

Saftronics Inc.

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VG10 Product Specifications

VG10

Dynamic Vector Drive

VG10 Specifications

<i>Category</i>	<i>Item</i>	<i>Description</i>
Nominal Motor	230 VAC, 3 Phase	1/4 Hp to 125 Hp
	460 VAC, 3 Phase	1/2 Hp to 600 Hp
Braking Torque (Standard)	1/4 Hp to 1 Hp	150%
	2 Hp to 10 Hp	100%
	15 Hp to 30 Hp	20%
	40 Hp and Higher	10% - 15%
Braking Torque (Optional)	1 Hp to 30 Hp	150%
	40Hp and Higher	100%
Enclosure, Standard	1/4 Hp to 30 Hp	NEMA 1 Standard, NEMA 4 Optional to 10 Hp, NEMA 12 Optional all ratings
	40 Hp and Up	NEMA 1 Standard, IP00 Optional 40Hp and above
Cooling Method	Convection	1 Hp and below
	Fan Cooled	Above 1 Hp
Standards	UL/cUL	No input fuses required
	CE	EN61800-3 for EMC EN61800-2 for Low Voltage
<i>Input</i>	<i>Item</i>	<i>Description</i>
	Up to 30 Hp, 230 VAC	200V - 230V (+10%, -15%), 50 or 60 Hz (+/- 5%)
	Up to 30 Hp, 460 VAC	380V - 480V (+10%, -15%), 50 or 60 Hz (+/- 5%)
	40 Hp & Above, 230 VAC	200V - 220V (+10%, -15%), 50 Hz (+/- 5%) / 220V - 230V (+10%, -15%), 60 Hz (+/- 5%)
	40 Hp & Above, 460 VAC	380V - 440V (+10%, -15%), 50 Hz (+/- 5%) / 380V - 480V (+10%, -15%), 60 Hz (+/- 5%)
	Unbalance	Voltage Unbalance within 3%
	Power Dip	For input voltage greater than Vmin, the drive will operate at rated output continuously For input voltage less than Vmin, the drive will operate at 85% of rated output for 15 Msec. Vmin (230V Series) = 165V, Vmin (460V Series) = 310V. Smooth recovery method is selectable
<i>Condition</i>	<i>Item</i>	<i>Description</i>
Altitude		1000 meters or less. Derate at 1% for each 100 meters from 1000 to 3000 meters (Above 3000 meters, consult factory)
	Temperature	Ambient Storage
Vibration		IEC61200-2
Humidity		5 - 95% Relative Humidity (Non-condensing)
<i>Output</i>	<i>Item</i>	<i>Description</i>
	230V, 3 Phase	3 Phase, 200V, 50Hz or 3 Phase, 200V, 220V, 230V, 60Hz
	460V, 3 Phase	3 Phase, 380V, 400V, 415V, 440V, 50Hz or 3 Phase, 380V, 400V, 440V, 460V, 60Hz
	Frequency	50 / 60 Hz
	Overload	150% of rated current for 1 min 180% of rated current for 0.5 sec => 30Hp 200% of rated current for 0.5 sec =< 30Hp
	Max Freq.	50 - 400 Hz
	Base Freq.	25 - 400 Hz
	Starting Freq.	0.1 - 60 Hz
	Carrier Freq.	0.75 - 15 kHz up to 100 Hp. 0.75 - 10 kHz 125 Hp and above. Minimum carrier frequency changes dependent on maximum output frequency
	Accuracy (Stability)	Analog
Digital		+/- 0.01% of maximum frequency (speed) between -10 and 50°C
Setting Resolution	Analog	1/3000 of maximum frequency (speed)
	Digital	0.01 Hz for frequency up to 99.9 Hz (0.1 Hz for frequency > 100 Hz)

