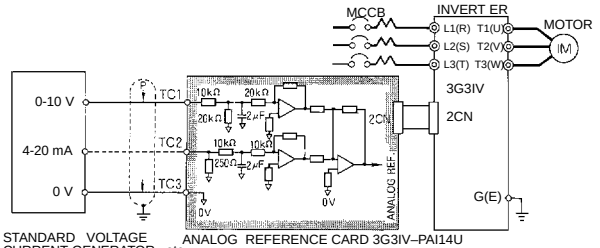

STANDARD VOLTAGE CURRENT GENERATOR etc

ANALOG REFERENCE CARD 3G3IV–PAI14U

ANALOG MONITOR CARD

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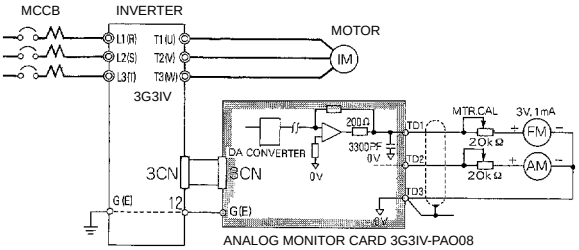

ANALOG MONITOR CARD 3G3IV-PAO08

ANALOG REFERENCE CARD
Bidirectional-type

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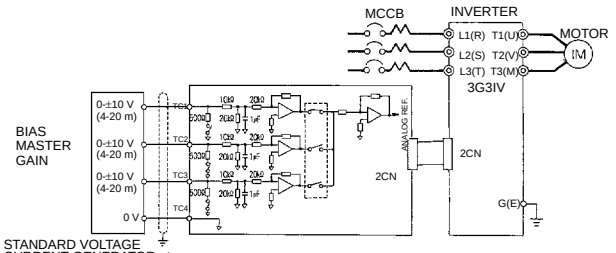

STANDARD VOLTAGE CURRENT GENERATOR etc

G(E)ANALOG REFERENCE CARD 3G3IV–PAI14B

ANALOG MONITOR CARD

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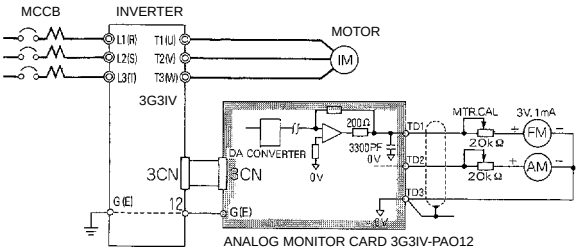

ANALOG MONITOR CARD 3G3IV-PAO12

DIGITAL REFERENCE CARD

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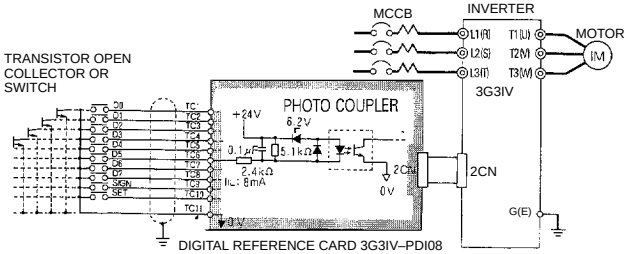

DIGITAL REFERENCE CARD 3G3IV–PDI08

PULSE OUTPUT CARD

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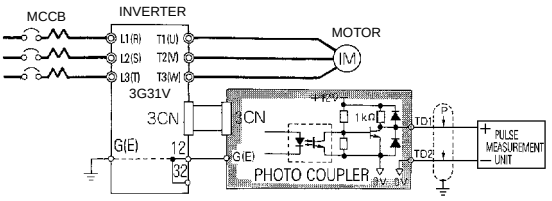
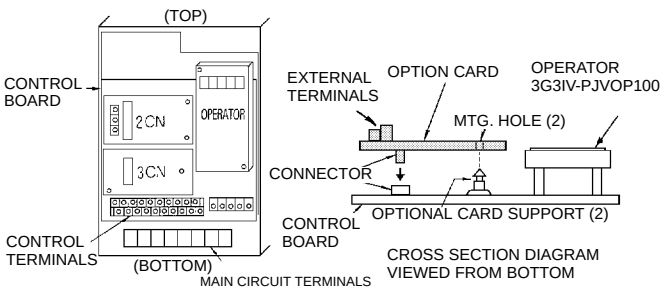


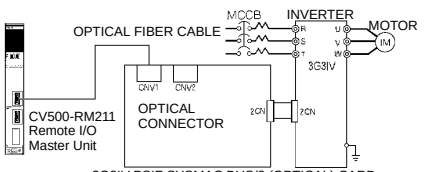
PULSE OUTPUT CARD 3G3IV-PPO36F

Installation of Option Card



Weight: 0.22 lb (0.1 kg)

SYSMAC BUS/2 (OPTICAL) CARD



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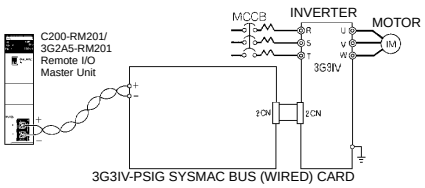
3G3IV-PSIF SYSMAC BUS/2 (OPTICAL) CARD

SYSMAC BUS (WIRED) CARD



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3G3IV-PSIG SYSMAC BUS (WIRED) CARD

DIGITAL OPERATOR/ADAPTER PANEL FOR DIGITAL MONITOR

ADAPTER PANEL

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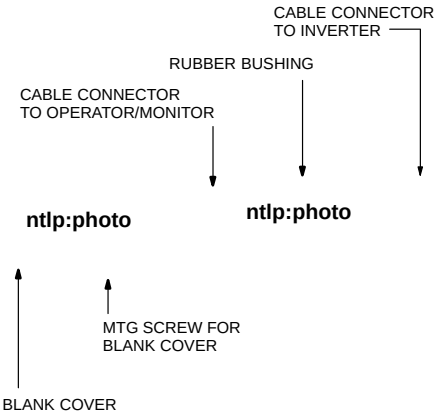
DIGITAL OPERATOR

ADAPTER PANEL SPECIAL CABLE

DIGITAL MONITOR

DIGITAL OPERATOR/SPECIAL CABLE FOR DIGITAL MONITOR



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Weight: 0.66 lb (0.3 kg)

DIGITAL MONITOR

MODEL 3G3IV-PJVOP101

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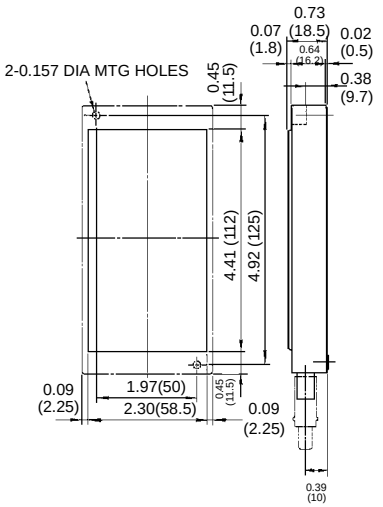

Weight: 0.22 lb (0.1 kg)

PANEL DRILLING PLAN

STANDARD SPECIFICATIONS AND APPLICATION

BRAKING RESISTOR MODEL OF 3G3IV-PERF150WJ

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BRAKING UNIT MODEL OF 3G3IV-PCDBR

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BRAKING RESISTOR UNIT MODEL OF 3G3IV-PLKEB

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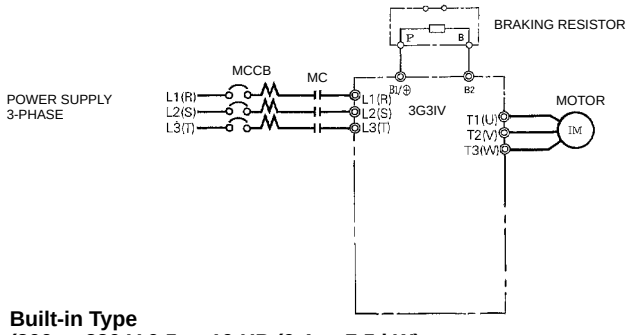
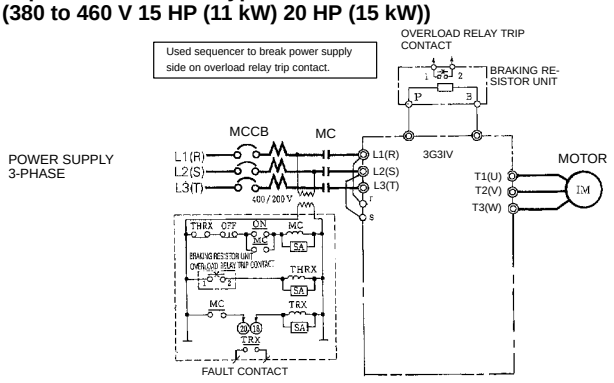
Inverter			Built-in Type				Separate Installation Type						
			Braking Resistor			Braking Torque (3%ED)%	Braking Unit		Braking Resistor Unit				Braking Torque (10%ED) %
Voltage	Max. Applicable Motor Unit HP (kW)	Model 3G3IV-□□□□-□	3G3IV-PERF150WJ□□□	Value of Resistance	No. of Used		Model 3G3IV-PCDBR□□□□	No,. of Used	Model 3G3IV-PLKEB□□□□	Specifications of Resistor	Unit		
											No. of Used	Max. Q'ty	
200 V to 230 V	0.5 (0.4)	A2004	201	200 Ω	1	220	---	---	20P7	70 W 200 Ω	1	4	220
	1 (0.75)	A2007	201	200 Ω	1	125	---	---	20P7	70 W 200 Ω	1	4	125
	2 (1.5)	A2015	101	100 Ω	1	125	---	---	21P5	260 W 100 Ω	1	5	125
	3 (2.2)	A2022	700	70 Ω	1	120	---	---	22P2	260 W 70 Ω	1	4	120
	5 (3.7)	A2037	620	62 Ω	1	100	---	---	23P7	390 W 40 Ω	1	2	125
	7.5 (5.5)	A2055	---	---	---	---	---	---	25P5	520 W 30 Ω	1	3	115
	10 (7.5)	A2075	---	---	---	---	---	---	27P5	780 W 20 Ω	1	2	125
	15 (11)	B2110	---	---	---	---	2015	1	2011	2400 W 13.6 Ω	1	1	125
	20 (15)	B2150	---	---	---	---	2015	1	2015	3000 W 10 Ω	1	1	125
	25 (18.5)	B2180	---	---	---	---	2022	1	2018	4800 W 8 Ω	1	1	125
	30 (22)	B2220	---	---	---	---	2022	1	2022	4800 W 6.8 Ω	1	1	125
	40 (30)	B2300	---	---	---	---	2015	2	2015	3000 W 10 Ω	2	1	125
	50 (37)	B2370	---	---	---	---	2015	2	2015	3000 W 10 Ω	2	1	100
	60 (45)	B2450	---	---	---	---	2022	2	2022	4800 W 6.8 Ω	2	1	120
	75 (55)	B2550	---	---	---	---	2022	2	2022	4800 W 6.8 Ω	2	1	100
	100 (75)	B2750	---	---	---	---	2022	3	2022	4800 W 6.8 Ω	3	1	110
380 V to 460 V	0.5 (0.4)	A4004	751	750 Ω	1	230	---	---	40P7	70 W 750 Ω	1	7	230
	1 (0.75)	A4007	751	750 Ω	1	130	---	---	40P7	70 W 750 Ω	1	7	130
	2 (1.5)	A4015	401	400 Ω	1	125	---	---	41P5	260 W 400 Ω	1	6	125
	3 (2.2)	A4022	251	300 Ω	1	115	---	---	42P2	260 W 250 Ω	1	3	135
	5 (3.7)	A4037	---	---	---	---	---	---	43P7	390 W 150 Ω	1	4	135
	7.5 (5.5)	A4055	---	---	---	---	---	---	45P5	520 W 100 Ω	1	3	135
	10 (7.5)	A4075	---	---	---	---	---	---	47P5	780 W 75 Ω	1	2	130
	15 (11)	B4110	---	---	---	---	---	---	4011	1040 W 50 Ω	1	2	135
	20 (15)	B4150	---	---	---	---	---	---	4015	1560 W 40 Ω	1	2	125
	25 (18.5)	B4180	---	---	---	---	4030	1	4018	4800 W 32 Ω	1	1	125
	30 (22)	B4220	---	---	---	---	4030	1	4022	4800 W 27.2 Ω	1	1	125
	40 (30)	B4300	---	---	---	---	4030	1	4030	600 W 20 Ω	1	1	125
	50 (37)	B4370	---	---	---	---	4045	1	4037	9600 W 16 Ω	1	1	125
	60 (45)	B4450	---	---	---	---	4045	1	4045	9600 W 13.6 Ω	1	1	125
	75 (55)	B4550	---	---	---	---	4030	2	4030	6000 W 20 Ω	2	1	135
	100 (75)	B4750	---	---	---	---	4045	2	4045	9600 W 13.6 Ω	2	1	145
	150 (110)	B411K	---	---	---	---	4030	3	4030	6000 W 20 Ω	3	1	100
	200 (160)	B416K	---	---	---	---	4045	4	4045	9600 W 13.6 Ω	4	1	140
	250 (185)	B418K	---	---	---	---	4045	4	4045	9600 W 13.6 Ω	4	1	120
	300 (220)	B422K	---	---	---	---	4045	5	4045	9600 W 13.6 Ω	5	1	125
	400 (300)	B430K	---	---	---	---	4045	6	4045	9600 W 13.6 Ω	6	1	110

INTERCONNECTIONS

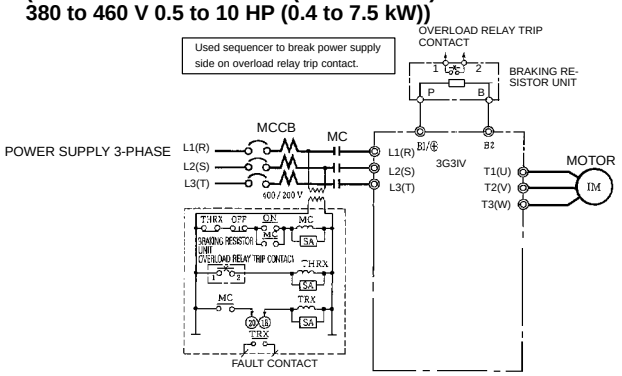
- **Built-in Type**
  (200 to 230 V 0.5 to 5 HP (0.4 to 3.7 kW)
  380 to 460 V 0.5 to 3 HP (0.4 to 2.2 kW))



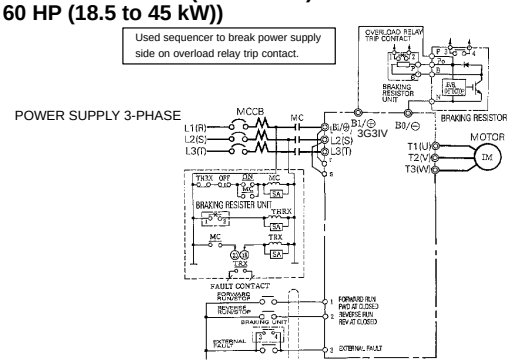
- **Separate Installation Type**
  (380 to 460 V 15 HP (11 kW) 20 HP (15 kW))



