OMRON

And Now a Power Inverter with a DeviceNet Interface

Advanced General-purpose Inverter

SYSDRIVE RV Series

Note: Do not use this document to operate the Unit.

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Note: Specifications subject to change without notice.

Cat. No. I906-E1-02
Printed in Japan
0902-0.6M

Advanced Functions and DeviceNet Capabilities for Even More Applications

Advanced Specifications in a Compact Inverter

Open-loop Vector Control

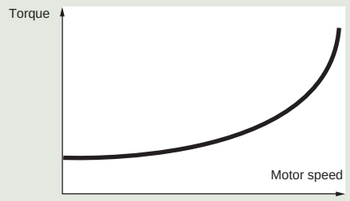
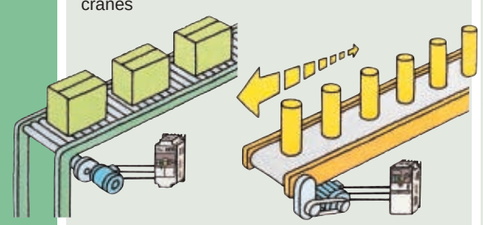
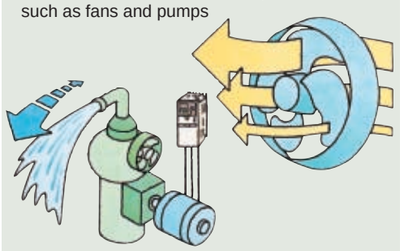
High Starting Torque and High-precision Speed Control during Open-loop Vector Control

Select V/f control without PG, V/f control with PG, or open-loop vector control for the Inverter.
Speed control precision of 0.2% has been achieved for open-loop vector control, ensuring precise control even for variations from light loads to heavy loads. High starting torque has also been achieved, up to 150% at 0.5 Hz.

Select Constant or Variable Torque

Select Overload Detection According to Application

Match the overload detection conditions to the application by selecting constant torque (CT) for loads such as conveyors or cranes, or variable torque (VT) for loads such as fans or pumps. (The setting range for Inverter parameters, such as the carrier frequency, overload resistance, and maximum output frequency, will vary.) The torque characteristic can also be effectively selected for V/f control or open-loop vector control.

Type of load		Constant Torque (CT)	Variable Torque (VT)
Characteristic		Loads with constant torque at all speeds 	Loads with lower torque at lower speeds 
Applications		Friction loads or weight loads, e.g., conveyors or cranes 	Air and water-related machines, such as fans and pumps 
Parameter settings	Inverter overload protection level	150% of Inverter's rated torque/minute	120% of Inverter's rated torque/minute
	Carrier frequency selection	Low carrier noise or 2 kHz	Low carrier noise or 2 to 15 kHz
	Maximum output frequency	150 Hz	400 Hz

Complete Autotuning Functions

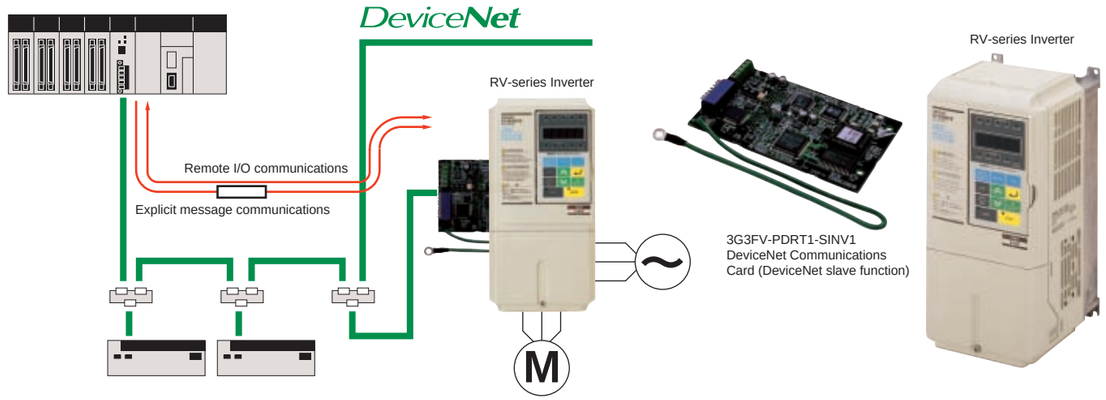
Autotuning with a Stationary Motor

Autotuning can be used to set motor constants for open-loop vector control and motor line resistance for long motor cables.
Autotuning motor constants for open-loop vector control can even be performed without turning the motor, making autotuning easier than ever.
The following types of autotuning are supported.
- Rotational autotuning for open-loop vector control
- Stationary autotuning for open-loop vector control
- Line resistance autotuning using stationary autotuning for V/f control or open-loop vector control

DeviceNet Communications

DeviceNet Communications Card Supported by All Models (Same as FV Series)

A 3G3FV-PDRT1-SINV1 DeviceNet Communications Card can be mounted to provide a DeviceNet interface for the Inverter.
- Remote I/O Communications: A PLC connected via DeviceNet can send speed references and operation commands or it can monitor Inverter status. Standard settings provide two output words from the PLC to the Inverter and two input words from the Inverter to the PLC. Using advanced remote I/O functions, parameters specified by number in the Inverter can be written from the PLC.
- Message Communications: Explicit messages can be sent from the PLC to achieve many control and monitoring functions for the Inverter, including specifying speed references, specifying forward/reverse commands, reading errors, and more.



Multi-function Inputs and Outputs

Freely Allocated Analog Inputs/Outputs, Contact Inputs/Outputs, and Pulse Outputs

Two analog outputs and one pulse train output enable monitoring of system status, including output frequency and output voltage.
Likewise, two analog inputs accommodate functions such as output voltage bias and acceleration/deceleration time gain, while five contact inputs accept multistep speed references, emergency stops, etc. Two contact outputs allow frequency coincidence, excessive torque detection, and other functions. The ability to freely allocate functions to all of these inputs and outputs allows the user to customize system functions.

Versatile Frequency Reference Inputs

Frequency references can be input via an analog input (voltage or current), Digital Operator, pulse train signal, or DeviceNet communications.

Built-in Braking Transistor

Complete Braking Functions

All models of 18.5 kW or less are equipped with a built-in braking transistor that allows powerful braking by simply connecting a braking resistor.

Protective Functions

Protective Functions Ensure Safety

A high-speed, high-precision current limiting function suppresses tripping from excessive current, and a stall prevention function for acceleration/deceleration, power loss compensation function, and fault retry function combine to improve continuous operation.
A PTC thermistor built into the motor protects the motor from overheating.

CONTENTS

This catalog presents only information related to selecting products and does not include application precautions. Always refer to user documentation for the product for application precautions before attempting to use the product.

Easy to Use and Gentle on the Environment, with a Wide Selection to Meet Exact Needs

Easy Operation

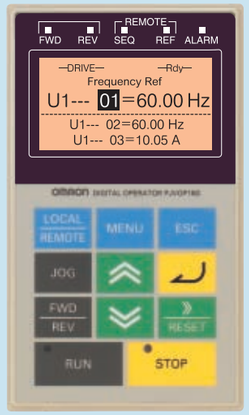
Digital Operator (LED: Standard, LCD: Optional)

Faster Setup and Maintenance for Easier Operation

Complete support is provided for the Digital Operator's Quick Program Mode for operation with a minimum of parameter settings, Verify Mode for batch confirmation of changed parameters, and a copy function for uploading/downloading parameters if replacement should be required. A Japanese/English-language LCD Digital Operator is also available as an option.

Standard LED Digital Operator

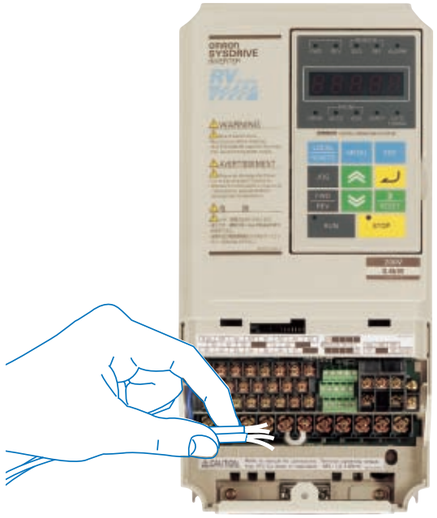
Optional LCD Digital Operator



Maintenance

Easy Maintenance and Inspection

• A detachable control circuit terminal makes it possible to replace the unit without disconnecting the wiring.



• Screw terminals are used for the main circuit terminals and control circuit terminals to simplify wiring and enhance reliability.
• Independent wire covers enable easier wiring.
• ON/OFF control for the cooling fan lengthens the service life of the fan, and enhances reliability. Fan replacement is also quick and easy due to the detachable fan design.

• The accumulated running time and cooling fan operation time can be recorded and/or displayed.

Gentle on the Environment

Energy-saving Control Functions

Energy-saving Operation for Maximum Motor Efficiency

The voltage reference (during V/f control) or slip frequency control (during vector control) constantly maximizes motor efficiency in response to load and turning speed. This enables a superb energy-saving effect for fans, pumps and other machinery.

Low-carrier PWM Control

Low-noise Operation

In addition to the conventional high-carrier PWM control, the RV Series is equipped with a unique, low-carrier PWM control that suppresses noise. The control mode can be selected depending on the functions and application. (Note: When a fixed torque load application is selected, the low-carrier PWM control mode is automatically applied.)

Harmonic Countermeasure

Compatible with Harmonic Suppression Countermeasure Guidelines

All models of 22 kW or above include a built-in DC reactor to improve the power factor. The DC reactor is optional for all models of 18.5 kW or less, ensuring compatibility with harmonic suppression countermeasure guidelines.

A Wide Range to Choose From

Maximum Applicable Motor Capacity

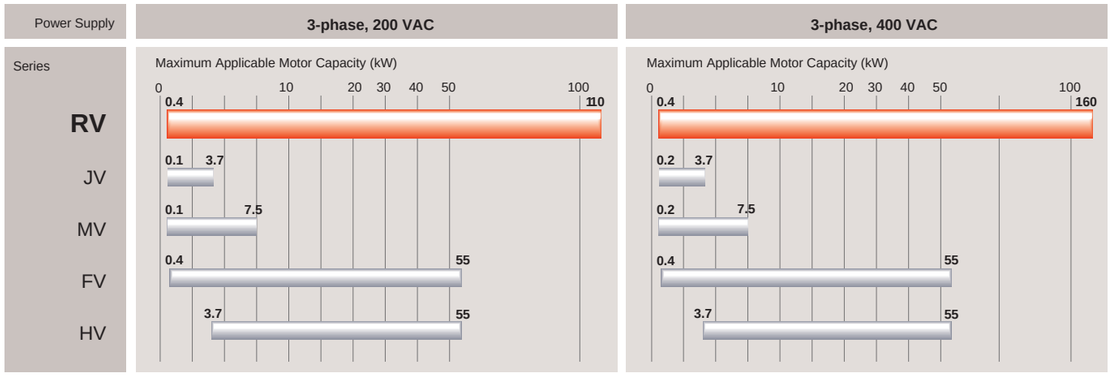
Applicable to Motors with 0.4- to 110-kW or 0.4- to 160-kW Capacity

The RV Series accommodates a wide range of motors, with low to high capacity.

Power Supply

Operates from a Variety of Power Supplies

Two power supply voltage series enable versatile use.
• 3-phase, 200-V series (200 to 240 V)
• 3-phase, 400-V series (380 to 480 V)
• Standard models can also be connected to DC power supply devices and other converters.



Standards

Complies with Major International Standards

Standard models comply with UL/uCL standards for the U.S. and Canada, and CE standards for Europe.

RV-series Inverters

■ Standard Inverter Specifications

200-V Class Inverters	**Model (3G3RV-)**		**A2004**	**A2007**	**A2015**	**A2022**	**A2037**	**A2055**	**A2075**	**A2110**	**A2150**	**A2185**	**B2220**	**B2300**	**B2370**	**B2450**	**B2550**	**B2750**	**B2900**	**B211K**	**---**	**---**
	Max. applicable motor output (kW)		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	---	---
	Output specifications	**Rated output capacity (kVA)**	1.2	1.6	2.7	3.7	5.7	8.8	12	17	22	27	32	44	55	69	82	110	130	160	---	---
		Rated output current (A)	3.2	4.1	7.0	9.6	15	23	31	45	58	71	85	115	145	180	215	283	346	415	---	---
		Max. output voltage (V)	3-phase, 200 to 240 VAC (Depends on input voltage.)																			
		Max. output frequency (Hz)	CT (low carrier, fixed torque applications): 150 Hz VT (high carrier, variable torque applications): 400 Hz																			
	Power supply specifications	**Rated voltage (V) Rated frequency (Hz)**	3-phase, 200 to 240 VAC, 50/60 Hz																			
		Allowable voltage fluctuation	–15% to +10%																			
		Allowable frequency fluctuation	±5%																			
	Power consumption (See note 1.) (W)		59	69	100	129	186	248	332	544	612	712	860	1,217	1,426	1,771	2,206	2,997	3,434	3,975	---	---
	Approx. weight (kg)		3			4			6	7	11		21	24	57	63	86	87	108	150	---	---
400-V Class Inverters	**Model (3G3RV-)**		**A4004**	**A4007**	**A4015**	**A4022**	**A4037**	**A4055**	**A4075**	**A4110**	**A4150**	**A4185**	**B4220**	**B4300**	**B4370**	**B4450**	**B4550**	**B4750**	**B4900**	**B411K**	**B413K**	**B416K**
	Max. applicable motor output (kW)		0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160
	Output specifications	**Rated output capacity (kVA)**	1.4	1.6	2.8	4.0	5.8	9.5	13	18	24	30	34	46	57	69	85	110	140	160	200	230
		Rated output current (A)	1.8	2.1	3.7	5.3	7.6	12.5	17	24	31	39	45	60	75	91	112	150	180	216	260	304
		Max. output voltage (V)	3-phase, 380 to 480 VAC (Depends on input voltage.)																			
		Max. output frequency (Hz)	CT selected (low carrier, fixed torque applications): 150 Hz VT selected (high carrier, variable torque applications): 400 Hz																			
	Power supply specifications	**Rated voltage (V) Rated frequency (Hz)**	3-phase, 380 to 480 VAC 50/60 Hz																			
		Allowable voltage fluctuation	–15% to +10%																			
		Allowable frequency fluctuation	±5%																			
	Power consumption (See note 1.) (W)		53	58	84	115	148	209	307	410	498	634	725	995	1,144	1,316	1,698	1,974	2,285	2,950	3,390	3,938
	Approx. weight (kg)		3			4			6		10		21		36			88	89	102	120	160
Control characteristics	**Countermeasures against power supply harmonics**		A DC Reactor (sold separately) can be connected.										A DC Reactor is built in.									
	Control method		Sine wave PWM																			
	Carrier frequency		2.0 to 15 kHz																			
	Speed control range		1:100 (Open loop vector control) (See note 2.)																			
	Speed control accuracy		±0.2% (25°C ±10°C) (Open loop vector control) (See note 2.)																			
	Speed control response		5 Hz (Open loop vector control) (See note 2.)																			
	Frequency control range		0.01 to 150 Hz (CT selected.), 0.01 to 400 Hz (VT selected.) (See note 3.)																			
	Frequency accuracy (temperature characteristics)		Digital references: ±0.01% (–10 to 40°C) Analog references: ±0.1% (–25 to 10°C)																			
	Frequency setting resolution		Digital references: 0.01 Hz (for frequencies less than 100 Hz) or 0.1 Hz (for 100 Hz and higher frequencies) Analog references: 0.06 Hz/60 Hz (10 bit with no sign)																			
	Output frequency resolution		0.01 Hz																			
	Overload capacity		CT selected: 150% of rated output current per minute VT selected: 120% of rated output current per minute																			
	Frequency setting signal		Voltage input of 0 to ±10 or 0 to 10 (20 kW) VDC or current input of 4 to 20 mA																			
	Acceleration/Deceleration time		0.01 to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)																			
	Braking torque		Approximately 20% (Approximately 125% with Braking Resistor option) Inverters with a max. motor capacity of 18.5 KW and higher are equipped with a built-in Braking Resistor. (See note 4.)																			
	Voltage/frequency characteristics		Select open loop vector control, select from 15 standard V/f patterns, or set a custom V/f pattern.																			

Protective functions	**Motor protection**	Protection by electronic thermal overload relay.	
	Momentary overcurrent protection	Stops at approx. 200% of rated output current.	
	Overload protection	CT selected: 150% of rated output current per minute VT selected: 120% of rated output current per minute	
	Overvoltage protection	200 V Class Inverter: Stops when main-circuit DC voltage is above 410 V. 400 V Class Inverter: Stops when main-circuit DC voltage is above 820 V.	
	Undervoltage protection	200 V Class Inverter: Stops when main-circuit DC voltage is below 190 V. 400 V Class Inverter: Stops when main-circuit DC voltage is below 380 V.	
	Momentary power loss ridethru (Selectable)	Stops for power loss lasting 15 ms or more. Power loss processing settings can be set to continue operation if power is restored within 2 s.	
	Cooling fin overheating	Protection by thermistor.	
	Ground fault protection	Protection by electronic circuits. (Detected at approx. 100% or more of rated current.)	
	Charge indicator (internal LED)	Lit when the main circuit DC voltage is approx. 50 V or more.	
Environment	**Application site**	Indoor (no corrosive gas, oil spray, or metal filings)	
	Ambient operating temperature	–10°C to 45°C (–10°C to 40°C when enclosed and wall-mounted)	–10°C to 45°C (Mounted in a panel)
	Ambient operating humidity	90% max. (with no condensation)	
	Storage temperature	–20°C to 60°C	
	Altitude	1,000 m max.	
	Vibration resistance	20 Hz max., 9.8 m/s^2 max.; 20 to 50 Hz, 2 m/s^2 max	
	Protective structure	Enclosed, wall-mounting (NEMA1: Equivalent to IP20) or Mounted in a panel (equivalent to IP00)	Mounted in a panel (equivalent to IP00)

Note: **1.** The power consumption is the amount of power consumed in the Inverter when it is operating at its rated output.

