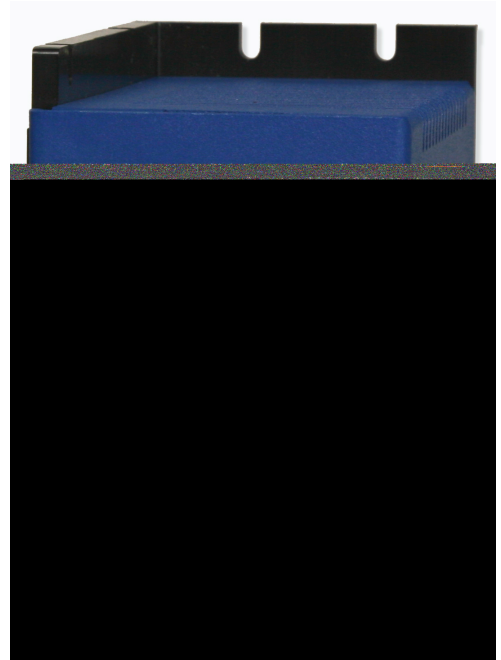


XTL-FA-01 Edge Filter for Xenus: User Guide



P/N 95-00378-000

Revision 3
June 2008

This page for notes.

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ABOUT THIS GUIDE

Overview and Scope

This guide describes the installation and connection of the Xenus Model XTL-FA-01 edge filter.

Related Documentation

Related information is available in these Copley Controls documents:

- *Xenus XTL User Guide*
- *CME 2 User Guide*

Information on Copley Controls Software can be found at:

<http://www.copleycontrols.com/Motion/Products/Software/index.html>

Comments

Copley Controls Corporation welcomes your comments on this guide. For contact information, see <http://www.copleycontrols.com>

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Document Validity

We reserve the right to modify our products. The information in this document is subject to change without notice and does not represent a commitment by Copley Controls Corporation. Copley Controls Corporation assumes no responsibility for any errors that may appear in this document.

Product Warnings

Observe all relevant state, regional, and local safety regulations when installing and using this product. For safety and to assure compliance with documented system data, only Copley Controls Corporation should perform repairs.



DANGER: Hazardous voltages.

Exercise caution when installing and adjusting.

Failure to heed this warning can cause equipment damage, injury, or death.

DANGER



Risk of electric shock.

High-voltage circuits on Xenus J1, J2, and J3 and on Filter J1 and J2 are connected to mains power.

Failure to heed this warning can cause equipment damage, injury, or death.

DANGER



Use equipment as described.

Operate equipment within the specifications provided in this manual.

Failure to heed this warning can cause equipment damage, injury, or death.

DANGER

Revision History

| Release | Date | DECO # | Comments |
|---------|---------------|--------|---|
| 1.0 | February 2005 | | Initial publication. |
| 2 | December 2007 | 16397 | Minor updates including RoHS compliance indication. |
| 3 | June 2008 | 17137 | Updated Web page references. |

CHAPTER

1: XTL-FA-01 EDGE FILTER

This chapter provides an overview of the Model XTL-FA-01 edge filter.

The contents of this chapter include:

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1.1: Overview

The XTL-FA-01 edge filter can be used to minimize noise on the output of any Xenus amplifier. The XTL-FA-01 edge filter is RoHS compliant.

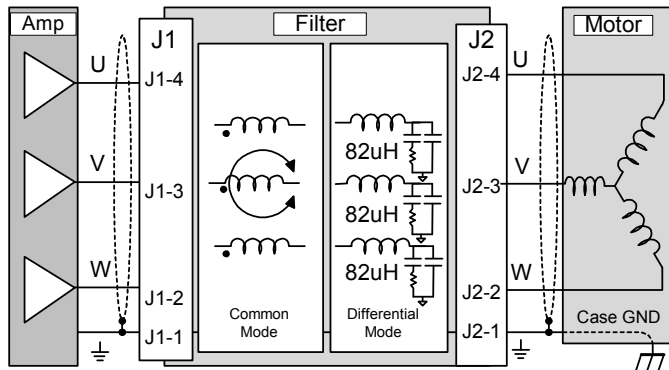
1.1.1: Differential and Common Mode Filtering

Most noise is capacitively coupled from the motor power cable to neighboring cables. To minimize this noise, the XTL-FA-01 edge filter uses both differential edge filtering and common mode filtering. Differential edge filtering reduces the high frequency component of the PWM signal, thus producing a signal with less energy that can be coupled during transmission. Common mode filtering reduces the unnecessary common mode noise generated by PWM signals.

