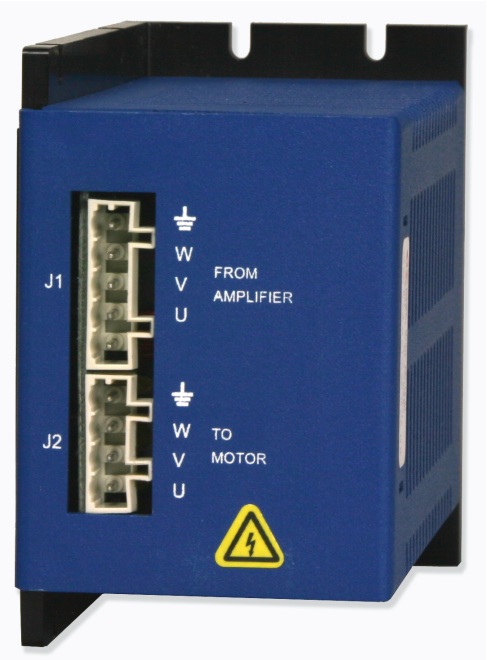
XTL-FA-01 Edge Filter for Xenus: User Guide



Copley Controls Corp.

P/N 95-00378-000

Revision 3
June 2008

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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

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Document Validity

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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:

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.

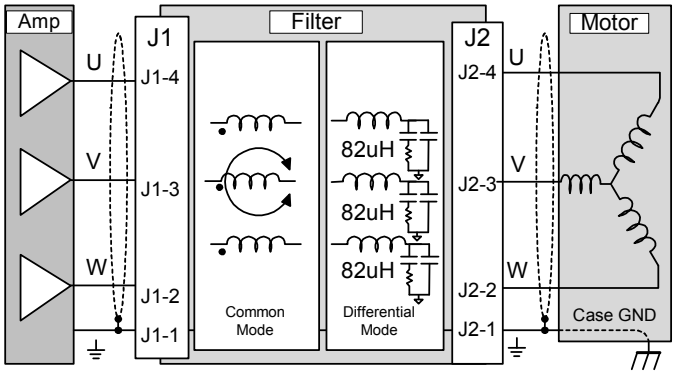
1.1.1: Differential and Common Mode Filtering

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.

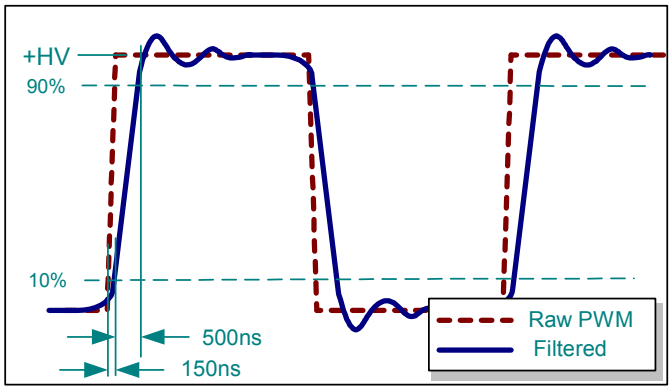
1.1.2: Description and Functional Diagram

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 164µH 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 µH per phase, 162 uH phase-phase (nominal)
Common Mode Inductance		220 µH (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.

