

Ultra3000 Digital Servo Drives



The Ultra3000, Ultra3000i, Ultra3000-SE, Ultra3000-DN, and Ultra3000X-DN drives make up a family of flexible, high-performance digital servo drives for a variety of motion control applications and architectures. The wide range of power platforms, connectivity options and functions makes the Ultra3000 digital servo drive family an attractive solution for a variety of machine control architectures including Logix, SLC, and third-party machine and motion control systems. In addition, the Ultra3000i indexing, Ultra3000-SE, Ultra3000-DN, Ultra3000X-DN drives are positioning drives designed for applications requiring either simple or complex motion profiles.

Only the 2098-DSD-xxx-SE and 2098-DSD-HVxxx-SE (SERCOS interface) drives are part of the Kinetix Integrated Motion solution.

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Ultra3000 Digital Servo Drive Architectures

Drive Type	Drive Cat. No.	Command Interface
SERCOS interface drive	2098-DSD-xxx-SE and 2098-DSD-HVxxx-SE	Fiber-optic SERCOS ring
Analog drive	2098-DSD-xxx and 2098-DSD-HVxxx	Analog command interface
Digital drive with DeviceNet interface	2098-DSD-xxx-DN and 2098-DSD-HVxxx-DN	DeviceNet communication interface
Indexing drive	2098-DSD-xxxX and 2098-DSD-HVxxxX	Standalone control
Indexing DeviceNet interface drives	2098-DSD-xxxX-DN and 2098-DSD-HVxxxX-DN	

Ultra3000 Digital Servo Drive Components

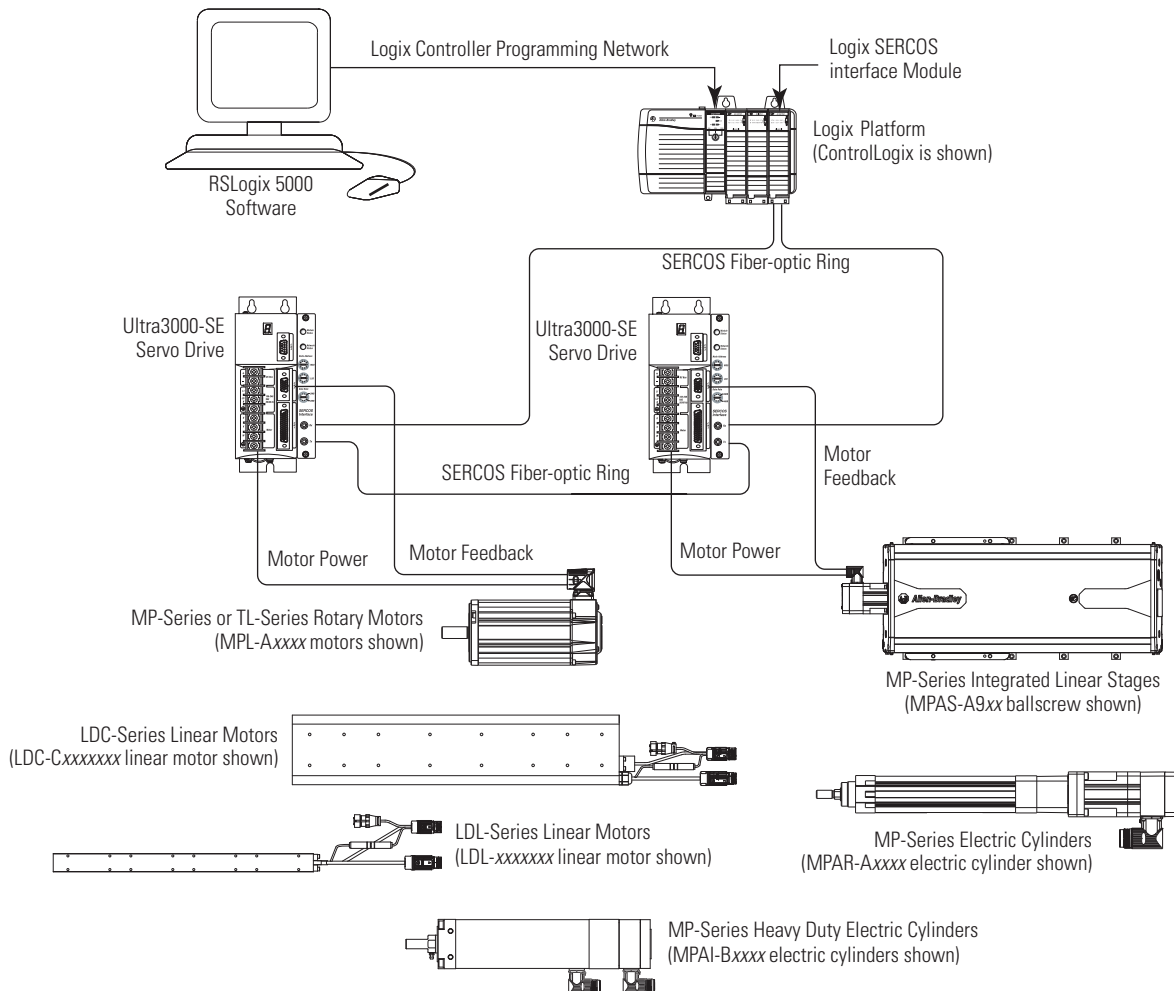
Ultra3000 digital servo drive systems consist of these required components:

