



## SECTION 3

# RM SERIES LINE REACTORS & RC SERIES DV/DT FILTERS

### Single and Three Phase

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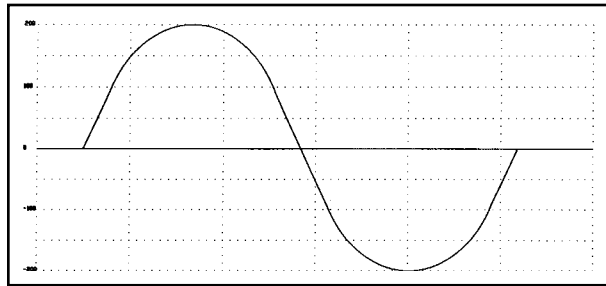
# Why Choose A Line Reactor?

Utilizing variable speed drives to control motor speed has impacted industry both in energy savings and increased efficiencies. The challenge for today's designers is dealing with non-linear wave shapes generated by solid state devices.

By choosing a HPS line reactor, many line problems can be eliminated. Additionally, performance, life expectancy and efficiency of both the motor and the drive itself are significantly enhanced.

## ELIMINATE NUISANCE TRIPPING

Transients due to switching on the utility line and harmonics from the drive system can cause intermittent tripping of circuit breakers. Furthermore, modern switchgear, equipped with solid state trip sensing devices is designed to react to peak current rather than RMS current. As switching transients can peak over 1000 volts, the resulting overvoltage will cause undesirable interruptions. A reactor added to your circuit restricts the surge current by utilizing its inductive characteristics, and therefore eliminates nuisance tripping.



*Normal sine wave from the utility supply.*

## EXTEND THE LIFE OF SWITCHING COMPONENTS

Due to the attenuation of line disturbances, the life of your solid state devices are extended when protected by the use of a HPS line reactor.

## SATURATION

Due to the care in the selection of the core material with its optimum flux density, HPS line reactors will not saturate under the most adverse line conditions. Since the inductance is linear over a broader current range, equipment is protected even in extreme overcurrent circumstances.

## EXTEND THE LIFE OF YOUR MOTOR

Line reactors, when selected for the output of your drive, will enhance the waveform and virtually eliminate failures due to output circuit faults. Subsequently, motor operating temperatures are reduced by 10 to 20 degrees and motor noise is reduced due to the removal of some of the high frequency harmonic currents.

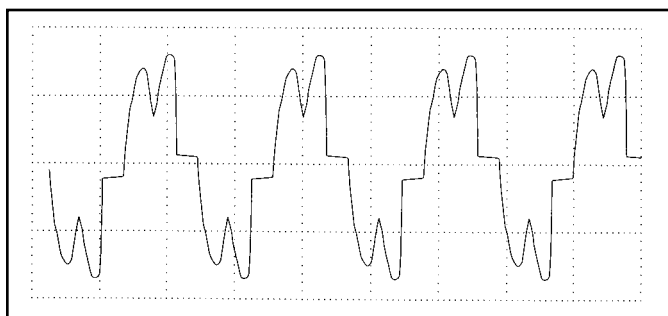
## LOW HEAT DISSIPATION

Particular attention has been focused on the design and field testing of this product line. The result is reactors with ideal operating features including low temperature rises and reduced losses. HPS reactors will operate efficiently and heat dissipation in your equipment will be of minimal concern.

### MINIMIZE HARMONIC DISTORTION

Non-linear current waveforms contain harmonic distortion. By using a HPS line reactor you can limit the inrush current to the rectifier in your drive. The peak current is reduced, the waveform is rounded and harmonic distortion is minimized. Current distortion typically is reduced to 30%.

Severe harmonic current distortion can also cause the system voltage to distort. Often, high peak harmonic current drawn by the drive, causes “flat-topping” of the voltage waveform. Adding a reactor controls the current component, and voltage harmonic distortion is therefore reduced.



