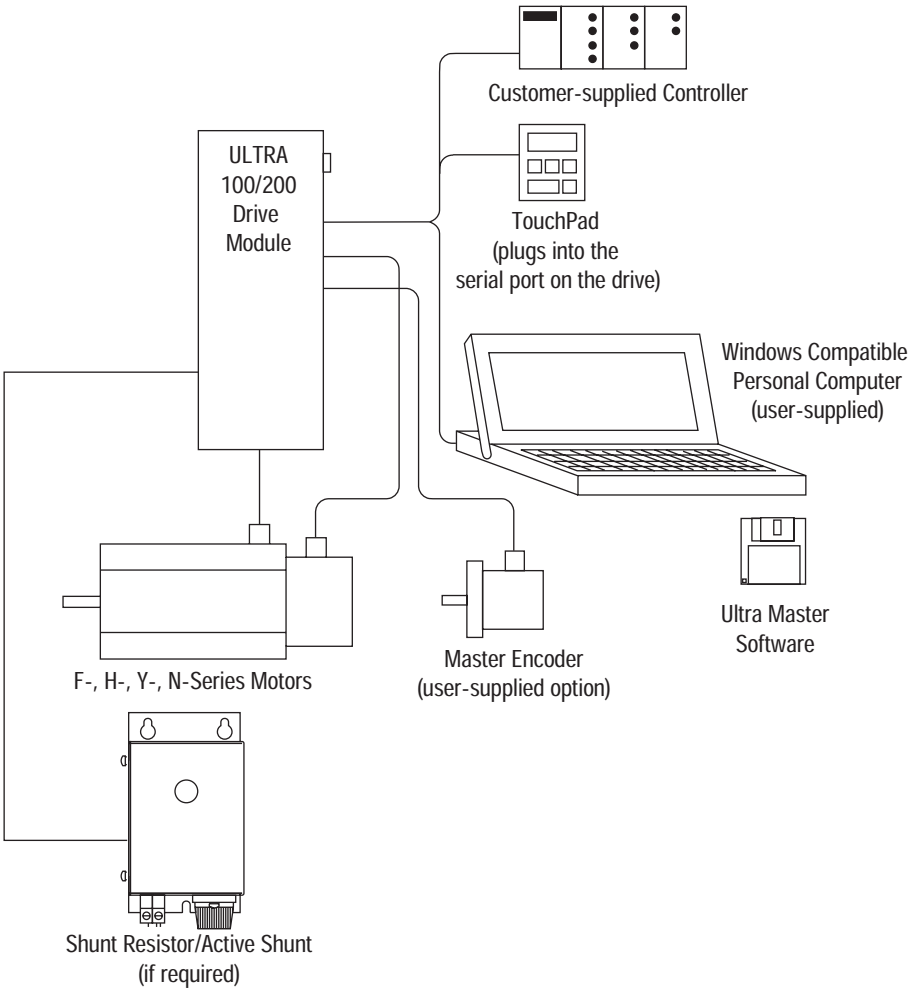
ULTRA 100/200 Drives

ULTRA 100 and 200 drives are feature-rich, high-performance drives that offer the flexibility to handle a wide range of applications. You can set up the ULTRA 100/200 drives as indexing drives, velocity servo drives, stepper drives, or master encoder followers. With the DeviceNet option, you can remotely commission and reprogram ULTRA 100 drives. In addition, you can use the ULTRA 100/200 drives host command protocol to set up multiple drives. Available in seven power ranges, theULT RA100/200 drives can be mated to four high-performance brushless servo motor lines. Ultra Master software, a Windows-based interface, provides you with a familiar programming environment and a powerful commissioning tool for all ULTRA 100/200 drives.

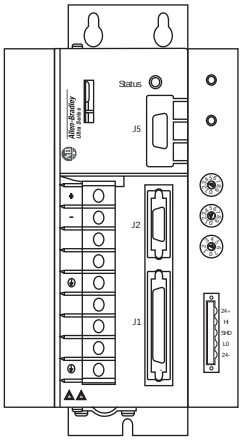


Note: To learn more about 1398 ULTRA Series 230V brushless servo motors, see publication 1398-2.1.

