

YASKAWA

LOW HARMONICS REGENERATIVE MATRIX CONVERTER

U1000

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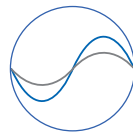
U1000 – The Drive for Maximum Efficiency

The U1000 is a highly efficient inverter drive based on latest Matrix converter technology. With full power regeneration capability it offers great energy saving potential while sinusoidal input currents and a power factor close to one reduce stress on grid components like transformers and power lines. With an ultra-compact shape the U1000 is the first choice for innovative, energy-efficient drive solutions with or without power regeneration.



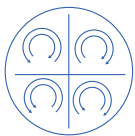
INNOVATIVE MATRIX TECHNOLOGY

The U1000 comes without a DC bus and provides highly efficient direct conversion of power from AC to AC up to a maximum output frequency of 400Hz. With this and the capability to run induction as well as permanent magnet motors with and without encoder feedback U1000 is the perfect match for a variety of applications and machinery.



CLEAN POWER

The sinusoidal input current with a total harmonic distortion of less than 5% and a displacement power factor of ~1 minimize losses in grid components like generators and transformers. This, at the same time, greatly reduces the potential of disturbance of other devices and improves the reliability of a machine or installation.



ENERGY SAVING 4Q OPERATION

Thanks to Matrix technology U1000 can operate fully regenerative, means braking energy is fed back to the grid and made available for other consumers. By that not only energy cost are reduced but also braking resistors and their cooling become obsolete and the risk of fire is reduced.



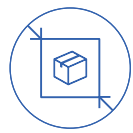
TIME SAVING INSTALLATION

As no external components are required, connecting a U1000 drive becomes a matter of minutes. 3 wires in, 3 wires out, done. It cannot be easier to build up a low harmonic regenerative solution.



FUNCTIONAL SAFETY BUILT IN

U1000 has a SIL3 STO function built in and so offers a simple solution for improving machine safety.



UP TO 50% SMALLER

U1000 does not need any external components like AC chokes or harmonic filters. Even an EMC filter is built in.* Nevertheless the required installation space is up to 50% smaller than other regenerative or low-harmonic drive solutions.



REDUCE COSTS

In addition to a reduction of energy consumption U1000 provides cost saving benefits by a simplified installation, smaller space requirements and smaller panels, less cooling requirement and less need for maintenance.

* up to and including 477 A



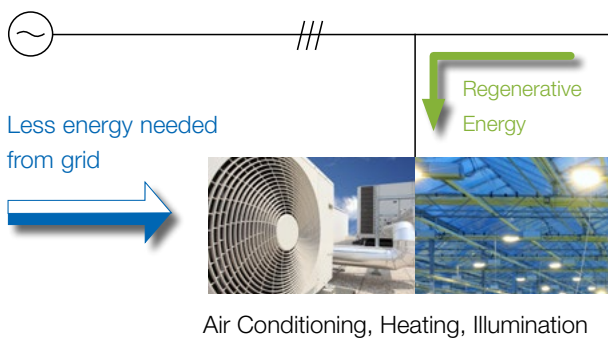
Power Regeneration to Maximize Efficiency

Rising energy cost and polluted power supply systems continuously drive the need for low harmonics and power regeneration. The U1000 offers both without the complexity of traditional solutions. On first sight it looks like a new Inverter Drive. But it contains all you need to get a system architecture with maximum efficiency at a minimum footprint.

Built In Power Regeneration

The U1000 has power regeneration built in. Braking energy that is typically wasted in resistors can be used by other consumers in the same grid, saving energy and cost.