***The total harmonic distortion of variable speed drives produces complex wave shapes such as the phase current shown above. The challenge for today's designers is to effectively minimize these line problems.***

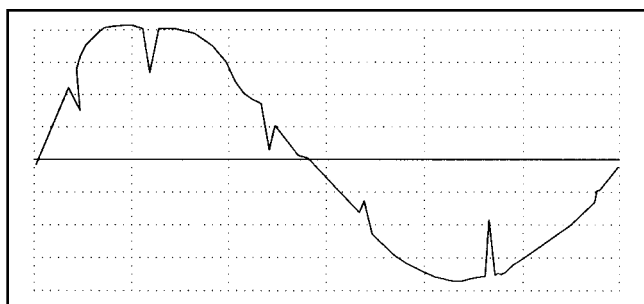
### SHORT CIRCUIT CAPABILITY

HPS line reactors can withstand current under short circuit conditions, reducing the potential of severe damage to electronic equipment. In a short circuit, the inductance of the coil is necessary to limit overcurrent after the core has saturated. HPS has extensive experience in designing and testing dry-type transformers to withstand short circuits for the most demanding applications, and this experience has been applied to line reactor design.

### REDUCE LINE NOTCHING

Whenever AC power is converted to DC by a rectifier using a non-linear device, such as an SCR, the process of commutation occurs. The result is a notch in the voltage waveform. The number of notches is a function of both the number of pulses and the number of SCR's in the rectifier.

Line reactors are used to provide the inductive reactance needed to reduce notching, which can adversely effect equipment operation.



***A voltage waveform illustrating line notching. Line reactors are used to provide the inductive reactance needed to reduce such notches.***

## Why Choose A Line Reactor continued...

### IMPEDANCE RATINGS

**Definition:**

$$\% Z = \frac{(VD \times 100)}{VS} \times \sqrt{3}$$

Z = IMPEDANCE (three phase)

VD = VOLTAGE DROP ACROSS REACTOR

VS = VOLTAGE SUPPLY FOR RATED CURRENT TO FLOW THROUGH REACTOR

### SELECTION - 3% OR 5% IMPEDANCE REACTOR

Choose 3% impedance reactors to satisfy most solid state applications in North America. Reactors rated for 3% impedance are ideal for absorbing normal line spikes and motor current surges, and will prevent most nuisance line tripping of circuit protection devices or equipment.

Where considerably higher line disturbances are present, a 5% impedance reactor may be required. Additionally, if the application is overseas, or when it is necessary to comply to IEEE 519, the higher impedance reactor is recommended. These units may also be selected to further reduce harmonic current and frequencies if desirable or to both extend motor life or diminish motor noise.

### LINE REACTORS OR DRIVE ISOLATION TRANSFORMERS ?

When true line isolation is required, such as limiting short circuit current, or where it is necessary to step up or step down voltage, use a drive isolation transformer. HPS carries an extensive line of drive isolation transformers in stock. Refer to Section 4 for information on Drive Isolation transformers.



## The RM Line Reactor . . .

### CORE

The quality and performance of a line reactor is fundamentally dependant on its ability to withstand harmonics and transients in what is clearly a difficult environment. The bonding and clamping techniques of the gapped core also significantly impacts its performance characteristics.

HPS has paid particular attention to these basics to ensure both reliable and consistent performance.

Core materials, manufacturing and assembly processes have been carefully evaluated to produce optimum losses and sound levels necessary for this product.

### COILS

Conductors are precision wound for optimum short circuit withstandability and electrical balance are used throughout the RM line. Choice of conductors, winding techniques and cooling ducts are precisely selected to assure the highest continuous, reliable performance.

### INSULATION SYSTEM

HPS Line Reactors are designed to meet the most difficult temperature environments. On units up to 160 amps, RM line reactors have a 115°C temperature rise designed for 200°C Insulation Class. This results in a permissible 24 hour maximum ambient of 50°C and an average of 40°C continuously.

On units larger than 160 amps, Class 220 Insulation is used throughout with a maximum permissible continuous ambient temperature of 60°C. These temperature tests are all measured at

150% rated 60 Hz current. The extra 50% current during the temperature test is to consider the worst heating effect due to the present of harmonics in the motor drive system. Generally harmonic heating effect is approximately 30% and depends on individual drive system. For further information on temperature rises, please consult our sales offices.

