

CIMR-E7Z

# Varispeed E7

## Frequency inverter for pumps and fans

- Energy saving function.
- Advanced PID controller with dedicated HVAC functions.
- 12 pulse operation for harmonics reduction.
- Speed search.
- Standard RS-485 communication - MODBUS.
- Optional network cards (DeviceNet, PROFIBUS, CANOpen, LONWORKS).
- CE, UL, and cUL marked and Germanischer Lloyds approval.
- Embedded OMRON PLC functionality with PLC option card
- PC configuration tool CX-drive.
- CE, UL, and cUL marked and Lloyds approval.

## E7IP54

- Robust metal chassis.
- LCD operator.
- Built in RFI filter.

## Customized software

- The inverter software can be customized to meet specific application. Examples:
- Pump sequencer (S-8801).

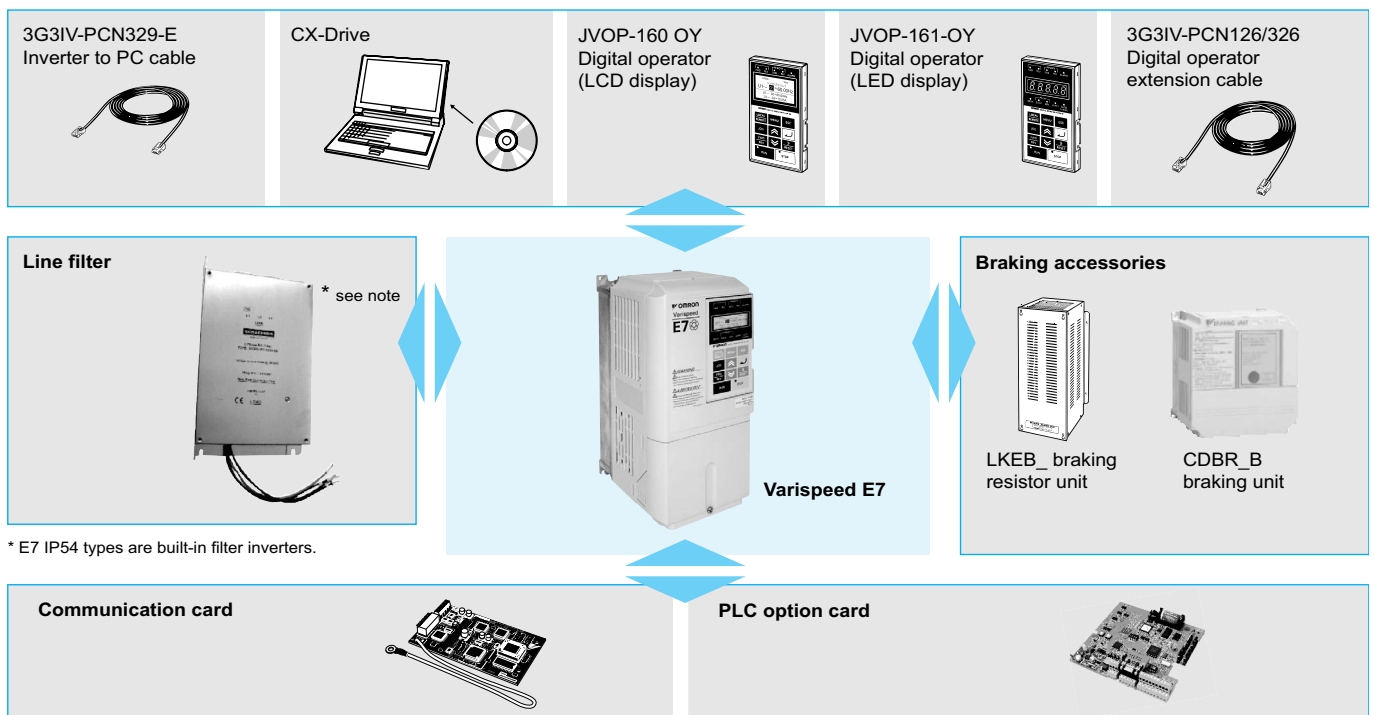
\*For detailed information please refer to CASE software section.

## Ratings

- 200 V Class 0.4 to 110 kW.
- 400 V Class 0.4 to 300 kW.

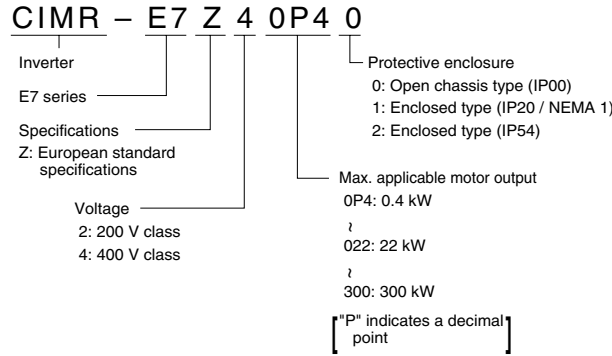


## System configuration



\* E7 IP54 types are built-in filter inverters.

Type designation



200 V class

Model CIMR-E7Z□		20P4	20P7	21P5	22P2	23P7	25P5	27P5	2011	2015	2018	2022	2030	2037	2045	2055	2075	2090	2110
Max. applicable motor output <sup>1</sup> Kw		0.55	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
Output characteristics	Inverter capacity kVA	1.2	1.6	2.7	3.7	5.7	8.8	12	17	22	27	32	44	55	69	82	110	130	160
	Rated current A	3.2	4.1	7.0	9.6	15	23	31	45	58	71	85	115	145	180	215	283	346	415
	Max. voltage	3-phase; 200, 220, 230, or 240 VAC (proportional to input voltage)																	
	Max. output frequency	200.0																	
Power supply	Rated input voltage and frequency	3-phase, 200/208/220/230/240 VAC, 50/60 Hz																	
	Allowable voltage fluctuation	+ 10%, - 15%																	
	Allowable frequency fluctuation	±5%																	
Harmonic wave prevention	DC reactor	Optional									Built in								
	12-pulse input	Not possible									Possible*2								

- Standard 4-pole motors are used for max. applicable motor output. Choose the inverter model whose rated current is allowable within the motor rated current range.
- A 3-wire transformer is required on the power supply for 12-phase rectification.