2. Rotational autotuning is required to obtain the specifications for open loop vector control listed in the table.

3. When CT is selected, the overload capacity is 150% of rated output current. (CT cannot be selected for the 110 kW)
When VT is selected, the overload capacity is 120% of rated output current.
Increase the Inverter capacity if loads exceeding these current values are expected.

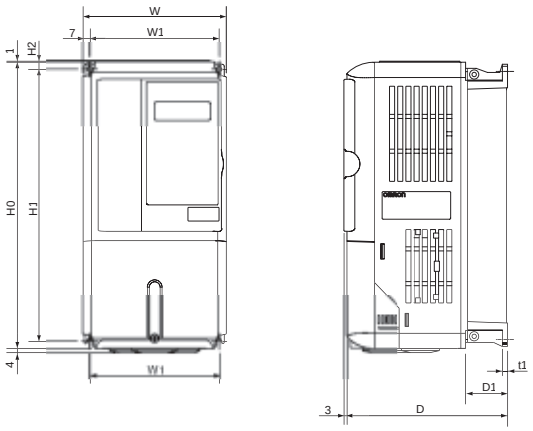
4. When a Braking Resistor or Braking Resistor Unit is being connected, set L3-04=0 to disable stall prevention during deceleration. If deceleration stall prevention is not disabled, the system may not stop within the specified deceleration time.

■ Dimensions

All dimensions are in mm.

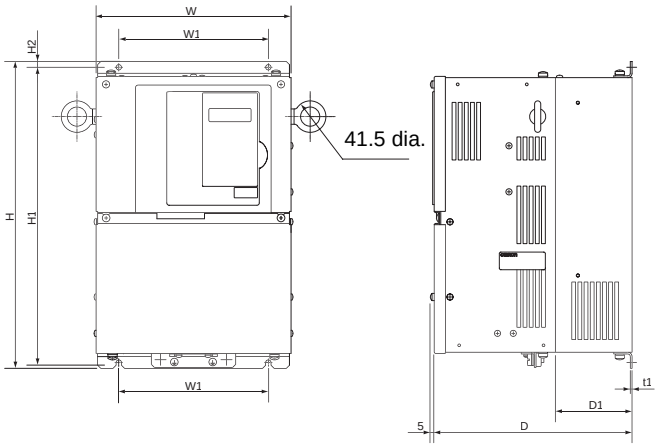
3G3RV-A2004 to A2185 (0.4 to 18.5 kW), Three-phase 200 V AC
3G3RV-A4004 to A4185 (0.4 to 18.5 kW), Three-phase 400 V AC

Dimensions Diagram A



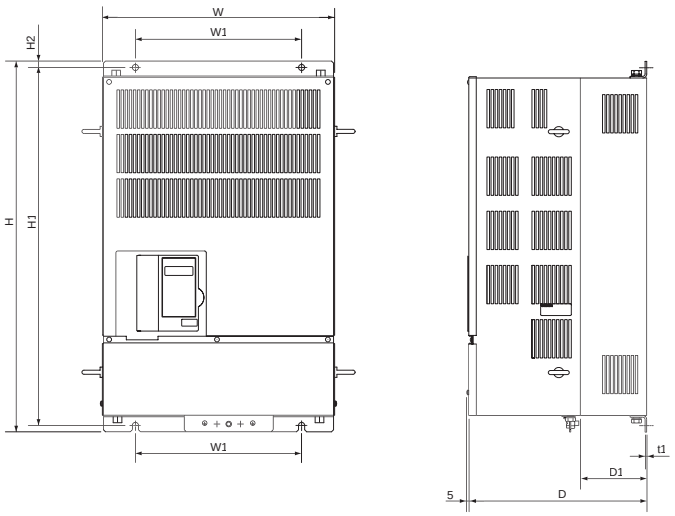
3G3RV-B2220 to B2300 (22 to 30 kW), Three-phase 200 V AC
3G3RV-B4220 to B4550 (22 to 55 kW), Three-phase 400 V AC

Dimensions Diagram B



3G3RV-B2370 to B211K (37 to 110 kW), Three-phase 200 V AC
3G3RV-B4750 to B416K (75 to 160 kW), Three-phase 400 V AC

Dimensions Diagram C

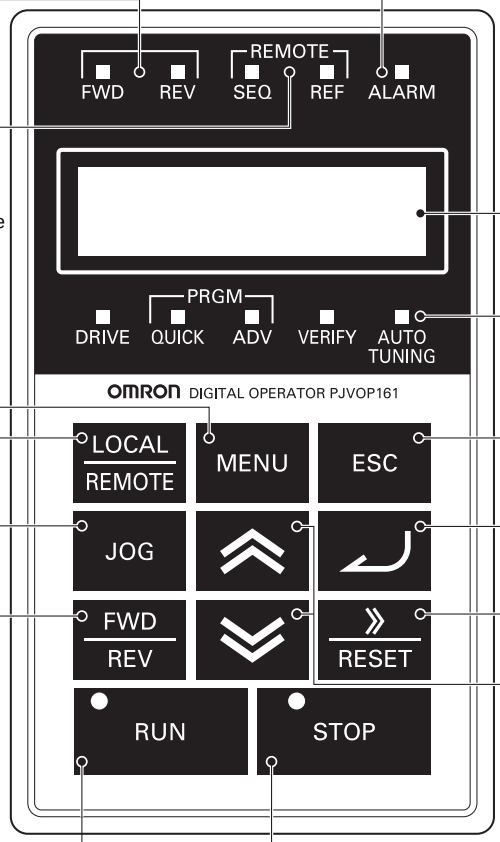


The following table lists the dimensions for the RV-series Inverters.

Voltage Class	Max. Motor Output (kW)	Model 3G3RV-	Figure	Dimensions											Mounting Holes d*
				W0	W	H	D	W1	H0	H1	H2	H3	D1	t1	
200 V 3-phase	0.4	A2004	A	---	140	280	157	126	280	266	7	0	39	5	M5
	0.75	A2007													
	1.5	A2015													
	2.2	A2022													
	3.7	A2037					177						59		
	5.5	A2055													
	7.5	A2075			200	300	197	186	300	285	7.5		65.5	2.3	M6
	11	A2110				310						10			
	15	A2150			240	350	207	216	350	335		0	78		
	18.5	A2185				380						30			
	22	B2220	B	345	254.2	400	258	195	---	385		---	100		
	30	B2300		370	279.2	450		220		435					
	37	B2370	C	470	379.2	600	298	250		575	13			3.2	M10
	45	B2450					328						130		
	55	B2550		545	454.2	725	348	325		700					
	75	B2750													
	90	B2900		615	505.2	850	358	370		820	15			4.5	M12
	110	B211K		690	579.2	885	378	445		855			140		
400 V 3-phase	0.4	A4004	A	---	140	280	157	126	280	266	7	0	39	5	M5
	0.75	A4007													
	1.5	A4015													
	2.2	A4022					177						59		
	3.7	A4037													
	5.5	A4055													
	7.5	A4075			200	300	197	186	300	285	7.5		65.5	2.3	M6
	11	A4110													
	15	A4150			240	350	207	216	350	335			78		
	18.5	A4185													
	22	B4220	B	370	280	450	258	220	---	435		---	100		
	30	B4300													
	37	B4370		420	329.2	550	283	260		535			105		
	45	B4450													
	55	B4550													
	75	B4750	C	545	454.2	725	348	325		700	13		130	3.2	M10
	90	B4900													
	110	B411K		615	505.2	850	358	370		820	15			4.5	M12
	132	B413K													
	160	B416K		(689)	(579.2)	(916)	378	445		855			140		

■ Digital Operator Operations

Digital Operator Components



Alarm Indicator

Rotation Direction Indicators

FWD: Lit when there is a forward run command input.
REV: Lit when there is a reverse run command input.

Remote Mode Indicators

Indicate the input mode selected for the control circuit terminals.

SEQ: Lit when the run command from the control circuit terminal is enabled.
REF: Lit when the frequency reference from control circuit terminals A1 and A2 is enabled.

MENU Key

Selects menu items (modes).

LOCAL/REMOTE Key

Switches between operation via the Digital Operator and parameter settings. This Key can be enabled or disabled by setting parameter o2-01.

Run Command Keys

These keys operate the Inverter when the Inverter is being operated from the Digital Operator.

JOG Key
Jog operation is performed while this key is pressed.

FWD/REV Keys
Switches between forward and reverse operation.

RUN Key
The red LED on the left will light when the RUN Key is pressed.

STOP Key
The red LED on the left will light when the STOP Key is pressed.

Data Display

Displays monitor data, constant numbers, and settings (in five digits).

Drive/Programming Mode Display

DRIVE: Lit in Drive Mode.
QUICK: Lit in Quick Programming Mode.
ADV: Lit in Advanced Programming Mode.
VERIFY: Lit in Verify Mode.
A. TUNE: Lit in Autotuning Mode.

ESC Key

Returns to the status before the ENTER Key was pressed.

ENTER Key

Selects modes, groups, functions, and constant names.

Displays a constant's set value if the constant's name is being displayed. Writes a new set value if pressed again after setting.

Digit Selection/RESET Key

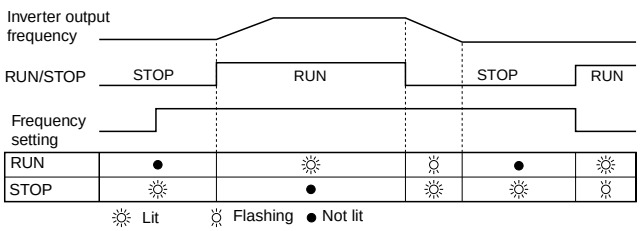
Selects the digit of the set value to be changed. The selected digit will flash.

Also used to reset operation after an error has occurred.

Increment Key
Decrement Key

Selects modes, groups, functions, constant names, and settings.

Note: The status of the RUN and STOP Indicators (lit, flashing, or not lit) depend on the Inverter's operation.



Example Digital Operator Operations

Step		Operation	Key operations	Digital Operator Displays
1	Power ON	Display frequency reference.	---	F 0.00
				DRIVE Indicator lit
2	Run condition setting	Select Local mode.	LOCAL/REMOTE	Remote Indicators (SEQ and REF) not lit
				FWD Indicator lit
3	Forward JOG (6 Hz)	Operates while key is being pressed.	JOG	F 6.00 Displayed while JOG Key is pressed.
4	Frequency setting	Enter reference value change mode.	↵	F 0.00
		Change digit.	RESET	F 15.00
		Change reference value.	∧ ∨	Selected digit flashes.
		Write setting.	↵	After "END" display F 15.00
		Exit reference value change mode.	ESC	F 15.00
		Select output frequency monitor display.	∧	0.00
5	Forward operation	Run operation (15Hz)	RUN	F 15.00 RUN RUN Indicator lit
6	Change frequency reference value (15 to 60 Hz)	Select frequency reference display.	∨	F 15.00
		Enter reference change mode.	↵	F 15.00
		Change digit.	RESET	F 60.00
		Change reference value.	∧ ∨	Selected digit flashes.
		Write setting.	↵	After "END" display F 60.00
		Exit reference value change mode.	ESC	F 60.00
		Select output frequency monitor display.	∧	60.00
7	Reverse operation	Switch to reverse operation.	FWD/REV	-60.00 RUN Indicator lit
8	Stop	Decelerate to a stop.	STOP	0.00 Decelerating RUN RUN Indicator flashing. Stopped STOP STOP Indicator lit.

Monitor Functions (Examples)

	Name	
U1-01	Frequency reference (Hz)	60.00
U1-02	Output frequency (Hz)	60.00
U1-03	Output current (A)	2.08
U1-04	Control mode	2
U1-05	Motor speed	60.00
U1-06	Output voltage (V)	168.1
U1-07	DC bus voltage (V)	Pn305
U1-08	Output power (kW)	0.4
U1-09	Torque reference (internal, %)	100.0
U1-10	Input terminal status	0111111
U1-11	Output terminal status	0111111
U1-12	Operation status	111111
U1-13	Cumulative operation time (hr)	700

Autotuning Procedure

This procedure performs stationary autotuning for line-to-line resistance only when using V/f control. This example uses a 3.7-kW motor, 4 pole, 200 V, and 14.0 A.)

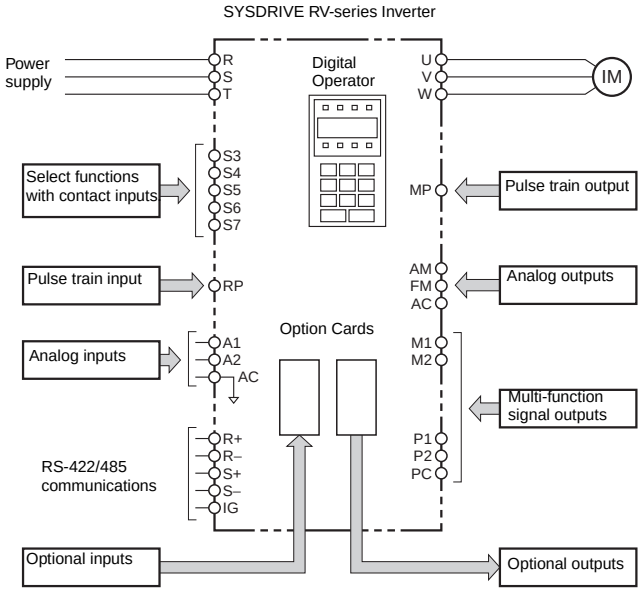
Step	Key operations	Digital Operator Displays	
Select mode (Press several times until AUTO TUNING flashes.)	MENU	t1-01	AUTO TUNING Indicator flashing
Select autotuning mode.	↵	t1-01	AUTO TUNING Indicator lit
Confirm stationary autotuning for line-to-line resistance. (Confirm that the setting is 2.)	↵	02	---
---	ESC	t1-01	---
Select motor output power.	∧	t1-02	---
Confirm motor output power. (Same as Inverter's rated output.)	↵	003.70	---
---	ESC	t1-02	---
Select motor rated current.	∧	t1-04	---
Confirm motor rated current. (Same motor current capacity as Inverter.)	↵	00 14.0	---
---	∧	t1-04	---
Start autotuning.	∧	tUn 12	DRIVE Indicator lit
---	RUN	tUn 12	---
Autotuning ends.	---	End	---
Return to Drive mode (Press several times until DRIVE flashes.)	MENU	F 60.00	DRIVE Indicator lit

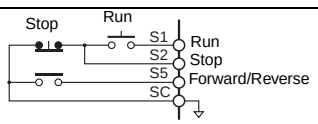
Displaying Monitor Items

Step	Key operations	Digital Operator Displays
Turn ON power.	---	---
	MENU Press repeatedly until DRIVE Indicator lights.	F 0.00 DRIVE Indicator lit.
Select mode.		
Select Drive mode.	↵	---
Frequency reference monitor	∧	F 0.00 DRIVE Indicator lit.
Output frequency monitor	∧	0.00
Output current monitor	∧	0.00A
Output voltage monitor (Monitor item set with o1-01.)	∧	0.0v
U1-□□ monitor	∧	U1-01
U2-□□ monitor (Error trace)	∧	U2-01
U3-□□ monitor (Error history)	∧	U3-01

■ Software Functions

The SYSDRIVE RV-series Inverters are equipped with flexible software for a variety of applications. Select the best functions for your application from the multitude of available software functions and customize the Inverter to your application.

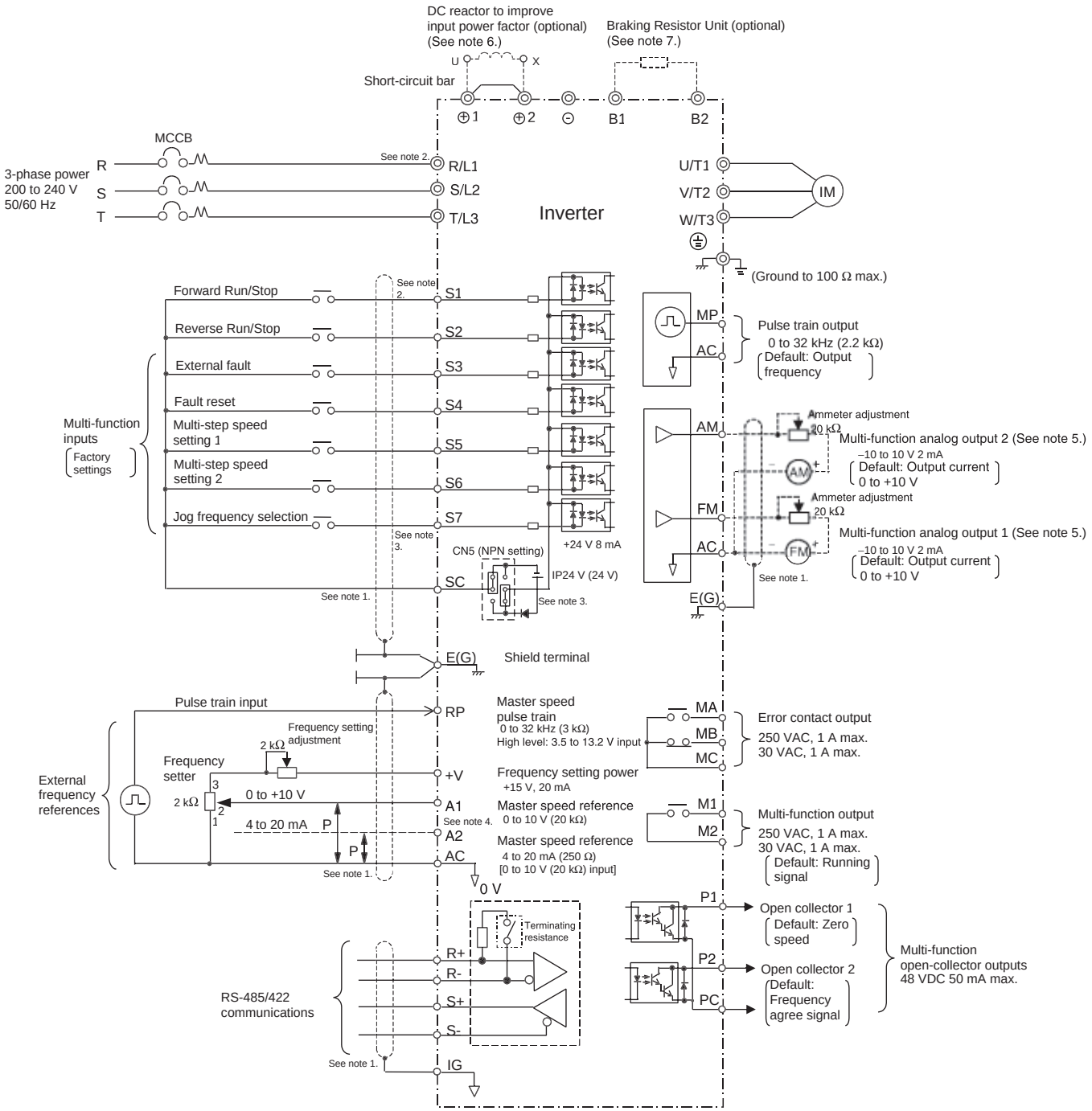


Function name	Example application	Purpose	Description
Energy saving	General	Automatic max. efficiency operation	Supplies voltage to the motor that maximizes its efficiency for the load and rotational speed. (Includes automatic temperature compensation function.)
PID control	Pumps, air conditioning	Automatic process control	Performs the PID calculation in the Inverter and uses the result as the frequency reference for steady control of a variable such as pressure, flow, or volume.
Speed search	Driving inertial loads such as blowers	Start free-run motors	Automatically adjusts the speed of a freely spinning motor to the set speed. A motor speed detector is not required.
DC injection braking	Equipment that continues rotating such as blowers and pumps	Start free-run motors	When a freely spinning motor's rotational direction is unknown, this function uses DC injection braking to stop the motor and then restarts it.
Commercial/Inverter power switching	Blowers, pumps, inertial equipment, extruding machines	Automatic switching of commercial power supply and Inverter	Switches between operation from a commercial power supply and operation from the Inverter without stopping the motor.
Multistep speed operation	Conveyors	Scheduled operation at preset speeds	Operates at a frequency stored in memory (up to 17 steps) based on the signal inputs. The Inverter can be connected to a PLC easily and simple positioning can be performed with limit switches and other inputs.
Acceleration/deceleration time switching	Automatic platens, conveyors	Switch acceleration/deceleration time with external signals	The acceleration/deceleration time is switched with external signals. Useful when using one Inverter to switch operation of two motors or when you require smooth acceleration/deceleration at high speeds.
Inverter overheating prediction	Air conditioning	Preventive maintenance	A warning can be displayed when the Inverter's ambient temperature approaches the protection temperature. (An optional thermoswitch is required.)
3-wire sequence control	General	Simple control circuit structure	The motor can be operated with automatic-reset push button switches. 
Select operation location	General	Improve operability	The source of Inverter operation and references (Digital Operator or external references, and signal inputs or options) can be selected online.

