

dv/dt MOTOR PROTECTION
OUTPUT FILTER

V1k



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

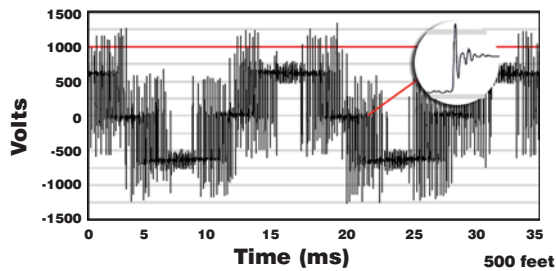
- Greatly extends the life of the motor and cable
- Specific applications can reach 3,000 feet
- 30% reduction in Common Mode Current



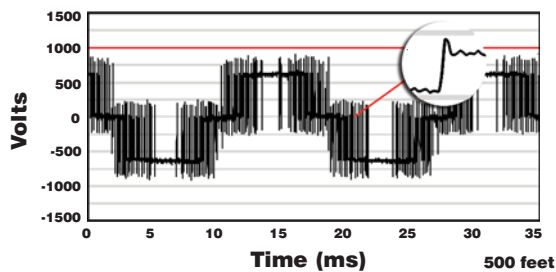
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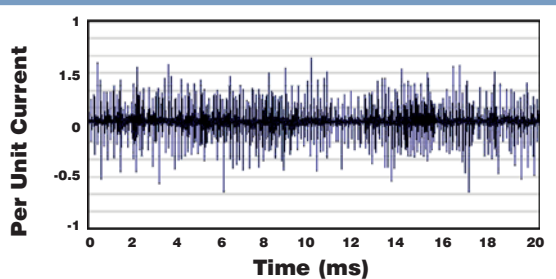
Voltage Without V1k



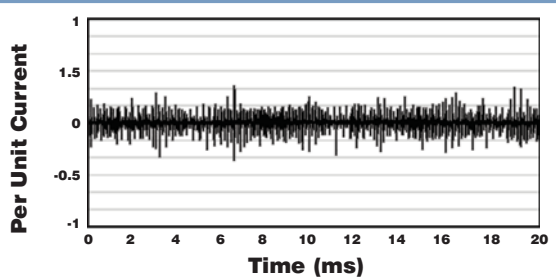
Voltage With V1k



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

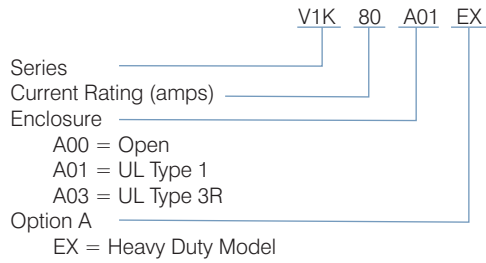
Reduces Common Mode Motor and Bearing Currents

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

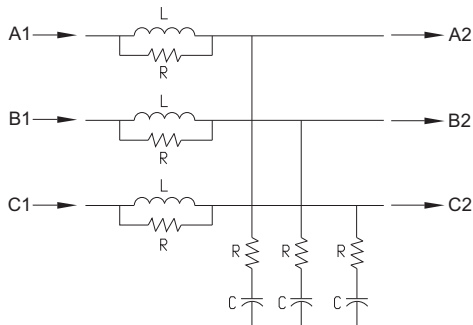
- Slow down the pulse dv/dt by a factor of 3, reducing the harmful common mode currents
- Increase bearing life and up-time
- Reduce common mode noise and currents

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/ μ s. The product has been used successfully in applications up to 3,000 feet depending on cable and VFD sizes.

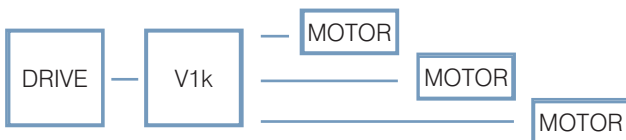
Part Numbering System



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)
- SCCR Version Available
- 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.

