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**Shop Drawings for Approval**  
**Well #8 Wiring/Distribution Repairs**

- Page 1-3 Service Entrance TVSS (Surge Protector Unit)
- Page 4-6 Well Pump Breaker (Installed Ahead of VFD Unit)
- Page 7-8 Remote VFD Keypad (To Mount on Exterior Cover of MCC)
- Page 9-13 In-Line Filter (Wired On Load Side of VFD)

<input checked="" type="checkbox"/> SUBMITTED	SUBMITTAL # _____
<input type="checkbox"/> APPROVED	DATE <u>11/20/20</u>
<input type="checkbox"/> APPROVED AS CORRECTED	JOB NO. _____
<input type="checkbox"/> REVISE AND RESUBMIT	BY <u>SJM</u>
<input type="checkbox"/> NOT APPROVED	
<input type="checkbox"/> _____	ENGEL ELECTRIC CO.
	815/ 625-5949

# Submittal specification for versions of the SPC series surge protective device (SPC200) installed external to an electrical assembly

Eaton's SPC series surge protective devices (SPDs) are used to protect equipment from damage caused by surge events. This submittal specification represents the side-mount version of the SPC series units with a catalog number beginning with "SPC200." These versions are designed to be mounted external to electrical distribution assemblies and interfaced via conduit and wires.

**Table 1. Surge current capacity**

Configuration	Minimum surge current capacity				
	Per phase	L-N mode	L-G mode	N-G mode	L-L mode
Single-phase (2W + G)	200	100	100	100	—
Single split-phase (3W + G)	200	100	100	100	—
Three-phase wye (4W + G)	200	100	100	100	—
Three-phase delta (3W + G)	200	—	100	—	100
Three-phase high-leg delta (4W + G)	200	100	100	100	—

**Table 2. Catalog number configuration**

(Check appropriate boxes that apply)

**SPC200 240S 1 P**

Voltage code	Feature package	SPD application
<input type="checkbox"/> 120N = 120 single-phase (2W + G)	<input type="checkbox"/> 1 = No options (standard configuration)	Type 1
<input type="checkbox"/> 240N = 240 single-phase (2W + G)	<input checked="" type="checkbox"/> 2 = Filtering, UL 1283 6th Edition	Type 2
<input type="checkbox"/> 277N = 277 single-phase (2W + G)	<input type="checkbox"/> 3 = Audible alarm	Type 1
<input type="checkbox"/> 480N = 480 single-phase (2W + G)	<input type="checkbox"/> 4 = Form C relay	Type 1
<input type="checkbox"/> 240S = 120/240 split-phase (3W + G)	<input type="checkbox"/> 5 = Audible alarm and Form C relay	Type 1
<input type="checkbox"/> 240D = 240 delta (3W + G)	<input type="checkbox"/> 6 = Filtering and audible alarm	Type 2
<input checked="" type="checkbox"/> 480D = 480 delta (3W + G)	<input type="checkbox"/> 7 = Filtering and Form C relay	Type 2
<input type="checkbox"/> 600D = 600 delta (3W + G)	<input type="checkbox"/> 8 = Filtering, audible alarm, and Form C relay	Type 2
<input type="checkbox"/> 240H = 240 delta high leg (4W + G)		
<input type="checkbox"/> 208Y = 120/208 wye (4W + G)		
<input type="checkbox"/> 415Y = 240/415 wye (4W + G)		
<input type="checkbox"/> 480Y = 277/480 wye (4W + G)		
<input type="checkbox"/> 600Y = 347/600 wye (4W + G)		

<b>Enclosure</b>
P = NEMA 4X

Available optional equipment	Catalog number
Flush-mount plate for P1 enclosure	<b>FLUSHMNTPLATE13</b>
Flush-mount plate for P2 enclosure	<b>FLUSHMNTPLATE14</b>