400 V class

Model CIMR-E7ZZ□		40P4	40P7	41P5	42P2	43P7	44P0	45P5	47P5	4011	4015	4018	4022	4030	4037	4045	4055	4075	4090	4110	4132	4160	4185	4220	4300
IP54 model: CIMR-E7Z		---	---	---	---	---	---	---	47P52	40112	40152	40182	40222	40302	40372	40452	40552	---	---	---	---	---	---	---	---
Max. applicable motor output <sup>1</sup> Kw		0.55	0.75	1.5	2.2	3.7	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	300
Output characteristics	Inverter capacity kVA	1.4	1.6	2.8	4.0	5.8	6.6	9.5	13	18	24	30	34	46	57	69	85	110	140	160	200	230	280	390	510
	Rated current A	1.8	2.1	3.7	5.3	7.6	8.7	12.5	17	24	31	39	45	60	75	91	112	150	180	216	260	304	370	506	675
	Max. voltage	3-phase; 380, 400, 415, 440, 460, or 480 VAC (proportional to input voltage)																							
	Max. output frequency	200.0																							
Power supply	Rated input voltage and frequency	3-phase, 380, 400, 415, 440, 460 or 480 VAC, 50/60 Hz																							
	Allowable voltage fluctuation	+ 10%, - 15%																							
	Allowable frequency fluctuation	±5%																							
Harmonic wave prevention	DC reactor	Optional									Built in														
	12-pulse input	Not possible									Possible*2														

- Standard 4-pole motors are used for max. applicable motor output. Choose the inverter model whose rated current is allowable within the motor rated current range.
  - A 3-wire transformer is required on the power supply for 12-phase rectification
- \* To agg 400 V class

Enclosures

Model CIMR-E7Z□		20P4	20P7	21P5	22P2	23P7	25P5	27P5	2011	2015	2018	2022	2030	2037	2045	2055	2075	2090	2110					
200 V class	Enclosed type (IEC IP20)	Available as standard									Available for option						Not available							
	Open chassis type (IEC IP00)	Available by removing the upper and lower cover of enclosed type									Available as standard													
Model CIMR-E7Z□		40P4	40P7	41P5	42P2	43P7	45P5	47P5	4011	4015	4018	4022	4030	4037	4045	4055	4075	4090	4110	4132	4160	4185	4220	4300
400 V class	Enclosed type (IEC IP20)	Available as standard									Available for option						Not available							
	Open chassis type (IEC IP00)	Available by removing the upper and lower cover of enclosed type									Available as standard													
	Enclosed type (IP54)	-----									Available as standard						-----							

Common specifications

Model Number CIMR-E7Z□		Specification
Control characteristics	Control method	Sine wave PWM V/f control
	Speed control range	1:40
	Speed control accuracy	±3 (25 °C ± 10 °C)
	Frequency control range	0.0 to 200.0 Hz
	Frequency accuracy (temperature characteristics)	Digital references: ± 0.01% (-10 °C to +40 °C)
		Analog references: ±0.1% (25 °C ±10 °C)
	Frequency setting resolution	Digital references: 0.01 Hz
		Analog references: 0.025/50 Hz (11 bits plus sign)
	Output frequency resolution	0.01 Hz
	Frequency setting signal	0 to +10 V, 4 to 20 mA
Accel/decels time	0.01 to 6000.0 s (2 selectable combinations of independent acceleration and deceleration settings)	
Braking torque	Approximately 20%	
Main control functions	Restarting for momentary power loss, speed searches, overtorque detection, 5-speed control (maximum), acceleration/deceleration time changes, S-curve acceleration, 3-wire control, autotuning, cooling fan ON/OFF control, torque compensation, jump frequencies, upper and lower limits for frequency references, DC braking for starting and stopping, high-slip braking, PI control (with sleep function), energy-saving control, MEMOBUS communications (RS-485/422, 19.2 kbps maximum), fault reset, and copy function.	
Protective functions	Motor protection	Protection by electronic thermal overload relay.
	Instantaneous overcurrent protection	Stops at approx. 200% of rated output current.
	Fuse blown protection	Stops for fuse blown.
	Overload protection	120% of rated output current for 1 minute
	Overvoltage protection	200 class inverter: stops when main-circuit DC voltage is above 410 V. 400 class inverter: stops when main-circuit DC voltage is above 820 V.
	Undervoltage protection	200 class inverter: stops when main-circuit DC voltage is below 190 V. 400 class inverter: stops when main-circuit DC voltage is below 380 V.
	Momentary power loss ride through	By selecting the momentary power loss method, operation can be continued if power is restored within 2 s.
	Cooling fin overheating	Protection by thermistor.
	Stall prevention	Stall prevention during acceleration, deceleration, or running.
	Grounding protection	Protection by electronic circuits.
Charge indicator	Lights up when the main circuit DC voltage is approx. 50 V or more.	
Protective structure		Enclosed wall-mounted type (NEMA 1): 18.5 kW or less (same for 200 V and 400 V class inverters) Open chassis type (IP00): 22 kW or more (same for 200 V and 400 V class inverters) Enclosed wall-mounted type (IP54): From 7.5 Kw to 55 Kw (400 V class inverters)
Environment	Ambient operating temperature	-10 °C to 40 °C (enclosed wall-mounted type) - 10 °C to 45 °C (open chassis type)
	Ambient operating humidity	95% max. (with no condensation)
	Storage temperature	- 20 °C to + 60 °C (short-term temperature during transportation)
	Application site	Indoor (no corrosive gas, dust, etc.)
	Altitude	1000 m max.
Vibration	10 to 20 Hz, 9.8 m/s <sup>2</sup> max.; 20 to 50 Hz, 2 m/s <sup>2</sup> max	

Enclosed type (IEC IP20)

