

## 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   | 2098-DSD-005                                    | 2098-DSD-010                                    | 2098-DSD-020                                     |
|---|---|---|--|
| AC input voltage <sup>(1)</sup>   | 100...240V rms Single-phase                     |   |  |
| AC input frequency  | 47...63 Hz                                      |   |  |
| AC input current <sup>(2)(3)</sup><br>Nom (rms)<br>230V AC (0-pk) max inrush <sup>(4)</sup> | 5 A<br>100 A - Series A or B<br>20 A - Series C | 9 A<br>100 A - Series A or B<br>20 A - Series C | 18 A<br>100 A - Series A or B<br>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 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<br>115V AC input<br>230V AC input                              | 93 J<br>38 J                                    | 125 J<br>51 J                                   |  |
| Continuous power output<br>115V AC input<br>230V AC input                                   | 0.25 kW<br>0.5 kW                               | 0.5 kW<br>1.0 kW                                | 1.0 kW<br>2.0 kW                                 |

- (1) Specification is for nominal voltage. The absolute limits are ±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 367](#)).
- (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 <sup>(1)</sup> | Class J <sup>(1)</sup> |
| 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              |

### Contactor Ratings

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

### Power Dissipation Specifications

| Drive Cat. No. | Max Loss<br>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<br>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 $\mu$ s   |
| Digital I/O firmware scan period   | 1 ms  |
| Analog inputs<br>COMMAND<br>ILIMIT | 14-bit A/D, $\pm$ 10V<br>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 <sup>(1)</sup> |

(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)  |                 |                    |
| Temperature, ambient |  |                 |                    |
| Operating            | 0...55 °C (32...131 °F)  |                 |                    |
| Storage              | -40...70 °C (-40...158 °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

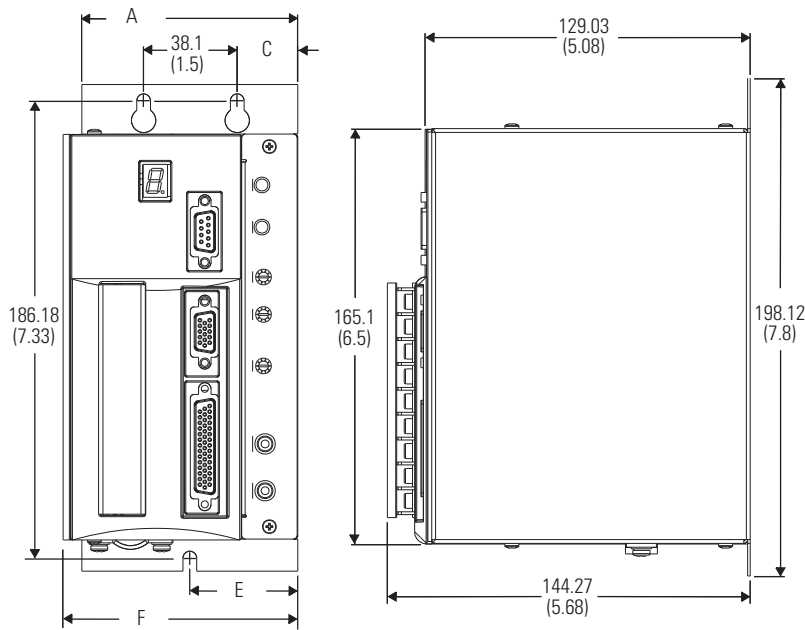
| Connector   | Description  | Specification                              |
|-------------|--|--|
| CN1         | User input/output  | 44-pin high-density female D-sub connector |
| CN2         | Motor feedback connector   | 15-pin high-density female D-sub connector |
| CN3         | Serial port connector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

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