

## SECTION IX

### RATINGS AND SPECIFICATIONS

#### RATINGS

- Horsepower Range: 5 through 1000 HP
- Power Source: See Tables 9-1 and 9-2
- Output: See Tables 9-1 and 9-2
- Reference Voltage: See Table 9-1

**Table 9-1: SERIES 3120 OPERATING VOLTAGES**

LINE SUPPLY (THREE-PHASE)		OUTPUT VDC		MAGNETIC CONTROL VOLTAGE	CONTROL REFERENCE VOLTAGE
Volts	Hertz	Armature	Field <sup>a</sup>		
230	50 or 60	0 - 240	150	115 VAC	10 VDC
460	50 or 60	0 - 500	300		
220	50	0 - 260	150		
380	50	0 - 440	250		
415	50	0 - 460	270		

a. For field voltages other than those shown, see Option 1079 (Constant Current Field Supply), page 8-22.

- Service Factor: 1.0
- Duty: Continuous
- Overload Capacity (Armature Circuit) 150% for 1 minute
- Speed Control Potentiometer: 5K ohms, 1/2W

**Table 9-2: 3120 RATINGS**

HP	INPUT VOLTAGE (VAC)	MODEL NUMBER	LINE AMPS	KVA	MOTOR ARMATURE		MAX MOTOR FIELD		KW	STD ENCL & APPROX WT (LBS) <sup>a</sup>
					VDC	AMPS	VDC	AMPS		
5	230	3121S0051A	18	8	240	18	150	5	3.7	W8, 160
	380	3121S00522A	11		440	10	240			
	460	3121S0053A	10		500	9	300			
7.5	230	3121S0071A	26	11	240	28	150	5	5.6	W8, 160
	380	3121S00722A	16		440	16	240			
	460	3121S0073A	14		500	14	300			
10	230	3122S0101A	32	14	240	36	150	5	7.5	W8, 160
	380	3121S01022A	20		440	21	240			
	460	3121S0103A	17		500	18	300			
15	230	3122S0151A	48	19	240	55	150	5	11.2	W8, 160
	380	3121S01522A	27		440	29	240			
	460	3121S0153A	23		500	25	300			
20	230	3122S0201A	60	25	240	70	150	5	14.9	W8, 160
	380	3122S02022A	35		440	40	240			
	460	3122S0203A	31		500	35	300			
25	230	3122S0251A	78	31	240	90	150	5	18.7	W8, 160
	380	3122S02522A	43		440	49	240			
	460	3122S0253A	38		500	43	300			
30	230	3122S0301A	90	36	240	105	150	5	22.4	W8, 160
	380	3122S03022A	51		440	58	240			
	460	3122S0303A	44		500	51	300			
40	230	3123S0401A	119	47	240	140	150	5	29.8	U200, 370 W8, 160 W8, 160
	380	3122S04022A	65		440	75	240			
	460	3122S0403A	57		500	66	300			
50	230	3123S0501A	148	59	240	175	150	5	37.3	U200, 370 W8, 160 W8, 160
	380	3122S05022A	80		440	94	240			
	460	3122S0503A	71		500	83	300			
60	230	3123S0601A	177	70	240	210	150	5	44.8	U200, 370 U200, 370 W8, 160
	380	3123S06022A	95		440	112	240			
	460	3122S0603A	83		500	98	300			
75	230	3123S0751A	216	86	240	258	150	5	56.0	U200, 370
	380	3123S07522A	118		440	140	240			
	460	3123S0753A	103		500	123	300			
100	230	3124S1001A	285	114	240	342	150	10	74.6	U200, 420 U200, 370 U200, 370
	380	3123S10022A	155		440	185	240	5		
	460	3123S1003A	136		500	163	300	5		
125	230	3124S1251A	336	137	240	426	150	10	93.3	U200, 420 U200, 370 U200, 370
	380	3123S12522A	194		440	233	240	5		
	460	3123S1253A	173		500	205	300	5		
150	380	3124S15022A	231	163	440	278	240	10	111.9	U200, 420 U200, 370
	460	3123S1503A	205		500	245	300	5		
200	380	3124S20022A	306	219	440	370	240	10	149.2	U200, 420
	460	3124S2003A	275		500	325	300			
250	380	3125S25022A	376	267	440	455	240	10	186.5	F3, 1500 U200, 420
	460	3124S2503A	336		500	400	300			
300	380	3125S30022A	451	314	440	546	240	10	223.8	F3, 1500
	460	3125S3003A	402		500	480	300			

(Continued on next page)