Function name	Example application	Purpose	Description
Reference Frequency Hold	General	Improve operability	This function temporarily pauses the increase or decrease in the frequency that occurs during acceleration/deceleration.
UP/DOWN operation	General	Improve operability	The speed setting can be raised and lowered by turning ON and OFF contact inputs.
Error retries	Air conditioning	Improve reliability	Even though the Inverter detects an error, the error is reset automatically after self-diagnosis and motor operation is restarted without stopping. The number of retries can be set up to 10.
Emergency Stop without a Braking Resistor Unit (DC injection braking)	High-speed router	Stop motor with DC injection braking	The motor can be decelerated quickly from its top speed without a Braking Resistor Unit. Use a deceleration duty less than 5% and a braking torque between 50% and 70%.
Torque limit (Drooping characteristic)	Blowers, pumps, extruding machines	Improve equipment protection and continuation of operation, limit torque	When the motor's generated torque reaches a certain level, it is recognized as an overload and the output frequency is adjusted. This function is ideal for tripless operation of pumps and blowers.
Upper and lower frequency limit	Blowers, pumps	Limit motor speed	The frequency reference's upper limit, lower limit, bias, and gain can be set independently without peripheral equipment.
Jump frequency	General equipment	Prevent resonance in the system	Automatically avoids resonance points during steady speed operation to prevent resonance in the mechanical system. Can also be used to control dead zones in the system.
Carrier frequency setting	General equipment	Decrease noise	Reduce noise resonance in the mechanical system by setting a different carrier frequency for the Inverter.
Automatic continuation after reference lost	Air conditioning	Improve reliability by continuing operation	Automatically continues operation at the preset frequency even if the frequency reference is lost because the host computer goes down. This function can provide seamless air conditioning service in intelligent buildings.
Load speed monitor	General	Improve monitoring	Various values can be displayed such as the motor speed (r/min), load equipment speed (r/min), or line speed (m/min).
Operation signal	General	Zero-speed interlock	This signal is ON while the motor is rotating; it can be used as an interlock signal when stopped. (OFF during free run.)
Zero-speed signal	Production equipment	Zero-speed interlock	This signal is ON when the output frequency is below the minimum frequency; it can be used as a feed rotation reversing signal in production equipment.
Frequency (speed) matching signal	Production equipment	Zero speed reached interlock	This signal is ON when the frequency reference (speed reference) matches the output frequency (motor speed when V/f with PG control is being used); it can be used as an interlock signal for operations such as cutting.
Overtorque signal	Production equipment, blowers, cutters, extruding machines	Improve equipment protection, improve reliability by continuing operation	This signal is ON when the motor's generated torque exceeds the overtorque detection level; it can be used as a protective interlock signal to detect overloads such as dulled cutting blades in production equipment.
Low voltage signal	General	A type of malfunction signal	This signal is ON when the Inverter detects a low voltage; it can be used as a power-interruption detection flag when external measures are being used to handle power interruptions.
User-defined speed matching signal	General	Reference speed matching interlock	This signal is ON when the speed matches a user-defined frequency reference.
Output frequency detection 1	General	Gear shift interlock	This signal is ON when the output frequency is above a user-defined level.
Output frequency detection 2	General	Gear shift interlock	This signal is ON when the output frequency is below a user-defined level.
Baseblock signal	General	Operating interlock	This signal is ON when the Inverter's output is blocked.
Braking Resistor protection	General	Preventive maintenance	This signal is ON when the built-in Braking Resistor is overheating or an error has been detected in the Braking Transistor.
Frequency reference sudden change detection	General	Improve reliability by continuing operation	This signal is ON when the Inverter detects that the frequency reference sudden changed to less than 10% of the set value; it can be used to detect errors in the host sequencer.

Function name	Example application	Purpose	Description
Multi-function analog input	General	Improve operability	The external analog input can be used for an auxiliary frequency reference. It can also be used to adjust settings such as the reference frequency, output voltage, acceleration/deceleration time, and overtorque detection level.
Multi-function analog output	General	Improve monitoring	Any two U1 monitors (frequency meter, current meter, voltage meter, or power meter) can be connected.
Pulse train input	General	Improve operability	The pulse train input can be used to input the frequency reference. It can also be used to input PID set points and PID feedback values in a pulse train when PID control is being used.
Pulse train output	General	Improve monitoring	A total of 6 values can be monitored such as the frequency reference, output frequency, PID set point, and PID feedback value.
PG speed control (optional)	General	Improve speed control performance	The speed control accuracy can be improved significantly by installing a PG Speed Control Card.

■ Standard Connections



Note: **1.** Shield, Twisted-pair wires

2. Main circuit terminals are indicated with double circles and control circuit terminals are indicated with single circles.

3. Sequence input signals S1 to S7 are labeled for sequence connections (0 V common and sinking mode) for no-voltage contacts or NPN transistors. These are the default settings.

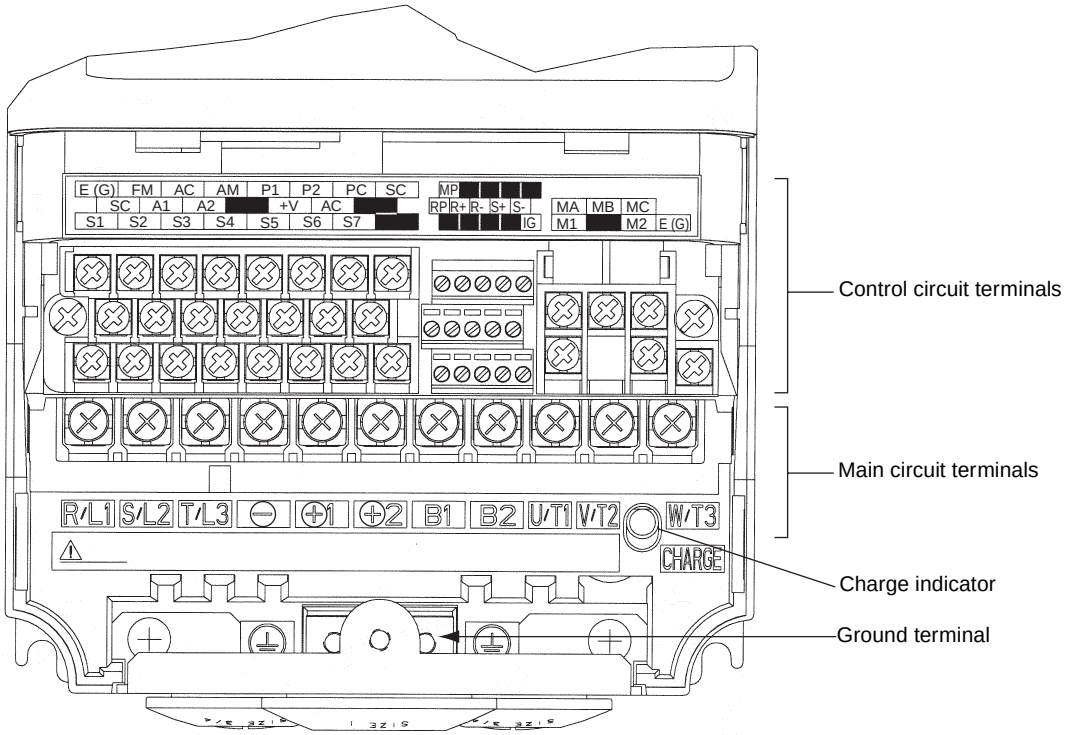
4. The main frequency reference input is selectable; it can be input from parameter H3-13, the voltage input (terminal A1), or the current input (terminal A2). The factory default setting is the voltage input.

5. The multi-function analog output is a dedicated meter output for an analog frequency meter, ammeter, voltmeter, watt-meter, etc. Do not use this output for feedback control or for any other control purpose.

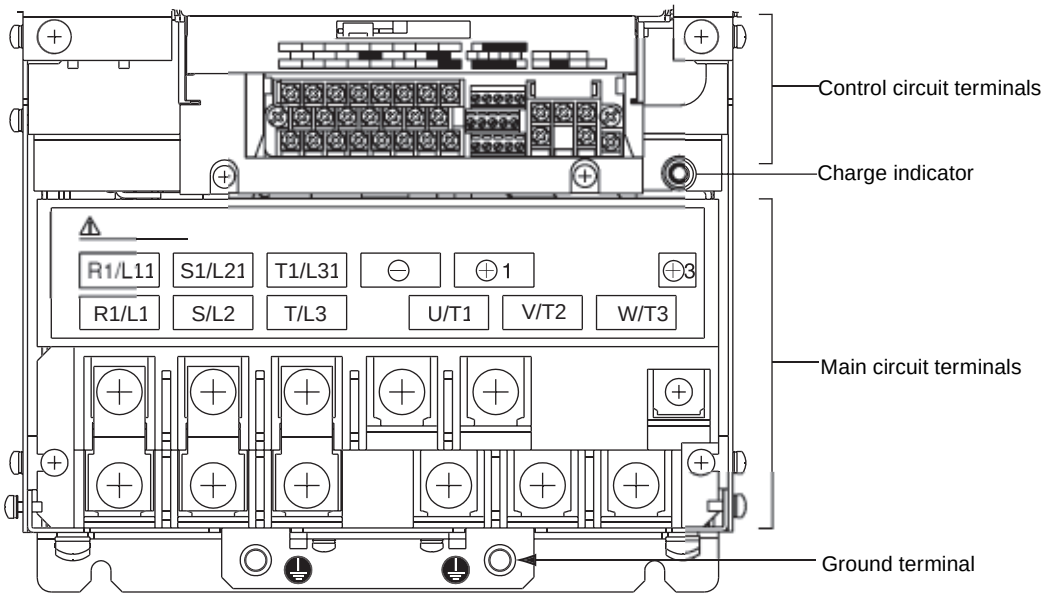
6. DC Reactors are built into 200-V class Inverters in the 22 to 110 kW range and 400-V class Inverters in the 22 to 160 kW range to improve the input power factor, so it isn't necessary to add a DC Reactor to these models. Remove the short bar when connecting a DC reactor to Inverters with a capacity of 18.5 kW or less.
7. Set parameter L8-01 to 1 when using a Braking Resistor (3G3IV-PERF150WJ□). When using a Braking Resistor Unit, a cutoff sequence for the power supply must be made using a thermal relay trip.

■ Terminal Block Configuration

Terminal Arrangement for the 200-V Class 0.4 kW Inverter



Terminal Arrangement for the 200-V Class 22 kW Inverter



Main-circuit Terminals

<table>
<tr><th>Voltage Class</th><th colspan="3">200-V Class</th><th colspan="3">400-V Class</th></tr>
<tr><th>Model (3G3RV-□)</th><th>A2004 to A2185</th><th>B2220 to B2300</th><th>B2370 to B211K</th><th>A4004 to A4185</th><th>B4220 to B4550</th><th>B4750 to B416K</th></tr>
<tr><th>Maximum Applied Motor Capacity</th><th>0.4 to 18.5 kW</th><th>22 to 30 kW</th><th>37 to 110 kW</th><th>0.4 to 18.5 kW</th><th>22 to 55 kW</th><th>75 to 160 kW</th></tr>
<tr><td>R/L1</td><td rowspan="3">Main-circuit power supply input</td><td colspan="2" rowspan="4">Main-circuit power supply input
R-R1, S-S1, T-T1 are wired when shipped from the factory.</td><td rowspan="3">Main-circuit power supply input</td><td colspan="2" rowspan="4">Main-circuit power supply input
R-R1, S-S1, T-T1 are wired when shipped from the factory.</td></tr>
<tr><td>S/L2</td></tr>
<tr><td>T/L3</td></tr>
<tr><td>R1/L11</td><td rowspan="3">---</td><td rowspan="3">---</td></tr>
<tr><td>S1/L21</td></tr>
<tr><td>T1/L31</td></tr>
<tr><td>U/T1</td><td colspan="3" rowspan="3">Inverter output</td><td colspan="3" rowspan="3">Inverter output</td></tr>
<tr><td>V/T2</td></tr>
<tr><td>W/T3</td></tr>
<tr><td>B1</td><td rowspan="2">For Braking Resistor Unit connection</td><td rowspan="2">---</td><td rowspan="2">For Braking Resistor Unit connection</td><td rowspan="2">---</td></tr>
<tr><td>B2</td></tr>
<tr><td>⊖</td><td rowspan="3">For DC reactor connection (⊕1 and ⊕2)
For DC power supply input (⊕1 and ⊖) (See note 1.)</td><td colspan="2" rowspan="3">For DC power supply input (⊕1 and ⊖) (See note 1.)
For Braking Unit connection (⊕3 and ⊖)</td><td rowspan="3">For DC reactor connection (⊕1 and ⊕2)
For DC power supply input (⊕1 and ⊖) (See note 1.)</td><td colspan="2" rowspan="3">For DC power supply input (⊕1 and ⊖) (See note 1.)
For Braking Unit connection (⊕3 and ⊖)</td></tr>
<tr><td>⊕1</td></tr>
<tr><td>⊕2</td></tr>
<tr><td>⊕3</td><td>---</td><td>---</td></tr>
<tr><td>S/L2</td><td colspan="2" rowspan="2">---</td><td rowspan="2">Cooling fan power supply input (See note 2.)</td><td colspan="3">---</td></tr>
<tr><td>R/L1</td><td colspan="2" rowspan="2">---</td><td rowspan="2">Cooling fan power supply input (See note 2.)</td></tr>
<tr><td>S200/L200</td><td colspan="3" rowspan="2">---</td></tr>
<tr><td>S400/L400</td></tr>
<tr><td>⏚</td><td colspan="3">Ground (to resistance of 100 Ω or less)</td><td colspan="3">Ground (to resistance of 10 Ω or less)</td></tr>
</table>

Note: **1.** The DC power supply inputs "⊕1 and ⊖" do not conform to UL/cUL standards.

2. Cooling fan power supply input R/L1-S/L2: 200 to 220-VAC, 50-Hz input or 200 to 230-VAC, 60-Hz input (A transformer is required for 230-VAC, 50-Hz input or 240-VAC, 50/60-Hz input.)

