

V240E VECTOR DRIVE



*Powerful and advanced
high performance*

1.5kW - 45kW

THE V240E STRENGTHENS THE MITSUBISHI DRIVE RANGE



- **Built in LED** - Configurable to display any one of a number of status values, e.g. load, speed, output current.
- **Easy to use** - Detachable parameter unit provides easy parameter read/write plus a range of useful troubleshooting and alarm features
- **Powerful** - Despite its compact frame size across the power range (1.5kW to 45kW), this closed loop vector drive is powerful enough to match the performance of any DC system.

As technology improves, industry expects higher standards of performance and increased flexibility from lower cost products. With this in mind, Mitsubishi have developed the new V240E - a closed loop vector drive with the power to produce torque from zero speed combined with the positioning accuracy expected from servo applications.

The V240E delivers full torque over its 1000:1 speed range

Closed loop control systems provide tremendous advantages. Encoder feedback guarantees improvements in both response and safety. This produces a system with outstanding dynamic response in four quadrant operation and the most efficient use of power to the motor.

With the following range of performance-enhancing features, the V240E can be easily integrated into any application:-

- **Auto-tuning** - With an advanced auto-tuning function utilising data from the encoder feedback, the new V240E vector drive can obtain class leading performance from a wide range of motors.
- **Expanded speed range** - When used in conjunction with force cooled motors, the V240E provides a speed range of 1000:1. This is reinforced by a choice of zero speed control or servo lock to provide holding torque at standstill.

- **Easy installation** - Compatibility with standard 5V, 1024 pulse encoders coupled with the auto tune facility means that installation can be completed with minimum commissioning effort.
- **Programmable I/O** - For ultimate flexibility all inputs and outputs are configurable. I/O functions include selection of torque mode at zero speed, configuration for external switching between speed and torque mode and coasting motor restart.
- **Zero harmonics option** - The FR-HC provides a high power factor, regenerative converter option ideal for applications using four quadrant operation. This solves the problems of current harmonics associated with inverters and facilitates continuous regeneration at 100% rated current saving substantial amounts of energy.



The V240E takes control of the most demanding applications

Industry characteristics

Materials Handling

- Transfer large loads quickly and accurately from position A to position B
- Control from central point via networks
- Minimum downtime

Passenger Lift

- Fast dynamic response for high speed lift applications
- Compatibility with high slip motors
- Flexibility with I/O for use with custom built controllers
- Passenger safety and comfort

Machine Tools

- High speed spindle drives
- High accuracy speed holding
- Compatibility with custom built controller
- Small footprint to meet control panel constraints

Paper and Textiles

- Tension control for winding and unwinding
- Four quadrant operation during unwind and rewind
- Selectable control mode to change between speed and tension control

V240E solutions

Materials Handling

- Continuously high levels of torque
- Wide speed range
- Orientation control
- Unbeatable reliability

Passenger Lift

- 32 bit DSP control for high speed data processing and power control
- Unique auto-tuning algorithm for remarkable performance
- Programmable I/O
- Encoder feedback for smoother operation

Machine Tools

- 1000:1 speed range
- 0.1% fluctuation from no load to full load
- Flexible I/O configuration
- Compact size, footprint filters and design for easy installation

Paper and Textiles

- Torque control for tensioning applications
- Regenerative converter option for continuous overhauling operation
- Control mode configurable by parameters or by external switch



The V240E offers flexible power

In addition to the numerous functions available as standard on this product, a range of options have also been developed (FR-VPA, VPB, VPC) to offer ultimate flexibility to meet the needs of any application.

Positioning control can be performed by connecting the MELSEC-A Series positioning unit (e.g. AD71) to the servo amplifier. The positioning unit on the PLC provides a pulse train output which is followed by the inverter to provide accurate positioning.

Motor thermistor interface facilitates the use of thermistors for motor temperature detection. This information is also used by the control algorithm to compensate for the effect of temperature fluctuations on performance.

The Serial communications interface allows the inverter to be controlled and monitored from a PC on RS 485. The PC can also perform parameter read/write operations.

Orientation control stops the motor shaft at a preset position. This function uses the feedback from an encoder on the motor or

spindle and incorporates compensation for gear backlash with a repeated positioning accuracy precision of +/-1.5deg.

The encoder pulse train output function transfers the encoder input pulses from the encoder on either the motor or spindle end, to open collector outputs from terminals on the option card. This pulse train output can also be divided.

A power supply is available for applications that require encoder cable lengths of greater than 50m to be used.

Configurable inputs and outputs can be added to adapt performance to any demanding application.

EMC Compliant

Use of the range of custom-designed filters enables full compliance with the standards called for by the EMC directive at the most stringent levels (residential emissions/industrial immunity).