E7Z 20P41 to E7Z25P51  
E7Z40P41 to E7Z45P51

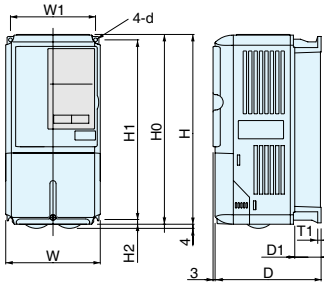


Fig 1

E7Z 27P51 to E7Z20181  
E7Z47P51 to E7Z40181

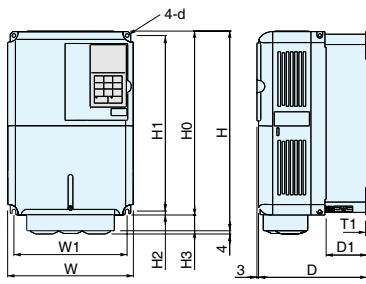


Fig 2

E7Z 20221 to E7Z20751  
E7Z40221 to E7Z41601

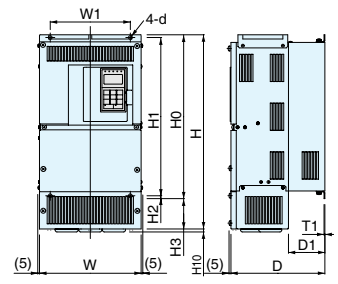
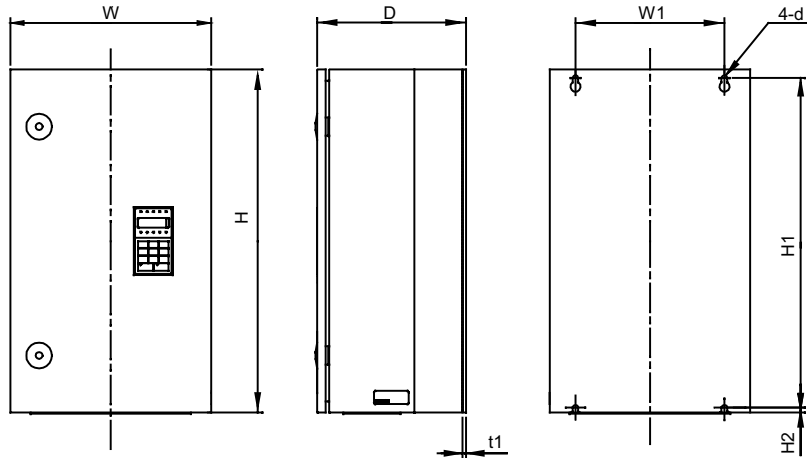


Fig 3

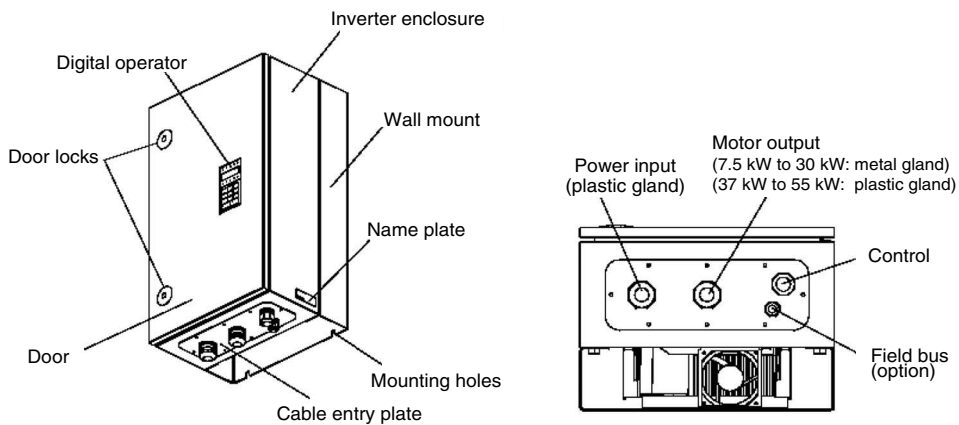
Voltage	Max. applicable motor output kW	Inverter CIMR-E7Z□	Fig	Dimensions in mm											Approx. weight kg	Cooling method	
				W	H	D	W1	H0	H1	H2	H3	D1	T1	d			
200 V class (3-phase)	0.4	20P4 1	1	140	280	157	126	280	266	7	---	39	5	M5	3	Self cooled	
	0.75	20P7 1															
	1.5	21P5 1															
	2.2	22P2 1															
	3.7	23P7 1															
	5.5	25P5 1	177	59	4												
	7.5	27P5 1															
	11	2011 1	2	200	300	197	186	300	285	8	0	65.5	2.3	M6	6	Fan cooled	
	15	2015 1			310						10				7		
	18.5	2018 1	350	78	11												
	22	2022 1	380			0	24										
	30	2030 1	254	535	258	195	400	385	7.5	135	100	3.2	M10	27			
	37	2037 1								165				62			
	45	2045 1	279	615	328	220	450	435	12.5	209	130	3.2	M10	68			
55	2055 1	380	809	298	250	600	575	302						94			
75	2075 1								328	95							
400 V class (3-phase)	0.4	40P4 1	1	140	280	157	126	280	266	7	---	39	5	M5	3		Self cooled
	0.75	40P7 1															
	1.5	41P5 1															
	2.2	42P2 1															
	3.7	43P7 1															
	4.0	44P0 1	177	59	4												
	5.5	45P5 1															
	7.5	47P5 1	2	200	300	197	186	300	285	8	65.5	2.3	M6	6			
	11	4011 1			350						---			10			
	15	4015 1	240	350	207	216	350	335	7.5	85	100	2.3	M6	10			
	18.5	4018 1	207	216	350	335	78	24									
	22	4022 1	275	535	258	220	450	435	7.5	85	100	2.3	M6	24			
	30	4030 1															
	37	4037 1	325	715	283	260	550	535	7.5	105	105	2.3	M6	40			
	45	4045 1															
	55	4055 1	453	1027	348	325	725	700	12.5	302	130	3.2	M10	96			
	75	4075 1												97			
	90	4090 1	504	1243	358	370	850	820	15	393	130	4.5	M12	122			
110	4110 1	130															
132	4132 1	579	1324	378	445	918	855	45.8	408	140	4.5	M12	130				
160	4160 1												170				

Enclosed wall-mounted inverters (IP54 type)