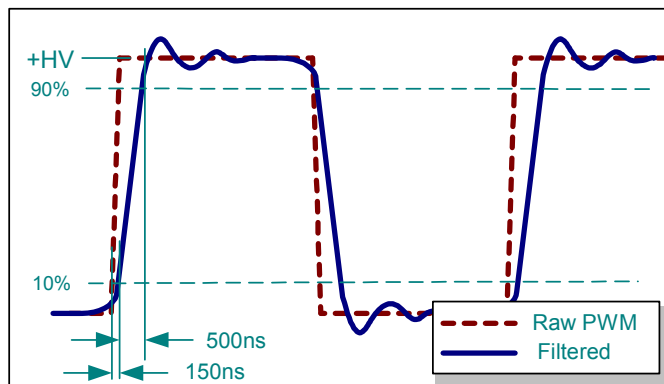
1.1.2: Description and Functional Diagram

The differential filter increases the rise time by at least a factor of 3, substantially reducing noise in the system. Copley Controls amplifiers typically have a 150 ns-rise time (high frequency component in the MHz range). Thus, the edge filter can increase rise time to 500 ns, reducing the high frequency noise emissions by the square law. The differential filter is designed with 82 μH inductors and a proprietary passive circuit. The inductance will provide a total of 164 μH in series with the load, helping to reduce ripple current. This brings low inductance motors into the required range.

The common mode filter is designed with a 220 μH common mode toroid that works with the cable capacitance to earth ground to remove common mode switching noise.



1.1.3: PWM Output Plot



1.2: XTL-FA-01 Edge Filter Specifications

| | | |
|--------------------------------|------------------|--|
| Input | Voltage, maximum | 373 Vdc |
| | Current, maximum | 20 Adc |
| Output | Voltage, maximum | 373 Vdc |
| | Current, maximum | 20 Adc |
| Peak Current/Peak Current Time | | 40 Adc for 1 second |
| Rise/Fall Time | | 500 mS (typical) |
| Differential Mode Inductance | | 82 μ H per phase, 162 μ H phase-phase (nominal) |
| Common Mode Inductance | | 220 μ H (nominal) |
| Nominal Resistance | | 27 milliohms per leg, 54 milliohms phase-phase (nominal) |
| Agency Approvals | | UL508C, EN60204, RoHS |

1.3: Thermal Considerations

Cooling Requirements

When used with XTL-230-18 or XTL 230-36 amplifiers, the XTL-FA-01 operates below maximum temperature values, and thus requires no cooling fan.

When used with XTL-40 amplifiers running continuous currents greater than 12 Adc, the XTL-FA-01 should be cooled with an external fan. The fan should have a flow rate of at least 110 CFM. The filter has been tested using the Comair Rotron MD24B2 24 Vdc powered fan.