- **Built-in Type**
  (200 to 230 V 0.5 to 10 HP (0.4 to 7.5 kW)
  380 to 460 V 0.5 to 10 HP (0.4 to 7.5 kW))



- **Separate Installation Type**
  (200 to 230 V 15 to 29 HP (11 to 22 kW) 380 to 460 V
  25 to 60 HP (18.5 to 45 kW))



MOUNTING OF BRAKING RESISTOR

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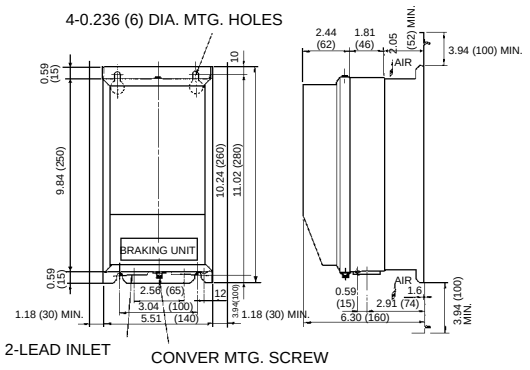
BRAKING UNIT DIMENSIONS: Inch (mm)

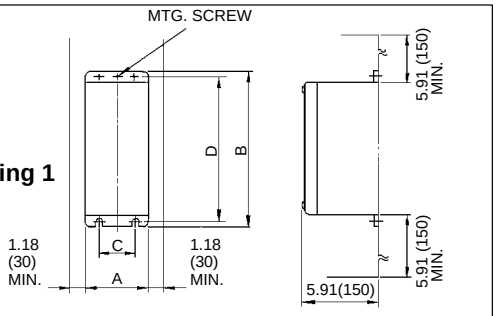


Model PCDBR2015
Weight: 33 lb (15 kg)

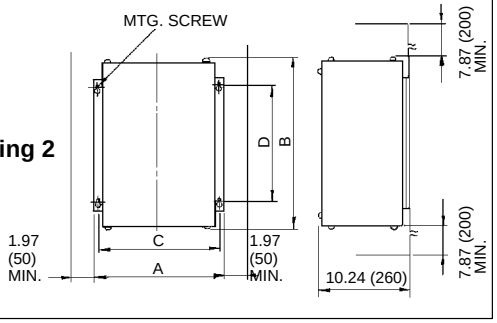
BRAKING RESISTOR UNIT DIMENSIONS: Inch (mm)

Voltage	Braking Resistor Unit Model 3G3IV-PLKEB□□□□	DWG	Dimensions: Inch (mm) A	B	C	D	MTG. Screw	Approx. Weight 1b (kg)
200 to 230 V	20P7	1	4.13 (105)	10.83 (275)	1.97 (50)	10.24 (260)	M5 x 3	6.62 (3.0)
	21P5	1	5.12 (130)	13.78 (350)	2.95 (75)	13.19 (335)	M5 x 4	9.93 (4.5)
	22P2	1	5.12 (130)	13.78 (350)	2.95 (75)	13.19 (335)	M5 x 4	9.93 (4.5)
	23P7	1	5.12 (130)	13.78 (350)	2.95 (75)	13.19 (335)	M5 x 4	11.0 (5.0)
	25P5	1	9.84 (250)	13.78 (350)	7.87 (200)	13.19 (335)	M6 x 4	16.6 (7.5)
	27P5	1	9.84 (250)	13.78 (350)	7.87 (200)	13.19 (335)	M6 x 4	18.8 (8.5)
	2011	2	10.47 (266)	21.38 (543)	9.69 (246)	13.39 (340)	M8 x 4	22.1 (10)
	2015	2	14.02 (356)	21.38 (543)	13.23 (336)	13.39 (340)	M8 x 4	33.1 (15)
	2018	2	17.56 (446)	21.38 (543)	16.77 (426)	13.39 (340)	M8 x 4	41.9 (19)
	2022	2	17.56 (446)	21.38 (543)	16.77 (426)	13.39 (340)	M8 x 4	41.9 (19)
380 to 460 V	40P7	1	4.13 (105)	10.83 (275)	1.97 (50)	10.24 (260)	M5 x 3	6.62 (3.0)
	41P5	1	5.12 (130)	13.78 (350)	2.95 (75)	13.19 (335)	M5 x 4	9.93 (4.5)
	42P2	1	5.12 (130)	13.78 (350)	2.95 (75)	13.19 (335)	M5 x 4	9.93 (4.5)
	43P7	1	5.12 (130)	13.78 (350)	2.95 (75)	13.19 (335)	M5 x 4	11.0 (5.0)
	45P5	1	9.84 (250)	13.78 (350)	7.87 (200)	13.19 (335)	M6 x 4	16.6 (7.5)
	47P5	1	9.84 (250)	13.78 (350)	7.87 (200)	13.19 (335)	M6 x 4	18.8 (8.5)
	4011	2	13.78 (350)	16.22 (412)	12.99 (330)	12.80 (325)	M6 x 4	35.3 (16)
	4015	2	13.78 (350)	16.22 (412)	12.99 (330)	12.80 (325)	M6 x 4	39.7 (18)
	4018	2	17.56 (446)	21.38 (543)	16.77 (426)	13.39 (340)	M8 x 4	41.9 (19)
	4022	2	17.56 (446)	21.38 (543)	16.77 (426)	13.39 (340)	M8 x 4	41.9 (19)
	4030	2	14.20 (356)	37.64 (956)	13.23 (336)	29.13 (740)	M8 x 4	55.2 (25)
	4037	2	17.56 (446)	37.64 (956)	16.77 (426)	29.13 (740)	M8 x 4	72.8 (33)
	4045	2	17.56 (446)	37.64 (956)	16.77 (426)	29.13 (740)	M8 x 4	72.8 (33)

Drawing 1



Drawing 2



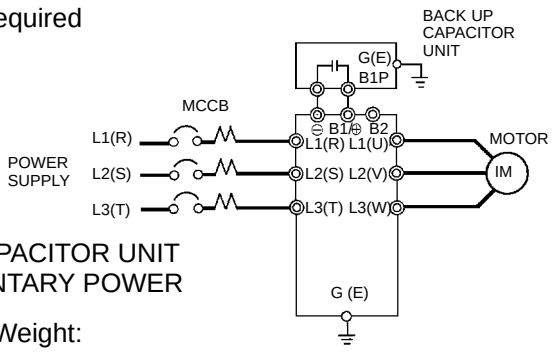
BACKUP CAPACITOR UNIT FOR MOMENTARY POWER LOSS

(Applicable to 0.5 to 3 HP (0.4 to 2.2 kW) of 200 to 230 V or 380 to 460 V)

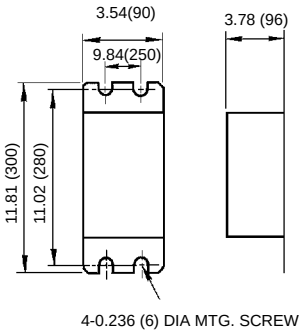
Use this unit for 3 HP (2.2 kW) and below and to extend the inverter's power loss ride-thru ability to 2 seconds. (Not required above 3 HP 2.2 kW)

200 to 230 V Model 3G3IV-PP0010
380 to 460 V Model 3G3IV-PP0020

- **Connection with Inverter**



- **Dimensions: Inch (mm)**



ntlp:photo

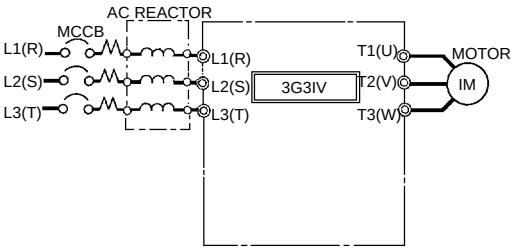
BACKUP CAPACITOR UNIT FOR MOMENTARY POWER LOSS

Weight:
4.4 lb (2 kg)

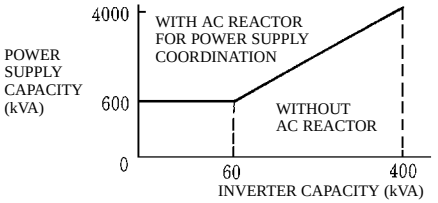
AC REACTOR (Model 3G3IV-PUZBAB, for Input, 50/60 Hz)

ntlp:photo

(Example of Connection)



When power capacity is significantly large compared to inverter capacity, or when the power-factor needs to be improved, connect the AC reactor. Select an AC reactor according to the motor capacity.

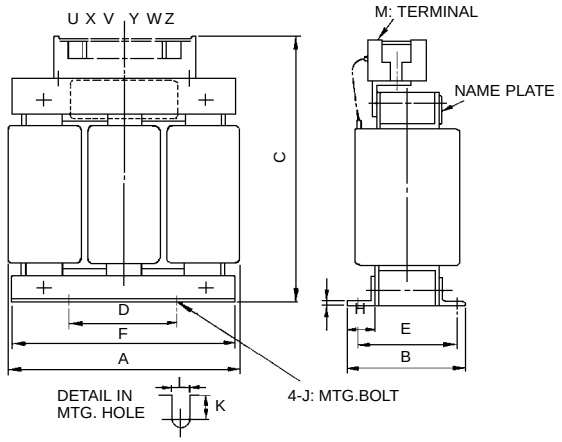


200 to 230 V

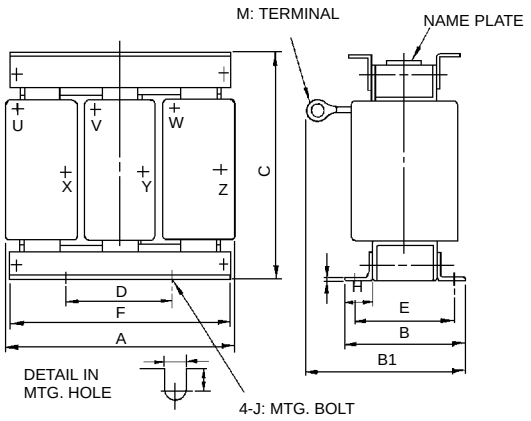
Max. Applicable Motor Output HP (kW)	Current Value A	Inductance mH	Drawing	Dimensions: Inch (mm)												Approx. Weight lb (kg)	Loss Watt
				A	B	B1	C	D	E	F	H	J	K	L	M		
0.5 (0.4)	2.5	4.2	1	4.72 (120)	2.80 (71)	---	4.72 (120)	1.57 (40)	1.97 (50)	4.13 (105)	0.79 (20)	M6	0.41 (10.5)	0.28 (7)	M4	5.51 (2.5)	15
1 (0.75)	5	2.1		4.72 (120)	2.80 (71)	---	4.72 (120)	1.57 (40)	1.97 (50)	4.13 (105)	0.79 (20)	M6	0.41 (10.5)	0.28 (7)	M4	5.51 (2.5)	15
2 (1.5)	10	1.1		5.12 (230)	3.46 (88)	---	5.12 (130)	1.97 (50)	2.56 (65)	5.12 (130)	0.87 (22)	M6	0.45 (11.5)	0.28 (7)	M4	6.62 (3)	25
3 (2.2)	15	0.71		5.12 (230)	3.46 (88)	---	5.12 (130)	1.97 (50)	2.56 (65)	5.12 (130)	0.87 (22)	M6	0.45 (11.5)	0.28 (7)	M4	6.62 (3)	30
5 (3.7)	20	0.53	2	5.12 (230)	3.46 (88)	4.49 (114)	4.13 (105)	1.97 (50)	2.56 (65)	5.12 (130)	0.87 (22)	M6	0.45 (11.5)	0.28 (7)	M4	6.62 (3)	35
7.5 (5.5)	30	0.35		5.12 (130)	3.46 (88)	4.69 (119)	4.13 (105)	1.97 (50)	2.76 (70)	5.12 (130)	0.87 (22)	M6	0.35 (9)	0.28 (7)	M4	6.62 (3)	45
10 (7.5)	40	0.265		5.12 (130)	3.86 (98)	5.47 (139)	4.13 (105)	2.95 (75)	2.95 (75)	5.12 (130)	0.87 (22)	M6	0.45 (11.5)	0.28 (7)	M4	8.82 (4)	50
15 (11)	60	0.18		6.30 (160)	4.13 (105)	5.81 (147.5)	5.12 (130)	2.95 (75)	3.15 (80)	6.30 (160)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M4	13.23 (6)	65
20 (15)	80	0.13		7.09 (180)	3.94 (100)	6.10 (155)	5.91 (150)	2.95 (75)	3.35 (85)	7.09 (180)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M4	17.64 (8)	75
25 (18.5)	90	0.12		7.09 (180)	3.94 (100)	5.91 (150)	5.91 (150)	2.95 (75)	3.15 (80)	7.09 (180)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M4	17.64 (8)	90
30 (22)	120	0.09		7.09 (180)	3.94 (100)	6.10 (110)	5.91 (150)	2.95 (75)	3.15 (80)	7.09 (180)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M4	17.64 (8)	90
40 (30)	160	0.07		8.27 (210)	3.94 (100)	6.69 (170)	6.89 (175)	2.95 (75)	3.15 (80)	8.07 (205)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M10	26.46 (12)	100
50 (37)	200	0.05		8.27 (210)	4.53 (115)	7.20 (182.8)	6.89 (175)	2.95 (75)	3.74 (95)	8.07 (205)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M10	33.07 (15)	110
60 (45)	240	0.044		9.45 (240)	4.96 (126)	8.58 (218)	8.47+0.2 (215+5)	5.91 (150)	4.33 (110)	9.45 (240)	0.98 (25)	M6	0.32 (8)	0.28 (7)	M10	50.71 (23)	125
75 (55)	280	0.038		9.45 (240)	4.96 (126)	8.58 (218)	8.47+0.2 (215+5)	5.91 (150)	4.33 (110)	9.45 (240)	0.98 (25)	M8	0.32 (8)	0.39 (10)	M12	50.71 (23)	130

