

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



P/N 95-00378-000

Version 1.0

February 2005

This page for notes.

TABLE OF CONTENTS

About This Guide	iii
Overview and Scope.....	iii
Related Documentation.....	iii
Comments.....	iii
Copyrights.....	iii
Document Validity.....	iii
Product Warnings.....	iv
Revision History.....	iv
1: XSL-FA-01 Edge Filter	5
1.1: Overview.....	6
1.1.1: Differential and Common Mode Filtering.....	6
1.1.2: Description and Functional Diagram.....	6
1.1.3: PWM Output Plot.....	6
1.2: XSL-FA-01 Edge Filter Specifications.....	7
1.3: Thermal Considerations.....	7
1.4: XSL-FA-01 Edge Filter Dimensions.....	8
1.5: XSL-FA-01 Edge Filter Wiring.....	9
1.5.1: Electrical Codes and Warnings.....	9
1.5.2: Connector Locations.....	10
1.5.3: Cable Notes.....	11
1.5.4: Input (J1) From Amplifier.....	11
1.5.5: Output (J2) To Motor.....	11
1.5.6: Diagram: Edge Filter Wiring with Brushless Motor.....	12
1.5.7: Diagram: Edge Filter Wiring with Brush Motor.....	12
1.6: XSL-FA-01 Edge Filter Ordering.....	13

This page for notes.

ABOUT THIS GUIDE

Overview and Scope

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

Related Documentation

Related information is available in these Copley Controls documents:

- *Xenus User Guide*
- *Using CME 2 with Xenus*

Information on Copley Controls Software can be found at:

<http://www.copleycontrols.com/motion/software>

Comments

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

Copyrights

No part of this document may be reproduced in any form or by any means, electronic or mechanical, including photocopying, without express written permission of Copley Controls Corporation.

Xenus and CME 2 are registered trademarks of Copley Controls Corporation.

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	Comments
1.0	February 2005	Initial publication.

CHAPTER

1: XSL-FA-01 EDGE FILTER

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

The contents of this chapter include:

Title	Page
1.1: Overview	6
1.2: XSL-FA-01 Edge Filter Specifications	7
1.3: Thermal Considerations	7
1.4: XSL-FA-01 Edge Filter Dimensions	8
1.5: XSL-FA-01 Edge Filter Wiring	9
1.6: XSL-FA-01 Edge Filter Ordering	13

1.1: Overview

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

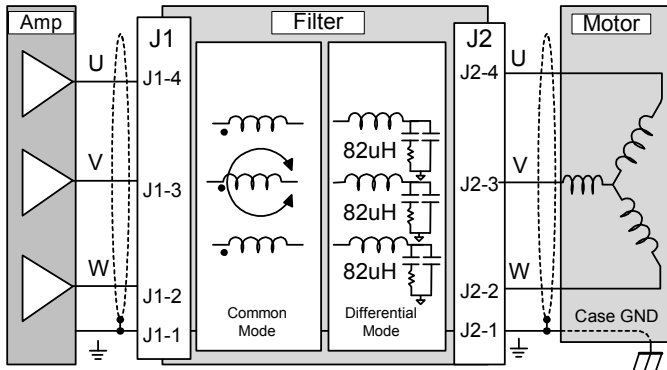
1.1.1: Differential and Common Mode Filtering

Most noise is capacitively coupled from the motor power cable to neighboring cables. To minimize this noise, the XSL-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.

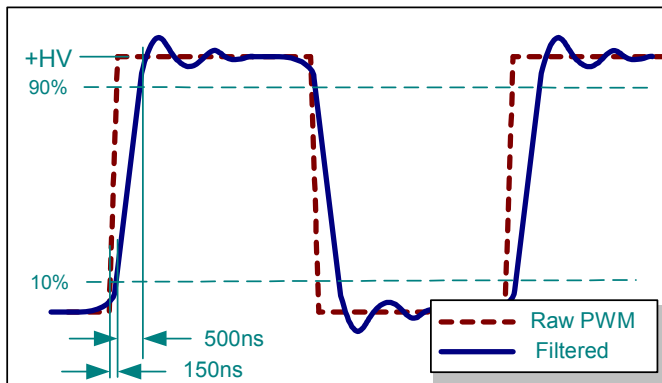
1.1.2: Description and Functional Diagram

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: XSL-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

1.3: Thermal Considerations

Cooling Requirements

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

When used with XSL-40 amplifiers running continuous currents greater than 12 Adc, the XSL-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.

