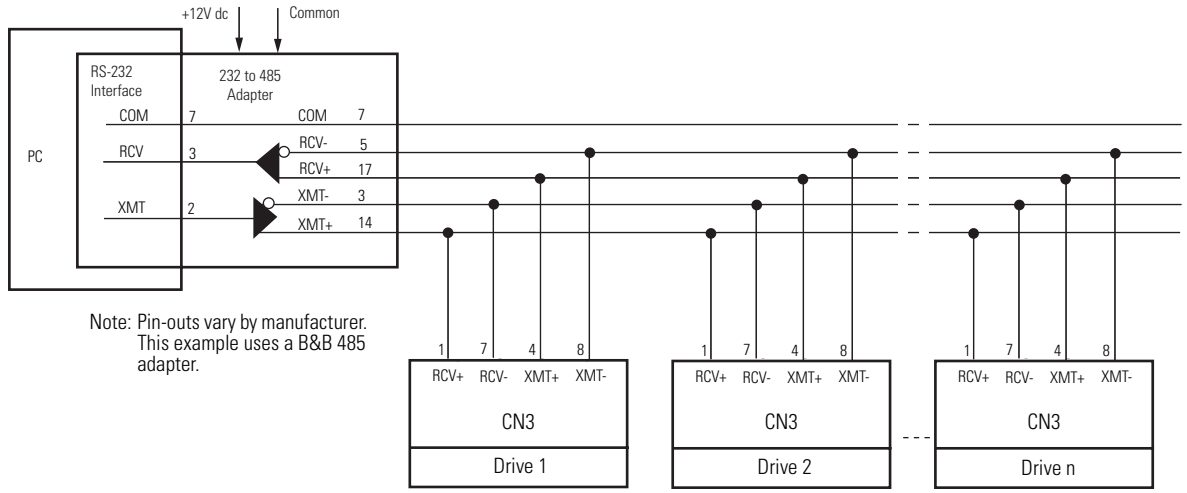
Page 2-52

Replace Figure 2.57 on page 2-52 with the one shown below. The new figure correctly identifies the drive connector as CN3.

Figure 2.57
RS-232 to RS-485 Connection Diagram



Page 4-3

Update the Error Codes table beginning on page 4-3 with the following entries:

- Replace the error code entry for E02. In the new entry, the reference to firmware revisions prior to 1.10 is removed.
- Replace the error code entry for E03. In the new entry, the reference to firmware revisions prior to 1.10 is added.
- Add the lost motion fault (E44).

Error Codes

Error Code	Problem or Symptom	Possible Cause	Action/Solution
E02	Velocity exceeds position rollover /2	The velocity command or feedback exceeds half the machine cycle length per millisecond (applies only when the machine cycle position rollover is enabled).	Increase machine cycle size or reduce velocity profile.
E03	Absolute feedback range exceeded	The motor position exceeds +/- 2047 revolutions from the home position (applies only to systems with absolute feedback).	• Decrease application range of motion. • Upgrade firmware. This error only applies to firmware revisions prior to 1.10.
E44	Lost motion fault (only applies to applications with Stegmann feedback devices)	Detection occurs during a fault reset. Absolute position in the drive is incorrect and the motion has been lost due to line loss condition.	• Cycle power. • Cycle power and re-home drive if drive was homed in the same power cycle that the lost motion fault occurred.

Page A-2

Replace the Ultra3000 (230V) Power Specifications table on page A-2 with the one shown below. The new table includes inrush current specifications configured as Series A, B, or C.

- Ultra3000 drive firmware revision 1.45 is required to support the Series C hardware.
- Ultraware software, version 1.63, is required to download firmware to Series C drives containing the new power board.