380 to 460 V

Max. Applicable Motor Output HP (kW)	Current Value A	Inductance mH	Drawing	Dimensions: Inch (mm)												Approx. Weight lb (kg)	Loss Watt
				A	B	B1	C	D	E	F	H	J	K	L	M		
0.5 (0.4)	1.3	18.0	1	4.72 (120)	2.80 (71)	---	4.72 (120)	1.57 (40)	1.97 (50)	4.13 (105)	0.79 (20)	M6	0.41 (10.5)	0.28 (7)	M4	5.51 (2.5)	15
1 (0.75)	2.5	8.4		4.72 (120)	2.80 (71)	---	4.72 (120)	1.57 (40)	1.97 (50)	4.13 (105)	0.79 (20)	M6	0.41 (10.5)	0.28 (7)	M4	5.51 (2.5)	15
2 (1.5)	5	4.2		5.12 (230)	3.46 (88)	---	5.12 (130)	1.97 (50)	2.76 (70)	5.12 (130)	0.87 (22)	M6	0.35 (9)	0.28 (7)	M4	5.51 (2.5)	25
3 (2.2)	7.5	3.6		5.12 (230)	3.46 (88)	---	5.12 (130)	1.97 (50)	2.76 (70)	5.12 (130)	0.87 (22)	M6	0.35 (9)	0.28 (7)	M4	6.62 (3)	35
5 (3.7)	10	2.2		5.12 (230)	3.46 (88)	---	5.12 (130)	1.97 (50)	2.56 (65)	5.12 (130)	0.87 (22)	M6	0.45 (11.5)	0.28 (7)	M4	6.62 (3)	43
7.5 (5.5)	15	14.2		5.12 (130)	3.46 (98)	---	5.12 (130)	1.97 (50)	2.95 (75)	5.12 (130)	0.87 (22)	M6	0.45 (11.5)	0.28 (7)	M4	6.62 (3)	50
10 (7.5)	20	1.06	2	6.30 (160)	3.54 (90)	4.53 (115)	5.12 (130)	2.95 (75)	2.76 (70)	6.30 (160)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M5	8.82 (4)	50
15 (11)	30	0.7		6.30 (160)	4.13 (105)	5.22 (132.5)	5.12 (130)	2.95 (75)	3.35 (85)	6.30 (160)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M5	11.03 (5)	65
20 (15)	40	0.53		7.09 (180)	3.94 (100)	5.51 (140)	5.91 (150)	2.95 (75)	3.15 (80)	7.09 (180)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M6	13.23 (6)	90
25 (18.5)	50	0.42		7.09 (180)	3.94 (100)	5.71 (145)	5.91 (150)	2.95 (75)	3.15 (80)	7.09 (180)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M6	17.64 (8)	90
30 (22)	60	0.36		7.09 (180)	3.94 (100)	5.91 (150)	5.91 (150)	2.95 (75)	2.95 (75)	7.09 (180)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M6	17.64 (8)	90
40 (30)	80	0.26		8.27 (210)	3.94 (100)	5.91 (150)	6.89 (175)	2.95 (75)	3.15 (80)	8.07 (205)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M8	18.74 (8.5)	95
50 (37)	90	0.24		8.27 (210)	4.53 (115)	6.99 (177.5)	6.89 (175)	2.95 (75)	3.75 (95)	8.07 (205)	0.98 (25)	M6	0.39 (10)	0.28 (7)	M8	26.46 (12)	110
60 (45)	120	0.18		9.45 (240)	4.96 (126)	7.66 (193)	8.07±0.2 (20.5±5)	5.91 (150)	4.33 (110)	9.45 (240)	0.98 (250)	M8	0.31 (8)	0.39 (10)	M10	33.07 (15)	130
75 (55)	150	0.15		9.45 (240)	4.96 (126)	7.80 (198)	8.07±0.2 (20.5±5)	5.91 (150)	4.33 (110)	9.45 (240)	0.98 (250)	M8	0.31 (8)	0.39 (10)	M10	50.71 (23)	150



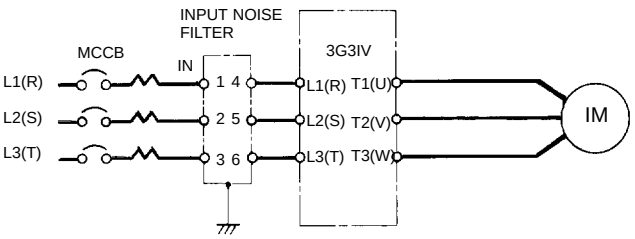
Drawing 1



Drawing 2

NOISE FILTER INPUT NOISE FILTER (Soshin Electric Co., Ltd.)

ntlp:photo



Example of Noise Filter connection

200 to 230 V

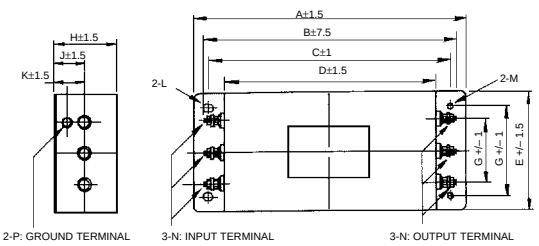
Max. Applicable Motor Output HP (kW)	Inverter Capacity kVA	Input Noise Filter	
		Model	Rated Current A
0.5 (0.4)	1.4	3G3IV-PHF3005AZ	5
1 (0.75)	2.1	3G3IV-PHF3010AZ	10
2 (1.5)	2.7	3G3IV-PHF3010AZ	10
3 (2.2)	4.1	3G3IV-PHF3015AZ	15
5 (3.7)	6.9	3G3IV-PHF3030AZ	30
7.5 (5.5)	10.3	3G3IV-PHF3040AZ	40
10 (7.5)	13.7	3G3IV-PHF3050AZ	50
15 (11)	20.6	3G3IV-PHF3080AZ	80
20 (15)	27.4	3G3IV-PHF3100AZ	100
25 (18.5)	34	3G3IV-PHF3150AZ	150
30 (22)	41	3G3IV-PHF3150AZ	150
40 (30)	54	3G3IV-PHF3200AZ	200
50 (37)	68	3G3IV-PHF3240AZ	240
60 (45)	78	3G3IV-PHF3240AZ	240
75 (55)	95	3G3IV-PHF3150AZX2P	300

380 to 460 V

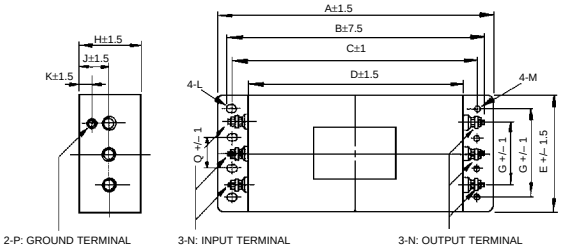
Max. Applicable Motor Output HP (kW)	Inverter Capacity kVA	Input Noise Filter	
		Model	Rated Current A
0.5 (0.4)	1.4	3G3IV-PHF3005CZ	5
1 (0.75)	2.1	3G3IV-PHF3005CZ	5
2 (1.5)	2.7	3G3IV-PHF3010CZ	10
3 (2.2)	4.1	3G3IV-PHF3010CZ	10
5 (3.7)	6.9	3G3IV-PHF3015CZ	15
7.5 (5.5)	10.3	3G3IV-PHF3020CZ	20
10 (7.5)	13.7	3G3IV-PHF3030CZ	30
15 (11)	20.6	3G3IV-PHF3040CZ	40
20 (15)	27.4	3G3IV-PHF3050CZ	50
25 (18.5)	34	3G3IV-PHF3060CZ	60
30 (22)	41	3G3IV-PHF3080CZ	80
40 (30)	54	3G3IV-PHF3100CZ	100
50 (37)	68	3G3IV-PHF3150CZ	150
60 (45)	82	3G3IV-PHF3150CZ	150
75 (55)	110	3G3IV-PHF3200CZ	200

DIMENSIONS: Inch (mm)

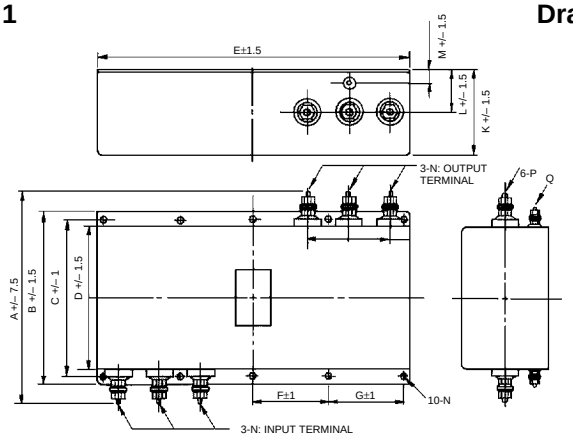
Model	DWG	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	Weight lb (kg)
3G3IV-PHF3005AZ	1	8.66 (220)	8.19 (208)	7.68 (195)	6.69 (170)	3.74 (95)	2.76 (70)	1.97 (50)	1.97 (50)	0.98 (25)	0.39 (10)	R0.09, 0.24 Length (R2.25, 6 Length)	ϕ0.18 (ϕ4.5)	M4	M4	---	2.213 (1.0)
3G3IV-PHF3010AZ																	2.65 (1.2)
3G3IV-PHF3015AZ																	4.86 (2.4)
3G3IV-PHF3030AZ	1	10.79 (274)	10.16 (258)	9.06 (230)	8.27 (210)	4.33 (110)	3.15 (80)	2.36 (60)	2.76 (70)	1.38 (35)	0.47 (12)	R0.11, 0.28 Length (R2.75, 7 Length)	ϕ0.22 (ϕ5.5)	M5	M4	---	5.29 (2.4)
3G3IV-PHF3040AZ	2	13.98 (355)	12.99 (330)	12.06 (320)	11.22 (285)	4.72 (120)	3.54 (90)	2.76 (70)	3.15 (80)	1.57 (40)	0.47 (12)	R0.15, 0.3 Length (R3.75, 8 Length)	ϕ0.26 (ϕ6.5)	M5	M4	1.18 (30)	10.58 (4.8)
3G3IV-PHF3050AZ			13.99 (340)											M6			12.35 (5.6)
3G3IV-PHF3080AZ		16.54 (420)	16.14 (410)	14.96 (380)	13.39 (340)	6.30 (160)	5.12 (130)	3.54 (90)	3.94 (100)	1.97 (50)	0.59 (15)			M8	M6	1.97 (50)	24.25 (11.0)
3G3IV-PHF3100AZ	3	11.81 (300)	10.24 (260)	9.45 (240)	8.66 (220)	16.54 (420)	4.13 (105)	3.82 (97)	4.13 (105)	0.98 (25)	3.94 (100)	2.17 (55)	0.79 (20)	ϕ0.26 (ϕ6.5)	M12	M6	40.78 (18.5)
3G3IV-PHF3150AZ		12.80 (325)	10.63 (270)	9.84 (250)	9.06 (230)	17.72 (450)	4.65 (118)	3.90 (99)	4.33 (110)		4.74 (120)	2.36 (60)					60.03 (27.5)
3G3IV-PHF3200AZ		13.58 (345)	11.42 (290)	10.63 (270)	9.84 (250)	18.90 (480)	4.53 (115)	4.53 (115)			5.91 (150)	2.95 (75)					77.16 (35)
3G3IV-PHF3005CZ	1	8.66 (220)	8.19 (208)	7.68 (195)	6.69 (170)	3.74 (195)	2.76 (70)	1.97 (50)	1.97 (50)	0.98 (25)	0.39 (10)	R0.09, 0.24 Length (R2.25, 6 Length)	ϕ0.18 (ϕ4.5)	M4	M4	---	2.65 (1.2)
3G3IV-PHF3010CZ		10.79 (274)	9.78 (248.5)	9.06 (230)	8.27 (210)	4.33 (110)	3.15 (80)	2.36 (60)	2.76 (70)	1.38 (35)	0.47 (12)	R0.11, 0.128 Length (R2.75, 7 Length)	ϕ0.22 (ϕ5.5)				3.97 (1.8)
3G3IV-PHF3015CZ																	4.4 (2.0)
3G3IV-PHF3020CZ																	4.41 (2.0)
3G3IV-PHF3030CZ	2	13.98 (355)	13.00 (330)	12.60 (320)	11.22 (285)	4.72 (120)	3.54 (90)	2.76 (70)	3.15 (80)	1.57 (40)	0.47 (12)	R0.13, 0.3 Length (R3.25, 8 Length)	ϕ0.26 (ϕ6.5)	M5	30	1.18 (30)	6.83 (3.1)
3G3IV-PHF3040CZ																	10.58 (4.8)
3G3IV-PHF3050CZ			13.39 (340)											M4			13.23 (5.6)
3G3IV-PHF3060CZ		16.54 (420)	15.51 (394)	14.96 (380)	13.39 (340)	6.30 (160)	5.12 (130)	3.54 (90)	3.94 (100)	1.97 (50)	0.59 (15)	R0.13, 0.3 Length (R3.25, 8 Length)	ϕ0.26 (ϕ6.5)	M4	50	1.97 (50)	22.05 (10)
3G3IV-PHF3080CZ			16.14 (410)											M6	50		24.25 (11)
3G3IV-PHF3100CZ	3	11.81 (300)	10.24 (260)	9.45 (240)	8.66 (220)	16.54 (420)	4.13 (105)	3.82 (97)	4.13 (105)	0.98 (25)	3.93 (100)	2.17 (55)	0.79 (20)	(46.5)	M6	M6	40.78 (18.5)
3G3IV-PHF3150CZ		12.80 (325)	10.63 (270)	9.84 (250)	9.06 (230)	17.2 (450)	4.65 (118)	3.90 (99)	4.33 (110)		4.72 (120)	2.36 (60)			M12		60.63 (27.5)
3G3IV-PHF3200CZ		13.58 (345)	11.42 (290)	10.63 (270)	9.84 (250)	18.90 (480)	4.53 (115)	4.53 (115)			5.91 (150)	2.95 (75)		ϕ0.26 (ϕ6.5)			



Drawing 1



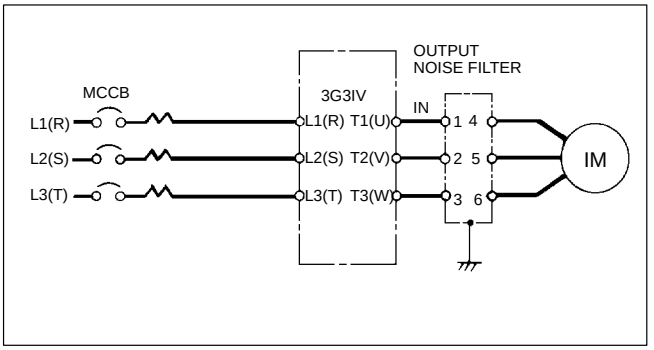
Drawing 2



Drawing 3

OUTPUT NOISE FILTER (Tohoku Metal Industries Co., Ltd.)

ntlp:photo



Example of Noise Filter connection

200 to 230 V

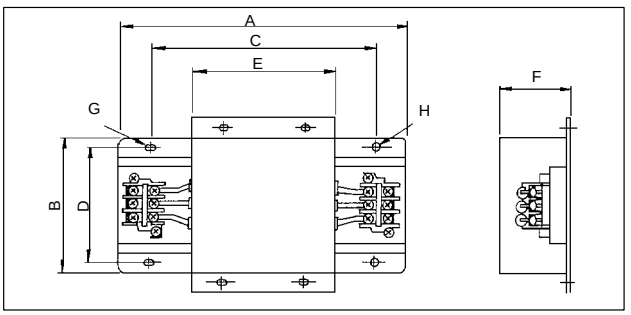
Max. Applicable Motor Output HP (kW)	Inverter Capacity kVA	Input Noise Filter	
		Model	Rated Current A
0.5 (0.4)	1.4	3G3IV-PLF310KA	10
1 (0.75)	2.1	3G3IV-PLF310KA	10
2 (1.5)	2.7	3G3IV-PLF310KA	10
3 (2.2)	4.1	3G3IV-PLF310KA	10
5 (3.7)	6.9	3G3IV-PLF320KA	20
7.5 (5.5)	10.3	3G3IV-PLF350KA	50
10 (7.5)	13.7	3G3IV-PLF350KA	50
15 (11)	20.6	3G3IV-PLF350KA x 2P	100
20 (15)	27.4	3G3IV-PLF350KA x 2P	100
25 (18.5)	34	3G3IV-PLF350KA x 2P	100
30 (22)	41		

