Allen-Bradley

Ultra3000
Digital Servo Drives

(Catalog Numbers
2098-DSD-005, -010, and -020
2098-DSD-*xxx*X
2098-DSD-*xxx*-SE
2098-DSD-*xxx*-DN
2098-DSD-*xxx*X-DN

2098-DSD-030, -075, and -150
2098-DSD-*xxx*X
2098-DSD-*xxx*-SE
2098-DSD-*xxx*-DN
2098-DSD-*xxx*X-DN

2098-DSD-HV030, -HV050, -HV100, -HV150, and -HV220
2098-DSD-HV*xxx*X
2098-DSD-HV*xxx*-SE
2098-DSD-HV*xxx*-DN
2098-DSD-HV*xxx*X-DN)

Installation Manual

Rockwell Automation

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.

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.

Understanding Shunt Connections

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

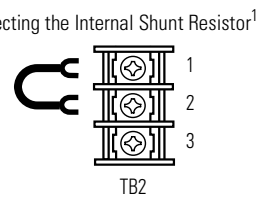
IMPORTANT When tightening screws to secure the wires, refer to the table on page 3-13 for torque values.

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.

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.

Contactor Ratings

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

Catalog Number	Input Voltage	Contactor
2098-DSD-HV030*x-xx*	460V	100-C23*x*10 (AC Coil) 100-C23Z*x*10 (DC Coil)
2098-DSD-HV050*x-xx*		100-C30*x*10 (AC Coil) 100-C30Z*x*10 (DC Coil)
2098-DSD-HV100*x-xx*		100-C37*x*10 (AC Coil) 100-C37Z*x*10 (DC Coil)
2098-DSD-HV150*x-xx*		100-C43*x*10 (AC Coil) 100-C43Z*x*10 (DC Coil)
2098-DSD-HV220*x-xx*		100-C60*x*10 (AC Coil) 100-C60Z*x*10 (DC Coil)

Power Dissipation Specifications

Use the following table to size an enclosure and calculate required ventilation for the Ultra3000. Typical heat losses run approximately one-half maximum power losses. The maximum power losses are shown below.

Catalog Number	Maximum Loss Watts
2098-DSD-005*x-xx*	48
2098-DSD-010*x-xx*	48
2098-DSD-020*x-xx*	50
2098-DSD-030*x-xx*	150 + dissipative shunt
2098-DSD-075*x-xx*	300 + dissipative shunt
2098-DSD-150*x-xx*	500 + dissipative shunt

Catalog Number	Maximum Loss Watts
2098-DSD-HV030*x-xx*	175 + dissipative shunt
2098-DSD-HV050*x-xx*	175 + dissipative shunt
2098-DSD-HV100*x-xx*	350 + dissipative shunt
2098-DSD-HV150*x-xx*	350 + dissipative shunt
2098-DSD-HV220*x-xx*	600 + dissipative shunt

Ultra3000 General Specifications

The following sections provide physical, environmental, control, I/O, communication, feedback, connector, and AC line filter specifications for the Ultra3000 drives.

Physical and Environmental Specifications

Specification	Description		Specification	Description	
Weight			Weight		
2098-DSD-005*x-xx*	1.8 kg	(4.1 lbs)	2098-DSD-HV030*x-xx*	8.55 kg	(18.8 lbs)
2098-DSD-010*x-xx*	2.1 kg	(4.6 lbs)	2098-DSD-HV050*x-xx*	8.55 kg	(18.8 lbs)
2098-DSD-020*x-xx*	2.1 kg	(4.6 lbs)	2098-DSD-HV100*x-xx*	10.44 kg	(22.96 lbs)
2098-DSD-030*x-xx*	6.2 kg	(13.6 lbs)	2098-DSD-HV150*x-xx*	10.44 kg	(22.96 lbs)
2098-DSD-075*x-xx*	9.3 kg	(20.6 lbs)	2098-DSD-HV220*x-xx*	14.1 kg	(31.0 lbs)
2098-DSD-150*x-xx*	14.1 kg	(31.0 lbs)			
Ambient Temperature	Storage: -40° C to 70° C (-40° F to 158° F) Operation: 0° C to 55° C (32° F to 131° F)				
Relative Humidity	5-95% non-condensing				
Altitude	1500 m (4921.5 ft) - Derate 3% per 300 m (984.3 ft) above 1500 m (4,921.5 ft)				
Vibration	5-2000 Hz @ 2.5g peak, 0.0006 mm (0.015 in.) maximum displacement				
Shock	15g, 11 ms half-sine				

Control Specifications

Specification	Description
Commutation	3-Phase Sinusoidal, Space Vector Modulated (SVM)
Current Regulator	Digital PI - 125 µs update rate
Velocity Regulator	Digital PID - 250 µs update rate
Position Regulator	Digital PID with feed-forward - 1 ms update rate
PWM	4 or 8 kHz, space vector modulation
Velocity Loop Bandwidth (maximum)	300 Hz

AC Line Filter Specifications

The following AC line filters are compatible with the Ultra3000 drives.

AC Line Filter Catalog Number	Specifications							
	Voltage	Phase	Current	Power Loss	Weight kg (lb)	Humidity	Vibration	Operating Temperature
2090-UXLF-106	250V ac 50/60 Hz	Single	6A @ 50° C (122° F)	3.5W	0.3 (0.66)	90% RH	10-200 Hz @ 1.8 g	-25 to 85° C (-13 to 185 ° F)
2090-UXLF-110			10A @ 50° C (122° F)	2.7W	0.95 (2.0)			
2090-UXLF-123			23A @ 50° C (122° F)	10W	1.6 (3.5)			
2090-UXLF-132			32A @ 50° C (122° F)	20W				
2090-UXLF-136			36A @ 50° C (122° F)	–	1.75 (3.9)			
2090-UXLF-336	250V ac 50/60 Hz	Three		–	2.7 (5.9)			
2090-UXLF-350			50A @ 50° C (122° F)	–				
2090-UXLF-HV323	520V ac 50/60 Hz		23A @ 50° C (122° F)	20W	1.6 (3.5)			
2090-UXLF-HV330			30A @ 50° C (122° F)	51W	1.8 (4.0)			
2090-UXLF-HV350			50A @ 50° C (122° F)	25W	4.8 (10.6)			

Use the table below to determine which AC line filter is best suited for your Ultra3000 drive (based on the length of the motor cables).

Ultra3000 Drives	AC Line Filter Catalog Number	
	Motor Cables < 30 m	Motor Cables > 30 m
2098-DSD-005*x*-*xx*	2090-UXLF-106	2090-UXLF-110
2098-DSD-010*x*-*xx*	2090-UXLF-110	2090-UXLF-110
2098-DSD-020*x*-*xx*	2090-UXLF-123	2090-UXLF-123
2098-DSD-030*x*-*xx*	2090-UXLF-136	2090-UXLF-132
2098-DSD-075*x*-*xx*	2090-UXLF-336	2090-UXLF-HV330
2098-DSD-150*x*-*xx*	2090-UXLF-350	2090-UXLF-HV350
2098-DSD-HV030*x*-*xx* 2098-DSD-HV050*x*-*xx* 2098-DSD-HV100*x*-*xx* 2098-DSD-HV150*x*-*xx*	2090-UXLF-HV323	2090-UXLF-HV323
2098-DSD-HV220*x*-*xx*	2090-UXLF-HV330	2090-UXLF-HV330