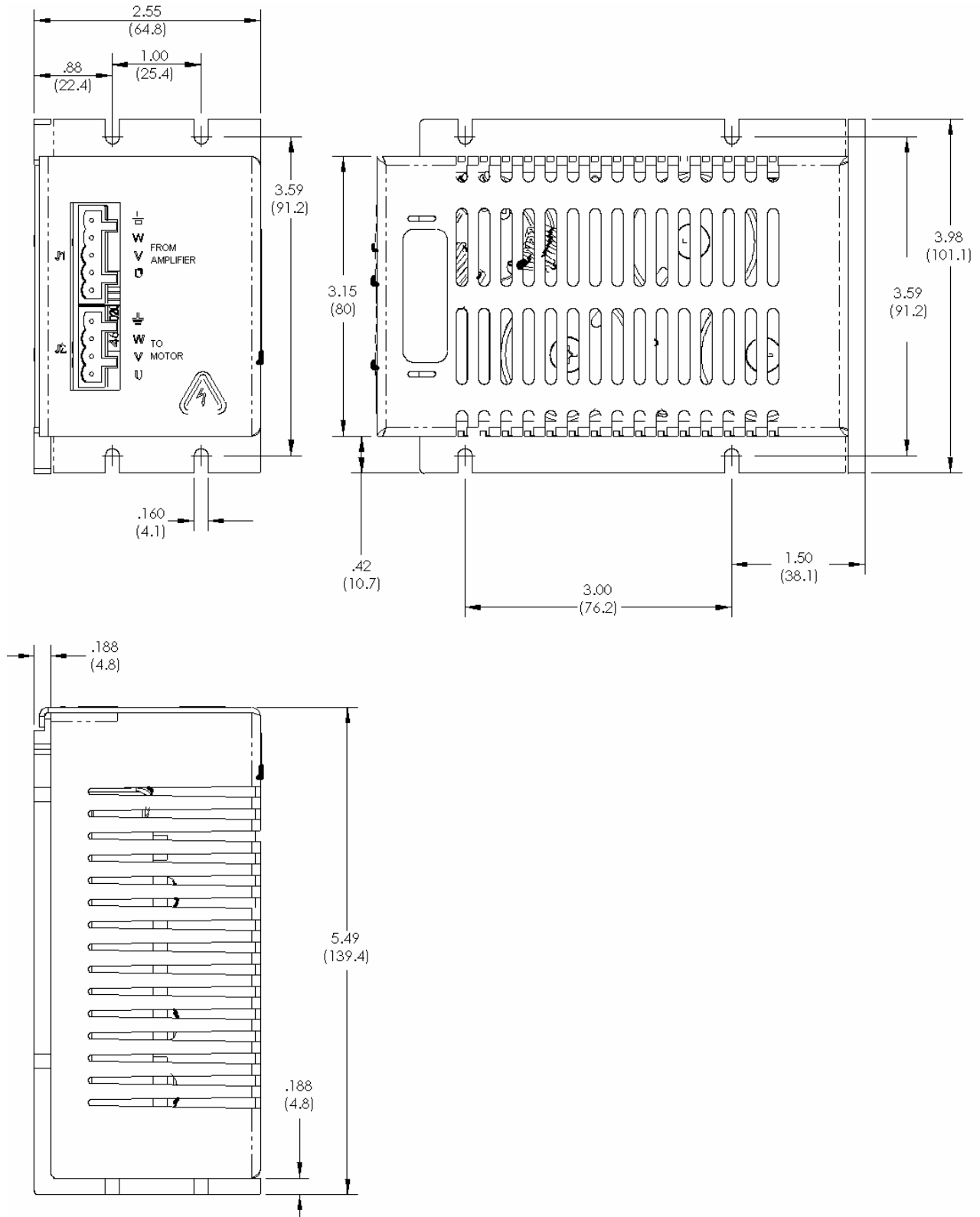
Fan Mounting Guidelines

Most of the filter's heat is transferred to ambient air, rather than through the heat plate. Thus, it is very important to mount the filter and fan in such a way that the fan can blow up through the filter's cover slots. Mount the filter on edge and mount the fan below it so that it blows up through the cover slots.

There is no heatsink option for the XTL-FA-01 edge filter.

1.4: XTL-FA-01 Edge Filter Dimensions

The following diagram shows the mounting dimensions of the XTL-FA-01 Edge Filter.



1.5: XTL-FA-01 Edge Filter Wiring

This section describes the wiring of the XTL-FA-01 Edge Filter.

1.5.1: Electrical Codes and Warnings

Be sure that all wiring complies with the National Electrical Code (NEC) or its national equivalent, and all prevailing local codes.



DANGER: Hazardous voltages.

Exercise caution when installing.

Failure to heed this warning can cause equipment damage, injury, or death.

DANGER



Risk of electric shock.

High-voltage circuits on Xenus J1, J2, and J3 and on Filter J1 and J2 are connected to mains power.

Failure to heed this warning can cause equipment damage, injury, or death.

DANGER



Do not ground mains-connected circuits.

With the exception of the ground pins on Xenus J1, J2, and J3 and on Filter J1 and J2, all of the other circuits on these connectors are mains-connected and must never be grounded.

WARNING

Failure to heed this warning can cause equipment damage.

1.5.2: Connector Locations

Edge Filter J1 connects to Xenus J2. Edge Filter J2 connects to the motor.



1.5.3: Cable Notes

- 1 Keep the Edge Filter J1 to Xenus J2 cable as short as possible. A typical length is 7 inches.
- 2 To reduce noise, twisted shielded cable must be used and the signal cables should not be bundled in the same conduit.

1.5.4: Input (J1) From Amplifier

Mating Connector

| | |
|--|--|
| Description | Euro-style, 5 position, 5.0 mm pluggable female terminal block |
| Manufacturer PN | Wago 51118042 or 721-105/026-047/RN01-0000 |
| Wire Size | 22 - 12 AWG |
| Recommended Wire | 12 AWG, 600 V (Shielded cable used for CE compliance) |
| Wire Insertion/Extraction Tool | Wago 231-131 |
| Connector and tool are included in connector kit XTL-FK. | |