### VPI IMPREGNATION

Every reactor is fully VPI vacuum and pressure processed with VT (vinyl-toluene) Polyester Resin. This modern, vinyl-toluene based resin with its thicker build, offers significant benefits for electrical, mechanical and thermal properties.

This impregnation process and material results in a much improved dielectric constant, dissipation factor, bonding strength and dielectric breakdown (volts per mil) than any other impregnation material including the more traditional oil modified epoxies and varnishes.

Vacuum impregnation is considered vital for the integrity of electrical equipment located in such sensitive locations. The core and coil assembly is

finished with a clear resin.

### TERMINATIONS

Custom connections are provided for in several ways. Finger-proof-terminal blocks are provided on three model ranges, and terminal pads are supplied on higher current ratings. Refer to the dimensional summary for details. All connections are brazed to ensure electrical integrity.



## ... Features of Construction

### ENCLOSURES

Enclosed reactors are standard as either NEMA 2 or 3R. Units in NEMA 3R enclosures are suitable for floor or wall mounting. Wall mounting is available on NEMA 3R units up to 600 lbs. Please consult customer service for details.

Enclosures are finished with a 7 stage phosphate process with baked enamel ANSI 61 grey.



### QUALITY CONTROL

Every reactor is production line tested in accordance with the requirements for UL, ANSI, NEMA and CSA. This confirms that every unit meets our highest expectations for Quality Assurance.

Additionally, line reactors have been short circuit tested at a certified laboratory to confirm the withstandability of our reactors to short circuits that may be present in a distribution system. Tests were done in accordance with ANSI C57.12.91 at 25 times rated current for 2 seconds. Those test results are available upon request successfully withstanding this test ensured that the RM line reactor will survive power stresses such as short circuits that may be present in a distribution circuit.

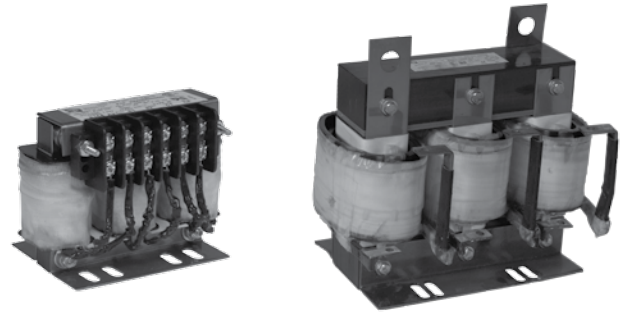
### UL and CSA CERTIFICATION

A vital assurance for our customers is the approval of this product line to national standards.

Our open and enclosed style reactors are recognized by UL and certified by CSA as follows:

UL File No.: E61431

CSA File No.: LR3902



This approval is inclusive to 2000 amps and 8.6 kV class, and may be of interest for any special applications.

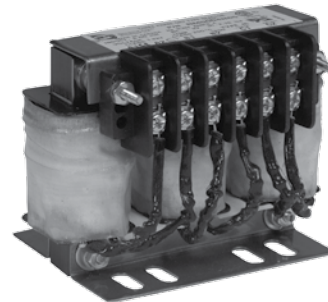
Our products are built in accordance with and meet UL 508, UL 506 and CSA C22.2 NO.66 standards.

### INPUT AND OUTPUT SIDE REACTORS

HPS three phase Line Reactors are designed for both the input and output side of variable speed drives including Insulated Gate Bipolar Transistor (IGBT) type inverters.

### SPECIALS

For special applications or for any features that you may require beyond the standard line listed, please contact our sales offices.



## Standard Three Phase Line Reactor Specifications

### RATINGS:

Nominal Inductance +/- 10% @ rated current.  
 95% of nominal inductance @ 150% rated current.  
 50% of nominal inductance @ 350% of rated current.

The above performance indicates that even at very substantial overload conditions (even beyond what other equipment in the circuit could tolerate), the RM Line Reactor will still provide current limiting performance against total harmonic distortion generated by the drive system.

### TEMPERATURE RISE:

115° C on units up to 160 amps; average ambient of 40°C.  
 115° C on units larger than 160 amps; average ambient of 60° C.

### INSULATION SYSTEM:

200°C Temperature Class up to 160 amps.  
 220°C Temperature Class over 160 amps.