PART NUMBER	RATED VOLTS	NEC HP 480V	NEC HP 600V	NEC HP 240V	AMPS	HEIGHT	WIDTH	DEPTH	TERM TYPE	TERM TORQUE	TORQUE UM	WATTS LOSS	WEIGHT
V1K2A00	600	0.75	1	-	2	9	5.5	7.25	TB	10	LB-IN	75	8
V1K3A00	600	1 - 1.5	2	0.5	3	9	5.5	7.25	TB	10	LB-IN	75	8
V1K4A00	600	2	3	0.75	4	9	5.5	7.25	TB	10	LB-IN	75	8
V1K6A00	600	3	-	1 - 1.5	6	9	5.5	7.25	TB	10	LB-IN	80	8
V1K8A00	600	5	5	2	8	9	5.5	7.25	TB	10	LB-IN	90	8
V1K12A00	600	7.5	10	3	12	9	5.5	7.25	TB	10	LB-IN	95	8
V1K16A00	600	10	-	5	16	9	5.5	8.25	TB	20	LB-IN	95	12
V1K18A00	600	10	15	-	18	9	5.5	8.25	TB	20	LB-IN	110	12
V1K21A00	600	15	-	-	21	9	5.5	8.25	TB	20	LB-IN	110	12
V1K25A00	600	15	20	7.5	25	9	5.5	8.25	TB	20	LB-IN	110	12
V1K27A00	600	20	25	-	27	9	5.5	8.25	TB	20	LB-IN	110	14
V1K35A00	600	25	30	10	35	12	8	9	TB	20	LB-IN	130	17
V1K45A00	600	30	40	15	45	12	8	9	TB	20	LB-IN	135	17
V1K55A00	600	40	50	20	55	12	8	9	TB	35	LB-IN	145	16
V1K80A00	600	50 - 60	75	25 - 30	80	12	8	9	TB	35	LB-IN	255	23
V1K110A00	600	75	100	40	110	12	8	10.25	PT	120	LB-IN	245	40
V1K130A00	600	100	125	50	130	8.5	11	9.5	PT	120	LB-IN	270	55
V1K160A00	600	125	150	60	160	8.5	11	10.5	PT	275	LB-IN	260	60
V1K200A00	600	150	200	75	200	8.5	11	10.25	PT	120	LB-IN	265	60
V1K250A00	600	200	250	100	250	8.5	11	10.25	PT	120	LB-IN	290	65
V1K305A00	600	250	300	-	305	8.75	11	12.25	PT	500	LB-IN	325	80
V1K362A00	600	300	350	150	362	8.5	11.75	12	PT	275	LB-IN	300	80
V1K420A00	600	350	450	-	420	10	11.75	13.75	PT	500	LB-IN	450	95
V1K480A00	600	400	500	200	480	10	11.75	13.75	PT	500	LB-IN	475	100
V1K600A00	600	500	600	-	600	12.75	15	13.75	PT	500	LB-IN	515	130
V1K750A00	600	600	700	-	750	12.75	15	14.75	PT	500	LB-IN	770	135