Ultra3000 Drive (230V) Power Specifications
2098-DSD-005*x-xx*, 2098-DSD-010*x-xx*, and 2098-DSD-020*x-xx*

Specification	Description		
	2098-DSD-005	**2098-DSD-010**	**2098-DSD-020**
AC input voltage [1]	100...240V rms single-phase		
AC input frequency	47...63 Hz		
AC input current [2] [3] Nom (rms) 230V ac (0-pk) max inrush [4]	 5 A 100 A - Series A or B 20 A - Series C	 9 A 100 A - Series A or B 20 A - Series C	 18 A 100 A - Series A or B 20 A - Series C
Continuous output current (0-pk)	2.5 A	5 A	10 A
Intermittent output current (0-pk)	7.5 A	15 A	30 A
Bus capacitance	1410 µF	1880 µF	1880 µF
Internal shunt resistance	N/A	N/A	N/A
Shunt on	N/A	N/A	N/A
Shunt off	N/A	N/A	N/A
Bus overvoltage	400V dc	400V dc	400V dc
Energy absorption capability 115V ac input 230V ac input	 93 J 38 J	 125 J 51 J	
Continuous power output 115V ac input 230V ac input	 0.25 kW 0.5 kW	 0.5 kW 1.0 kW	 1.0 kW 2.0 kW

[1] Specification is for nominal voltage. The absolute limits are ±10%, or 88...265V rms.

[2] The 2098-DSD-005*x-xx*, -010*x-xx*, and -020*x-xx* (230V) drives are limited to:
Series A or B - one contactor cycle every two minutes.
Series C - one contactor cycle every 10 s for up to two minutes, not to exceed 12 cycles in five minutes.

[3] Power initialization requires a short period of inrush current. Dual-element time delay (slow blow) fuses are recommended.

[4] Inrush current-limiting circuitry is enabled within 3 s after removal of ac line power.

ATTENTION



The inrush current-limiting circuitry is limited in the number of power cycles it can withstand within a set period of time. If you exceed these limitations, the circuitry will be damaged.

Page A-3

Replace the Ultra3000 (230V) Power Specifications table on page A-3 with the one shown below. The new table includes an updated value in the bus capacitance field for 2098-DSD-030 drives.

Ultra3000 Drive (230V) Power Specifications
2098-DSD-030*x-xx*, 2098-DSD-075*x-xx*, and 2098-DSD-150*x-xx*

Specification	Description		
	2098-DSD-030	**2098-DSD-075**	**2098-DSD-150**
AC input voltage [1]	100...240V rms Single-phase	100...240V rms Three-phase	
AC input frequency	47...63 Hz		
Main ac input current [2] [3] Nom (rms) 230V ac (0-pk) Max inrush	 28 A 50 A	 30 A 50 A	 46 A 68 A
Auxiliary ac Input current 115V ac (rms) Nom 230V ac (rms) Nom 115V ac (0-pk) Max inrush [4] 230V ac (0-pk) Max inrush [4]	 1.0 A 0.5 A 47 A 95 A	 1.0 A 0.5 A 47 A 95 A	 1.0 A 0.5 A 47 A 95 A
Continuous output current (0-pk)	15 A	35 A	65 A
Intermittent output current (0-pk)	30 A	75 A	150 A
Bus capacitance	2820 µF	4290 µF	7520 µF
Internal shunt resistance	35 Ω	16.5 Ω	9.1 Ω
Shunt on	420V dc	420V dc	420V dc
Shunt off	402V dc	402V dc	402V dc
Bus overvoltage	452V dc	452V dc	452V dc
Internal shunt Continuous power Peak power	 50 W 4.5 kW	 50 W 10 kW	 180 W 18 kW
External shunt Resistance Continuous power Peak power	 30 Ω(-0/+5%) 2.4 kW 6 kW	 16.5 Ω(-0/+5%) 4 kW 10 kW	 9 Ω(-0/+5%) 8 kW 19 kW
Energy absorption capability 115V ac input 230V ac input	 211 J 117 J	 381 J 211 J	 669 J 370 J
Continuous power output 115V ac input 230V ac input	 1.5 kW 3 kW	 3.75 kW 7.5 kW	 7.5 kW 15 kW

(1) Specification is for nominal voltage. The absolute limits are ±10%, or 88...265V rms.

