

Low Harmonics Regenerative
Matrix Converter
for Elevator Applications
U1000L

U



Matrix Innovation

Certified for
ISO9001 and
ISO14001



JQA-QMA14913 JQA-EM0202

Much More Than an AC Drive! Next-generation Motor Drives

Do You Have Problems with AC Drives?

Yaskawa's development of the world's first application of matrix converter technology in 2006 made it possible to solve AC drive problems. Further evolution of this technology has resulted in the U1000L.

This sophisticated series of motor drives available only from Yaskawa eliminates the problems of standard AC drives. The U1000L tops the performance of general-purpose AC drives to further improve the performance of your facilities.



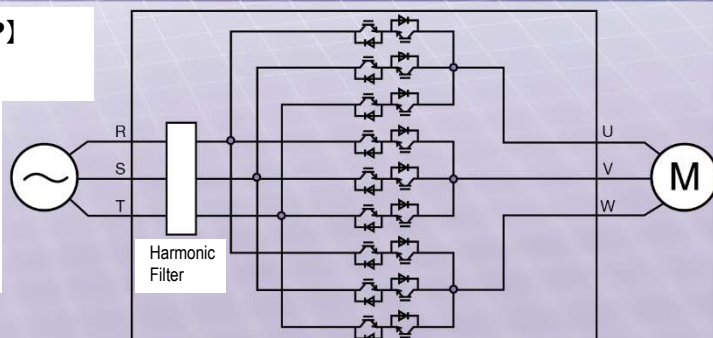
Matrix Converter U1000L



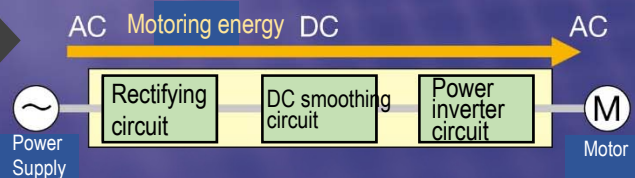
Matrix Innovation

[What Is a Matrix Converter?]

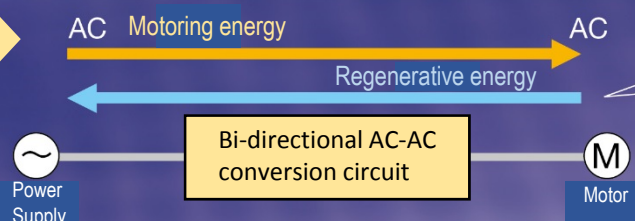
A matrix converter is AC/AC converter which consists of 9 bi-directional switches that are arranged in a matrix. It converts a three-phase AC power supply directly into the required voltage and frequency.



Standard Drive



Matrix Converter



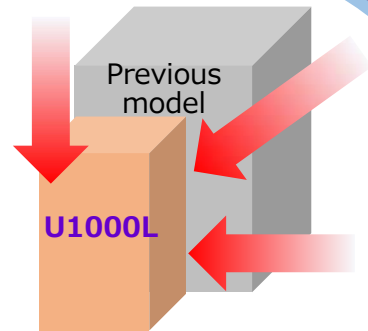
No main circuit capacitor



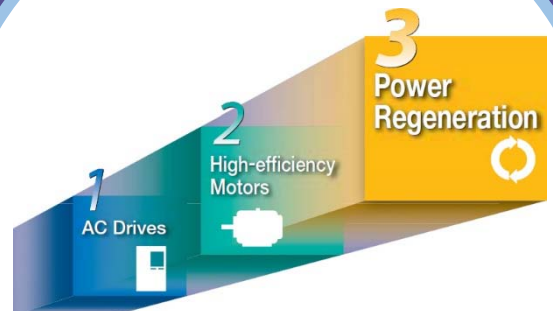
Special power module



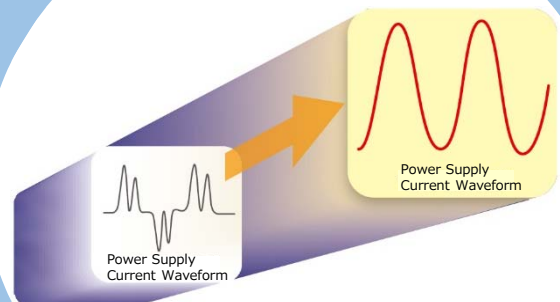
Meets All Elevator Requirements!



Compact
(Compact design of the machine room)



Energy saving

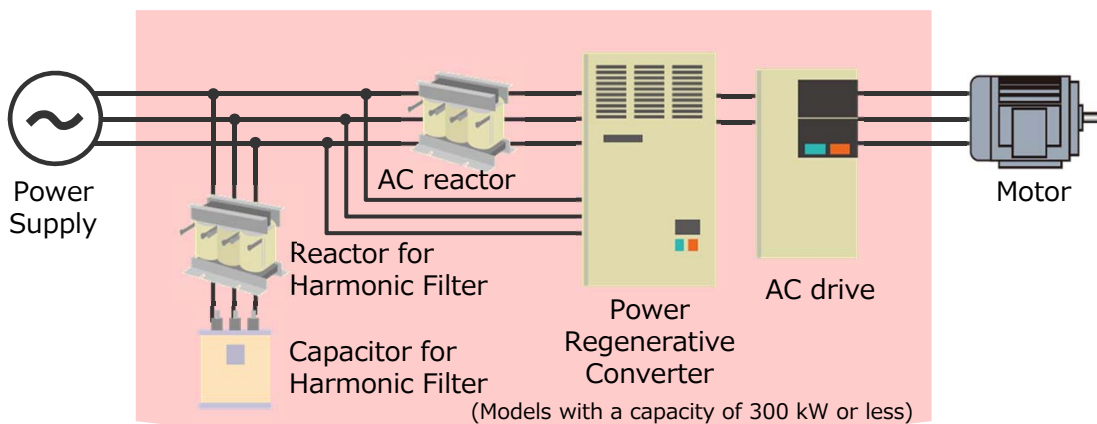


Low Harmonics

Compact All-in-One Unit!

Harmonic countermeasures that were previously required to connect a converter, such as input AC reactors, harmonic filter reactors, and capacitors, are not necessary, which helps you save wiring, space, and energy costs.

Previous configuration



Wiring reduced
by approx. **70%**^{*1}
20 → 6

Footprint reduced
by approx. **65%**^{*1}

Weight reduced
by approx. **81%**^{*1}

19%^{*2}
less power loss

*1 : Example for 400 V 30 kW
*2 : Example for 400 V 15 kW

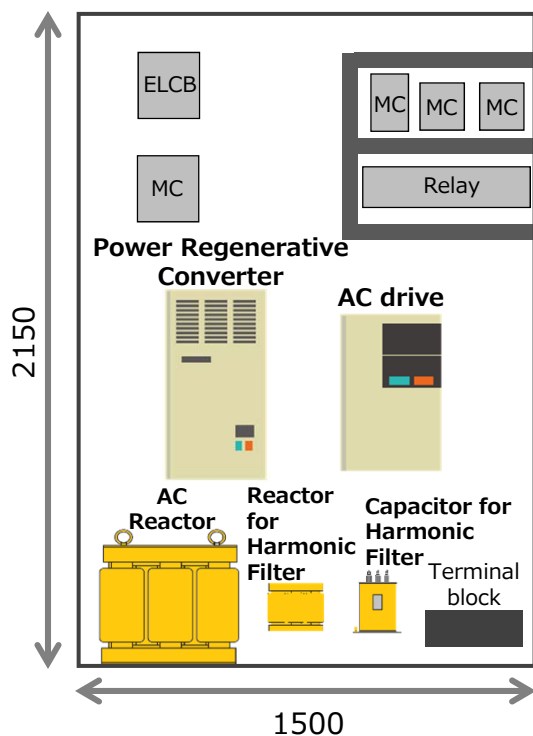
Matrix Converter



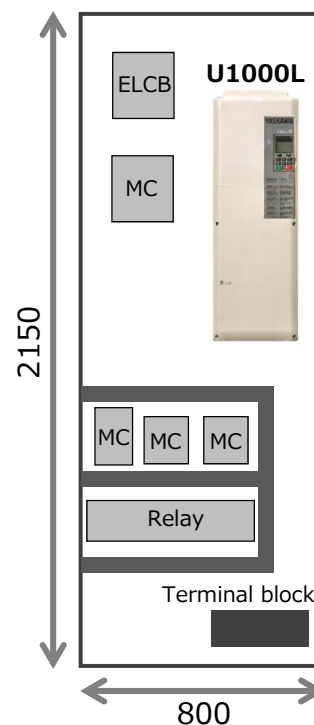
【Control Panel Configuration Example (400 V 45 kW)】 Unit : mm

Capacity of 160 m/min for elevators
with a load of 1,600 kg (24 people)

Regenerative converter and AC drive



Matrix Converter U1000L



Width of
control panel
by approx. **47%**

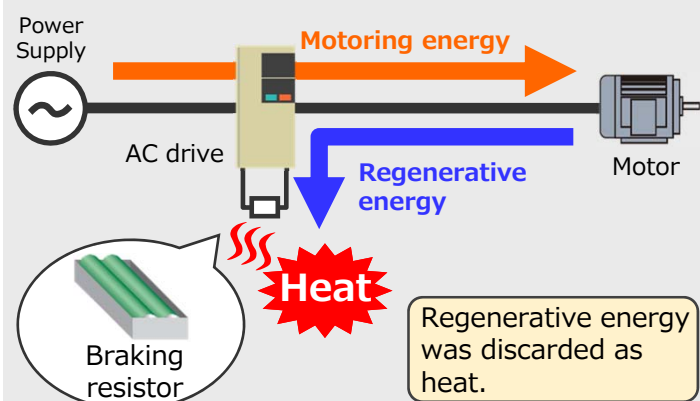
Power Regeneration to Save Energy!

When a motor rotates, it consumes energy. When a motor is rotated, it generates energy. You can save energy by using regenerative energy instead of wasting it.

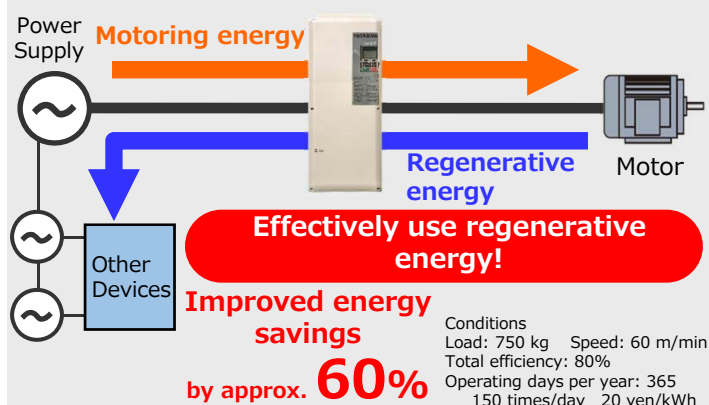
Efficient Energy Usage

Braking resistor results in discarding energy as heat, but you can return this regenerative energy to the power supply to save energy.

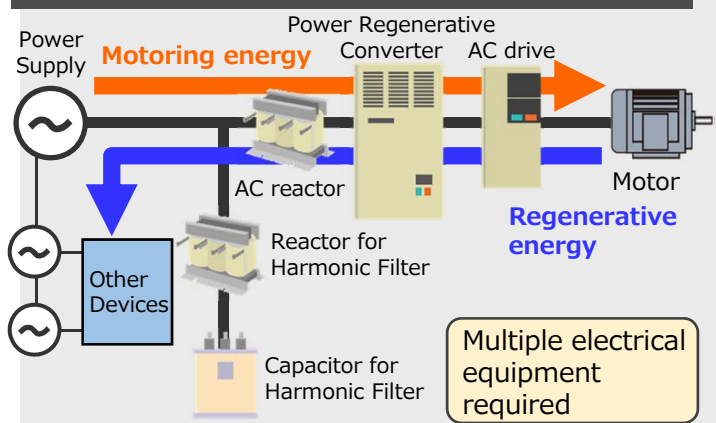
Braking Resistor Configuration



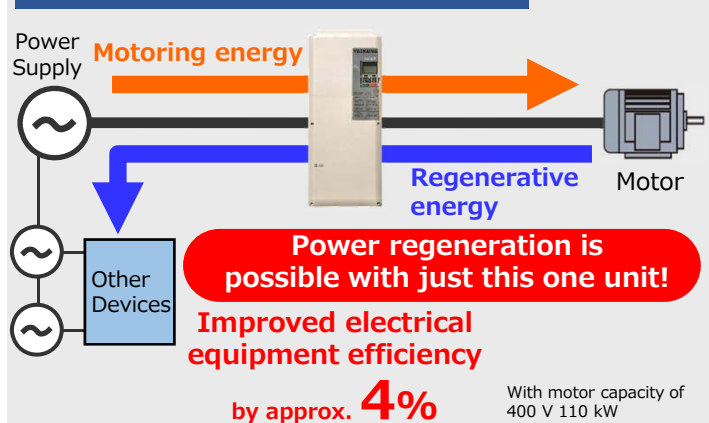
Matrix Converter U1000L



Power Regenerative Converter Configuration

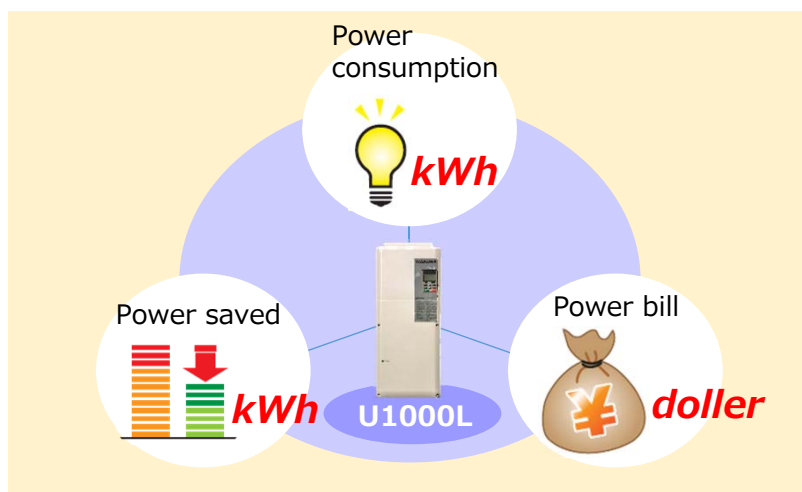


Matrix Converter U1000L



Visualizing Savings in Electricity

Use analog outputs or communications networks to monitor all sorts of data with easy operations. You'll instantly see the energy that you've saved.





