

IMPORTANT

If you are using the Rockwell Automation/Allen-Bradley system sizing program, the average speed and average torque data has already been calculated and can be used in the above equation. If you are not sure of the exact speed and torque in your application, another approach is to look at the speed/torque curve for your Ultra3000/motor combination and use the values for the worst case continuous speed and torque.

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Calculations are multiplied by a factor to compensate for the power and loss elements within a power system. A factor of 2.0 is used with a single phase system and a factor of 1.5 is used with a three phase system. This factor should minimize the effects of the secondary line voltage sagging in the transformer during peak current periods.

Example: sizing a transformer to the voltage requirements of an 2098-DSD-020 and MPL-A320P motor:

$$KVA = \frac{Speed(RPM) \times Torque(lb-in)}{63,025} \times \frac{746Watts}{HP} \times \frac{KVA}{1000Watts} \times 2.0$$

$$KVA = \frac{(5,000(RPM)) \times 17.7(lb-in)}{42,250}$$

$$Transformer\ Size = 2.1\ KVA$$

The speed/torque curve information for 230V motors is based upon an Ultra3000 input voltage of 230V ac. For a 115V ac input voltage, the maximum speed can be reduced up to one half.

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.

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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-005x-xx	Input Power ¹ 100-240V ac single-phase	L1, L2/N, and 	1.5 (16)	1.25 (11)
2098-DSD-010x-xx			2.5 (14)	
2098-DSD-020x-xx			3 (12)	
2098-DSD-030x-xx	Input Power ¹ 100-240V ac single-phase	L1, L2/N,  L1 AUX, and L2/N AUX	6 (10)	4.0 (35)
2098-DSD-075x-xx	Input Power ¹ 100-240V ac three-phase	L1, L2, L3,  L1 AUX, and L2/N AUX	10 (8)	
2098-DSD-150x-xx				
2098-DSD-HV030x-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-HV050x-xx			4 (12)	
2098-DSD-HV100x-xx			6 (10)	
2098-DSD-HV150x-xx			10 (8)	
2098-DSD-HV220x-xx				
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 3.10 for TB1 terminal positions.

Ultra3000 Power Specifications

The following sections provide power specifications for the Ultra3000.

Ultra3000 (230V) Power Specifications

The table below lists general power specifications and requirements for the Ultra3000 230V drives (2098-DSD-005x-xx, -010x-xx, and -020x-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} Nominal Maximum inrush (230V ac input)	5A _{rms} 100A (0-peak)	9A _{rms} 100A (0-peak)	18A _{rms} 100A (0-peak)
Continuous Output Current	2.5A (0-peak)	5A (0-peak)	10A (0-peak)
Intermittent Output Current	7.5A (0-peak)	15A (0-peak)	30A (0-peak)
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 Joules 38 Joules	125 Joules 51 Joules	
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 2098-005x-xx, -010x-xx, and -020x-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 (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-005x-xx	230V	Input Power	FNQ-R-6	LPJ-6SP
2098-DSD-010x-xx			FNQ-R-10	LPJ-10SP
2098-DSD-020x-xx			FNQ-R-20	LPJ-20SP
2098-DSD-030x-xx			FNQ-R-30	LPJ-30SP
2098-DSD-075x-xx			FNQ-R-30	LPJ-30SP
2098-DSD-150x-xx			N/A	LPJ-60SP
2098-DSD-xxxx-xx		Auxiliary Input Power	FNQ-R-10	LPJ-10SP
2098-DSD-HV030x-xx	460V	Input Power	KTK-R-5	LPJ-5SP
2098-DSD-HV050x-xx			KTK-R-8	LPJ-8SP
2098-DSD-HV100x-xx			KTK-R-20	LPJ-17-1/2SP
2098-DSD-HV150x-xx			KTK-R-30	LPJ-30SP
2098-DSD-HV220x-xx			N/A	LPJ-35SP
2098-DSD-HVxxxx-xx		Auxiliary Input Power	FNQ-R-10	LPJ-10SP

¹ Bussmann® Fuse

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Follow the wire size information as shown in the *Power Wiring Requirements* table on page 3-9 and select the fuse for the appropriate temperature rating of the wire. Auxiliary input fuses must not exceed 13A.

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-005x-xx	48
2098-DSD-010x-xx	48
2098-DSD-020x-xx	50
2098-DSD-030x-xx	150 + dissipative shunt
2098-DSD-075x-xx	300 + dissipative shunt
2098-DSD-150x-xx	500 + dissipative shunt

Catalog Number	Maximum Loss Watts
2098-DSD-HV030x-xx	175 + dissipative shunt
2098-DSD-HV050x-xx	175 + dissipative shunt
2098-DSD-HV100x-xx	350 + dissipative shunt
2098-DSD-HV150x-xx	350 + dissipative shunt
2098-DSD-HV220x-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-005x-xx	1.8 kg	(4.1 lbs)	2098-DSD-HV030x-xx	8.55 kg	(18.8 lbs)
2098-DSD-010x-xx	2.1 kg	(4.6 lbs)	2098-DSD-HV050x-xx	8.55 kg	(18.8 lbs)
2098-DSD-020x-xx	2.1 kg	(4.6 lbs)	2098-DSD-HV100x-xx	10.44 kg	(22.96 lbs)
2098-DSD-030x-xx	6.2 kg	(13.6 lbs)	2098-DSD-HV150x-xx	10.44 kg	(22.96 lbs)
2098-DSD-075x-xx	9.3 kg	(20.6 lbs)	2098-DSD-HV220x-xx	14.1 kg	(31.0 lbs)
2098-DSD-150x-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				

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 ¹			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	50A @ 50° C (122° F)	—	2.7 (5.9)			
2090-UXLF-350				—				
2090-UXLF-HV323	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)				

¹ Contact your Allen-Bradley representative for availability.

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-005x-xx	2090-UXLF-106	2090-UXLF-110
2098-DSD-010x-xx	2090-UXLF-110	2090-UXLF-110
2098-DSD-020x-xx	2090-UXLF-123	2090-UXLF-123
2098-DSD-030x-xx	2090-UXLF-136	2090-UXLF-132
2098-DSD-075x-xx	2090-UXLF-336	2090-UXLF-HV330
2098-DSD-150x-xx	2090-UXLF-350	2090-UXLF-HV350
2098-DSD-HV030x-xx 2098-DSD-HV050x-xx 2098-DSD-HV100x-xx 2098-DSD-HV150x-xx	2090-UXLF-HV323	2090-UXLF-HV323
2098-DSD-HV220x-xx	2090-UXLF-HV330	2090-UXLF-HV330