### FREQUENCY:

60 Hz Fundamental Current Maximum.

### COOLING METHOD:

Natural convection

### SYSTEM VOLTAGE:

600V Class

### APPROVALS:

UL File No.: E61431  
 CSA File No.: LR 3902  
 CE Mark (IEC 61558-2-20:2000)

### SOUND LEVEL:

2 to 18 amps: 58 dBA  
 130 to 320 amps: 70 dBA  
 25 to 100 amps: 64 dBA  
 400 to 1200 amps: 75 dBA

### ENCLOSURE: (when specified)

NEMA 2 or NEMA 3R, ANSI 61 Grey, UL50

### HARMONIC WITHSTAND:

HPS reactors are designed to withstand typical harmonics associated with both the input and output side of AC variable speed drives including IGBT type inverter drives. For additional information, contact our sales office.



# RM Series Line Reactor Selection Tables

**Line Reactor Part Number Guide**

RM 0002 M 32 \* \_

Further suffix to follow.  
**Add suffix "E" for Enclosure.**  
 Inductance Value  
 The inductance value is preceded with a letter to designate the position of the decimal point to determine the inductance.  
 The letters are as follows:  
 'M' XX. mH  
 'N' X.X mH  
 'P' 0.XX mH  
 'U' .0XX mH or XX.0 uH  
 Example: M32 is 32.0 mH  
 4 digits for current rating  
 In-Line Reactor

**Note:** As all characters of the P/N represent performance values of the reactor, P/N's are not completely sequential. They are sorted by current rating.

\* Add the Suffix "E" to the standard part number for an Enclosed unit.

HP Rating	240 Volt - 60 Hz			
	3% Impedance		5% Impedance	
	P/N	Amps	P/N	Amps
0.5	RM0004N65	4	RM0004M12	4
1	RM0004N30	4	RM0004N65	4
1.5	RM0008N30	8	RM0008N50	8
2	RM0008N15	8	RM0008N30	8
3	RM0012N13	12	RM0012N25	12
5	RM0018P80	18	RM0018N15	18
7.5	RM0025P50	25	RM0025N12	25
10	RM0035P40	35	RM0035P80	35
15	RM0045P30	45	RM0055P50	55
20	RM0055P25	55	RM0055P50	55
25	RM0080P20	80	RM0080P40	80
30	RM0080P20	80	RM0080P23	80
40	RM0130P10	130	RM0110P18	110
50	RM0130P10	130	RM0130P20	130
60	RM0160U75	160	RM0160P15	160
75	RM0200U55	200	RM0200P11	200
100	RM0250U45	250	RM0250U90	250
125	RM0320U40	320	RM0320U75	320
150	RM0400U30	400	RM0400U61	400
200	RM0500U25	500	RM0500U50	500
250	RM0600U20	600	RM0600U40	600
300	RM0750U15	750	RM0750U25	750
350	RM0900U13	900	RM0900U26	900
400	RM1000U11	1000	RM1000U18	1000
500	RM1200U10	1200	RM1200U15	1200

HP Rating	480 Volt - 60 Hz			
	3% Impedance		5% Impedance	
	P/N	Amps	P/N	Amps
1	RM0002M12	2	RM0002M20	2
1.5	RM0004N91	4	RM0004M12	4
2	RM0004N65	4	RM0004M12	4
3	RM0008N50	8	RM0008N75	8
5	RM0008N30	8	RM0008N50	8
7.5	RM0012N25	12	RM0012N42	12
10	RM0018N15	18	RM0018N25	18
15	RM0025N12	25	RM0025N20	25
20	RM0035P80	35	RM0035N17	35
25	RM0035P80	35	RM0035N12	35
30	RM0045P70	45	RM0045N12	45
40	RM0055P50	55	RM0055P85	55
50	RM0080P40	80	RM0080P70	80
60	RM0080P40	80	RM0080P70	80
75	RM0110P30	110	RM0110P45	110
100	RM0130P20	130	RM0130P30	130
125	RM0160P15	160	RM0160P23	160
150	RM0200P11	200	RM0200P24	200
200	RM0250U90	250	RM0250P15	250
250	RM0320U75	320	RM0320P13	320
300	RM0400U61	400	RM0400P11	400
350	RM0500U50	500	RM0500U85	500
400	RM0500U50	500	RM0500U85	500
500	RM0600U40	600	RM0600U65	600
600	RM0750U36	750	RM0750U60	750
700	RM0900U26	900	RM0900U43	900
800	RM1000U29	1000	RM1000U38	1000
1000	RM1200U18	1200	RM1200U30	1200