- ▶ Saves energy
- ▶ Less heat generation, reduced need for ventilation
- ▶ Greatly reduced risk of fire
- ▶ Less maintenance
- ▶ Less parts

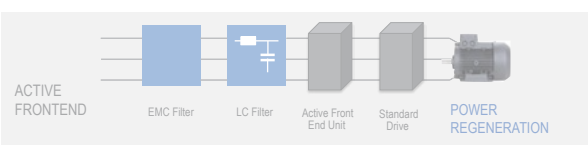


Compact and Easy

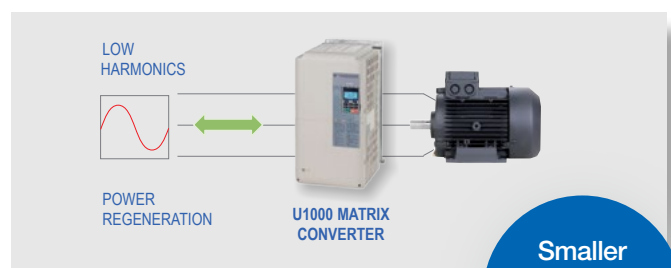
The all-integrated design of the U1000 reduces the required installation space for more than 50%. Traditional regenerative and low harmonic solutions often use external transformers, reactors, and filter circuits. Not so the U1000. EMC and current filter components are built in and external components are not necessary.

The U1000 needs only a minimum of space and is easily installed in shortest time.

- ▶ Smaller panels
- ▶ Less components to handle
- ▶ Simple installation in short time
- ▶ Perfectly fits in existing installations - easy retro fit



Traditional low harmonics and regenerative solutions



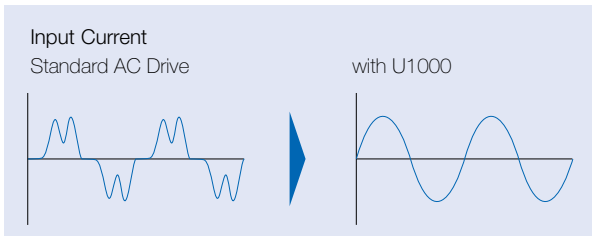
U1000 Matrix Converter Solution

Features and Functions

Clean Power

With the U1000, typical field problems caused by current harmonics, such as excessive heating of power grid devices or malfunction of peripheral electronics, are history. The U1000 matrix converter provides clean power with a total harmonic current distortion of less than 5%.

- ▶ No over-dimensioning of transformers, generators or cables
- ▶ Less watt loss on power grid components
- ▶ Sinusoidal input current with $\cos \phi \sim 0.98$
- ▶ Easy installation by all-integrated design
- ▶ Reduced lifecycle cost



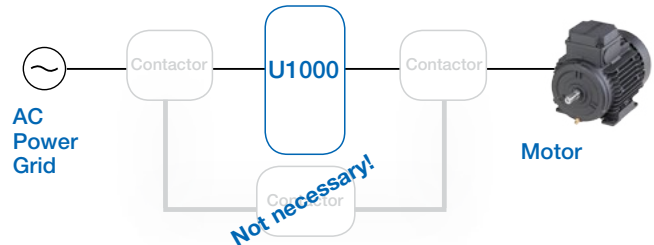
- ▶ No trouble in IT and Control Systems
- ▶ Reliable Operation

U1000 – A Class of its Own

- ▶ Precise control of induction and permanent motors with or without encoder
- ▶ Highly efficient AC to AC direct conversion
- ▶ Automatic motor data adjustment
- ▶ Built in EMC filter
- ▶ 13 language full text keypad built in
- ▶ 10 years maintenance free design

Built In Bypass Operation

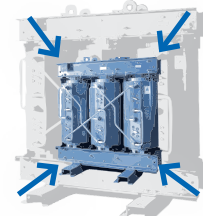
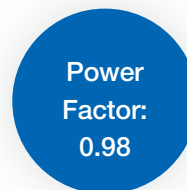
The U1000 has a built in bypass function. Whenever an application is running at the frequency and voltage of the power grid, U1000 can stop modulating the output and switch the motor directly to the grid.