ULTRA 100 Features

ULTRA 100 servo drives deliver flexibility and performance in a very compact size. Each ULTRA 100 drive provides:

- 115/230V AC, single-phase input
- Built-in logic power supplies (external 12 to 24V I/O logic power required)
- The ability to drive sinusoidal AC brushless motors
- Advanced control algorithms for leading-edge velocity loop bandwidth, fully digital current, velocity, and position loops
- A 14-bit A/D convertor for velocity command input
- An internally-shielded filter for electromagnetic compatibility (EMC)
- Several analog or digital command interfaces:
  - Indexing—absolute with the Homing feature, incremental, or registration (optional)
  - DeviceNet (optional)
  - ±10 Volt analog interface—position, velocity, or torque control
  - Presets (from one to eight binary inputs)—torque or velocity control
  - Quadrature encoder digital interface—electronic gearing position follower
  - Step/direction digital interface—position control
  - CW/CCW (step up/step down) interface—position control
  - Operating mode override—alternate movement interface
- Four dedicated I/O plus six user-selectable, optically isolated digital inputs and outputs (sourcing/active high):
  - Two dedicated inputs
  - Two dedicated outputs
  - Four user-selectable inputs
  - Two user-selectable outputs
- One analog input for external current limit
- One analog output for variable monitoring or torque sharing
- Unlimited I/O capability over DeviceNet
- A serial port for RS-232/RS-485 host communication



ULTRA 100 and DeviceNet

The DeviceNet interface card is an optional card that provides a direct, digital connection between a DeviceNet network and an ULTRA 100 drive.

The DeviceNet option provides:

- Two bi-colored LEDs for network and module status
- Three switches to set node addresses and baud rate
- Several message protocols
  - Explicit messaging
  - Polled I/O messaging
  - Change-of-state/cyclic messaging

ULTRA 100 Specifications

The following tables contain ULTRA 100 specifications:

General

Specification	1398-DDM-		
	005, 005X[1], 005-DN[2], 005X-DN	009, 009X[1], 009-DN[2], 009X-DN	0019, 0019X[1], 0019-DN[2], 0019X-DN
Peak output current	7.5A	15A	30A
Continuous output current	2.5A	5A	10A
Continuous output power	0.5 kW	1.0 kW	2.0 kW
Continuous input current	5A	9A	18A
Input voltage	100 to 240V AC RMS nominal (88 to 265 Volts), single phase		
Input frequency	47-63 Hz		

1 The X indicates the indexing version of the drive.
2 The DN denotes the DeviceNet option.

Command Sources

Specification	Description
Analog velocity/torque input	±10 Volts
Presets	8 presets, binary selection by digital inputs (unlimited I/O capability over DeviceNet)
Step and direction, step up/step down	1 MHz maximum frequency Differential or single-ended line drivers
Master encoder following	1 MHz maximum line frequency Differential or single-ended line drivers
Digital serial commands	Via serial port and ULTRA Series host language
DeviceNet commands	Via DeviceNet port
Indexing	Absolute (with Homing feature) Incremental Registration (with high-speed registration)

DeviceNet

Specification	Description
Baud rate	125 kps (default), 250 kps, or 500 kps
Multiple drive addressing	00-63 (63 default)
Power consumption (DeviceNet current draw)	60 mA

Serial Communication Port

Specification	Description
Type	RS-232, four-wire RS-485
Baud rate	1,200 to 19,200 baud
Multiple drive addressing	Up to 32 drives[1]

1 You can use the Ultra Master software to setup multiple drives using the ULTRA 100/200 drives host command protocol.

Control Loops

Specification	Description
Modes	Torque, velocity, and position control
Type	All loops are digital.
Velocity loop bandwidth (maximum)	300 Hz
Position loop	1 ms
Current loop	125 µs