3. Cooling fan power supply input R/L1-S200/LS200: 200 to 220-VAC, 50-Hz input or 200 to 230-VAC, 60-Hz input; R/L1-S400/L2400: 380 to 480-VAC, 50/60 Hz input

Control-circuit Terminals (Same for 200-V and 400-V Class)

Type	Signal Symbol	Signal Name	Terminal Function	Signal Level
Sequence Input	S1	Forward-stop command	Forward when ON, stop when OFF	+24 V DC, 8 mA photocoupler
	S2	Reverse-stop command	Reverse when ON, stop when OFF	
	S3	Multi-function input selection 1	Factory setting: External fault detected when ON	
	S4	Multi-function input selection 2	Factory setting: Fault reset when ON	
	S5	Multi-function input selection 3	Factory setting: Multi-step speed command 1 effective when ON	
	S6	Multi-function input selection 4	Factory setting: Multi-step speed command 2 effective when ON	
	S7	Multi-function input selection 5	Factory setting: Inching frequency selected when ON	
	SC	Sequence control input common	---	
Analog Input	+V	+15-V power supply	+15-V power supply for analog reference	+15 V (20 mA maximum allowable current)
	A1	Main speed frequency reference	0 to 10 V/100%	0 to 10 V (input impedance: 20 kΩ)
	A2	Multi-function analog input	4 to 20 mA/100%, 0 to 10 V/100% Factory setting: Add to terminal A1 (H3-09 = 0)	4 to 20 mA (input impedance: 250 kΩ) 0 to 10 V (input impedance: 20 kΩ)
	AC	Analog common	0 V	---
	E (G)	Shield wire, optional ground connection	---	---
Sequence Output	P1	Multi-function contact output 1	Factory setting: Zero speed Zero level (b2-01) or below when ON.	Open collector output +48 VDC, 50 mA
	P2	Multi-function contact output 2	Factory setting: Frequency agreement detection ON when the frequency is within ±2 Hz of the set frequency.	
	PC	Photocoupler output common	---	
	MA	Fault output (NO contact)	ON between MA and MC during fault ON between MB and MC during fault.	Relay output Dry contacts Contact capacity 250 VAC, 1 A max. 30 VDC, 1 A max.
	MB	Fault output (NC contact)		
	MC	Relay contact output common	---	
	M1	Multi-function contact output (NO contact)	Factory setting: RUN ON between M1 and M2 during operation.	
	M2			
Analog Monitor Output	FM	Multi-function analog monitor 1	Factory setting: Output frequency 0 to 10 V/100% frequency	0 to +10 VDC ±5% 2 mA max.
	AM	Multi-function analog monitor 2	Factory setting: Current monitor 5 V/Inverter rated current	
	AC	Analog common	---	

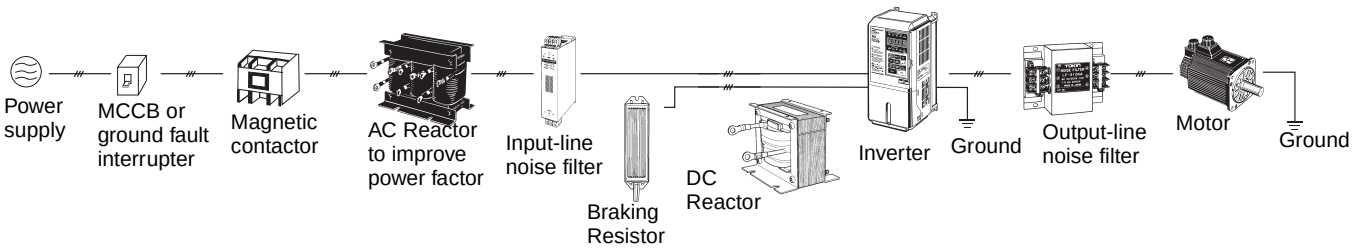
Type	Signal Symbol	Signal Name	Terminal Function	Signal Level
Pulse Input/Output	RP	Multi-function pulse input	Factory setting: Frequency reference input (H6-01 = 0)	0 to 32 kHz (3 kΩ)
	MP	Multi-function pulse monitor	Factory setting: Output frequency (H6-06 = 2)	0 to 32 kHz (2.2 kΩ)

Communications-circuit Terminals (Same for 200-V and 400-V Class)

Type	Signal Symbol	Signal Name	Terminal Function	Signal Level
RS-422A/485 Communications	R+	Receive data	For 2-wire RS-485 communications, short R+ and S+, as well as R– and S–.	Differential input, photocoupler isolation
	R–			
	S+	Send data		Differential input, photocoupler isolation
	S–			
	IG	Shield wire for communications	---	---

■ Specifications of Optional Items and Peripheral Devices

The following optional items and peripheral devices can be used with the Inverter. Select them according to the application.

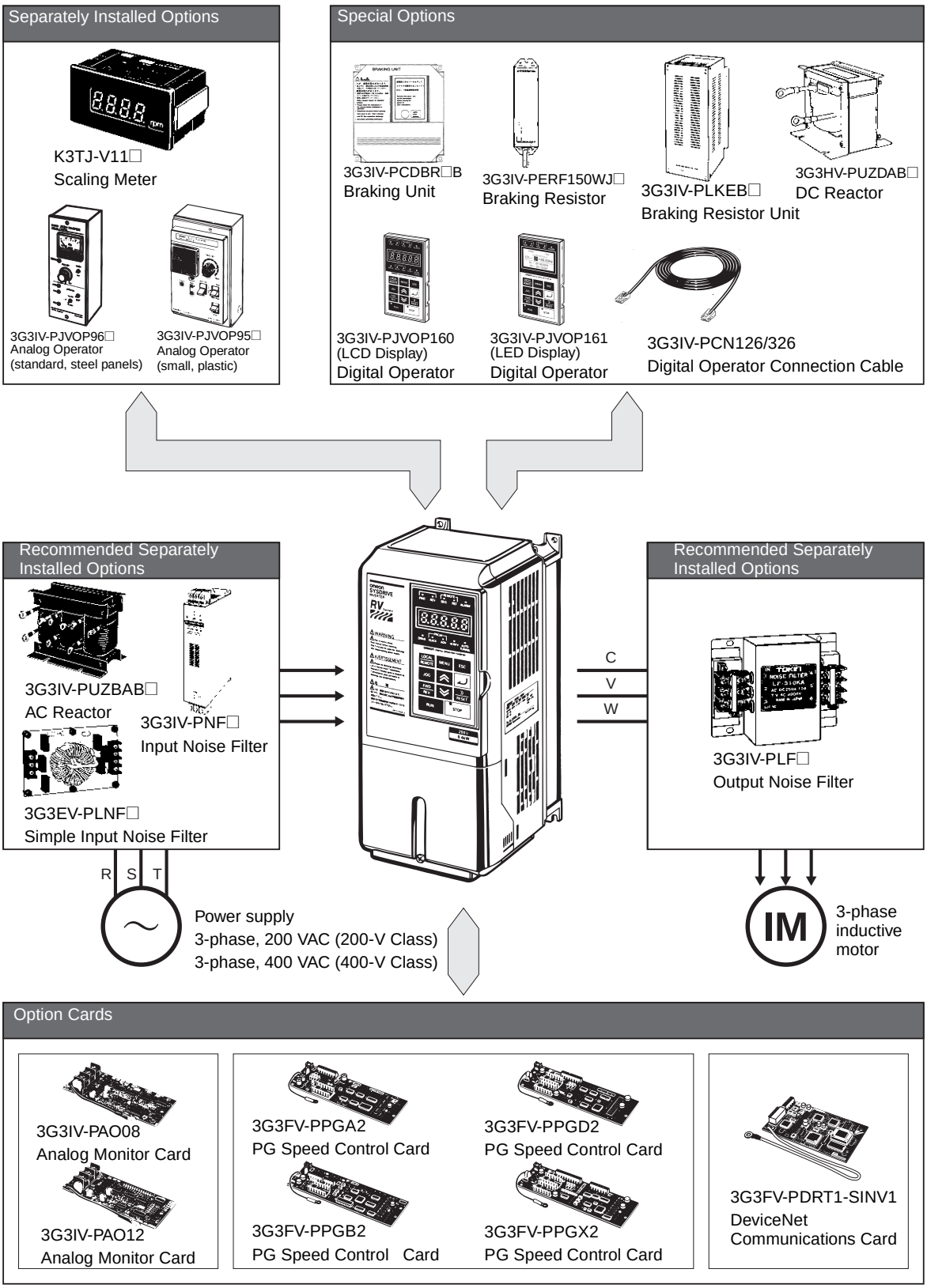


Purpose	Name	Model	Description
Protect Inverter wiring	MCCB or Ground Fault Interrupter (See note.)	Example: Mitsubishi Electric's NV Series	Always connect a breaker to the power supply line to protect Inverter wiring. Use a ground fault interrupter suitable for high frequencies.
Prevents burning when a Braking Resistor is used.	Magnetic Contactor	Example: Fuji Electric's SC Series	Install to prevent the braking resistor from burning out when one is used. Always attach a surge absorber to the coil.
Contains switching surge	Surge Absorber	Example: MARCON Electric's DCR2-□	Absorbs surge from the magnetic contactor and control relays. Connect surge absorbers to all magnetic contactors and relays near the Inverter.
Isolates I/O signals	Isolator	Example: MARCON Electric's DGP□	Isolates the I/O signals of the Inverter and is effective against inductive noise.
Improve the input power factor of the Inverter	DC Reactor AC Reactor	3G3HV-PUZDAB□ 3G3IV-PUZBAB□	Used to improve the input power factor of the Inverter. All Inverters of 22 kW or higher contain built-in DC reactors. These are optional for Inverters of 18 kW or less. Install DC and AC reactors for applications with a large power supply capacity (600 kVA or higher).
Reduce the affects of radio and control device noise	Input Noise Filter	3G3IV-PFN□ 3G3EV-PLNF□	Reduces noise coming into the inverter from the power supply line and to reduce noise flowing from the inverter into the power supply line. Connect as close to the Inverter as possible.
	Output Noise Filter	3G3IV-PLF□	Reduces noise generated by the Inverter. Connect as close to the Inverter as possible.
Enable stopping the machine in a set time	Braking Resistor	3G3IV-PERF150WJ□	Consumes the regenerative motor energy with a resistor to reduce deceleration time (use rate: 3% ED).
	Braking Resistor Unit	3G3IV-PLKEB□	Consumes the regenerative motor energy with a resistor to reduce deceleration time (use rate: 10% ED).
	Braking Unit	3G3IV-PCDBR□B	Used with a Braking Resistor Unit to reduce the deceleration time of the motor.

Purpose	Name	Model	Description
Operates the Inverter externally	Analog Operator (small plastic Operator)	3G3IV-PJVOP95□	Allows frequency reference settings and ON/OFF operation control to be performed by analog references from a remote location (50 m max.). Frequency counter specifications: 60/120 Hz, 90/180Hz
	Analog Operator (Standard steel-plate Operator)	3G3IV-PJVOP96□	Allows frequency reference settings and ON/OFF operation control to be performed by analog references from a remote location (50 m max.). Frequency counter specifications: 75 Hz, 150 Hz, 220 Hz
	Digital Operator Connecting Cable	1 m cable: (3G3IV-PCN126) 3 m cable: (3G3IV-PCN326)	Extension cable to use a Digital Operator remotely. Cable length: 1 m or 3 m
Provides Inverter momentary power loss recovery time	Momentary Power Loss Recovery Unit	3G3IV-PCN□26	Handles momentary power losses for the control power supply for models 2.2 kW or less (maintains power for 2 s).
Set/monitor frequencies and voltages externally.	Scaling Meter	K3TJ-V11□	Measures the output voltage externally and designed for use with a PWM Inverter.

Note: Use a ground fault interrupter with a current sensitivity of 200 mA minimum and an operating time of 0.1 s minimum to prevent operating errors. The interrupter must be suitable for high-frequency operation.
Example: NV series by Mitsubishi Electric Corporation (manufactured in or after 1988)
EG, SG series by Fuji Electric Co., Ltd. (manufactured in or after 1984)

■ Options


Separately Installed Options
K3TJ-V11□
Scaling Meter
3G3IV-PJVOP96□
Analog Operator
(standard, steel panels)
3G3IV-PJVOP95□
Analog Operator
(small, plastic)
Special Options
3G3IV-PCDBR□B
Braking Unit
3G3IV-PERF150WJ□
Braking Resistor
3G3IV-PLKEB□
Braking Resistor Unit
3G3HV-PUZDAB□
DC Reactor
3G3IV-PJVOP160
(LCD Display)
Digital Operator
3G3IV-PJVOP161
(LED Display)
Digital Operator
3G3IV-PCN126/326
Digital Operator Connection Cable
Recommended Separately Installed Options
3G3IV-PUZBAB□
AC Reactor
3G3IV-PNF□
Input Noise Filter
3G3EV-PLNF□
Simple Input Noise Filter
C
V
W
Recommended Separately Installed Options
3G3IV-PLF□
Output Noise Filter
R
S
T
Power supply
3-phase, 200 VAC (200-V Class)
3-phase, 400 VAC (400-V Class)
IM
3-phase
inductive
motor
Option Cards
3G3IV-PAO08
Analog Monitor Card
3G3IV-PAO12
Analog Monitor Card
3G3FV-PPGA2
PG Speed Control Card
3G3FV-PPGD2
PG Speed Control Card
3G3FV-PPGB2
PG Speed Control Card
3G3FV-PPGX2
PG Speed Control Card
3G3FV-PDRT1-SINV1
DeviceNet
Communications Card

Separately Installed Options

Name	Model number	Application
Scaling Meter	K3TJ-V11□	Connects to a multi-function analog output from the Inverter. Used to display rotational speeds of motors, line speeds, etc., in physical units.
Analog Operator (standard with steel panels)	3G3IV-PJVOP96□	Allows frequency reference settings and ON/OFF operation control to be performed by analog references from a remote location (50 m max.). Frequency counter specifications: 75 Hz, 150 Hz, 220 Hz
Analog Operator (small, plastic)	3G3IV-PJVOP95□	Allows frequency reference settings and ON/OFF operation control to be performed by analog references from a remote location (50 m max.). Frequency counter specifications: 60/120 Hz, 90/180Hz

Special Options

Name	Model number	Application
Braking Unit	3G3IV-PCDBR□B	Used with a Braking Resistor Unit to reduce the deceleration time of the motor. Not required with Inverters of 7.5 kW or less for 200-V class Inverters or for Inverters of 15 kW or less for 400-V class Inverters.
Braking Resistor	3G3IV-PERF150WJ□	Consumes the regenerative motor energy with a resistor to reduce deceleration time (use rate: 3% ED). Not required with Inverters of 3.7 kW or less for 200-V class Inverters or for Inverters of 2.2 kW or less for 400-V class Inverters.
Braking Resistor Unit	3G3IV-PLKEB□	Consumes the regenerative motor energy with a resistor to reduce deceleration time (use rate: 10% ED).
DC Reactor	3G3HV-PUZDAB□	Used to control harmonics generated by the Inverter and to improve the input power factor of the Inverter. All Inverters of 18.5 kW or higher contain built-in DC reactors.
Digital Operator with LCD Display	3G3IV-PJVOP160	Used to display and change the Inverter's parameters and perform maintenance. The Digital Operator is equipped with a copy function, so if some problem arises the Digital Operator can be replaced just by mounting another one.
Digital Operator with LED Display	3G3IV-PJVOP161	Used to display and change the Inverter's parameters and perform maintenance. The Digital Operator is equipped with a copy function, so if some problem arises the Digital Operator can be replaced just by mounting another one.
Digital Operator Connecting Cable	3G3IV-PCN126 (1 m) 3G3IV-PCN326 (3 m)	Extension cable to use an FV-series Digital Operator remotely. Cable length: 1 m or 3 m

Recommended Separately Installed Option

Name	Model number	Application
AC Reactor (Yaskawa)	3G3IV-PUZBAB□	Used to control harmonics generated by the Inverter or when the power supply capacity is greatly larger than the Inverter's capacity. Also used to increase the power factor.
Input Noise Filter (Schaffner)	3G3IV-PFN□	Reduces noise coming into the inverter from the power supply line and to reduce noise flowing from the inverter into the power supply line.Connected to the power supply input side.
Simple Input Noise Filter (Yaskawa)	3G3EV-PLNF□	Reduces noise coming into the inverter from the power supply line and to reduce noise flowing from the inverter into the power supply line. Connected to the power supply input side.
Output Noise Filter (Tokin)	3G3IV-PLF□	Controls noise generated by the Inverter so it does not enter the power supply. Connected to the motor output side.

Option Cards

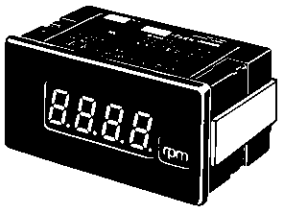
Name	Model number	Application
Analog Monitor Cards	3G3IV-PAO08	The resolution of the analog output from the Inverter is 11 bits. Use this Card if there are not enough analog outputs. The output resolution of the 3G3IV-PAO08 is (0 to 10 V output for frequency meters or output current meters) and the output resolution of the 3G3IV-PAO12 is 1/2048 (0 to ±10 V for control applications).
	3G3IV-PAO12	
PG Speed Control Cards	3G3FV-PPGA2	Phase-A (single-phase) pulse input and open collector output for V/f control with a PG. Maximum response frequency: 30 kHz, with pulse monitor output.
	3G3FV-PPGB2	Phase-A/B pulse inputs and open collector output for V/f control. Maximum response frequency: 30 kHz, with pulse monitor output.
	3G3FV-PPGD2	Phase-A (single-phase) pulse input and line driver output (RS-422) for V/f control with a PG. Maximum response frequency: 30 kHz, with pulse monitor output.
	3G3FV-PPGX2	Phase-A/B/Z pulse inputs and line driver output (RS-422) for V/f control. Maximum response frequency: 30 kHz, with pulse monitor output
DeviceNet Communications Card	3G3FV-PDRT1-SINV1	Used for DeviceNet communications with a Programmable Controller or other DeviceNet master device.

■ Separately Installed Options

Scaling Meters

K3TJ-V11□

Connect a Scaling Meter to the Inverter's analog monitor output to display rotational speeds of devices or linear speed of equipment (such as the line) in the physical units that you actually want to read.



Standard Models and Application

Model No.	Control Power Supply	Display
K3TJ-V111R	100 to 240 VAC	Red LED
K3TJ-V111G		Green LED
K3TJ-V116R	24 VDC, isolated (See note.)	Red LED
K3TJ-V111G		Green LED

Note: The power supply circuit is isolated from the input circuits.

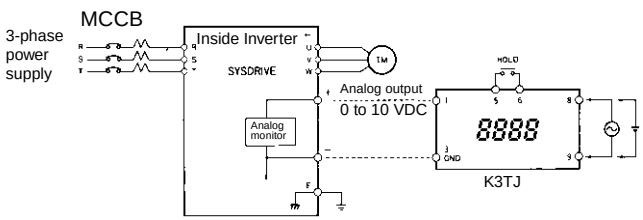
RV-series Inverters

Standard Specifications

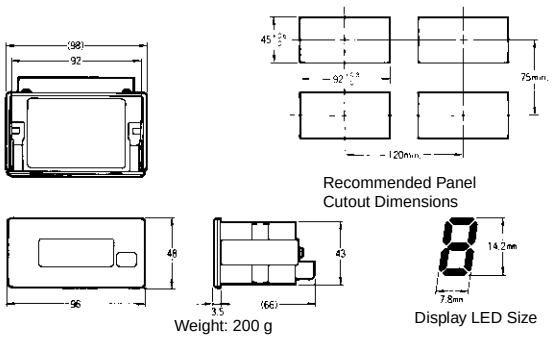
Sampling Period	2 times/s
Display Refresh Cycle	2 times/s
Measurement Averaging Methods	Simple average or moving average
Number of Samples for Averaging	1, 2, 4, or 8 samples
Max. No. of Display Digits	4 digits (–1999 to 9999)
Display	7-segment red/green LEDs, character height: 14.2 mm
Decimal Point Display	User-set using function selection switch and up/down keys.
Scaling Method	Shifting and scaling are user-set using function selection switch and up/down keys.
Scaling Range	–1999 to 9999
Zero Limit Range	0 to 99 digits
Overrange Values	Flashing display
Zero Suppression	Supported
External Controls	Present value hold (by short-circuiting terminal on front panel)
Protective Structure (conforming to IEC standards)	Front panel display: IP51 (See note.) Case: IP20 Terminal section: IP00
Memory Protection	Non-volatile memory

Note: IP51 requires that the optional K32-L49SC Drop-proof Cover be used. The protective structure is IP50 without it.