PART NUMBER	RATED VOLTS	NEC HP 480V	NEC HP 600V	NEC HP 240V	AMPS	HEIGHT	WIDTH	DEPTH	ENCL TYPE	TERM TYPE	TERM TORQUE	TORQUE UM	WATTS LOSS	WEIGHT
V1K2A01	600	0.75	1	-	2	9	5.5	10	1	tb	10	LB-IN	75	11
V1K3A01	600	1 - 1.5	2	0.5	3	9	5.5	10	1	TB	10	LB-IN	75	11
V1K4A01	600	2	3	0.75	4	9	5.5	10	1	TB	10	LB-IN	75	11
V1K6A01	600	3	-	1 - 1.5	6	9	5.5	10	1	TB	10	LB-IN	80	11
V1K8A01	600	5	5	2	8	9	5.5	10	1	TB	10	LB-IN	90	11
V1K12A01	600	7.5	10	3	12	9	5.5	10	1	TB	10	LB-IN	95	11
V1K16A01	600	10	-	5	16	9	5.5	10	1	TB	20	LB-IN	95	15
V1K18A01	600	10	15	-	18	9	5.5	10	1	TB	20	LB-IN	110	15
V1K21A01	600	15	-	-	21	9	5.5	10	1	TB	20	LB-IN	110	15
V1K25A01	600	15	20	7.5	25	9	5.5	10	1	TB	20	LB-IN	110	15
V1K27A01	600	20	25	-	27	9	5.5	10	1	TB	20	LB-IN	110	15
V1K35A01	600	25	30	10	35	12	8	11.5	1	TB	20	LB-IN	130	23
V1K45A01	600	30	40	15	45	12	8	11.5	1	TB	20	LB-IN	135	23
V1K55A01	600	40	50	20	55	12	8	11.5	1	TB	35	LB-IN	145	23
V1K80A01	600	50 - 60	75	25 - 30	80	12	8	11.5	1	TB	35	LB-IN	255	29
V1K110A01	600	75	100	40	110	16.5	18	15	1	PT	120	LB-IN	245	68
V1K130A01	600	100	125	50	130	16.5	18	15	1	PT	120	LB-IN	270	83
V1K160A01	600	125	150	60	160	16.5	18	15	1	PT	275	LB-IN	260	83
V1K200A01	600	150	200	75	200	16.5	18	15	1	PT	120	LB-IN	265	93
V1K250A01	600	200	250	100	250	16.5	18	15	1	PT	120	LB-IN	290	93
V1K305A01	600	250	300	-	305	16.5	18	30	1	PT	500	LB-IN	325	117
V1K362A01	600	300	350	150	362	16.5	18	30	1	PT	275	LB-IN	300	117
V1K420A01	600	350	450	-	420	16.5	18	30	1	PT	500	LB-IN	450	132
V1K480A01	600	400	500	200	480	16.5	18	30	1	PT	500	LB-IN	475	138
V1K600A01	600	500	600	-	600	16.5	18	30	1	PT	500	LB-IN	515	168
V1K750A01	600	600	700	-	750	16.5	18	30	1	PT	500	LB-IN	770	180