- One Ultra3000 digital servo drive
- One rotary servo motor or linear motor/actuator (MP-Series, TL-Series, LDC-Series, or LDL-Series)
- One motor power and feedback cable
- Two SERCOS fiber-optic cables for Ultra3000-SE drives

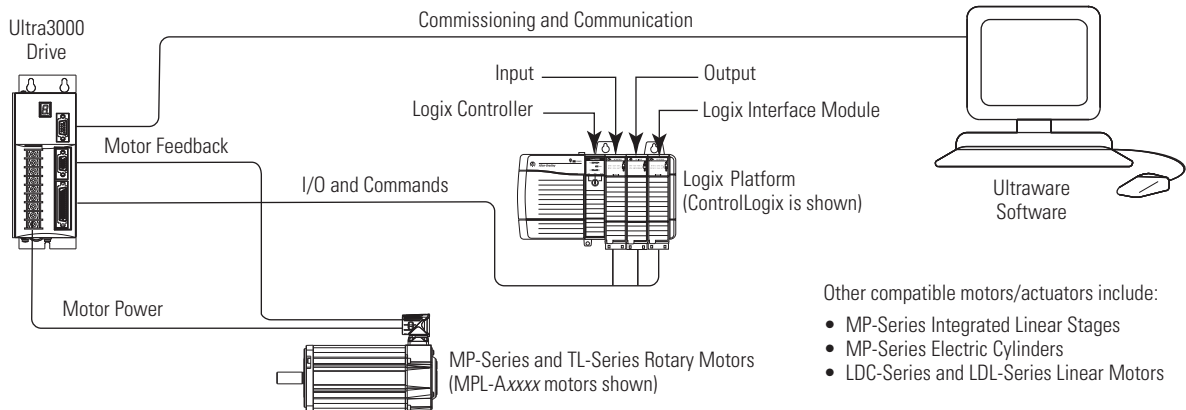
Ultra3000 systems may also include any of these optional components:

- Bulletin 2090 external active or passive shunt module
- Bulletin 2090 Resistive Brake Module (RBM)