(2) The 2098-DSD-030*x-xx*, -075*x-xx*, and -150*x-xx* (230V) drives are limited to one contactor cycles per two minutes.

(3) Power initialization requires a short period of inrush current. Dual-element time delay (slow blow) fuses are recommended.

(4) 400 µs half wave sine.

ATTENTION

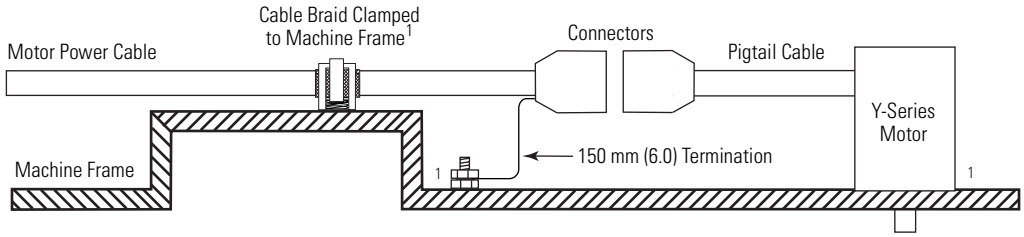


The inrush current-limiting circuitry is limited in the number of power cycles it can withstand within a set period of time. If you exceed these limitations, the circuitry will be damaged.

Connecting the Y-Series Cable Shield at the Motor

Y-Series motors have a short pigtail cable which connects to the motor, but is not shielded. The preferred method for grounding the Y-Series motor power cable on the motor side is to expose a section of the cable shield and clamp it directly to the machine frame. The motor power cable also has a 150 mm (6.0 in.) shield termination wire with a ring lug that connects to the closest earth ground. Use this method in addition to the cable clamp. The termination wire may be extended to the full length of the motor pigtail if necessary, but it is best to connect the supplied wire directly to ground without lengthening. Refer to Figure 3.13 for an illustration and Figure B.15 in *Appendix B* for the interconnect diagram.

Figure 3.13
Y-Series Motor Power Cable Connection



[1] Remove paint from machine frame to ensure proper HF-bond between machine frame and motor case, shield clamp, ground stud, etc.

Power Wiring Requirements

Power wiring requirements are given in the tables below. Wire should be copper with 75° C (167° F) minimum rating, unless otherwise noted. Phasing of main AC power is arbitrary and earth ground connection is required for safe and proper operation.

IMPORTANT The National Electrical Code and local electrical codes take precedence over the values and methods provided.

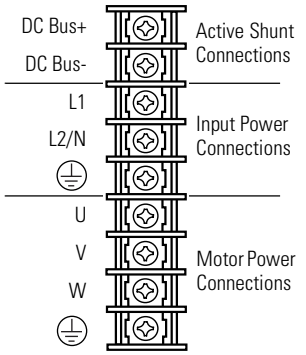
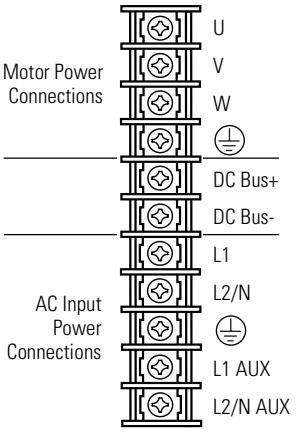
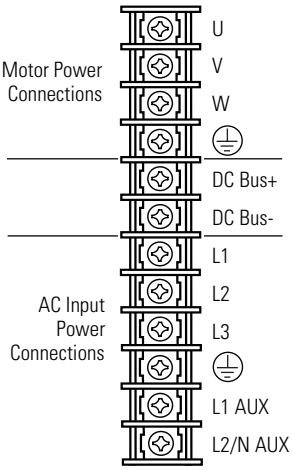
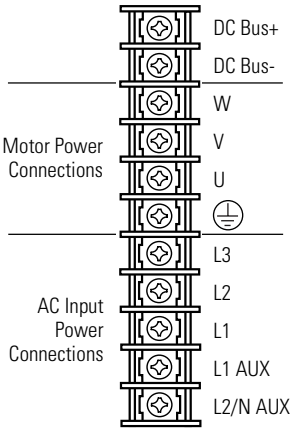
Ultra3000 Power Wiring Requirements

