

ADJUSTABLE FREQUENCY DRIVES

SERIES 9000 AF DRIVES

MotoRx™ Series

dV/dt Filters

- **Instruction Sheet**



Cutler-Hammer

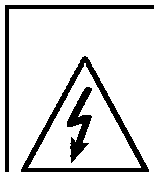
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Series 9000 MotoRx dV/dt Filters

1. Introduction	4
1.1 MotoRx™ dV/dt Filter Kit Operation.....	4
1.2 Parts Included with the MotoRx™ dV/dt Filter Kits.....	4
2. Mounting	6
2.1 Dimensions	6
2.2 Mounting Guidelines	7
2.3 Mounting Instructions.....	8
3. Wiring	9
3.1 Wiring Guidelines.....	9
3.2 Wiring Diagrams	10
4. Ordering Information	11
4.1 Ordering Matrix	11



WARNING: All electrical installation and maintenance work on the MotoRx dV/dt Filter should only be carried out by qualified electricians.



WARNING: Do not attempt any work on powered units. Components and component boards inside the variable frequency drive and MotoRx dV/dt Filter components may be at incoming voltage potential when the AFD is connected to supply voltage. Coming in contact with live components is extremely dangerous and may cause death or serious injury.

Because of the variety of uses for this equipment and because of the differences between this solid-state equipment and electromechanical equipment, the user of and those responsible for applying this equipment must satisfy themselves as to the acceptability of each application and use of the equipment. In no event will EATON Cutler-Hammer be responsible or liable for indirect or consequential damages from the use or application of this equipment.

1. Introduction

1.1 MotoRx™ dV/dt Filter Kit Operation

The MotoRx dV/dt filter is comprised of a 0.5% impedance line reactor, followed by capacitive filtering and an energy recovery/clamping circuit. The filter is used to reduce the dV/dt of the Adjustable Frequency Drive (AFD) output waveform. A three-phase diode bridge clamps the output voltage to the AFD's internal DC Bus through resistors. The energy in the voltage peaks is primarily recovered for reuse by the AFD with some resistor losses.

Important: The MotoRx dV/dt Filter Kit can not be used with Compact NEMA 1 drives, or with drives that have built in chopper circuits.

1.2 Parts Included with the MotoRx™ dV/dt Filter Kits

Table 1: 1000 V/μs, 500V MotoRx dV/dt Filter Kits

	Resistor Assembly Part Number and Mounting Hardware	Clamp Board Part Number and Mounting Hardware	Output Reactor Part Number and Mounting Hardware	Other
MotoRx1000-5010	<i>Part No. 015-000330-0800</i> 2 10-32 X 0.5 self-tapping screws	<i>Part No. 015-001092-0011</i> 4 1/4 turn standoffs, black 3 22-18 AWG male terminals	<i>Part No. 064-001073-0001</i> 4 0.25-20 X 0.62 screws 4 1/4 in. flat washers	1 motor lead label 1 terminal block
MotoRx1000-5020	<i>Part No. 015-000330-0800</i> 2 10-32 X 0.5 self-tapping screws	<i>Part No. 015-001092-0011</i> 4 1/4 turn standoffs, black 3 22-18 #10 ring lugs	<i>Part No. 064-001073-0002</i> 4 0.25-20 X 0.62 screws 4 1/4 in. flat washers 6 #8 ring lug 6 10-32 X 0.5 hex screws 6 Belleville spring washers 6 #10 flat washers 6 10-32 hex nuts	1 motor lead label 1 terminal block 2 6-32 X 1 Phillips head screw
MotoRx1000-5030	<i>Part No. 015-000330-0800</i> 2 10-32 X 0.5 self-tapping screws	<i>Part No. 015-001092-0011</i> 4 1/4 turn standoffs, black	<i>Part No. 064-001073-0003</i> 4 0.25-20 X 0.62 hex screws 4 1/4 in. flat washers	1 motor lead label 1 terminal block 2 6-32 X 1 Phillips head screw
MotoRx1000-5050	<i>Part No. 015-000330-0801</i> 2 10-32 X 0.5 self-tapping screws	<i>Part No. 015-001092-0012</i> 4 1/4 turn standoffs, black	<i>Part No. 064-001073-0004</i> 4 0.25-20 X 0.62 hex screws 4 1/4 in. flat washers 6 0.25-20 X 0.62 hex screws 6 Belleville spring washers 6 1/4 in. flat washers 6 0.25-20 hex nuts 6 #6 ring lug	1 motor lead label 1 terminal block 2 8-32 X 0.75 screw
MotoRx1000-5075	<i>Part No. 015-000330-0802</i> 2 10-32 X 0.5 self-tapping screws	<i>Part No. 015-001092-0013</i> 3 22-16 #1/4 ring lug 4 1/4 turn standoffs, black	<i>Part No. 064-001073-0005</i> 4 0.25-20 X 0.62 hex screws 4 1/4 in. flat washers 6 0.25-20 X 0.62 hex screws 6 Belleville spring washers 6 1/4 in. flat washers 6 0.25-20 hex nuts 6 #4 ring lug	1 motor lead label 1 terminal block 2 8-32 X 0.75 screw
MotoRx1000-5100	<i>Part No. 015-000330-0802</i> 2 10-32 X 0.5 self-tapping screws	<i>Part No. 015-001092-0014</i> 3 22-16 #1/4 ring lug 4 1/4 turn standoffs, black	<i>Part No. 064-001073-0006</i> 4 5/16-18 X 0.75 self-tapping screws 4 5/16 in. flat washers 6 0.25-20 X 0.62 hex screws 6 0.25-20 hex nuts 6 1/4 in. flat washers 6 Belleville spring washers 6 #2 ring lug	1 motor lead label 1 terminal block 2 8-32 X 0.75 screw