- ▶ No external components needed
- ▶ Minimum watt loss on drive
- ▶ Silent motor operation

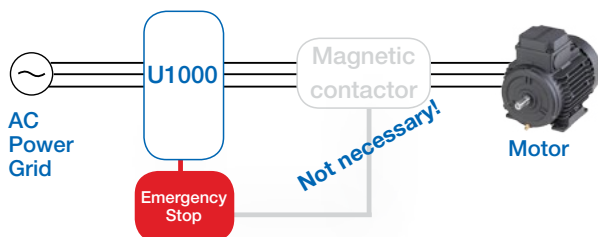
Smaller Transformers and Generators

The U1000 provides a power factor close to One. By that it reduces losses in generators, transformers and cables, allowing a size down of these components for new installations or the possibility to add more drives to an existing installation without increasing transformer power.



Built In Functional Safety

The U1000 comes with a built in dual-channel safe torque off (STO) function that meets the requirements of SIL3/PlE and offers an easy way to improve machine safety without the need for complex external wiring.



- ▶ Simple wiring
- ▶ Less components and higher reliability

Engineering Tools for YASKAWA Inverter Drives

DriveWorksEZ

DriveWorksEZ® adds programmable functions that can tailor the U1000 matrix converters to the machine without the help of external controllers such as a PLC. This provides the user with easy access to the power of the inverters through an icon-based, graphical programming environment.



Benefits

- ▶ PLC or other external controllers not necessary
- ▶ Easy to use
- ▶ Constant scan cycle of 1 ms
- ▶ Easy to learn graphical programming with online monitoring
- ▶ Higher reliability and less cost by lower number of components

Example Projects

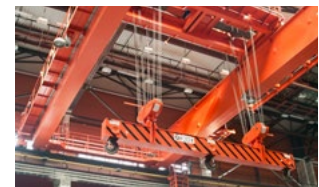
Economically optimized water skiing facility

- ▶ No additional I/Os necessary
- ▶ No PLC required - reduced system cost to less than 50% of the initial estimate



Efficient brake sequence

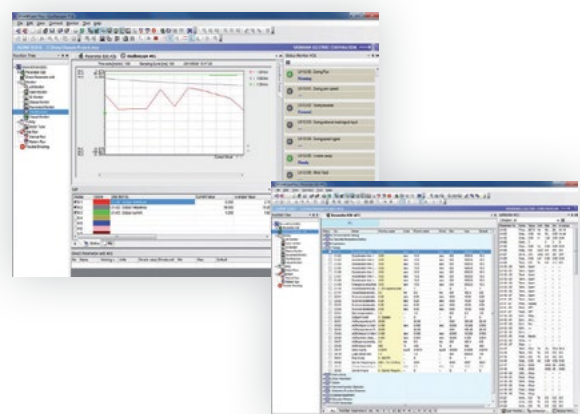
- ▶ Flexible Sequence for mechanical brake of hoists
- ▶ Avoids brake wear and unsafe operation



DriveWizard Plus for easy Engineering

Manage the unique settings for all your drives right on your 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.

- ▶ All in one tool for parameter management, drive setup, monitoring and fault diagnostics
- ▶ Convenient PC-based drive-setup, monitoring and diagnostic functions
- ▶ Built in Scope function
- ▶ Online and offline parameter editing



For a Wide Range of Industries

The U1000 Matrix Converter Unit saves energy and thereby money by reusing braking energy and providing a clean power supply. The maximum effect can be realized in applications with large-inertia loads, 4-quadrant loads, long-term energy feedback and quick braking.