Ultra3000 Drives	Description	Connects to Terminals TB1	Recommended Wire Size mm^2 (AWG)	Terminal Block Torque Values Nm (lb-in.)
2098-DSD-005*x-xx*	Input Power [1] 100-240V ac single-phase	L1, L2/N, and ⏚	1.5 (16)	1.25 (11)
2098-DSD-010*x-xx*			2.5 (14)	
2098-DSD-020*x-xx*			3 (12)	
2098-DSD-030*x-xx*	Input Power [1] 100-240V ac single-phase	L1, L2/N, ⏚ L1 AUX, and L2/N AUX	6 (10)	
2098-DSD-075*x-xx*	Input Power [1] 100-240V ac three-phase	L1, L2, L3, ⏚ L1 AUX, and L2/N AUX		
2098-DSD-150*x-xx*			10 (8)	4.0 (35)
2098-DSD-HV030*x-xx*	Input Power [1] 230-480V ac three-phase	⏚ L3, L2, L1 L1 AUX, and L2/N AUX	2.5 (14)	1.25 (11)
2098-DSD-HV050*x-xx*				
2098-DSD-HV100*x-xx*			4 (12)	
2098-DSD-HV150*x-xx*			6 (10)	
2098-DSD-HV220*x-xx*			10 (8)	
All Ultra3000 drives (230V and 460V)	Motor Power	U, V, W, and ⏚	Motor power cable depends on motor/ drive combination.	

[1] The input power may be optionally isolated through a transformer.

Note: Refer to Figure 3.14 for TB1 terminal positions.

Figure 3.14
TB1 Terminal Positions

TB1 Terminal Positions (2098-DSD-005*x-xx*, -010*x-xx*, -020*x-xx*)	TB1 Terminal Positions (2098-DSD-030*x-xx*)	TB1 Terminal Positions (2098-DSD-075*x-xx* and -150*x-xx*)	TB1 Terminal Positions (2098-DSD-HV*xxx-xx* and -HV*xxx*X-*xx*)
			

Shunt Module Power Wiring Requirements

Ultra3000 Drives	Shunt Module Catalog Number	Connects to Terminals	Recommended Wire Size mm^2 (AWG)	Terminal Block Torque Values Nm (lb-in.)
2098-DSD-005*x-xx*, -010*x-xx*, and -020*x-xx*	2090-UCSR-A300	TB1-DC Bus+ TB1-DC Bus- TB1-L1 TB1-L2/N ⏚	4.0 (12)[1]	1.25 (11)
2098-DSD-030*x-xx*	9101-1183	TB2-1 TB2-2 TB2-3	2.5 (14)[1]	
2098-DSD-075*x-xx* and 2098-DSD-150*x-xx*	2090-UCSR-P900		10 (8)[1]	
2098-DSD-HV030-*xx*, -HV030X-*xx* -DSD-HV050-*xx*, and -HV050X-*xx*	2090-SR120-09		6 (10)[2]	
2098-DSD-HV100-*xx* and -HV100X-*xx*	2090-SR040-09 or 2090-SR040-18			
2098-DSD-HV150-*xx* and -HV150X-*xx*	2090-SR025-09 or 2090-SR025-18			
2098-DSD-HV220-*xx* and -HV220X-*xx*	2090-SR020-36			

[1] 75° C (167° F), 600V copper wire. Maximum length 3.05 m (10 ft).

[2] 105° C (221° F), 600V copper wire (preferred) 90° C (194° F) (minimum). Maximum length 3.05 m (10 ft).

Note: Refer to Figure 3.15 for TB2 terminal positions.

4. Gently pull on each wire to make sure it does not come out of its terminal. Re-insert and tighten any loose wires.

5.