Wiring Example



Dimensions

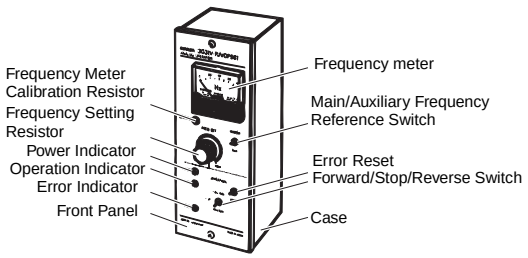


Analog Operators

Standard Steel Case

3G3IV-PJVOP96□

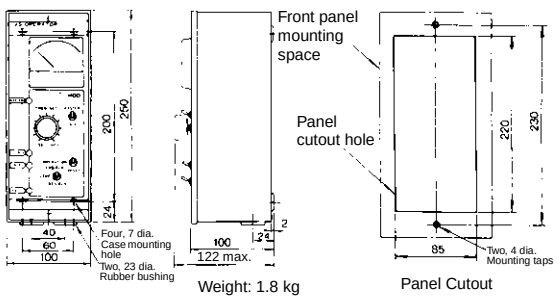
An Analog Operator allows frequency reference settings and ON/OFF operation control to be performed by analog references from a remote location (50 m max.)
Frequency meter scale: 75 Hz, 150 Hz, or 220 Hz



Standard Specifications

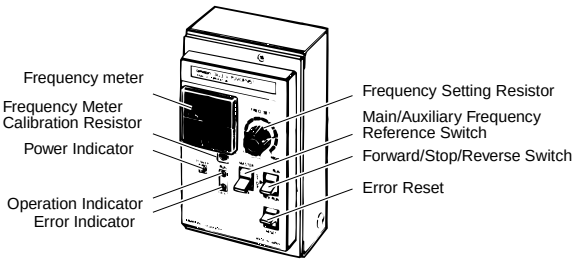
Model No.	Frequency Meter Specifications
3G3IV-PJVOP961	DCF-6A, 3 V, 1 mA, 75 Hz
3G3IV-PJVOP962	DCF-6A, 3 V, 1 mA, 150 Hz
3G3IV-PJVOP963	DCF-6A, 3 V, 1 mA, 220 Hz

Dimensions



Compact Plastic Analog Operator 3G3IV-PVJOP95□

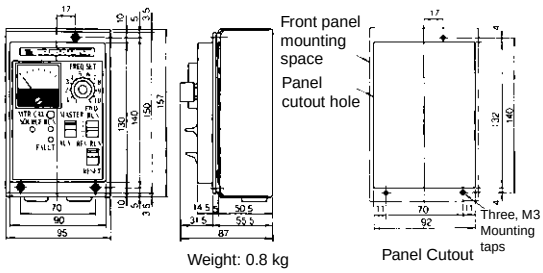
An Analog Operator allows frequency reference settings and ON/OFF operation control to be performed by analog references from a remote location (50 m max.)
Frequency meter scale: 60/120 Hz or 90/180 Hz



Standard Specifications

Model No.	Frequency Meter Specifications
3G3IV-PJVOP951	TRM-45, 3 V, 1 mA, 60/120 Hz
3G3IV-PJVOP952	TRM-45, 3 V, 1 mA, 90/180 Hz

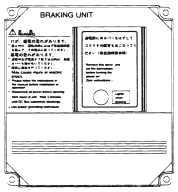
Dimensions



■ Special Options

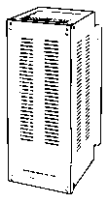
Braking Units, Braking Resistors, and Braking Resistor Units

A Braking Unit and Braking Resistor are required when braking the Inverter, although Braking Units are built into all Inverters with capacities between 0.4 and 18.5 kW. Select the appropriate Braking Resistor or Braking Resistor Unit based on the Inverter's application.



Braking Unit
3G3IV-PCDBR□B

Braking Resistor
(Resistor for installation)
3G3IV-PERF150WJ□



Braking Resistor Unit
(Separate Unit)
3G3IV-PLKEB□

Inverter		Braking Unit		Braking Resistors[1]								
				Braking Resistors (Duty factor 3% ED, 10 s max.)[2, 3]				Braking Resistor Units (Duty factor 10% ED, 10 s max.)[3]				
Voltage	Max. Motor Capacity (kW)	3G3IV-PCDBR□B	Qty Used	3G3IV-PERF150WJ□	Resistance	Qty Used	Approx. braking torque (%)	3G3IV-PLKEB□	Resistor Specifications (per Unit)	Qty Used	Braking torque (%)	Min. resistance (Ω)[4]
200-V Class	0.4	Internal		201	200 Ω	1	220	20P7	70 W 200 Ω	1	220	48
	0.75			201	200 Ω	1	125	20P7	70 W 200 Ω	1	125	48
	1.5			101	100 Ω	1	125	21P5	260 W 100 Ω	1	125	48
	2.2			700	70 Ω	1	120	22P2	260 W 70 Ω	1	120	16
	3.7			620	62 Ω	1	100	23P7	390 W 40 Ω	1	125	16
	5.5			---	---	---	---	25P5	520 W 30 Ω	1	115	16
	7.5			---	---	---	---	27P5	780 W 20 Ω	1	125	9.6
	11			---	---	---	---	2011	2,400 W 13.6 Ω	1	125	9.6
	15			---	---	---	---	2015	3,000 W 10 Ω	1	125	9.6
	18.5			---	---	---	---	2015	3,000 W 10 Ω	1	125	9.6
	22	2022	1	---	---	---	---	2022	4,800 W 6.8 Ω	1	125	6.4
	30	2015	2	---	---	---	---	2015	3,000 W 10 Ω	2	125	9.6
	37	2015	2	---	---	---	---	2015	3,000 W 10 Ω	2	100	9.6
	45	2022	2	---	---	---	---	2022	4,800 W 6.8 Ω	2	120	6.4
	55	2022	2	---	---	---	---	2022	4,800 W 6.8 Ω	2	100	6.4
	75	2022	3	---	---	---	---	2022	4,800 W 6.8 Ω	3	110	6.4
	90	2022	4	---	---	---	---	2022	4,800 W 6.8 Ω	4	120	6.4
	110	2022	5	---	---	---	---	2022	4,800 W 8 Ω	5	100	7.6
400-V Class	0.4	Internal		751	750 Ω	1	230	40P7	70 W 750 Ω	1	230	96
	0.75			751	750 Ω	1	130	40P7	70 W 750 Ω	1	130	96
	1.5			401	400 Ω	1	125	41P5	260 W 400 Ω	1	125	64
	2.2			301	300 Ω	1	115	42P2	260 W 250 Ω	1	135	64
	3.7			201	200 Ω	1	110	43P7	390 W 150 Ω	1	135	32
	5.5			---	---	---	---	45P5	520 W 100 Ω	1	135	32
	7.5			---	---	---	---	47P5	780 W 75 Ω	1	130	32
	11			---	---	---	---	4011	1,040 W 50 Ω	1	135	20
	15			---	---	---	---	4015	1,560 W 40 Ω	1	125	20
	18.5			---	---	---	---	4018	4,800 W 32 Ω	1	125	19.2
	22	4030	1	---	---	---	---	4022	4,800 W 27.2 Ω	1	125	19.2
	30	4030	1	---	---	---	---	4030	6,000 W 20 Ω	1	125	19.2
	37	4045	1	---	---	---	---	4037	9,600 W 16 Ω	1	125	12.8
	45	4045	1	---	---	---	---	4045	9,600 W 13.6 Ω	1	125	12.8
	55	4030	2	---	---	---	---	4030	6,000 W 20 Ω	2	135	19.2
	75	4045	2	---	---	---	---	4045	9,600 W 13.6 Ω	2	145	12.8
	90	4045	2	---	---	---	---	4045	9,600 W 13.6 Ω	2	100	12.8
	110	4030	3	---	---	---	---	4030	6,000 W 20 Ω	3	100	19.2
	132	4045	3	---	---	---	---	4045	9,600 W 13.6 Ω	4	140	12.8
	160	4045	4	---	---	---	---	4045	9,600 W 13.6 Ω	4	140	12.8

Note: **1.** When a Braking Resistor or Braking Resistor Unit is connected, set L3-04=0 to disable stall prevention during deceleration. If deceleration stall prevention is not disabled, the system may not stop within the specified deceleration time.

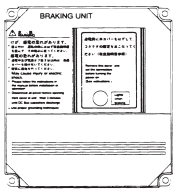
2. When a Braking Resistor is connected, set L8-01=1 to enable DB resistor protection.

3. This is the duty factor when there is not a constant output. The duty factor is lower when there is a constant output.
4. The minimum resistance is the minimum value per Braking Unit. Select a resistance that i greater than the minimum value and produces sufficient braking torque.

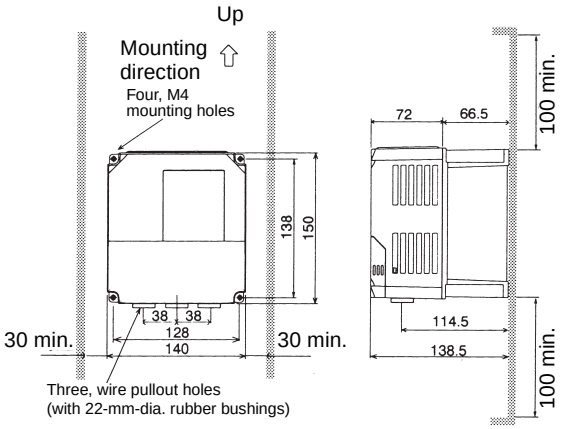
■ Special Options

3G3IV-PCDBR□B

Use a Braking Unit together with a Braking Resistor Unit to reduce the deceleration time of the motor. A Braking Unit is not required with Inverters with a capacity of 18.5 kW or less.



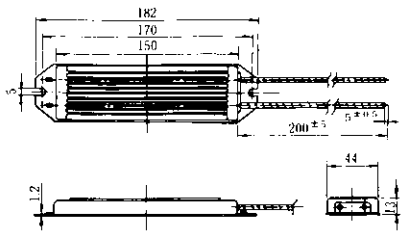
Dimensions



3G3IV-PERF150WJ□

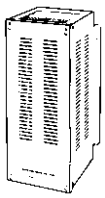
A Braking Resistor consumes the regenerative motor energy with a resistor to reduce deceleration time (use rate: 3% ED). The Resistor can be installed in the back of the Inverter (200-V Inverters with a capacity of 3.7 kW or less, 400-V Inverters with a capacity of 2.2 kW or less.)

Dimensions



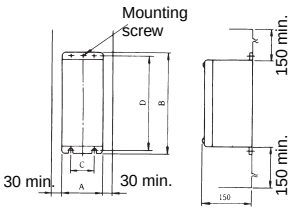
3G3IV-PLKEB□

A Braking Resistor Unit is used to absorb the regenerative motor energy with a resistor to reduce deceleration time (use rate: 10% ED).

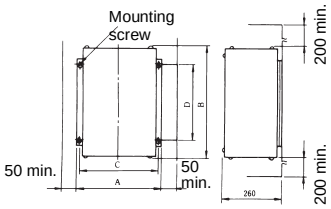


Dimensions

Dimensions Diagram 1



Dimensions Diagram 2



Voltage Class	Model number (3G3IV-PLKEB□)	Dimensions Diagram	Dimensions (mm)					Weight (kg)
			A	B	C	D	Mounting Screws	
200-V Class	20P7	1	105	275	50	260	M5 × 3	3.0
	21P5	1	130	350	75	335	M5 × 4	4.5
	22P2	1	130	350	75	335	M5 × 4	4.5
	23P7	1	130	350	75	335	M5 × 4	5.0
	25P5	1	250	350	200	335	M6 × 4	7.5
	27P5	1	250	350	200	335	M6 × 4	8.5
	2011	2	266	543	246	340	M8 × 4	10
	2015	2	356	543	336	340	M8 × 4	15
	2018	2	446	543	426	340	M8 × 4	19
	2022	2	446	543	426	340	M8 × 4	19
400-V Class	40P7	1	105	275	50	260	M5 × 3	3.0
	41P5	1	130	350	75	335	M5 × 4	4.5
	42P2	1	130	350	75	335	M5 × 4	4.5
	43P7	1	130	350	75	335	M5 × 4	5.0
	45P5	1	250	350	200	335	M6 × 4	7.5
	47P5	1	250	350	200	335	M6 × 4	8.5
	4011	2	350	412	330	325	M6 × 4	16
	4015	2	350	412	330	325	M6 × 4	18
	4018	2	446	543	426	340	M8 × 4	19
	4022	2	446	543	426	340	M8 × 4	19
	4030	2	356	956	336	740	M8 × 4	25
	4037	2	446	956	426	740	M8 × 4	33
	4045	2	446	956	426	740	M8 × 4	33

■ Special Options

Digital Operators

3G3IV-PJVOP160 (LCD Display)
3G3IV-PJVOP161 (LED Display)

Used to display/change the Inverter's parameters and monitor the frequency or current. The Operator can perform commands such as starting and stopping operation.

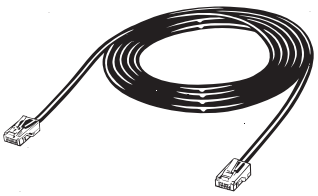
3G3IV-PJVOP160

3G3IV-PJVOP161

Digital Operator Connection Cable

3G3IV-PCN□26

Use a Connection Cable to connect a Digital Operator to the Inverter at some distance from the Inverter. Both 1-m and 3-m Cables are available.



3G3IV-PCN126 (Cable length: 1 m)
3G3IV-PCN326 (Cable length: 3 m)

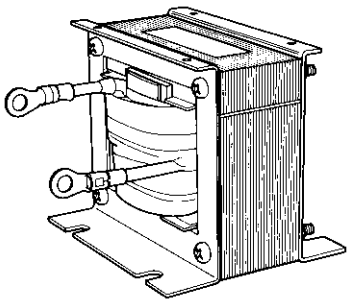
■ Special Options

DC Reactors (Yaskawa Electric)

3G3HV-PUZDAB□

A DC Reactor is used to control harmonics generated by the Inverter. It is more effective than and can be used in combination with an AC Reactor.

These DC Reactors are for Inverters with capacities of 18.5 kW and less. (The 22 kW and larger Inverters have built-in DC Reactors.)

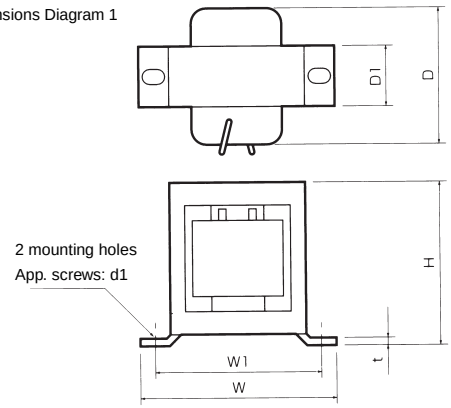


Standard Specifications and Applications

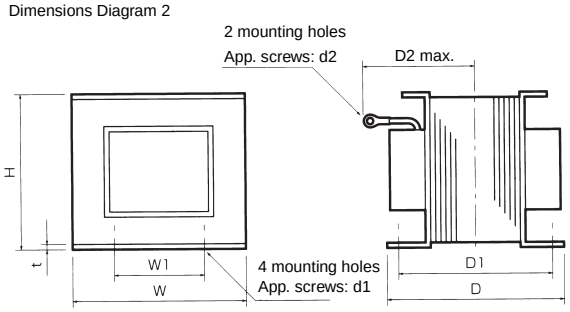
Inverter		DC Reactor			
Class	Max. Motor Capacity (kW)	Model number (3G3HV-PUZDAB□)	Rated Voltage (V)	Rated Current (A)	Impedance (mH)
200-V Class	0.4/0.75	5.4A8MH	800 DC	5.4	8
	1.5 to 3.7	18A3MH		18	3
	5.5/7.5	36A1MH		36	1
	11/15	72A0.5MH		72	0.5
	18.5	90A0.4MH		90	0.4
400-V Class	0.4/0.75	3.2A28MH	800 DC	3.2	28
	1.5/2.2	5.7A11MH		5.7	11
	3.7	12A6.3MH		12	6.3
	5.5/7.5	23A3.6MH		23	3.6
	11/15	33A1.9MH		33	1.9
	18.5	47A1.3MH		47	1.3

Dimensions

Dimensions Diagram 1



Dimensions Diagram 2



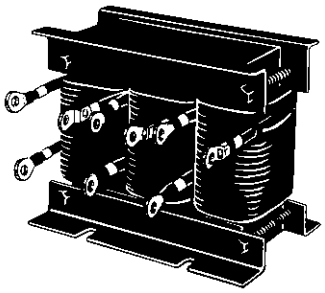
Model 3G3HV-PUZDAB□	Dimensions Diagram	Dimensions (mm)									Weight (kg)
		H	W	W1	D	D1	D2	t	d1	d2	
5.4A8MH	1	53	85	74	60	32	---	0.8	M4	---	0.8
18A3MH	2	76	86	60	72	55	80	1.2	M4	M5	2.0
36A1MH	2	93	105	64	92	80	90	1.6	M6	M6	3.2
72A0.5MH	2	93	105	64	112	100	105	1.6	M6	M8	4.9
90A0.4MH	2	117	133	86	105	80	120	1.6	M6	M8	6.5
3.2A28MH	1	53	85	74	60	32	---	0.8	M4	---	0.8
5.7A11MH	1	60	90	80	60	32	---	0.8	M4	---	1.0
12A6.3MH	2	76	86	60	72	55	80	1.2	M4	M5	2.0
22A3.6MH	2	93	105	64	92	80	90	1.6	M6	M5	3.2
33A1.9MH	2	93	105	64	102	90	95	1.6	M6	M4	4.0
47A1.3MH	2	100	115	72	115	90	125	1.6	M6	M6	6.0

■ Recommended Separately Installed Options

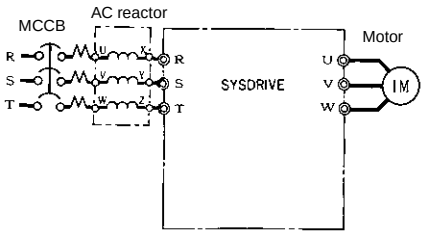
AC Reactors (Yaskawa Electric)

3G3IV-PUZBAB□

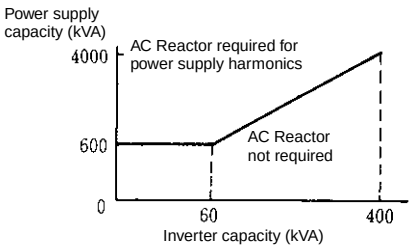
Connect an AC Reactor when the power supply capacity is significantly greater than the Inverter's capacity or you want to improve the power factor. Select the AC Reactor from the following tables according to the motor capacity.