Table 2: 1500 V/ μ s, 500 V MotoRx dV/dt Filter Kits

	Resistor Assembly Part Number and Mounting Hardware	Clamp Board Part Number and Mounting Hardware	Output Reactor Part Number and Mounting Hardware	Other
MotoRx1500-5010	Part No. 015-000330-0800 2 10-32 X 0.5 self-tapping screws	Part No. 015-001092-0001 4 1/4 turn standoffs, black 3 22-18 AWG male terminals	Part No. 064-001073-0001 4 0.25-20 X 0.62 screws 4 1/4 in. flat washers	1 motor lead label 1 terminal block
MotoRx1500-5020	Part No. 015-000330-0800 2 10-32 X 0.5 self-tapping screws	Part No. 015-001092-0001 4 1/4 turn standoffs, black 3 22-18 #10 ring lugs	Part No. 064-001073-0002 4 0.25-20 X 0.62 screws 4 1/4 in. flat washers 6 10-32 X 0.5 hex screws 6 10-32 hex nuts 6 #10 flat washers 6 Belleville spring washers 6 #8 ring lug	1 motor lead label 1 terminal block 2 6-32 X 1 Phillips head screw
MotoRx1500-5030	Part No. 015-000330-0800 2 10-32 X 0.5 self-tapping screws	Part No. 015-001092-0002 4 1/4 turn standoffs, black	Part No. 064-001073-0003 4 0.25-20 X 0.62 hex screws 4 1/4 in. flat washers	1 motor lead label 1 terminal block 2 6-32 X 1 Phillips head screw
MotoRx1500-5050	Part No. 015-000330-0801 2 10-32 X 0.5 self-tapping screws	Part No. 015-001092-0002 4 1/4 turn standoffs, black	Part No. 064-001073-0004 4 0.25-20 X 0.62 hex screws 4 1/4 in. flat washers 6 0.25-20 X 0.62 hex screws 6 Belleville spring washers 6 1/4 in. flat washers 6 0.25-20 hex nuts 6 #6 ring lug	1 motor lead label 1 terminal block 2 8-32 X 0.75 screw
MotoRx1500-5075	Part No. 015-000330-0802 2 10-32 X 0.5 self-tapping screws	Part No. 015-001092-0003 3 22-16 #1/4 ring lug 4 1/4 turn standoffs, black	Part No. 064-001073-0005 4 0.25-20 X 0.62 hex screws 4 1/4 in. flat washers 6 0.25-20 X 0.62 hex screws 6 Belleville spring washers 6 1/4 in. flat washers 6 0.25-20 hex nuts 6 #4 ring lug	1 motor lead label 1 terminal block 2 8-32 X 0.75 screw
MotoRx1500-5100	Part No. 015-000330-0802 2 10-32 X 0.5 self-tapping screws	Part No. 015-001092-0004 3 22-16 #1/4 ring lug 4 1/4 turn standoffs, black	Part No. 064-001073-0006 4 5/16-18 X 0.75 self-tapping screws 4 5/16 in. flat washers 6 0.25-20 X 0.62 hex screws 6 0.25-20 hex nuts 6 1/4 in. flat washers 6 Belleville spring washers 6 #2 ring lug	1 motor lead label 1 terminal block 2 8-32 X 0.75 screw