If your motor is:	Then:
Y-Series	1. Connect the 152.4 mm (6.0 in.) termination wire at the motor end of the cable to the closest earth ground (refer to Figure 3.13 for an illustration). 2. Go to *Understanding Motor Brake Connections*.
Not Y-Series	Go to *Understanding Motor Brake Connections*.

Understanding Motor Brake Connections

The procedure for wiring your motor brake varies slightly, depending on the motor series you are using. Refer to the table below to determine where the brake wires for your servo motor are located and for the appropriate brake cable or connector kit catalog number.

For this Motor Series:	The Brake Wires are:	Cable Catalog Number:
MP-Series (low inertia and integrated gear)	In a separate brake cable (the motor has a brake connector)	2090-UXNBMP-18S*xx* brake cable
1326AB-Series (M2L/S2L)		
F-Series		Cable connector kit 9101-0330
H-Series		
N-Series		Cable connector kit 9101-1698
MP-Series (food grade)	Included in the power cable (the motor does not have a brake connector)	2090-XXNPMF-*xx*S*xx* power cable
Y-Series		2090-XXNPY-16S*xx* power cable

To wire your motor brakes refer to *Ultra3000/Motor Interconnect Diagrams* in *Appendix B* for the interconnect diagram showing the brake connections for your Ultra3000 drive and servo motor.

Understanding Shunt Connections

Follow these guidelines when installing and wiring your active or passive shunt module/resistor.

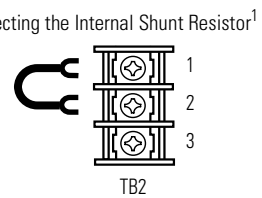
IMPORTANT When tightening screws to secure the wires, refer to the table on page 3-13 for torque values.

IMPORTANT To ensure system performance, run wires and cables in the wireways as established in *Chapter 1*.

Refer to *Appendix B* for the Ultra3000 interconnect diagrams.

If your application requires an:	And you are wiring to this Ultra3000 drive:	Then refer to:
External Shunt	2098-DSD-005*x-xx*, 2098-DSD-010*x-xx*, or 2098-DSD-020*x-xx*	• *Planning Your Panel Layout* in *Chapter 1*. • Figure B.5 on page B-7 of *Appendix B*. • The installation instructions provided with your shunt (publication 2090-IN002*x*-EN-P).
	2098-DSD-030*x-xx*	• *Planning Your Panel Layout* in *Chapter 1*. • Figure B.7 on page B-8 of *Appendix B*. • The installation instructions provided with your shunt (publication 2090-IN003*x*-EN-P).
	2098-DSD-075*x-xx*, or 2098-DSD-150*x-xx*	• *Planning Your Panel Layout* in *Chapter 1*. • Figures B.7 and B.8 on page B-8 of *Appendix B*. • The installation instructions provided with your shunt (publication 2090-IN001*x*-EN-P).
	2098-DSD-HV030-*xx*, -HV050-*xx*, or -HV100-*xx*	• *Planning Your Panel Layout* in *Chapter 1*. • Figure B.7 on page B-8 of *Appendix B*. • The installation instructions provided with your shunt (publication 2090-IN004*x*-EN-P).
	2098-DSD-HV150-*xx*, or -HV220-*xx*	• *Planning Your Panel Layout* in *Chapter 1*. • Figure B.9 on page B-9 of *Appendix B*. • The installation instructions provided with your shunt.
Internal Shunt	2098-DSD-030*x-xx*, 2098-DSD-075*x-xx*, 2098-DSD-150*x-xx*, 2098-DSD-HV*xxx-xx*, or 2098-DSD-HV*xxx*X-*xx*	Verify the TB2 internal shunt jumper is in place between TB2-1 and TB2-2, as shown in Figure 3.19 below.

Figure 3.19
Connecting Your Shunt Resistor



[1] This is the factory default jumper setting for TB2.