Powering Business Worldwide

### Performance specifications and features of the SPD series surge protective device

- ANSI/UL® 1449 4th Edition voltage protection rating (VPR)
  - VPR for units rated, 50, 80–100, and 120–200 kA, respectively
- Overcurrent protection
  - All units contain thermally protected metal oxide varistors that contain an internal thermal element that disconnects the device safely when exposed to abnormal conditions such as temporary overvoltage or high fault current conditions.
- Monitoring and features (refer to **Table 2** for a listing of individual features contained in each feature package)
- Enclosure dimensions and weight
  - NEMA® 4X; 11.30 L x 8.70 W x 5.40 D inches, 14.6 lb

**Table 3. Voltage code**

Voltage code	Protection mode			
	L-N	L-G	N-G	L-L
<b>120–200 kA unit VPR</b>				
120N	700	700	700	—
240N	1000	1200	1000	—
277N	1200	1200	1200	—
480N	1800	1800	1800	—
240S	700	700	700	1200
208Y	700	700	700	1200
415Y	1200	1200	1200	2000
480Y	1200	1200	1200	2000
600Y	1500	1500	1500	2500
240D	—	1000	—	1000
480D	—	1800	—	2000
600D	—	2500	—	2500
240H ①	700	700	700	1200

① Additional 240H VPRs: 2000 H-L, 1200 H-N, 1200 H-G

**Table 4. Specifications**

Description	Specification
Peak surge current capacity ratings available	50, 80, 100, 120, 150, 160, 200 kA per phase
Nominal discharge current (I <sub>n</sub> )	20 kA
Short-circuit current rating (SCCR)	200 kA
Single-phase voltages available (2W + G)	120, 240, 277, 480
Split-phase voltages available (3W + G)	120/240
Three-phase wye system voltages available (4W + G)	120/208, 240/415, 277/480, 347/600
Three-phase delta system voltages available (3W + G)	240, 480, 600
Three-phase high-leg delta system voltages available (4W + G)	240
Input power frequency	50/60 Hz
Protection modes	
Single-phase	L-N, L-G, N-G
Single split-phase	L-N, L-G, N-G, L-L
Three-phase wye	L-N, L-G, N-G, L-L
Three-phase delta	L-G, L-L
Maximum continuous operating voltage (MCOV)	
120N voltage code	150 L-N, 150 L-G, 150 N-G
240N, 277N voltage code	320 L-N, 320 L-G, 320 N-G
480N voltage code	550 L-N, 550 L-G, 550 N-G
240S, 208Y voltage code	150 L-N, 150 L-G, 150 N-G, 300 L-L
240H voltage code	150 L-N, 150 L-G, 150 N-G, 300 L-L, 470 H-L, 320 H-N, 320 H-G
415Y, 480Y voltage code	320 L-N, 320 L-G, 320 N-G, 640 L-L
600Y voltage code	420 L-N, 420 L-G, 420 N-G, 840 L-L
240D voltage code	320 L-G, 300 L-L
480D voltage code	550 L-G, 640 L-L
600D voltage code	840 L-G, 840 L-L
Ports	1
Operating temperature	–40 °F to +140 °F (–40 °C to +60 °C)
Storage temperature	–40 °F to +140 °F (–40 °C to +60 °C)
Operating humidity	5% through 95%, noncondensing
Operating altitude	Up to 2000 m (6561 ft)
Agency certifications/listing	UL 1449 4th Edition, UL 1283 7th Edition, CSA® C22.2 No. 269.1-14 for Type 1 SPD, CSA C22.2 No. 269.2-13 for Type 2 SPD, CSA C22.2 No. 8-13 for EMI filter
Durability repetitive strike test	Passed 12,000 strikes to ANSI/IEEE® C62.41 (20 kV, 10 kA) Category C waveform
SPD type	UL 1449 4th Edition and CSA Type 1 and Type 2 SPD (dependent on feature options)
Enclosure rating	NEMA 4X enclosure ①
Form C relay contact ratings	2 A at 30 Vdc or 250 Vac
Form C relay contact logic	Power ON, normal state— NO contact = open, NC contact = closed  Power OFF or fault state— NO contact = closed, NC contact = open
EMI/RFI filtering attenuation	Up to 40 dB from 10 kHz to 100 MHz
RoHS compliant	Yes
Warranty	5 years standard, 10 years with product registration at Eaton.com/spc

① Mounting feet required to achieve NEMA 4X rating.