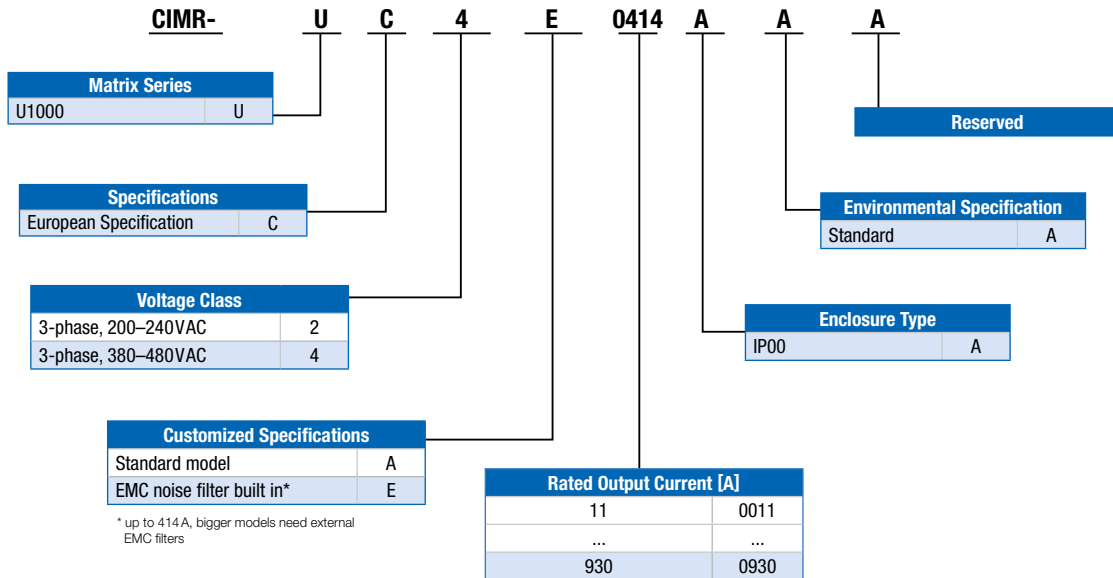
- ▶ Centrifugal Separators
- ▶ Eccentrics
- ▶ Presses

Communication Options

- ▶ RS-422/485 (MEMOBUS/Modbus at 115.2 kbps) standard on all models
- ▶ Option cards available for all major fieldbuses



Model Number Key for the U1000 Matrix Converter



U1000 Matrix Converter

Voltage Class	Rated Output Current [A]		Framesize	Part Number			
	Heavy Duty (HD)	Normal Duty (ND)		CIMR-UC2A□□□□AAA	LC Filter (necessary)	EMC Filter	
200 V	22	28	1	0028	integrated	integrated	
	28	42		0042			
	42	54	2	0054			
	54	68		0068			
	68	81	3	0081			
	81	104		0104			
	104	130	4	0130			
	130	154		0154			
154	192	5	0192				
192	248		0248				
				CIMR-UC4A□□□□AAA			
400 V	9.6	11	1	0011	integrated	integrated	
	11	14		0014			
	14	21		2			0021
	21	27					0027
	27	34		3			0034
	34	40					0040
	40	52	4	0052			
	52	65		0065			
	65	77	5	0077			
	77	96		0096			
	96	124	6	0124			
	124	156		0156			
	156	180	7	0180			
	180	216		0216			
	216	240	8	0240			
	240	302		0302			
	302	361	7	0361			
	361	414		0414			
414	477	8	0477				
477	590		0590				
590	720	7	0720	EUJ711830	B84143B1000S080		
720	900		0900	EUJ711840			
900	930	8	0930	EUJ711850	B84143B1600S080		