Understanding Feedback and I/O Cable Connections

Factory made cables with premolded connectors are designed to minimize EMI and are recommended over hand-built cables to improve system performance. However, other options are available for building your own feedback and I/O cables. Refer to the table below for the available options.

Drive Connector	Connector Option		Option Catalog Number	Reference
CN1 I/O Connector	44-pin drive-mounted breakout board with 24V to 5V auxiliary power converter		2090-U3CBB-DM44	• *CN1 Control Interface Breakout Boards with 24V to 5V Auxiliary Power Converter* (publication 2090-IN008*x*-EN-P). • *Understanding Ultra3000 I/O Specifications* beginning on page 2-26.
	12-pin drive-mounted breakout board with 24V to 5V auxiliary power converter for SERCOS interface applications		2090-U3CBB-DM12	
	44-pin panel-mounted breakout board kit		2090-U3BK-D44*xx*	*Understanding Ultra3000 I/O Specifications* beginning on page 2-26.
	44-pin, drive-mounted breakout board.[1]		2090-U3BB2-DM44	
	44-pin (high-density D-shell) drive connector kit		2090-U3CK-D44	
	Single-axis flying lead to 1756-M02AE module or 1784-PM02AE PCI card		2090-U3CC-D44*xx*	
	Two-axis pre-wired to 1756-M02AE module		2090-U3AE-D44*xx*	• *Understanding Ultra3000 I/O Specifications* on page B-20. • *Understanding Ultra3000 I/O Specifications* beginning on page 2-26.
CN2 Feedback Connector	Premolded cable at drive and motor end		2090-UXNFB*xx*-S*xx*	• The table below for your motor feedback cable catalog number. • *Motor Feedback Connector Pin-outs* on page 3-24. • *Understanding Motor Encoder Feedback Specifications* beginning on page 2-40.
	Flying lead cable at drive end (2090-XXNF*xx*-S*xx*)	15-pin drive-mounted breakout board	2090-UXBB-DM15	
		15-pin panel-mounted breakout board kit	2090-UXBK-DM15*xx*	
		15-pin (high-density D-shell) drive connector kit	2090-UXCK-D15	
CN3 Serial Connector	PC serial connector to premolded drive connector		2090-UXPC-DM09	*Understanding the Serial Interface* beginning on page 2-51.
	9-pin drive-mounted breakout board		2090-UXBB-DM09	
	9-pin (high-density D-shell) drive connector kit		2090-UXCK-D09	

[1] This breakout board accepts 1 - 0.14 mm^2 (16 - 26 AWG) wire. For applications that require a 44-pin drive-mounted breakout board that accepts 4 - 0.5 mm^2 (12 - 22 AWG) wire, contact your local Allen-Bradley representative.

Ultra3000 (460V) Power Specifications

The table below lists general power specifications and requirements for the Ultra3000 460V drives (2098-DSD-HV030*x-xx*, -HV050*x-xx*, -HV100*x-xx*, -HV150*x-xx*, and -HV220*x-xx*).