Connectors

Specification	Description
DeviceNet	5-pin open-style connector
Serial	9-pin D-shell (for J5)
Control and feedback	20-pin (for J2) and 50-pin (for J1) high density Mini D
Power	Screw terminal block (for TB1)

Environmental

Specification	1398-DDM-		
	005, 005X[1], 005-DN[2], 005X-DN	009, 009X[1], 009-DN[2], 009X-DN	0019, 0019X[1], 0019-DN[2], 0019X-DN
Storage temperature	-40°C to 70°C (-40°F to 158°F)		
Operating temperature	-5°C to 55°C (23°F to 131°F)		
Humidity	5% to 90%, non-condensing		
Altitude	1500m (5000 ft)		
Vibration	10 to 2000 Hz at 2g		
Shock	15g, 11 ms, half sine		
Weight	1.68 kg (3.7 lb)[3]	2.03 kg (4.47 lb)[3]	2.0 kg (4.4 lb)[3]

1 The X indicates the indexing version of the drive.
2 The DN denotes the DeviceNet option.
3 The DeviceNet option adds 0.16 kg (0.35lb).

Inputs and Outputs

Specification	Description
Selectable digital inputs	4 optically isolated, 12 to 24 volt, active high. User-selectable as: • Analog override • Define home • Drive mode select • Integrator inhibit • Fault reset • Follower enable • Forward enable • Mode override • Preset select • Registration sensor[1] • Reverse enable • Remove command offset • Starting homing • Start index
Selectable digital outputs	2 optically isolated, 12 to 24 volt, active high, short circuit protected. User-selectable as: • At speed • Axis homed • Bus charged • Current limit • Disabling fault • Drive enable • In dwell • In motion • In position • Registered • Sequence complete • Within position window • Within speed window • Zero speed • various fault indications
Dedicated digital inputs	Enable, Fault Reset (optically isolated, 12-24 Volt, active high)
Dedicated relay outputs	Ready/Not Faulted, Brake Output
Analog inputs	1 external analog current limit, 0 to10 Volt 10-bit resolution
Analog outputs	1 user programmable, ±10 Volt
Encoder output	1 MHz maximum line frequency Differential line drivers Scalable by 1, 1/2, 1/4, 1/8
Motor feedback	Incremental encoder

[1] You must use input 2 as the high-speed input.

- When placing the cable into the cable carrier, the carrier should be laid out flat with the bending direction facing upward. It should then be fitted with the cables in working position. The cables should be laid into the cable carrier and not woven between or around other cables.
- Allow at least 10% clearance between cables so that they are free to move. Use separators between cables.
- The cables must be free to move within the carrier. Do not attach the cables to the carrier or to each other.
- Clamp heavier cables toward the edge of the track and lighter cables in the center of the track.
- Do not pull cables tight against the inner/outer track curves.

System Configuration Checklist

Use the following checklist to configure an ULTRA 100/200 system for your application:

ULTRA 100/200 Drives (choose one of the following):

ULTRA 100 Drives [1]

- ❑ 1398-DDM-005, -005-DN
  1398-DDM-005X, -005X-DN
- ❑ 1398-DDM-009, -009-DN
  1398-DDM-009X, -009X-DN
- ❑ 1398-DDM-019, -019-DN
  1398-DDM-0019X, -0019X-DN

ULTRA 200 Drives [2]

- ❑ 1398-DDM-010, -010X
- ❑ 1398-DDM-020, -020X
- ❑ 1398-DDM-030, -030X
- ❑ 1398-DDM-075, -075X
- ❑ 1398-DDM-150, -150X

1 Includes the *ULTRA 100 Installation Manual* (Publication 1398-5.2).
2 Includes the *ULTRA 200 Installation Manual* (Publication 1398-5.0).