Options and Specifications

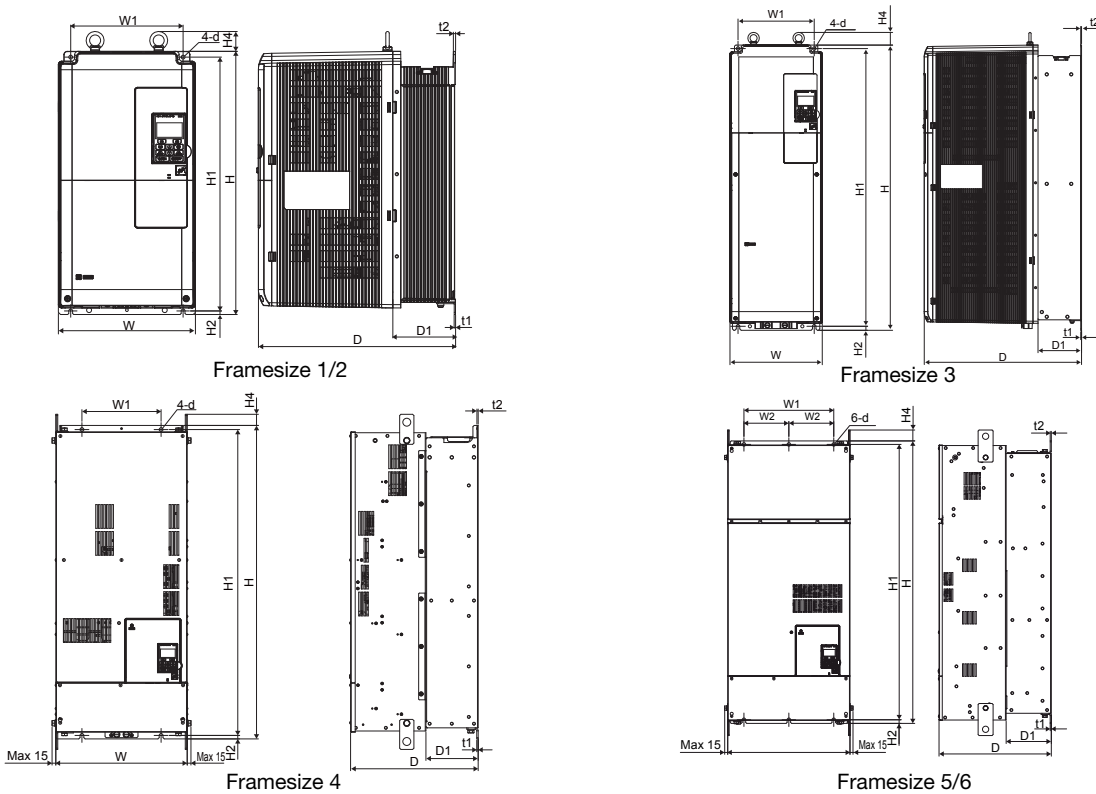
Options

	Item	Description	Model Code
Input/ Output	▶ Analogue Monitor	2 channel analogue output option -10 to +10VDC (Resolution 1/2048)	AO-A3
	▶ Digital Output	8 channel digital output option 6 photo couplers (48V, 50mA or less), 2 relay contact outputs max 250VAC / 30VDC, 1A	DO-A3
	▶ Analogue Input	3 channel analogue input option -10 to +10VDC (20kΩ, Resolution 1/8192), 4 to 20mA (500Ω, Resolution 1/6554)	AI-A3
	▶ Digital Input	1 channel digital input option 16bit binary, 2 digit BCD + sign signal + set signal, +24V (isolated), 8mA 2 relay contact inputs max. 250VAC / 30VDC, 1A	DI-A3
Communication	▶ Communication Interface Unit	CanOpen	SI-S3
		CC-Link	SI-C3
		DeviceNET	SI-N3
		EtherCAT	SI-ES3
		EtherNET/IP	SI-EN3 / SI-END3
		MECHATROLINK-II	SI-T3
		MECHATROLINK-III	SI-ET3
		Modbus TCP/IP	SI-EM3
		POWERLINK	SI-EL3
		PROFIBUS-DP	SI-P3
PROFINET	SI-EP3		
Speed Feedback	▶ Open Collector Type	Phase A, B, and Z pulse, max. 50kHz	PG-B3
	▶ Line Driver Type	A+, A-, B+, B-, Z+, Z- pulse (RS-422), max. 300kHz, pulse monitor output	PG-X3
Others	▶ USB Copy Unit	USB converter for PC Tool usage and copy unit for easy parameter setup duplication and backup in one	JVOP-181
	▶ IP65 Operator Mounting Frame	Provides a simple way of installing the LCD Remote Operator of the drive on a cabinet wall or door	JVOP-V11001
	▶ DriveWizard Plus	Software used for parametrization	
	▶ IP20/NEMA Kit	Framesize 1: EZZ022745A, Framesize 2: EZZ022745B, Framesize 3: EZZ022745C, Framesize 4: EZZ022745D, Framesize 5: EZZ022745E, Framesize 6: EZZ022745F Framesize 7: EZZ022745G	
	▶ Heatsink Kit	Framesize 1: EZZ022706A, Framesize 2: EZZ022706B, Framesize 3: EZZ022706C, Framesize 4: EZZ022706D, Framesize 5: EZZ022706E, Framesize 6: EZZ022706F, Framesize 7/8: possible with standard model, no kit needed	