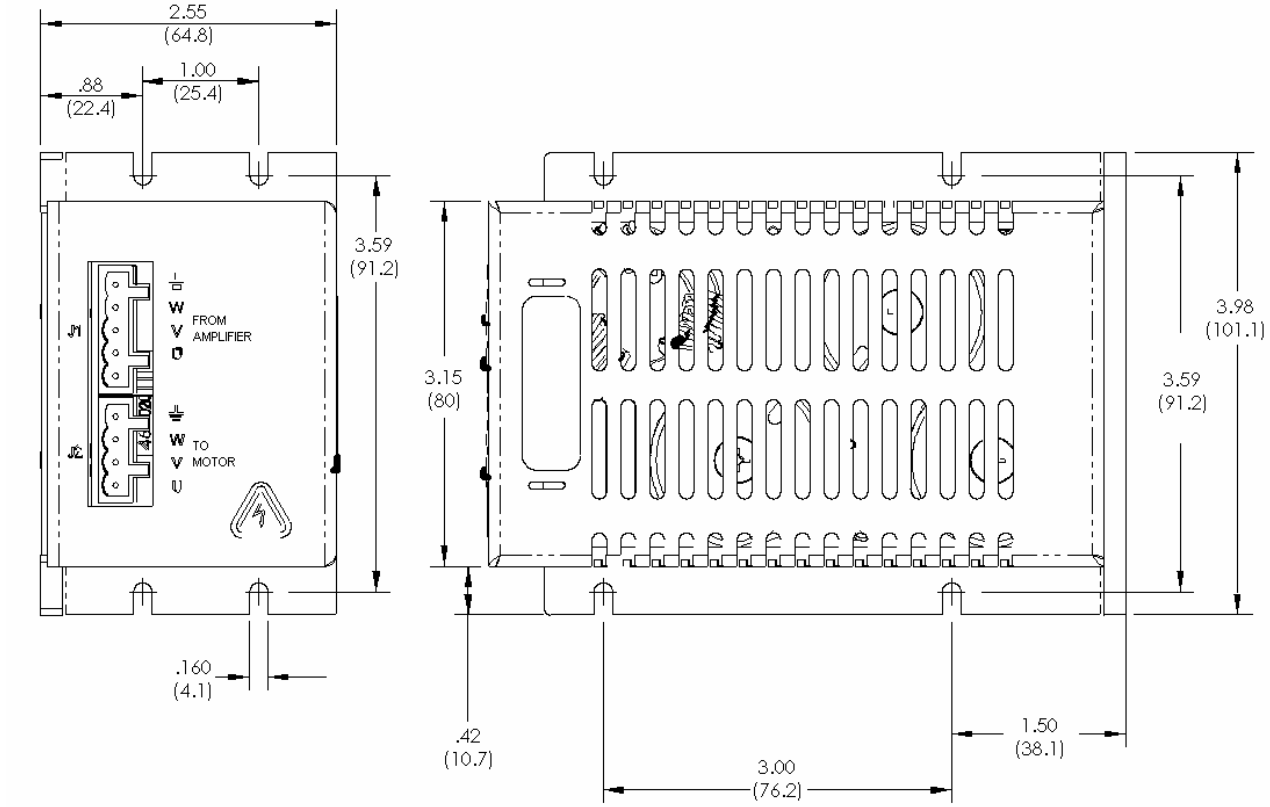
Fan Mounting Guidelines

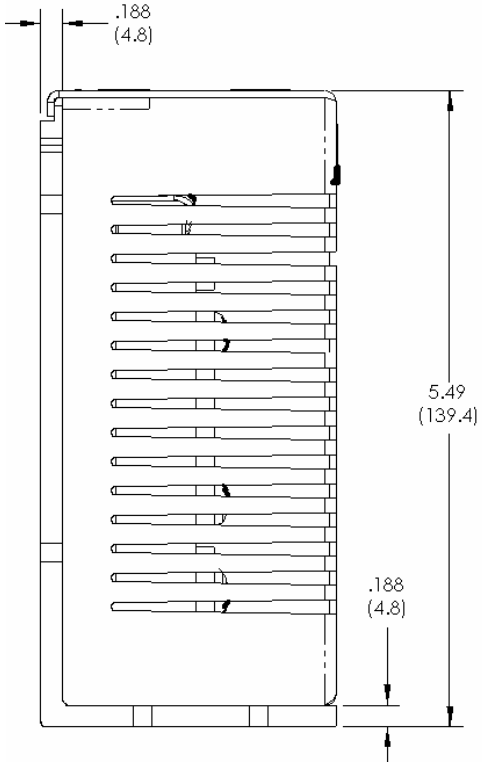
Most of the filter's heat is transferred to ambient air, rather than through the heat plate. Thus, it is very important to mount the filter and fan in such a way that the fan can blow up through the filter's cover slots. Mount the filter on edge and mount the fan below it so that it blows up through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

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.

WARNING

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.

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

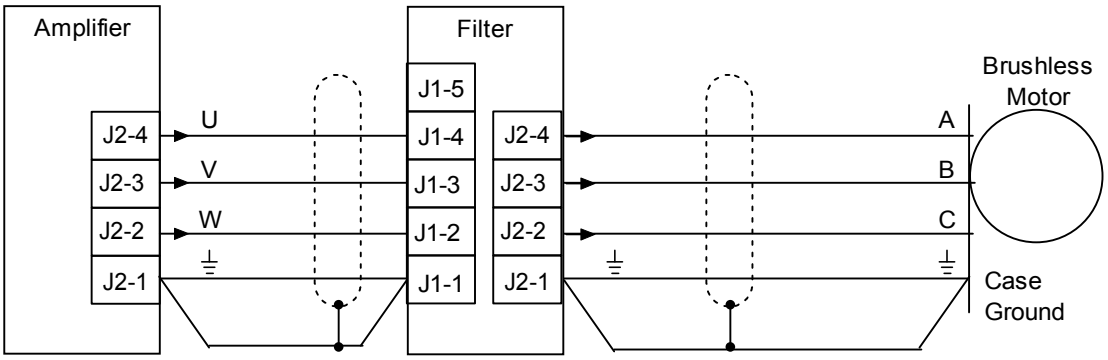
Mating Connector

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.	

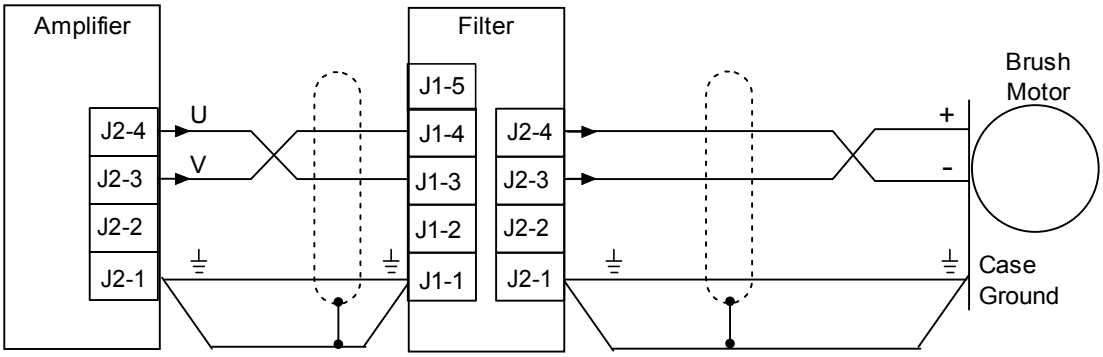
Pin Description

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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