HP Rating	600 Volt - 60 Hz			
	3% Impedance		5% Impedance	
	P/N	Amps	P/N	Amps
1	RM0002M20	2	RM0002M32	2
1.5	RM0002M12	2	RM0002M20	2
2	RM0004M12	4	RM0004M22	4
3	RM0004N91	4	RM0004M12	4
5	RM0008N50	8	RM0008N75	8
7.5	RM0012N31	12	RM0012N51	12
10	RM0012N25	12	RM0012N42	12
15	RM0018N15	18	RM0018N25	18
20	RM0025N12	25	RM0025N20	25
25	RM0035N12	35	RM0035N17	35
30	RM0035P80	35	RM0035N17	35
40	RM0045P70	45	RM0045N12	45
50	RM0055P50	55	RM0055P85	55
60	RM0080P40	80	RM0080P70	80
75	RM0080P40	80	RM0080P70	80
100	RM0110P30	110	RM0110P45	110
125	RM0130P20	130	RM0130P37	130
150	RM0160P23	160	RM0160P32	160
200	RM0200P19	200	RM0200P24	200
250	RM0250P15	250	RM0250P19	250
300	RM0320U96	320	RM0320P16	320
350	RM0400U82	400	RM0400P14	400
400	RM0400U82	400	RM0400P14	400
500	RM0500U57	500	RM0500U96	500
600	RM0600U65	600	RM0600U80	600
700	RM0700U41	700	RM0700U68	700
800	RM0750U36	750	RM0750U60	750
900	RM0900U32	900	RM0900U53	900
1000	RM1000U29	1000	RM1000U48	1000
1200	RM1200U24	1200	RM1200U40	1200

SECTION 3





HP Rating	525 Volt - 50 Hz			
	3% Impedance		5% Impedance	
	P/N	Amps	P/N	Amps
1	RM0002M20	2	RM0002M32	2
1.5	RM0002M12	2	RM0002M20	2
2	RM0004M12	4	RM0004M22	4
3	RM0004N65	4	RM0004M12	4
5	RM0008N50	8	RM0008N75	8
7.5	RM0012N31	12	RM0012N51	12
10	RM0012N25	12	RM0012N42	12
15	RM0018N15	18	RM0018N25	18
20	RM0025N12	25	RM0025N20	25
25	RM0035N12	35	RM0035N17	35
30	RM0035P80	35	RM0035N17	35
40	RM0045P70	45	RM0045N12	45
50	RM0055P50	55	RM0055P85	55
60	RM0080P40	80	RM0080P70	80
75	RM0080P40	80	RM0080P70	80
100	RM0110P30	110	RM0110P45	110
125	RM0130P20	130	RM0130P37	130
150	RM0160P23	160	RM0160P32	160
200	RM0200P19	200	RM0200P24	200
250	RM0250P15	250	RM0250P19	250
300	RM0320U96	320	RM0320P16	320
350	RM0400U82	400	RM0400P14	400
400	RM0400U82	400	RM0400P14	400
500	RM0500U57	500	RM0500U96	500
600	RM0600U65	600	RM0600U80	600
700	RM0700U41	700	RM0700U68	700
800	RM0750U36	750	RM0750U60	750
900	RM0900U32	900	RM0900U53	900
1000	RM1000U29	1000	RM1000U48	1000
1200	RM1200U24	1200	RM1200U40	1200