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<i>Control</i>	<i>Item</i>	<i>Description</i>
Control Method	Sinusoidal PWM	V/Hz
		Dynamic Torque Vector Control (Sensorless) Flux-vector Control with Pulse Tachometer
Operation	Methods	Keypad, Digital Input, Bus Communication
Frequency Setting	Keypad	(UP or DOWN)
		Potentiometer
	Analog	0 - 5 VDC
		0 to +/∓ 10 VDC Bi-polar (Reversible operation by signal polarity)
		0 - 10 VDC (10 - 0 VDC selectable)
		4 - 20 MA (20 - 4 MA selectable)
	Digital	Up/Down Control (Increases with UP, decreases with DOWN)
		Multi-step (4 different frequencies via SS1 and SS2)
		Multi-step (8 different frequencies via SS1, SS2, and SS4)
		Multi-step (16 different frequencies via SS1, SS2, SS4, and SS8)
		Programmed pattern operation - 8 stages
Serial Networks		RS485 with Modbus RTU - Standard
		Optional network cards
Acceleration Setting	Four Modes	0.01 - 3600 seconds (Independent Acc/Dec, four times, three modes - Linear, S-Curve, Non-linear)
	Automatic	When the motor acc.(dec.) torque reaches a preset value, the acc. (dec.) time is automatically extended for tripless operation.
Frequency Limiter		High and low values are presettable
Bias Frequency		-400.0 to +400.0 Hz
Frequency Gain		Adjustable from 0 - 200 %
Jump Frequency		Jump frequency setting (3 points), jump hysteresis width (1 setting)
Catch Spinning Motor		Smoothly pick up a rotating motor without stopping (speed search method) - No DB required
Auto-Restart		Autorestart is available after a momentary power failure (speed search method)
		Continuous operation mode is selectable
Switching Operation		Control terminals are provided for smooth switching operation from line power to drive
Slip Compensation		Related to load torque and magnified for negative slips frequencies
Torque Limiting		Automatic overcurrent adjustments
		2 torque limiting functions can be preset
Torque Control		Output torque or load factor can be controlled by analog input signal with PG option
PID Control		Process controller - standard
Automatic Deceleration		Automatic extension of deceleration time when braking torque limit is reached for tripless operation without a DB resistor
2nd Motor Settings		Settings for a second motor: base freq, rated voltage, rated current, no load current, impedances
Fan Stop Operation		Automatically manage cooling fan operation to extend life - up to 30Hp operation is preset, above 30Hp signal is preset
Motor Autotune	Offline Tuning	Selectable with motor rotating and without motor rotating
	Online Tuning	Dynamically compensates regulator for changes in motor temperature
Energy Saving		Reduces losses at light loads
Keypad	Item	Description
		Backlit LCD Display
		Smart Keypad to copy parameters from one drive to another
		Extension cable adapter for RJ45 connector

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<i>Indication</i>	<i>Item</i>	<i>Description</i>
Operation Mode	LED	Output frequency
		Output current, Output voltage
		Motor synchronous speed (RPM)
		Line speed (M/min)
		Load shaft speed (RPM)
		Output torque (%)
		Frequency setting
		PID (Set 1 value, Set 2 value, Feedback value)
		Power consumption
		Motor load factor
	LCD	Heatsink temperature
		Drive internal temperature
		I/O Test - indicates signal existence or absence of digital I/O and signal value of analog I/O
		RMS current - 1 cycle
	Other	DC Link power charge display
Program Mode	Feature	Function Code and Function Name, Data or Data Code
	Languages	English, French, German, Italian, Japanese, Spanish
Trip Mode	OC1	Overcurrent during acceleration
	OC2	Overcurrent during deceleration
	OC3	Overcurrent running at constant speed
	FUS	Fuse blown
	OU1	Overvoltage during acceleration
	OU2	Overvoltage during deceleration
	OU3	Overvoltage running at constant speed
	LV	Low voltage
	OH1	Overheating of heatsink
	OH2	External thermal relay tripped
	OH3	Overtemperature of inside air
	dBH	Overheating of DB circuit
	OL1, OL2	Motor overload
	OUV	Drive unit overload
	EF	Ground fault
	LIM	Input Phase Loss
	FUS	DC Fuse open (40 Hp and above)
	Er1	Memory error
Er2	KEYPAD communication error	
Er3	CPU error	
Er4	Option card error, detected by the control card	
Er5	Option card error, detected by the option card	
Er6	Operations procedure error.	
Er7	Output wiring error - impedance unbalance	
Er8	RS485 communications error	
Diagnostics	History	Trip history - passed four events (Trip and Warning)