**Table 9-2: 3120 RATINGS**

HP	INPUT VOLTAGE (VAC)	MODEL NUMBER	LINE AMPS	KVA	MOTOR ARMATURE		MAX MOTOR FIELD		KW	STD ENCL & APPROX WT (LBS) <sup>a</sup>
					VDC	AMPS	VDC	AMPS		
400	380	3126S40022A	595	421	440	722	240	10	298.4	F3, 1793 F3, 1500
	460	3125S4003A	529		500	635	300			
500	380	3126S50022A	739	522	440	898	240	10	373	F3, 1793
	460	3126S5003A	656		500	790	300			
600	380	3126S60022A	889	633	440	1091	240	10	447.6	F3, 1793
	460	3126S6003A	795		500	960	300			
700	380	3127S70022A	1047	738	440	1120	240	10	522.2	F3, 1893 F3, 1793
	460	3126S7003A	927		500		300			
800	380	3127S80022A	1196	842	440	1280	240	10	596.8	F3, 1893
	460	3127S8003A	1058		500		300			
900	380	3127S90022A	1345	947	440	1637	240	10	671.4	F3, 1893
	460	3127S9003A	1190		500	1440	300			
1000	460	3127S10003A	1320	1050	500	1600	300	10	746.0	F3, 1893

a. Refer to Table 2-1 (page 2-4) for dimensions.

### **OPERATING CONDITIONS**

- Altitude (standard): 1000 meters (3300 feet) maximum. Controller can be derated by 1% per 100 meters (330 feet) to operate at higher altitudes.
- Ambient Temperature
  1. Enclosed Controller: 0 to 40°C (32°F to 104°F)
  2. Unenclosed Controller: 0 to 55°C (32°F to 131°F)\*

Note: \*Temperature inside enclosure where controller is mounted.

- Line Frequency Variation:  $\pm 2$  Hz of rated
- Line Unbalance (permissible): 1.20 (ratio of high to low line)
- Line Voltage Variation:  $\pm 10\%$  of rated
- Relative Humidity: 95% noncondensing

### **PERFORMANCE CHARACTERISTICS**

- Controlled Speed Range: Zero to motor base speed. Speed range with respect to specified regulation is shown in Table 9-3.

- Displacement Power Factor (maximum speed and rated load): 88%
- Efficiency (maximum speed and rated load)
  1. Model 3120M Module only: 99%
  2. Complete drive (controller with motor): 87%
- Speed Regulation (see Table 9-3): Regulation percentages are of motor base speed under steady-state conditions

**Table 9-3: SPEED REGULATION CHARACTERISTICS**

REGULATION METHOD	VARIABLE				
	LOAD CHANGE 95%	LINE VOLTAGE ±10%	FIELD HEATING COLD-NORMAL	TEMP ±10 °C	SPEED RANGE
Standard Voltage Feedback with IR Compensation	2.0%	±1.0%	5-12%	±2.0%	50:1
Optional Speed Feedback 1061C w/5PY DC Tach	0.5%	±1.0%	0.2%	±2.0%	200:1
Optional Speed Feedback 1061C w/5PY DC Tach and Precision Reference Option 1059	0.2%	±0.1%	0.2%	±0.5%	500:1
Optional Speed Feedback 1061C w/BC42 DC Tach and Precision Reference Option 1059	0.2%	±0.1%	0.2%	±0.1%	500:1
Optional Speed Feedback 1061C w/BC46 DC Tach and Precision Reference Option 1059	0.2%	±0.1%	0.2%	±0.05%	500:1

**ADJUSTMENTS**

The following user adjustment potentiometers are located on the standard circuit boards in the 3120M Regulator Module. See Figure 10-11, page 10-13. The remaining potentiometers on the circuit boards are factory set and should not be readjusted.

**Linear Accel/Decel Board**

- Acceleration, linear - 1 to 30 seconds, linear
- Deceleration, linear - 1 to 30 seconds, linear
- Minimum Speed - 0 to 25% of motor base speed

**Adjustment Board**

- Current Limit - 50% to 150% of full-load torque
- IR (load) Compensation - 0 to 100% of rated load
- Maximum Speed (armature feedback) - 70% to 100% of motor base speed

**Control Board**

- Current Limit Test - Simulates current feedback from 0 to 150%

**SPECIFICATIONS****REGULATOR MODULE DESCRIPTION**

The following components are located on standard Series 3120M Regulator Modules. Refer to Figure 10-11 (page 10-13) for 3121M and 3122M Modules, Figure 10-12 (page 10-14) for 3123M Modules, Figure 10-13 (page 10-15) for 3124M Modules, and Figure 10-14 (page 10-16) for 3125M, 3126M and 3127M Modules.