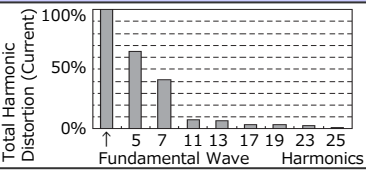
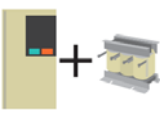
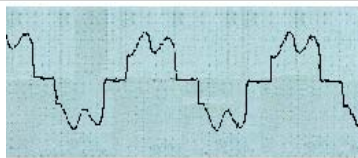
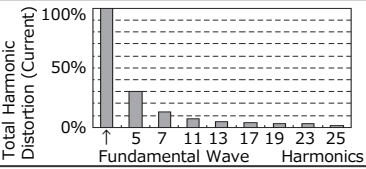

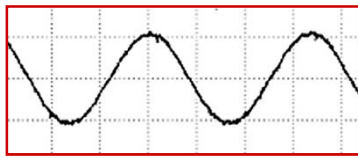
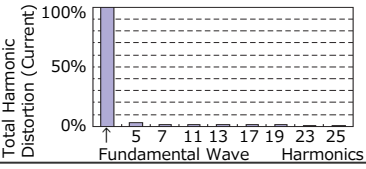
Low Harmonics!

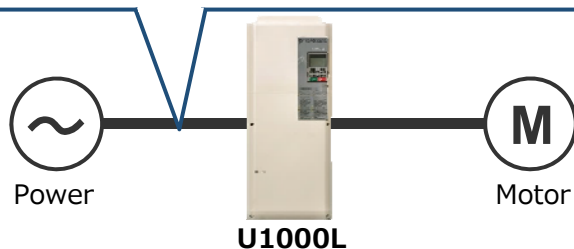
The input current is converted to a sine wave that is nearly the same as that from a commercial power supply source. This makes power equipment more compact and satisfies the guidelines for harmonic suppression to offer a sense of security to intelligent buildings, hospitals, and nursing homes.

Harmonics

When an AC drive converts power, the input current is distorted, which results in harmonics. These harmonics can interfere with other electric devices, such as by causing overheating or damage to power supply facilities and malfunction and noise in precision devices.



	Power Current Waveform Samples	Input Current Spectrums	Current Distortion	Power factor
 AC drive without reactor			88%	0.75
 AC drive with DC reactor			33%	0.9
 Matrix Converter U1000L			5%	0.98



Conforms to IEEE519

Reduce power supply capacity

Reduce Power Supply Capacity

The power factor is high, so you can use a lower power supply capacity.

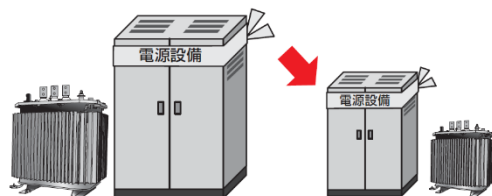
You can also downsize wires and generator capacity, and may qualify for price benefits from your power company.

AC Drive
Power factor: Approx.0.75

(at rated current load)

U1000L
Power factor: Approx.0.98

(at rated current load)



$$\text{Power usage (kW)} = \sqrt{3} \times V \times I \times \cos\theta$$

[active power]

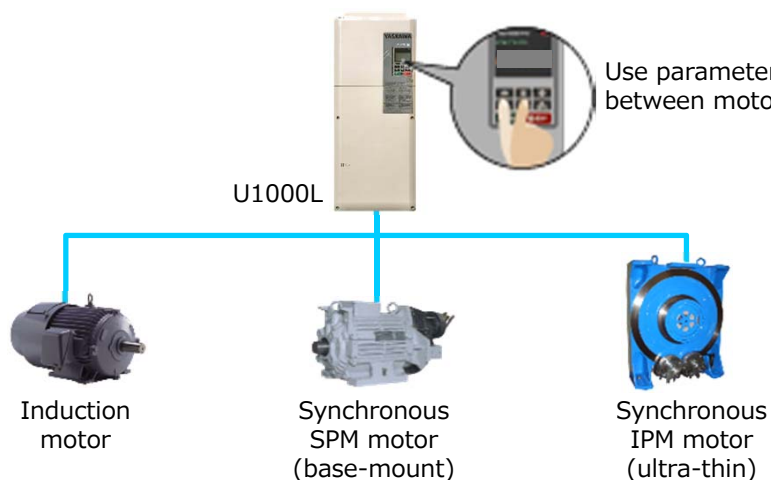
Power capacity(kVA) [apparent power]

Power factor

Matching Every Need !

Runs Induction and Synchronous Motors

- Cutting-edge drive technology allows U1000L to run a newly installed gearless synchronous motor, or a refurbished geared induction motor. This minimizes equipment required for your application.



Capacity Range	200 V class 7.5 ~ 30 kW 400 V class 15 ~ 45 kW
Control Mode	PM motors • Closed Loop Vector Control for PM motors (SPM/IPM drive) Induction motors • V/f Control • Open Loop Vector Control • Closed Loop Vector Control

Rescue Operations

Rescue operations during power loss can be supported through the use of UPS and battery systems.
Contact Yaskawa for more information.

Compatible with a Wide Range of Encoders

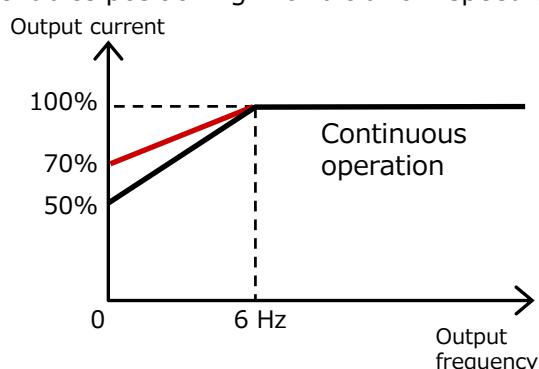
- High-performance current vector control generates powerful starting torque and allows precision control at low speeds.
- Interfaces to match gearless, SPM synchronous motors and every type of absolute encoder. High resolution and pole position detection for a smooth and safe ride.

Control Mode	Starting Torque	Speed Range	Motor Encoders and Option Cards
V/f Control	3Hz 150% *	1 : 40	N/A
Open Loop Vector Control	0.3Hz 200% *	1 : 200	N/A
Closed Loop Vector Control	0min-1 200% *	1 : 1500	<Incremental type> Line Driver : PG-X3 Complementary : PG-B3
Closed Loop Vector Control for PM	0min-1 200% *	1 : 1500	<Incremental type> Line Driver : PG-X3 <Absolute type> EnDat, HIPERFACE : PG-F3 ERN1387 : PG-E3

* U1000L and motor must be matched appropriately.

Stable Low-speed Operation!

- The main circuit IGBT continues to switch evenly in accordance with the frequency of the AC power supply even during low-speed operation.
- A output torque of $\pm 70\%$ is available at zero speed with Closed Loop control.
→ This enables positioning with ultra-low-speed operation instead of inching operation.

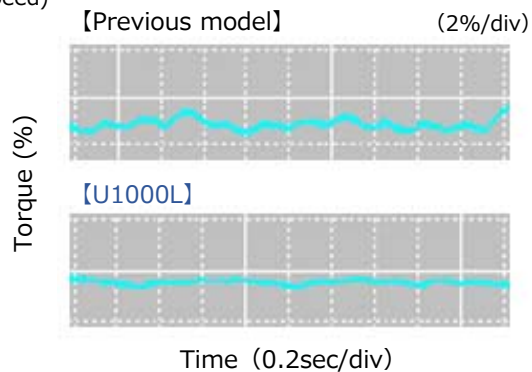


Smooth, Comfortable Ride !

Smooth Operation

- U1000L has ½ the torque ripple compared to our earlier models, for an even smoother ride.
- Designed specifically for elevator applications, U1000L provides precise motor torque performance capability for smoother acceleration and deceleration.

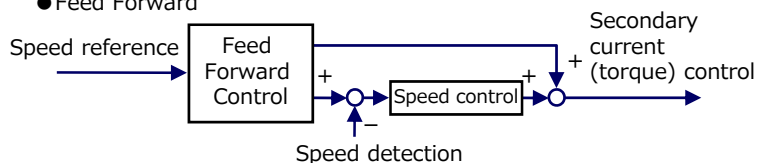
- Torque Ripple Comparison (Closed Loop Vector at zero speed)



Overshoot and Anti-Vibration Control

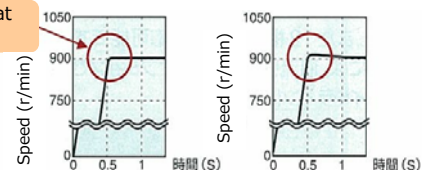
- Feed Forward achieves ideal speed response, eliminating vibration and overshoot, and makes it easy to tweak the speed control loop (ASR). (Available soon)
- Adjust jerk settings at the start and end of acceleration and deceleration to create a perfectly smooth ride.

- Feed Forward



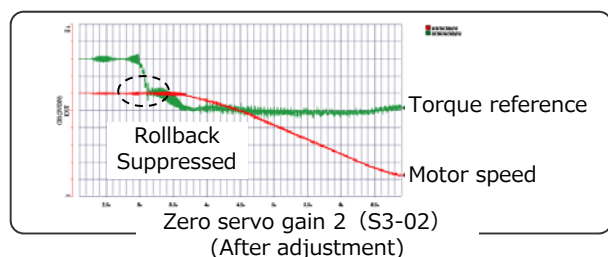
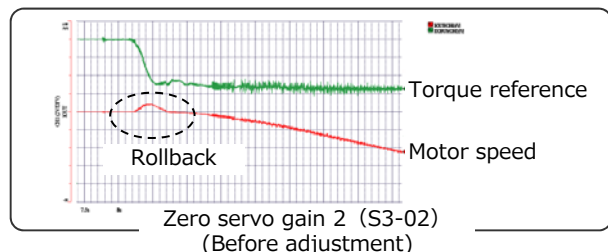
- Overshoot Compensation

Suppresses overshoot at the end of acceleration



High Performance Starting Torque without Sensors

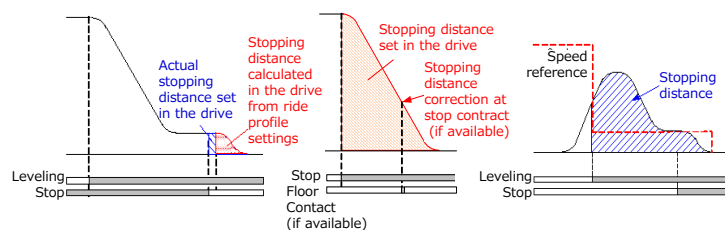
- Even without a load sensor, high-performance torque compensation (Advanced Anti-Rollback*) and high-resolution absolute encoder eliminate shock when the brake is released. Simplifying load sensor control signals makes cumbersome adjustments unnecessary.



Reduced Operation Time and More Powerful Braking

Improved operation efficiency

- U1000L calculates the stopping distance to minimize operation time. "Direct Landing" function is also available. These features improve operation efficiency as well as greater stopping precision.
- Short Floor minimizes the "creep speed" time for faster, more efficient operation.



- Faster Operation Time

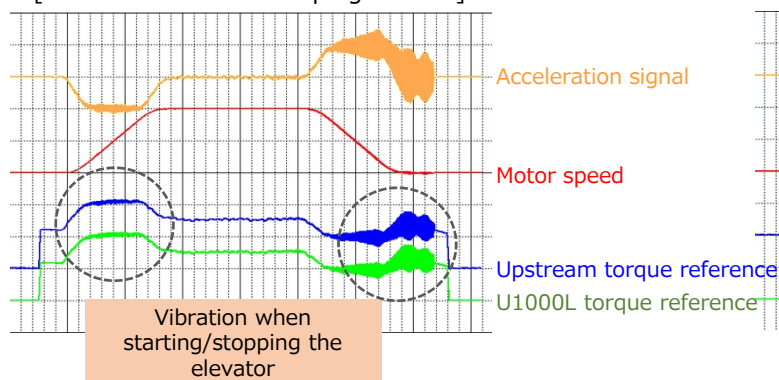
- Direct Landing

- Short Floor

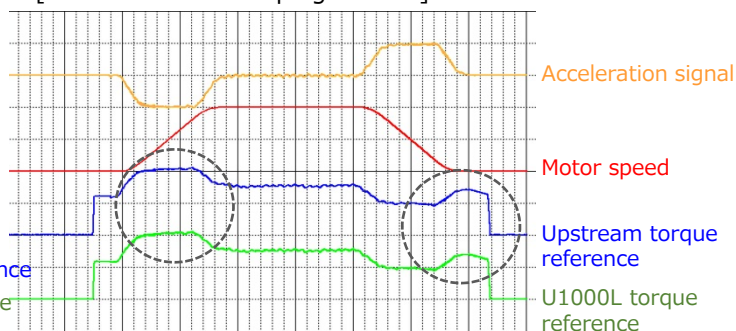
Vibration Damping Control

Vibration damping control can be used in elevators that require shockless operation for a more comfortable ride.