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<i>Protection</i>	<i>Item</i>	<i>Description</i>
Overload		Detection of electronic thermal overload relay
Overvoltage		Detection of DC link circuit overvoltage (230V series - 400V, 460V series - 800V)
Incoming Surge		Drive protection from surge voltage input (Max. 1.2 x 50 usec 7KV peak)
Undervoltage		Detection of DC link circuit undervoltage (230V series - 200V, 460V series - 400V)
Overheating		Drive overheating protection by temperature detection
Short Circuit		Short circuit protection for drive output circuit
Ground Fault		Ground fault protection for drive output circuit - 3 phase circuit detection method Zero phase current detection method - 40 Hp and above
Motor Overload		Electronic thermal overload relay can be selected for general purpose motor or dedicated drive motor Calculation of thermal time constant can be preset 2nd motor electronic thermal overload relay
DB Resistor Overheating		Internal electronic thermal overload relay - up to 10 Hp Overheating detection thermal overload relay installed in braking resistor unit - 15 Hp and above (option)
Motor Overheating		Overheating detection PTC thermistor can be connected to terminals 13-C1-11
Phase Loss		Drive protection for line side phase loss Drive protection for motor side phase loss during tuning Detection of output impedance unbalance during tuning
Signal Loss		Detection of loss of C1 current signal
Auto-reset		Auto reset times and reset interval can be preset
<i>Terminal Functions</i>	<i>Item</i>	<i>Description</i>
<i>Main Circuit</i>		
Power Input	L1/R, L2/S, L3/T	Connect a three phase power source
Drive Output	U, V, W	Connect to a three phase induction motor
DC Reactor	P1, P(+)	Connect the DC reactor for power factor correcting or harmonic current reduction Shipped in same carton with drive
Braking Unit	P(+), N(-)	Connect the braking unit - optional for 15 Hp and above
Ext. Braking Resistor Unit	P(+). DB	Connect the external braking resistor - 230V/460V series up to 10 Hp
Ground	G	Ground terminal for drive chassis (housing)
Aux. Control Power	R0, T0	Connect the same AC power source used for Power Input as backup for control circuit power supply - 2 Hp and above
<i>Analog Inputs</i>		
Potentiometer Power	13	+10V DC power supply, maximum allowable output current 10ma
Voltage Input	12	0-10V / 0-100%, 22K ohm input impedance 0-5V / 0-100% can be selected by signal gain setting Inverse mode operation by polarity Reversible operation can be selected by function code Frequency command, torque control, Tach feedback, or PID control
Common	11	Common for analog signal
Current Input	C1	4-20ma / 0-100 % (input impedance 250 ohm) Inverse mode operation Frequency command, PID feedback
Analog Input 1	V2	0 - +/- 10V / 0 - +/- 100% (input impedance 22K ohm)

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<i>Digital Inputs</i>	<i>Item</i>	<i>Description</i>
Forward Operation	FWD	ON - Motor runs in the forward direction, OFF - Motor decelerates and stops
Reverse Operation	REV	ON - Motor runs in the reverse direction, OFF - Motor decelerates and stops
Digital Input 1	X1	Functions selected via function codes - Sink type terminal specification default with source type hardware selectable
Digital Input 2	X2	ON state - maximum input voltage 2V, maximum source current 5ma
Digital Input 3	X3	OFF state - maximum voltage 27V, maximum leakage current 0.5ma
Digital Input 4	X4	Selectable from the following
Digital Input 5	X5	
Digital Input 6	X6	
Digital Input 7	X7	
Digital Input 8	X8	
Digital Input 9	X9	
3 Wire Stop	HLD	ON - the drive latches the FWD or REV signal, OFF - the drive releases the latch
Coast Stop	BX	ON - motor will coast to a stop, no alarm signal will be issued
Trip Command	THR	OFF - OH2 trip is issued and latched, motor will coast to a stop
Alarm Reset	RST	ON - Momentary on for >0.1 sec will reset faults
Multistep Frequency	SS1 / SS2	4 different frequencies can be selected by ON/OFF pattern on terminals SS1 and SS2
	SS4	8 different frequencies can be selected by ON/OFF pattern on terminals SS1, SS2, and SS4
	SS8	16 different frequencies can be selected by ON/OFF pattern on terminals SS1, SS2, SS4, and SS8
ACC/DEC Time Select	RT1	Second ACC/DEC time can be selected by terminal RT1
	RT2	4 different ACC/DEC times can be selected by ON/OFF pattern on terminals RT1 and RT2
JOG	JOG	ON - JOG frequency is activated
2nd Frequency Select	HZ2/HZ1	ON - drive will stop and the 2nd frequency command becomes effective
2nd Motor Select	M2/M1	ON - drive will stop and Motor 1 values are changed to Motor 2 values
DC Brake Command	DCBRK	ON - DC injection braking is active during deceleration
2nd Torque Limiter	TL2/TL1	ON - Torque Limiter 2 is active
Line/drive Switching	SW50 / SW60	ON - Motor is changed from drive operation to line operation (Main circuit signal output via Y1-Y5)
UP Command	UP	ON - drive output frequency increases (change rate determined by ACC time)
DOWN Command	DOWN	ON - drive output frequency decreases (change rate determined by DEC time)
Write Enable	WE-KP	ON - data can be changed by KEYPAD operation
PID Control Cancel	HZ/PID	ON - PID control is canceled
Inverse Mode Changeover	IVS	ON - Operation mode is toggled from Normal to Inverse or Inverse to Normal
Interlock Signal (52-2)	IL	Connection for auxiliary contact 52-2
TRQ Control Cancel	HZ/TRQ	ON - Torque control is canceled
Link Enable (RS485)	LE	ON - Bus link or RS485 link is active
Universal Digital Input	U-DI	ON - Enables input from RS485 or LAN option
Sync/Tach Enable	PG/HZ	ON - Synchronize operation or Tach feedback operation is active
Zero Speed Command	ZERO	ON - Enables stall torque function
Timed Alarm Command	STP	OFF -The drive decelerates and stops
Pre-exciting Command	EXITE	ON - The motor enters into a pre-exciting state during flux vector control
RS485 I/O Terminal	DXA, DXB, SD	Connections for RS485 serial port communications Modbus RTU standard protocol
PLC Terminal	PLC	Connection for PLC power supply that avoids drive current loops on Sink type inputs when PLC power supply is off.
Common	CM	Common for digital inputs