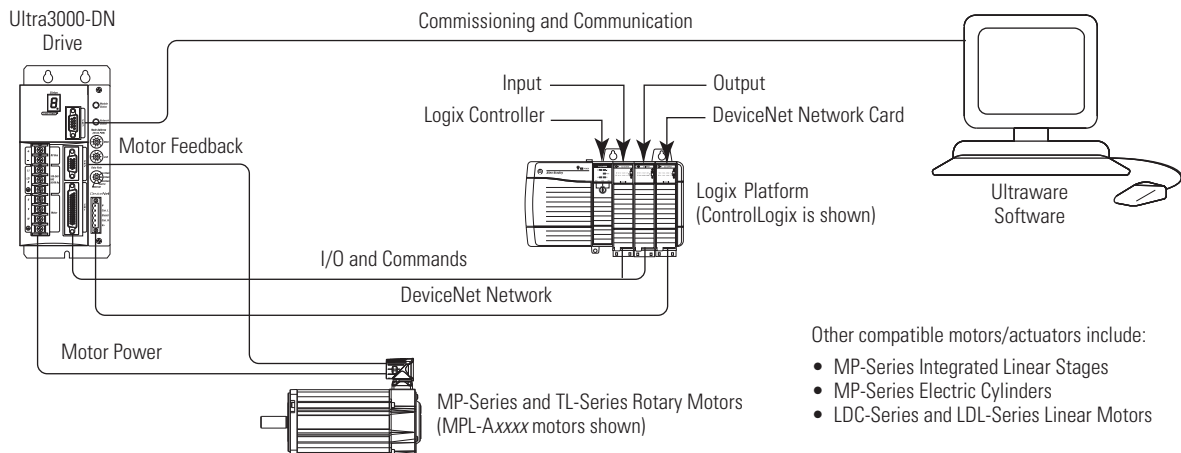
Typical Configuration - Ultra3000-SE (SERCOS) Digital Servo Drive System



Typical Configuration - Ultra3000 Digital Servo Drive System



Typical Configuration - Ultra3000-DN (DeviceNet) Digital Servo Drive System



Ultra3000 Digital Servo Drive Specifications

This section contains general power, physical/environmental, power dissipation, controller, I/O, operating modes command sources, serial communication, network communication, feedback, and connector specifications for the Ultra3000 digital servo drives.

Specifications apply to these Ultra3000 drive models:

- SE indicates the 2098-DSD-xxx-SE SERCOS interface drive
- DN indicates the 2098-DSD-xxx-DN DeviceNet interface drive
- X indicates the 2098-DSD-xxxX indexing drive
- X-DN indicates the 2098-DSD-xxxX-DN indexing DeviceNet interface drive

Power Specifications

2098-DSD-005x-xx, 2098-DSD-010x-xx, and 2098-DSD-020x-xx Ultra3000 (230V) Drives

Attribute	Value		
	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 (rms)	1.8 A	3.5 A	7.1 A
Continuous output current (0-pk)	2.5 A	5.0 A	10 A
Peak output current (rms)	5.3 A	10.6 A	21.2 A
Peak output current (0-pk)	7.5 A	15 A	30 A
Bus capacitance	1410 μ F	1880 μ F	1880 μ F
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 $\pm 10\%$, or 88...265V rms.

(2) The 2098-DSD-005x-xx, 2098-DSD-010x-xx, and 2098-DSD-020x-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 (refer to Fuse Specifications on [page 337](#)).

(4) In-rush current limiting circuitry is enabled within 3 s after removal of AC line power.

Fuse Specifications

Use class CC, G, J, L, R, or T 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.

Fuse Examples for Ultra3000 Drives

Drive Cat. No.	Input Voltage	Input Type	Recommended Fuse	
			Class CC ⁽¹⁾	Class J ⁽¹⁾
2098-DSD-005	230V AC	Input Power	FNQ-R-6	LPJ-6SP
2098-DSD-010			FNQ-R-10	LPJ-10SP
2098-DSD-020			FNQ-R-20	LPJ-20SP
2098-DSD-030			FNQ-R-30	LPJ-30SP
2098-DSD-075			FNQ-R-30	LPJ-30SP
2098-DSD-150			N/A	LPJ-60SP
2098-DSD-xxx		Auxiliary Input Power	FNQ-R-10	LPJ-10SP
2098-DSD-HV030	460V AC	Input Power	KTK-R-5	LPJ-5SP
2098-DSD-HV050			KTK-R-8	LPJ-8SP
2098-DSD-HV100			KTK-R-20	LPJ-17-1/2SP
2098-DSD-HV150			KTK-R-30	LPJ-30SP
2098-DSD-HV220			N/A	LPJ-35SP
2098-DSD-HVxxx		Auxiliary Input Power	FNQ-R-10	LPJ-10SP

(1) Part numbers shown are examples of Bussmann fuses.

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.