Specification	Description				
	2098-DSD-HV030	**2098-DSD-HV050**	**2098-DSD-HV100**	**2098-DSD-HV150**	**2098-DSD-HV220**
AC Input and Auxiliary Input Voltage [1, 2]	230-480V_{rms} Three Phase				
AC Input Frequency	47 - 63 Hz				
Main AC Input Current [3, 5] Nominal, 460V ac input Maximum inrush, 460V ac input	 4A_{rms} 6A_{rms}	 7A_{rms} 6A_{rms}	 14A_{rms} 6A_{rms}	 20A_{rms} 6A_{rms}	 28A_{rms} 6A_{rms}
Auxiliary AC Input Current Nominal, 230V ac input Nominal, 360V ac input Nominal, 480V ac input Maximum inrush, 230V ac input [4] Maximum inrush, 480V ac input [4]	 0.55A_{rms} 0.35A_{rms} 0.25A_{rms} 47A (0-peak) 68A (0-peak)	 0.55A_{rms} 0.35A_{rms} 0.25A_{rms} 47A (0-peak) 68A (0-peak)	 0.55A_{rms} 0.35A_{rms} 0.25A_{rms} 47A (0-peak) 68A (0-peak)	 0.55A_{rms} 0.35A_{rms} 0.25A_{rms} 47A (0-peak) 68A (0-peak)	 0.55A_{rms} 0.35A_{rms} 0.25A_{rms} 47A (0-peak) 68A (0-peak)
Continuous Output Current	7A (0-peak)	11A (0-peak)	23A (0-peak)	34A (0-peak)	47A (0-peak)
Intermittent Output Current	14A (0-peak)	22A (0-peak)	46A (0-peak)	68A (0-peak)	94A (0-peak)
Bus Capacitance	470 µF	470 µF	705 µF	940 µF	1880 µF
Internal Shunt Resistance	120 Ohms	120 Ohms	40 Ohms	25 Ohms	20 Ohms
Shunt On	800V dc	800V dc	800V dc	800V dc	800V dc
Shunt Off	750V dc	750V dc	750V dc	750V dc	750V dc
Bus Overvoltage	810V dc	810V dc	810V dc	810V dc	810V dc
Internal Shunt Continuous power Peak power	 100W 5.3 kW	 100W 5.3 kW	 200W 16 kW	 200W 25.6 kW	 400W 32 kW
External Shunt Resistance (-0/+5%) Continuous power Peak power	 120 Ohms 3 kW 5.3 kW	 120 Ohms 5 kW 5.3 kW	 40 Ohms 10 kW 16 kW	 25 Ohms 15 kW 25.6 kW	 20 Ohms 22 kW 32 kW
Energy Absorption Capability 230V ac input with 230V motor 230V ac input with 460V motor 460V ac input	 15 Joules 129 Joules 55 Joules	 15 Joules 129 Joules 55 Joules	 22 Joules 194 Joules 82 Joules	 29 Joules 259 Joules 109 Joules	 59 Joules 517 Joules 219 Joules
Continuous Power Output 230V ac input 460V ac input	 1.5 kW 3.0 kW	 2.5 kW 5.0 kW	 5.0 kW 10 kW	 7.5 kW 15 kW	 11 kW 22 kW

[1] Specification is for nominal voltage. The absolute limits are ±10%, or 207-528V_{rms}.

[2] The 2098-DSD-HV*xxx-xx* drives can be powered with 230-240V_{rms} in order to be used in conjunction with motors designed for 230V operation. In such cases, the voltage levels used for shunting and DC bus overvoltage limits are adjusted to be compatible with the voltage limit of the motor.

[3] The 2098-DSD-HV*xxx -xx* (460V) drives are limited to three contactor cycles per minute.

[4] 400 µs half wave sine.

[5] Power initialization requires a short period of inrush current (processor controlled via soft start circuitry). Dual element time delay (slow blow) fuses are recommended (refer to *Fuse Specifications* on page A-5).

Fuse Specifications

Use class CC, G, J, L, R, or T class fuses, with current ratings as indicated in the table below. The table below lists fuse examples recommended for use with the Ultra3000 (230V and 460V) drives.

Refer to *Power Wiring Requirements* in *Chapter 3* for input wire size.

Catalog Number	Input Voltage	Voltage Type	Recommended Fuse	
			Class CC [1]	Class J [1]
2098-DSD-005*x-xx*	230V	Input Power	FNQ-R-6	LPJ-6SP
2098-DSD-010*x-xx*			FNQ-R-10	LPJ-10SP
2098-DSD-020*x-xx*			FNQ-R-20	LPJ-20SP
2098-DSD-030*x-xx*			FNQ-R-30	LPJ-30SP
2098-DSD-075*x-xx*			FNQ-R-30	LPJ-30SP
2098-DSD-150*x-xx*			N/A	LPJ-60SP
2098-DSD-*xxxx-xx*		Auxiliary Input Power	FNQ-R-10	LPJ-10SP
2098-DSD-HV030*x-xx*	460V	Input Power	KTK-R-5	LPJ-5SP
2098-DSD-HV050*x-xx*			KTK-R-8	LPJ-8SP
2098-DSD-HV100*x-xx*			KTK-R-20	LPJ-17-1/2SP
2098-DSD-HV150*x-xx*			KTK-R-30	LPJ-30SP
2098-DSD-HV220*x-xx*			N/A	LPJ-35SP
2098-DSD-HV*xxxx-xx*		Auxiliary Input Power	FNQ-R-10	LPJ-10SP