380 to 460 V

Max. Applicable Motor Output HP (kW)	Inverter Capacity kVA	Input Noise Filter	
		Model	Rated Current A
0.5 (0.4)	1.4	3G3IV-PLF310KB	10
1 (0.75)	2.1	3G3IV-PLF310KB	10
2 (1.5)	2.7	3G3IV-PLF310KB	10
3 (2.2)	4.1	3G3IV-PLF310KB	10
5 (3.7)	6.9	3G3IV-PLF310KB	10
7.5 (5.5)	10.3	3G3IV-PLF320KB	20
10 (7.5)	13.7	3G3IV-PLF320KB	20
10 (7.5)	20.6	3G3IV-PLF335KB	35
15 (11)	27.4	3G3IV-PLF335KB	35
25 (18.5)	34	3G3IV-PLF345KB	45
30 (22)	41	3G3IV-PLF375KB	75
40 (30)	54	3G3IV-PLF375KB	75
50 (37)	68	3G3IV-PLF3110KB	110
60 (45)	82	3G3IV-PLF3110KB	110

DIMENSIONS: Inch (mm)

Model	Terminal Plate	A	B	C	D	E	F	G	H	Weight lb (kg)
3G3IV-PLF310KA	TE-K5.5 M4	5.51 (140)	3.94 (100)	3.94 (100)	3.54 (90)	2.76 (70)	1.77 (45)	0.28 x ϕ0.18 (7 x 4.5)	0.18 (ϕ4.5)	1.10 (0.5)
3G3IV-PLF320KA	TE-K5.5 M4	5.51 (140)	3.94 (100)	3.94 (100)	3.54 (90)	2.76 (70)	1.77 (45)	0.28 x ϕ0.18 (7 x 4.5)	0.18 (ϕ4.5)	1.32 (0.6)
3G3IV-PLF350KA	TE-K22 M6	10.24 (260)	7.09 (180)	7.09 (180)	6.30 (160)	4.72 (120)	2.56 (65)	0.28 x ϕ0.18 (7 x 4.5)	0.18 (ϕ4.5)	4.41 (2.0)
3G3IV-PLF310KB	TE-K5.5 M4	5.51 (140)	3.94 (100)	3.94 (100)	3.54 (90)	2.76 (70)	1.77 (45)	0.28 x ϕ0.18 (7 x 4.5)	0.18 (ϕ4.5)	1.10 (0.5)
3G3IV-PLF320KB	TE-K5.5 M4	5.51 (140)	3.94 (100)	3.94 (100)	3.54 (90)	2.76 (70)	1.77 (45)	0.28 x ϕ0.18 (7 x 4.5)	0.18 (ϕ4.5)	1.32 (0.6)
3G3IV-PLF335KB	TE-K5.5 M4	5.51 (140)	3.94 (100)	3.94 (100)	3.54 (90)	2.76 (70)	1.77 (45)	0.28 x ϕ0.18 (7 x 4.5)	0.18 (ϕ4.5)	1.76 (0.8)
3G3IV-PLF345KB	TE-K22 M6	10.24 (260)	7.09 (180)	7.09 (180)	6.30 (160)	4.72 (120)	2.56 (65)	0.28 x ϕ0.18 (7 x 4.5)	0.18 (ϕ4.5)	4.41 (2.0)
3G3IV-PLF375KB	TE-K22 M6	21.26 (540)	12.60 (320)	18.80 (480)	11.81 (300)	13.39 (340)	9.45 (240)	0.35 x ϕ0.26 (9 x 6.5)	0.26 (ϕ6.5)	28.46 (12.0)
3G3IV-PLF3110KB	TE-K60 M8	21.26 (540)	13.39 (340)	18.80 (480)	11.81 (300)	13.39 (340)	9.45 (240)	0.35 x ϕ0.26 (9 x 6.5)	0.26 (ϕ6.5)	42.90 (19.5)



ISOLATOR (TRANSDUCER)

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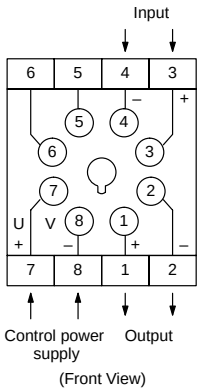
K3F



(Front View)

Performance

Accuracy	±0.2% FS
Response time	0.1 s max. for standard type or 500 μs max. for high-speed type between 0% and 90%
Temperature influence	±0.015% per °C max.
Control power supply	100 to 240 VAC ±10%, 50/60 Hz 12 to 24 VDC ±10%, 48 to 110 VDC ±10%
Influence of power supply fluctuations	±0.1% for 10% change in voltage
Power/current consumption	AC: 10 VA max. DC: 6 W max.

Ratings

Ambient temperature	Operating: –10% to 55%C Storage: –20% to 65%C
Ambient operating humidity	35% to 85%
Insulation resistance	100 Ω min. between inputs, outputs, and power supply (at 500 VDC)
Dielectric strength	2,000 VAC for 1 min. between inputs, outputs, and power supply (at 500 VDC)
Vibration resistance	10 to 35 Hz, 1-mm double amplitude for 2 hours each in X, Y, and Z directions
Shock resistance	100 m/s^2 (10G) three times each in X, Y, and Z directions
Noise immunity	1,500 V on power supply terminals in normal or common mode ±1μs, 50 ns for square-wave noise with 1-ns rise time

Standard Models (Response Time; 0.1 s max.)

Voltage Inputs Type

Input	0 to 10 V	4 to 20 mA
0 to 10 mV	K3F-IV0□-V4	K3F-IV0□-A3
0 to 100 mV	K3F-IV6□-V4	K3F-IV6□-A3
0 to 1 V	K3F-IV1□-V4	K3F-IV1□-A3
0 to 5 V	K3F-IV2□-V4	K3F-IV2□-A3
1 to 5 V	K3F-IV3□-V4	K3F-IV3□-A3
0 to 10 V	K3F-IV4□-V4	K3F-IV4□-A3
–1 to +1 V	K3F-IV1P□-V4	K3F-IV1P□-A3
–5 to +5 V	K3F-IV2P□-V4	K3F-IV2P□-A3
–10 to +10 V	K3F-IV4P□-V4	K3F-IV4P□-A3

Current Inputs Type

Input	0 to 10 V	4 to 20 mA
0 to 1 mA	K3F-IA1□-V4	K3F-IA1□-A3
0 to 10 mA	K3F-IA6□-V4	K3F-IA6□-A3
0 to 20 mA	K3F-IA7□-V4	K3F-IA7□-A3
4 to 20 mA	K3F-IA3□-V4	K3F-IA3□-A3
–1 to +1 mA	K3F-IA1P□-V4	K3F-IA1P□-A3
–20 to +20 mA	K3F-IA7P□-V4	K3F-IA7P□-A3

High-speed Models (Response Time; 500 μs max.)

Voltage Inputs Type

Input	0 to 10 V	4 to 20 mA
0 to 1 V	K3F-IV1□H-V4	K3F-IV1□H-A3
0 to 5 V	K3F-IV2□H-V4	K3F-IV2□H-A3
1 to 5 V	K3F-IV3□H-V4	K3F-IV3□H-A3
0 to 10 V	K3F-IV4□H-V4	K3F-IV4□H-A3

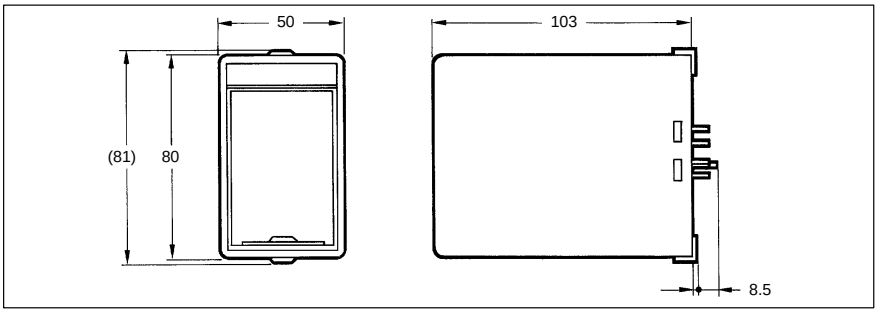
Current Inputs Type

Input	0 to 10 V	4 to 20 mA
0 to 1 mA	K3F-IA1□H-V4	K3F-IA1□H-A3
0 to 10 mA	K3F-IA6□H-V4	K3F-IA6□H-A3
0 to 20 mA	K3F-IA7□H-V4	K3F-IA7□H-A3
4 to 20 mA	K3F-IA3□H-V4	K3F-IA3□H-A3

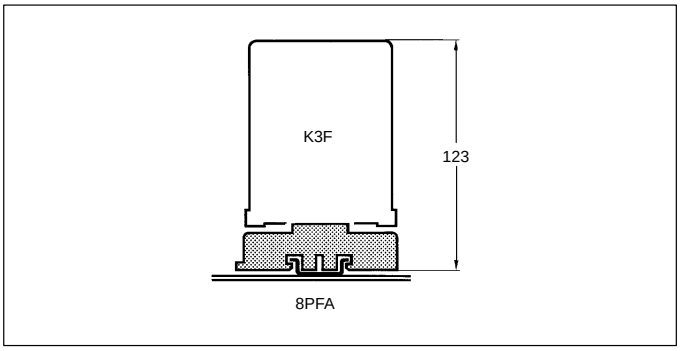
Note: 1. Replace the box in the model number with one of the following numbers to indicate the power supply voltage.
(1) 100 to 240 VAC
(2) 12 to 24 VDC
(3) 48 to 110 VDC

2. Models with the following output specifications are also provided: 0 to 10 mV, 0 to 1 V, 0 to 5 V, 1 to 5 V, 0 to 50 mV, 0 to 100 mV, 0 to 1 mA, 0 to 5 mA, 0 to 2.5 mA, 0 to 10 mA, and 0 to 20 mA.

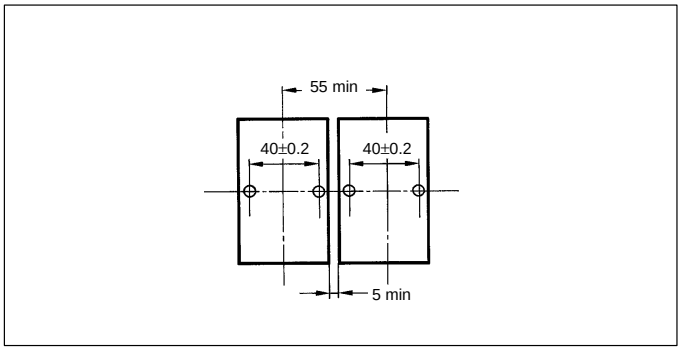
Dimensions



Connection Socket

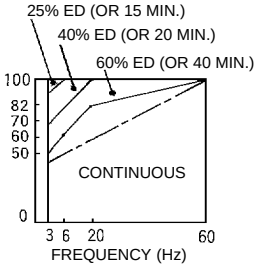


Mounting Holes



Application to Existing Standard Motors

A standard motor driven by the inverter generates slightly less power than it does when it is driven with commercial power supply. Also, the cooling effect deteriorates in low speed range so that the motor temperature rise increases. Reduce load torque in the low speed range. Allowable load characteristics of the standard motor are shown in the figure. If 100% continuous torque is required in the low speed range, use an inverter duty motor. (See page 53)



Allowable Load Characteristics of the Standard Motor

High-speed Operation

When the inverter is used above 60 Hz, motor mechanical design should be verified. Contact your motor mfg.

Torque Characteristics

Motor torque characteristics vary when the motor is driven by an inverter instead of commercial power supply. Check the load torque characteristics of the machine to be connected. (For torque characteristics for inverter operation, see page 57.)

Vibration

Because of the high carrier modulation technique for PWM control, the VS-616G3 series reduces motor vibration to a level equal to running with a commercial power supply. Larger vibrations may occur under the following conditions:

(1) Response at resonant frequency of the mechanical system.
Special care is required if a machine which has previously been driven at a constant speed, is to be driven at varying speeds. Installation of anti-vibration rubber padding under the motor base and frequency jump control are recommended.

(2) Rotator residual imbalance
Special care is required for operation at 60 Hz or higher frequencies.

Noise

Inverter operation is as quiet as operation with commercial power supply. At above rated rpm (60 Hz), noise may increase.

Application to Special Purpose Motors

Motors with Brakes	Use brake-equipped motors with an independent power supply. Connect the brake power supply to the inverter primary side. When the brake operates (the motor stops) it turns the inverter output OFF. Some types of brakes may make abnormal sounds in low speed range.
Pole Change Motors	Select the inverter with a capacity exceeding the rated current of each pole. Pole change should be made only after the motor stops. If a pole is changed while the motor is rotating, the regenerative overvoltage or overcurrent protection circuit is activated and the motor coasts to a stop.
Underwater Motors	Since the rate current of underwater motors is large compared with general purpose motors, select an inverter with a larger capacity. If the wire length between the inverter and the motor is large, use cables with sufficiency large diameter.
Explosion-proof Motors	Explosion-proof motors which are applied to an inverter must be currently approved as explosion-proof equipment. The inverter is not explosion-proof and should not be located where explosive gases exist.
Geared Motors	Lubrication method and continuous rotation limit differ with manufacturers. When oil lubrication is employed, continuous operation only in low speed range may cause burnout. Before operating the motor at more than 60 Hz you should consult the motor manufacturer.
Single-phase Motors	Single-phase motors are not suitable for variable speed operation with an inverter. If the inverter is applied to a motor using a capacitor stack, a high harmonic current flows and the capacitor may be damaged. For split-phase start motors and repulsion start motors, the internal centrifugal switch will not be actuated and the starting coil may be burned out. Therefore, use only 3-phase motors.

Power Transmission Mechanism (Gear Reduction, Belt, Chain, etc.)

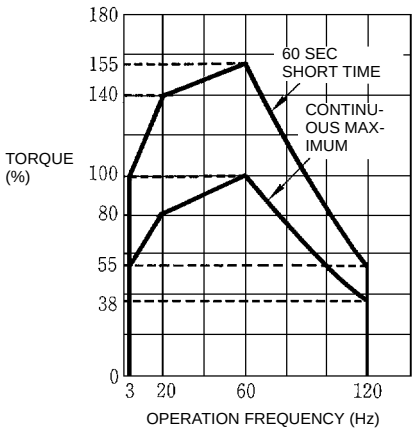
When gear boxes and change/reduction gears lubricated with oil are used in power transmission systems, continuous low speed operation decreases the oil lubrication function. Also, operation at more than 60 Hz may result in noise, reduced life, etc.