Make sure the selected components are properly coordinated and meet acceptable codes including any requirements for branch circuit protection. Evaluation of the short-circuit available current is critical and must be kept below the short-circuit current rating of the circuit breaker.

Circuit Breaker Examples for Ultra3000 (460V) Drives

Drive Cat. No.	Input Voltage	Circuit Breakers
2098-DSD-HV030	460V	140M-F8E-C16
2098-DSD-HV050		140M-F8E-C20
2098-DSD-HV100		140M-F8E-C32
2098-DSD-HV150		140M-F8E-C45
2098-DSD-HV220		N/A

Contactors Ratings

Drive Cat. No.	Input Voltage	Contactors
2098-DSD-HV030	460V	100-C23x10 (AC coil) 100-C23Zx10 (DC coil)
2098-DSD-HV050		100-C30x10 (AC coil) 100-C30Zx10 (DC coil)
2098-DSD-HV100		100-C37x10 (AC coil) 100-C37Zx10 (DC coil)
2098-DSD-HV150		100-C43x10 (AC coil) 100-C43Zx10 (DC coil)
2098-DSD-HV220		100-C60x10 (AC coil) 100-C60Zx10 (DC coil)

Power Dissipation Specifications

Drive Cat. No.	Max Loss W
2098-DSD-005	48
2098-DSD-010	48
2098-DSD-020	50
2098-DSD-030	150 + dissipative shunt
2098-DSD-075	300 + dissipative shunt
2098-DSD-150	500 + dissipative shunt

Drive Cat. No.	Max Loss W
2098-DSD-HV030	175 + dissipative shunt
2098-DSD-HV050	175 + dissipative shunt
2098-DSD-HV100	350 + dissipative shunt
2098-DSD-HV150	350 + dissipative shunt
2098-DSD-HV220	600 + dissipative shunt

Communication Specifications

Attribute	Value
SERCOS (option)	
Communication rates	4 and 8 Mbps
Node addresses	01...99
DeviceNet (option)	
Power consumption from network	60 mA
Data rates	125, 250, and 500 kps, and auto-baud
Node addresses	00...63
Messaging capabilities	Explicit, Polled I/O, Change of State, and Cyclic Messaging
Serial	
Ports	One RS-232/RS-422/RS-485
Communication rates	1200, 2400, 4800, 9600, 19,200, and 38,400 bps

Inputs/Outputs Specifications

Attribute	Value
Digital inputs	8 optically isolated, 12...24V, active high, current sinking
Digital outputs	4 optically isolated, 12...24V, active high, current sourcing
Relay output	One normally open relay, 30V DC, max, 1 A, max
I/O response	100 μ s
Digital I/O firmware scan period	1 ms
Analog inputs COMMAND ILIMIT	14-bit A/D, \pm 10V 10-bit A/D, 0 to 10V
Analog output	\pm 10V, 8 bits, 2 mA max

Auxiliary Feedback Specifications

Attribute	Value
Input modes	A quad B, Step/Direction, CW/CCW
Maximum input frequency	2.5 MHz
Input types	Differential, single-ended, open collector ⁽¹⁾

(1) Differential input types are recommended.

Physical and Environmental Specifications

Attribute	Value	Attribute	Value
Weight, approx.		Weight, approx.	
2098-DSD-005	1.80 kg (4.1 lb)	2098-DSD-HV030	8.55 kg (18.8 lb)
2098-DSD-010	2.10 kg (4.6 lb)	2098-DSD-HV050	8.55 kg (18.8 lb)
2098-DSD-020	2.10 kg (4.6 lb)	2098-DSD-HV100	10.44 kg (22.9 lb)
2098-DSD-030	6.20 kg (13.6 lb)	2098-DSD-HV150	10.44 kg (22.9 lb)
2098-DSD-075	9.30 kg (20.6 lb)	2098-DSD-HV220	14.1 kg (31.0 lb)
2098-DSD-150	14.1 kg (31.0 lb)		
Ambient temperature	Storage: -40...70 °C (-40...158 °F) Operation: 0...55 °C (32...131 °F)		
Relative humidity	5...95% noncondensing		
Altitude	1500 m (4921.5 ft) - Derate 3% per 300 m (984.3 ft) above 1500 m (4921.5 ft)		
Vibration	5...2000 Hz @ 2.5 g peak, 0.0006 mm (0.015 in.) max displacement		
Shock	15 g, 11 ms half-sine		