HP Rating	660 Volt - 50 Hz			
	3% Impedance		5% Impedance	
	P/N	Amps	P/N	Amps
1	RM0002M32	2	Consult Factory	2
1.5	RM0002M20	2	RM0002M32	2
2	RM0004M22	4	Consult Factory	4
3	RM0004M12	4	RM0004M22	4
5	RM0008N75	8	Consult Factory	8
7.5	RM0008N50	8	RM0008N75	8
10	RM0012N42	12	Consult Factory	12
15	RM0018N25	18	Consult Factory	18
20	RM0025N20	25	Consult Factory	25
25	RM0025N20	25	Consult Factory	25
30	RM0035N17	35	Consult Factory	35
40	RM0035N12	35	RM0035N17	35
50	RM0055P85	55	Consult Factory	55
60	RM0055P85	55	Consult Factory	55
75	RM0080P70	80	Consult Factory	80
100	RM0080P40	80	RM0080P70	80
125	RM0110P45	110	Consult Factory	110
150	RM0130P30	130	Consult Factory	130
200	RM0160P23	160	Consult Factory	160
250	RM0200P19	200	Consult Factory	200
300	RM0250P15	250	Consult Factory	250
350	RM0320P13	320	Consult Factory	320
400	RM0320P13	320	Consult Factory	320
500	RM0400U82	400	RM0400P14	400
600	RM0500U85	500	Consult Factory	500
700	RM0600U65	600	Consult Factory	600
800	RM0700U68	700	Consult Factory	700
900	RM0750U60	750	Consult Factory	750
1000	RM0900U43	900	Consult Factory	900
1200	RM1000U38	1000	Consult Factory	1000

HP Rating	690 Volt - 50 Hz			
	3% Impedance		5% Impedance	
	P/N	Amps	P/N	Amps
1	RM0002M32	2	Consult Factory	2
1.5	RM0002M20	2	Consult Factory	2
2	RM0002M20	2	RM0002M32	2
3	RM0004M12	4	RM0004M22	4
5	RM0008N75	8	Consult Factory	8
7.5	RM0008N50	8	Consult Factory	8
10	RM0012N42	12	Consult Factory	12
15	RM0018N25	18	Consult Factory	18
20	RM0018N25	18	Consult Factory	18
25	RM0025N20	25	Consult Factory	25
30	RM0035N17	35	Consult Factory	35
40	RM0035N12	35	Consult Factory	35
50	RM0045N12	45	Consult Factory	45
60	RM0055P85	55	Consult Factory	55
75	RM0080P70	80	Consult Factory	80
100	RM0080P40	80	Consult Factory	80
125	RM0110P45	110	Consult Factory	110
150	RM0130P30	130	Consult Factory	130
200	RM0160P23	160	Consult Factory	160
250	RM0200P19	200	Consult Factory	200
300	RM0250P19	250	Consult Factory	250
350	RM0320P16	320	Consult Factory	320
400	RM0320P13	320	Consult Factory	320
500	RM0400P11	400	Consult Factory	400
600	RM0500U85	500	Consult Factory	500
700	RM0600U65	600	Consult Factory	600
800	RM0600U65	600	Consult Factory	600
900	RM0700U68	700	Consult Factory	700
1000	RM0750U60	750	Consult Factory	750
1200	RM0900U43	900	Consult Factory	900