MOTOR OUTPUT TORQUE CHARACTERISTICS

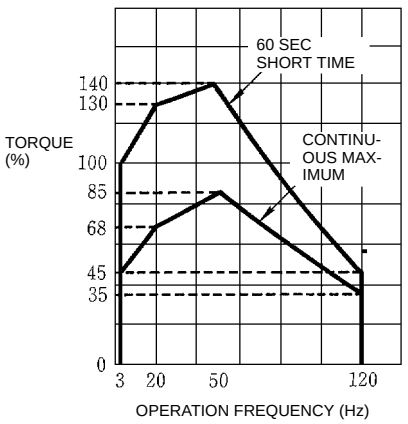
(Application example with 20 HP (15 kW), 4-pole motor and 3G3IV-B2150-E inverter)

The output torque of an induction motor driven by the inverter depends on the motor type. Select a motor according to the driven machine's load requirements.

Examples of Standard Motor Combination Characteristics

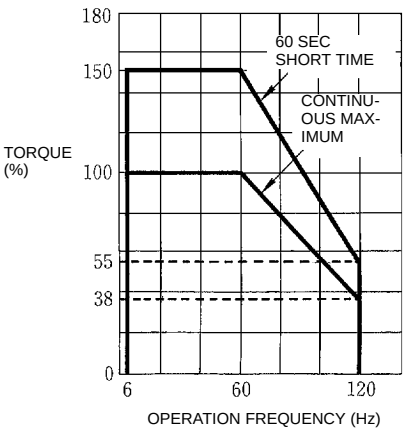


Base Frequency 60 Hz (V/f for 60 Hz, 220 V Input Voltage)

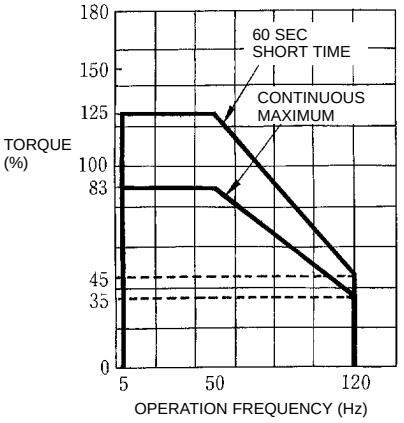


Base Frequency 50 Hz (V/f for 60 Hz, 200 V Input Voltage)

Examples of Inverter Duty Motor Characteristics



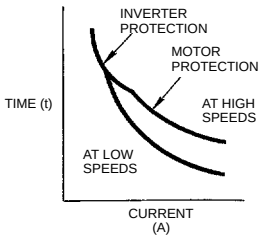
Base Frequency 60 Hz (V/f for 60 Hz, 220 V Input Voltage)



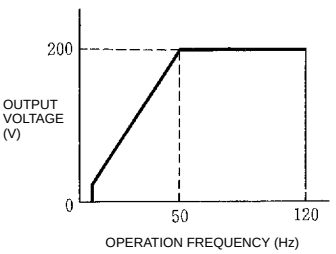
Base Frequency 50 Hz (V/f for 60 Hz, 200 V Input Voltage)

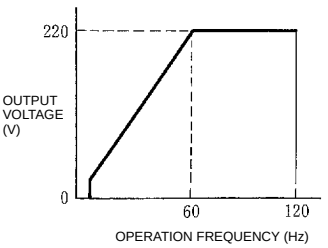
Motor Protection with Electronics Thermal Overload

Motor thermal characteristics as a function of operating frequency are simulated to protect the motor at any speed.



Standard V/f Characteristics



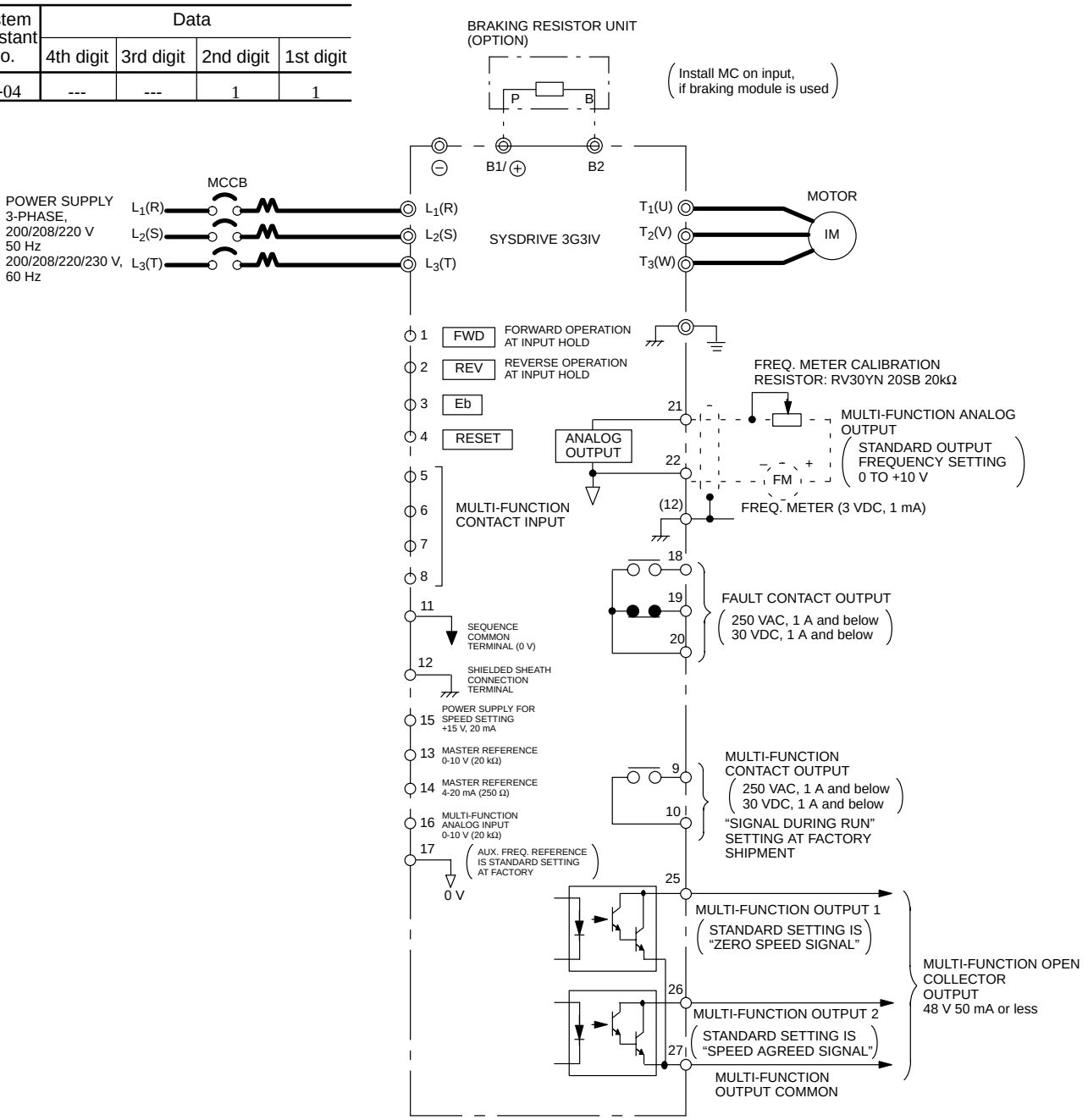


1. indicates shielded leads and P twisted-pair shielded leads.
2. External terminal (15) of +15 V has maximum output current capacity of 20 mA.
3. Either external terminal (13) or (14) can be used.
4. Terminal symbols: ◎ shows main circuit; ◯ shows control circuit.

With Digital Operator

System Constant Setting
(Standard Setting at Factory Shipment)

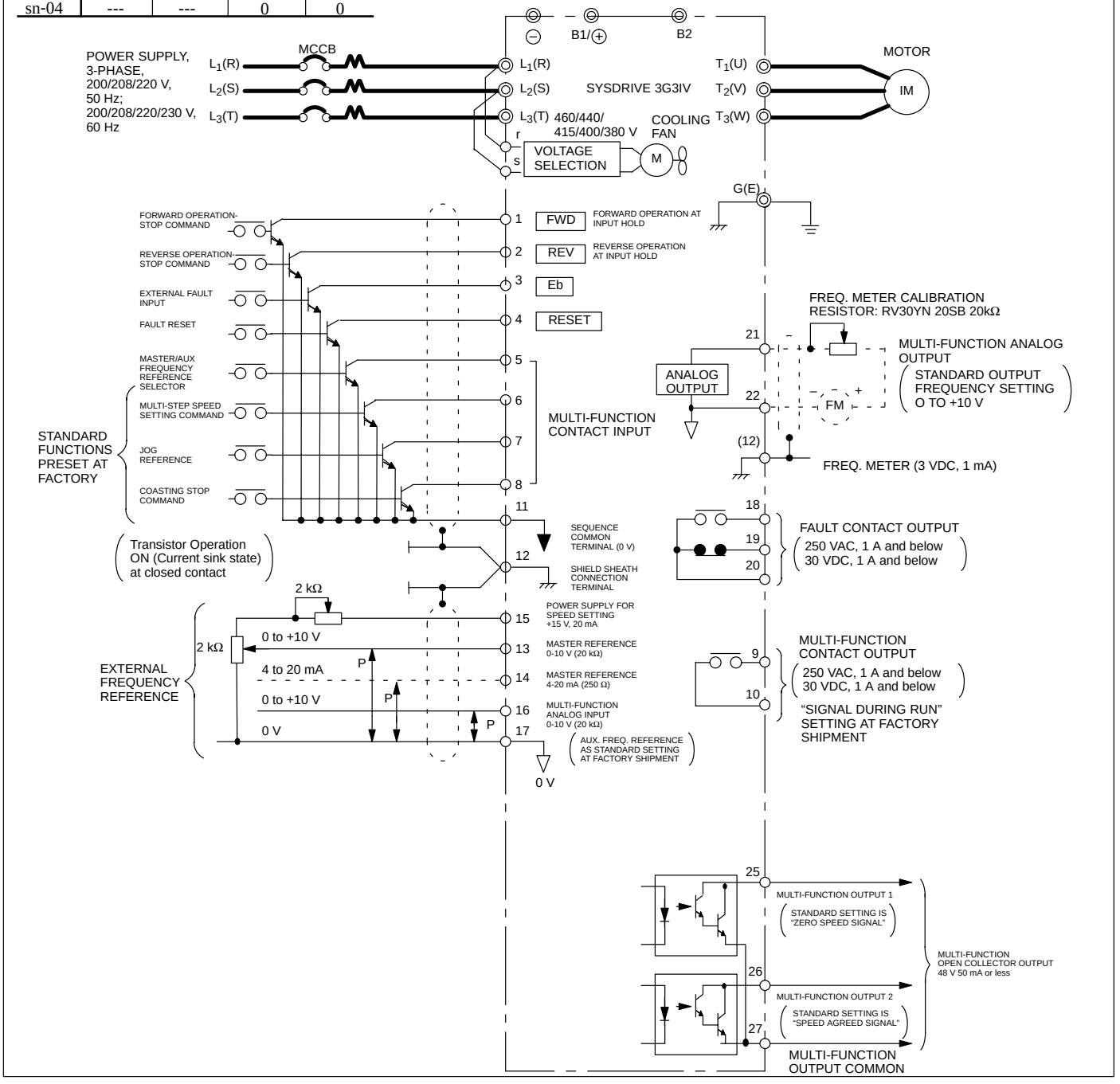
System Constant No.	Data			
	4th digit	3rd digit	2nd digit	1st digit
sn-04	---	---	1	1



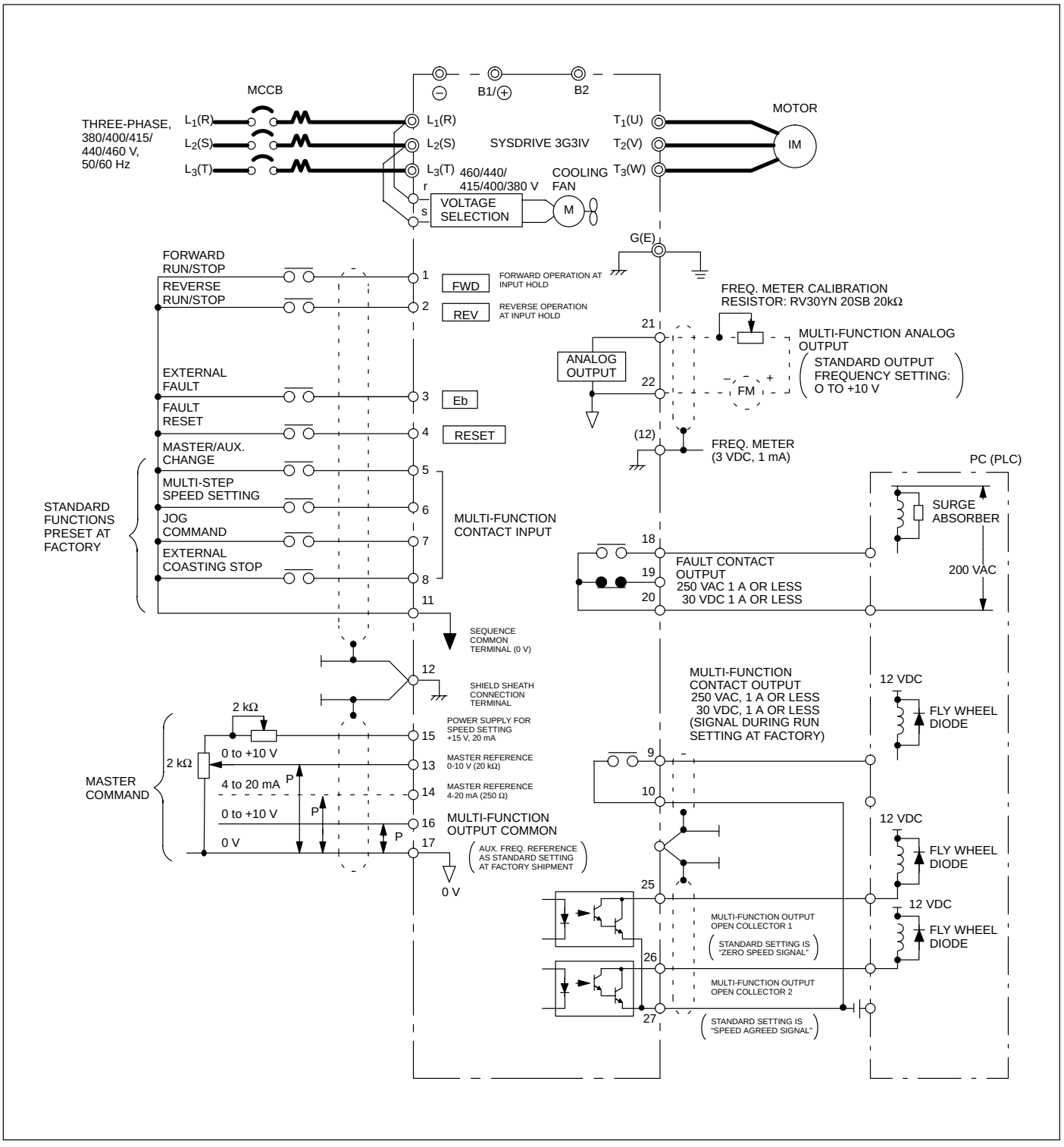
With Transistor (Open Collector)