Connector Specifications

Connector	Description	Specification
CN1	User input/output	44-pin high-density female D-sub connector
CN2	Motor feedback connector	15-pin high-density female D-sub connector
CN3	Serial port connector	9-pin female D-sub connector
TB1 and TB2	Main and auxiliary AC, DC bus, motor power, and shunt connectors	Screw terminal block

Maximum Feedback Cable Lengths

Although motor feedback cables are available in standard lengths up to 90 m (295.3 ft), the drive/motor/feedback combination may limit the maximum cable length, as shown in the tables below. These tables assume the use of cables recommended in Motor/Actuator Cable Selection table on [page 380](#).

Maximum Cable Lengths for Compatible Rotary Motors

Motor Cat. No.	Absolute High-resolution (5V) Encoder m (ft)	Absolute High-resolution (9V) Encoder m (ft)	Incremental/TTL (5V) Encoder m (ft)
MPL-A15xxx...MPL-A2xxx-E/V	90 (295.3)		
MPL-A3xxx...MPL-A5xxx-S/M ⁽¹⁾	90 (295.3)		
MPL-B15xxx...MPL-B2xxx-E/V		90 (295.3)	
MPL-B3xxx...MPL-B9xxx-S/M		90 (295.3)	
MPL-A/B15xxx...MPL-A/B45xxx-H			45 (147.6)
MPM-Axxxx-S/M	30 (98.4)		
MPM-Bxxxx-S/M		90 (295.3)	
MPF-Axxx-S/M ⁽¹⁾	90 (295.3)		
MPF-Bxxx-S/M		90 (295.3)	
MPS-Axxx-S/M	90 (295.3)		
MPS-Bxxx-S/M		90 (295.3)	
TLY-Axxx-H			30 (98.4)

(1) MPL-A5xxx and MPF-A5xxx motor encoders are rated for 9V, the remaining Bulletin MPL and MPF (230V) motor encoders are rated for 5V.

Maximum Cable Lengths for Compatible Linear Actuators

Actuator Cat. No.	Absolute High-resolution (5V) Encoder m (ft)	Absolute High-resolution (9V) Encoder m (ft)	Incremental/TTL (5V) Encoder m (ft)
MPMA-Axxxx or MPAS-Axxxx-V (ballscrew)	90 (295.3)		
MPMA-Axxxx or MPAS-Axxxx-A (direct drive)			45 (147.6)
MPMA-Bxxxx or MPAS-Bxxxx-V (ballscrew)		90 (295.3)	
MPMA-Bxxxx or MPAS-Bxxxx-A (direct drive)			45 (147.6)
MPAR-Axxxx-V/M	30 (98.4)		
MPAR-Bxxxx-V/M		90 (295.3)	
MPAI-AxxxxM3	30 (98.4)		
MPAI-BxxxxM3		90 (295.3)	