**Adjustment Board**

The adjustment board provides potentiometers for adjusting current limit, IR compensation, and maximum speed (armature)\*. This board unplugs from the control board, thereby allowing the control board to be replaced without disturbing potentiometer settings.

Note: \*When optional tachometer feedback is used, the maximum speed potentiometer on the tachometer feedback board sets maximum speed.

**Control Board**

The control board generates firing pulses for triggering the SCR's. This board combines the speed reference signal with various feedback signals which results in an error signal that determines the duration of the firing pulses.

The control board provides the following features:

- Auxiliary Interface Connections: The following terminals are provided for interfacing external devices with the controller:
  1. Regulated -12 VDC power supply output\*
  2. Unregulated +24 VDC power supply output\*
  3. Run signal - Provides +24 VDC when a Start command is initiated\*
  4. Current signal - Provides a 0 to -5 VDC signal directly proportional to 0 - 150% armature current
  5. Overload reset - Allows resetting the overload circuit with a jumper wire or contact without turning-off the AC supply
  6. Phase loss reset - Allows resetting the phase loss circuit with a jumper wire or contact without turning-off the AC supply

Note: \*30 mA maximum combined total.

- Dual Voltage Operation: Controllers rated through 426 amperes DC can be selected by a slide switch for low line voltage (190 - 230V) or high line voltage (380 - 460V) operation. Higher current rated controllers operate from 380 - 460V lines only.
- Feedback Isolation: Isolates current feedback with optical isolator and isolates voltage feedback with high impedance (4 megohms) isolator.
- 50 Hz Operation: Removal of a plug-in module allows the controller to operate from a 50 Hz line.
- Isolated Regulator: Isolates the DC circuits from the AC line supply for operator and equipment safety, and for simplified application. The control reference input common may be grounded or connected without additional isolation to other drive controllers or grounded external signal sources. Isolation eliminates line voltage to ground potentials on the speed control potentiometer.
- LED Indicators:
  1. Current limit - Lights when the current limit is limiting motor armature current. Normally set for 150% armature current.
  2. Overload trip - Lights when the overload circuit trips.
  3. Phase loss - Lights when a phase loss is detected.
  4. Run - Lights when a Start command is initiated and remains illuminated until a Stop command is initiated.

- **Overload Protection:** Circuit shuts down the controller by dropping out a relay connected in the run/stop logic if armature current exceeds 120% for 80 seconds.
- **Phase Loss Protection:** Circuit shuts down the controller by dropping out a relay connected in the run/stop logic when a phase loss is detected.
- **Static Current Limit Adjustment:** Allows adjustment of the current limit without running the motor.

### **Feedback Board**

The feedback board is plugged into the feedback receptacle on the control board and provides jumpers which close various circuits on the control board. When optional tachometer feedback is used, a tachometer feedback board replaces the standard armature feedback board, which allows the tachometer generator signal to feed into the control board circuits.

### **Field Supply Board**

The field supply board supplies half-wave DC to the motor shunt field. When a Start command is initiated, rated shunt field power is supplied to the motor, and when a Stop command is initiated and the armature contactor drops out, field power reduces to 66% of rated for field economy. The field supply is transient and fuse protected.

### **Linear Accel/Decel Board**

The linear accel/decel board is plugged into the input receptacle on the control board and provides independently adjustable rates of linear acceleration and deceleration, and a minimum speed adjustment.

### **Relay/Interface Board**

The relay/interface board interconnects the operator controls, magnetic control logic, field supply board, and control board. Provides undervoltage protection with relay contacts connected in the run/stop logic.

### **SCR Bridge**

The NEMA Type C full-converter SCR bridge consists of six silicon controlled rectifiers (SCR's), mounted in heat sinks. Each SCR has a 1200 PIV rating.

The SCR bridge rectifies the three-phase AC supply to adjustable DC for armature voltage control of motor speed.

### **Shunt**

The shunt provides an armature current feedback signal for the control board and can be reconnected for any standard horsepower rating within the design range of the 3120M Modules shown in Table 1-1, page 1-1.

### **Snubber/Trigger Board**

The snubber/trigger board provides dv/dt protection for the SCR's, line synchronization for the control board, and gate isolation for the SCR firing pulses.

### **Test Meter**

The test meter provides a meter, calibrated 0 - 150% with color coded scale segments, for monitoring and checking essential operating parameters. A selector switch connects the meter to various test points in the 3120M Module. A polarity indicator on the test meter shows the polarity of the test point being monitored.