**Eaton**  
1000 Eaton Boulevard  
Cleveland, OH 44122  
United States  
Eaton.com

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September 2018



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## Main

Range of product	PowerPact L
Product or component type	Circuit breaker
Trip Unit Type	Electronic, standard, Micrologic 3.3, LI
Interrupt Code	J

## Complementary

Line Rated Current	600 A
Number of Poles	3P
Interrupt Rating	100 kA 240 V AC 65 kA 480 V AC 25 kA 600 V AC
Voltage Rating	600 V AC
Continuous current rating	80 %
Mounting mode	Unit mount
Electrical connection	Lugs load Lugs line
Wire Size	AWG 2/0...500 kcmil aluminium/copper)2
Terminal Type	AL600LS52K3
I-Line Phase Connection	ABC
Height	13.39 in (340.11 mm)
Width	7.27 in (184.66 mm)
Depth	6.61 in (167.89 mm)
Tightening torque	442.54 lbf.in (50 N.m) 0.11...0.37 in <sup>2</sup> (70...240 mm <sup>2</sup> ) AWG 2/0...500 kcmil)

\* Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

## Environment

Product certifications	CSA 22-2 CCC IEC CE UL 489 NMX NEMA
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## Ordering and shipping details

Category	01116 - L ELEC TRIP UNIT MOUNT BREAKER/SW
Discount Schedule	DE2
GTIN	00785901891635
Package weight(Lbs)	17.03 lb(US) (7.72 kg)
Returnability	Yes
Country of origin	US

## Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: DINP, which is known to the State of California to cause cancer, and DIDP, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to <a href="http://www.P65Warnings.ca.gov">www.P65Warnings.ca.gov</a>
REACH Regulation	<a href="#">REACH Declaration</a>
EU RoHS Directive	Compliant <a href="#">EU RoHS Declaration</a>
Mercury free	Yes
RoHS exemption information	<a href="#">Yes</a>
China RoHS Regulation	<a href="#">China RoHS declaration</a> Product out of China RoHS scope. Substance declaration for your information.
Environmental Disclosure	<a href="#">Product Environmental Profile</a>
Circularity Profile	<a href="#">End of Life Information</a>
PVC free	Yes