Pin Description

| Pin | Signal | Function |
|-----|---------|--|
| 1 | Ground | Chassis ground and cable shield |
| 2 | Phase W | Phase W input from amplifier |
| 3 | Phase V | Phase V input from amplifier (use for DC motor connection) |
| 4 | Phase U | Phase U input from amplifier (use for DC motor connection) |
| 5 | --- | No connection |

1.5.5: Output (J2) To Motor

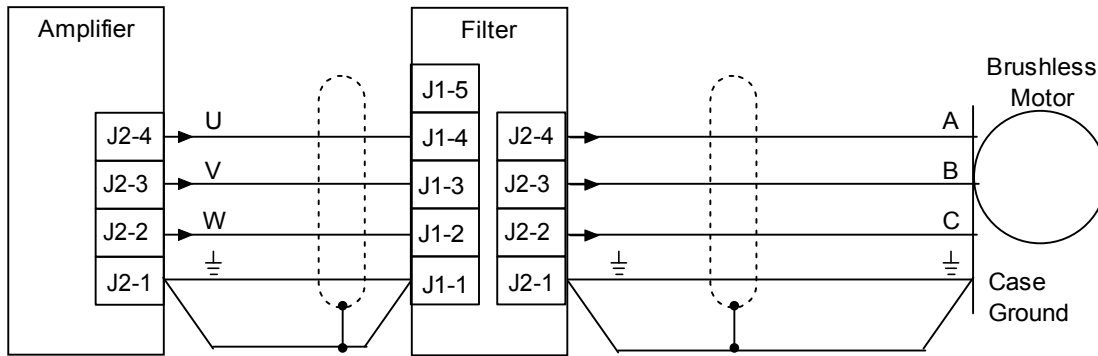
Mating Connector

| | |
|--|---|
| Description | Euro-style, 4 position, 5.0 mm pluggable female terminal block. |
| Manufacturer PN | Wago 51118008 or 721-104/026-047/RN01-0000 |
| Wire Size | 22 - 12 AWG |
| Recommended Wire | 12 AWG, 600 V (Shielded cable used for CE compliance) |
| Wire Insertion/Extraction Tool | Wago 231-131 |
| Connector and tool are included in connector kit XTL-FK. | |

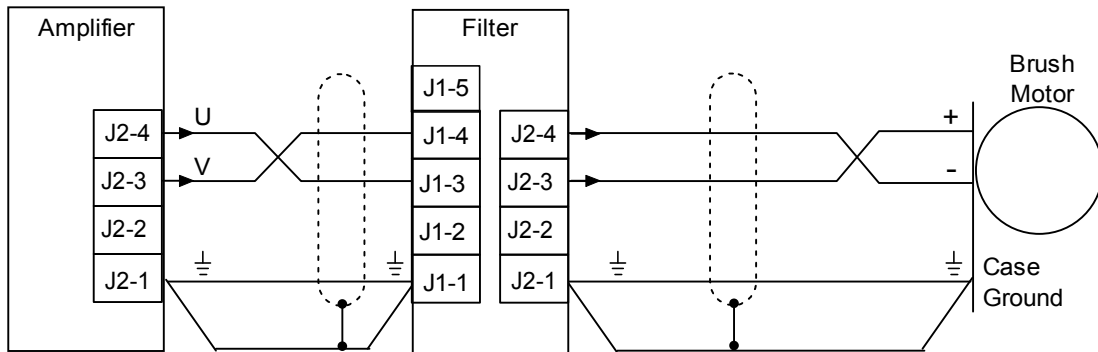
Pin Description

| Pin | Signal | Function |
|-----|---------|---|
| 1 | Ground | Chassis ground and cable shield |
| 2 | Phase W | Phase W output to motor |
| 3 | Phase V | Phase V output to motor (use for DC motor connection) |
| 4 | Phase U | Phase U output to motor (use for DC motor connection) |

1.5.6: Diagram: Edge Filter Wiring with Brushless Motor



1.5.7: Diagram: Edge Filter Wiring with Brush Motor



1.6: XTL-FA-01 Edge Filter Ordering

Filter

| Model | Description |
|-----------|-------------------|
| XTL-FA-01 | Xenus Edge Filter |

Connector Kit

| Model | Qty | Ref | Description | Mfr.Model No. |
|--------|-----|-----|----------------------------------|---|
| XTL-FK | 1 | J1 | Plug, 5 position, 5.0 mm, female | Wago 51118042 or 721-105/026-047/RN01-0000 |
| | 1 | J2 | Plug, 4 position, 5.0 mm, female | Wago 51118008 or 721-104/026-047/RN01-0000 |
| | 2 | -- | Insertion / Extraction Tool | Wago 231-131 |

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