2. Mounting

2.1 Dimensions

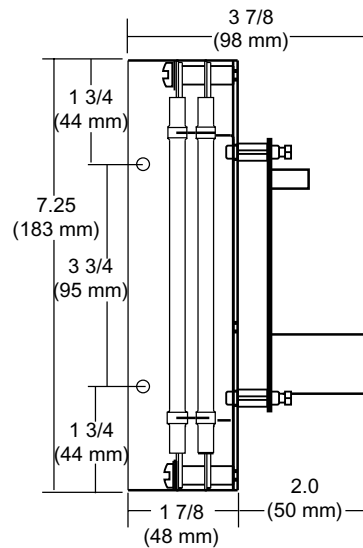


Figure 1: Resistor and Clamp Board Assembly Dimensions

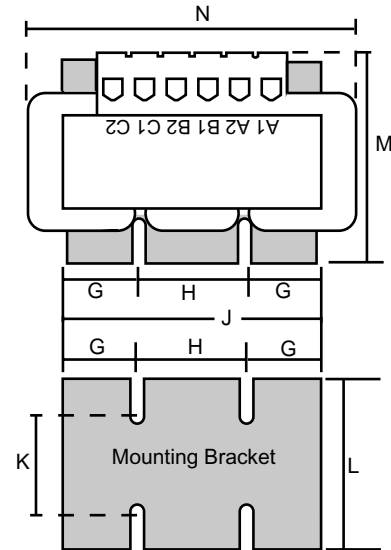


Figure 2: Output Reactor Dimensions (see table 5 below)

Table 3: Output Reactor Dimensions

	Mounting Plate inches/(mm)					Output Reactor inches/(mm)		
	G	H	J	K	L	M (max)	N (max)	Depth (max)
MotoRx1000-5010	0.72 (18)	2.00 (51)	3.44 (87)	1.64 (42)	2.51 (64)	4.00 (102)	5.00 (127)	4.00 (102)
MotoRx1000-5020	0.72 (18)	2.00 (51)	3.44 (87)	1.64 (42)	2.51 (64)	3.5 (89)	5.00 (127)	4.00 (102)
MotoRx1000-5030	1.34 (34)	1.90 (48)	4.57 (116)	2.15 (55)	3.45 (88)	4.00 (102)	6.00 (152)	5.00 (127)
MotoRx1000-5050	1.27 (32)	1.80 (46)	4.33 (110)	2.03 (52)	3.27 (83)	4.95 (126)	6.00 (152)	5.00 (127)
MotoRx1000-5075	1.27 (32)	1.80 (46)	4.33 (110)	2.03 (52)	3.27 (83)	4.95 (126)	6.00 (152)	5.00 (127)
MotoRx1000-5100	1.22 (31)	2.43 (62)	4.86 (123)	2.02 (51)	2.73 (69)	4.05 (103)	8.00 (203)	5.75 (146)
MotoRx1500-5010	0.72 (18)	2.00 (51)	3.44 (87)	1.64 (42)	2.51 (64)	4.00 (102)	5.00 (127)	4.00 (102)
MotoRx1500-5020	0.72 (18)	2.00 (51)	3.44 (87)	1.64 (42)	2.51 (64)	3.5 (89)	5.00 (127)	4.00 (102)
MotoRx1500-5030	1.34 (34)	1.90 (48)	4.57 (116)	2.15 (55)	3.45 (88)	4.00 (102)	6.00 (152)	5.00 (127)
MotoRx1500-5050	1.27 (32)	1.80 (46)	4.33 (110)	2.03 (52)	3.27 (83)	4.95 (126)	6.00 (152)	5.00 (127)
MotoRx1500-5075	1.27 (32)	1.80 (46)	4.33 (110)	2.03 (52)	3.27 (83)	4.95 (126)	6.00 (152)	5.00 (127)
MotoRx1500-5100	1.22 (31)	2.43 (62)	4.86 (123)	2.02 (51)	2.73 (69)	4.05 (103)	8.00 (203)	5.75 (146)

2.2 Mounting Guidelines

Important: The MotoRx dV/dt Filter Kit can not be used with Compact NEMA 1 drives, or with drives that have built in chopper circuits.

- Mount the resistor and clamp board assembly and output reactor near the output of the drive to minimize long wiring runs between components.
 - The resistor and clamp board assembly should be mounted less than 2 ft. away from the drive terminals.
 - The output reactor should be mounted less than 2 ft. away from the drive terminals.
 - Maintain a minimum 1 inch space between the clamp board and the output reactor.
- Mount the terminal block near the drive.
- Orient filter kit components as shown in Figure 3 below.