## Contractual warranty

Warranty	18 months
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Altivar Process Short Circuit Current Ratings (a) (b) With Enclosure			Minimum Enclosure Volume	With Circuit Breaker		With GV <sub>e</sub> P				Fuses		Line Reactor Min Value (o)			
Input Voltage 50/60 Hz (Y)	Power Ratings in Normal Duty			Catalog Number (c) Catalog Number (Z1, Z2)	SCCR (X) (kA)	GV2P/3P (Z1, Z2)	GV <sub>e</sub> P		SCCR (X) (kA)	600 V Class J (d) (Z1, Z2)	SCCR (X) (kA)	600 V Class J (d) (Z1, Z2)	SCCR (X) (kA)	Line Reactor Min Value (o)	
	(kW)	(HP)				Type E (e)	Voltage Rating (V)	Power (i) (HP)							(A)
480 Vac Three-phase Evaluated for UL508C	22	30	ATV630D22N4 ATV650D22N4	56	3390	HoL36080	100	GV3P40	480Y/277	20	65	60	100	-	-
	30	40	ATV630D30N4 ATV650D30N4	115	7010	HoL36100	100	GV3P65	480Y/277	40	65	80	100	-	-
	37	50	ATV630D37N4 ATV650D37N4	115	7010	HoL36125	100	-	-	-	-	90	100	-	-
	45	60	ATV630D45N4 ATV650D45N4	115	7010	HoL36150	100	-	-	-	-	100	100	-	-
	55	75	ATV630D55N4 ATV650D55N4	132	8040	JoL36175	100	-	-	-	-	150	100	-	-
	75	100	ATV630D75N4 ATV650D75N4	132	8040	JoL36200	100	-	-	-	-	200	100	-	-
	90	125	ATV630D90N4 ATV650D90N4	132	8040	JoL36250	100	-	-	-	-	200	100	-	-
	110	150	ATV630C11N4	478	29160	LoL36400	100	-	-	-	-	300	100	-	-
	132	200	ATV630C13N4	478	29160	LoL36600	100	-	-	-	-	400	100	-	-
	160	250	ATV630C16N4	478	29160	LoL36600	100	-	-	-	-	500	100	-	-
220	350	ATV630C22N4 ATV630C22N4MN	878	53550	-	-	-	-	-	-	500 (g)	100	0.05	400	
250	400	ATV630C25N4 ATV630C25N4MN	878	53550	-	-	-	-	-	-	600 (h)	100	0.05	440	
315	500	ATV630C31N4 ATV630C31N4MN	878	53550	-	-	-	-	-	-	600 (h)	100	0.04	500	
600 Vac Three-phase Evaluated for UL61800-5-1	2.2	3	ATV630U22S6X	47	2880	HoL36015	100	GV3P13	600Y/347	10	25	6	100	10	3
	4	5	ATV630U40S6X	47	2880	HoL36015	100	GV3P13	600Y/347	10	25	10	100	4	6
	5.5	7.5	ATV630U55S6X	47	2880	HoL36020	100	GV3P13	600Y/347	10	25	15	100	4	7
	7.5	10	ATV630U75S6X	47	2880	HoL36025	100	GV3P13	600Y/347	10	25	15	100	2	10
	11	15	ATV630D11S6X	47	2880	HoL36040	100	GV3P18	600Y/347	15	25	25	100	2	16
	15	20	ATV630D15S6X	47	2880	HoL36050	100	GV3P25	600Y/347	20	25	30	100	1.1	20
	18.5	25	ATV630D18S6	142	8640	HoL36080	100	GV3P32	600Y/347	25	25	35	100	-	-
	22	30	ATV630D22S6	142	8640	HoL36100	100	GV3P32	600Y/347	25	25	40	100	-	-
	30	40	ATV630D30S6	283	17280	HoL36125	100	GV3P50	600Y/347	40	25	60	100	-	-
	37	50	ATV630D37S6	283	17280	HoL36150	100	GV3P50	600Y/347	40	25	70	100	-	-
	45	60	ATV630D45S6	283	17280	HoL36150	100	GV3P65	600Y/347	50	25	80	100	-	-
	55	75	ATV630D55S6	283	17280	JoL36200	100	-	-	-	-	110	100	-	-
	75	100	ATV630D75S6	283	17280	JoL36250	100	-	-	-	-	150	100	-	-
600 Vac Three-phase Evaluated for UL61800-5-1	1.5	2	ATV630U22Y6	142	8640	HoL36015	100	GV3P13	600Y/347	10	25	6	100	-	-
	2.2	3	ATV630U30Y6	142	8640	HoL36015	100	GV3P13	600Y/347	10	25	10	100	-	-
	3	-	ATV630U40Y6	142	8640	HoL36020	100	GV3P13	600Y/347	10	25	15	100	-	-
	4	5	ATV630U55Y6	142	8640	HoL36020	100	GV3P13	600Y/347	10	25	15	100	-	-
	5.5	7.5	ATV630U75Y6	142	8640	HoL36025	100	GV3P13	600Y/347	10	25	15	100	-	-
	7.5	10	ATV630D11Y6	142	8640	HoL36040	100	GV3P13	600Y/347	10	25	20	100	-	-
	11	15	ATV630D15Y6	142	8640	HoL36050	100	GV3P18	600Y/347	15	25	25	100	-	-
	15	20	ATV630D18Y6	142	8640	HoL36060	100	GV3P25	600Y/347	20	25	30	100	-	-
	18.5	25	ATV630D22Y6	142	8640	HoL36080	100	GV3P32	600Y/347	25	25	35	100	-	-
	22	30	ATV630D30Y6	142	8640	HoL36100	100	GV3P32	600Y/347	25	25	40	100	-	-
	30	40	ATV630D37Y6	283	17280	HoL36125	100	GV3P50	600Y/347	40	25	60	100	-	-
	37	50	ATV630D45Y6	283	17280	HoL36150	100	GV3P50	600Y/347	40	25	70	100	-	-
	45	60	ATV630D55Y6	283	17280	HoL36150	100	GV3P65	600Y/347	50	25	80	100	-	-
	55	75	ATV630D75Y6	283	17280	JoL36200	100	-	-	-	-	110	100	-	-
	75	100	ATV630D90Y6	283	17280	JoL36250	100	-	-	-	-	150	100	-	-