ULTRA Series Motors (choose one of the following):

F-Series Motors

- ❑ F-4030-Q-H00AA
- ❑ F-4050-Q-H00AA
- ❑ F-4075-R-H00AA[1]
- ❑ F-6100-R-H00AA[1]
- ❑ F-6200-R-H00AA[1]

H-Series Motors

- ❑ H-2005-K-H00AA
- ❑ H-3007-N-H00AA
- ❑ H-3016-N-H00AA
- ❑ H-4030-M-H00AA[1]
- ❑ H-4030-P-H00AA

Y-Series Motors

- ❑ Y-1002-1-H00AA
- ❑ Y-1002-2-H00AA
- ❑ Y-1003-1-H00AA
- ❑ Y-1003-2-H00AA
- ❑ Y-2006-1-H00AA

N-Series Motors

- ❑ N-2302-1-F00AA
- ❑ N-2304-1-F00AA
- ❑ N-3406-2-H00AA
- ❑ N-3412-2-F00AA[2]
- ❑ N-3412-2-H00AA[1]

F-Series Motors

- ❑ F-6300-R-H00AA[1]

H-Series Motors

- ❑ H-4050-P-H00AA[1]
- ❑ H-4075-R-H00AA[1]
- ❑ H-6100-Q-H00AA[1]
- ❑ H-6200-Q-H00AA[1]
- ❑ H-6300-Q-H00AA[1]
- ❑ H-8350-S-H00AA[1]
- ❑ H-8500-S-H00AA[1]

Y-Series Motors

- ❑ Y-2006-2-H00AA
- ❑ Y-2012-1-H00AA
- ❑ Y-2012-2-H00AA
- ❑ Y-3023-2-H00AA

N-Series Motors

- ❑ N-4214-2-H00AA
- ❑ N-4220-2-H00AA
- ❑ N-5630-2-H00AA
- ❑ N-5637-2-H00AA
- ❑ N-5647-2-H00AA

1 ULTRA 200 drives only.
2 ULTRA 100 drives only

Cables:

Note: The last three digits select standard cable lengths of:
10 ft (3.0m)—010; 25 ft (7.7m)—025; 50 ft (15.0m)—050;
75 ft (23.0m)—075; 100 ft (31m)—100.

TB1 to Motor Power Connections (choose one of the following):

	Part Number	Description
❑	9101-1381-*xxx*	Use for H-2000 and H-3000 motors
❑	9101-1382-*xxx*	Use for F-4000 and H-4000 motors
❑	9101-1383-*xxx*	Use for F-6000 and H-6100, H-6200 motors Use for F-6300 and H-6300 with 1398-DDM-075
❑	9101-1384-*xxx*	Use for H-8000 motors
❑	9101-1385-*xxx*	Use for Y-Series motors
❑	9101-1399-*xxx*	Use for 1398-DDM-150, -150X with F-6300 and H-6300 motors
❑	9101-1467-*xxx*	Use for N-Series motors

J1 to Controller Connections (choose one of the following):

	Part Number	Description
❑	9101-1369-003	J1 to a 50-position female D-sub cable (1m/3 ft length) This cable is included in the 9101-1391 kit.
❑	9101-1370-*xxx*	J1 cable with flying lead opposite (rail mounted)
❑	9101-1391	J1 to 50-pin terminal strip (includes 1 m/3 ft cable and mounting hardware)
❑	1398-CCAE*xx*	J1 to 1756-M02AE ControlLogix Analog/Encoder Card (includes 39-pin connector with no hood)
❑	1398-CFLAE*xx*	J1 to 1756-M02AE ControlLogix Analog/Encoder single axis flying lead

J2 to Motor Encoder Connections (choose one of the following):

	Part Number	Description
❑	9101-1365-*xxx*	F- and H-Series motors connector cable with flying leads opposite
❑	9101-1366-*xxx*	J2 to motor (F- and H-Series motors)
❑	9101-1371-003	J2 to a 20-position female D-sub cable (1m/3 ft length) This cable is included in the 9101-1392 kit.
❑	9101-1373-*xxx*	Y-Series motor connector cable with flying leads opposite
❑	9101-1375-*xxx*	J2 to motor (Y-Series motors)
❑	9101-1380-*xxx*	J2 to customer supplied connector
❑	9101-1392	J2 to 25-pin terminal strip (includes 1m/3 ft cable and mounting hardware)
❑	9101-1468-*xxx*	J2 to motor (N-Series motor)
❑	9101-1469-*xxx*	N-Series motor connector cable with flying leads opposite