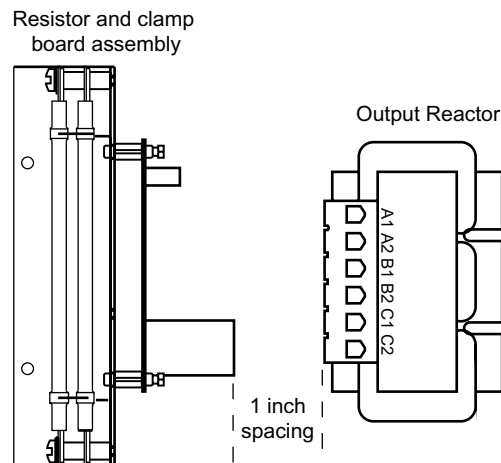


Figure 3: Mounting Orientation and Component Spacing

2.3 Mounting Instructions

1. Mount the clamp board to the resistor assembly, using the four 1/4 turn standoffs as in Figure 4 below.

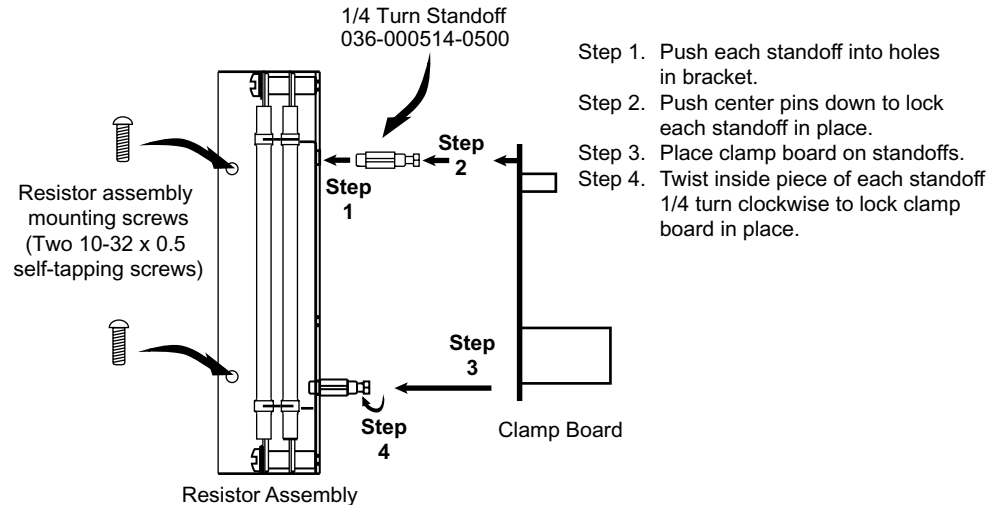


Figure 4: Resistor Assembly and Clamp Board Mounting

2. Mount the resistor assembly bracket to the panel, using the two 10-32 x 0.5 self tapping screws.
3. Mount the output reactor to the drive housing, using the four 0.25-20 X 0.62 self tapping hex screws and 1/4 in. flat washers, as shown in Figure 5 below.