[Without Vibration Damping Control]



[With Vibration Damping Control]



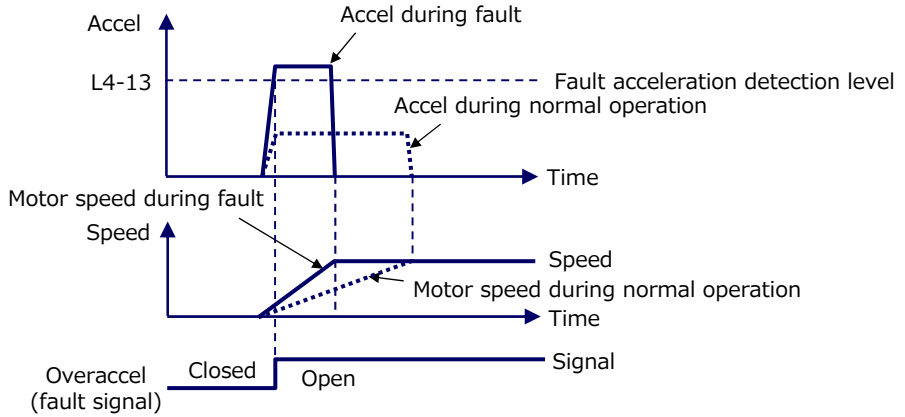
Safety !

Safe Disable Function

Protect the elevator application with immediate fault detection.

- U1000L protects the entire elevator application by detecting overacceleration, speed reversal, wiring errors, and improper parameter settings.
- Hardware sensors respond immediately if the motor encoder signal is lost, ensuring an even higher level of safety.

● Overacceleration Fault Detection

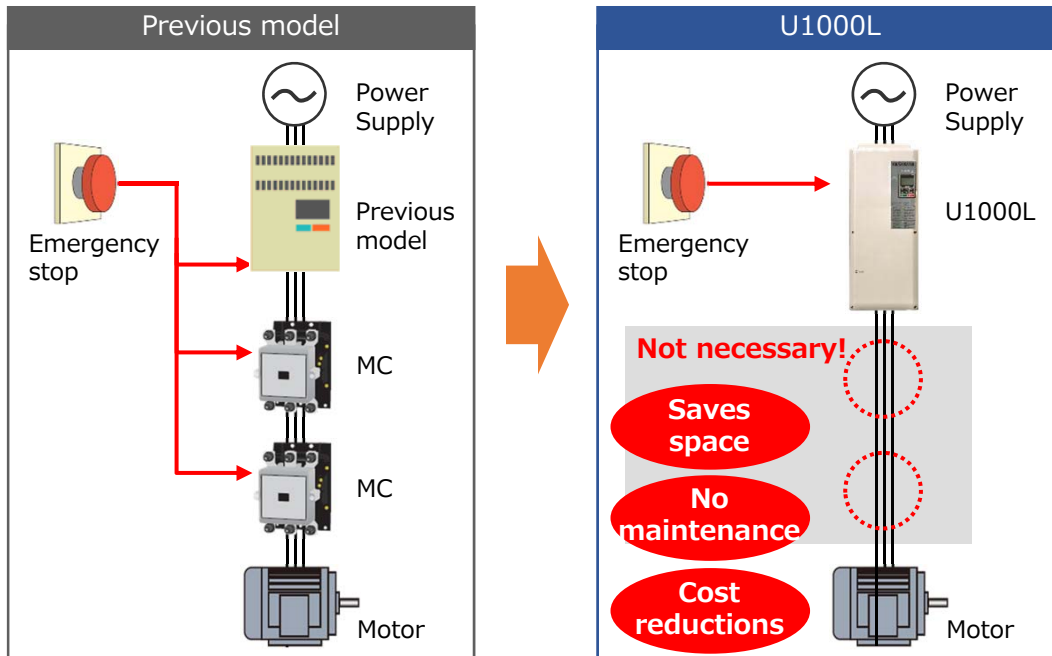


* Actual operation varies by the control mode and motor encoder.

Safe Disable Function

Safety Regulations

- The products comply with ISO/EN13849-1 Cat.3 Ple and IEC/EN61508 SIL3 (two safety inputs and one EDM output).
- An External Device Monitor (EDM) function has also been added to monitor the safety status of the drive.
- When compliant with EN81, the number of required magnetic contactors, which has conventionally been two, can be reduced using the safety function.



Monitor status of input power supply

- Customized hardware immediately detects phase loss from the input power supply.
- Detection remains active regardless of whether the drive is running or stopped.
- An output signal can also be setup if a phase loss occurs.

Easy Setup and Maintenance

Terminal Block with Parameter Backup

The Drive Industry's

First Terminal Board with a Parameter Backup Function

- The terminal block's ability to save parameter setting data makes it a breeze to get the application back online in the event of a failure requiring drive replacement.



Parameter

Parameter Name	No.	Setting
Control Mode Selection	A1-02	0
Frequency Reference Selection 1	b1-01	1
Run Command Selection 1	b1-02	1

DriveWizard Plus

Engineering Tool DriveWizard Plus

- Manage the unique settings for all your drives with a personal computer (PC).
- An indispensable tool for drive setup and maintenance. Edit parameters, access all monitors, create customized operation sequences, and observe drive performance with the oscilloscope function.
- Equipped with a USB port for easy connection to a personal computer.

- Connecting U1000L and a PC with USB



Note: Users can also use the WV103 cable included with earlier Yaskawa models. Simply remove the operator keypad to access the comm. port.

Preventative Warnings

Performance Life Monitors

- U1000L is equipped with performance life monitors that notify the user of part wear and maintenance periods to prevent problems before they occur.

- Alarm Signals Output PLC or Control Device



Operator Display	Corresponding Component
LT-1	Cooling fan
LT-2	Capacitors
LT-3	Inrush prevention relay

Easy Setup

Quick setup and easy maintenance

- Set speed, acceleration, and jerk parameters in elevator units.
- All models come standard with an LED unit equipped with a Copy function that lets the user quickly upload and download parameter settings.
- LED operator keypad option available
- USB Copy Unit is available to copy parameter settings and program multiple drives instantly.
- The Setup Mode gives the user access to just those parameters needed to get the drive up and running right away.
- The Verify Function lets the user check parameters that may have been changed from their default values.



● LCD Operator (standard)



● LED Operator (optional)



● USB Copy Unit (optional)

- Verify Function

List of parameters that have been changed from their default settings.

Parameter Name	No.	Default	Setting
Speed reference selection	b1-01	1	0
Acceleration time	C1-01	3.00s	3.50s
Deceleration time	C1-02	3.00s	3.50s
...

Long-Life Performance

Ten Years of Durable Performance

- Cooling fan, capacitors, relays, and IGBTs have been carefully selected and designed for a life expectancy up to ten years*.

* : Assumes the drive is running continuously for 24 hours a day,
60 s/cycle, at 80% load, and an ambient temperature of 40°C.

Loaded with Auto-Tuning Features

- U1000L is loaded with a variety of Auto-Tuning methods to ensure top performance.
- Rotational Auto-Tuning and Stationary Auto-Tuning are available for induction motors as well as synchronous motors.

Motor tuning features optimize drive settings without needing to disconnect the rope or car.

- Tuning features for connected machinery.

- Types of Auto-Tuning

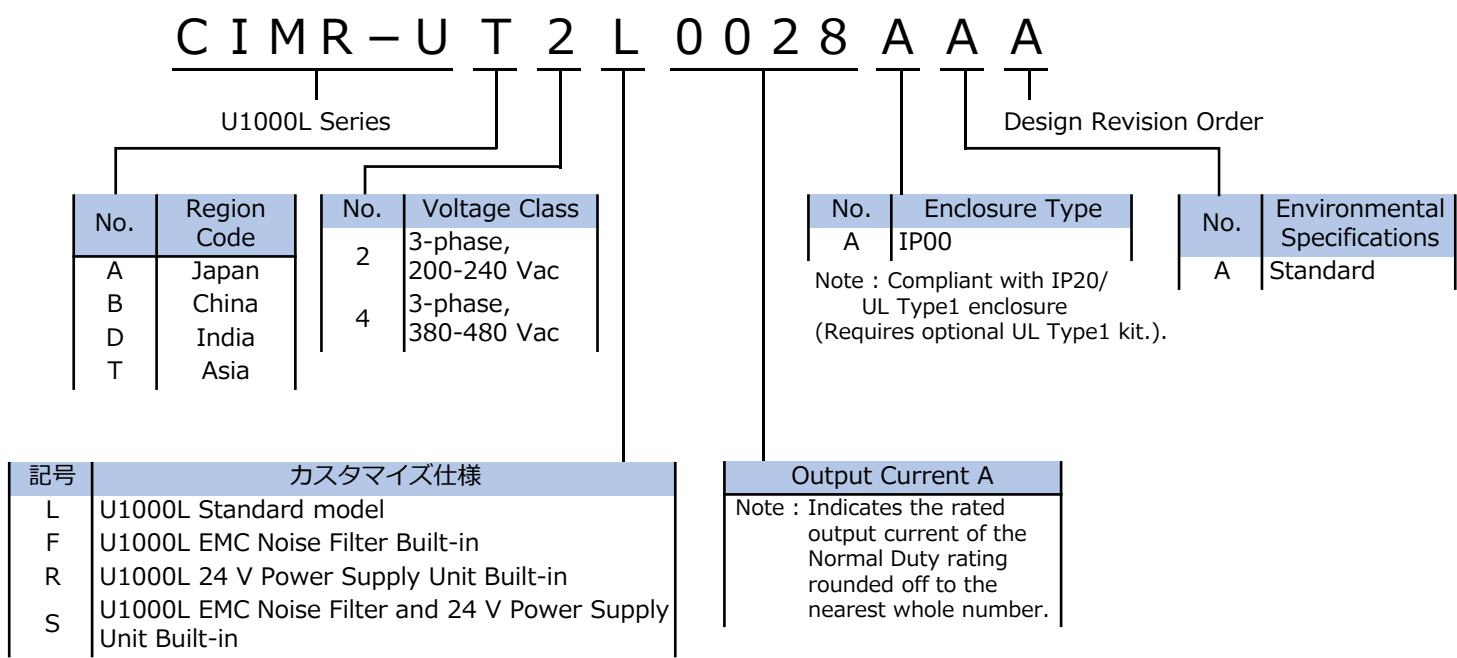
Motor Tuning

Rotational Auto-Tuning	Applications requiring high starting torque, high speed, and high accuracy. Tuning is performed on the motor alone, uncoupled from the load.
Stationary Auto-Tuning	Applications where the motor must remain connected to the load during the auto-tuning process.
Motor Resistance Auto-Tuning	For re-tuning when the cable length between the motor/drive has changed or when motor/drive capacities are different.
Encoder Offset Auto-Tuning	Fine tunes the home pulse position when using an encoder with a synchronous motor. Possible with both Rotational and Stationary Auto-Tuning.

- Brand new Auto-Tuning methods allow U1000L to continuously analyze changes in motor characteristics during run for highly precise speed control (when using Open Loop Vector Control)

Model Number Key

Model Number Key



Standard Specifications

200 V Class

Model : CIMR-UT2□□□□		0028	0042	0054	0068	0081	0104	
Max. Applicable Motor Capacity kW *1		7.5	11	15	18.5	22	30	
Rated Input / Output	Rated Input Current A *2		25	38	49	62	74	95
	Rated Input Capacity kVA *3		12	17	22	28	34	43
	Rated Output Current A *5,*6	3 minutes 50%ED	35	52.5	67.5	85	101.2	130
		100%ED	28	42	54	68	81	104
	Maximum Load Current		150% of rated output current of 100%ED can be maintained for 60 s. (120% of rated output current of 50%ED can be maintained for 10 s (6 Hz).)					
	Carrier Frequency		4 to 10 kHz			4 to 8 kHz		
	Max. Output Voltage		Depends on input voltage *8					
Max. Output Frequency		200 Hz (User-adjustable)						
Power	Rated Voltage/Rated Frequency		Three-phase AC power supply : 200 to 240 V 50/60 Hz					
	Allowable Voltage Fluctuation		-15% to 10%					
	Allowable Frequency Fluctuation		±3% (Frequency fluctuation rate : 1 Hz/100 ms or less)					
	Allowable Power Voltage Imbalance between Phases		Less than 2%					
	Harmonic Current Distortion Rate *7		5% or less (IEEE519)					
	Input Power Factor		0.98 or more (for rated load)					

400 V Class

Model : CIMR-UT4□□□□		0034	0040	0052	0065	0077	0096	
Max. Applicable Motor Capacity kW *1		15	18.5	22	30	37	45	
Rated Input / Output	Rated Input Current A *2		31	36	47	59	70	87
	Rated Input Capacity kVA *4		28	33	43	54	64	80
	Rated Output Current A *5,*6	3 minutes 50%ED	42.5	50	65	81.3	96.3	120
		100%ED	34	40	52	65	77	96
	Maximum Load Current		150% of rated output current of 100%ED can be maintained for 60 s. (120% of rated output current of 50%ED can be maintained for 10 s (6 Hz).)					
	Carrier Frequency		4 to 10 kHz				4 to 8 kHz	
	Max. Output Voltage		Depends on input voltage *8					
Max. Output Frequency		200 Hz (User-adjustable)						
Power	Rated Voltage/Rated Frequency		Depends on input voltage (CIMR-U□4L□/4R□) : 380 to 500 Vac 50/60Hz Depends on input voltage (CIMR-U□4F□/4S□) : 380 to 480 Vac 50/60Hz					
	Allowable Voltage Fluctuation		-15% to 10%					
	Allowable Frequency Fluctuation		±3% (Frequency fluctuation rate : 1 Hz/100 ms or less)					
	Allowable Power Voltage Imbalance between Phases		Less than 2%					
	Harmonic Current Distortion Rate *7		5% or less (IEEE519)					
	Input Power Factor		0.98 or more (for rated load)					

* 1 : Units are displayed in kW. When selecting a model, make sure that the rated output current is higher than the motor rating current.

* 2 : Assumes operation at the rated output current. This value may fluctuate based on the power supply side impedance, as well as the input current, power supply transformer, and wiring conditions.

* 3 : The rated input capacity is calculated by multiplying the power line voltage (240 V) by 1.1.

* 4 : The rated input capacity is calculated by multiplying the power line voltage (480 V) by 1.1.

* 5 : The rated output current of the drive should be equal to or greater than the motor rated current.