Specifications

Operating Environment	▶ Ambient Temperature	-10 to +50 °C
	▶ Humidity	95 % RH or less (non condensating)
	▶ Storage Temperature	-20 to +60 °C (short-term temperature during transportation)
	▶ Altitude	Up to 1000meters (output derating required above 1000m, max. 3000m)
	▶ Shock	10 to 20Hz: 9.8m/s ² ; 20 to 55Hz: 5.9m/s ² , (UC2A0028 - UC2A0081, UC4A0011 - UC4A0077) 2.0m/s ² (UC2A0104 - UC2A0248, UC4A0096 - UC4A0414)
	▶ Protective Design	IP00 Open Type enclosure standard, IP20/NEMA Type 1 Kit optional
	▶ Standards	UL508C, IEC/EN 61800-3, IEC/EN 61800-5-1, ISO/EN 13849-1 Cat.3 PLe, IEC/EN 61508 SIL3
Power Ratings	▶ Input Voltage / Range	200 to 240 VAC 50/60Hz (-15 % to +10 %), 380 to 480 VAC 50/60Hz (-15 % to +10 %)
	▶ Rated Input Frequency	50/60 Hz ± 3 %
	▶ Output Frequency Range	0 - 400Hz
	▶ Input Power Factor	0.98 min (for rated operation)
	▶ Overload Capability	Heavy Duty: 150 % for 1 min, Normal Duty: 120 % for 1 min
	▶ Frequency	4 - 10kHz

Models up to 414A Rated Current



U1000 Matrix Converter 200V

Part Number Kit	Rated Current [A]		Frame-size	Dimensions [mm]										Weight [kg] with integrated EMC filter		Weight [kg] Standard model		
	Normal Duty (ND)	Heavy Duty (HD)		W	H (IP00)	H (IP20)	D	W1	H1	H2	H4	D1	d	IP00	IP20	IP00	IP20*	
CIMR-UC2□□□□AAA																		
0028	28	22	1	250	480	524	360	205	463	6.5	40	100	7	21	22.5	20	21.5	
0042	42	28													33	35	32	34
0054	54	42		2	264	650	705	420	218	629	11.5	40	115.5	10	36	38	35	37
0068	68	54																
0081	81	68																
0104	104	81	3	264	816	885	450	218	795	11.5	40	124.5	10	63	65	60	62	
0130	130	104																
0154	154	130																
0192	192	154	4	415	990	1,107	403	250	966	11.0	40	165	12	115	118	110	113	
0248	248	192																
			5	490	1,132	1,320	450	360	1,104	14.5	49	181	14	181	185	176	180	

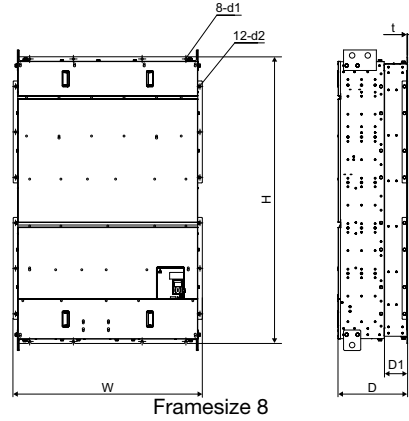
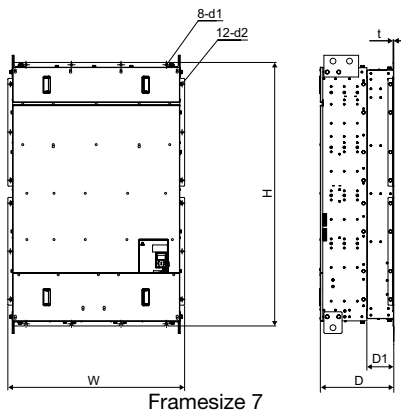
* with optional NEMA1/IP20 kit