J3 Connections (choose one of the following for ULTRA 200 drives):

	Part Number	Description
❑	9101-1368-*xxx*	J3 to customer-supplied connector
❑	9101-1463-002	J3 to J3 (for slaving drives or torque sharing)

J4 and J5 Connections:

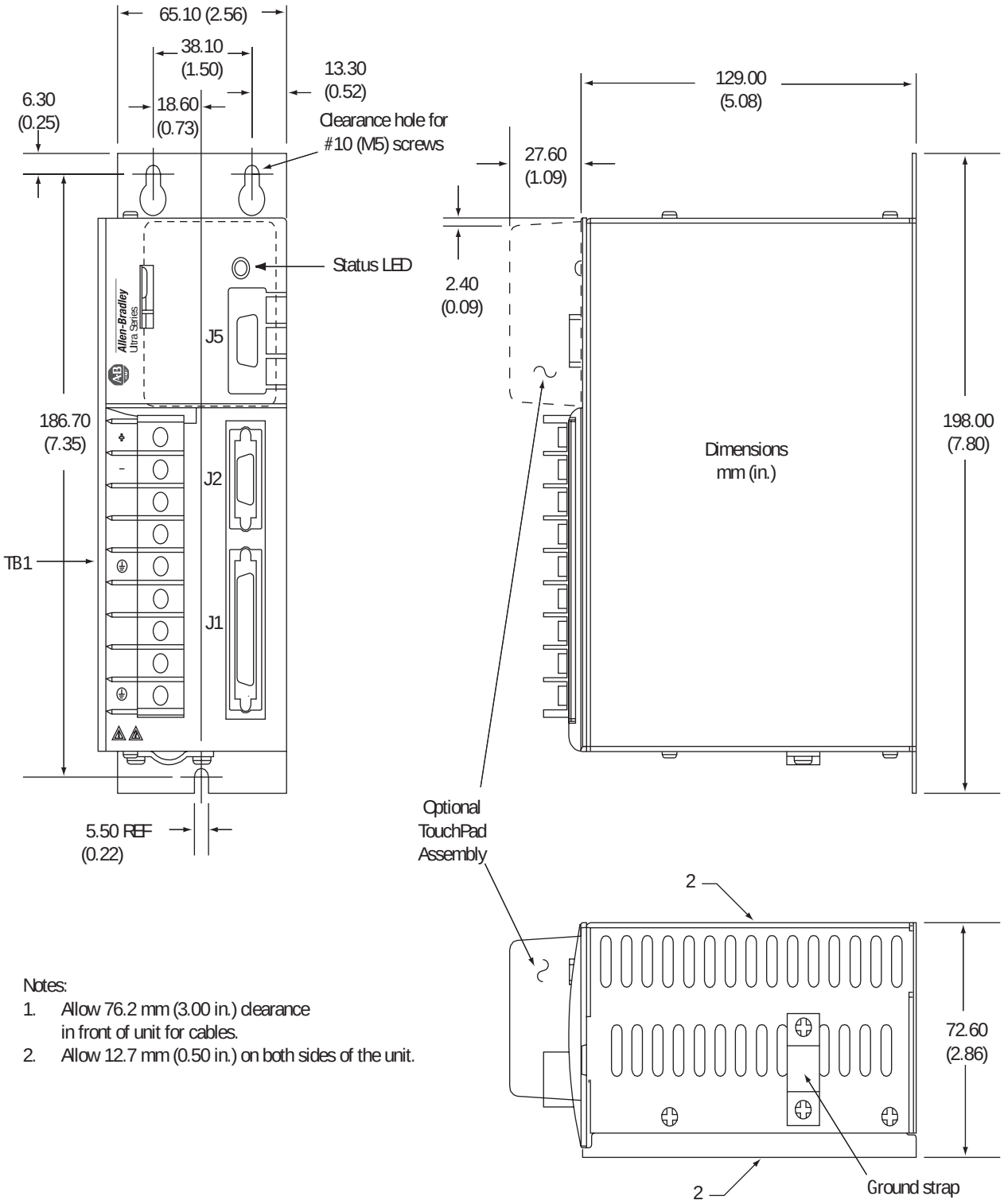
	Part Number	Description
❑	9101-1372-*xxx*	J4 or J5 to PC (RS-232 9-pin D-shell connector)
❑	9101-1374-001	J5 to J4 (RS-485 multi-drop communications) (30 cm/1 ft)
❑	9101-1379-*xxx*	J4 or J5 to customer-supplied connector (RS-232/RS-485)
❑	1398-HMI-001	TouchPad that fits into the J5 position