* 6 : This value assumes a carrier frequency of 4 kHz. Increasing the carrier frequency requires a reduction in current.

* 7 : When the harmonic current distortion rate is 5% or less, the maximum output voltage is calculated by multiplying input power voltage by 0.87.

C7-60 (Output Voltage Limit Mode Selection) is set to 0 (Harmonic Suppression Priority Mode).

* 8 : The maximum output voltage is calculated by multiplying input power voltage by 0.87.

C7-60 (Output Voltage Limit Mode Selection) is set to 0 (Harmonic Suppression Priority Mode).

Standard Specifications

Common Specifications

Item		Specifications
Control Characteristics	Control Method	Use drive parameters to select from the following control modes: V/f Control, Open Loop Vector Control, Closed Loop Vector Control, Closed Loop Vector Control for PM
	Frequency Control Range	0.01 to 200 Hz
	Frequency Accuracy (Temperature Fluctuation)	Digital reference: within $\pm 0.01\%$ of the max. output frequency (-10 to $+40^{\circ}\text{C}$) Analog reference: within $\pm 0.1\%$ of the max. output frequency ($25^{\circ}\text{C} \pm 10^{\circ}\text{C}$)
	Frequency Setting Resolution	Digital reference: 0.01 Hz Analog reference: 0.03 Hz / 60 Hz (11 bit)
	Output Frequency Resolution	0.001 Hz
	Frequency Setting Resolution	Main frequency reference : -10 to $+10$ Vdc (20 k Ω), 0 to $+10$ Vdc (20 k Ω), 4 to 20 mA (250 Ω), 0 to 20 mA (250 Ω)
	Starting Torque	V/f Control 150%/3 Hz , Open Loop Vector Control 200%/0.3 Hz *1 Closed Loop Vector Control 200%/0 min-1 *1, Closed Loop Vector Control for PM 200%/0 min-1 *1
	Speed Control Range	V/f Control 1 : 40, Open Loop Vector Control 1 : 200 Closed Loop Vector Control 1 : 1500, Closed Loop Vector Control for PM 1 : 1500
	Speed Control Accuracy	$\pm 0.2\%$ ($25 \pm 10^{\circ}\text{C}$) (Open Loop Vector Control) *2
	Speed Response	10 Hz ($25 \pm 10^{\circ}\text{C}$) (Open Loop Vector Control) , 250Hz (Closed Loop Vector Control) (excludes temperature fluctuation when performing Rotational Auto-Tuning)
	Torque Limit	Parameters setting allow separate limits in four quadrants (available in OLV, CLV, CLV/PM)
	Accel/Decel Time	0.00 to 6000.0 s (4 selectable combinations of independent acceleration and deceleration settings)
	Braking Torque	Same value as overload tolerance
	V/f Characteristics	User-selected programs and V/f preset patterns possible
	Main Control Functions	Undertorque Detection, Torque Limit, Speed Reference, Accel/decel Switch, 5 Zone Jerk Settings, Auto-Tuning (Stationary and Rotational Motor/Encoder Offset Tuning), Dwell, Cooling Fan on/off Switch, Slip Compensation, Torque Compensation, DC Injection Braking at Start and Stop, MEMOBUS/Modbus Comm. (RS-422/RS-485 max, 115.2 kbps), Fault Reset, Removable Terminal Block with Parameter Backup Function, Online Tuning, High Frequency Injection, Short Floor, Rescue Operation (Light Load Direction Search Function), Inspection Run, Brake Sequence, Speed related parameters with elevator units display, etc.
Protection Function	Power Supply Regeneration	Available
	Motor Protection	Electronic thermal overload relay
	Momentary Overcurrent Protection	Drive stops when output current reaches about 200% of the rated current.
	Overload Protection	Drive stops after 60 s at 150% of rated output current *3
	Overvoltage Protection	200 V class: Stops when input voltage exceeds approx. 315 V 400 V class: Stops when input voltage exceeds approx. 630 V
	Undervoltage Protection	200 V class: Stops when input voltage falls below approx. 150 V 400 V class: Stops when input voltage falls below approx. 300 V
	Heatsink Overheat Protection	Thermistor
	Stall Prevention	Stall Prevention is available during acceleration, and during run.
	Ground Fault Protection	Protection by electronic circuit *4
Environment	Charge LED of Capacitor for Control Power Supply	Remains lit until control power supply voltage falls below 50 V
	Area of Use	Indoors
	Ambient Temperature	-10 to $+50^{\circ}\text{C}$ (open-chassis), -10 to $+40^{\circ}\text{C}$ (IP20/UL Type1)
	Humidity	95% RH or less (no condensation)
	Storage Temperature	-20 to 60°C (short-term temperature during transportation)
	Altitude	Up to 1000 meters *5
	Shock	10 to 20 Hz : 9.8 m/s ² 20 to 55 Hz : 5.9 m/s ² (CIMR-UT2□0022 to 2□0068, 4□0010 to 4□0065) 2.0 m/s ² (CIMR-UT2□0081 to 2□0192, 4□0077 to 4□0361)
Standards Compliance		<ul style="list-style-type: none"> UL508C IEC/EN 61800-3, IEC/EN 61800-5-1 ISO/EN 13849-1 Cat.3 PLe, IEC/EN 61508 SIL3
Protection Design		IP00 enclosure, IP20/UL Type1 enclosure *6, *7

*1 : Current derating is required. Select control modes in accordance with the drive capacity.

*2 : The accuracy of these values depends on motor characteristics, ambient conditions, and drive settings. Specifications may vary with different motors and with changing motor temperature. Contact Yaskawa for consultation.

*3 : Overload protection may be triggered when operating with 150% of the rated output current if the output frequency is less than 6 Hz.

*4 : Protection is provided when the motor is grounded during Run. Protection may not be provided under the following conditions:

• Low resistance to ground from the motor cable or terminal block.

• Drive already has a short-circuit when the power is turned on.

*5 : Up to 3000 m with output current and voltage derating. Refer to Technical Manual for details.

*6 : Optional UL Type1 kit is required.

*7 : Removing the top protective cover on an IP20/UL Type 1 enclosure drive converts this drive to an IP20 conformity.

Note: Specifications regarding Open Loop Vector Control capabilities require Rotational Auto-Tuning.

U1000L must be used in acceptable environmental conditions to ensure the expected performance life of all drive components.

Dimensions

Open-Chassis 【IP00】

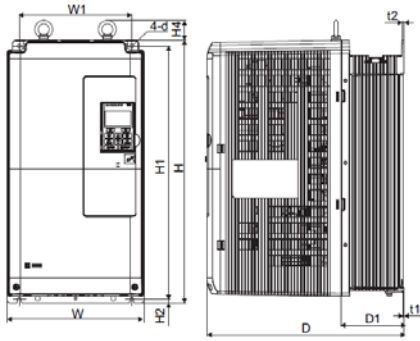


Figure 1

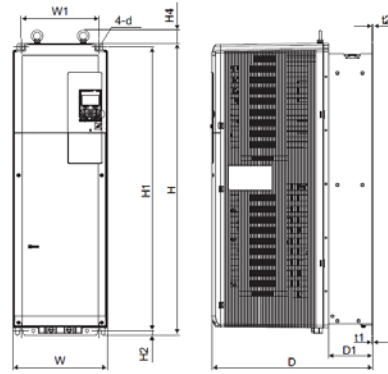


Figure 2

200 V Class

Model CIMR-UT□	Figure	Dimensions (mm)												Weight (kg)	
		W	H	D	W1	W2	H1	H2	H4	D1	t1	t2	d	CIMR-UT 2L□/2R□	CIMR-UT 2F□/2S□
2□0028	1	264	650	420	218	—	629	11.5	40	115.5	2.3	4	10	32	33
2□0042														35	36
2□0054															
2□0068															
2□0081	2	264	816	450	218	—	795	11.5	40	124.5	2.3	2.3	10	60	63
2□0104															

400 V Class

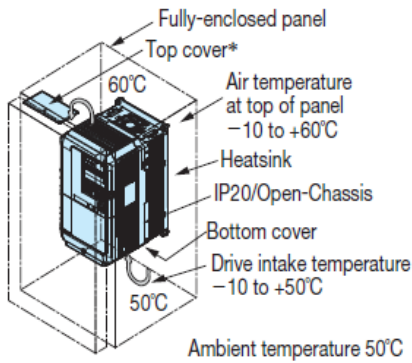
Model CIMR-UT□	Figure	Dimensions (mm)												Weight (kg)	
		W	H	D	W1	W2	H1	H2	H4	D1	t1	t2	d	CIMR-UT 4L□/4R□	CIMR-UT 4F□/4S□
4□0034	1	264	650	420	218	—	629	11.5	40	115.5	2.3	4	10	32	33
4□0040														35	36
4□0052															
4□0065															
4□0077	2	264	816	450	218	—	795	11.5	40	124.5	2.3	2.3	10	60	63
4□0096															

Fully-Enclosed Design

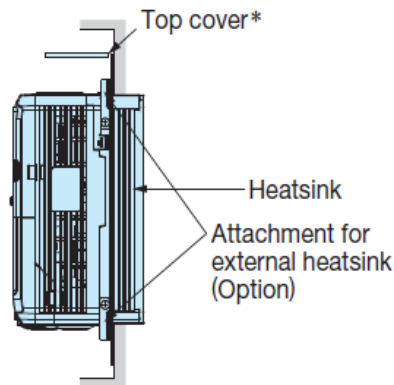
The Open-Chassis type drive can be installed in a fully-enclosed panel.

An open-chassis model in a protective enclosure with the heatsink inside the panel allows for intake air temperature up to 50°C. The heatsink can alternatively be mounted outside the enclosure panel, thus reducing the amount of heat inside the panel and allowing for a more compact set up. Current derating or other steps to ensure cooling are required at 50°C.

• Cooling Design for Fully-Closed Enclosure Panel

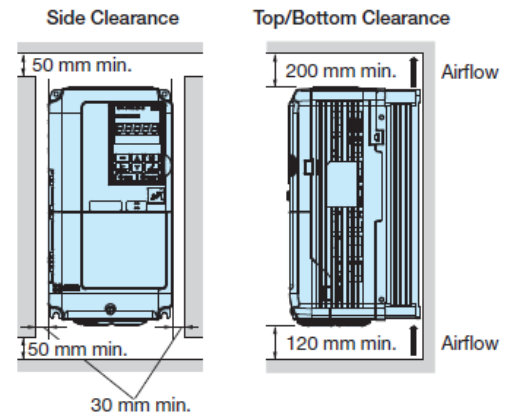


• Mounting the External Heatsink



*: Enclosure panel can be installed with the top and bottom covers removed.

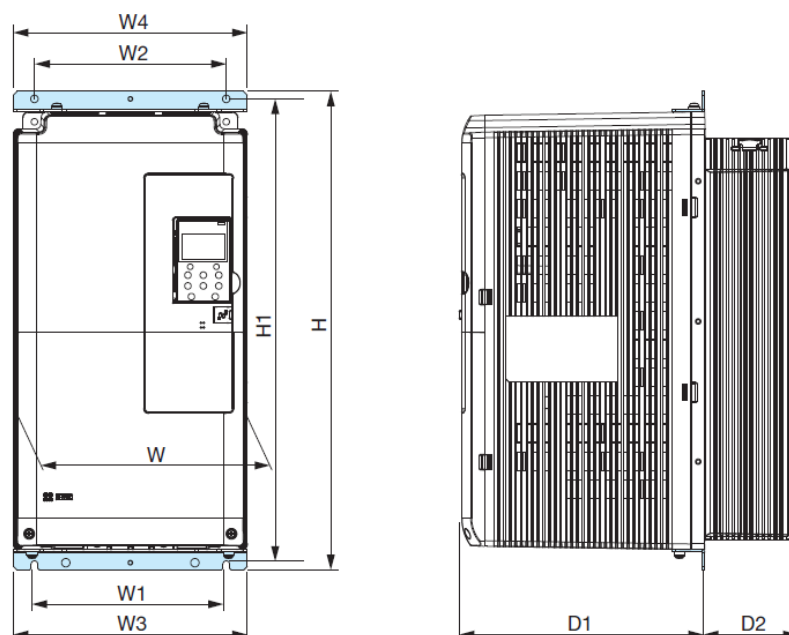
• Ventilation Space



If you use the Matrix Converter installed in a panel, provide sufficient space for the suspension fittings on the Unit and for wiring the main circuits.

● Attachment for External Heatsink

When the heatsink is installed outside the drive, additional attachments are required. Installing the additional attachments will extend the width and height of the drive.



200 V Class

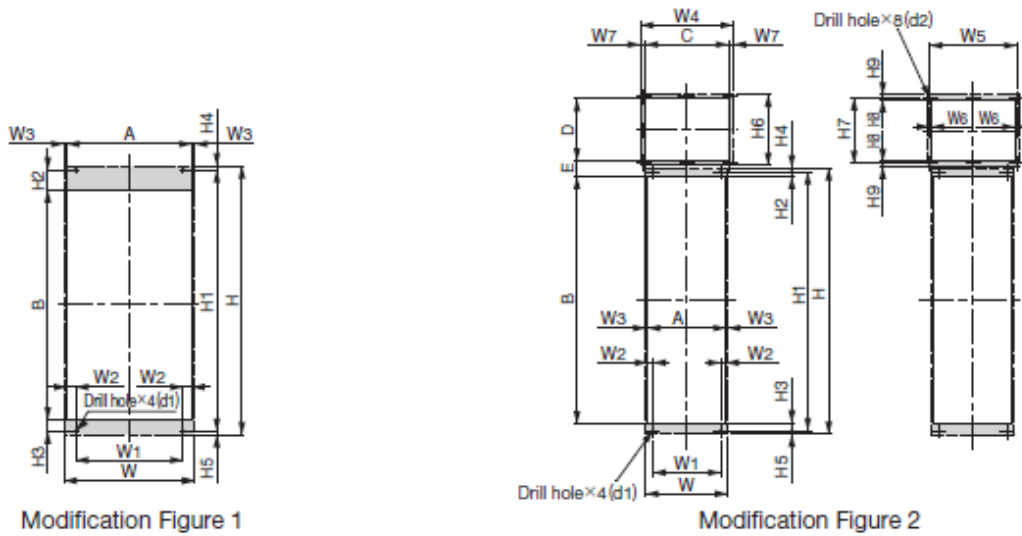
Model CIMR-UT□	Dimensions (mm)									Cade No.
	W	W1	H	W2	W3	W4	H1	D1	D2	
2□0028	264	218	691.5	218	250	264	667.5	305	115.5	EZZ022706B
2□0042										
2□0054										
2□0068										
2□0081	264	218	857.5	218	250	264	833.5	326	124.5	EZZ022706C
2□0104										

400 V Class

Model CIMR-UT□	Dimensions (mm)									Cade No.
	W	W1	H	W2	W3	W4	H1	D1	D2	
4□0034	264	218	691.5	218	250	264	667.5	305	115.5	EZZ022706B
4□0040										
4□0052										
4□0065										
4□0077	264	218	857.5	218	250	264	833.5	326	124.5	EZZ022706C
4□0096										

● Panel Modification for External Heatsink

Additional panel cutout is needed to replace cooling fans of models CIMR-UT2□0081 and larger and CIMR-UT4□0077 and larger.