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<i>Analog Outputs</i>	<i>Item</i>	<i>Description</i>
Analog Monitor	FMA / 11	Output DC voltage is proportional to selected function's value. Functions are selected by FC31 Slip frequency (0 - max frequency) Output frequency (0 - max frequency) Output current (0 - 200 %) Output voltage (0 - 200 %) Output torque (0 - 200 %) Load factor (0 - 200 %) Input power (0 - 200 %) PID feedback value (0 - 100 %) Tach feedback value (0 - max speed)
Universal Analog Output		Analog output pass through for process control
Pulse Rate Monitor	FMP / CM	Pulse rate is proportional to selected function's value. maximum output current: 2ma The average value of the pulse train is proportional to the selected function's value, output functions same as for FMA
<i>Transistor Outputs</i>	<i>Item</i>	<i>Description</i>
Power Supply	P24	DC power supply - +24V, 100ma
Transistor Output 1	Y1	ON state maximum output voltage 2V, sink current 50ma
Transistor Output 2	Y2	OFF state maximum allowable voltage 27V, leakage current 0.1ma
Transistor Output 3	Y3	Select from the following
Transistor Output 4	Y4	
Drive Running	RUN	ON - output frequency is larger than starting frequency
Frequency Equivalence	FAR	ON - difference between output frequency and setting frequency is smaller than FAR hysteresis width
Frequency Level Detection	FDT	ON - output frequency is larger than preset detection level
Undervoltage Detection	LV	ON - drive undervoltage stops and operation command is ON
Torque Polarity	B/D	ON - drive is in braking mode
Torque Limiting	TL2/TL1	ON - drive is in torque limiting mode
Auto-restarting	IPF	ON - drive auto restarting mode active or restart waiting mode is active
KEYPAD Operation Mode	TP	ON - drive is in KEYPAD operation mode
Drive Stopping	STOP	ON - drive is in stopping mode or DC braking mode
Overload Early Warning (Selectable)	OL	ON - electronic thermal calculated value is larger than preset protection level ON - output current is larger than preset detection level
Line/drive Changeover	SW88 SW52-2 SW52-1	Outputs signal 88 for line/drive changeover Outputs signal 52-2 for line/drive changeover Outputs signal 52-1 for line/drive changeover
Motor 2 / Motor 1	SWM2	Outputs motor changeover control switch for switching between motor 1 and motor 2
Auxiliary Terminal	AX	ON - drive is running
Times UP	TU	Outputs a 100ms ON pulse for time up for pattern operation
Cycle Complete	TO	Outputs a 100ms ON pulse for cycle complete for pattern operation
Stage 1 Indicator	STG-1, STG-2, STG-3	Pattern operation stage indicator (binary encoded)
Alarm 1 Indicator	AL-1, AL-2, AL-4	Trip alarm number (binary encoded)
Fan Control	FAN	Outputs the drive fan control signal for 40 Hp and larger drives
Auto-resetting	1-TRY	ON - auto resetting mode or reset waiting mode active
Universal Digital Output	U-DO	ON - Enables output from RS485 or LAN option
Overheating Early Warning	OH	ON - heatsink temperature is larger than preset detection level
Synchronization Complete	SY	Synchronization signal for synchronize operation option
Loss of C1 Current Input Signal	C1-OFF	ON - When C1 current input is smaller than 2mA
Common	CM	Common terminal for transistor output signals

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<i>Relay Output</i>	<i>Item</i>	<i>Description</i>
Alarm Relay Output	30A, 30B, 30C	Activates when a protective function is activated, programmable with the default state function code settable
Programmable Relay Output	Y5A, Y5C	Selectable the same as Y1-Y4
<i>Options</i>	<i>Item</i>	<i>Description</i>
	LAN	GENIUS
	LAN	Profibus DP
	LAN	N2 - Metasys
	LAN	Interbus-S
	LAN	Modbus Plus
	LAN	DeviceNet
Tachometer		
KEYPAD Extension Cable		Adaptor for RJ45 cable, up to 100'