SPECIFICATIONS

Type	FR-V240E	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K		
Inverter	Output	Rated Capacity (kVA)	3.1	4.5	6.9	9.6	12.6	18.3	24.6	30.1	35.8	44.0	57.8	67.5	
		Rated Current (A)	4.5	6.5	10.0	13.9	18.2	26.3	35.5	43.5	51.8	63.3	83.5	97.5	
		Overload Current Rating	*1 150% 60 seconds, 200% 0.5 seconds (inverse-time characteristics)												
		Voltage	*2 Three-phase, 380V to 460V 50Hz/50Hz												
		Regenerative braking torque	Maximum value/time	100%/5seconds					20% *3						
		Permissible duty	2%ED					Continuous *3							
	Power Supply	Rated input AC voltage, frequency	Three-phase, 380V to 460V 50Hz/60Hz												
		Permissible AC voltage fluctuation	323V to 506V 50Hz/60Hz *4												
		Permissible frequency fluctuation	± 5%												
		Instantaneous voltage drop immunity	Operation continues at 320V or higher. If voltage drops from rated voltage to less than 320V operation continues for 15msec												
Power supply capacity (kVA) *5		4.5	5.5	9	12	17	20	28	34	41	52	66	80		
Protective structure (JEM 1030)	Enclosed type (IP20)						Open type (IP00)								
Cooling system	Forced air cooling														
Approx weight (kgf)	4.5	4.5	7.5	7.7	16	16	20	20	33	54	54	72			
Inverter	Control Specifications	Control system	High carrier frequency PWM control, full digital vector control												
		Speed control range	1.5 to 1500r/min (constant torque), 1500 to 3000r/min (constant output) (when vector inverter motor is used)												
		Speed setting resolution	Digital input	0.03% to the maximum setting (minimum setting in 1r/min increments)											
			Analog input	0.1% of the maximum set speed											
		Acceleration/deceleration time	0 to 3600 seconds (acceleration and deceleration can be set individually in 0.1 sec increments)												
		Acceleration/deceleration pattern	Linear or S-pattern acceleration/deceleration mode can be selected												
	Input Signals	Analog setting signals	Terminal number	Setting range		Speed control				Torque control					
			2	0 to 10VDC (resolution 0.1%)		Main speed setting				Speed limit					
			1	0 to ±10VDC (resolution 0.2%)		Auxiliary speed setting				Speed limit compensation					
			3	0 to ± 10 VDC (resolution 0.2%)		Torque limit (regeneration/drive)				Torque command					
			4	0 to ±10VDC (resolution 0.2%)		Torque limit (regeneration only)				-					
		6	0 to ± 10 VDC (resolution 0.01%)		Main speed setting (at this time terminals 1,2 are invalid)				Torque command (at this time terminal 3 is invalid)						
	Contact signals	Fixed function terminal 4 points	Forward rotation command, reverse rotation command, alarm reset, thermal protector, total 4 points												
		Multi-function terminal 3 points	3 points can be selected with parameters from among multi-speed setting (max 7 speeds) jogging operation selection*6, second function selection, pre-excitation, coasting terminal, running signal holding, S-pattern switching and control mode switching												
	Output Signals	Contact signals	Alarm output, change-over contact (230V 0.3A, AC, 30V, 0.3A, DC)												
Open collector signals		3 points can be selected from among up-to-speed, overload detection, undervoltage detection, inverter running, minor fault, torque detection, ready, low-speed signal, speed detection and parameter unit operation signal													
Analog output		2 points can be selected from among speed, output current, output voltage, speed setting, output frequency, output torque, DC bus voltage and load meter.													
Digital output (PLG output)		A-phase, B-phase, Z-phase (Div. of A-phase & B-phase is possible) (when option FR-VPA, VPB VPC (A-phase, B-phase only) is mounted)													
Display	Operation functions	Upper/lower limit speed setting, external protection (thermal relay) input, forward/reverse rotation prevention, auto tuning function													
	Parameter unit	PU02V various monitors (11 types: alarm, input/output terminal monitors in addition to the above analog outputs)													
	LED (7-Segment)	7 segment, 4 character display (8 types of data can be selected)													
Environment	Protective functions	Overcurrent, output short circuit protection (acceleration, deceleration, constant speed), regenerative, overvoltage, undervoltage, no signal, excessive speed deviation, overload, (electronic thermal overload protection), brake transistor alarm*7, overspeed, motor overheat etc													
	Ambient temperature	-10°C to 50°C (non-freezing)													
	Ambient humidity	90% RH or less (non-condensing)													
	Storage temperature	*8 -20°C to 65°C													
	Ambience	Indoors. No corrosive gases, flammable gases, oil mist, dust and dirt													
Altitude, Vibration	Below 1000m, 5.9m/S2 (0.6G) or less (conforms to JIS C0911)														
Vector Inverter Motor	Ambient temperature humidity	-10°C to +40°C, 90%RH or less													
	Structure	Totally enclosed forced draft system													
	Encoder	PLG 1000P/R, A, B, Z + 5VDC power supply													
	Insulation	Class F													
	Vibration rank	V10													

Note:

- The percentage of the overload current rating indicates a ratio to the rated output current of the inverter. For repeated use, it is necessary to wait until the inverter and motor return to temperature below the value under 100% load.
- The maximum output voltage does not exceed the power supply voltage. Below the power supply voltage the maximum output voltage can be set as required.
- Indicates the average torque when the inverter is decelerated to a stop from 60Hz. Changes according to motor loss.

- If the power supply voltage fluctuation is 342V or less or 484V or more when using the 400V class inverter, the internal transformer's tap must be changed.
- The power supply capacity depends on the value of impedance on the power supply side (including the input reactor and cables).
- Jogging operation can also be performed from the parameter unit.
- Not provided for the FR-V240E-7.5K to 45k which does not have a built in brake circuit.
- Temperature applicable for a short period in transit etc.



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