# Product data sheet

## Characteristics

# VW3A1112

door mounting kit - for remote graphic terminal - variable speed drive - IP65 /

Product availability : Stock - Normally stocked in distribution facility



### Main

Range of product	Altivar
Accessory / separate part category	Mounting and fixing accessory
Accessory / separate part type	Mounting kit
Accessory / separate part destination	Variable speed drive
Range compatibility	Altivar Process ATV900 Altivar Process ATV600 Altivar Easy 610 Altivar Machine ATV340 Altivar Machine ATV320
IP degree of protection	IP65

### Complementary

Kit composition	Fixing nut Mounting plate Anti-rotation tee Tightening wrench
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### Ordering and shipping details

Category	22205 - ATV630 FRAMES 1 & 2
Discount Schedule	CP4E
GTIN	00785901623816
Package weight(Lbs)	0.27 lb(US) (0.12 kg)
Returnability	Yes
Country of origin	CN

### Offer Sustainability

California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to <a href="http://www.P65Warnings.ca.gov">www.P65Warnings.ca.gov</a>
REACH Regulation	<a href="#">REACH Declaration</a>
REACH free of SVHC	Yes

\* Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

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EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) <a href="#">EU RoHS Declaration</a>
Mercury free	Yes
RoHS exemption information	<a href="#">Yes</a>
China RoHS Regulation	<a href="#">China RoHS declaration</a>

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Image Not Available



An **Allied Motion** Company

## PRODUCT INFORMATION

Categories: Output, dv/dt output filter, V1K filter.