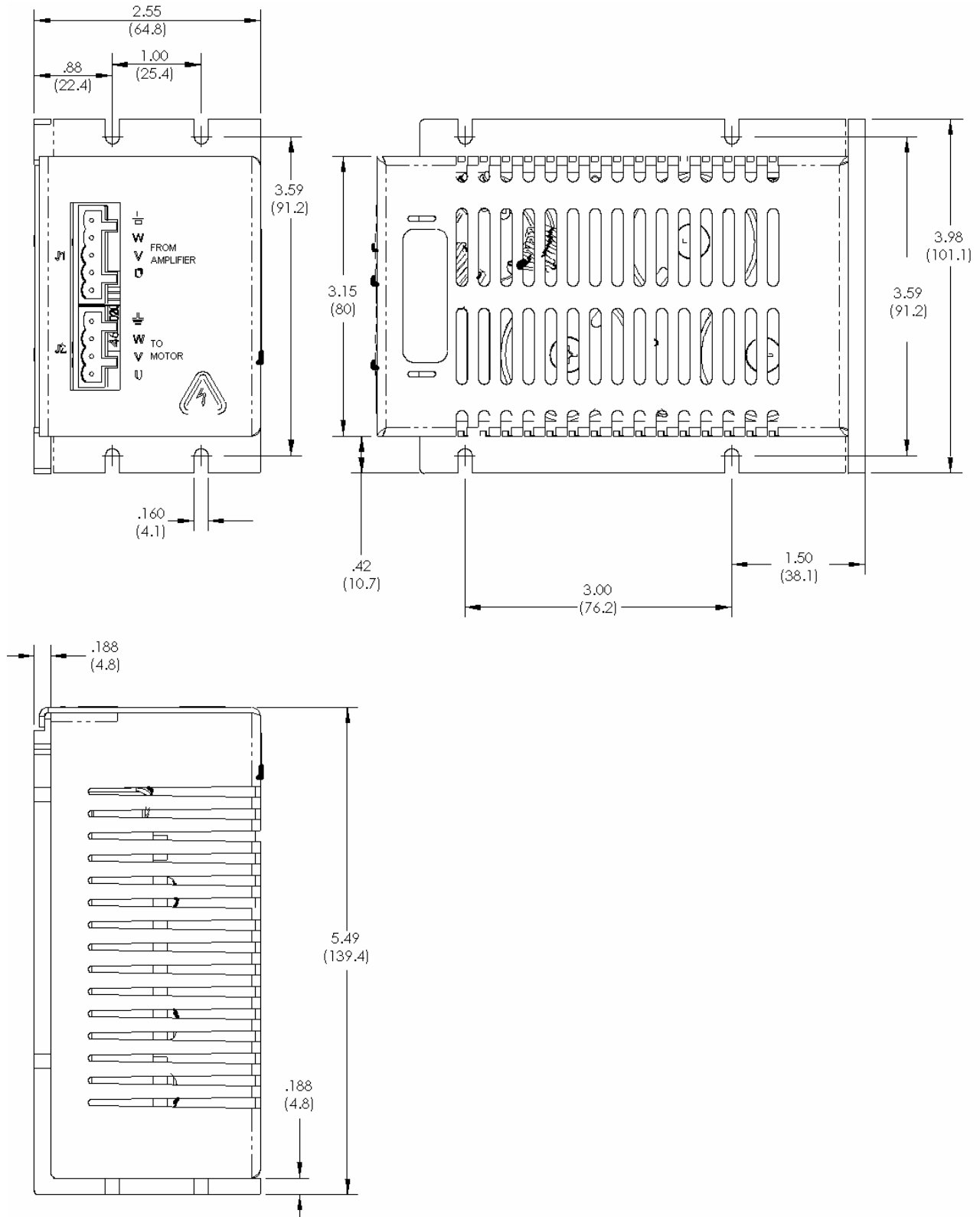
Fan Mounting Guidelines

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 XSL-FA-01 edge filter.

1.4: XSL-FA-01 Edge Filter Dimensions

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



1.5: XSL-FA-01 Edge Filter Wiring

This section describes the wiring of the XSL-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.