PART NUMBER	RATED VOLTS	NEC HP 480V	NEC HP 600V	NEC HP 240V	AMPS	HEIGHT	WIDTH	DEPTH	ENCL TYPE	TERM TYPE	TERM TORQUE	TORQUE UM	WATTS LOSS	WEIGHT
V1K2A03	600	0.75	1	-	2	11.45	10	12	3R	TB	10	LB-IN	75	25
V1K3A03	600	1 - 1.5	2	0.5	3	11.45	10	12	3R	TB	10	LB-IN	75	25
V1K4A03	600	2	3	0.75	4	11.45	10	12	3R	TB	10	LB-IN	75	25
V1K6A03	600	3	-	1 - 1.5	6	11.45	10	12	3R	TB	10	LB-IN	80	25
V1K8A03	600	5	5	2	8	11.45	10	12	3R	TB	10	LB-IN	90	25
V1K12A03	600	7.5	10	3	12	11.45	10	12	3R	TB	10	LB-IN	95	25
V1K16A03	600	10	-	5	16	11.45	10	12	3R	TB	20	LB-IN	95	29
V1K18A03	600	10	15	-	18	11.45	10	12	3R	TB	20	LB-IN	110	25
V1K21A03	600	15	-	-	21	11.45	10	12	3R	TB	20	LB-IN	110	29
V1K25A03	600	15	20	7.5	25	11.45	10	12	3R	TB	20	LB-IN	110	29
V1K27A03	600	20	25	-	27	19.18	15.62	19.5	3R	TB	20	LB-IN	110	29
V1K35A03	600	25	30	10	35	19.18	15.62	19.5	3R	TB	20	LB-IN	130	56
V1K45A03	600	30	40	15	45	19.18	15.62	19.5	3R	TB	20	LB-IN	135	56
V1K55A03	600	40	50	20	55	19.18	15.62	19.5	3R	TB	35	LB-IN	145	56
V1K80A03	600	50 - 60	75	25 - 30	80	19.18	15.62	19.5	3R	TB	35	LB-IN	255	62
V1K110A03	600	75	100	40	110	19.18	15.62	19.5	3R	PT	120	LB-IN	245	74
V1K130A03	600	100	125	50	130	19.18	15.62	19.5	3R	PT	120	LB-IN	270	89
V1K160A03	600	125	150	60	160	19.18	15.62	19.5	3R	PT	275	LB-IN	260	99
V1K200A03	600	150	200	75	200	19.18	15.62	19.5	3R	PT	120	LB-IN	265	99
V1K250A03	600	200	250	100	250	19.18	15.62	19.5	3R	PT	120	LB-IN	290	99
V1K305A03	600	250	300	-	305	22.15	20.62	28.5	3R	PT	500	LB-IN	325	109
V1K362A03	600	300	350	150	362	22.15	20.62	28.5	3R	PT	275	LB-IN	300	109
V1K420A03	600	350	450	-	420	22.15	20.62	28.5	3R	PT	500	LB-IN	450	156
V1K480A03	600	400	500	200	480	22.15	20.62	28.5	3R	PT	500	LB-IN	475	161
V1K600A03	600	500	600	-	600	36	28.21	36.86	3R	PT	500	LB-IN	515	297
V1K750A03	600	600	700	-	750	36	28.21	36.86	3R	PT	500	LB-IN	770	307

PART NUMBER	RATED VOLTS	NEC HP 480V	NEC HP 600V	NEC HP 240V	AMPS	HEIGHT	WIDTH	DEPTH	TERM TYPE	TERM TORQUE	TORQUE UM	WATTS LOSS	WEIGHT
V1K2A00EX	600	0.75	1	-	2	9	5.5	7.25	TB	10	LB-IN	75	8
V1K3A00EX	600	1 - 1.5	2	0.5	3	9	5.5	7.25	TB	10	LB-IN	75	8
V1K4A00EX	600	2	3	0.75	4	9	5.5	7.25	TB	10	LB-IN	75	8
V1K6A00EX	600	3	-	1 - 1.5	6	9	5.5	7.25	TB	10	LB-IN	80	8
V1K8A00EX	600	5	5	2	8	9	5.5	7.25	TB	10	LB-IN	90	8
V1K12A00EX	600	7.5	10	3	12	9	5.5	7.25	TB	10	LB-IN	95	8
V1K16A00EX	600	10	-	5	16	9	5.5	8.25	TB	20	LB-IN	95	12
V1K18A00EX	600	10	15	-	18	9	5.5	8.25	TB	20	LB-IN	110	12
V1K21A00EX	600	15	-	-	21	9	5.5	8.25	TB	20	LB-IN	110	12
V1K25A00EX	600	15	20	7.5	25	9	5.5	8.25	TB	20	LB-IN	110	12
V1K27A00EX	600	20	25	-	27	9	5.5	8.25	TB	20	LB-IN	110	14
V1K35A00EX	600	25	30	10	35	12	8	9	TB	20	LB-IN	130	17
V1K45A00EX	600	30	40	15	45	12	8	9	TB	20	LB-IN	135	17
V1K55A00EX	600	40	50	20	55	12	8	9	TB	35	LB-IN	145	16
V1K80A00EX	600	50 - 60	75	25 - 30	80	12	8	9	TB	35	LB-IN	255	23
V1K110A00EX	600	75	100	40	110	12	8	10.25	PT	120	LB-IN	245	40
V1K130A00EX	600	100	125	50	130	8.5	11	9.5	PT	120	LB-IN	270	55
V1K160A00EX	600	125	150	60	160	8.5	11	10.5	PT	275	LB-IN	260	60
V1K200A00EX	600	150	200	75	200	8.5	11	10.25	PT	120	LB-IN	265	60
V1K250A00EX	600	200	250	100	250	8.5	11	10.25	PT	120	LB-IN	290	65
V1K305A00EX	600	250	300	-	305	8.75	11	12.25	PT	500	LB-IN	325	80
V1K362A00EX	600	300	350	150	362	8.5	11.75	12	PT	275	LB-IN	300	80
V1K420A00EX	600	350	450	-	420	10	11.75	13.75	PT	500	LB-IN	450	95
V1K480A00EX	600	400	500	200	480	10	11.75	13.75	PT	500	LB-IN	475	100
V1K600A00EX	600	500	600	-	600	12.75	15	13.75	PT	500	LB-IN	515	130
V1K750A00EX	600	600	700	-	750	12.75	15	14.5	PT	500	LB-IN	770	135