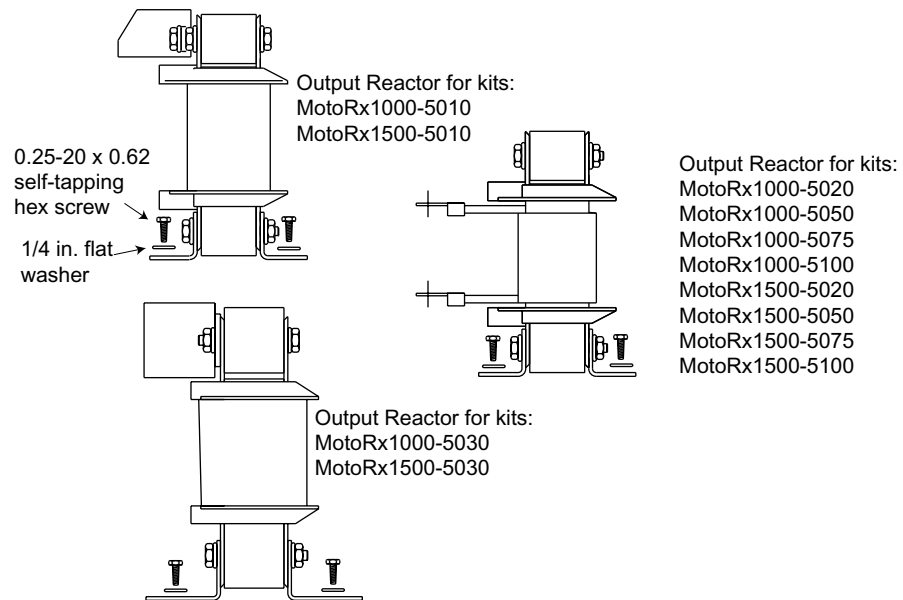


Figure 5: Output Reactor Mounting

4. Mount the terminal block to the drive housing in a convenient location, using two 6-32 x 1 Phillips mounting screws.
5. Affix the terminal block label to the drive housing to indicate the appropriate motor lead locations.

3. Wiring

3.1 Wiring Guidelines

- Follow all applicable NEC and local regulations when wiring MotoRx dV/dt filter kits.

All electrical installation and maintenance work on MotoRx dV/dt Filter Kits should only be carried out by qualified electricians.

Important: The MotoRx dV/dt Filter Kit can not be used with Compact NEMA 1 drives, or with drives that have built in chopper circuits.

- When wiring the output reactor to the motor terminals and to the drive terminals, use the wire sizes recommended in Table 4.

Table 4: Recommended Wire Sizing

Code Number	Recommended Wire Sizing (based on 600 V, 105°C rated wire)
MotoRx1000-5010 MotoRx1500-5010	# 10 AWG (6 mm ²)
MotoRx1000-5020 MotoRx1500-5020	# 8 AWG (10 mm ²)
MotoRx1000-5030 MotoRx1500-5030	# 6 AWG (16 mm ²)
MotoRx1000-5050 MotoRx1500-5050	# 6 AWG (16 mm ²)
MotoRx1000-5075 MotoRx1500-5075	# 4 AWG (25 mm ²)
MotoRx1000-5100 MotoRx1500-5100	# 2 AWG (35 mm ²)

3.2 Wiring Diagrams

Connect the drive, resistor and clamp assembly, and output reactor as shown in Figure 6 below.