200 V Class

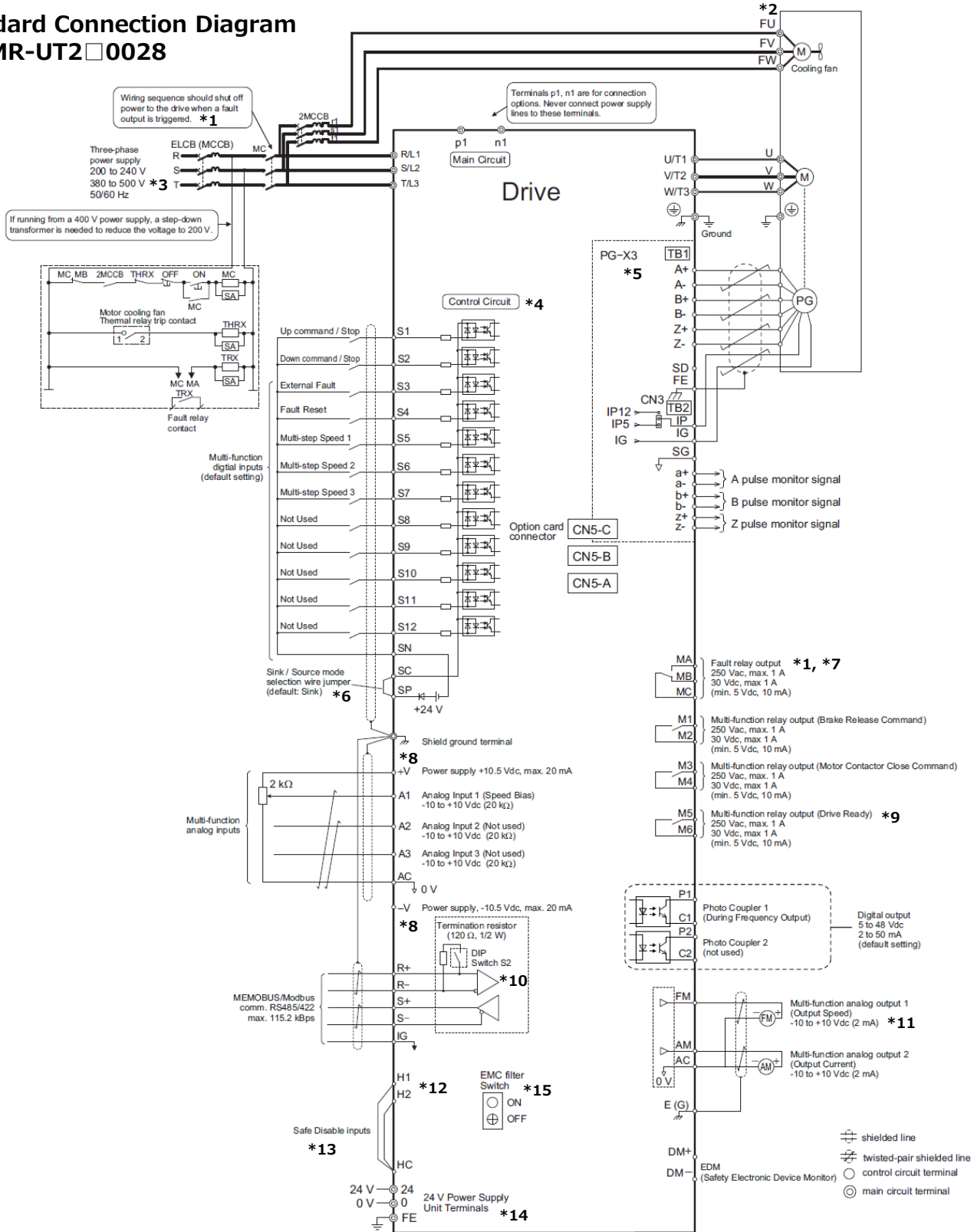
Model CIMR- UT□	Modification Figure	Dimensions (mm)																								
		W	H	W1	W2	W3	W4	W5	W6	W7	H1	H2	H3	H4	H5	H6	H7	H8	H9	A	B	C	D	E	d1	d2
2□0028	1	264	691.5	218	17	6	-	-	-	-	667.5	15	24.5	12.5	11.5	-	-	-	-	252	628	-	-	-	M8	-
2□0042																										
2□0054																										
2□0068																										
2□0081	2	264	857.5	218	17	6	300	280	6	16	833.5	15	24.5	12.5	11.5	230	212	6	9	252	794	268	200	50	M8	M5
2□0104																										

400 V Class

Model CIMR- UT□	Modification figure	Dimensions (mm)																								
		W	H	W1	W2	W3	W4	W5	W6	W7	H1	H2	H3	H4	H5	H6	H7	H8	H9	A	B	C	D	E	d1	d2
4□0034	1	264	691.5	218	17	6	—	—	—	—	667.5	15	24.5	12.5	11.5	—	—	—	—	252	628	—	—	—	M8	—
4□0040																										
4□0052																										
4□0065																										
4□0077	2	264	857.5	218	17	6	300	280	6	16	833.5	15	24.5	12.5	11.5	230	212	6	9	252	794	268	200	50	M8	M5
4□0096																										

Standard Connection Diagram

Standard Connection Diagram CIMR-UT2 0028



- * 1 : When the drive is set to trigger a fault output upon activation of the fault reset function (L5-02 = 1), a sequence to interrupt power when a fault occurs will shut off the power to the drive when the drive attempts a reset. The default setting for L5-02 is 0 (fault output not active during reset attempt).
- * 2 : Self-cooling motors do not require the same wiring necessary for motors with separate cooling fans.
- * 3 : Use a three-phase power supply with a voltage of 380 to 480 V for models CIMR-U · 4F · · · · and 4S · · · · which are models CIMR-U · 4 · 0034 to 4 · 0096 with built-in EMC filter.
- * 4 : Supplying power to the control circuit separately from the main circuit requires a 24 V power supply.
- * 5 : For control modes that do not use a motor speed feedback signal, PG option card wiring is not necessary.
- * 6 : This figure illustrates an example of a sequence input to S1 through S8 using a non-powered relay or an NPN transistor. Install the wire link between terminals SC-SP for Sink mode, between SC-SN for Source mode, or leave the link out for external power supply. Never short terminals SP and SN, as it will damage the drive.
- * 7 : Wire fault contact outputs MA, MB, and MC. Wire so that a fault will open the safety circuit and interrupt drive output.
- * 8 : The maximum output current capacity for the +V and -V terminals on the control circuit is 20 mA. Never short terminals +V, -V, and AC, as it can cause erroneous operation or damage the drive.
- * 9 : When using the Programming Mode to edit parameter settings, U1000L will not accept an Up/Down command. If the drive still will not run when an Up/Down command has been entered and no fault is present, then use the "Drive ready" signal (the default setting for terminal M5-M6) to interlock components.
- * 10 : Enable the termination resistor in the last drive in a MEMOBUS network by setting DIP switch S2 to the ON position.
- * 11 : Monitor outputs work with devices such as analog frequency meters, ammeters, voltmeters, and wattmeters. They are not intended for use as a feedback-type of signal.
- * 12 : The sink/source setting for the Safe Disable input is the same as with the sequence input. Jumper S3 has the drive set for an external power supply. When not using the Safe Disable input feature, remove the jumper shorting the input and connect an external power supply.
- * 13 : Disconnect the wire jumper between H1 - HC and H2 - HC when utilizing the Safe Disable input.
- * 14 : Models U□□□□□□ and U□□F□□□□ do not have terminals 24, 0, and FE. The main circuit power supply can be turned off separately even when power is supplied to the control circuit.
- * 15 : Models U□□□□□□□ and U□□R□□□□ do not have a built-in EMC filter switch.

Drive Watt Loss Data • Efficiency / Rated Current Depending on Carrier Frequency

Drive Watt Loss Data • Efficiency

Carrier frequency is set to 4 kHz.

200 V Class

Model CIMR-UT□	Interior Loss W	Exterior Loss W	Total Loss W	Efficiency %
2□0028	138	586	724	91
2□0042	168	808	976	92
2□0054	190	1016	1207	93
2□0068	208	1181	1389	93
2□0081	234	1313	1547	93
2□0104	280	1673	1953	94

400 V Class

Model CIMR-UT□	Interior Loss W	Exterior Loss W	Total Loss W	Efficiency %
4□0034	150	693	844	95
4□0040	178	855	1034	95
4□0052	204	1087	1290	94
4□0065	220	1238	1458	95
4□0077	247	1373	1620	96
4□0096	290	1693	1983	96

Rated Current Depending on Carrier Frequency

The following table shows the drive output current depending on the carrier frequency settings.
Use the data in the following table to linearly calculate output current values for carrier frequencies not listed in the tables.

50%ED

200 V Class

Model CIMR- UT□	Rated Current A (50%ED)						
	4kHz	5kHz	6kHz	7kHz	8kHz	9kHz	10kHz
2□0028	35	33.3	31.6	29.9	28.3	26.6	24.9
2□0042	52.5	50.8	49	47.3	45.5	43.8	42
2□0054	67.5	65.3	63.1	60.9	58.8	56.6	54.4
2□0068	85	82.2	79.4	76.6	73.7	70.9	68.1
2□0081	101.2	97.4	93.6	89.8	86	—	—
2□0104	130	125.3	120.5	115.8	111	—	—

400 V Class

Model CIMR- UT□	Rated Current A (50%ED)						
	4kHz	5kHz	6kHz	7kHz	8kHz	9kHz	10kHz
4□0034	42.5	39.4	36.4	33.3	30.2	27.2	24.1
4□0040	50	47.3	44.6	41.9	39.2	36.5	33.9
4□0052	65	61.4	57.7	54.1	50.5	46.9	43.2
4□0065	81.3	76.9	72.5	68.2	63.8	59.4	55
4□0077	96.3	90.6	84.9	79.2	73.5	—	—
4□0096	120	113	106	99	92	—	—

100%ED

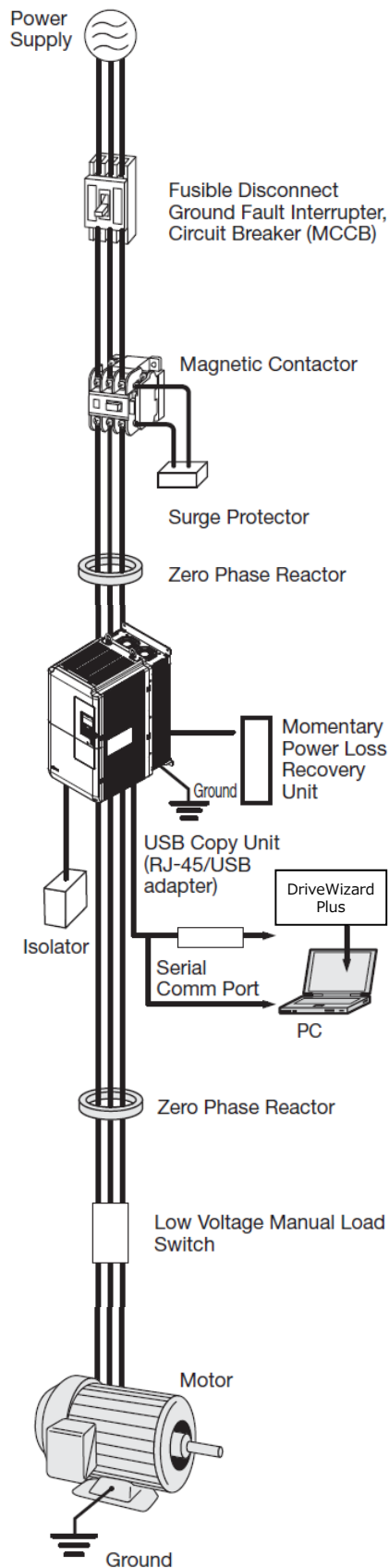
200 V Class

Model CIMR- UT□	Rated Current A (100%ED)						
	4kHz	5kHz	6kHz	7kHz	8kHz	9kHz	10kHz
2□0028	28	26.7	25.3	24	22.6	21.3	19.9
2□0042	42	40.6	39.2	37.8	36.4	35	33.6
2□0054	54	52.3	50.5	48.8	47	45.3	43.5
2□0068	68	65.7	63.5	61.2	59	56.7	54.5
2□0081	81	77.9	74.9	71.8	68.8	—	—
2□0104	104	100.2	96.4	92.6	88.8	—	—

400 V Class

Model CIMR- UT□	Rated Current A (100%ED)						
	4kHz	5kHz	6kHz	7kHz	8kHz	9kHz	10kHz
4□0034	34	31.5	29.1	26.6	24.2	21.7	19.3
4□0040	40	37.8	35.7	33.5	31.4	29.2	27.1
4□0052	52	49.1	46.2	43.3	40.4	37.5	34.6
4□0065	65	61.5	58	54.5	51	47.5	44
4□0077	77	72.4	67.9	63.3	58.8	—	—
4□0096	96	90.4	84.8	79.2	73.6	—	—