## Standard Three Phase Line Reactor Core & Coil Specification Charts

Current (Amps)	Part Number	Inductance (mH)	Watts Loss	Dimensions					Mtg Slot/ Hole Size	Dim. Fig. # (Page 117)	Weight (Lbs.)
				W	D	H	Mtg. W	Mtg. D			
2	RM0002M12	12.0	7	4.40	2.83	3.33	1.44/2.56	1.77	.281 x .625	1	2
2	RM0002M20	20.0	9	4.40	2.83	3.33	1.44/2.56	1.77	.281 x .625	1	3
2	RM0002M32	32.0	13	4.40	2.83	3.33	1.44/2.56	1.77	.281 x .625	1	3
4	RM0004M12	12.0	21	4.40	3.33	3.33	1.44/2.56	2.37	.281 x .625	1	4
4	RM0004M22	22.0	25	6.00	3.30	4.80	2.00/3.00	2.09	.281 x .625	3	8
4	RM0004N30	3.00	7	4.40	2.83	3.33	1.44/2.56	1.77	.281 x .625	1	2
4	RM0004N65	6.50	13	4.40	2.83	3.33	1.44/2.56	1.77	.281 x .625	1	3
4	RM0004N91	9.10	15	4.40	3.33	3.33	1.44/2.56	2.37	.281 x .625	1	3
8	RM0008N15	1.50	11	4.40	2.83	3.33	2.00	1.77	.281 x .625	1	3
8	RM0008N30	3.00	25	4.40	2.83	3.33	2.00	1.77	.281 x .625	1	3
8	RM0008N50	5.00	31	4.40	3.33	3.33	2.00	2.37	.281 x .625	1	4
8	RM0008N75	7.50	31	6.00	3.55	4.80	2.00/3.00	2.34	.281 x .625	3	9
12	RM0012N13	1.30	23	4.40	2.83	3.33	2.00	1.77	.281 x .625	1	3
12	RM0012N25	2.50	26	6.00	3.30	4.80	2.00/3.00	2.09	.281 x .625	3	8
12	RM0012N31	3.10	30	6.00	3.55	4.80	2.00/3.00	2.34	.281 x .625	3	9
12	RM0012N42	4.20	34	6.00	3.80	4.80	2.00/3.00	2.59	.281 x .625	3	10
12	RM0012N51	5.10	39	6.05	3.80	4.80	2.00/3.00	2.59	.281 x .625	3	13
18	RM0018N15	1.50	29	6.00	3.55	4.80	2.00/3.00	2.34	.281 x .625	3	9
18	RM0018N25	2.50	40	6.00	3.84	4.80	2.00/3.00	2.84	.281 x .625	2	13
18	RM0018P80	0.80	19	6.00	3.30	4.80	2.00/3.00	2.09	.281 x .625	3	7
25	RM0025N12	1.20	44	6.10	3.84	5.70	2.00/3.00	2.34	.281 x .625	2	10
25	RM0025N20	2.00	59	7.15	3.75	5.60	3.00	2.87	.38 x .63	3	18
25	RM0025P50	0.50	23	6.00	3.84	5.70	2.00/3.00	2.09	.281 x .625	2	7
35	RM0035N12	1.20	75	8.50	4.37	6.88	3.00/4.20	3.12	.44 X 1.00	3	26
35	RM0035N17	1.70	90	8.60	4.87	6.93	3.00/4.20	3.62	.44 X 1.00	3	35
35	RM0035P40	0.40	36	6.00	3.34	5.70	2.00/3.00	2.34	.281 x .625	2	9
35	RM0035P80	0.80	51	7.00	3.75	5.61	3.00	2.87	.38 x .63	3	17
45	RM0045N12	1.20	100	8.50	4.37	6.88	3.00/4.20	3.62	.44 X 1.00	3	35
45	RM0045P30	0.30	33	6.00	3.84	5.70	2.00/3.00	2.84	.281 x .625	2	13
45	RM0045P70	0.70	64	6.90	4.45	5.60	3.00	3.37	.38 x .63	3	22
55	RM0055P25	0.25	39	6.05	3.84	5.70	2.00/3.00	2.84	.281 x .625	2	12
55	RM0055P50	0.50	75	8.50	4.37	6.88	3.00/4.20	3.12	.44 X 1.00	3	26
55	RM0055P85	0.85	110	8.50	4.87	6.95	3.00/4.20	3.62	.44 X 1.00	3	35
80	RM0080P20	0.20	88	8.50	4.37	6.88	3.00/4.20	3.12	.44 X 1.00	4	26
80	RM0080P23	0.23	70	8.50	4.87	6.88	3.00/4.20	3.62	.44 X 1.00	4	33
80	RM0080P40	0.40	138	9.40	5.94	6.95	3.00/4.20	3.62	.44 X 1.00	4	36
80	RM0080P70	0.70	140	10.50	5.85	8.35	3.60/4.80	4.23	.44 X 1.25	4	63
110	RM0110P15	0.15	86	8.50	5.44	6.88	3.00/4.20	3.12	.44 X 1.00	4	27
110	RM0110P18	0.18	95	8.50	4.87	6.88	3.00/4.20	3.62	.44 X 1.00	4	35
110	RM0110P30	0.30	123	10.70	5.85	8.35	3.60/4.80	4.23	.44 X 1.25	4	52
110	RM0110P45	0.45	130	10.50	5.85	8.29	3.60/4.80	4.23	.44 X 1.25	4	63
130	RM0130P10	0.10	95	8.50	5.44	6.88	3.00/4.20	3.12	.44 X 1.00	4	27
130	RM0130P20	0.20	115	10.70	6.20	8.35	3.60/4.80	3.73	.44 X 1.25	4	41
130	RM0130P30	0.30	142	10.70	5.85	8.29	3.60/4.80	4.23	.44 X 1.25	4	53
130	RM0130P37	0.37	143	10.70	6.35	8.32	3.60/4.80	4.73	.44 X 1.25	4	75
160	RM0160P15	0.15	129	10.50	6.20	8.31	3.60/4.80	3.73	.44 X 1.25	4	46
160	RM0160P23	0.23	142	10.90	6.35	8.29	3.60/4.80	4.73	.44 X 1.25	4	66
160	RM0160P32	0.32	141	10.50	8.35	8.29	3.60/4.80	6.73	.44 X 1.25	4	104
160	RM0160U75	0.08	100	8.50	5.44	6.91	3.00/4.20	3.12	.44 X 1.00	4	29