Voltage	Max. applicable motor output kW	Inverter CIMR-E7Z□	Dimensions in mm									Heat loss (W)	Cooling method
			W	H	D	W1	H1	H2	T1	d	Approx. weight (kg)		
400 V class (3-phase)	7.5	47P52	350	600	240	260	576	9	2.5	M8	25	304	Fan
	11	40112			427								
	15	40152			536								
	18.5	40182	260	300	370	620	12	2.5	M10	43	662		
	22	40222	410	650	300	370	620	12	2.5	M10	43	754	
	30	40302	410	650	300	370	620	12	2.5	M10	43	989	
	37	40372	410	650	300	370	620	12	2.5	M10	43	1145	
	45	40452	580	750	330	410	714	11	2.5	M14	71	1317	
55	40552	580	750	330	410	714	11	2.5	M14	71	1701		

Component names



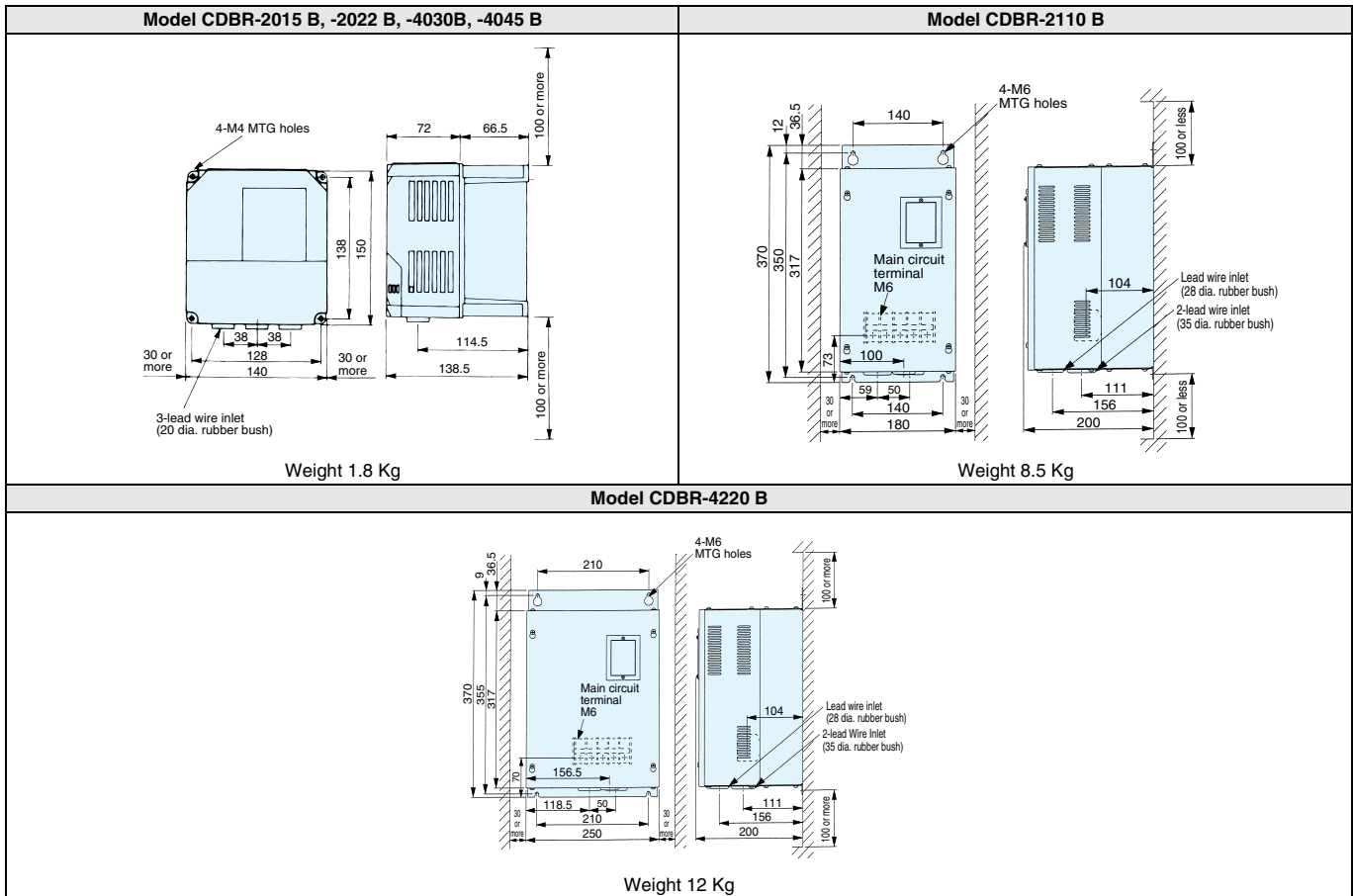
Accessories

Following parts are delivered in the package with the inverter.

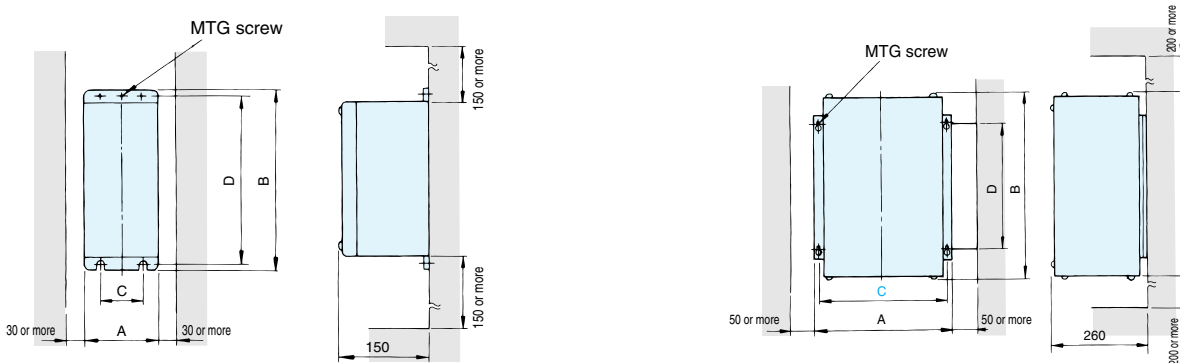
Part name	Qty
Cable gland (for input)*	1
Cable gland (for motor output)*	1
Cable gland (for control)*	1
Cable gland (for fieldbus)*	1
Door key	1
Blind plug (control cable entry)	1
Blind plug (fieldbus cable entry)	1

\*Locknuts for each cable gland are also supplied.