## SPECIFICATIONS

### V1K362A00

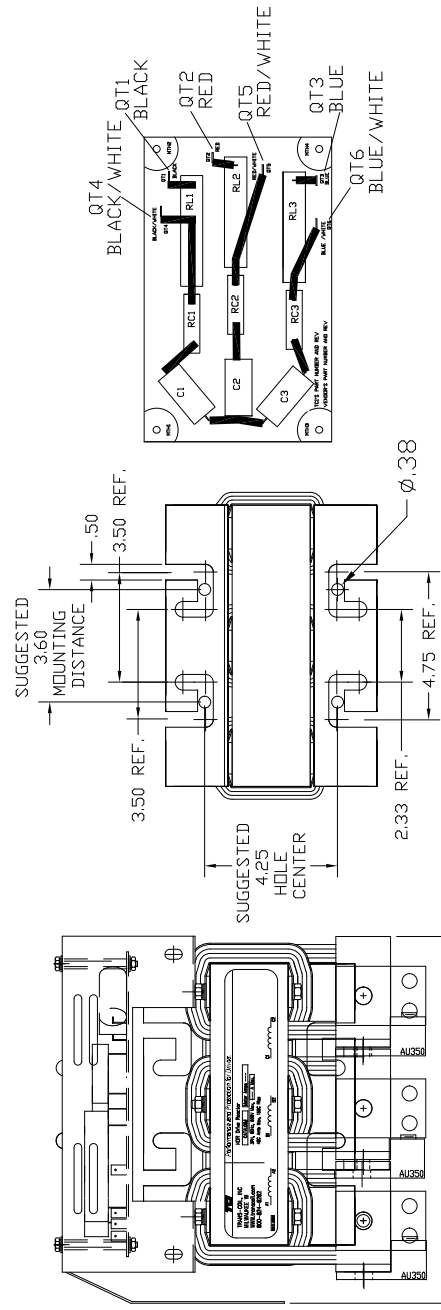
V1K, 600V max, 362A, 3 Phase, Open, dV/dT  
Output Filter, UL Listed

Contact TCI for more information or to place an order:  
800-824-8282 | [sales@transcoil.com](mailto:sales@transcoil.com) | [transcoil.com](http://transcoil.com)  
W132 N10611 Grant Drive, Germantown, WI 53022

SPECIFICATIONS:

ENCLOSURE OPEN DESIGN

AMP.	362	PHASE	3	WGHT.	80 L.B.
VOLT	240-600	HZ	60		

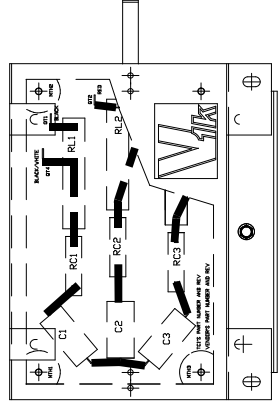


BRD. MTG. BRKT.

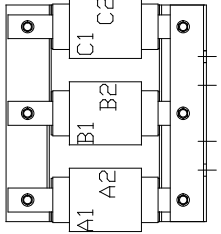
PC. BRD

REACTOR ASSY.

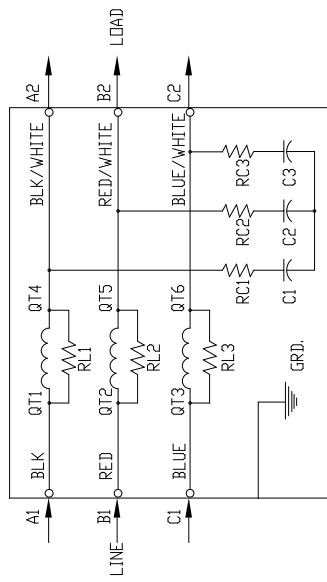
WIRE GUIDE



REAR VIEW



TYPICAL REACTOR  
TERMINAL CONFIGURATION



WIRE LUG :  
RANGE: (2)350 MCM-#4 AWG  
275 IN-LB TORQUE

TOLERANCE UNLESS  
OTHERWISE NOTED:  
MOUNTING +/- .06  
OVERALL +/- .12

CUSTOMER IS RESPONSIBLE FOR INSTALLATION TO  
MEET ALL NATIONAL AND LOCAL ELECTRICAL CODES.

NO	REVISION	DATE	BY	TOLERANCES (EXCEPT AS NOTED)
F	2716 REMOVE COLOR	1/11/11	DSW	DECIMAL
E	2645, VOLT WAS 480	12/3/09	RJC	.XX ± .01
D	ADDED TERM. CONFIG.	12/12/08	RJC	XXX ± .005
C	UPDATED ILLSCO LUGS	7/14/08	RJC	FRACTIONAL
B	2499, UPDATE KDR FLAG			± 1/32
A	REPLACE WIRE GUIDE	6/15/07	RJC	ANGULAR
				± 1/2°



