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Inverter Varispeed E7



Main Features of Varispeed E7 Inverter

Feature 1: For pumps and fans



Specially designed for pump and fan applications

The Varispeed E7 was developed for applications (particularly HVAC) requiring a quadratic torque characteristic.

High slip braking (HSB)

Yaskawa's intelligent function allows up to 3 times faster braking without the use of a braking transistor or resistor.

Improved protective functions

The high speed overcurrent limiting function allows virtually uninterrupted operation (no overcurrent tripping, restart after brief power failure, motor stall prevention, attempted restart after malfunction, etc).

Speed search function

The Varispeed E7 determines the speed and direction of rotation of a coasting motor, then brings it to the required reference speed. This is carried out extremely smooth in both directions.

Feature 2: Ecologically friendly



Reliable energy saving function

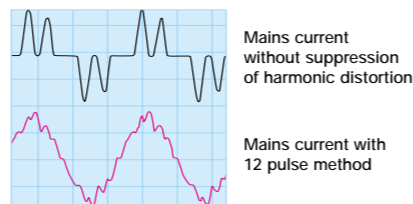
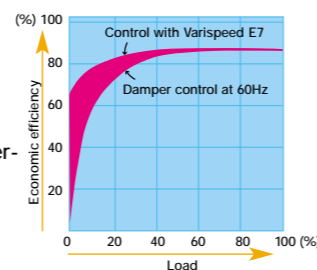
This intelligent function has been greatly enhanced by Yaskawa to allow considerable energy savings, especially under part load.

Low noise operation

Use of the latest generation of IGBTs limits the voltage rise time. Together with the high switching frequency during pump or fan operation and low noise, constant torque operation, this reduces noise due to magnetic transients in the motor. The motor is quieter and its bearings and windings saved wear and tear.

Suppression of harmonic distortion

All inverters for a motor output higher than 18.5kW have a double diode supply, which can use a transformer with two secondary windings for the 12 pulse method. This suppresses the harmonics to about 12%. The units also have a built-in DC bus reactor. All units up to 18.5kW have terminals for connecting an external DC bus reactor.



Feature 3: User-friendly installation and operation



Simple to operate

- The Varispeed E7 can be fully controlled and all parameters can be set using the digital operator. The operator is equipped with a parameter copy function and can even be used up to 3m away with a standard cable. The LED display can be read easily, even at a considerable distance.
- An optional LCD operator with plain text display and the same functions is available.

Clear hierarchy of menus for setting parameters

Easy operation for fast start up and maintenance.

Quick program

Simplifies the start-up procedure by showing the most important parameters only.

Modified Parameters

Easy trouble-shooting by indicating those parameters which differ from the factory's parameter pre-settings.

Easily maintained

- The control terminal block can be disconnected from the motherboard with the control lines. This enables replacement of the inverter without disconnecting the controller.
- The inverter fan switches off when the motor is at a standstill. If necessary, it can be replaced without dismantling the unit.



Feature 4: Global specification



Conformity with global standards for worldwide use

Certified to UL/cUL and CE

Available worldwide

Worldwide service

Operation with commonly used mains voltages

- Series for 400V (three phase) 380 to 480V +10% -15%
- Series for 200V (three phase) 200 to 240V +10% - 15%



Global fieldbus standards supported

- RS-485/422 (MEMOBUS protocol) supported as standard
- Metasys protocol and Landis-Staefa protocol under development
- Optional cards available for Profibus-DP, INTERBUS-S, CANopen and DeviceNet (LONworks, CC Link & ControlNet)

Description of digital operator

Varispeed E7

Overview of display and keypad

Data display

Menu button

Switches menu within the hierarchy.

Local/Remote button

Switches between control with the digital operator to control via the terminal block.

JOG button

Invokes the JOG speed, which has top priority.