Connection Example



Application Example



Standard Specifications and Applications

200-V Class

Max. Motor Capacity (kW)	Current (A)	Impedance (mH)	Model 3G3IV-PVZBAB□	Dimensions Diagram	Dimensions (mm)													Approx. weight (kg)	Loss (W)
					A	B	B1	C	D	E	F	H	J	K	L	M			
0.4	2.5	4.2	2.5A4.2MH	1	120	71	---	120	40	50	105	20	M6	10.5	7	M4		2.5	15
0.75	5	2.1	5A2.1MH		120	71	---	120	40	50	105	20	M6	10.5	7	M4		2.5	15
1.5	10	1.1	10A1.1MH		130	88	---	130	50	65	130	22	M6	11.5	7	M4		3	25
2.2	15	0.71	15A0.71MH		130	88	---	130	50	65	130	22	M6	11.5	7	M4		3	30
3.7	20	0.53	20A0.53MH	2	130	88	114	105	50	65	130	22	M6	11.5	7	M5		3	35
5.5	30	0.35	30A0.35MH		130	88	119	105	50	70	130	22	M6	9	7	M5		3	45
7.5	40	0.265	40A0.265MH		130	98	139	105	50	75	130	22	M6	11.5	7	M6		4	50
11	60	0.18	60A0.18MH		160	105	147.5	130	75	85	160	25	M6	10	7	M6		6	65
15	80	0.13	80A0.13MH		180	100	155	150	75	80	180	25	M6	10	7	M8		8	75
18.5	90	0.12	90A0.12MH		180	100	150	150	75	80	180	25	M6	10	7	M8		8	90
22	120	0.09	120A0.09MH		180	100	155	150	75	80	180	25	M6	10	7	M10		8	90
30	160	0.07	160A0.07MH		210	100	170	175	75	80	205	25	M6	10	7	M10		12	100
37	200	0.05	200A0.05MH		210	115	182.8	175	75	95	205	25	M6	10	7	M10		15	110
45	240	0.044	240A0.044MH		240	126	218	215 ±5	150	110	240	25	M6	8	7	M10		23	125
55	280	0.038	280A0.038MH		240	126	218	215 ±5	150	110	240	25	M8	8	10	M12		23	130

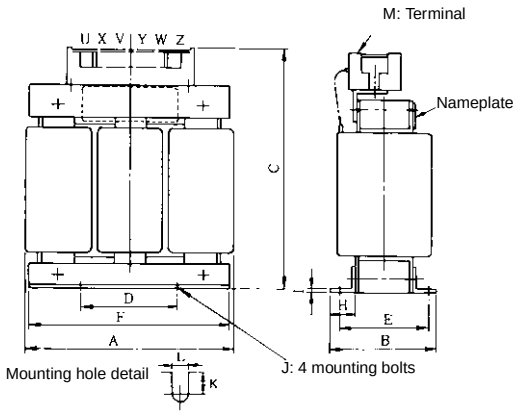
400-V Class

Max. Motor Capacity (kW)	Current (A)	Impedance (mH)	Model 3G3IV-PVZBAB□	Dimensions Diagram	Dimensions (mm)													Approx. weight (kg)	Loss (W)
					A	B	B1	C	D	E	F	H	J	K	L	M			
0.4	1.3	18.0	1.3A18.0MH	1	120	71	---	120	40	50	105	20	M6	10.5	7	M4		2.5	15
0.75	2.5	8.4	2.5A8.4MH		120	71	---	120	40	50	105	20	M6	10.5	7	M4		2.5	15
1.5	5	4.2	5A4.2MH		130	88	---	130	50	70	130	22	M6	9	7	M4		3	25
2.2	7.5	3.6	7.5A3.6MH		130	88	---	130	50	70	130	22	M6	9	7	M4		3	35
3.7	10	2.2	10A2.2MH		130	88	---	130	50	65	130	22	M6	11.5	7	M4		3	43
5.5	15	1.42	15A1.42MH		130	98	---	130	50	75	130	22	M6	11.5	7	M4		4	50

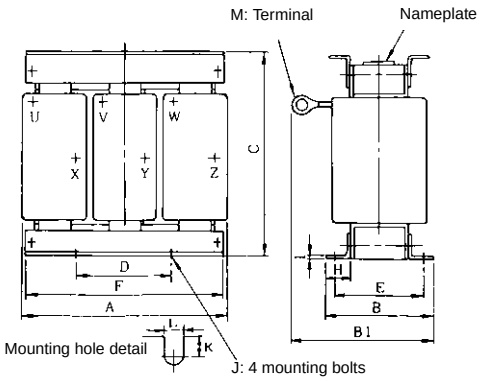
Max. Motor Capacity (kW)	Current (A)	Impedance (mH)	Model 3G3IV-PVZBAB□	Dimensions Diagram	Dimensions (mm)												Approx. weight (kg)	Loss (W)
					A	B	B1	C	D	E	F	H	J	K	L	M		
7.5	20	1.06	20A1.06MH	2	160	90	115	130	75	70	160	25	M6	10	7	M5	5	50
11	30	0.7	30A0.7MH		160	105	132.5	130	75	85	160	25	M6	10	7	M5	6	65
15	40	0.53	40A0.53MH		180	100	140	150	75	80	180	25	M6	10	7	M6	8	90
18.5	50	0.42	50A0.42MH		180	100	145	150	75	80	180	25	M6	10	7	M6	8	90
22	60	0.36	60A0.36MH		180	100	150	150	75	75	180	25	M6	10	7	M6	8.5	90
30	80	0.26	80A0.26MH		210	100	150	175	75	80	205	25	M6	10	7	M8	12	95
37	90	0.24	90A0.24MH		210	115	177.5	175	75	95	205	25	M6	10	7	M8	15	110
45	120	0.18	120A0.18MH		240	126	193	205 ±5	150	110	240	25	M8	8	10	M10	23	130
55	150	0.15	150A0.15MH		240	126	198	205 ±5	150	110	240	25	M8	8	10	M10	23	150

Dimensions

Dimensions Diagram 1



Dimensions Diagram 2

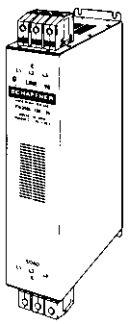


■ Recommended Separately Installed Options

Input Noise Filter (Schaffner)

3G3IV-PFN□

The input noise filter suppresses high-frequency noise generated by the Inverter so that it isn't transmitted to the power supply line. The filter is effective in preventing interference to nearby equipment such as radios in areas with little electromagnetic noise.



Standard Specifications and Applications

- Filters for 3-phase 200-V Inverters

Max. motor capacity (kW)	Inverter capacity (kVA)	Input Noise Filter	
		Model	Rated current (A)
5.5	10.3	3G3IV-PFN258L4207	42
7.5	13.7	3G3IV-PFN258L5507	55
11	20.6	3G3IV-PFN258L7534	75
15	27.4	3G3IV-PFN258L10035	100
18.5	34	3G3IV-PFN258L13035	130
22	41	3G3IV-PFN258L13035	130
30	54	3G3IV-PFN258L18007	180
37	68	3G3IV-PFN359P25099	250
45	78	3G3IV-PFN359P25099	250
55	95	3G3IV-PFN359P30099	300

RV-series Inverters

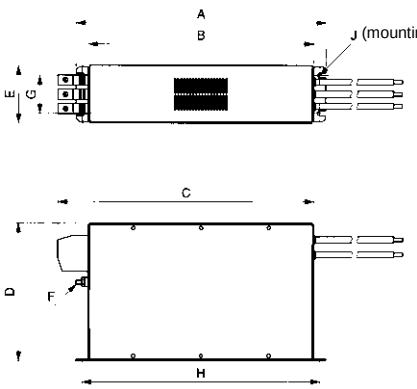
- Filters for 3-phase 400-V Inverters

Max. motor Capacity (kW)	Inverter capacity (kVA)	Input Noise Filter	
		Model	Rated current (A)
11	20.6	3G3IV-PFN258L4207	42
15	27.4	3G3IV-PFN258L5507	55
18.5	34	3G3IV-PFN258L5507	55

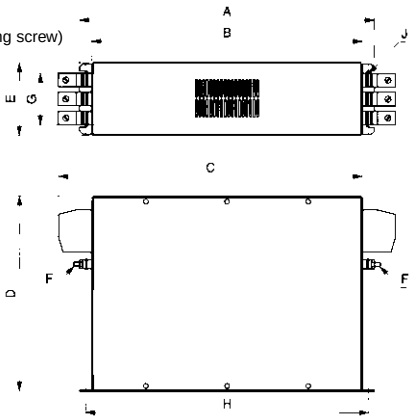
Max. motor Capacity (kW)	Inverter capacity (kVA)	Input Noise Filter	
		Model	Rated current (A)
22	41	3G3IV-PFN258L7534	75
30	54	3G3IV-PFN258L10035	100
37	68	3G3IV-PFN258L13035	130
45	82	3G3IV-PFN258L13035	130
55	110	3G3IV-PFN258L18007	180

Dimensions

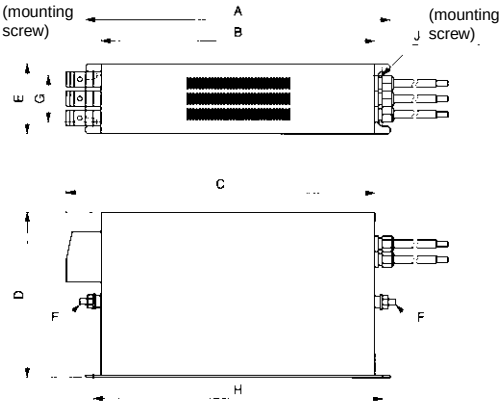
Dimensions Diagram 1



Dimensions Diagram 2

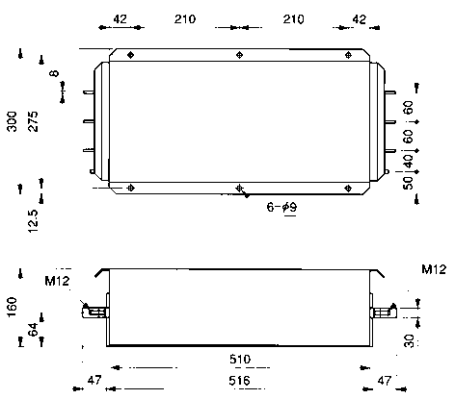


Dimensions Diagram 3



Model 3G3IV-	Dimensions Diagram	Dimensions (mm)									Weight (kg)
		A	B	C	D	E	F	G	H	J	
PFN258L4207	1	329	300	325	185	70	M6	45	314	Four, M5	2.8
PFN258L5507		329	300	353	185	80	M6	55	314	Four, M5	3.1
PFN258L7534	2	329	300	377	220	80	M6	55	314	Four, M5	4
PFN258L10035		379	350	436	220	90	M10	65	364	Four, M5	5.5
PFN258L13035		439	400	486	240	110	M10	80	414	Four, M5	7.5
PFN258L18007	3	438	400	480	240	110	M10	80	413	Four, M5	11
PFN359P25099	4	---	---	---	---	---	---	---	---	---	16
PFN359P30099		---	---	---	---	---	---	---	---	---	16

Dimensions Diagram 4

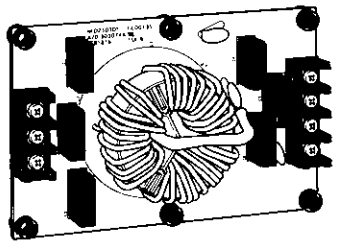


■ Recommended Separately Installed Options

Simple Input Noise Filter (Yaskawa Electric)

3G3EV-PLNF□

The input noise filter suppresses high-frequency noise generated by the Inverter so that it isn't transmitted to the power supply line.



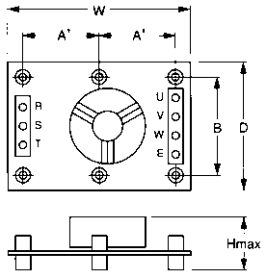
Standard Specifications and Applications

Inverter		Simple Input Noise Filter		
Voltage Class	Max. Motor Capacity (kW)	Model No.	Qty	Rated Current (A)
200-V Class	0.4	3G3EV-PLNFD2103DY	1	10
	0.75	3G3EV-PLNFD2103DY	1	10
	1.5	3G3EV-PLNFD2103DY	1	10
	2.2	3G3EV-PLNFD2153DY	1	15
	3.7	3G3EV-PLNFD2303DY	1	30
	5.5	3G3EV-PLNFD2203DY	2	40
	7.5	3G3EV-PLNFD2303DY	2	60
	11	3G3EV-PLNFD2303DY	3	90
	15	3G3EV-PLNFD2303DY	3	90
	18.5	3G3EV-PLNFD2303DY	4	120
	22	3G3EV-PLNFD2303DY	4	120
400-V Class	0.4	3G3EV-PLNFD4053DY	1	5
	0.75	3G3EV-PLNFD4053DY	1	5
	1.5	3G3EV-PLNFD4103DY	1	10
	2.2	3G3EV-PLNFD4103DY	1	10
	3.7	3G3EV-PLNFD4153DY	1	15
	5.5	3G3EV-PLNFD4203DY	1	20
	7.5	3G3EV-PLNFD4303DY	1	30
	11	3G3EV-PLNFD4203DY	2	40
	15	3G3EV-PLNFD4303DY	2	60
	18.5	3G3EV-PLNFD4303DY	2	60
	22	3G3EV-PLNFD4303DY	3	90
	30	3G3EV-PLNFD4303DY	3	90
	37	3G3EV-PLNFD4303DY	4	120
	45	3G3EV-PLNFD4303DY	4	120

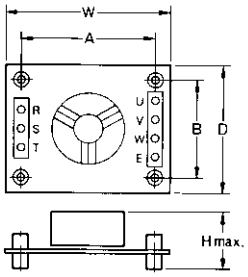
Dimensions

Model 3G3EV-	Dimensions Diagram	Dimensions							Weight (kg)
		W	D	H max	A	A'	B	Mounting Screws	
PLNFD2103DY	1	120	80	55	108	---	68	M4 × 4 20 mm	0.2
PLNFD2153DY	1	120	80	55	108	---	68	M4 × 4 20 mm	0.2
PLNFD2203DY	1	170	90	70	158	---	78	M4 × 4 20 mm	0.4
PLNFD2303DY	2	170	110	70	---	79	98	M4 × 6 20 mm	0.5
PLNFD4053DY	2	170	130	75	---	79	118	M4 × 6 30 mm	0.3
PLNFD4103DY	2	170	130	95	---	79	118	M4 × 6 30 mm	0.4
PLNFD4153DY	2	170	130	95	---	79	118	M4 × 6 30 mm	0.4
PLNFD4203DY	2	200	145	100	---	94	133	M4 × 6 30 mm	0.5
PLNFD4303DY	2	200	145	100	---	94	133	M4 × 6 30 mm	0.6

Dimensions Diagram 1



Dimensions Diagram 2

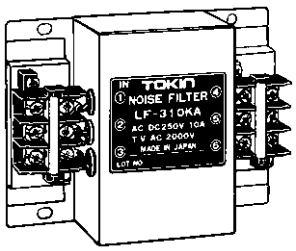


■ Recommended Separately Installed Options

Output Noise Filter (Tokin)

3G3IV-PLF□

An Output Noise Filter suppresses noise generated by the Inverter so it isn't transmitted to the power supply line.