7878 N. 86th STREET  
MILWAUKEE, WI 53224

V1K362A00 OUTPUT FILTER  
362 AMP., OPEN

DATE	5/20/05	DWG. NO.	102656DG
APPROV.		SCALE	B
TURN BY	RJC		

dv/dt MOTOR PROTECTION  
OUTPUT FILTER

V1k



### Limits voltage spikes below 1,000 Volts for long lead applications

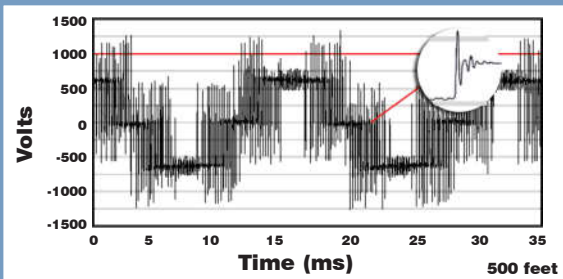
- Greatly extends the life of the motor and cable
- Specific applications can reach 3,000 feet
- 30% reduction in Common Mode Current



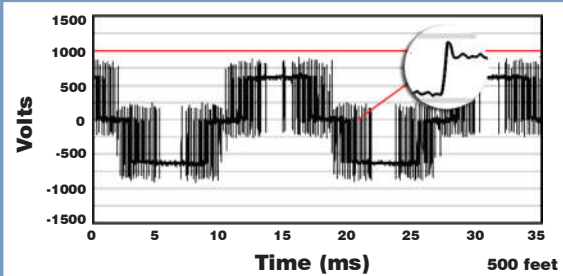
## dv/dt MOTOR PROTECTION OUTPUT FILTER

# V1k

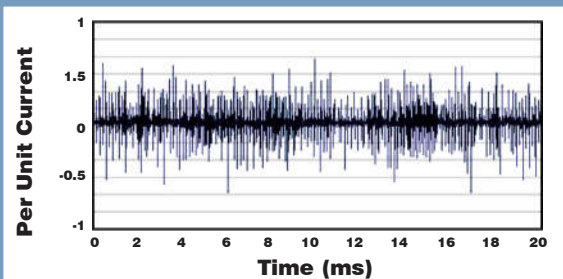
### Voltage Without V1k



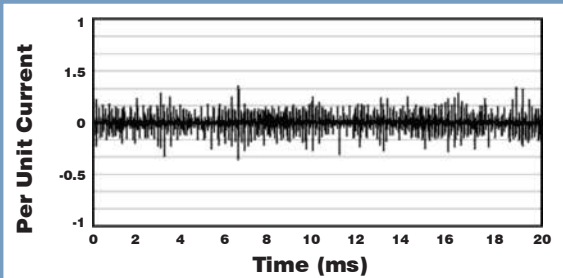
### Voltage With V1k



### Common Mode Without V1k



### Common Mode With V1k



### Typical Problems, Superior Solutions with V1k

As Pulse Width Modulated (PWM) Drives are incorporated into various applications and processes, the increased energy savings and decreased maintenance on Drives can be offset by increases in Motor failures.

The KLC-Series V1k product family has been designed as an engineered solution for motor failures due to the reflected wave phenomenon.

#### Reflective Wave Phenomenon

Voltage wave reflection is a function of the voltage rise time ( $dv/dt$ ) and the length of the motor cables.

The impedance on either end of the cable run does not match, causing voltage pulses to be reflected back in the direction from which it arrived. As these reflected waves encounter other waves, their values add, causing higher peak voltage.

As wire length or carrier frequency increases, the overshoot peak voltage also increases.

Peak Voltages on a 460V system can reach 1200 to 1600V, causing rapid breakdown of motor insulation, leading to motor failure. On 575V systems, the peak voltages can easily reach 2100V. If this is left uncontrolled, insulation failure may occur.