FWD/REV button

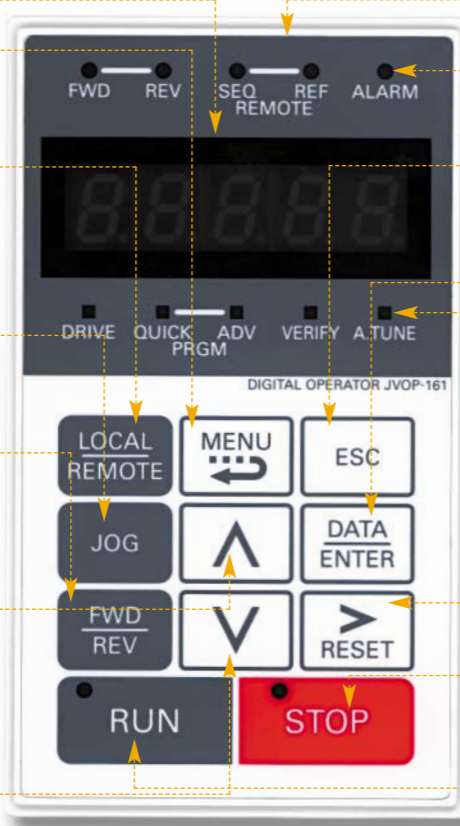
Reverses the direction of rotation of the motor.

Arrow up button

Increases the parameter number or data value.

Arrow down button

Decreases the parameter number or data value.



Digital operator

Status LEDs

Indicate the inverter status.

ESC button

Returns to previous menu in the hierarchy without saving.

Enter button

Saves data when setting parameters. Entering a parameter number in the PRGM mode displays the associated data.

Reset button

Shifts the position on the display. Pressing this button when there is a malfunction resets the inverter (acknowledgement).

Stop button

Stops the motor.

Run button

Starts the motor. The LED in the top left corner of the button lights up to indicate that the motor is running.

Specification/Nameplate

Inverter

Varispeed E7 series

CIMR - E7C40P41

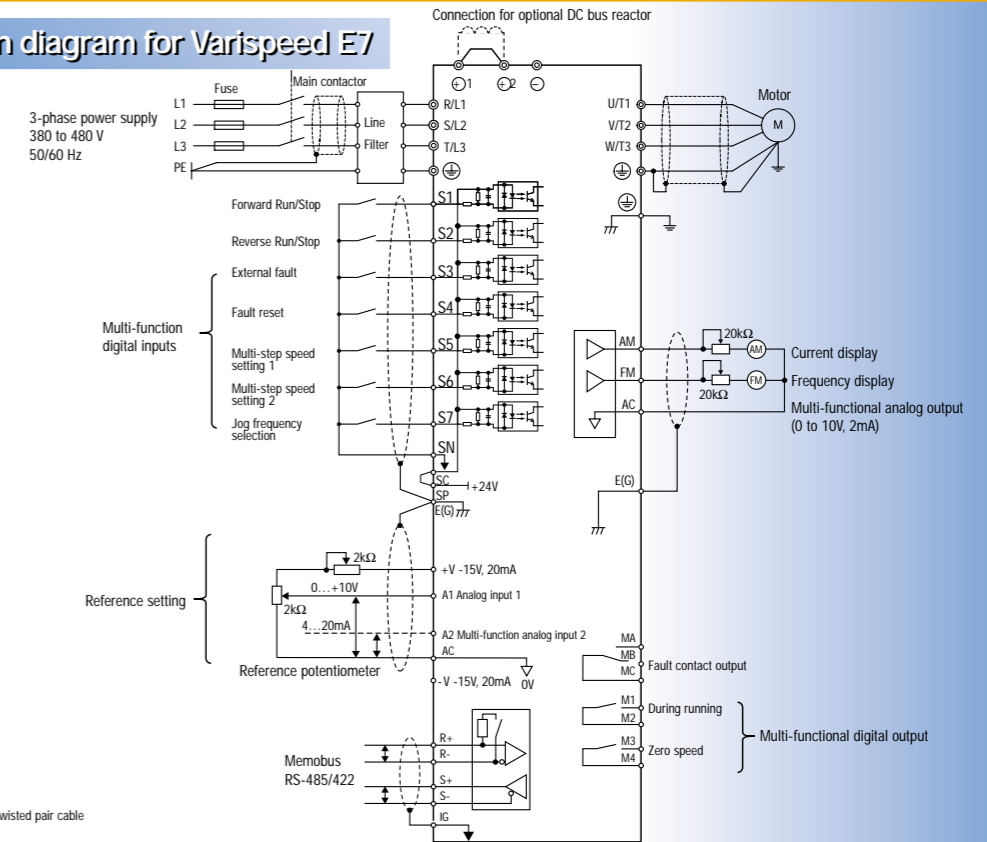
Code	Specification
C	European standard
U	American standard