Braking unit dimensions



Braking resistor unit (separately-installed type) dimensions



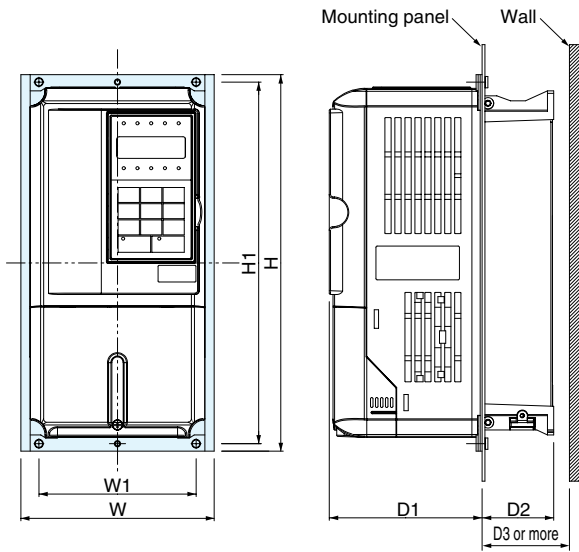
Voltage	Model LKEB-	Dimensions in mm					Weight kg
		A	B	C	D	MTG screw	
220 V class	20P7	105	275	50	260	M5 x 3	3.0
	21P5	130	350	75	335	M5 x 4	4.5
	22P2	130	350	75	335	M5 x 4	4.5
	23P7	130	350	75	335	M5 x 4	5.0
	25P5	250	350	200	335	M6 x 4	7.5
	25P5	250	350	200	335	M6 x 4	8.5
400 V class	40P7	105	275	50	260	M5 x 3	3.0
	41P5	130	350	75	335	M5 x 4	4.5
	42P2	130	350	75	335	M5 x 4	4.5
	43P7	130	350	75	335	M5 x 4	5.0
	45P5	250	350	200	332	M6 x 4	7.5
	47P5	250	350	200	332	M6 x 4	8.5

Voltage	Model LKEB□	Dimensions in mm					Weight kg
		A	B	C	D	MTG screw	
220 V class	2011	266	543	246	340	M8 x 4	10
	2015	356	543	336	340	M8 x 4	15
	2018	446	543	426	340	M8 x 4	19
	2022	446	543	426	340	M8 x 4	19
	4011	350	412	330	325	M6 x 4	16
400 V class	4015	350	412	330	325	M6 x 4	18
	4018	446	543	426	340	M8 x 4	19
	4022	446	543	426	340	M8 x 4	19
	4030	356	956	336	740	M8 x 4	25
	4037	446	956	426	740	M8 x 4	33
	4045	446	956	426	740	M8 x 4	33

**Attachments**

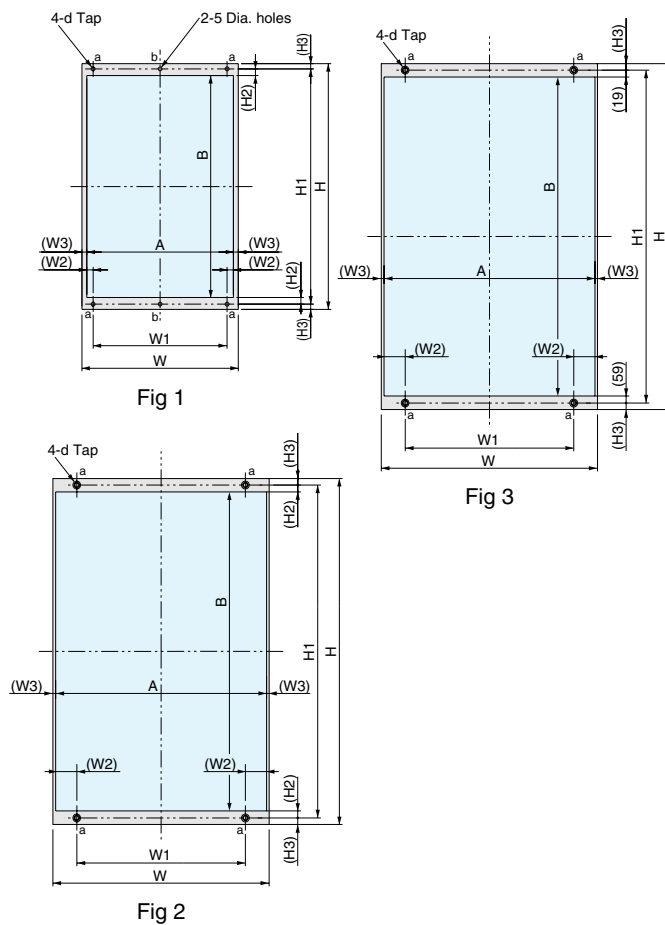
**Heatsink external mounting attachment**

The Varispeed E7 inverters under the 200/400 V class 18.5 kW or less need this attachment for mounting the heatsink externally. This attachment expands the outer dimensions of the width and height of the inverter. (Attachment is not required for inverters of 22 kW or more.)



Model CIMR- E7Z□	Attachment order code	Dimensions in mm						
		W	H	W1	H1	D1	D2	D3
20P4	EZZ08676A	155	302	126	290	122.6	37.4	40
20P7								
21P5								
22P2								
23P7								
25P5	EZZ08676B	210	330	180	316	136.1	63.4	70
27P5								
2011	EZZ08676C	250	392	216	372	133.6	76.4	85
2015								
2018								
40P4	EZZ08676A	155	302	126	290	122.6	37.4	40
40P7								
41P5								
42P2								
43P7								
45P5	EZZ08676B	210	330	180	316	136.1	63.4	70
47P5								
4011	EZZ08676C	250	392	216	372	133.6	76.4	85
4015								
4018								

