Bulletin 284

Electrical Ratings		UL/NEMA	IEC
Power Circuit	Rated Operation Voltage	380…480V	380…480V
	Rate Insulation Voltage	600V	600 V
	Rated Impulsed Voltage	6 kV	6 kV
	Dielectric Withstand	2200V AC	2500V AC
	Operating Frequency	50/60 Hz	50/60 Hz
	Utilization Category	N/A	AC-3
	Protection Against Shock	N/A	IP2X
	Rated Operating Current Max.	2.5 A	
		5.5 A	
		16 A	
Control Circuit	Rated Operation Voltage	24V DC (+10%, –15%) A2 (should be grounded at voltage source)	
	Rate Insulation Voltage	250V	250V
	Rated Impulsed Voltage	—	4 kV
	Dielectric Withstand	1500V AC	2000V AC
	Overvoltage Category	—	III
	Operating Frequency	50/60 Hz	50/60 Hz

Short Circuit Protection	SCPD Performance	**Current Rating**	**Voltage**	480Y/277V	480/480V	600Y/347V	600V
		10 A	Sym. Amps RMS	65 kA	65 kA	30 kA	30 kA
		25 A		30 kA	30 kA	30 kA	30 kA
	SCPD List	Size per NEC Group Motor			—		

	UL/NEMA	IEC
Standards Compliance	UL 508C CSA C22.2, No. 14 EN50178 EN61800-3 EN/IEC 60947-4-2 CE Marked per Low Voltage 2006/95/EC EMC Directive 2004/108/EC CCC – In Process ODVA for EtherNet/IP	
Certifications	cULus (File No. E207834, Guide NMMS, NMMS7)	

EtherNet/IP Version – Control and I/O Power Requirements				
	Units	**A1/A2 ❶**	**A3/A2 ❷**	**A3/A2 ❸**
Control Voltage	Volts	24V DC		
Current	Amps	0.375	0.125	0.35
Total Control Power (no options)	Watts	9	3	8.4
Total Control Power (with Dynamic Brake or Output Contactor option)	Watts	12	3	8.4
Total Control Power (with Dynamic Brake and Output Contactor option)	Watts	15	3	8.4

❶ Add power requirements for outputs (1 A max.) to A1/A2.
❷ Add power requirements for intputs (200 mA max.) to A3/A2.
❸ If A1 power is disconnected.

Drive Characteristics	Sensorless Vector Control
Maximum (kW) Hp Rating/Input Voltage	2 Hp (1.5 kW)/230V AC
	5 Hp (3.3 kW)/480V AC
	5 Hp (4.0 kW)/600V AC
Overload Capacity	150% for 60 s
	200% for 3 s
Preset Speeds	8
Carrier Frequency	2…16 kHz
Skip Frequency	✓
Process Control Loop	✓ (PID)
StepLogic Functionality	✓
Timer/Counter Functions	✓

Drive Ratings — VFD Output Current vs. Input Current							
				Output Current [A]		**Input Current [A]**	
Line Voltage [V]	**Frequency [Hz]**	**3-Phase kW Rating**	**3-Phase Hp Rating**	**Sensorless Vector Control**	**Sensorless Vector Performance**	**Sensorless Vector Control**	**Sensorless Vector Performance**
380	50	0.4	—	1.4	—	2.15	—
		0.75	—	2.3	—	3.80	—
		1.5	—	4.0	—	6.40	—
		2.2	—	6.0	—	9.00	—
		3.0	—	7.6	—	12.40	—

Drive Ratings — VFD Output Current vs. Input Current							
				Output Current [A]		Input Current [A]	
Line Voltage [V]	Frequency [Hz]	3-Phase kW Rating	3-Phase Hp Rating	Sensorless Vector Control	Sensorless Vector Performance	Sensorless Vector Control	Sensorless Vector Performance
460	60	—	0.5	1.4	1.4	1.85	1.8
		—	1	2.3	2.3	3.45	3.2
		—	2	4.0	4.0	5.57	5.7
		—	3	6.0	6.0	8.20	7.5
		—	5	7.6	7.6	12.5	8.6

Sensorless Vector Control (SVC)

Protective Specifications — Sensorless Vector Control	
Motor Protection	I^2t overload protection – (Provides Class 10 protection)
Overcurrent:	200% hardware limit, 300% instantaneous fault
Over Voltage:	380…480V AC Input – Trip occurs @ 810V DC bus voltage (equivalent to 575V AC incoming line)
Under Voltage:	380…480V AC Input – Trip occurs @ 390V DC bus voltage (equivalent to 275V AC incoming line)
Faultless Power Ride Through:	100 milliseconds