Code	Power supply
2	three phase 200V AC
4	three phase 400V AC

Code	Protection
0	IP00
1	NEMA 1/IP20

No.	Rated output of motor
0P4	0.55 kW
4P0	4.0 kW
7P5	7.5 kW
011	11 kW
045	45 kW
110	110 kW
160	160 kW
300	300 kW

Standard connection diagram for Varispeed E7



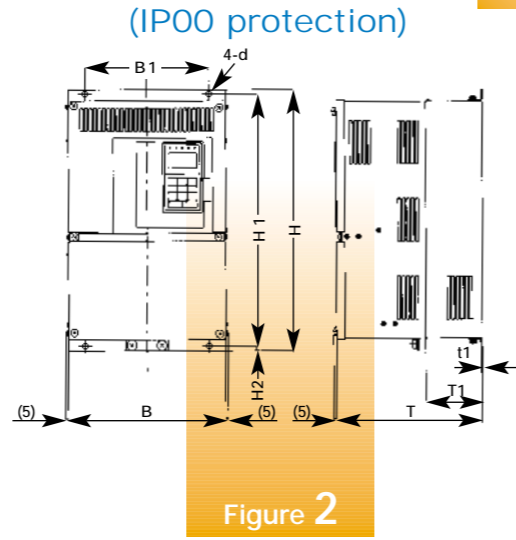
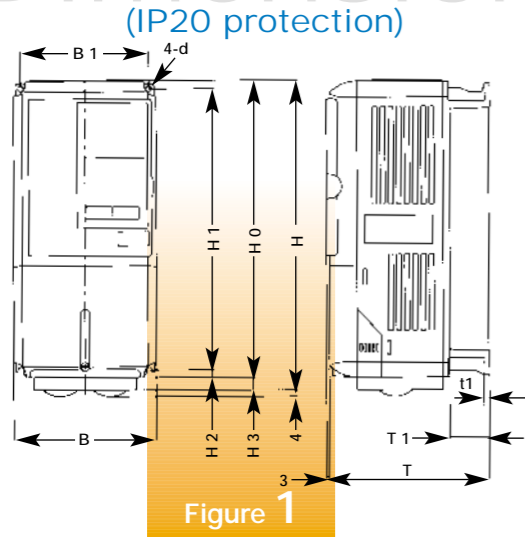
Radio interference suppression filters for conformity with the EMC Directive (CE)

The radio interference filters tested by Yaskawa are listed below. The stipulations of the Operating Manual (YEG-TOE-S616-56.1) or separate EMC documentation relating to their connection must be followed to achieve proper electromagnetic compatibility (EMC).