System Constant Setting

System Constant No.	Data			
	4th digit	3rd digit	2nd digit	1st digit
sn-04	---	---	0	0

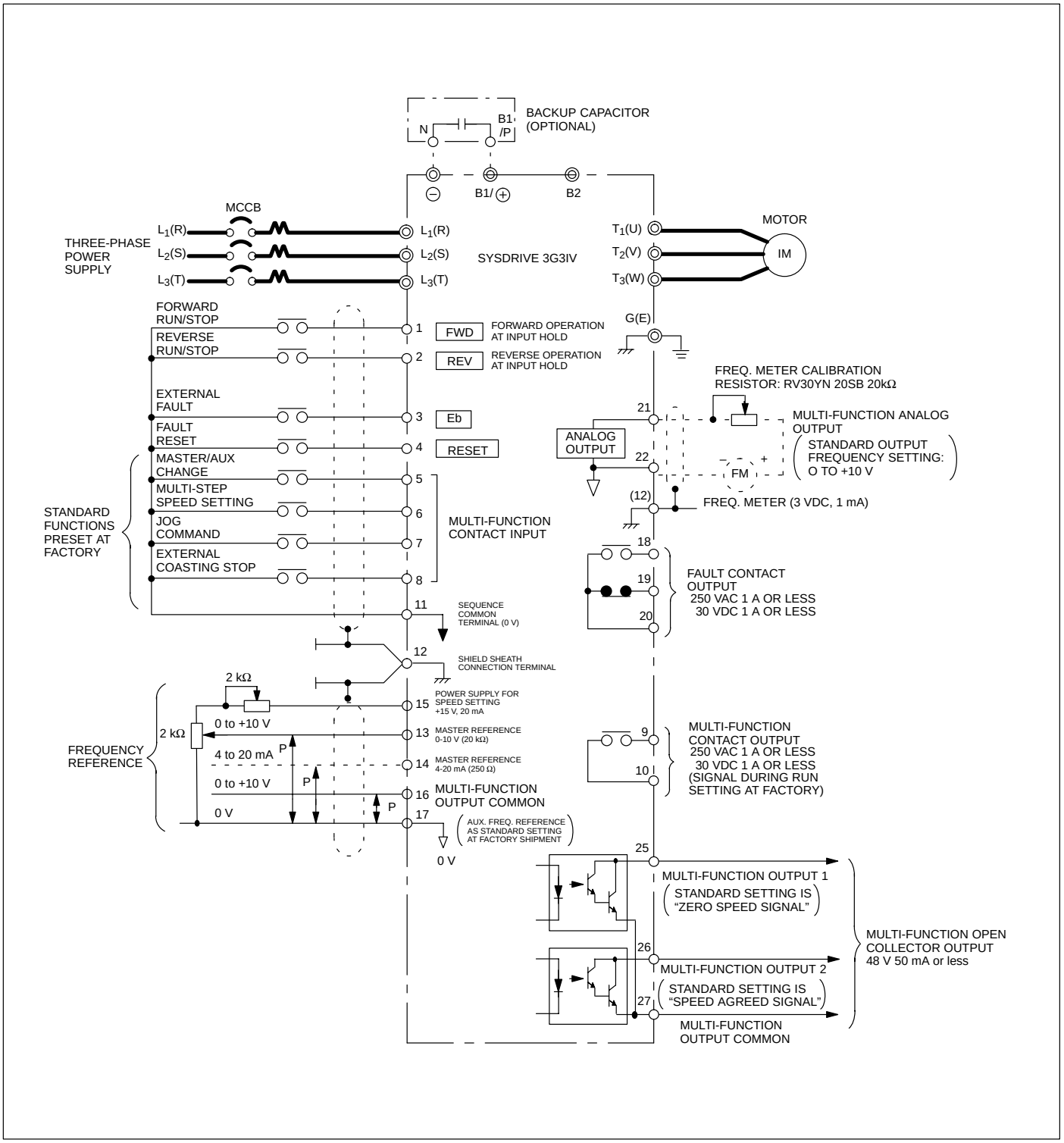


With Contact Output, Open Collector Output



Backup Capacitor for Momentary Power Loss

(200 V class-4.1 kVA and below, 400 V class-4.1 kVA and below)

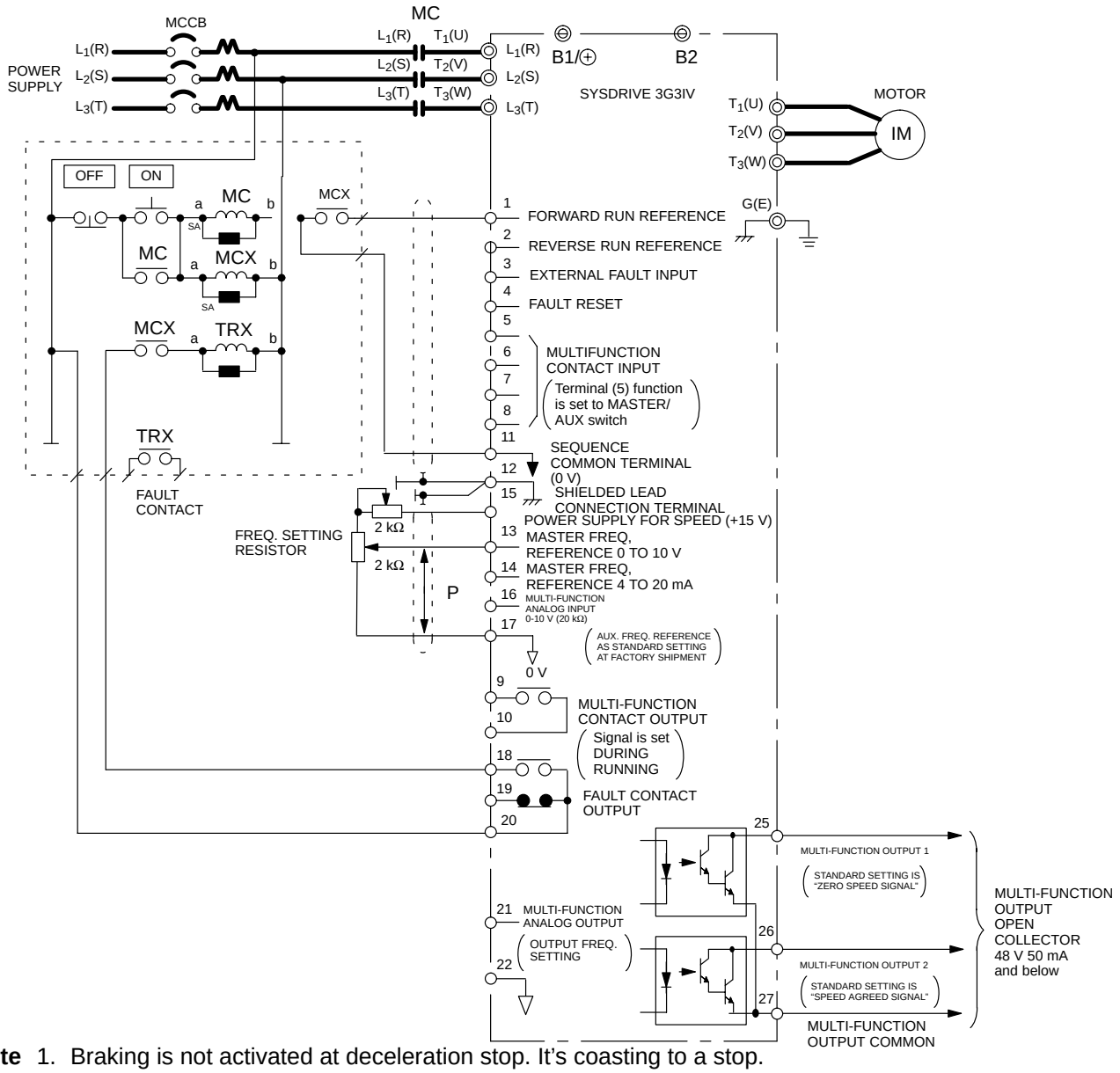


With Power Supply Magnetic Contactor (MC)

System Constant Setting

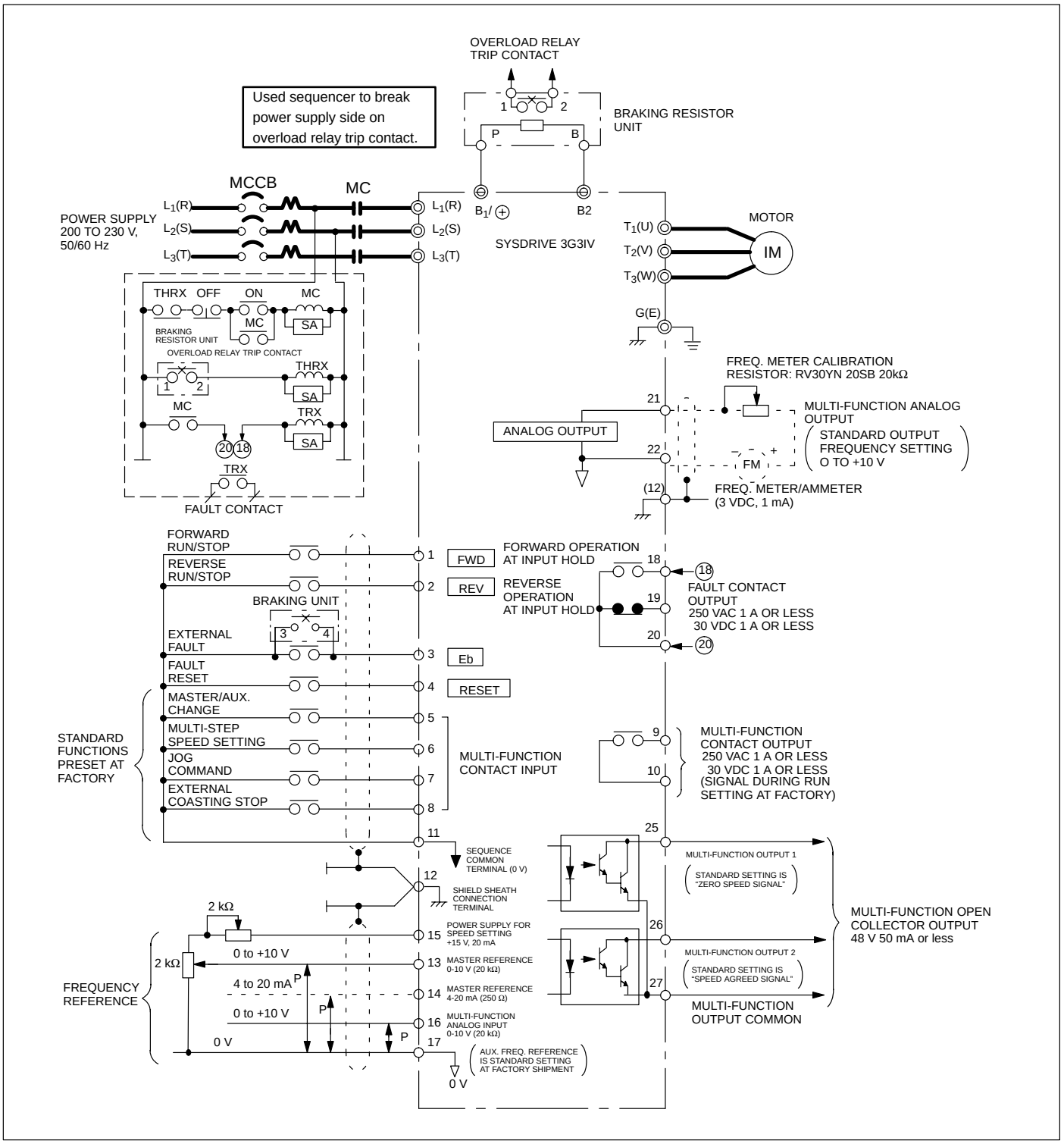
System Constant No.	Data			
	4th digit	3rd digit	2nd digit	1st digit
sn-04	---	1	0	0*

* Frequency reference selection
0: Set by frequency setting resistor
1: Set value of digital operator (An-01)

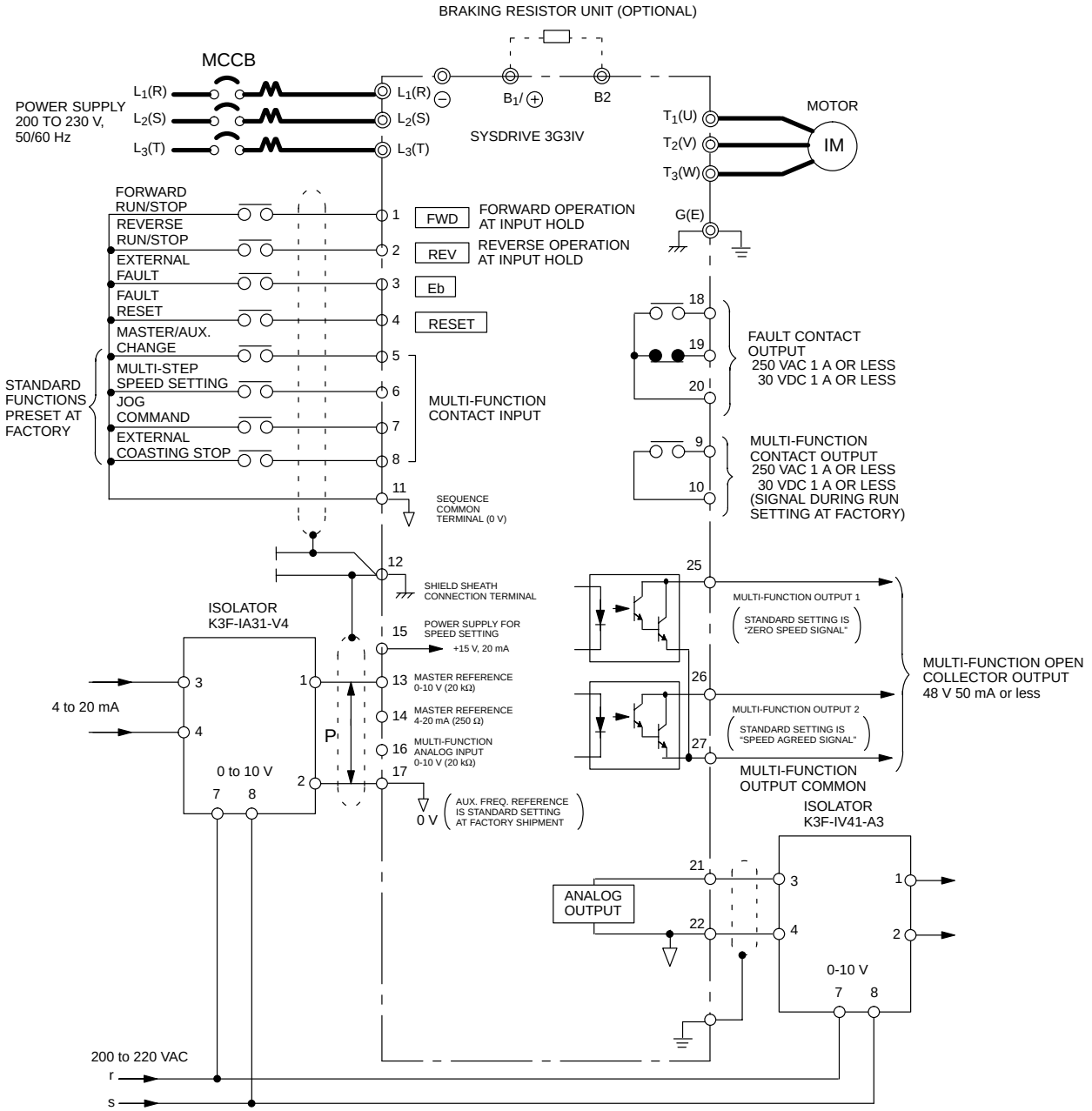


Note 1. Braking is not activated at deceleration stop. It's coasting to a stop.
2. Use MC or MCX of delay release type for restart operation after momentary power loss.
3. Frequency setting resistor is not required for the use of digital operator's set value as frequency reference.