Standard Specifications and Applications

- 200-V Inverters

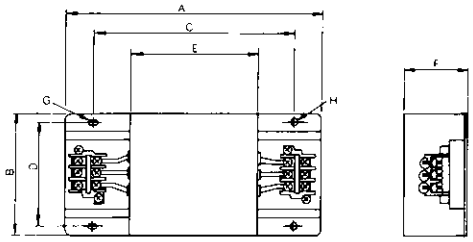
Max. motor capacity (kW)	Inverter capacity (kVA)	Output Noise Filter	
		Model number	Rated current (A)
0.1	0.3	3G3IV-PLF310KA	10
0.2	0.6	3G3IV-PLF310KA	10
0.4	1.4	3G3IV-PLF310KA	10
0.75	2.1	3G3IV-PLF310KA	10
1.5	2.7	3G3IV-PLF310KA	10
2.2	4.1	3G3IV-PLF310KA	10
3.7	6.9	3G3IV-PLF320KA	20
5.5	10.3	3G3IV-PLF350KA	50
7.5	13.7	3G3IV-PLF350KA	50
11	20.6	3G3IV-PLF350KA × 2P	100
15	27.4	3G3IV-PLF350KA × 2P	100
18.5	34	3G3IV-PLF350KA × 2P	100

- 400-V Inverters

Max. motor capacity (kW)	Inverter capacity (kVA)	Output Noise Filter	
		Model number	Rated current (A)
0.2	0.9	3G3IV-PLF310KB	10
0.4	1.4	3G3IV-PLF310KB	10
0.75	2.1	3G3IV-PLF310KB	10
1.5	2.7	3G3IV-PLF310KB	10
2.2	4.1	3G3IV-PLF310KB	10
3.7	6.9	3G3IV-PLF310KB	10
5.5	10.3	3G3IV-PLF320KB	20
7.5	13.7	3G3IV-PLF320KB	20
11	20.6	3G3IV-PLF335KB	35
15	27.4	3G3IV-PLF335KB	35
18.5	34	3G3IV-PLF345KB	45
22	41	3G3IV-PLF375KB	75
30	54	3G3IV-PLF375KB	75
37	68	3G3IV-PLF3110KB	110
45	82	3G3IV-PLF3110KB	110

Dimensions

Model 3G3IV-	Terminal	A	B	C	D	E	F	G	H	Weight (kg)
PLF310KA	TE-K5.5 M4	140	100	100	90	70	45	7 × 4.5 dia.	4.5 dia.	0.5
PLF320KA	TE-K5.5 M4	140	100	100	90	70	45	7 × 4.5 dia.	4.5 dia.	0.6
PLF350KA	TE-K22 M6	260	180	180	160	120	65	7 × 4.5 dia.	4.5 dia.	2.0
PLF310KB	TE-K5.5 M4	140	100	100	90	70	45	7 × 4.5 dia.	4.5 dia.	0.5
PLF320KB	TE-K5.5 M4	140	100	100	90	70	45	7 × 4.5 dia.	4.5 dia.	0.6
PLF335KB	TE-K5.5 M4	140	100	100	90	70	45	7 × 4.5 dia.	4.5 dia.	0.8
PLF345KB	TE-K22 M6	260	180	180	160	120	65	7 × 4.5 dia.	4.5 dia.	2.0
PLF375KB	TE-K22 M6	540	320	480	300	340	240	9 × 6.5 dia.	6.5 dia.	12.0
PLF3110KB	TE-K60 M8	540	340	480	300	340	240	9 × 6.5 dia.	6.5 dia.	19.5



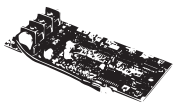
■ Option Cards

Analog Monitor Card

The resolution of the Inverter's analog output is 11 bits, which is enough to be used as control signals. Use this Card if the Inverter's analog outputs are insufficient.

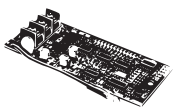
There are two Analog Monitor Cards available: the 3G3IV-PAO08 has an output resolution of 1/256 (0 to 10 V output for frequency meters or output current meters) and the 3G3IV-PAO12 has an output resolution of 1/2,048 (0 to ±10 V for control applications).

3G3IV-PAO08



Item	Specifications
Output resolution	1/256 (8 bits)
Output voltage	0 to 10 V (non-insulated)
Output channels	2 channels

3G3IV-PAO12

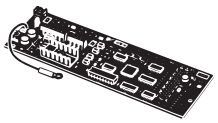


Item	Specifications
Output resolution	1/2,048 (11 bits + sign)
Output voltage	0 to ±10 V (non-insulated)
Output channels	2 channels

PG Speed Control Cards

Use these cards for V/f control with speed feedback control from the PG (pulse generator/encoder). There are two models available with different response frequencies and signal input interfaces.

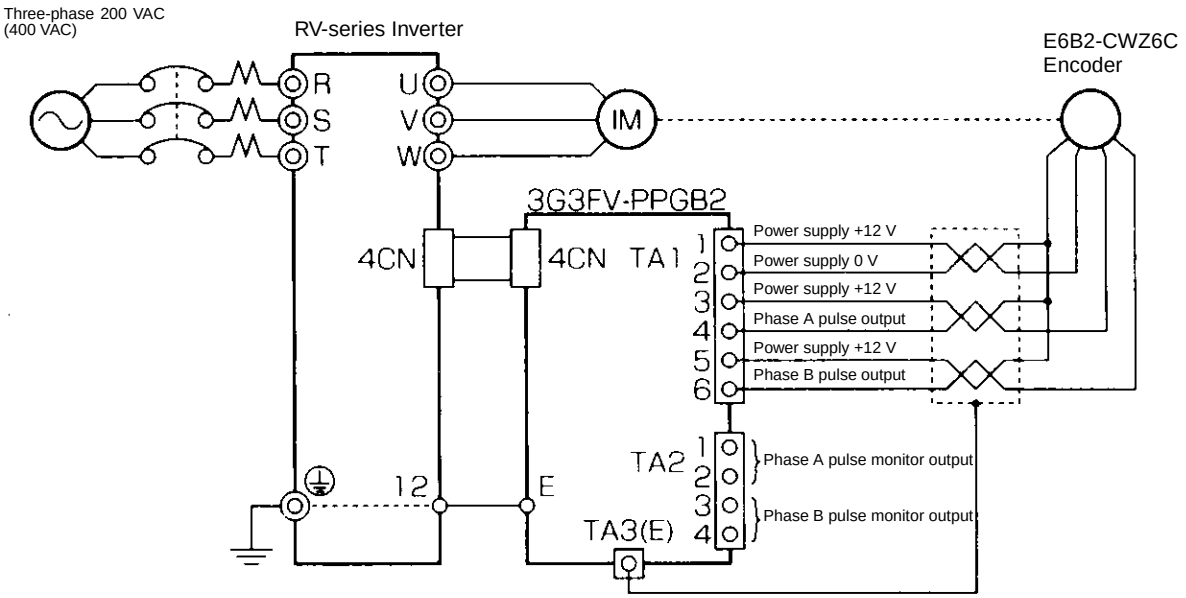
3G3FV-PPGB2



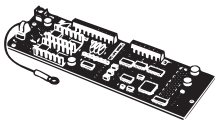
Specifications

Item	Specifications
Input signal	Phase A/B pulse output, For open collector outputs
Max. response frequency	30 kHz
Monitor output	Open collector output

Wiring Example



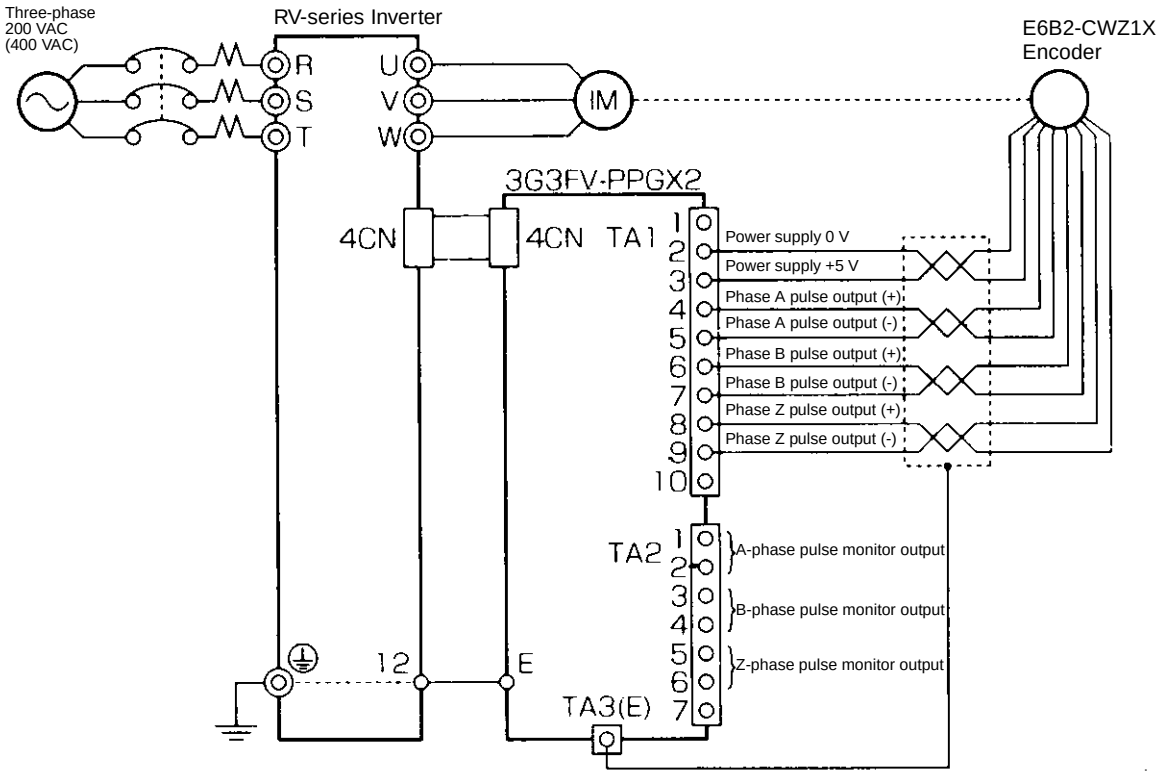
3G3FV-PPGX2



Specifications

Item	Specifications
Input signal	Phase A/B/Z pulse output, Line driver input (RS-422)
Max. response frequency	300 kHz
Monitor output	Line driver output

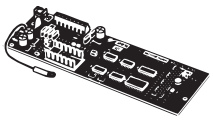
Wiring Example



PG Speed Control Cards (for V/f Control with PG)

Use these cards for V/f control with speed feedback control from the PG (pulse generator/encoder). There are two models available with different response frequencies and signal input interfaces.

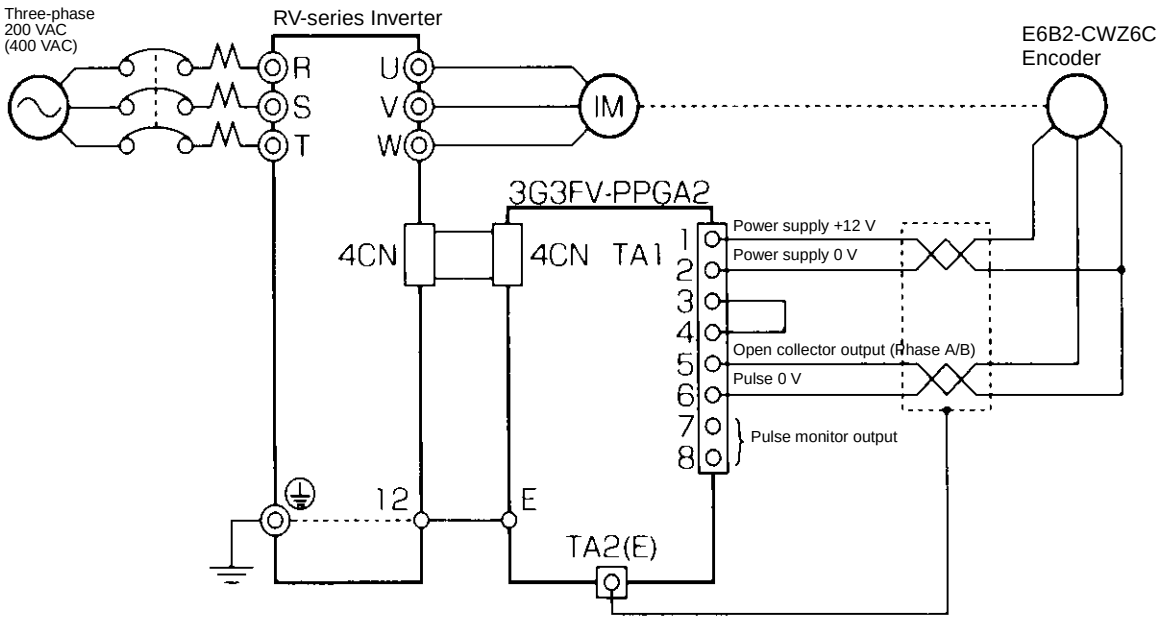
3G3FV-PPGA2



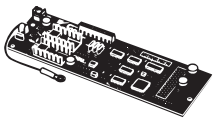
Specifications

Item	Specifications
Input signal	Phase A (single) pulse output, For open collector outputs
Max. response frequency	30 kHz
Monitor output	Open collector output

Wiring Example



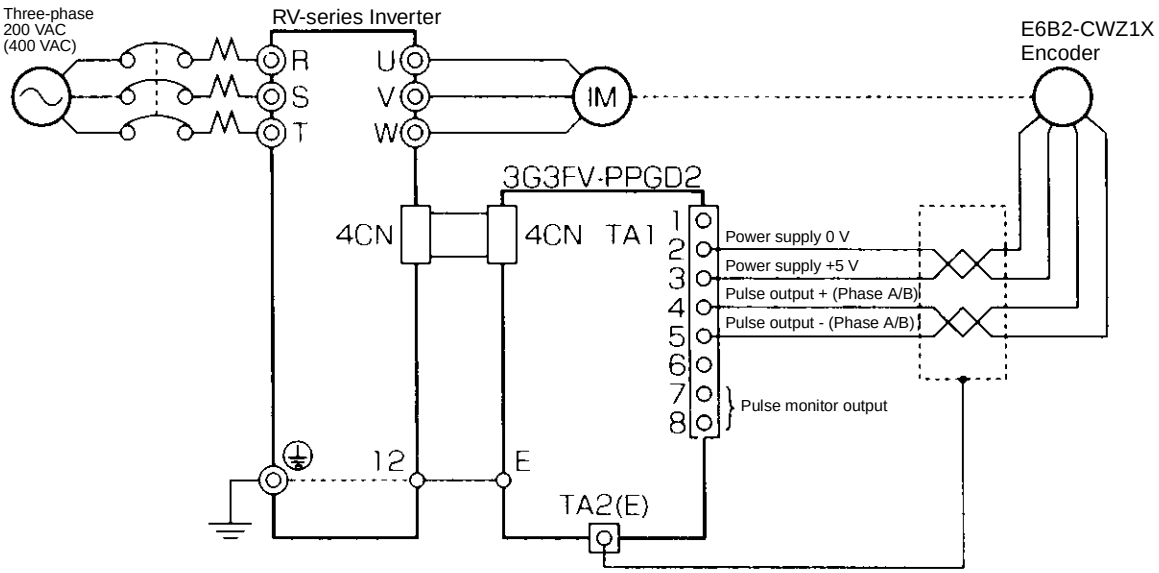
3G3FV-PPGD2



Specifications

Item	Specifications
Input signal	Phase A (single) pulse output, Line driver input (RS-422)
Max. response frequency	300 kHz
Monitor output	Line driver output

Wiring Example

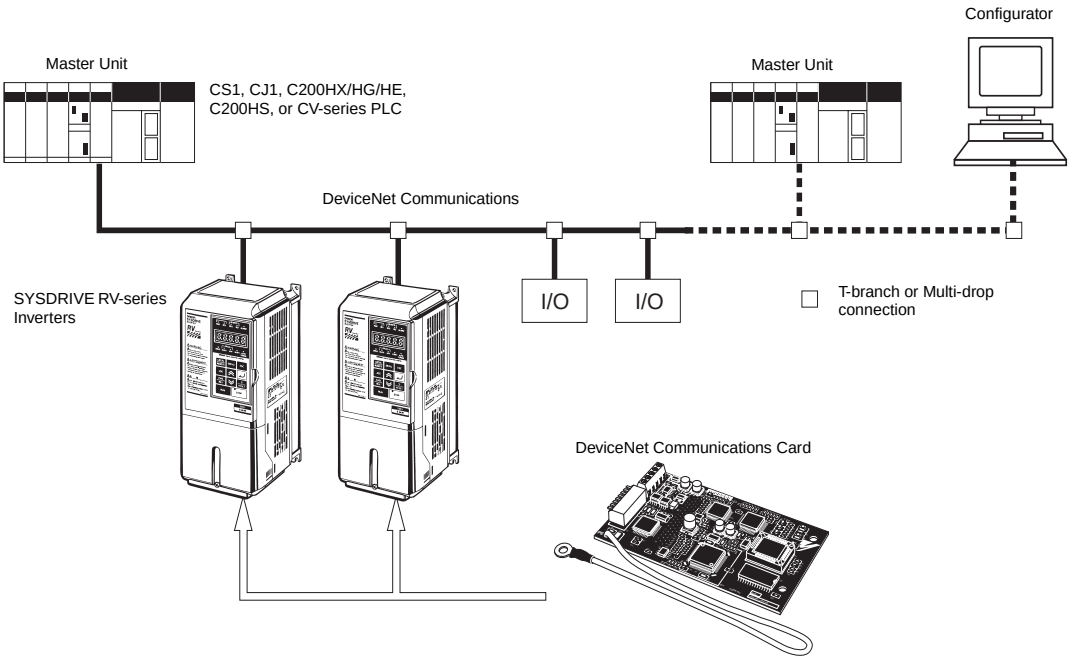


■ Option Cards

DeviceNet Communications Card

3G3FV-PDRT1-SINV1

Use the DeviceNet Communications Card for DeviceNet communications with a PLC or other DeviceNet Master.



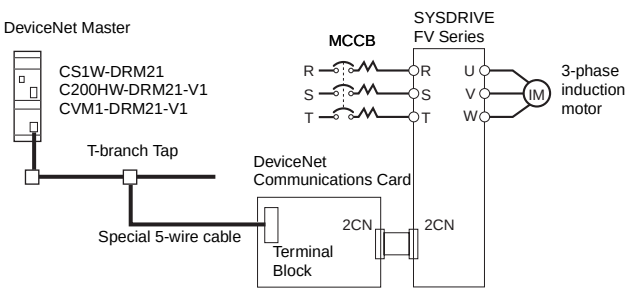
Specifications

Item		Specifications
Connection method		Multi-drop or T-branch
Communications speed		500, 250, or 125 kbps
Communications cycle time		Approx. 10, 20, or 40 ms
Communications media		Special 5-wire cable
Max. number of Inverters (See note 1.)	With Configurator	63 Units (when message communications are not being used) 25 Units (when message communications are being used)
	Without Configurator	25 Units
Remote I/O words required		2 input words and 2 output words (See note 2.)

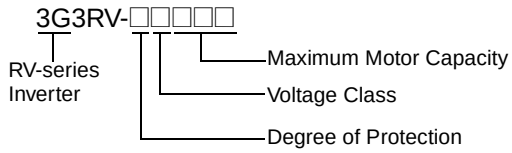
Note: **1.** With CS1 PCs, this is the maximum number of Inverters that can be connected when special remote I/O is not being used.