**Panel cut for external mounting of cooling fin (heatsink)**

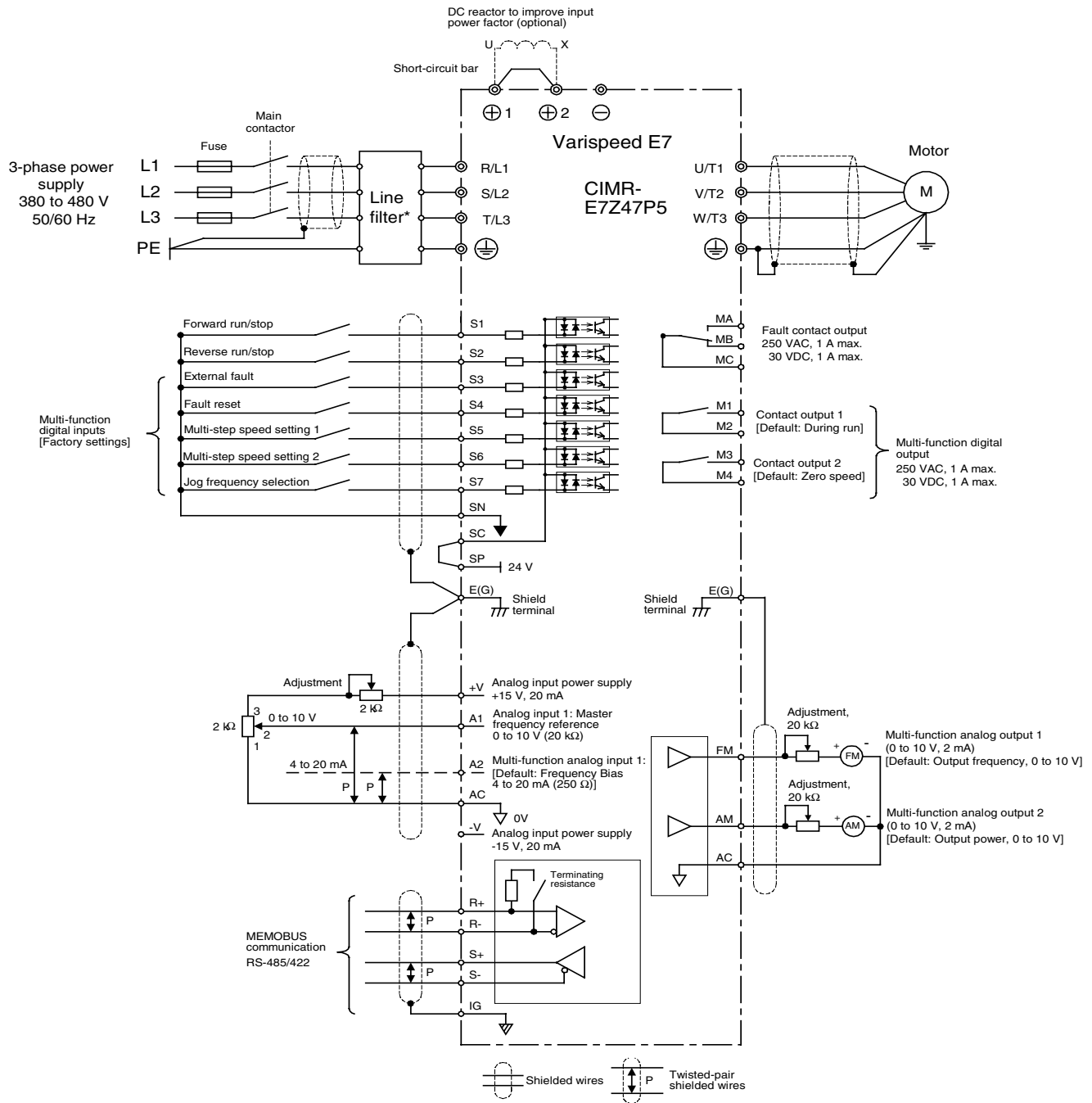


Model CIMR- E7Z□	Drawing	Dimensions in mm																					
		W	H	W1	(W2)	(W3)	H1	(H2)	(H3)	A	B	d											
20P4	1	155	302	126	6	8.5	290	9.5	6	138	271	M5											
20P7																							
21P5																							
22P2																							
23P7																							
25P5																							
27P5																							
2011																							
2015																							
2018																							
2022	2	250	400	195	24.5	3	385	8	7.5	244	369	M6											
2030																							
2037																							
2045																							
2055																							
2075																							
2090																							
2110																							
40P4																							
40P7																							
41P5	1	155	302	126	6	8.5	290	9.5	6	138	271	M5											
42P2																							
43P7																							
45P5																							
47P5																							
4011																							
4015																							
4018																							
4022																							
4030																							
4037	2	275	450	220	24.5	3	435	8	7.5	269	419	M6											
4045																							
4055																							
4075																							
4090																							
4110																							
4132																							
4160																							
4132													3	575	925	445	55	10	895	15	555	817	
4160																							