Inverter model	Filter model	Current (A)	Weight (kg)	Dimensions WxHxD (mm)	Fit under yes/no
CIMR-E7C20P4	FS 5972-10-07	10	1.1	141x330x46	yes
CIMR-E7C20P7					
CIMR-E7C21P5					
CIMR-E7C22P2					
CIMR-E7C23P7	FS 5972-18-07	18	1.3	141x330x46	yes
CIMR-E7C25P5					
CIMR-E7C27P5	FS 5973-35-07	35	1.4	141x330x46	yes
CIMR-E7C2011					
CIMR-E7C2015	FS 5973-60-07	60	3	206x355x60	yes
CIMR-E7C2018					
CIMR-E7C2022	FS 5973-100-07	100	4.9	236x408x80	yes
CIMR-E7C2030					
CIMR-E7C2037	FS 5973-130-35	130	4.3	90x366x180	no
CIMR-E7C2045					
CIMR-E7C2055	FS 5973-160-40	160	6	120x451x170	no
CIMR-E7C2075					
CIMR-E7C2090	FS 5973-240-37	240	11	130x610x240	no
CIMR-E7C2110					
CIMR-E7C40P4	Filters under development				no
CIMR-E7C40P7					
CIMR-E7C41P5					
CIMR-E7C42P2					
CIMR-E7C43P7					
CIMR-E7C44P0					
CIMR-E7C45P5					
CIMR-E7C47P5					
CIMR-E7C4011					
CIMR-E7C4015					
CIMR-E7C4018					
CIMR-E7C4022					
CIMR-E7C4030	FS 5972-10-07	10	1.1	141x330x46	yes
CIMR-E7C4037					
CIMR-E7C4045	FS 5972-18-07	18	1.3	141x330x46	yes
CIMR-E7C4055					
CIMR-E7C4075	FS 5972-21-07	21	1.8	206x355x50	yes
CIMR-E7C4090					
CIMR-E7C4110	FS 5972-25-37 or FS 3359-250-28	25	2.1	206x355x50	yes
CIMR-E7C4132					
CIMR-E7C4160	FS 5972-35-07	35	2.1	206x355x50	yes
CIMR-E7C4185					
CIMR-E7C4220	FS 5972-60-07	60	4	236x408x65	yes
CIMR-E7C4300					
CIMR-E7C4037	FS 5972-70-52	70	3.4	80x329x185	no
CIMR-E7C4045					
CIMR-E7C4055	FS 5972-100-35	100	4.5	90x326x150	no
CIMR-E7C4075					
CIMR-E7C4090	FS 5972-130-35	130	4.7	90x366x180	no
CIMR-E7C4110					
CIMR-E7C4132	FS 5972-170-40	170	6	120x451x170	no
CIMR-E7C4160					
CIMR-E7C4185	FS 5972-250-37 or FS 3359-250-28	250	11.7	130x610x240	no
CIMR-E7C4220					
CIMR-E7C4300	FS 3359-250-28	250	7.0	230x300x125	no
CIMR-E7C4099 or FS 5972-400-99					
CIMR-E7C4160	FS 5972-400-99 or FS 5972-410-99	400	18.5	300x610x160	no
CIMR-E7C4185					
CIMR-E7C4220	FS 5972-410-99	410	10.5	260x386x115	no
CIMR-E7C4300					
CIMR-E7C4099 or FS 5972-600-99	FS 5972-410-99	410	10.5	260x386x115	no
CIMR-E7C4220					
CIMR-E7C4300	FS 5972-600-99	600	11	260x386x135	no
CIMR-E7C4300					
CIMR-E7C4300	FS 5972-800-99	800	31	300x716x160	no
CIMR-E7C4300					

Dimensions:

Varispeed E7



Dimensions in mm												
Voltage class	Model: CIMR-E7C	B	H	T	B1	H1	H2	D1	t1	d	Weight in kg	Fig No
200 V	20P4	140	280	157	126	266	7	39	5	M5	3	1
	20P7	140	280	157	126	266	7	39	5	M5	3	1
	21P5	140	280	157	126	266	7	39	5	M5	3	1
	22P2	140	280	157	126	266	7	39	5	M5	3	1
	23P7	140	280	177	126	266	7	59	5	M5	4	1
	25P5	140	280	177	126	266	7	59	5	M5	4	1
	27P5	200	300	197	186	285	7.5	65.5	2.3	M6	6	1
	2011	200	300	197	186	285	7.5	65.5	2.3	M6	7	1
	2015	240	350	207	216	335	7.5	78	2.3	M6	11	1
	2018	240	350	207	216	335	7.5	78	2.3	M6	11	1
	2022	250	400	258	195	385	7.5	100	2.3	M6	21	2
	2030	275	450	258	220	435	7.5	100	2.3	M6	24	2
	2037	375	600	300	250	575	13	100	3.2	M10	57	2
	2045	375	600	330	250	575	13	130	3.2	M10	63	2
	2055	450	725	350	325	700	13	130	3.2	M10	86	2
	2075	450	725	350	325	700	13	130	3.2	M10	87	2
2090	500	850	360	370	820	15	130	4.5	M12	108	2	
2110	575	885	380	445	855	15	140	4.5	M12	150	2	
400 V	40P4	140	280	157	126	266	7	39	5	M5	3	1
	40P7	140	280	157	126	266	7	39	5	M5	3	1
	41P5	140	280	157	126	266	7	39	5	M5	3	1
	42P2	140	280	177	126	266	7	59	5	M5	4	1
	43P7	140	280	177	126	266	7	59	5	M5	4	1
	44P0	140	280	177	126	266	7	59	5	M5	4	1
	45P5	140	280	177	126	266	7	59	5	M5	4	1
	47P5	200	300	197	186	285	7.5	65.5	2.3	M6	6	1
	4011	200	300	197	186	285	7.5	65.5	2.3	M6	6	1
	4015	240	350	207	216	335	7.5	78	2.3	M6	10	1
	4018	240	350	207	216	335	7.5	78	2.3	M6	10	1
	4022	275	450	258	220	435	7.5	100	2.3	M6	21	2
	4030	275	450	258	220	435	7.5	100	2.3	M6	21	2
	4037	325	550	283	260	535	7.5	105	2.3	M6	36	2
	4045	325	550	283	260	535	7.5	105	2.3	M6	36	2
	4055	325	550	283	260	535	7.5	105	2.3	M6	36	2
4075	450	725	350	325	700	13	130	3.2	M10	88	2	
4090	450	725	350	325	700	13	130	3.2	M10	89	2	
4110	500	850	360	370	820	15	130	4.5	M12	102	2	
4132	500	850	360	370	820	15	130	4.5	M12	120	2	
4160	575	925	380	445	895	15	140	4.5	M12	160	2	
4185	710	1305	415	540	1270	15	125.5	4.5	M12	160	2	
4220	710	1305	415	540	1270	15	125.5	4.5	M12	160	2	
4300	916	1475	416	730	1440	15	125.5	4.5	M12	160	2	

Heat loss

200 V																			
Voltage class	Model: CIMR-E7C	20P4	20P7	21P5	22P2	23P7	25P5	27P5	2011	2015	2018	2022	2030	2037	2045	2055	2075	2090	2110
Heat loss in W	Heat sink	20	27	50	70	112	164	219	374	429	501	586	865	1015	1266	1588	2019	2437	2733
	Interior	39	42	50	59	74	84	113	170	183	211	274	352	411	505	619	838	997	1242
	Total	59	69	100	129	186	248	332	544	612	712	860	1217	1426	1771	2207	2857	3434	3975

400 V																									
Voltage class	Model: CIMR-E7C	40P4	40P7	41P5	42P2	43P7	44P0	45P5	47P5	4011	4015	4018	4022	4030	4037	4045	4055	4075	4090	4110	4132	4160	4185	4220	4300
Heat loss in W	Heat sink	14	17	36	59	80	91	127	193	252	326	426	466	678	784	901	1203	1399	1614	2097	2388	2791	3237	3740	5838
	Interior	39	41	48	56	68	74	82	114	158	172	208	259	317	360	415	495	575	671	853	1002	1147	1372	1537	2320
	Total	53	58	84	115	148	161	209	307	410	498	634	725	995	1144	1316	1698	1974	2285	2950	3390	3938	4609	5277	8158

Standard specifications

Varispeed E7

200 V																					
Voltage class	Inverter model CIMR-E7C	20P4	20P7	21P5	22P2	23P7	25P5	27P5	2011	2015	2018	2022	2030	2037	2045	2055	2075	2090	2110		
Inverter output	Recommended maximum motor output (kW) *1	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		
	Rated output (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	9.6	15	23	31	45	58	71	85	115	145	180	215	283	346	415		
	Max. output voltage	three phase 200 to 240V (proportional to input voltage)																			
Mains input	Max. output frequency	120 Hz																			
	Rated input voltage and frequency	three phase, 200 to 240V, 50/60Hz																			
	Suppression of harmonic distortion	DC bus reactor	Optional																	Built-in	
		Double diode 12 pulse supply	Not available																	Standard	