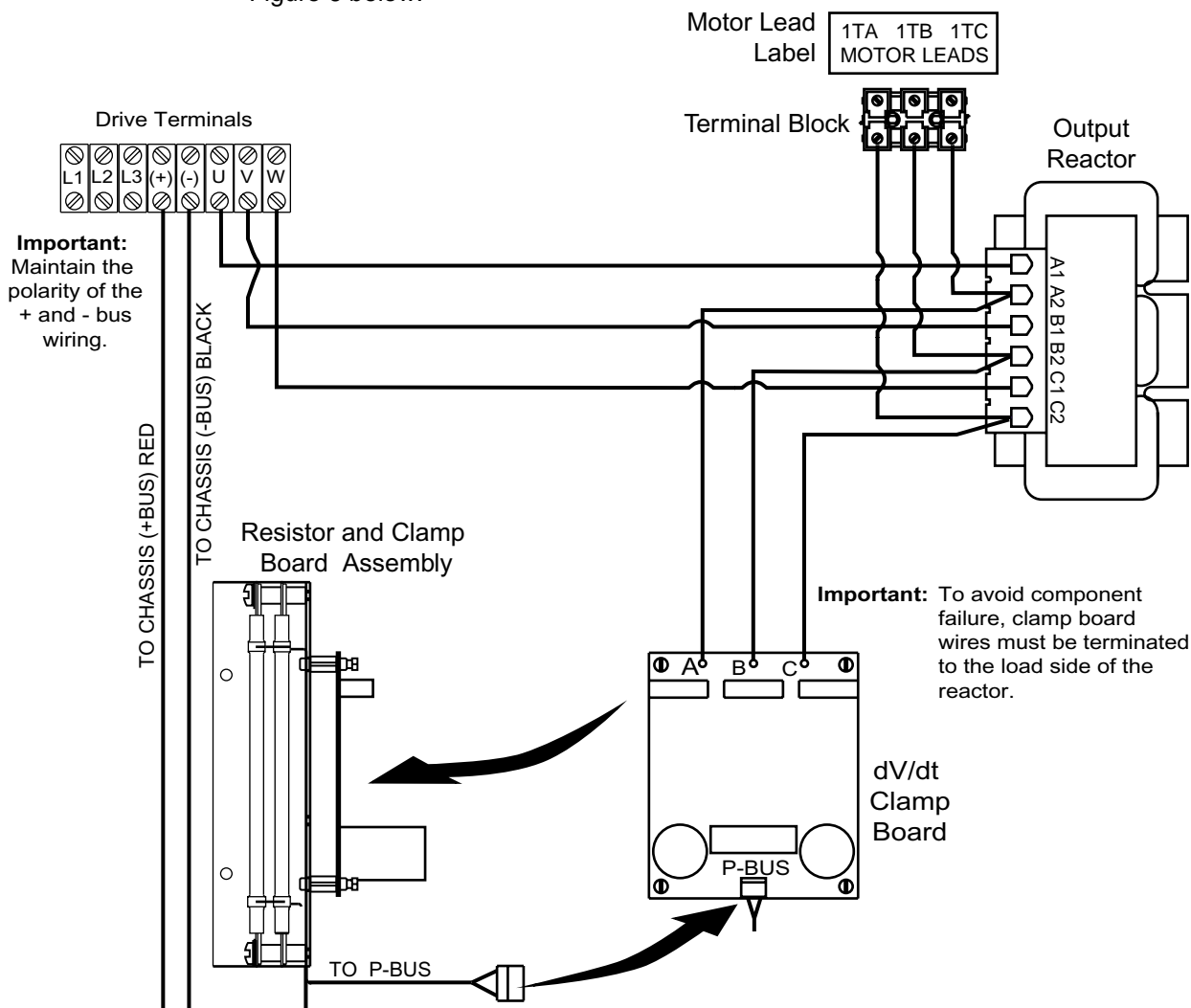


Figure 6: Wiring the MotoRx dV/dt Filter Kit

Output reactors with wire lug connections are wired as shown in Figure 7 below. Lug connections should be tightened to 60 lbs torque.

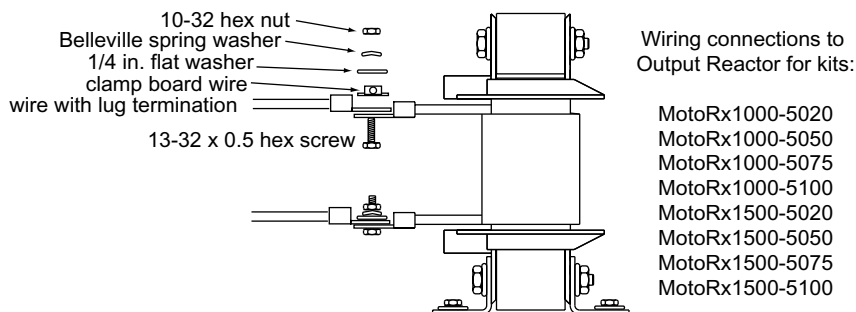


Figure 7: Output Reactor Wiring Connections

4. Ordering Information

4.1 Ordering Matrix

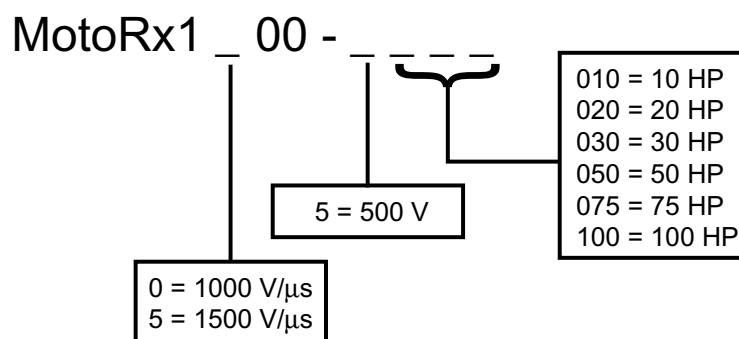


Figure 8: MotoRx dV/dt Filter Kit Ordering Matrix

Table 5: Ordering Information

Code Number	Description			
	1000 V/ μ s	1500 V/ μ s	500V	HP
MotoRx1000-5010	X		X	10
MotoRx1500-5010		X	X	10
MotoRx1000-5020	X		X	20
MotoRx1500-5020		X	X	20
MotoRx1000-5030	X		X	30
MotoRx1500-5030		X	X	30
MotoRx1000-5050	X		X	50
MotoRx1500-5050		X	X	50
MotoRx1000-5075	X		X	75
MotoRx1500-5075		X	X	75
MotoRx1000-5100	X		X	100
MotoRx1500-5100		X	X	100

Notes

For technical support contact your Cutler-Hammer distributor or the
Cutler-Hammer AF Drives Product Integrity Center at 1-800-322-4986