Maximum Cable Lengths for Compatible Linear Motors

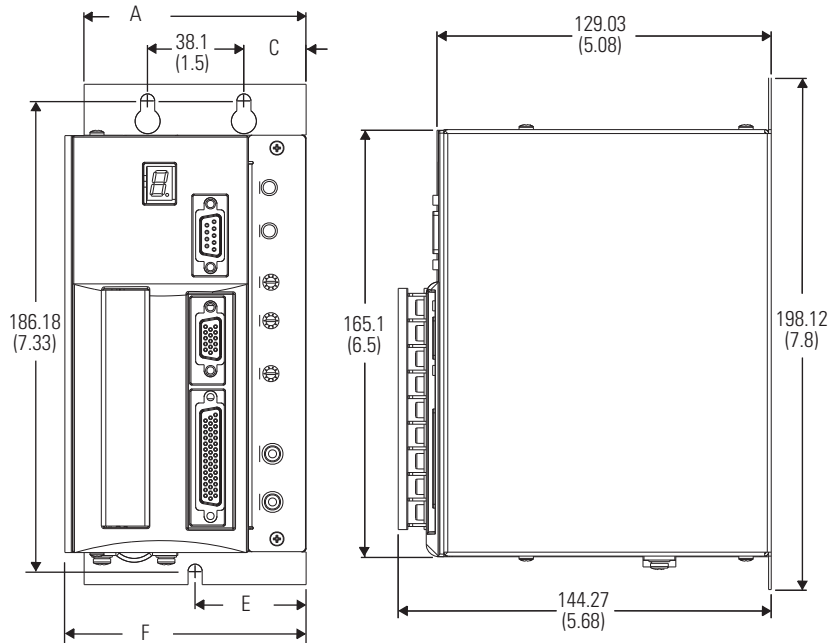
Motor Cat. No.	Absolute High-resolution (5V) Encoder m (ft)	Incremental/TTL (5V) Encoder m (ft)
LDC-Series or LDL-Series	30 (98.4)	30 (98.4)

Ultra3000 Digital Servo Drive Dimensions

This section contains dimensions for the Ultra3000 digital servo drives (X indicates indexing, -SE indicates SERCOS interface, -DN indicates DeviceNet interface, and X-DN indicates indexing DeviceNet interface).

In the figure below, -xxx is replaced by -005, -010, or -020 to represent the Ultra3000 500 W, 1 kW, and 2 kW drives respectively.

2098-DSD-xxx, 2098-DSD-xxxX, 2098-DSD-xxx-SE, 2098-DSD-xxx-DN, 2098-DSD-xxxX-DN Dimensions (230V)



Dimensions are in mm (in.)