Accessories (choose all that apply):

	Part Number	Description
❑	9101-1387	AC line filter (36A, 1ϕ) for 1398-DDM-030, -030X, -075, -075X
❑	9101-1388	AC line filter (50A, 1ϕ) for 1398-DDM-075, -075X
❑	9101-1389	AC line filter (36A, 3ϕ) for 1398-DDM-075, -075X
❑	9101-1390	AC line filter (80A, 3ϕ) for 1398-DDM-075, -075X
❑	9101-1516	AC line filter (6A, 1ϕ) for 1398-DDM-005, -005X

	Part Number	Description
❑	9101-1517	AC line filter (10A, 1ϕ) for 1398-DDM-009, -009X, -010, -010X
❑	9101-1518	AC line filter (23A, 1ϕ) for 1398-DDM-019, -019X, -020, -020X
❑	9101-1575	AC line filter (50A, 3ϕ) for 1398-DDM-150, -150X
❑	9101-1183	External shunt resistor for 1398-DDM-010, -10X, -020, -020X, -030 and -030X
❑	Master-D-U	Ultra Master software for ULTRA 100/100X and ULTRA 200/200X
❑	1398-SR3AF	Ultra 100 active external shunt module
❑	1398-SR9P	Ultra 200 passive shunt module (DDM-010, -020, -030, PDM-010, -020 and -030)

Dimensions for 1398-DDM-005, -005X



Notes:
1. Allow 76.2 mm (3.00 in.) clearance in front of unit for cables.
2. Allow 12.7 mm (0.50 in.) on both sides of the unit.

ULTRA 100/200 Drives Options and Accessories

Ultra Master

Ultra Master is a point-and-click interface for customizing the ULTRA 100/200 drives to meet the requirements of your application. Suitable for any PC with Windows, Ultra Master allows you to configure, monitor, and troubleshoot a servo system. The online help and quick start-up windows will simplify your setup while tools, such as the on-screen digital oscilloscope, provide simplified tuning and diagnosis. Ultra Master also provides a full array of on-screen meters and other software tools for rapid debugging and measurement. It also keeps error messages in its own non-volatile message buffer to save time in tracking down a problem. In systems with multiple drives, Ultra Master can simultaneously display status and configuration screens for all drives that are on a four-wire RS-485 link. Ultra Master can also be used offline to configure a drive and save the setup to a disk for later downloading to a drive.

PC Requirements

The minimum PC configuration required for Ultra Master software is:

- A 386-based IBM compatible PC with 2MB of available hard disk space to load Ultra Master
- 4 MB minimum of memory
- Microsoft® Windows version 3.1 or higher
- A 3.5 in., 1.44 MB floppy disk drive
- An RS-232 serial port
- A VGA monitor

DeviceNet Option

ULTRA 100 with DeviceNet gives you the ability to operate your drive remotely over a network. DeviceNet, an open, low-cost network based on Controller Area Network (CAN) technology, is a device-level network that can connect individual components, such as drives and switches. ULTRA 100 with DeviceNet supports generic object mapping and unconnected message manager (UCMM) for dynamic and multiple explicit message connections.