Peripheral Devices and Options



Name	Purpose	Model, Manufacturer	Page
Ground Fault Interrupter (GFI)	Always install a GFI on the power-supply side to protect the power supply system and to prevent an overload at the occurrence of short-circuit, and to protect the drive from ground faults that could result in electric shock or fire. Note: When a GFI is installed for the upper power supply system, an MCCB can be used instead of a GFI. Choose a GFI designed to minimize harmonics specifically for AC drives. Use one GFI per drive, each with a current rating of at least 30 mA.	NV series*2 by Mitsubishi Electric Corporation NS Series*2 by Schneider Electric	P.22
Circuit Breaker	Always install a circuit breaker on the power-supply side to protect the power supply system and to prevent an overload at the occurrence of a short-circuit.	NF series*2 by Mitsubishi Electric Corporation	P.22
Magnetic Contactor	Interrupts the power supply to the drive.	SC series*2 by Fuji Electric FA Components & Systems Co., Ltd.	P.23
Surge Protector	Absorbs the voltage surge from switching of electro magnetic contactors and control relays. Install a surge protector to the magnetic contactors and control relays as well as magnetic valves and magnetic braking coil.	DCR2 series RFN series by Nippon Chemicon Corporation	P.23
Zero Phase Reactor	Reduces noise from the line that enters into the drive input power system. Should be installed as close as possible to the drive. Can be used on both the input and output sides.	F6045GB F11080GB F200160PB by Hitachi Metals, Ltd.	P.24
USB Copy Unit (RJ-45/USB compatible plug)	<ul style="list-style-type: none"> Can copy parameter settings easily and quickly to be later transferred to another drive. Adapter for connecting the drive to the USB port of a PC. 	JVOP-181	P.26
PC cable	Connect the drive and PC when using DriveWizard Puls. The cable length must be 3 m or less.	Commercially available USB2.0 A/B cable.	P.26
LED Operator	For easier operation when using the optional LED operator. Allows for remote operation. Includes a Copy function for saving drive settings.	JVOP-182	P.25
Operator Extension Cable	Cable for connecting the LCD operator.	WV001: 1 m WV003: 3 m	P.25
Momentary Power Loss Recovery Unit	Ensures continuous drive operation for a power loss of up to 2 s.	P0010 Type (200 V class) P0020 Type (400 V class)	P.24
Frequency Meter, Current Meter	Allows the user to set and monitor the frequency, current, and voltage using an external device.	DCF-6A	P.27
Variable Resistor Board (20 kΩ)		ETX3120	P.27
Frequency Setting Potentiometer (2 kΩ)		RH000739	P.27
Frequency Meter Adjusting Potentiometer (20 kΩ)		RH000850	P.27
Control Dial for Frequency Setting Potentiometer		CM-3S	P.27
Output Voltage Meter		SCF-12NH	P.28
Voltage Transformer		UPN-B	P.28
Attachment for External Heatsink	Required for heatsink installation. Current derating may be needed when using a heatsink.	—	P.16
Low Voltage Manual Load Switch	Prevents shock from the voltage created on the terminals board from a coasting synchronous motor.	AICUT, LB series*2 by Aichi Electric Works Co., Ltd	—

Peripheral Devices and Options

● Option Cards

RoHS compliant

Type	Name	Model	Function	Manual No.
Built-in Type (connected to connector)	Speed Reference Card	Digital Input	DI-A3 Enables 16-bit digital speed reference setting. • Input signal: 16 bit binary, 2 digit BCD + sign signal + set signal • Input voltage: 24 V (isolated) • Input current: 8 mA User-set: 8 bit, 12 bit, 16 bit	TOBPC73060039
	Communications Option Card *1	CANopen Interface	SI-S3 Used for running or stopping the drive, setting or referencing parameters, and monitoring output frequency, output current, or similar items through CANopen communication with the host controller.	TOBPC73060045
				SIEPC73060045
	Monitor Option Card	Analog Monitor	AO-A3 Outputs analog signal for monitoring drive output state (output freq., output current etc.). • Output resolution: 11 bit signed (1/2048) • Output voltage: -10 to +10 Vdc (non-isolated) • Terminals: 2 analog outputs	TOBPC73060040
		Digital Output	DO-A3 Outputs isolated type digital signal for monitoring drive run state (alarm signal, zero speed detection, etc.) • Terminals: 6 photocoupler outputs (48 V, 50 mA or less) 2 relay contact outputs (250 Vac, 1 A or less 30 Vdc, 1 A or less)	TOBPC73060041
	PG Speed Controller Card *2	Complimentary Type PG	PG-B3 For control modes requiring a PG encoder for motor feedback. • Phase A, B, and Z pulse (3-phase) inputs (complimentary type) • Max. input frequency: 50 kHz • Pulse monitor output: Open collector, 24 V, max. current 30 mA • Power supply output for PG: 12 V, max. current 200 mA Note: Not available in Advanced Open Loop Vector for PM.	TOBPC73060036
		Line Driver PG	PG-X3 For control modes requiring a PG encoder for motor feedback. • Phase A, B, and Z pulse (differential pulse) inputs (RS-422) • Max. input frequency: 300 kHz • Pulse monitor output: RS-422 • Power supply output for PG: 5 V or 12 V, max. current 200 mA	TOBPC73060037
		EnDat Encoder Interface (EnDat, HIPERFACE)	PG-F3 For speed feedback input by connecting a motor encoder Encoder type: EnDat 2.1/01, EnDat 2.2/01, and EnDat 2.2/22(HEIDENHAIN), HIPERFACE (SICK STEGMANN) Maximum input frequency: 20 kHz Wiring length: 20 m max. for the encoder, 30 m max. for the pulse monitor Pulse monitor: Matches RS-422 level [Encoder power supply: 5 V, max current 330 mA or 8 V, max current 150 mA] Use one of the following encoder cables. EnDat2.1/01, EnDat2.2/01 : 17-pin cable from HEIDENHAIN EnDat2.2/22 : 8-pin cable from HEIDENHAIN HIPERFACE : 8-pin cable from SICK STEGMANN	TOBPC73060051
		Encoder Type (ERN1387)	PG-E3 For HEIDENHAIN ERN1387: Maximum input frequency: 20 kHz Pulse monitor: Matches RS-422 Voltage output for encoder: 5 V, 200 mA max. Encoder cable: 20 m max. Pulse monitor cable: 10 m max.	TOBPC73060052

* 1 : Each communication option card requires a separate configuration file to link to the network.

* 2 : PG speed controller card is required for PG control.

Peripheral Devices and Options

● Ground Fault Interrupter, Circuit Breaker

Base device selection on motor capacity.



Ground Fault
Interrupter
【Mitsubishi Electric
Corporation】



Circuit Breaker
【Mitsubishi Electric
Corporation】

200V級

Motor Capacity (kW)	Ground Fault Interrupter			Circuit Breaker		
	Model	Rated Current (A)	Interrupt Capacity (kA) Icu/Ics*	Model	Rated Current (A)	Interrupt Capacity (kA) Icu/Ics*
7.5	NV63-SV	40	15/8	NF63	40	7.5/4
11	NV63-SV	50	15/8	NF63	50	7.5/4
15	NV125-SV	75	50/25	NF125	75	30/15
18.5	NV125-SV	75	50/25	NF125	75	30/15
22	NV125-SV	100	50/25	NF125	100	30/15
30	NV250-SV	125	50/25	NF250	125	35/18

* : Icu : Icu : Rated ultimate short-circuit breaking capacity Ics : Rated service short-circuit breaking capacity

400V級

Motor Capacity (kW)	Ground Fault Interrupter			Circuit Breaker		
	Model	Rated Current (A)	Interrupt Capacity (kA) Icu/Ics*	Model	Rated Current (A)	Interrupt Capacity (kA) Icu/Ics*
15	NV32-SV	30	5/2	NF32	30	2.5/1
18.5	NV63-SV	40	7.5/4	NF63	40	2.5/1
22	NV63-SV	50	7.5/4	NF63	50	2.5/1
30	NV125-SV	60	25/13	NF125	60	10/5
37	NV125-SV	75	25/13	NF125	75	10/5
45	NV125-SV	100	25/13	NF125	100	10/5

* : Icu : Icu : Icu : Rated ultimate short-circuit breaking capacity Ics : Rated service short-circuit breaking capacity

Peripheral Devices and Options

● Magnetic Contactor

Base device selection on motor capacity.

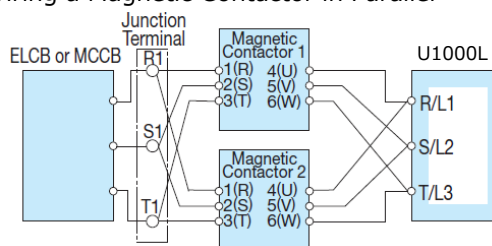


Magnetic Contactor
[Fuji Electric FA Components
& Systems Co., Ltd]

200 V Class

Motor Capacity kW	Utilization Category AC-1*1		Utilization Category AC-3*1	
	Model	Rated Current A	Model	Rated Current A
7.5	SC-4-1	32	SC-N2	35
11	SC-N1	50	SC-N2S	50
15	SC-N2	60	SC-N3	65
18.5	SC-N2S	80	SC-N4	80
22	SC-N2S	80	SC-N4	80
30	SC-N4	135	SC-N6	125

Wiring a Magnetic Contactor in Parallel



Note: When wiring contactors in parallel, make sure wiring lengths are the same to keep current flow even to the relay terminals.

400 V Class

Motor Capacity kW	Utilization Category AC-1*1		Utilization Category AC-3*1	
	Model	Rated Current A	Model	Rated Current A
15	SC-4-1	32	SC-N2	32
18.5	SC-N1	50	SC-N2S	48
22	SC-N1	50	SC-N2S	48
30	SC-N2	60	SC-N3	65
37	SC-N2S	80	SC-N4	80
45	SC-N3	100	SC-N5A	90

* 1 : Utilization categories for contactors according to IEC standards.

AC-1 : Typical application is non-inductive or slightly inductive loads, such as a heater. Normally select AC-1.

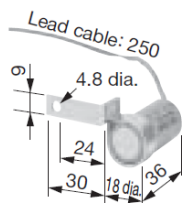
AC-3 : Typical application is squirrel cage motors: starting, switches off running motors. Select AC-3 to open the circuit during motor operation, such as for emergency stops.

* 2 : When two units are connected in parallel.

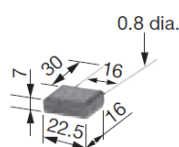
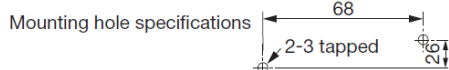
* 3 : Rated current for a single unit.

● Surge Protector

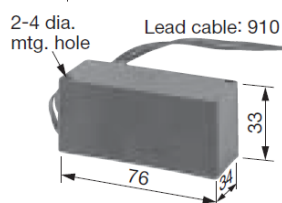
Dimensions mm



Weight: 22 g
Model: DCR2-50A22E



Weight: 5 g
Model: DCR2-10A25C



Weight: 150 g
Model: RFN3AL504KD

Product Line

[Nippon Chemi-Con Corporation]

Peripheral Devices		Model	Specifications	Code No.
200 to 230 V	Large-Capacity Coil (other than relay)	DCR2-50A22E	AC 220 V 0.5 μ F+200 Ω	C002417
200 to 240 V	Control Relay	MY2, MY3 [Omron Corporation] MM2, MM4 [Omron Corporation] HH22, HH23 [Fuji Electric FA Components & Systems Co., Ltd]	AC 250 V 0.1 μ F+100 Ω	C002482
380 to 480 V		RFN3AL504KD	DC 1000 V 0.5 μ F+220 Ω	C002630

Peripheral Devices and Options

● Zero Phase Reactor

Zero-phase reactor should match wire gauge.*

* : Current values for wire gauges may vary based on electrical codes.

The table below lists selections based on Japanese electrical standards and Yaskawa's ND rating.

Contact Yaskawa for questions regarding UL.

Finemet Zero-Phase Reactor to Reduce Radio Noise

Note: Finemet is a registered trademark of Hitachi Metals, Ltd.



【Hitachi Metals, Ltd.】

Connection Diagram

Compatible with the input and output side of the drive.

Example: Connection to output terminal

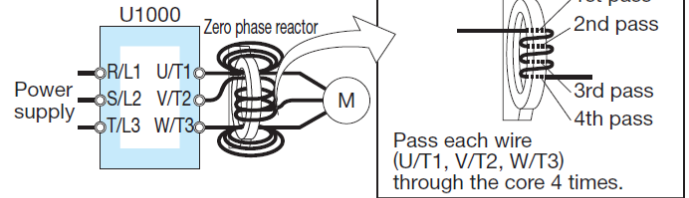
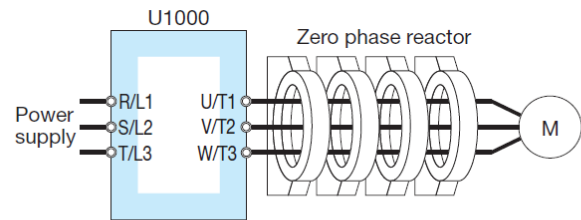


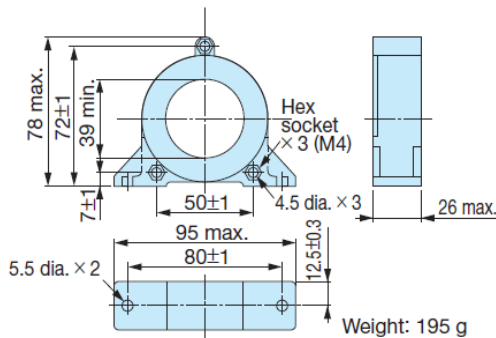
Diagram a



All wires (U/T1, V/T2, W/T3) should pass through the four cores of the reactor in series without winding.