[1] Bussmann® Fuse

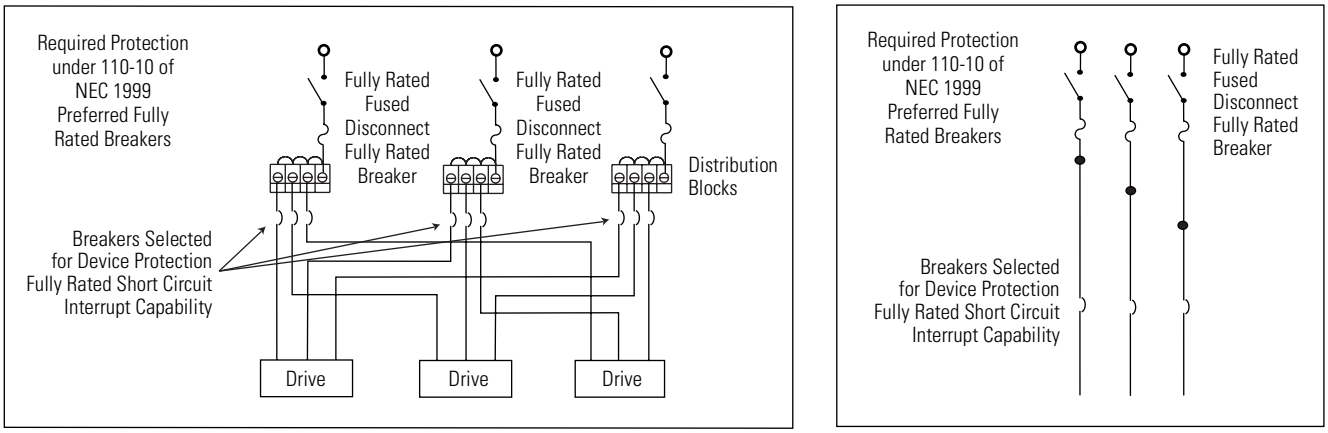
IMPORTANT Follow the wire size information as shown in the *Power Wiring Requirements* table on page 3-13 and select the fuse for the appropriate temperature rating of the wire. Auxiliary input fuses must not exceed 13A.

Circuit Breaker Specifications

While circuit breakers offer some convenience, there are limitations for their use. Circuit breakers do not handle high current inrush as well as fuses. The Ultra3000 needs to be protected by a device having a short circuit interrupt current rating of the service capacity provided or a maximum of 100,000A.

The wiring interconnection in Figure A.1 provide examples of the needed protection and follows UL and NEC codes. Full compliance is dependent on final wiring design and installation.

Figure A.1
Circuit Protection under NEC 1999 110-10 (preferred fully rated devices)



The table below lists circuit breaker examples recommended for use with the Ultra3000 (460V) drives.

Catalog Number	Input Voltage	Circuit Breakers
2098-DSD-HV030*x*-*xx*	460V	140M-F8E-C16
2098-DSD-HV050*x*-*xx*		140M-F8E-C20
2098-DSD-HV100*x*-*xx*		140M-F8E-C32
2098-DSD-HV150*x*-*xx*		140M-F8E-C45
2098-DSD-HV220*x*-*xx*		N/A

ATTENTION



Bulletin 140M circuit breakers should not be used on the output of an ac drive as an isolating disconnect switch or motor overload device. These devices are designed to operate on sine wave voltage and the drive's PWM waveform does not allow it to operate properly. As a result, damage to the device will occur.