U1000 Matrix Converter 400V

Part Number Kit	Rated Current [A]		Frame-size	Dimensions [mm]										Weight [kg] with integrated EMC filter		Weight [kg] Standard model			
	Normal Duty (ND)	Heavy Duty (HD)		W	H (IP00)	H (IP20)	D	W1	H1	H2	H4	D1	d	IP00	IP20	IP00	IP20*		
CIMR-UC4□□□□AAA																			
0011	11	9.6	1	250	480	524	360	205	463	6.5	40	100	7	21	22.5	20	21.5		
0014	14	11																	
0021	21	14		2	264	650	705	420	218	629	11.5	40	115.5	10	33	35	32	34	
0027	27	21														36	38	35	37
0034	34	27																	
0040	40	34	3	264	816	885	450	218	795	11.5	40	124.5	10	63	65	60	62		
0052	52	40																	
0065	65	52																	
0077	77	65	4	415	990	1,107	403	250	966	11	40	165	12	115	118	110	113		
0096	96	77																	
0124	124	96	5	490	1,132	1,320	450	360	1,104	14.5	49	181	14	181	185	176	180		
0156	156	124																	
0180	180	156	6	695	1,132	1,460	450	560	1,102	14.5	65	178	14	267	278	259	270		
0216	216	180																	
0240	240	216																	
0302	302	240																	
0361	361	302																	
0414	414	361																	

* with optional NEMA1/IP20 kit

Models from 477 A to 930 A Rated Current



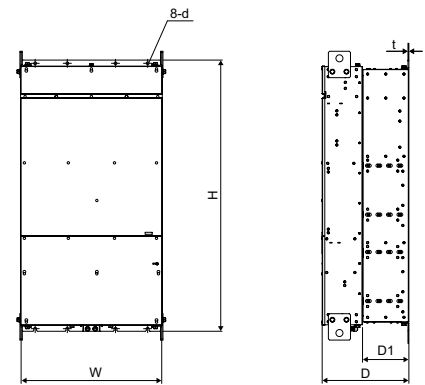
Matrix-Converter U1000 400V

Part Number Kit	Rated Current [A]		Frame-size	Dimensions [mm]								Weight [kg]	
	Normal Duty (ND)	Heavy Duty (HD)		W	H (IP00)	H (IP20)	D	D1	t	d1	d2	IP00	IP20*
0477	477	414	7	1,070	1,595	1,853	445	163	4.5	14	15	560	570
0590	590	477										630	-
0720	720	590										-	-
0900	900	720	8	1,210	1,835	-	-	150	4.5	14	15	630	-
0930	930	900										-	-

* with optional NEMA1/IP20 kit

LC Filter Module 400V

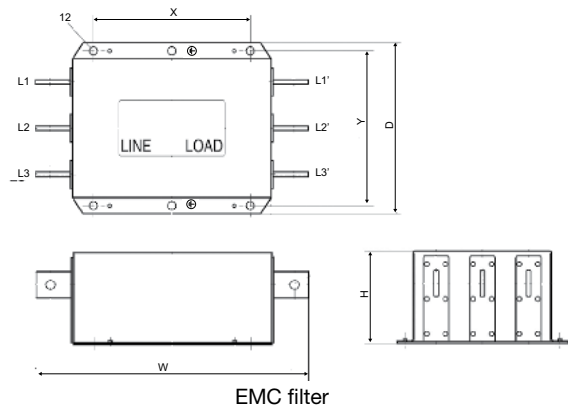
Model Number		Dimensions [mm]								Weight [kg]
LC Filter	CIMR-UC4□□□□AAA	W	H (IP00)	H (IP20)	D	D1	t	D1		
EUJ711830	0720	700	1,350	-	432	231	4.5	14	345	
EUJ711840	0900									
EUJ711850	0930									