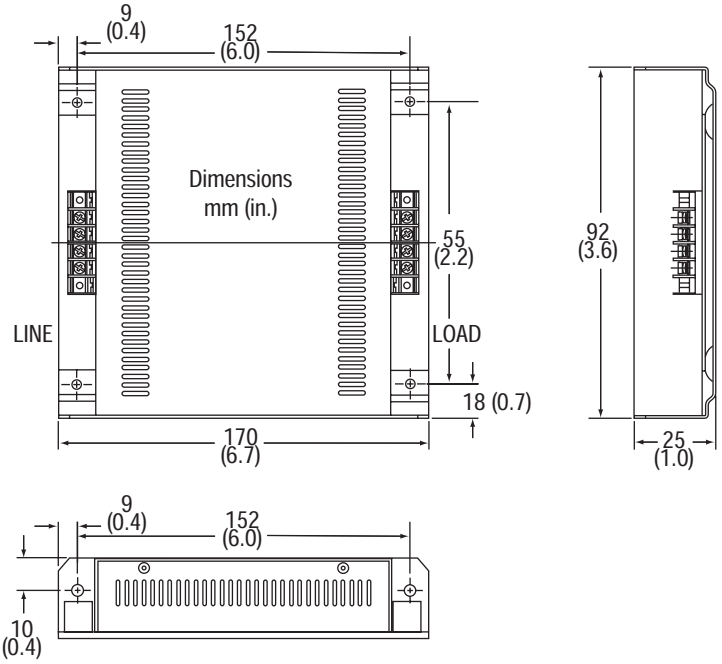
AC Line Filters

AC line filters are required for EMC compliance.

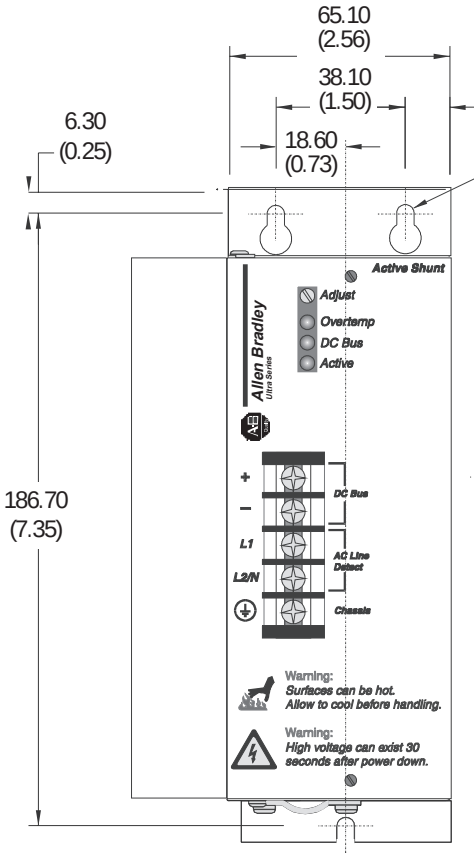
Part Number	Description	ULTRA 100/200
9101-1516	6A, 1ϕ	1398-DDM-005
9101-1517	10A, 1ϕ	1398-DDM-009, -010
9101-1518	23A, 1ϕ	1398-DDM-019, -020
9101-1575	50A, 3ϕ	1398-DDM-150
9101-1387	36A, 1ϕ	1398-DDM-030
9101-1388	50A, 1ϕ	For multiple drives on one filter[1]
9101-1389	36A, 3ϕ	1398-DDM-075
9101-1390	70A, 3ϕ	For multiple 1398-DDM-075 drives on one filter[1]

[1] For multiple drives using one filter, the combined drive input currents must not exceed filter current rating.