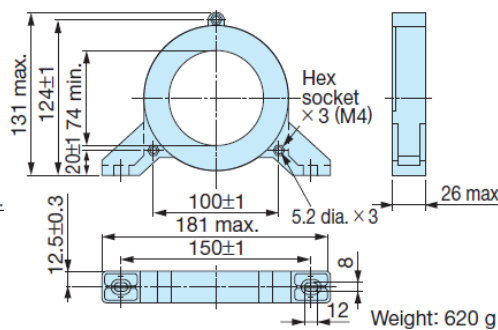
Diagram b

Dimensions mm



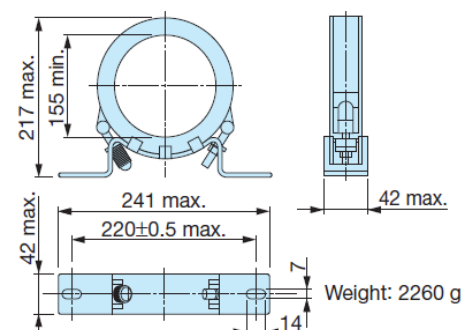
Model F6045GB

Weight: 195 g



Model F11080GB

Weight: 620 g



Model F200160PB

Weight: 2260 g

200 V Class

Model CIMR-UT□	U1000L	Zero Phase Reactor			
	Recommended Gauge mm2	Input Side/Output Side			
	Input Side/ Output Side	Model	Code No.	Qty.	Diagram
2□0028	14	F6045GB	FIL001098	4	b
2□0042	14	F6045GB	FIL001098	4	b
2□0054	22	F6045GB	FIL001098	4	b
2□0068	30	F6045GB	FIL001098	4	b
2□0081	38	F6045GB	FIL001098	4	b
2□0104	22×2P	F11080GB	FIL001097	4	b

400 V Class

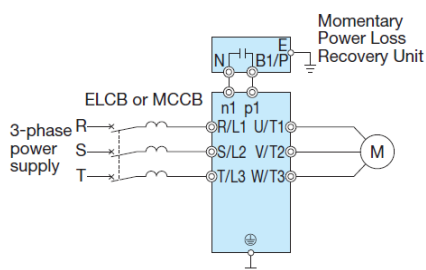
Model CIMR-UT□	U1000L	Zero Phase Reactor			
	Recommended Gauge mm2	Input Side/Output Side			
	Input Side/ Output Side	Model	Code No.	Qty.	Diagram
4□0034	14	F6045GB	FIL001098	4	b
4□0040	14	F6045GB	FIL001098	4	b
4□0052	22	F6045GB	FIL001098	4	b
4□0065	22	F6045GB	FIL001098	4	b
4□0077	38	F6045GB	FIL001098	4	b
4□0096	22×2P	F11080GB	FIL001097	4	b

● Momentary Power Loss Recovery Unit

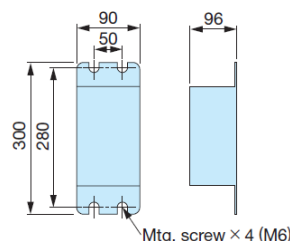


Weight: 2 kg

Connection Diagram



Dimensions (mm)



Model, Code No.

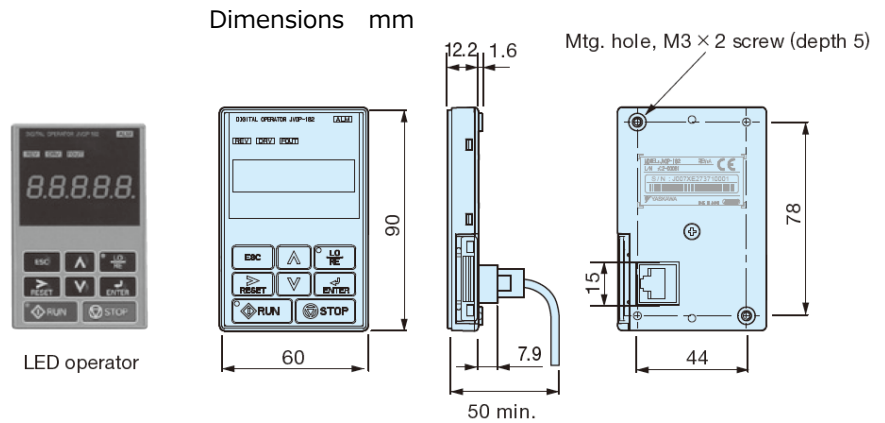
Model	Code No.
200 V 級用: P0010	100-005-752
400 V 級用: P0020	P0020

Note: Functions as a back-up power supply for drives up to 11 kW. Allows the drive to ride through a power loss up to 2 s long. The drive alone can continue running through a power loss lasting 0.1 s to 1.0 s. Results may vary with drive capacity.

Peripheral Devices and Options

●LED Operator

Model	Code No.
JVOP-182	100-142-916

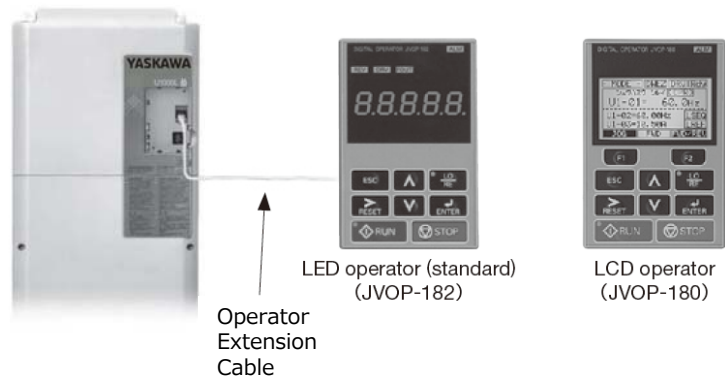


●Operator Extension Cable

Enables remote operation

Model	Code No.
WV001 (1m)	WV001
WV003 (3m)	WV003

Note: Never use this cable for connecting the drive to a PC. Doing so may damage the PC.



●Operator Mounting Bracket

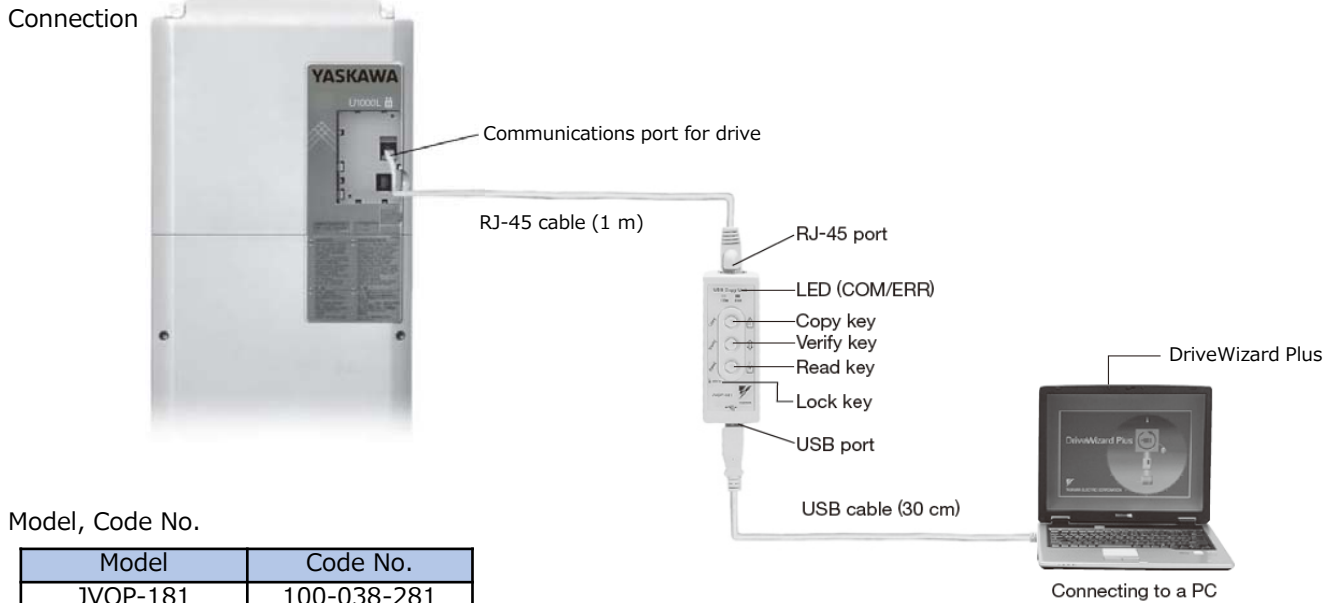
This bracket is required to mount the LED or LCD operator outside an enclosure panel.

Item	Model	Code No.	Installation	Notes
<p>Installation Support Set A</p>	EZZ020642A	100-039-992	<p>M4x10 truss head screw</p> <p>M3x6 pan head screw</p> <p>13.9</p> <p>50 min.</p>	For use with holes through the panel
<p>Installation Support Set B</p>	EZZ020642B	100-039-993	<p>M4 nut</p> <p>M3x6 pan head screw</p> <p>13.9</p> <p>50 min.</p>	<p>For use with panel mounted threaded studs</p> <p>Note: If weld studs are on the back of the panel, use the Installation Support Set B.</p>

Peripheral Devices and Options

●USB Copy Unit (Model: JVOP-181)

Copy parameter settings in a single step, then transfer those settings to another drive.
Connects to the RJ-45 port on the drive and to the USB port of a PC.



Note: JVOP-181 is a set consisting of a USB copy unit, RJ-45 cable, and USB cable.

- Note: 1. You can also use a commercially available USB 2.0 cable (with A-B connectors) for the USB cable.
2. No USB cable is needed to copy parameters to other drives.

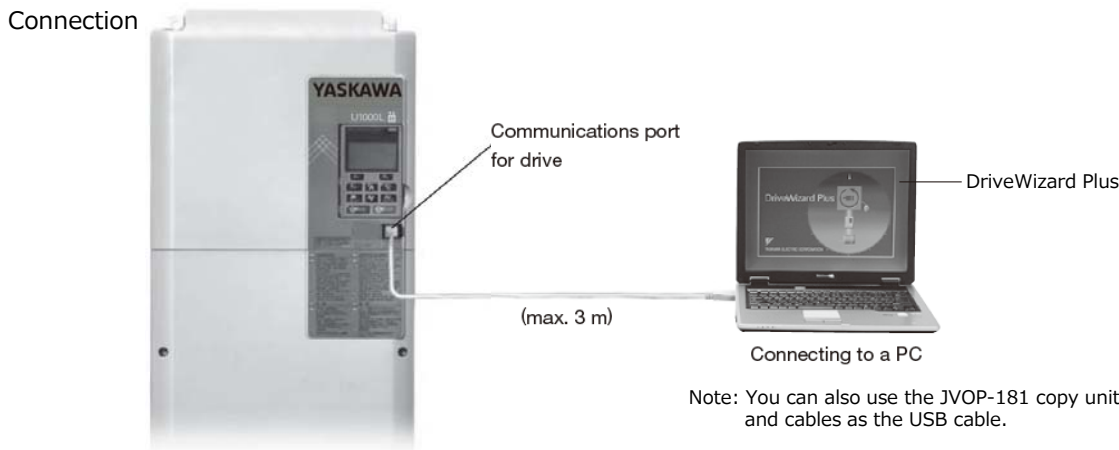
Specifications

Item	Specifications	
Port	LAN (RJ-45) Connect to the drive.	
	USB (Ver.2.0 compatible) Connect to the PC as required.	
Power Supply	Supplied from a PC or the drive	
Operating System	OS compatible with 32-bit memory	Windows 2000 Windows XP
	OS compatible with 32-bit and 64-bit memory	Windows 7
Memory	Memorizes the parameters for one drive.	
Dimensions	30 (W)×80 (H)×20 (D) mm	
Accessories	RJ-45 Cable (1 m), USB Cable (30 cm)	

- Note: 1. Drives must have identical software versions to copy parameters settings.
2. Requires a USB driver.
You can download the driver for free from Yaskawa's product and technical information website (<http://www.e-mechatronics.com>).
3. Parameter copy function disabled when connected to a PC.

●PC Cable

Cable to connect the drive to a PC with DriveWizard Plus installed.
Use a commercially available USB 2.0 cable (A-B connectors, max. 3 m).



- Note: 1. DriveWizard Plus is a PC software package for managing parameters and functions in Yaskawa drives. To order this software, contact your Yaskawa.
2. Requires USB driver. You can download the driver for free from Yaskawa's product and technical information website (<http://www.e-mechatronics.com>).

Peripheral Devices and Options

● Frequency Meter/Current Meter

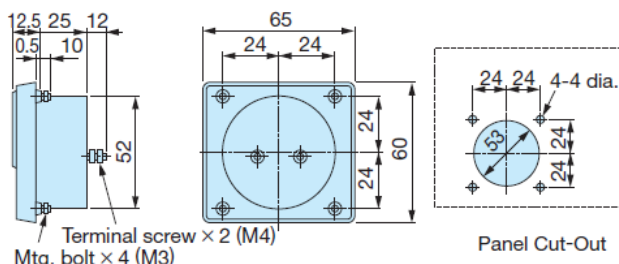


Model, Code No.

Model	Code No.
Scale-75 Hz full-scale: DCF-6A	FM000065
Scale-60/120 Hz full-scale: DCF-6A	FM000085
Scale-5 A full-scale: DCF-6A	DCF-6A-5A
Scale-10 A full-scale: DCF-6A	DCF-6A-10A
Scale-20 A full-scale: DCF-6A	DCF-6A-20A
Scale-30 A full-scale: DCF-6A	DCF-6A-30A
Scale-50 A full-scale: DCF-6A	DCF-6A-50A

Note: DCF-6A specifications are 3 V, 1 mA, and 3 k Ω inner impedance. Because the U1000L multifunction analog monitor output default setting is 0 to 10 V, set frequency meter adjusting potentiometer (20 k Ω) or parameter H4-02 (analog monitor output gain) within the range of 0 to 3 V.