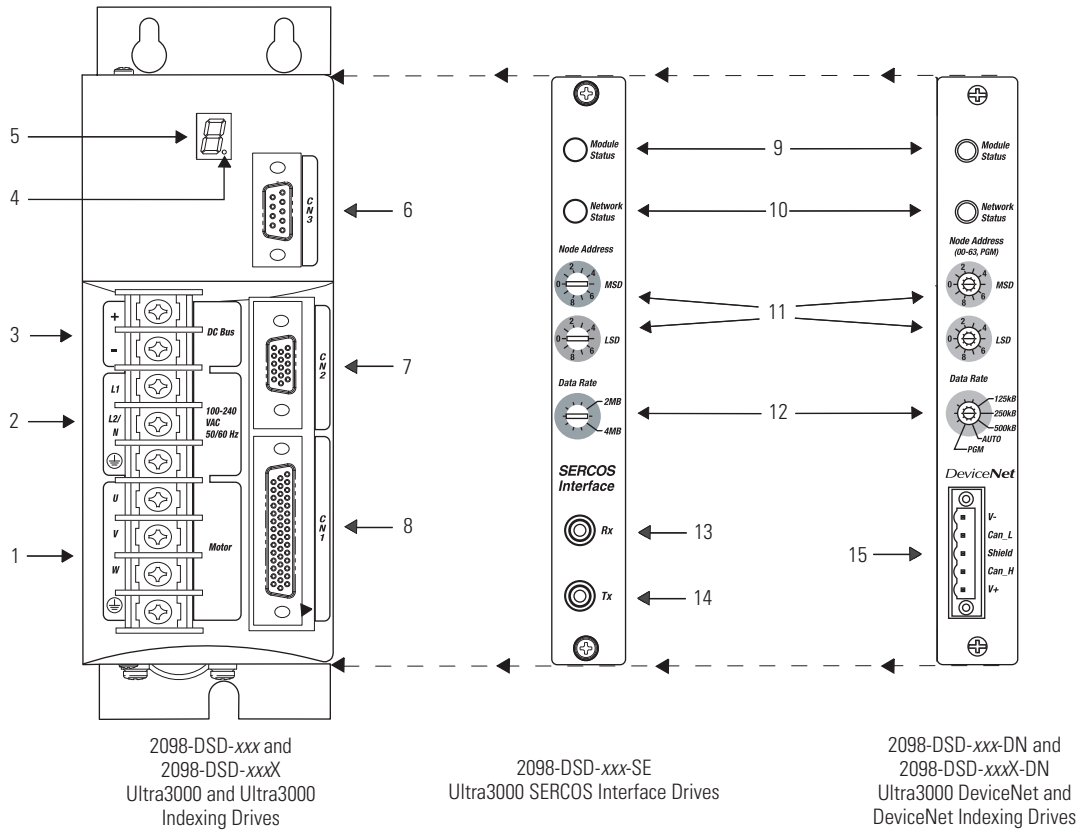
Unit shown is the 2098-DSD-005-SE

Ultra3000 Drives	A mm (in.)	C mm (in.)	E mm (in.)	F mm (in.)
2098-DSD-005, 2098-DSD-005X	65.02 (2.56)	13.26 (0.52)	32.77 (1.29)	72.64 (2.86)
2098-DSD-010, 2098-DSD-010X, 2098-DSD-020, 2098-DSD-020X				98.1 (3.89)
2098-DSD-005-SE, 2098-DSD-005-DN, 2098-DSD-005X-DN				95.5 (3.76)
2098-DSD-010-SE, 2098-DSD-010-DN, 2098-DSD-010X-DN, 2098-DSD-020-SE, 2098-DSD-020-DN, 2098-DSD-020X-DN	87.88 (3.46)	24.64 (0.97)	43.94 (1.73)	121.54 (4.79)

Ultra3000 Connector, Indicator, and Switch Locations

This section provides the connector, indicator, and switch locations for the Ultra3000 Digital Servo Drives (X indicates indexing, -SE indicates SERCOS interface, -DN indicates DeviceNet interface, and X-DN indicates indexing DeviceNet interface).

2098-DSD-005, 2098-DSD-010, 2098-DSD-020 Ultra3000 (230V) Connectors



Item	Description
1	Motor power connections
2	AC input power connections
3	DC bus connections for active shunt resistor kit
4	Logic power
5	Seven-segment fault status indicator

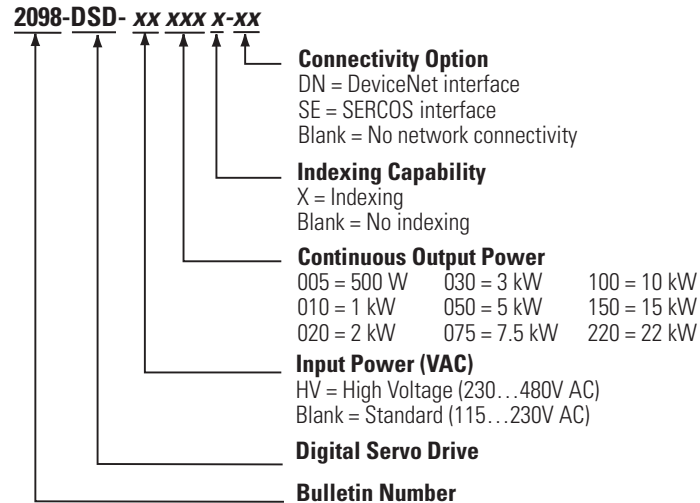
Item	Description
6	CN3 9-pin serial port connector
7	CN2 15-pin motor feedback connector
8	CN1 44-pin user I/O connector
9	Module status indicator
10	Network status indicator

Item	Description
11	SERCOS node address switches
12	Data rate switch
13	SERCOS receive (Rx) connector
14	SERCOS transmit (Tx) connector
15	DeviceNet interface connector

For CN1, CN2, and CN3 connector options, refer to Breakout Components and Connector Kits beginning on [page 418](#).

Ultra3000 Digital Servo Drive Catalog Numbers

Catalog numbers consist of various characters, each of which identifies a specific option for that component. Use the catalog numbering chart below to understand the configuration of your drive. For questions regarding product availability, contact your Allen-Bradley distributor.



Ultraware Software Catalog Number

Ultra3000, Ultra3000 with indexing, Ultra3000-DN, and Ultra3000-DN with indexing drives are configured by using Ultraware software (catalog number 2098-UWCPRG). The Ultra3000-SE drives are configured by using RSLogix 5000 software.