400 V																											
Voltage class	Inverter model CIMR-E7C	40P4	40P7	41P5	42P2	43P7	44P0	45P5	47P5	4011	4015	4018	4022	4030	4037	4045	4055	4075	4090	4110	4132	4160	4185	4220	4300		
Inverter output	Recommended maximum motor output (kW) *1	0.55	0.75	1.5	2.2	3.7	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	300		
	Rated output (kVA)	1.4	1.6	2.8	4	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. output voltage	three phase 380 to 480V (proportional to input voltage)																									
Mains input	Max. output frequency	120 Hz																									
	Rated input voltage and frequency	three phase, 380 to 480V, 50/60Hz																									
	Suppression of harmonic distortion	DC bus reactor	Optional																							Built-in	
		Double diode 12 pulse supply	Not available																							Standard	

General specifications		
Mains	Allowable mains voltage fluctuation	from -15 to +10%
	Allowable mains frequ. fluct.	from -5 to +5%
Control/regulation	Control method	Sinusoidal pulse width modulation (V/f control)
	Speed control range	1:40
	Frequency accuracy	±2 to 3% (25°C ± 10°C)
	Reference frequency signal	4 to 20 mA (250 Ω), 0 to 10 V (20 kΩ)
	Acceleration/deceleration time	0.01 to 6000 seconds (2 different independent acceleration and deceleration times)
	Braking torque	approximately 20%
Protective functions	V/f characteristic	Fully user-definable
	Motor protection	Electronic thermal overload relay (PTC evaluation possible)
	Overload	120% of the inverter rated current for 1 min.
	Overvoltage	Fault tripping occurs if the DC bus voltage exceeds 410V with a 200V, or 820V with a 400V inverter
	Undervoltage	Fault tripping occurs if the DC bus voltage drops to a value less than 190V at 200V inverters, or 380V at 400V inverters
	Momentary power loss	Operation can be continued if the power supply is restored within 2 seconds
	Overheating of heat sink	Controlled by with thermistor
	Stall prevention limit	Stall prevention during acceleration and deceleration, and operation can be set separately
	Earth fault	Protection provided by electronic circuit
	DC bus charging indication	The charging indicator lights up if the DC bus circuit voltage exceeds 50V
Inputs and outputs	Digital inputs	Seven inputs, of which 5 are fully user-definable
	Digital outputs	1 change over contact for fault/ready signaling; 2 NO contacts fully user-definable with 34 different functions
	Analog inputs	1 analog input 0 to +10V; 1 analog input 0 to +10V/4-20mA
	Analog outputs	2 analog outputs, 0 to 10V, fully user-definable (current output 4-20mA available as option)
Digital operator	Displays	5-character, 7-segment display, 12 LED status indicators for forwards/reverse, local/remote control, alarm, ready, status of short menu, standard menu, modified parameters, autotuning, start, stop.
	Buttons	9 buttons for displaying and programming the parameters and changing the speed, RUN button and STOP button
	Copying function	Copy and verify function included
Ambient conditions	Option	LCD digital operator with plain text display and the same functions as the LED operator is available as an option.
	Case	IP20 up to and including 18.5kW, IP00 (IP20 optional) from 22kW
	Relative humidity	Maximum of 95% (non-condensing)
	Ambient temperature	IP20 inverters from -10 to +40°C, IP00 from -10 to +45°C
	Storage temperature	From -20 to +60°C (short-term in transit)
Installation location	Installation location	Indoors (rooms free from corrosive gases and dust)
	Height of installation location	Maximum of 1000m
	Vibration	Maximum of 9.8m/s ² (1g) from 10 to 20Hz, maximum of 2m/s ² (0.2g) from 20 to 50Hz

*1: The recommended maximum connected load is specified for a four pole standard motor. Choose the version of the converter that does not exceed the rated current of the motor.