#### Mitigate Reflective Wave

By combining a patented dampening circuit with a low pass filter, V1k filters:

- Increase the voltage rise time (dt out of  $dv/dt$ )
- Prevent voltage spikes from exceeding 1,000 V
- Slow pulse transitions, reduce  $dv/dt$  by a factor of 3 or more
- Protect motor and cable insulation

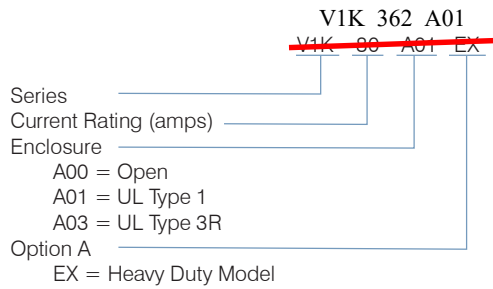
#### Reduces Common Mode Motor and Bearing Currents

Common Mode current, which lead to shaft voltages, bearing pitting, and bearing fluting is reduced by a minimum of 30%. V1k filters:

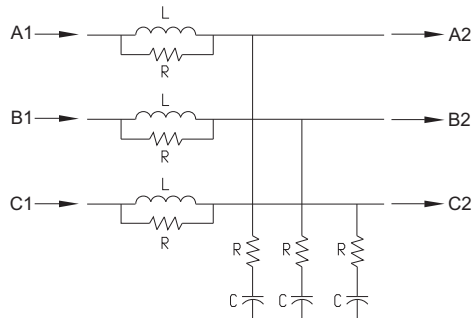
- Slow down the pulse  $dv/dt$  by a factor of 3, reducing the harmful common mode currents
- Increase bearing life and up-time
- Reduce common mode noise and currents

The V1K prevents voltage spikes from exceeding 1,000 V up to 2,000 feet and limits  $dv/dt$  to less than 1,000 V/ $\mu$ s. The product has been used successfully in applications up to 3,000 feet depending on cable and VFD sizes.

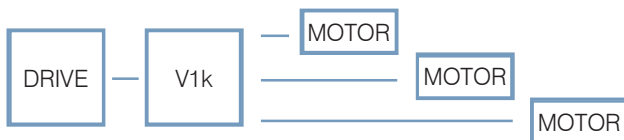
## Part Numbering System



## One Line Diagram of Patented Design



## Multiple Motor Applications



Please see web site for configuration guidelines.

## Product Specifications

- Ratings: 2 - 750 amps; 240 V - 600 V; 7.5 - 600 HP
- Carrier Frequency: 1 - 12 kHz
- Fundamental Frequency: 0 - 60 Hz (consult factory for applications over 8 kHz and/or 60 - 120 Hz fundamental if the cable lengths exceed 400 feet)
- Efficiency: > 98%
- Insulation Rating: 600V Class
- Insulation Class:  
Class H (180°C) or Class R (220°C)
- Ambient Temperature: 40° C
- Maximum Altitude: 2,000 meters (6,000 feet)  
Derating necessary above 2,000 meters
- Agency Approvals: cUL, UL
- Enclosures: Open, UL Type 1, UL Type 3R
- Lead Length: Specific applications can reach 3,000 feet (consult factory for applications above 1,500 feet)
- Operation possible up to 120 Hz output drive frequency with derating (contact factory for details)

## PERFORMANCE GUARANTEE

Properly sized and applied, TCI guarantees that the V1k will limit motor terminal peak input voltage to 150% of the bus voltage with a wire lead length of 1,000 feet and a carrier frequency of 4 kHz. Maximum lead length and carrier frequency can vary depending on wire lead type.

If a properly selected, installed and loaded V1k filter fails to meet the guaranteed performance levels, TCI will provide the necessary components or replacement filter at no additional charge.

TCI does not take responsibility for additional installation or removal costs to include but not limited to replacement of third party equipment. Please see TCI web site for minimum system requirements.