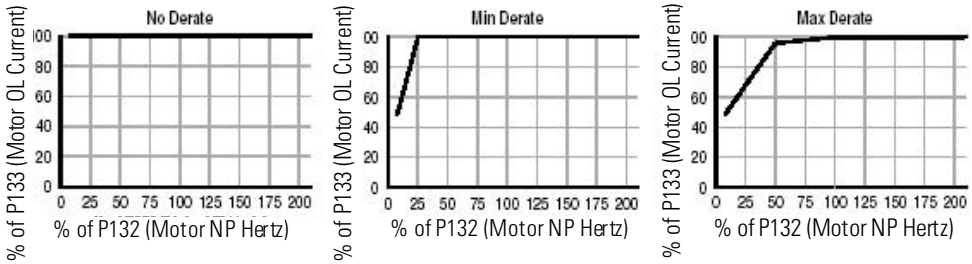
Control Specifications — Sensorless Vector Control	
Carrier Frequency	2…16 kHz. Drive rating based on 4 kHz.
Frequency Accuracy Digital Input: Analog Input:	 Within ±0.05% of set output frequency. Within 0.5% of maximum output frequency.
Speed Regulation – Open Loop with Slip Compensation:	±1% of base speed across a 60:1 speed range
Stop Modes:	Multiple programmable stop modes including – Ramp, Coast, DC-Brake, Ramp-to-Hold and S Curve.
Accel/Decel:	Two independently programmable accel and decel times. Each time may be programmed from 0…600 s in 0.1 s increments.
Intermittent Overload:	150% Overload capability for up to 1 m 200% Overload capability for up to 3 s
Electronic Motor Overload Protection	Class 10 protection with speed sensitive response and power-down overload retention function.

Minimum DB Resistance			
Drive Rating			Minimum DB Resistance
Input Voltage	[kW]	[Hp]	[Ω]
380…480V, 50/60 Hz, Three-Phase	0.4	0.5	97
	0.75	1	97
	1.5	2	97
	2.2	3	97
	4.0	5	77

Motor Overload Trip Curves

Motor OL Current parameter provides class 10 overload protection. Ambient insensitivity is inherent in the electronic design of the overload.

Figure 89 - 284E Overload Trip Curves



		UL/NEMA	IEC
Input Ratings – Sourced from Control Circuit (A3/A2)	Rated Operation Voltage	24V DC	
	Input On-State Voltage Range	10…26V DC	
	Input On-State Current	3.0 mA @ 10V DC	
		7.2 mA @ 24V DC	
	Input Off-State Voltage Range	0…5V DC	
	Input Off-State Current	<1.5 mA	
	Input Filter — Software Selectable		
	Off to On	Settable from 0…64 ms in 1 ms increments	
	On to Off	Settable from 0…64 ms in 1 ms increments	
	Input Compatibility	N/A	IEC 1+
	Number of Inputs	4	
	Sensor Source		
	Voltage Status Only	11…26.4V DC	
	Current Available	50 mA max. per input, 200 mA total	

		UL/NEMA	IEC
Output Ratings – Sourced from Control Circuit (A1/A2)	Rated Operation Voltage	26.4V DC	
	Rate Insulation Voltage	250V	
	Dielectric Withstand	1500V AC (UL)	2000V AC (IEC)
	Type of Control Circuit	Solid state sourcing output	
	Type of Current	24V DC	
	Conventional Thermal Current Ith	0.5 A each, 1 A max. combined	
	Type of Contacts	Normally open (N.O.)	
	Number of Contacts	2	
	Load Types	Resistive or light inductive	
	Surge Suppression	Integrated diode, clamps @ 35V DC	
	Thermo-Protection	Integrated short circuit and over current protection	
	Maximum Cycle Rate	30 operations/minute capacitive and inductive loads	
	Maximum Blocking Voltage	35V DC	
	Maximum On-State Voltage @ Maximum Output	1.5V DC	
	Maximum Off-State Leakage Current	10 µA	
Device Level Ring (DLR)		Beacon-based performance including IEEE 1588 end to end transparent clock	
	Maximum Nodes	50	
	Fault Recovery	Ring recovery time is less than 3 ms for a 50 node network	
EtherNet Port		2 D-coded, 4-pin female M12 connecters	
	Ports	Embedded switch with 2 ports	
	IP Address	DHCP enabled by default	
	DHCP Timeout	30 s	
	Communication Rate	10/100 Mbs with auto negotiate half duplex and full duplex	
	Data	Transported over both TCP and UDP	
Web Server		Embedded web server	
	Security	Login and password configurable	
	E-mail	Support Simple Mail Transfer Protocol (SMTP)	
	Configuration	Status, diagnostics, and configuration tabs	
Device Connections		Supports scheduled (Class 1) and unscheduled (Class 3 & UCMM) connections	
		6 - Class 3 connections	
		2 - Class 1 (1 exclusive owner, 1 input only and 1 listen only) connections are supported	