PART NUMBER	RATED VOLTS	NEC HP 480V	NEC HP 600V	NEC HP 240V	AMPS	HEIGHT	WIDTH	DEPTH	ENCL TYPE	TERM TYPE	TERM TORQUE	TORQUE UM	WATTS LOSS	WEIGHT
V1K2A01EX	600	0.75	1	-	2	9	5.5	10	1	TB	10	LB-IN	75	11
V1K3A01EX	600	1 - 1.5	2	0.5	3	9	5.5	10	1	TB	10	LB-IN	75	11
V1K4A01EX	600	2	3	0.75	4	9	5.5	10	1	TB	10	LB-IN	75	11
V1K6A01EX	600	3	-	1 - 1.5	6	9	5.5	10	1	TB	10	LB-IN	80	11
V1K8A01EX	600	5	5	2	8	9	5.5	10	1	TB	10	LB-IN	90	11
V1K12A01EX	600	7.5	10	3	12	9	5.5	10	1	TB	10	LB-IN	95	11
V1K16A01EX	600	10	-	5	16	9	5.5	10	1	TB	20	LB-IN	95	15
V1K18A01EX	600	10	15	-	18	9	5.5	10	1	TB	20	LB-IN	110	15
V1K21A01EX	600	15	-	-	21	9	5.5	10	1	TB	20	LB-IN	110	15
V1K25A01EX	600	15	20	7.5	25	9	5.5	10	1	TB	20	LB-IN	110	15
V1K27A01EX	600	20	25	-	27	9	5.5	10	1	TB	20	LB-IN	110	15
V1K35A01EX	600	25	30	10	35	12	8	11.5	1	TB	20	LB-IN	130	23
V1K45A01EX	600	30	40	15	45	12	8	11.5	1	TB	20	LB-IN	135	23
V1K55A01EX	600	40	50	20	55	12	8	11.5	1	TB	35	LB-IN	145	23
V1K80A01EX	600	50 - 60	75	25 - 30	80	12	8	11.5	1	TB	35	LB-IN	255	29
V1K110A01EX	600	75	100	40	110	16.5	18	15	1	PT	120	LB-IN	245	68
V1K130A01EX	600	100	125	50	130	16.5	18	15	1	PT	120	LB-IN	270	83
V1K160A01EX	600	125	150	60	160	16.5	18	15	1	PT	275	LB-IN	260	83
V1K200A01EX	600	150	200	75	200	16.5	18	15	1	PT	120	LB-IN	265	93
V1K250A01EX	600	200	250	100	250	16.5	18	15	1	PT	120	LB-IN	290	93
V1K305A01EX	600	250	300	-	305	16.5	18	30	1	PT	500	LB-IN	325	117
V1K362A01EX	600	300	350	150	362	16.5	18	30	1	PT	275	LB-IN	300	117
V1K420A01EX	600	350	450	-	420	16.5	18	30	1	PT	500	LB-IN	450	132
V1K480A01EX	600	400	500	200	480	16.5	18	30	1	PT	500	LB-IN	475	138
V1K600A01EX	600	500	600	-	600	16.5	18	30	1	PT	500	LB-IN	515	168
V1K750A01EX	600	600	700	-	750	16.5	18	30	1	PT	500	LB-IN	770	180