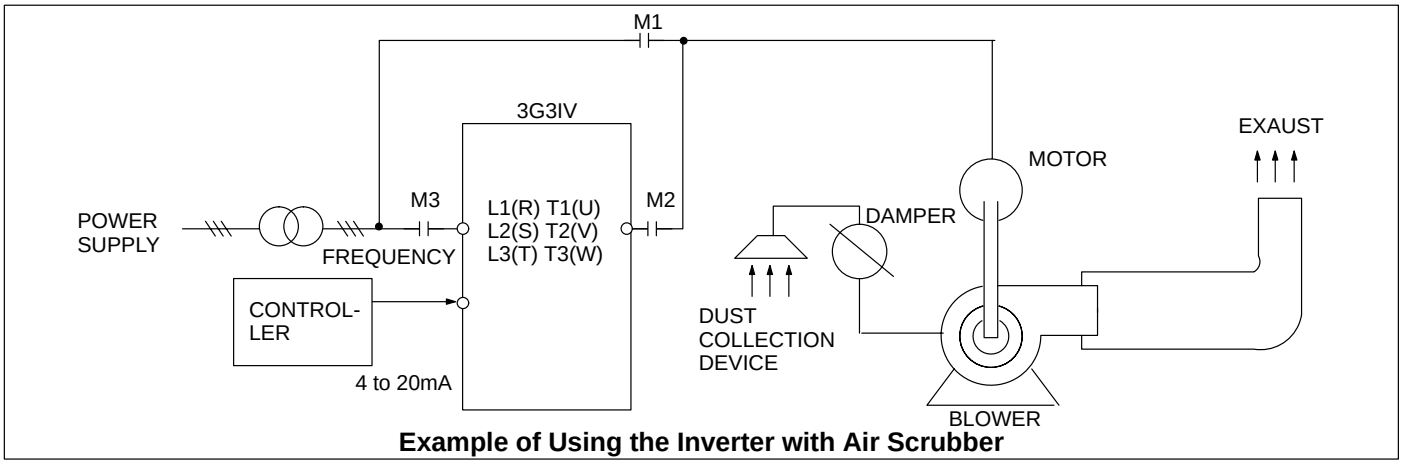
With Braking Resistor Unit



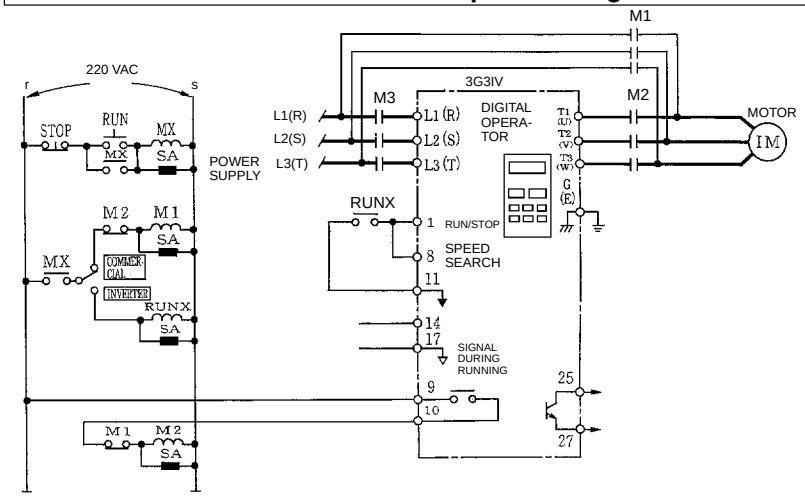
With Isolator



FANS AND BLOWERS



Example of Using the Inverter with Air Scrubber

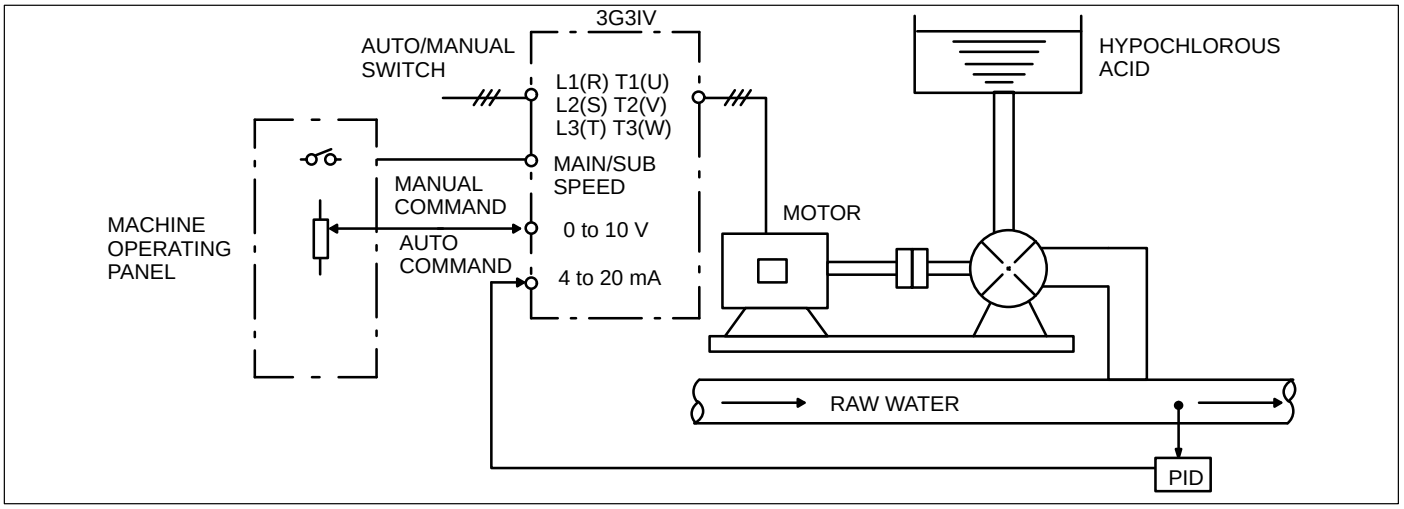


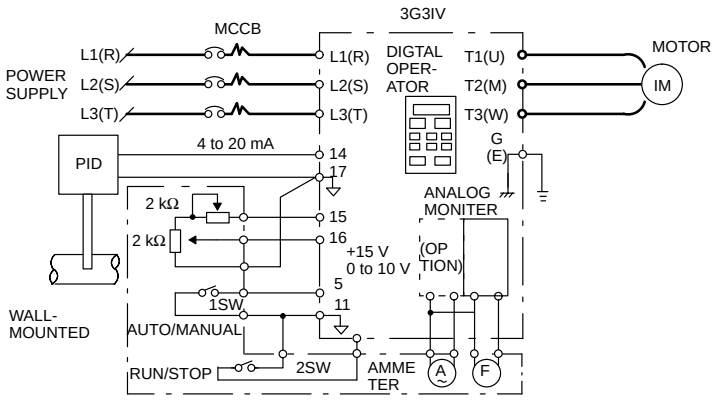
Details of the Commercial/Inverter Selector Circuit

Customer's Request	Function and Parame-ter Setting
Wants to Operate Using External Terminals	Operation signal selection Sn-04 = xx00
Wants Speed Search Function	Multi-function input Sn-15 to Sn-18 = 61
Wants Coast to Stop	Stop procedure selection Sn-04 = 01xx

Application example	Customer's Request	Applicable 3G3IV Function	Function and Parameter Setting
Dust-collecting blower, fan for boilers Fan for cooling towers	Wants to switch commercial poer supply and inverter drive without stopping the motor.	Use the speed search operation	Multi-function input Sn-15 to Sn-18 = 61
	Needs inverter start from coasting stop status. Is it possible without stopping the motor?		
	Wants to save energy since the load is not heavy at low-soeed operation	Apply the variable load V/f	V/f selection Sn-02 = 05
	Wants to avoid operation tripping	Apply the stall prevention function du-ring-running	During-operation stall level change Cn-30 = 30 to 200%
	Wants to continue operation even when momentary power loss not longer than 2 seconds occurs.	Select the instantaneous outage reset and restart mode	Momentary power loss protection Sn-11 = x1xx
	Wants to monitor output power.	Turn the monitor to the output power in-dication.	Monitor display Un-06
	Needs r/min lower limit for lubricating the decelerator bearing.	Use th frequency command lower limit	Frequency command lower limit cn-15 = 0 to 109%
	Wants to avoid mechanical resonance. (The resonance point will be passed, and continuous operation is eliminated at this point.)	Use the preset frequency band prohibi-tion function (frequency jump control).	Preset prohibited frequency Cn-16 = 0 to 400 Hz
			Preset prohibited frequency range Cn-19 = 0 to 25.5 Hz
	Wants to prevent machine stop caused by inverter tripping.	Use the retry function.	Retry count Cn-36 = 0 to 10 times

PUMP



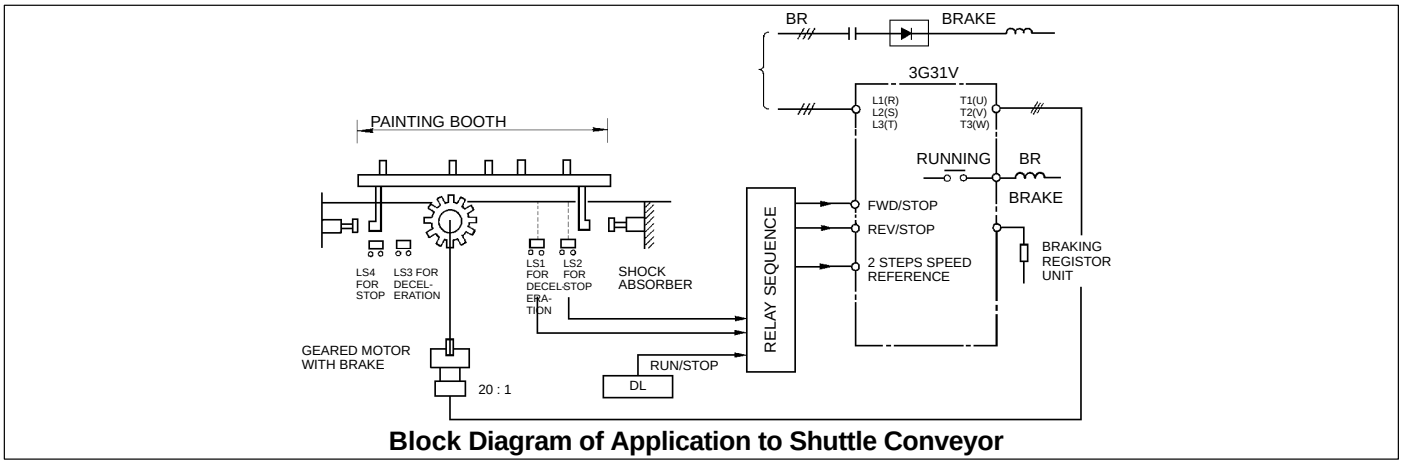


Man/Auto Switch Circuit

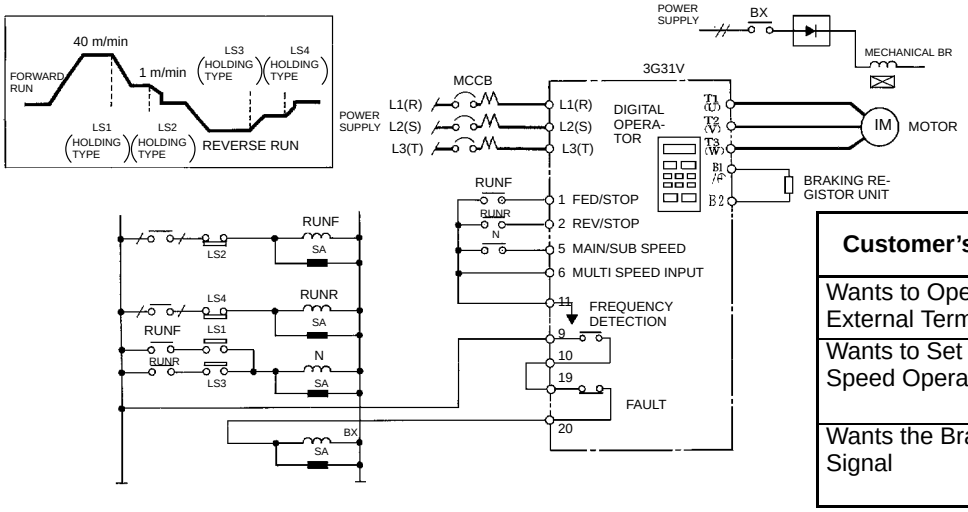
Customer's Request	Function and Parameter Setting
Wants to Operate Using External Terminals	Operation signal selection Sn-04 = xx00
Wants 4 to 20 mA signal Fine Control	Frequency command gain bn-05 = 0% to 100% Frequency command bias bn-06 = –100% to 100%
Wants a Meter that Indicates Output Frequency	Channel 1 output Sn-28 = xx00 Channel 2 output Sn-28 = 01xx