2. When special remote I/O is being used, 3 input words and 3 output words are required.

Wiring Example



■ Model Number Explanation



Maximum Motor Capacity

004	0.4 kW	220	22 kW
007	0.75 kW	300	30 kW
015	1.5 kW	370	37 kW
022	2.2 kW	450	45 kW
037	3.7 kW	550	55 kW
055	5.5 kW	750	75 kW
075	7.5 kW	900	90 kW
110	11 kW	11k	110 kW
150	15 kW	13k	132 kW
185	18.5 kW	16k	160 kW

Voltage Class

2	Three-phase 200 V AC (200-V Class)
4	Three-phase 400 V AC (400-V Class)

Degree of Protection

A	Enclosed wall-mounted (IP20 or higher)
B	Open chassis

■ Standard Models

Voltage class	Degree of protection	Max. motor capacity	Model number
200-V class	Enclosed wall-mounted	0.4 kW	3G3RV-A2004
		0.75 kW	3G3RV-A2007
		1.5 kW	3G3RV-A2015
		2.2 kW	3G3RV-A2022
		3.7 kW	3G3RV-A2037
		5.5 kW	3G3RV-A2055
		7.5 kW	3G3RV-A2075
		11 kW	3G3RV-A2110
		15 kW	3G3RV-A2150
		18.5 kW	3G3RV-A2185
	Open chassis	22 kW	3G3RV-B2220
		30 kW	3G3RV-B2300
		37 kW	3G3RV-B2370
		45 kW	3G3RV-B2450
		55 kW	3G3RV-B2550
		75 kW	3G3RV-B2750
		90 kW	3G3RV-B2900
		110 kW	3G3RV-B211K

RV-series Inverters

Voltage class	Degree of protection	Max. motor capacity	Model number
400-V class	Enclosed wall-mounted	0.4 kW	3G3RV-A4004
		0.75 kW	3G3RV-A4007
		1.5 kW	3G3RV-A4015
		2.2 kW	3G3RV-A4022
		3.7 kW	3G3RV-A4037
		5.5 kW	3G3RV-A4055
		7.5 kW	3G3RV-A4075
		11 kW	3G3RV-A4110
		15 kW	3G3RV-A4150
		18.5 kW	3G3RV-A4185
	Open chassis	22 kW	3G3RV-B4220
		30 kW	3G3RV-B4300
		37 kW	3G3RV-B4370
		45 kW	3G3RV-B4450
		55 kW	3G3RV-B4550
		75 kW	3G3RV-B4750
		90 kW	3G3RV-B4900
		110 kW	3G3RV-B411K
		132 kW	3G3RV-B413K
		160 kW	3G3RV-B416K

■ Selecting the Motor Capacity

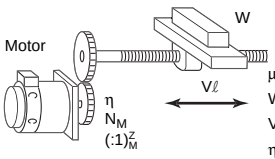
Select a motor before selecting the Inverter. Calculate the load inertia in the application, calculate the motor capacity and torque required to handle the load, and select an appropriate motor.

■ Simple Selection Method (Calculation of the Required Output)

With this method, you select the motor based on the output (W) required when the motor is rotating at a steady rate. This method does not include the involved calculations for acceleration and deceleration, so add some extra capacity to the calculated value when selecting the motor. This is a simple way to calculate the size of motor needed in equipment that operates at a steady rate for long periods, such as fans, conveyors, and mixing machines. This method is not suitable for the following kinds of applications:

- Applications requiring sudden start-ups
- Applications where the equipment starts and stops frequently
- Applications where there is a lot of inertia in the transmission system
- Applications with a very inefficient transmission system

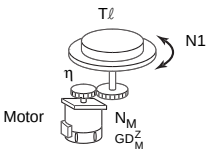
Linear Motion: Steady Power P_O (kW)



$$P_0 = \frac{\mu \cdot W \cdot V/}{6120 \cdot \eta}$$

μ: Friction coefficient
W: Weight of moveable load (kg)
V/: Speed of moveable load (m/min)
η: Efficiency of reduction mechanism (transmission)

Rotational Motion: Steady Power P_O (kW)



$$P_0 = \frac{T/ \cdot N/}{9535 \cdot \eta}$$

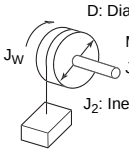
T/: Load torque at load axis (N · m)
N/: Speed of load axis (r/min)
η: Efficiency of reduction mechanism (transmission)

■ Detailed Selection Method (R.M.S. Calculation Method)

With this method, you calculate the effective torque and maximum torque required in the application's operating pattern. This method provides a detailed motor selection that matches the operating pattern.

Calculating the Motor Shaft Conversion Inertia

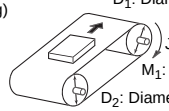
Use the following equations to calculate the inertia of all of the parts and convert that to the motor shaft conversion inertia.



M2: Mass of object (kg)
JW: Inertia (kg · m²)

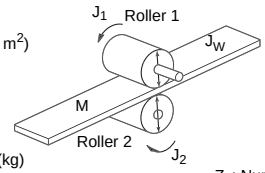
$$J_W = J_1 + J_2 = \left(\frac{M_1 \cdot D^2}{8} + \frac{M_2 \cdot D^2}{4}\right) \times 10^{-6} \text{ (kg · m}^2\text{)}$$

M3: Mass of object (kg)
M4: Mass of belt (kg)



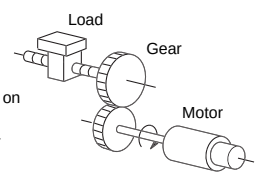
$$J_W = J_1 + J_2 + J_3 + J_4 = \left(\frac{M_1 \cdot D_1^2}{8} + \frac{M_2 \cdot D_2^2}{4} \cdot \frac{D_1^2}{D_2^2} + \frac{M_3 \cdot D_1^2}{4} + \frac{M_4 \cdot D_1^2}{4}\right) \times 10^{-6} \text{ (kg · m}^2\text{)}$$

JW: Inertia (kg · m²)
J1: Inertia of cylinder 1 (kg · m²)
J2: Inertia of cylinder 2 (kg · m²)
J3: Inertia due to object (kg · m²)
J4: Inertia due to belt (kg · m²)



JW: Inertia of entire system (kg · m²)
J1: Inertia of roller 1 (kg · m²)
J2: Inertia of roller 2 (kg · m²)
D1: Diameter of roller 1 (mm)
D2: Diameter of roller 2 (mm)
M: Effective mass of workpiece (kg)

$$J_W = J_1 + \left(\frac{D_1}{D_2}\right)^2 J_2 + \frac{M \cdot D_1^2}{4} \times 10^{-6} \text{ (kg · m}^2\text{)}$$



JW: Load inertia (kg · m²)
Z1: Number of gear teeth on motor side
J1: Motor gear inertia (kg · m²)
Z2: Number of gear teeth on load side
J2: Load gear inertia (kg · m²)

$$J_L = J_1 + G^2 (J_2 + J_W) \text{ (kg · m}^2\text{)}$$

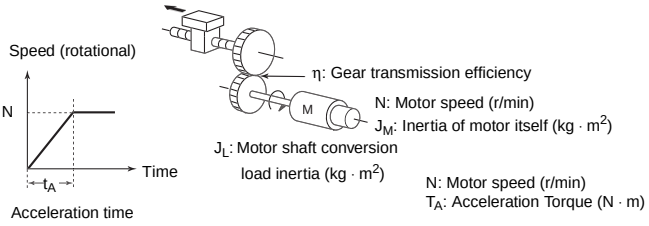
J1: Motor shaft conversion load inertia (kg · m²)

Gear ratio $G = Z_1 / Z_2$

Calculating the Motor Shaft Conversion Torque and Effective Torque

Calculate the total combined torque required for the motor to operate based on the acceleration torque due to the motor shaft conversion load inertia (calculated above) and the load torque due to friction force and the external force applied to the load.

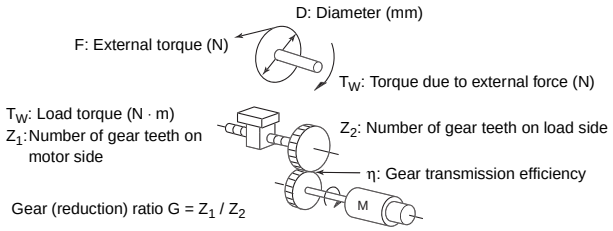
- Acceleration Torque



Acceleration Torque (T_A)

$$T_A = \frac{2\pi N}{60 t_A}\left(J_M + \frac{J_L}{\eta}\right) (N \cdot m)$$

- Motor Conversion Load Torque (External and Friction)



$$T_W = F \cdot \frac{D}{2} \times 10^{-3} (N \cdot m)$$

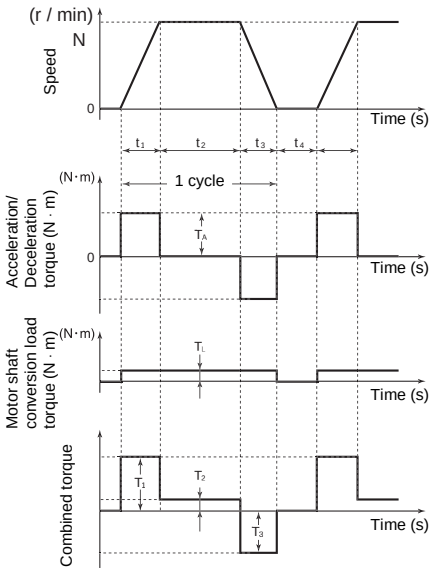
(Friction force in general:

F = μW μ: Friction coefficient
W: Weight of moving parts

$$T_L = T_W \cdot \frac{G}{7} (N \cdot m)$$

T_1: Motor shaft conversion load torque (N · m)

- Calculating the Combined Torque and Effective Torque



Effective torque T_{RMS} (N · m) =

$$\sqrt{\frac{\Sigma (T_i)^2 \cdot t_i}{\Sigma t_i}}$$

$$= \sqrt{\frac{T_1^2 \cdot t_1 + T_1^2 \cdot t_2 + T_3^2 \cdot t_3}{t_1 + t_2 + t_3 + t_4}}$$

Maximum torque T_{MAX} (N · m) =

$$T_1 = T_A + T_L$$

Note: Use the Servomotor's Motor Selection Software to calculate the motor conversion inertia, effective torque, and maximum torque shown above.

Selecting the Motor

Use the results of the calculations above and the equations below to determine the required motor capacity from the effective torque and maximum torque. Use the larger of the following motor capacities when selecting the motor.
When selecting the motor, set a motor capacity higher than the calculated capacity to provide some extra capacity.

- Motor Capacity Supplied for Effective Torque:
  Motor capacity (kW) = $1.048 \cdot N \cdot T_{RMS} \cdot 10^{-4}$ (N: Max. speed in r/min)
- Motor Capacity Supplied for Maximum Torque:
  Motor capacity (kW) = $(1.048 \cdot N \cdot T_{MAX} \cdot 10^{-4})/1.5$ (N: Max. speed in r/min)

■ Selecting the Inverter Capacity

Select an Inverter that is large enough to handle the motor selected in *Selecting the Motor* above. Basically, select an Inverter with a maximum motor capacity that matches the motor capacity calculated above.

After selecting the Inverter, verify that the following conditions are satisfied. If the conditions are not satisfied, select the Inverter that is one size larger and check the conditions again.

- Motor's rated current ≤ Inverter's rated output current
- The application's continuous maximum torque output time ≤ 1 minute

Note: **1.** If the Inverter's overload endurance is 120% of the rated output current for one minute, check for 0.8 minute.

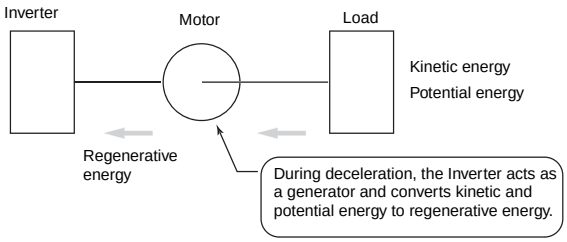
2. Use an Inverter that is one size larger than determined by the conditions above if open-loop vector control with PG is being used and a holding torque is required at 0 r/min or a torque that is 150% or more of the rated torque is required regularly at low frequencies (10 Hz or less).

■ Applications Requiring Braking Resistors

In applications where excessive regenerative motor energy is produced during deceleration or descent, the main-circuit voltage in the Inverter may rise high enough to damage the Inverter. Standard Inverters are equipped with an overvoltage protection function so the main-circuit overvoltage (OV) is detected and operation is stopped to prevent damage. Although the Inverter will be protected, the overvoltage protection function will generate an error and the motor will stop; this system configuration will not provide stable continuous operation.

About Regenerative Energy

The load connected to the motor has kinetic energy if it is rotating or potential energy if it is at a high level. The kinetic or potential energy is returned to the Inverter when the motor decelerates or lowers the load. This phenomenon is known as regeneration and the returned energy is called regenerative energy.



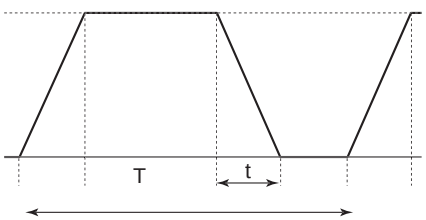
Avoiding the Use of a Braking Resistor

The following methods can be used to avoid having to connect a Braking Resistor. These methods require the deceleration time to be extended, so you must evaluate whether extending the deceleration time will cause any problems in the application.

- Enable the "stall prevention during deceleration" function; the default setting for this function is enabled. (The deceleration time is extended automatically to prevent main-circuit overvoltage from occurring.)
- Set a longer deceleration time. (This reduces the rate at which the regenerative energy is produced.)
- Select "coast to stop" as the stopping method. (Regenerative energy will not be returned to the Inverter.)

■ Simple Method for Braking Resistor Selection

This is a simple method for determining the braking resistance from the percentage of time that regenerative energy is produced during a normal operating pattern.



Use rate (duty) = t/T x 100 (%ED)

t: Deceleration time (regenerative time)
T: Time for 1 cycle of operation

Use Rate: 3% ED or Less

Select a Braking Resistor. Refer to *Braking Units, Braking Resistors, and Braking Resistor Units* on page 27 or the Braking Resistor selection tables in the Inverter's Operation Manual or Catalog for more details on selecting the appropriate Braking Resistor. (A cooling fan can be installed on the Braking Resistor if a high-capacity Inverter is being used.)

Use Rate: 10% ED or Less

Select a Braking Resistor Unit. Refer to *Braking Units, Braking Resistors, and Braking Resistor Units* on page 27 or the Braking Resistor selection tables in the Inverter's Operation Manual or Catalog for more details on selecting the appropriate Braking Resistor Unit.

■ Detailed Method for Braking Resistor Selection

If the Braking Resistor's use rate (duty factor) exceeds 10% ED or the application requires an extremely large braking torque, use the following method to calculate the regenerative energy and select a Braking Resistor.

Calculating the Required Braking Resistance

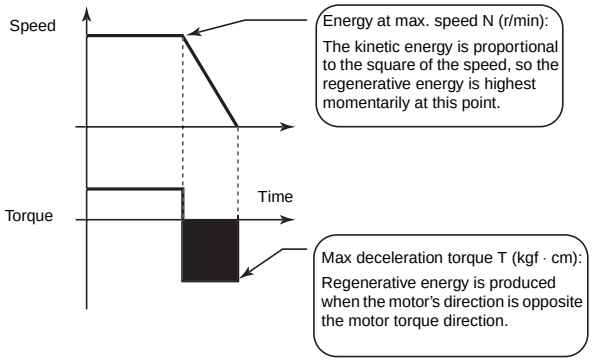
$$\text{Braking Resistor's resistance: } R \leq \frac{V^2}{1.048 \times (T - 0.2 \times Tm) \times N \times 10^{-1}}$$

V: 385 V for a 200-V Class Inverter
760 V for a 400-V Class Inverter

T: Maximum braking torque (kgf · cm)

T_m: Motor's rated torque (N · cm)

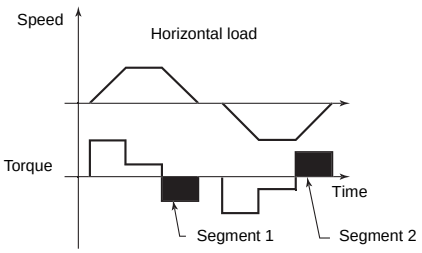
N: Maximum speed (r/min)

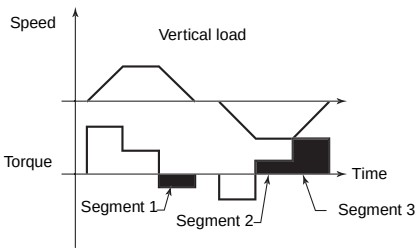


Note: Use the value for the braking torque calculated in *Calculating the Motor Shaft Conversion Torque and Effective Torque* on page 46.

Calculating the Average Regenerative Energy

Regenerative energy is produced when the motor is rotating in the opposite direction of the motor torque. Use the following equations to calculate the regenerative energy produced in each segment of the cycle.





$$P_i = N \times T \times t \times 1.048 \times 10^{-1}$$

P_i: Regenerative energy (J) produced in segment i

N: Motor's speed (r/min)
(Use the average speed if the speed varies.)

T: Deceleration torque (N · m)

t: Deceleration time (s)

Calculate the average regenerative energy by adding the power produced in each segment of the cycle and dividing by the total cycle time.

$$\text{Average regenerative energy (W)} = \frac{(P_1 + P_2 + \cdots + P_i)}{\text{1 cycle time}}$$

Note: **1.** The speed is positive when the motor is rotating forward and the torque is positive when it is in the forward direction.
2. Use the value for the braking torque calculated in *Calculating the Motor Shaft Conversion Torque and Effective Torque* on page 46.

Selecting the Braking Resistor

Select the appropriate Braking Resistor based on the required braking resistance and average regenerative energy that were calculated above.

- Required braking resistance ≥ Braking Resistor Unit's resistance ≥ Inverter or Braking Unit's minimum resistance
- Average regenerative energy ≤ Braking Resistor Unit's allowable power

Note: **1.** The internal braking transistor will be damaged if a resistor is connected with a resistance below the Inverter or Braking Unit's minimum resistance. If the required resistance is less than the minimum resistance, increase the Inverter's capacity and replace the Inverter or Braking Unit with one that has a minimum resistance less than the required resistance.

2. Two or more Braking Units can be connected in parallel. Use the following equation to determine the braking resistance when driving two or more Units.

Braking resistance (Ω) = (required braking resistance calculated above) x (number of Units)

3. Do not select the braking resistance with the results calculated above. A rating of 150 W is not the allowed power, it is the maximum rated power in resistance units. The actual allowed power rating depends upon the resistor.