PART NUMBER	RATED VOLTS	NEC HP 480V	NEC HP 600V	NEC HP 240V	AMPS	HEIGHT	WIDTH	DEPTH	ENCL TYPE	TERM TYPE	TERM TORQUE	TORQUE UM	WATTS LOSS	WEIGHT
V1K2A03EX	600	0.75	1	-	2	11.45	10	12	3R	TB	10	LB-IN	75	11
V1K3A03EX	600	1 - 1.5	2	0.5	3	11.45	10	12	3R	TB	10	LB-IN	75	11
V1K4A03EX	600	2	3	0.75	4	11.45	10	12	3R	TB	10	LB-IN	75	11
V1K6A03EX	600	3	-	1 - 1.5	6	11.45	10	12	3R	TB	10	LB-IN	80	11
V1K8A03EX	600	5	5	2	8	11.45	10	12	3R	TB	10	LB-IN	90	11
V1K12A03EX	600	7.5	10	3	12	11.45	10	12	3R	TB	10	LB-IN	95	11
V1K16A03EX	600	10	-	5	16	11.45	10	12	3R	TB	20	LB-IN	95	15
V1K18A03EX	600	10	15	-	18	11.45	10	12	3R	TB	20	LB-IN	110	15
V1K21A03EX	600	15	-	-	21	11.45	10	12	3R	TB	20	LB-IN	110	15
V1K25A03EX	600	15	20	7.5	25	11.45	10	12	3R	TB	20	LB-IN	110	15
V1K27A03EX	600	20	25	-	27	19.18	15.62	19.5	3R	TB	20	LB-IN	110	15
V1K35A03EX	600	25	30	10	35	19.18	15.62	19.5	3R	TB	20	LB-IN	130	23
V1K45A03EX	600	30	40	15	45	19.18	15.62	19.5	3R	TB	20	LB-IN	135	23
V1K55A03EX	600	40	50	20	55	19.18	15.62	19.5	3R	TB	35	LB-IN	145	23
V1K80A03EX	600	50 - 60	75	25 - 30	80	19.18	15.62	19.5	3R	TB	35	LB-IN	255	29
V1K110A03EX	600	75	100	40	110	19.18	15.62	19.5	3R	PT	120	LB-IN	245	68
V1K130A03EX	600	100	125	50	130	19.18	15.62	19.5	3R	PT	120	LB-IN	270	83
V1K160A03EX	600	125	150	60	160	19.18	15.62	19.5	3R	PT	275	LB-IN	260	83
V1K200A03EX	600	150	200	75	200	19.18	15.62	19.5	3R	PT	120	LB-IN	265	93
V1K250A03EX	600	200	250	100	250	19.18	15.62	19.5	3R	PT	120	LB-IN	290	93
V1K305A03EX	600	250	300	-	305	22.15	20.62	28.5	3R	PT	500	LB-IN	325	117
V1K362A03EX	600	300	350	150	362	22.15	20.62	28.5	3R	PT	275	LB-IN	300	117
V1K420A03EX	600	350	450	-	420	22.15	20.62	28.5	3R	PT	500	LB-IN	450	132
V1K480A03EX	600	400	500	200	480	22.15	20.62	28.5	3R	PT	500	LB-IN	475	138
V1K600A03EX	600	500	600	-	600	36	28.21	36.86	3R	PT	500	LB-IN	515	168
V1K750A03EX	600	600	700	-	750	36	28.21	36.86	3R	PT	500	LB-IN	770	180