1. The sizes are different between the top and the bottom. Refer Fig 3

Installation

Standard connections



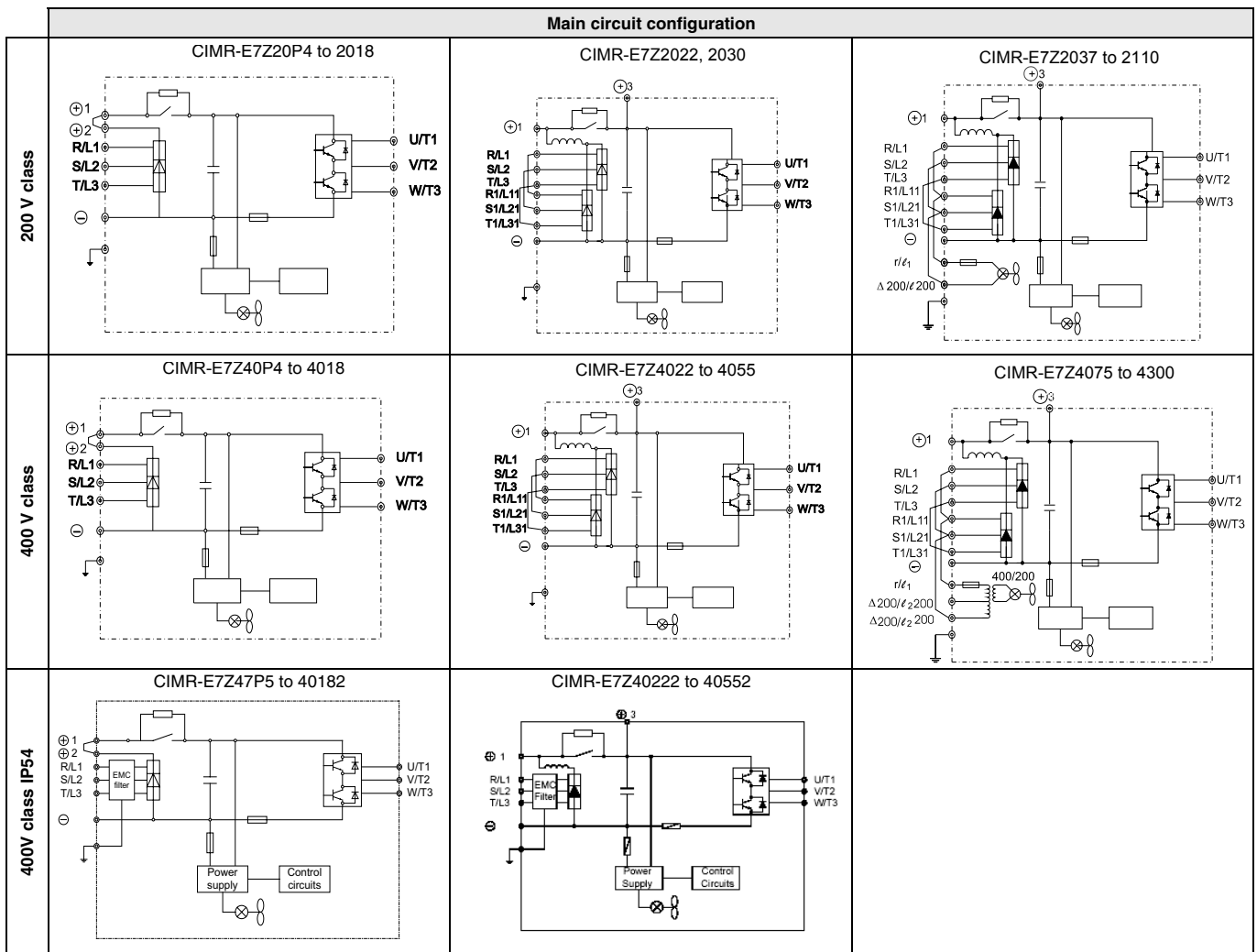
\*E7 IP54 types has RFI filter included as standard



Main circuit

Voltage	200 V			400 V			
	Model CIMR-E7Z□	20P4 to 2018	2022, 2030	2037 to 2110	40P4 to 4018	4022 to 4055	4075 to 4300
Max. applicable motor output	0.4 to 18.5 kW	22 to 30 kW	37 to 110 kW	0.4 to 18.5 kW	22 to 55 kW	75 to 300 kW	
R/L1	Main circuit input power supply	Main circuit input power supply		Main circuit input power supply	Main circuit input power supply		R-R1, S-S1 and T-T1 have been wired before shipment
S/L2							
T/L3							
R1/L11	---	R-R1, S-S1 and T-T1 have been wired before shipment (see P59).		---	R-R1, S-S1 and T-T1 have been wired before shipment		
S1/L21							
T1/L31							
U/T1	Inverter output			Inverter output			
V/T2							
W/T3							
⊖	DC reactor (⊕1 - ⊕2)	DC power supply (⊕1 - ⊕2)		DC reactor (⊕1 - ⊕2)	DC power supply (⊕1 - ⊕2)		
⊕1							
⊕2	DC power supply <sup>1</sup> (⊕1 - ⊖)	Braking unit (⊕3 - ⊖)		DC power supply <sup>1</sup> (⊕1 - ⊖)	Braking unit (⊕3 - ⊖)		
⊕3	---						
↓ /I <sub>2</sub>	-----		Cooling fan power supply <sup>2</sup>	-----		Cooling fan power supply <sup>3</sup>	
r/l1	-----						
↓ 200 / I <sub>2</sub> 200	-----		-----		-----		Cooling fan power supply <sup>3</sup>
↓ 400 / I <sub>2</sub> 400	-----		-----		-----		
PE (⊖)	Ground terminal (100 Ω or less)			Ground terminal (10 Ω or less)			

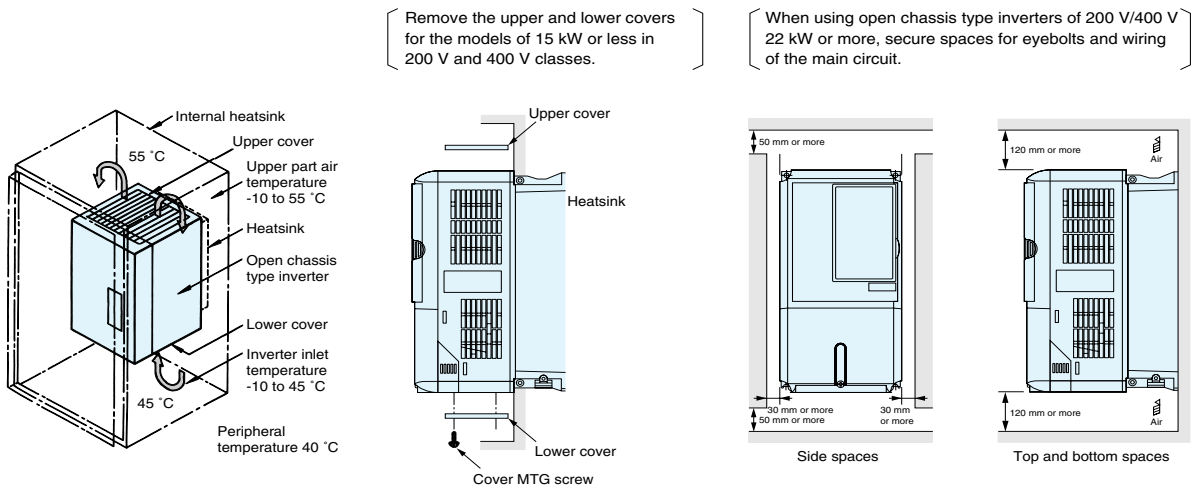
- ⊕1 - ⊖ DC power input does not conform to UL/c-UL listed standard.
- Cooling fan power supply r/l<sub>1</sub> - ↓ /I<sub>2</sub>: 200 to 220 VAC 50 Hz, 200 to 230 VAC 60 Hz (A transformer is required for 230 V 50 Hz or 240 V 50/60 Hz power supply.)
- Cooling fan power supply r/l<sub>1</sub> - ↓ /I<sub>2</sub> 200: 200 to 220 VAC 50 Hz, 200 to 230 VAC 60 Hz, r/l<sub>1</sub> - ↓ /I<sub>2</sub> 400: 380 to 480 VAC 50/60 Hz