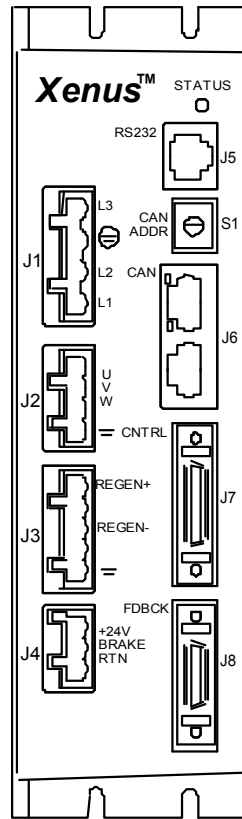
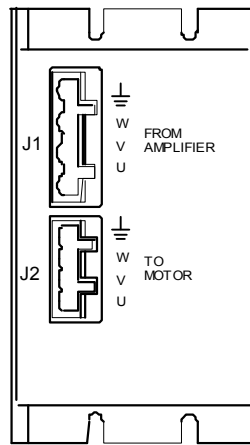
With the exception of the ground pins on Xenus J1, J2, and J3 and on Filter J1 and J2, all of the other circuits on these connectors are mains-connected and must never be grounded.

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 721-105/026-047
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 XSL-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

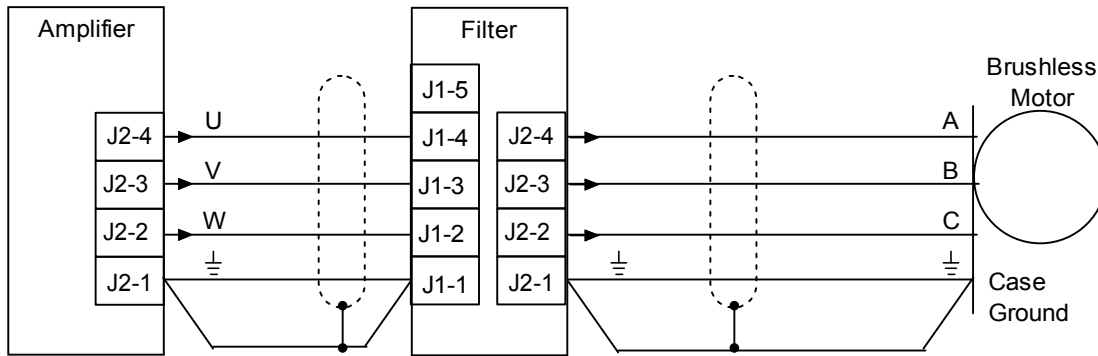
Mating Connector

Description	Euro-style, 4 position, 5.0 mm pluggable female terminal block.
Manufacturer PN	Wago 721-104/026-047
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 XSL-FK.	

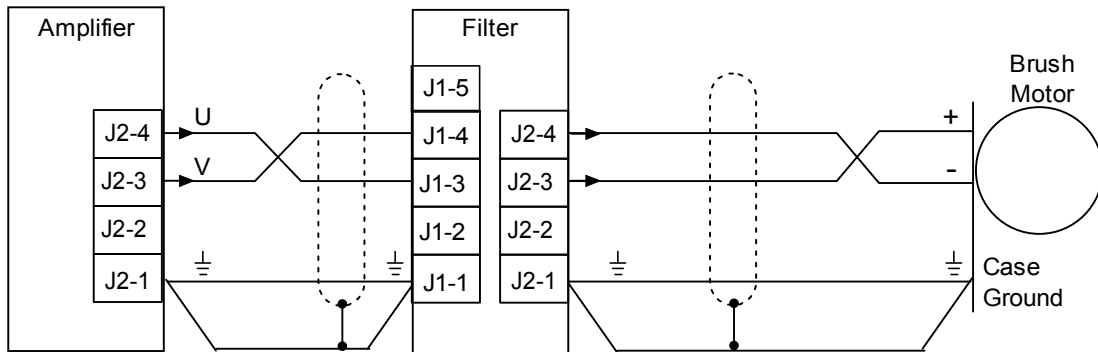
Pin Description

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: XSL-FA-01 Edge Filter Ordering

Filter

Model	Description
XSL-FA-01	Xenus Edge Filter

Connector Kit

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

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

P/N 95-00378-000

Version 1.0

February 2005

© 2005

Copley Controls Corporation

20 Dan Road

Canton, MA 02021 USA

All rights reserved