LC filter module

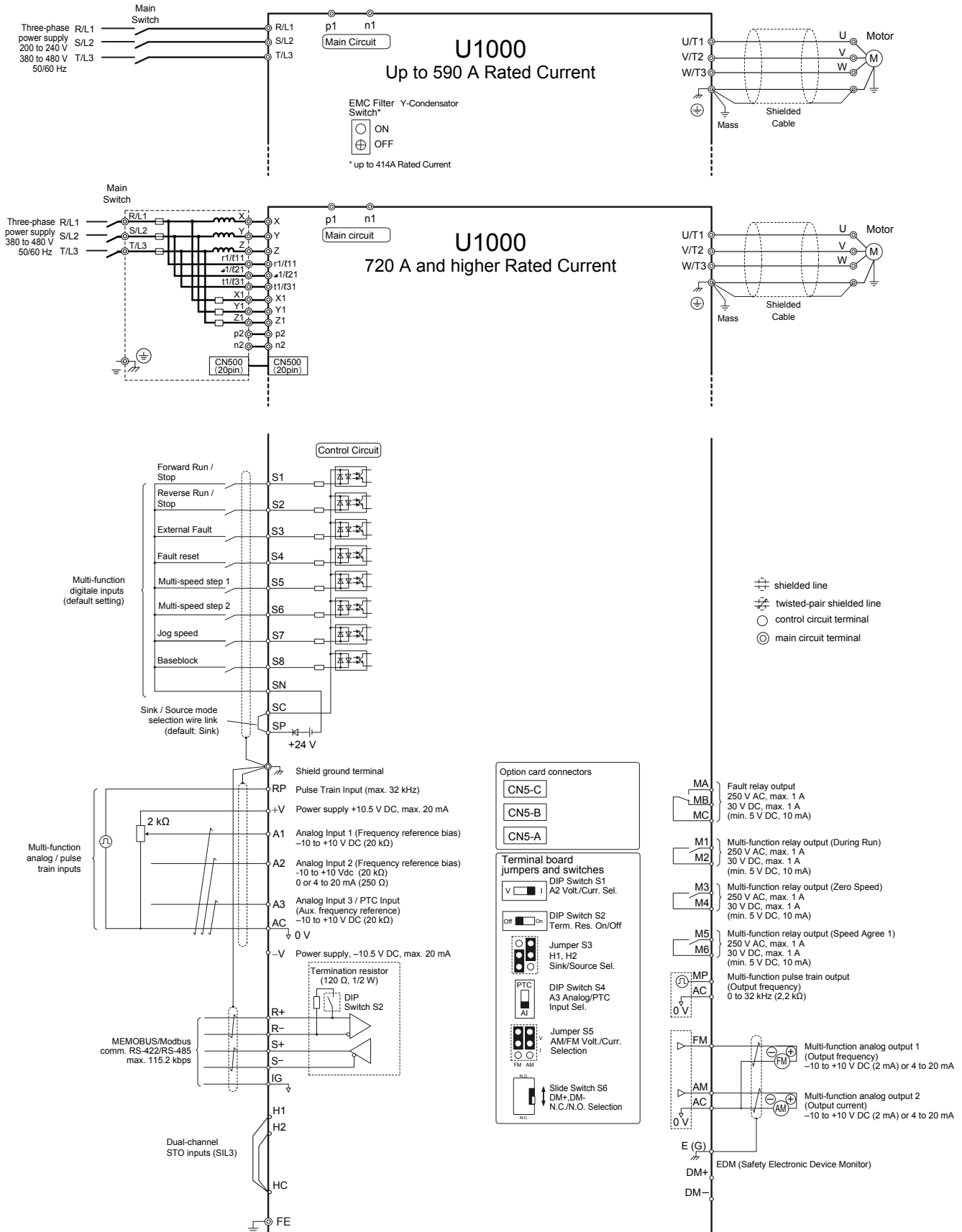
EMC Filter 400V

Model Number		Dimensions [mm]			Weight [kg]
EMC Filter	CIMR-UA4A□□□□AAA	W	H	D	
B84143B1000S080	0477	410	140	260	18.5
	0590				
B84143B1600S080	0720	490	140	260	24.5
	0900				
	0930				



EMC filter

Standard Connection Diagram





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