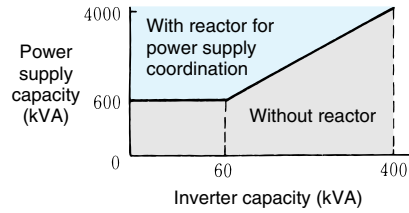
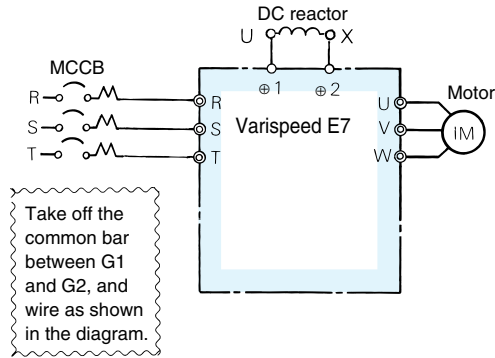
Control circuit

Type	No.	Signal name	Function	Signal level	
Digital input signals	S1	Forward run/stop command	Forward run when ON; stopped when OFF.	24 VDC, 8 mA photocoupler isolation	
	S2	Reverse run/stop command	Reverse run when ON; stopped when OFF.		
	S3	External fault input <sup>*1</sup>	Fault when ON.		
	S4	Fault reset <sup>*1</sup>	Reset when ON		
	S5	Multi-step speed reference 1 <sup>*1</sup> (Master/auxiliary switch)	Auxiliary frequency reference when ON.		Functions are selected by setting H1-01 to H1-05.
	S6	Multi-step speed reference 2 <sup>*1</sup>	Multi-step setting 2 when ON.		
	S7	Jog frequency reference <sup>*1</sup>	Jog frequency when ON.		
	SC	Digital input common	–		–
	SN	Digital input neutral	–		–
	SP	Digital input power supply	+24 VDC power supply for digital inputs		24 VDC, 250 mA max. <sup>*2</sup>
Analog input signals	+V	15 V power output	15 V power supply for analog references	15 V (max. current: 20 mA)	
	A1	Frequency reference	0 to +10 V/100%	0 to +10 V (20 kΩ)	
	A2	Multi-function analog input	4 to 20 mA/100% 0 V to +10 V/100% 0 to 20 mA/100%	Function is selected by setting H3-09.	4 to 20 mA (250 Ω) 0 V to +10 V (20 kΩ) 0 to 20 mA (250 Ω)
	AC	Analog reference common	–	–	
	E(G)	Shield wire, optional ground line connection point	–	–	
	Digital output signals	M1	Running signal (1NO contact)	Operating when ON.	Relay contacts contact capacity: 1 A max. at 250 VAC 1 A max. at 30 VDC <sup>*3</sup>
M2					
M3		Zero speed	Zero level (b2-01) or below when ON		
M4					
MA		Fault output signal	Fault when CLOSED across MA and MC Fault when OPEN across MB and MC		
MB					
MC					
Analog output signals	FM	Multi-function analog output (frequency output)	0 to 10 V, 10 V=100% output frequency	Multi-function analog output 1	
	AC	Analog common	–	–	
	AM	Multi-function analog output (current monitor)	0 to 10 V, 10V = 200% of the inverter rated current	Multi-function analog output 2	
RS-485/422	R+	MEMOBUS communications input	For 2-wire RS-485, short R+ and S+ as well as R- and S-.	Differential input, photocoupler isolation	
	R-				
	S+	MEMOBUS communications output		Differential input, photocoupler isolation	
	S-				
IG	Signal common	–	–		

Note: 1. The default settings are given for terminals S3 to S7. For a 3-wire sequence, the default settings are a 3-wire sequence for S5, multi-step speed setting 1 for S6 and multi-step speed setting 2 for S7.  
 2. Do not use this power supply for supplying any external equipment.  
 3. When driving a reactive load, such as a relay coil with DC power supply, always insert a flywheel diode.



DC reactor



200 V class			400 V class		
Max. applicable motor output kW	Current value A	Inductance mH	Max. applicable motor output kW	Current value A	Inductance mH
0.4	5.4	8	0.4	3.2	28
0.75			0.75		
1.5	18	3	1.5	5.7	11
2.2			2.2		
3.7			3.7		
5.5	36	1	5.5	23	3.6
7.5			7.5		
11	72	0.5	11	33	1.9
15			15		
18.5	90	0.4	18.5	47	1.3
22 to 110	Built-in		22 to 300	Built-in	

Fuse installation

To protect the inverter, it is recommended to use semiconductor fuses as shown in the table below

Inverter type	FUSE		
	Voltage (V)	Current (A)	I <sup>2</sup> t (A <sup>2</sup> s)
20P4	240	10	12~25
20P7	240	10	12~25
21P5	240	15	23~55
22P2	240	20	34~98
23P7	240	30	82~220
25P5	240	40	220~610
27P5	240	60	290~1300
2011	240	80	450~5000
2015	240	100	1200~7200
2018	240	130	1800~7200
2022	240	150	870~16200
2030	240	180	1500~23000
2037	240	240	2100~19000
2045	240	300	2700~55000
2055	240	350	4000~55000
2075	240	450	7100~64000
2090	240	550	11000~64000
2110	240	600	13000~83000

Inverter type	FUSE		
	Voltage (V)	Current (A)	I <sup>2</sup> t (A <sup>2</sup> s)
40P4	480	5	6~55
40P7	480	5	6~55
41P5	480	10	10~55
42P2	480	10	18~55
43P7	480	15	34~72
44P0	480	20	50~570
45P5	480	25	100~570
47P5	480	30	100~640
4011	480	50	150~1300
4015	480	60	400~1800
4018	480	70	700~4100
4022	480	80	240~5800
4030	480	100	500~5800
4037	480	125	750~5800
4045	480	150	920~13000
4055	480	150	1500~13000
4075	480	250	3000~55000
4090	480	300	3800~55000
4110	480	350	5400~23000
4132	480	400	7900~64000
4160	480	450	14000~250000
4185	480	600	20000~250000
4220	480	700	34000~400000
4300	480	900	52000~920000