AC Line Filter (9101-1516) for 1398-DDM-005

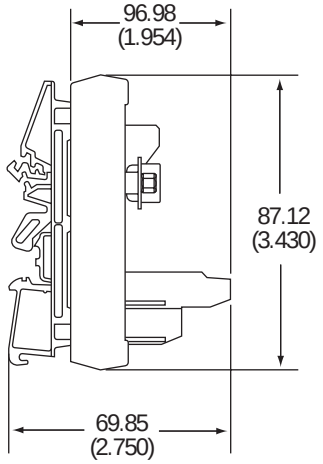


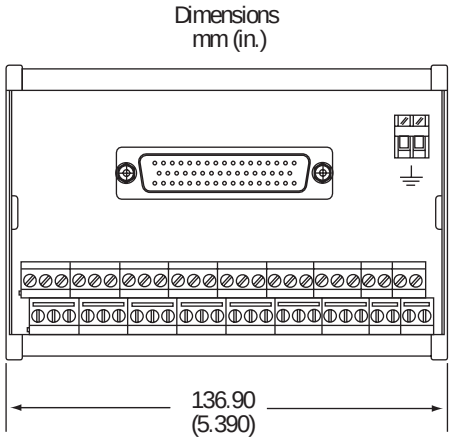
Active External Shunt Module (1398-SR3AF) for 1398-DDM-005, -005-DN, -005X, -005X-DN 1398-DDM-009, -009-DN, -009X, -009X-DN, and 1398-DDM-019, -019-DN, -019X, -019X-DN



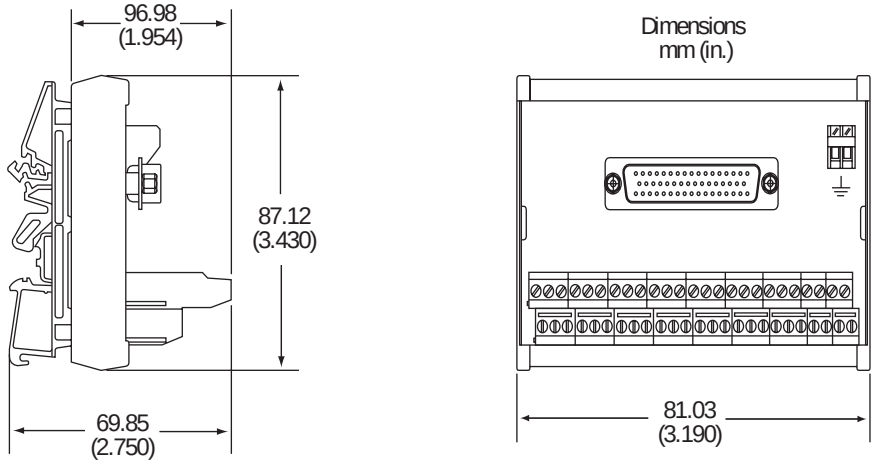
Notes:
1. Allow 76.2 mm (3.00 in.) clearance in front of unit for cables.
2. Allow 12.7 mm (0.50 in.) on both sides of the unit.
3. Allow 5.0 cm (2.0 in.) above and below the unit.

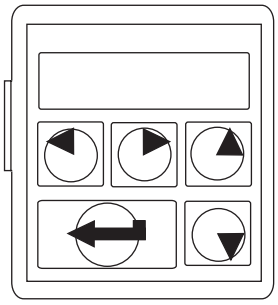
Breakout Board (J1) for ULTRA 100/200 Drives (9101-1391)





Breakout Board (J2) for ULTRA 100/200 Drives (9101-1392)





TouchPad

The TouchPad (part number 1398-HMI-001) is a convenient alternative to using Ultra Master for drive setup and monitoring. The small TouchPad module plugs directly into the front of the drive, and its eight-character dot matrix display and five keys provide access to many of the same functions available in Ultra Master software.

The TouchPad is a convenient diagnostic and monitoring tool for use on the factory floor. One TouchPad can support several drives because it is independent of the drive and can be quickly attached and removed once power is removed.

You can enter commands by pressing a single key or combinations of keys. Two modes of operation are available:

- Display mode, which allows you to move through the TouchPad command tree to each parameter.
- Modify mode, which allows you to monitor and change each parameter.

You can modify or view most parameters while the drive is either running or disabled. Refer to the TouchPad Card (publication 1398-5.5) for more information.