Dimensions (mm)



Panel Cut-Out
Weight: 0.3 kg

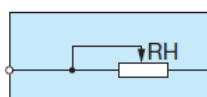
● Variable Resistor Board (installed to drive terminals)



Model, Code No.

Model	Code No.
Meter scale 20 k Ω	ETX3120

Connection Diagram



Weight: 20 g

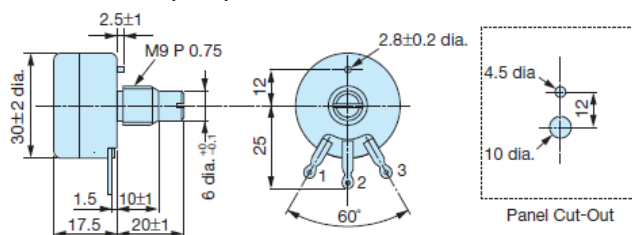
● Frequency Setting Potentiometer/Frequency Meter Adjusting Potentiometer



Model, Code No.

Model	Code No.
RV30YN20S 2 kΩ	RH000739
RV30YN20S 20 kΩ	RH000850

Dimensions (mm)



Weight: 0.2 kg

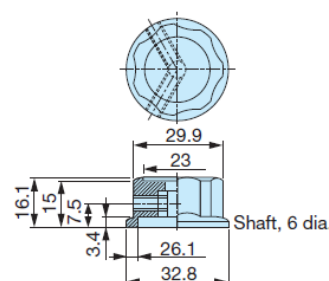
● **Control Dial for Frequency Setting Potentiometer/
Frequency Meter Adjusting Potentiometer**



Model, Code No.

Model	Code No.
CM-3S	HLNZ-0036

Dimensions (mm)



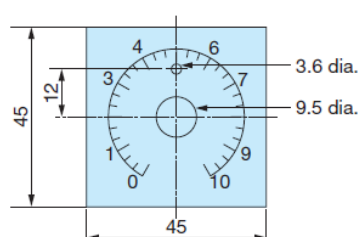
● Meter Plate for Frequency Setting Potentiometer/ Frequency Meter Adjusting Potentiometer



Model, Code No.

Model	手配番号
NPJT41561-1	NPJT41561-1

外形寸法 mm



Peripheral Devices and Options

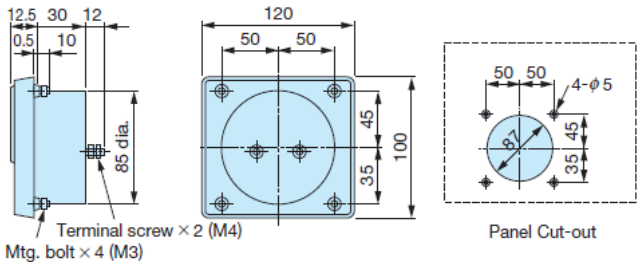
● Output Voltage Meter



Model, Code No.

Model	Code No.
Scale-300 V full-scale (Rectification Type Class 2.5: SCF-12NH)	VM000481
Scale-600 V full-scale (Rectification Type Class 2.5: SCF-12NH)	VM000502

Dimensions (mm)



● Potential Transformer

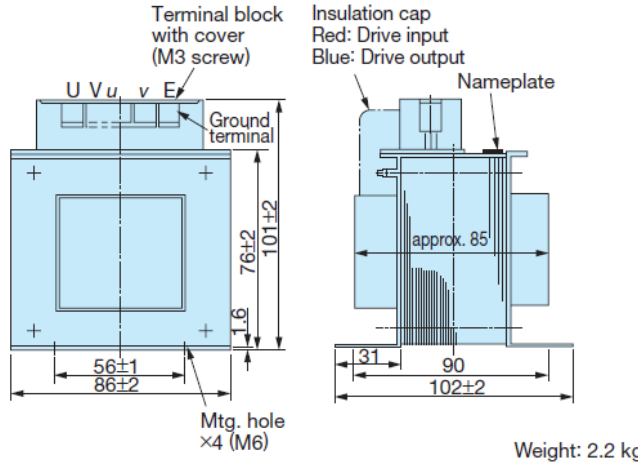


Model, Code No.

Model	Code No.
600 V meter for voltage transformer UPN-B 440/110 V (400/100 V)	100-011-486

Note: For use with a standard voltage regulator. A standard voltage regulator may not match the drive output voltage. Select a regulator specifically designed for the drive output (100-011-486), or a voltmeter that does not use a transformer and offers direct read out.

Dimensions (mm)



● Application Notes

Selection

■ Drive Rated Output Current

Make sure that the motor rated current is less than the rated output current for the drive.

■ When 2 Seconds is Required for Momentary Power Loss Ride-Thru Time

Use the units listed below when continuing drive operation after the power is restored even after a momentary loss of power of 2 seconds occurs:

- 200 V class Momentary Power Loss Ride-Thru unit: Model No. P0010
- 400 V class Momentary Power Loss Ride-Thru unit: Model No. P0020

■ Drive Start-Up Time

The drive requires 1.5 seconds to prepare for operation after the power is turned on. Be mindful of this delay when using an external reference input.

Note: 1.5 seconds is the required time when no optional devices are used with the drive. When using an optional communication device, the time required for the drive to be ready for operation will vary in accordance with the start up time of the communication card.

■ Selection of Power Supply Capacity

Use a power supply that is greater than the rated input capacity (kVA) of the drive. If the power supply is lower than the rated capacity of the drive, the device will be unable to run the application properly and will trigger a fault.

The rated input capacity of the drive, $SCONV$ (kVA) : can be calculated by the following formula:

$$SCONV = \sqrt{3} \times I_{in} \times V_{in} / 1000$$

(I_{in} : Rated input current [A], V_{in} : Applicable power supply voltage [V])

■ Connection to Power Supply

The total impedance of the power supply and wiring for the rated current of the drive is $\%Z = 10\%$ or more. Power voltage distortion may occur when the impedance of the power supply is too large. When wiring over long distances, be sure to take preventative measures such as using thick cables or series wiring to lower the impedance of wiring. Contact Yaskawa for details.

■ Grounding the Power Supply

Yaskawa recommends using a dedicated ground for the power supply, as the drive is designed to run with a 1:1 ratio relative to the power supply. Ground other devices as directed in the specifications for those devices. Take particular care when connecting sensitive electronic equipment such as OA devices. Separate ground lines and install a noise filter to prevent problems from noise.

■ When Using a Generator as a Power Supply

Select the generator capacity approximately twice as large as the drive input power supply capacity. Set the deceleration time or load so that the regenerative power from the motor will be 10% or less of the generator capacity. For further information, contact a Yaskawa representative.

■ When a Phase Advance Capacitor or Thyristor Controller is Provided for the Power Supply

The drive does not require a phase advance capacitor. Installing a phase advance capacitor to the drive will weaken the power factor.

Attach a phase-advance capacitor with a series reactor to prevent oscillation with the drive after installing the phase advance capacitor on the same power supply system as the drive. Contact Yaskawa or your Yaskawa agent when a device generating voltage surge or voltage distortion such as DC motor drive thyristor controller or magnetic agitator is installed on the same power supply system.

■ Prevention Against EMC or Harmonic Leakage Current

Use units with built-in EMC filters that have the CE marking. Use a zero-phase reactor as a noise filter when a device that will be affected by noise is near the drive.

■ Effects of Power Supply Distortion

Distortion of the power supply voltage increases the harmonics contents due to power supply harmonics entering the drive.

■ Starting Torque

The startup and acceleration characteristics of the motor are restricted to the drive's overload current rating (150% rated current for 60 s). The overload rating for the drive determines the starting and accelerating characteristics of the motor. Expect lower torque than when running from line power. To achieve a higher starting torque, use a larger drive, or a drive and motor with larger capacity.

■ Output Short Circuit

In an elevator with a synchronous motor, the three-phase motor line can be short-circuited to generate a holding force for the motor while stopping, and to generate a large braking force during power loss or emergency stop. In this case, select the appropriate motors and perform an interlock. Failure to comply could cause damage the drive and motor or mechanical shock. Contact Yaskawa or your nearest sales representative for details.

Carrier Frequency Derating

When the carrier frequency of the drive is increased above the factory default setting, the rated output current of the drive should be reduced. Refer to the instruction manual of the drive for details on this function.

Settings

■ DC Injection Braking

Motor overheat can result if there is too much current used during DC Injection Braking, or if the time for DC Injection Braking is too long.

■ Acceleration/Deceleration Times

Acceleration and deceleration times are affected by how much torque the motor generates, the load torque, and the inertia moment. Set a longer accel/decel time when Stall Prevention is enabled. The accel/decel times are lengthened for as long as the Stall Prevention function is operating. For faster acceleration and deceleration, use a larger drive and motor.

Compliance with Harmonic Suppression Guidelines

- Guidelines for harmonic suppression measures are applicable to consumers that receive power from a 6.6 kV or higher system. For details, refer to the Harmonics Suppression Technical Guideline JEAG 9702-2013.
- With respect to the harmonic suppression guidelines, the U1000L is a Matrix Converter and does not generate harmonics ($K5=0$). However, the harmonic component is not completely zero.

General Handling

■ Installing a Ground Fault Interrupter or an MCCB

We recommend that you install ground fault interrupter (ELCB) for wire protection and as protection against secondary damage for faults. Also, if short circuit cutoffs are permitted in the upstream power supply system, we recommend that you use a molded case circuit breaker (MCCB). We recommend that you select an ELCB designed for AC drives (one with high-frequency countermeasures). Select the MCCB based on the power supply power factor of the Matrix Converter (depends on the power supply voltage, output frequency, and load).

■ Magnetic Contactor Installation

Use a magnetic contactor (MC) to ensure that power to the drive can be completely shut off when necessary. The MC should be wired so that it opens when a fault output terminal is triggered. Avoid switching a magnetic contactor on the power supply side more frequently than once every 30 minutes. Frequent switching can cause damage to the drive.

■ Inspection and Maintenance

Capacitors for the control power supply take time to discharge even after the power has been shut off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components. The heatsink can become quite hot during operation, and proper precautions should be taken to prevent burns. When replacing the cooling fan, shut off the power and wait at least 15 minutes to be sure that the heatsink has cooled down. Even when the power has been shut off for a drive running a PM motor, voltage continues to be generated at the motor terminals while the motor coasts to stop. Take the precautions described below to prevent shock and injury:

- Applications where the machine can still rotate even though the drive has fully stopped should have a load switch installed to the output side of the drive. Yaskawa recommends manual load switches from the AICUT LB Series by AICHI Electric Works Co., Ltd.
- Do not allow an external force to rotate the motor beyond the maximum allowable speed, also when the drive has been shut off.
- Wait for at least the time specified on the warning label after opening the load switch on the output side before inspecting the drive or performing any maintenance.
- Do not open and close the load switch while the motor is running, as this can damage the drive.
- If the motor is coasting, make sure the power to the drive is turned on and the drive output has completely stopped before closing the load switch.
- Before performing maintenance and inspections, make sure the synchronous motor is stopped. Failure to do so may result in electric shock.
- Do not change wiring or connect/disconnect connectors while the power is on. Doing so may result in injury.

■ Wiring

All wire ends should use ring terminals for UL/cUL compliance. Use only the tools recommended by the terminal manufacturer for crimping.

■ Transporting the Drive

Never steam clean the drive.
During transport, keep the drive from coming into contact with salts, fluorine, bromine, phthalate ester, and other such harmful chemicals.

● Notes on Motor Operation

■ Insulation Tolerance

Consider voltage tolerance levels and insulation in applications with an input voltage of over 440 V or particularly long wiring distances. Contact Yaskawa or your Yaskawa agent for consultation.

■ High Speed Operation

Problems may occur with the motor bearings and dynamic balance in applications operating at over 60 Hz.
Contact Yaskawa for consultation.

■ Torque Characteristics

Torque characteristics differ when operating directly from line power. The user should have a full understanding of the load torque characteristics for the application.

■ Vibration and Shock

U1000L lets the user choose high carrier PWM control. Selecting Closed Loop Vector Control can help reduce motor oscillation. Keep the following points in mind when using high carrier PWM:

- Resonance
Take particular caution when using a variable speed drive for an application that is conventionally run from line power at a constant speed.
- Any imperfection on a rotating body increases vibration with speed.
Caution should be taken when operating above the motor rated speed.

■ Audible Noise

Noise created during run varies by the carrier frequency setting. Using a high carrier frequency creates about as much noise as running from line power. Operating above the rated speed can create unpleasant motor noise.

■ Using a Synchronous Motor

- Loosen the holding brake and then accelerate the motor. If the timing between the holding brake operation and motor start does not match, the motor may stall. Select a PG and an encoder in accordance with the type of the synchronous motor.
- When operating the synchronous motor for the first time or after replacing the drive or the synchronous motor, configure the drive with the correct motor parameters. Be sure to confirm that the motor speed is detected before starting operation.
Failure to do so may result in insufficient torque, which may cause the synchronous motor to be pulled towards the load or motor operation to be inconsistent with commands (reverse operation, no operation, sudden acceleration, etc.)
Refer to the synchronous motor instruction manual for more information.
- When driving the synchronous motor with an option card other than for the absolute encoder such as the PG-F3 and using a brake sequence that is not recommended for the drive, create a sequence to loosen the brake externally after the run command is input and the Rotor Position Detection Complete signal changes to a closed state.
Failure to do so may cause the elevator car to be pulled by the counterweight, which may cause injury.
- Make sure the synchronous motor is stopped before performing maintenance, inspections, and wiring.
- If the synchronous motor is running even after the power to the drive is turned off, make sure that the outputs of the synchronous motor and the drive are shut off. Failure to do so may cause injury.
- When using the synchronous motor, make sure that the motor rated current is within the rated output current specified for the drive to prevent demagnetization of the synchronous motor.

MEMO

U1000L

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YASKAWA

YASKAWA ELECTRIC CORPORATION

In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply. Specifications are subject to change without notice for ongoing product modifications and improvements.

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