Application example	Customer's Request	Applicable 3G3IV Function	Function and Parameter Setting
Chemical-Feeding Pump	Wants to save evergy since the load is not heavy at low-speed operation.	Use the sensorless slip correction function.	Motor rated slip: bn-08 = 0 to 9.9%, Motor rated current: Cn-09 = 10 to 200 A
	Wants to have Manual/Auto switching function.	Use the Master/aux. switching function. Two toggle switches do the job.	Master/Aux. switching: Sn-15 to 18 = 03
	Needs an ammeter for monitoring load conditions.	Use an F-I motor (option).	Output selection function: Sn-28 = xx00
Warm/Cold Water Circulation Pump	Wants to drive the pump directly using 4 to 20 mA signal.	Use external terminals (14) and (17).	Run signal selection: Sn-04 = xx00
	Wants a function which can maintain minimum speed.	Use the lower-limit of the reference frequency.	Frequency reference lower limit: Cn-15 = 0 to 109%
	Wants to run the system using the commercial power supply when an emergency occurs.	Use a selector circuit together with the speed search function.	Speed search function selection Sn-15 to 18 = 61
	Wants a function which can keep the system working without resetting it even when a momentary power loss occurs.	Use the continuous operation function which can compensate for a momentary power loss within two seconds. Use a toggle switch for selecting the start and stop of operations.	Momentary power loss protection: Sn-11 = x1xx
Discharge Pump	Wants to keep a constant water level inside a tank using a water gauge.	Read signals directly sent from the water-level adjusting unit. (4 to 20 mA)	Run signal selection: Sn-04 = xx00
	Wants to keep the motor rpm above the minimum because if the rpm is too low, water flows in the reverse direction.	Use the lower-limit of the frequency reference.	Frequency ref. lower limit: Cn-15 = 0 to 109%

Improves Safety and Enables Optimum Operation Setting



Block Diagram of Application to Shuttle Conveyor

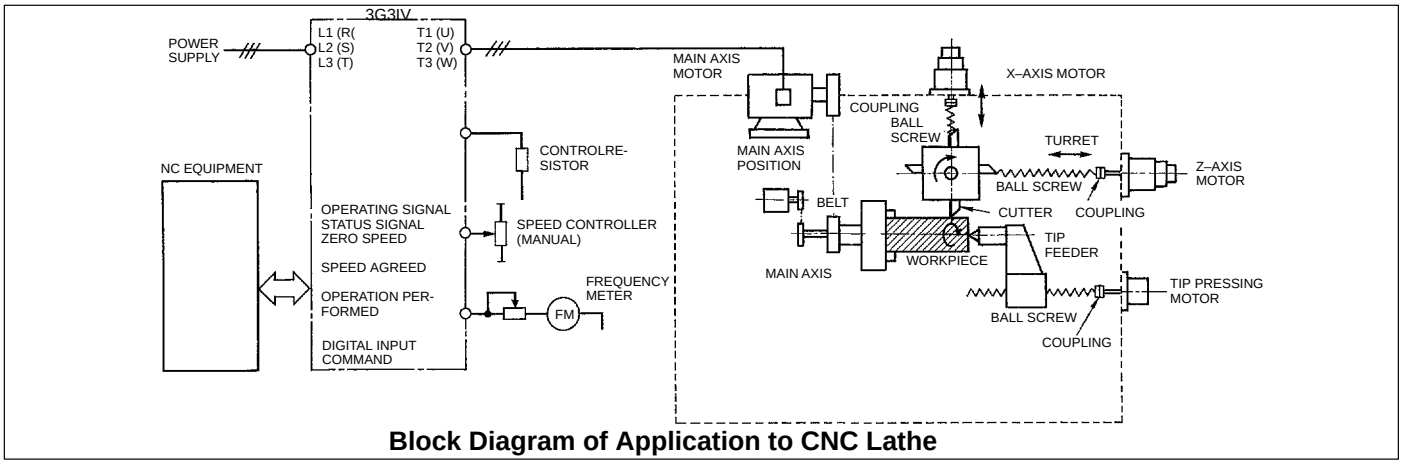


Customer's Request	Function and Parameter Setting
Wants to Operate Using External Terminals	Operation signal selection Sn-04 = xx00
Wants to Set Multi-Step Speed Operation	Multi-step setting An-03 = 0 to 400 Hz An-04 = 0 to 400 Hz
Wants the Braking Signal	Frequency detection signal Sn-20 = 05 Cn-21 = 0 to 400 Hz

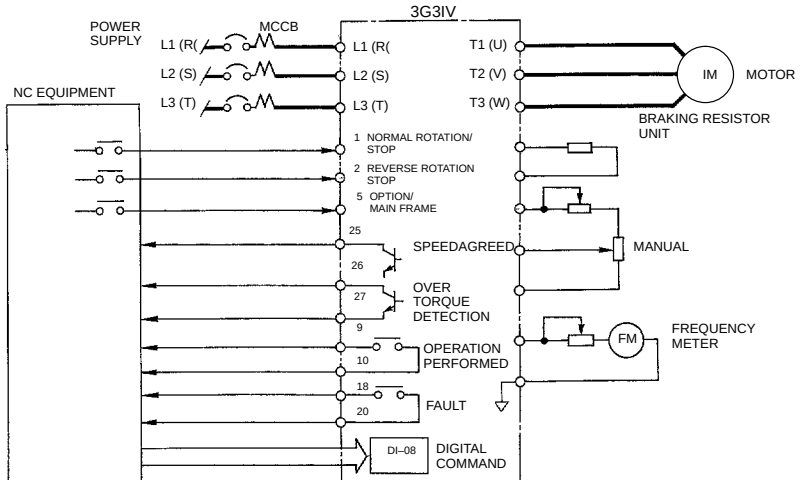
For Application to Conveyor

Application example	Customer's Request	Applicable 3G3IV Function	Function and Parameter Setting
Shuttle Conveyor	Wants to increase precision of positioning stop.	Control the braking motor using contact output from terminals 9 and 10.	Operating signal selection Slip prevention Sn-20 = 0, Sn-20 = 05, Cn-21 = 0 to 400 Hz
		Run at lower speeds.	Torque compensation gain bn-07 = 0 to 9.9
	Wants to perform two-step speed operation	Use the multi-step speed function.	Multi-step operation An-01 to 04 = 0 to 400 Hz
	Wants smooth accel/decel time.	Apply non-linear accel/decel.	Operating signal selection Sn-06 = xx □□ selection
	Wants to vary accel/decel time.	Use the accel/decel time setting function.	Accel/decel time switching Sn-15 to 18 = 07
	Wants to select stop procedure according to degree of emergency.	Select stop procedures.	External fault Sn-15 to 18 = 20 to 3F
Raw Material Input Conveyor	Wants to increase starting torque (with a constant-torque motor).	Use the standard-equipped automatic torque boosting function.	Torque compensation gain bn-07 = 0 to 9.9
Steel Pipe Conveyor	Wants to drive more than one motor with a single inverter.	The function is provided.	---
Lifter	Wnats a simple slip compensation function	Check the motor generation torque by the excess torque detection function.	Over torque detection Sn-07 = xxx1 Over torque detection level Cn-26 = 30 to 200% Over torque detection time Cn-27 = 0 to 25.5 s
	Wants to use the non-excitation operating type braking motor.	Use the free V/f setting function to turn the motor without excess excitation.	V/f selection Sn-02 = 0F Free V/f setting Cn-02 to 08 = Setting

Improves Safety and Enables Optimum Operation Setting



Block Diagram of Application to CNC Lathe



Interface Circuit to NC

Customer's Request	Function and Parameter Setting
Wants to Operate Using Digital Command.	3G3IV-PDI08 (option)
Wants a Cutter Edge Abrasion Detection function.	Over torque detection Sn-07 = xxx1 Over torque detection level Cn-26 = 30% to 200% Over torque detection time Cn-27 = 0 to 25.5 s Multi-function output Sn-20 to Sn-22 = 0B
Needs a Speed Agreed Signal	Frequency agreed signal Sn-20 to Sn-22 = 02

Application example	Customer's Request	Applicable 3G3IV Function	Function and Parameter Setting
CNC Lathe	Needs a large constant-output range.	Use the winding selection motor.	Option
	Wants the cutting loss detection function.	Apply the over torque detection function.	Over torque detection Sn-07 = 0001 Over torque detection level Cn-26 = 30% to 200% Over torque detection time Cn-27 = 0 to 25.5 s Multi-function output Sn-20 to Sn-22 = 0B
	Wants to turn motor with digital input	Use the digital speed command equipment	Connect DI-08. Frequency command setting mode Sn-26 = select
	Want to interface to NC.	Apply the zero-speed function.	Multi-function output Sn-20 to Sn-22 = 01
		Apply the speed agreed function.	Multi-function output Sn-20 to Sn-22 = 02
		Apply the over torque detection function. (Cutting loss)	Multi-function output Sn-20 to Sn-22 = 0B
Super High-precision Lathe	Wants to reduce vibration.	Apply the energy-saving mode.	Energy-saving operation Sn-15 to Sn-18 = 63 bn-9 = 0% to 200%

Inverter Capacity Selection

Inverter Capacity Check Points

Classification	Item		Related specification			
			Speed and Torque Characteristics	Time Ratings	Overload Capacity	Starting torque
Load characteristics	Load type	Friction load and weight load Liquid (viscous) load Inerita load Load with poer transmission and accumulation	YES			YES
	Load speed and torque charcteristics	Constant torque Constant output Decreasing torque	YES		YES	
	Load charcteristics	Motoring Braking or overhauling load Constant load Shock load Repetitive load High-start torque Low-start torque	YES	YES	YES	YES
Operation	Continuous operation Long-time operation at medium or low speeds Short-time operation			YES	YES	
Rated output	Maximum required output (instantaneous) Constant output (continuous)		YES		YES	
Rated r/min	Maximum r/min Rated r/min		YES			
Power supply	Power supply transformer capacity percentage impednace Voltage fluctuations Number of phases, singla phase protection Frequency				YES	YES
Deterioration of load capacity due to age	Mechanical friction, losses in wiring				YES	YES
	Duty cycle modification			YES		

Inverter Capacity Required for Continuous Operation

Item	Calculation formula
Required output for the load within the allowable range?	$\frac{k \times P_M}{\eta \times \cos\phi} \leq Inverter\ capacity\ [kVA]$
Motor capacity within the invterter ratings?	$k \times \sqrt{3} \times V_M \times I_M \times 10^{-3} \leq Inverter\ capacity\ [kVA]$
Current within the inverter capacity?	$k \times I_M \leq Inverter\ capacity\ [A]$

Inverter Capacity Required for Group Drive

Item	Calculation formula with overload capacity of 150% for 1 minute	
	Motor acceleration of 1 minute or less	Motor acceleration of 1 minute or more
Starting requirements are within the inverter capacity?	$\frac{k \times P_M}{\eta \times \cos\phi}\ [n_T + n_S\ (k_S - 1)]$ $= P_{C_1}\ [1 + \frac{n_S}{n_T}(k_S - 1)]$ $\leq 1.5 \times Inverter\ capacity\ [kVA]$	$\frac{k \times P_M}{\eta \times \cos\phi}[n_T + n_S(k_S - 1)]$ $= P_{C_1}\ [1 + \frac{n_S}{n_T}(k_S - 1)]$ $\leq Inverter\ capacity\ [kVA]$
Current within the inverter capacity?	$n_T \times I_M\ [1 + \frac{n_S}{n_T}(k_S - 1)]$ $\leq 1.5 \times Inverter\ capacity\ [A]$	$n_T \times I_M\ [1 + \frac{n_S}{n_T}(k_S - 1)]$ $\leq Inverter\ capacity\ [A]$

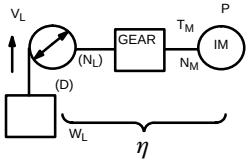
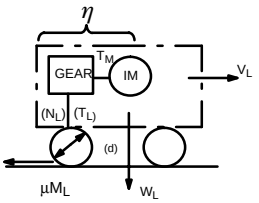
Inverter Capacity Required for Starting

Item	Calculation formula [tA < 60 s]
Total starting capacity within the inverter capacity?	$\frac{k \times N}{973 \times \eta \times \cos\phi}\left(T_L + \frac{GD^2}{375} \times \frac{N}{tA}\right) \leq 1.5 \times Inverter\ capacity\ [kVA]$

Specifications

P_M;	Motor shaft output required for the load [kW}
η;	Motor efficiency (normally, approx. 0.85)
$cos\ \phi$;	Motor power factor (normally, approx. 0.75)
V_M;	Motor voltage [v]
I_M;	Motor current [A] (current with commercial power supply)
k;	Correction factor calculated from current form factor (1.05 to 1.1, depending on the PWM method.)
P_{C1};	Continuous capacity [kVA]
ks;	Motor starting current/motor rated current
n_T;	Number of motors in parallel
ns;	Number of simultaneously started motors
(GD^2);	Total (GD^2) converted into motor shaft (kg-m^2)
T_L;	Load torque (kg-m)
t_A:	Motor acceleration time

FORMULA for Motor Capacity

Application	 Fig. 1	 Fig. 2
Symbol	W_L: Weight of Load. V_L: Linear Velocity of Load. ta: Acceleration time.	μ: Coefficient of friction η: Efficiency of mechanism
Unit	ft, lb	kg, m
1. Full Load Power	$P_O = \frac{(\mu)W_L\ x\ V_L}{33000\ x\ \eta}\ [Hp]$	$P_O = \frac{(\mu)W_L\ x\ V_L}{6120\ x\ \eta}\ [kW]$
2. Full Load Torque	$T_L = \frac{(\mu)W_L\ x\ V_L}{2\pi\ x\ N_M\ x\ \eta}\ [ft{\cdot}lb]$	$T_L = \frac{(\mu)W_L\ x\ V_L}{2\pi\ x\ N_M\ x\ \eta}\ [kg{\cdot}m]$
3. Acceleration Power	$Pa = \frac{W_L\ x\ V_L^{\ 2}}{64\ x\ 10^6\ x\ ta}\ [Hp]$	$Pa = \frac{W_L\ x\ V_L^{\ 2}}{3600\ x\ 10^3\ x\ ta}\ [kW]$
4. Acceleration Torque	$Ta = \frac{\sum (WK^2)\ x\ N_M}{308\ x\ ta}$	$Ta = \frac{\sum GD^2\ x\ N_M}{375\ x\ ta}$
5. INERTIA (Reflected to Motor)	$WK^2{}_1 = 0.55\ x\ W_L\left(\frac{V_L}{\pi N_M}\right)^2 [lb{\cdot}ft^2]$ $\left(= \left(\frac{N_L}{N_M}\right)^2 {\cdot} WK^2\right)$	$GD^2{}_1 = W_L\left(\frac{V_L}{\pi N_M}\right)^2 [kg{\cdot}m^2]$ $\left(= \left(\frac{N_L}{N_M}\right)^2 {\cdot} GD^2{}_L\right)$
6. INERTIA (LOAD)	$WK^2 = \frac{W_L D^2}{4}$	$GD^2{}_L = W_L{\cdot}D^2$

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