All dimensions in inches

SECTION 3



## Standard Three Phase Line Reactor Core & Coil Specification Charts

Current (Amps)	Part Number	Inductance (mH)	Watts Loss	Dimensions					Mtg Slot/ Hole Size	Dim. Fig. # (Page 117)	Weight (Lbs.)
				W	D	H	Mtg. W	Mtg. D			
200	RM0200P11	0.11	114	10.50	7.53	8.35	3.60/4.80	4.48	.44 X 1.25	4	52
200	RM0200P19	0.190	138	10.50	9.53	8.29	3.60/4.80	6.23	.44 X 1.25	4	93
200	RM0200P24	0.240	164	10.50	8.35	8.29	3.60/4.80	6.73	.44 X 1.25	4	105
200	RM0200U55	0.055	89	8.50	5.94	7.05	3.00/4.20	3.62	.44 X 1.00	4	37
250	RM0250P15	0.150	188	13.75	9.00	11.43	4.80	5.44	.44 X 1.00	5	119
250	RM0250P19	0.190	203	13.75	7.25	11.43	4.80	5.94	.44 X 1.00	5	137
250	RM0250U45	0.045	90	10.50	5.35	8.31	3.60/4.80	3.73	.44 X 1.25	4	40
250	RM0250U90	0.090	131	10.50	8.75	8.35	3.60/4.80	4.73	.44 X 1.25	4	65
320	RM0320P13	0.13	245	13.75	7.75	11.43	4.80	6.44	.44 X 1.00	5	127
320	RM0320P16	0.160	270	13.75	8.25	11.43	4.80	6.44	.44 X 1.00	5	146
320	RM0320U40	0.040	94	10.50	6.85	8.29	3.60/4.80	5.23	.44 X 1.25	4	69
320	RM0320U75	0.075	184	13.75	8.44	11.43	4.80	5.94	.44 X 1.00	5	87
320	RM0320U96	0.096	214	13.75	6.25	11.43	4.80	4.93	.44 X 1.00	5	107
400	RM0400P11	0.11	278	13.75	7.75	11.43	4.80	6.44	.44 X 1.00	5	156
400	RM0400P14	0.14	305	18.00	11.00	14.00	6.00	8.25	0.563	6	253
400	RM0400U30	0.030	130	10.50	6.35	8.29	3.60/4.80	4.73	.44 X 1.25	4	61
400	RM0400U61	0.061	177	13.75	8.69	11.43	4.80	5.44	.44 X 1.00	5	115
400	RM0400U82	0.082	210	13.75	7.75	11.43	4.80	6.44	.44 X 1.00	5	148
500	RM0500U25	0.025	152	13.75	7.75	11.43	4.80	6.44	.44 X 1.00	5	100
500	RM0500U50	0.05	196	13.75	9.69	11.43	4.80	6.44	.44 X 1.00	5	151
500	RM0500U57	0.057	217	13.75	9.63	11.43	4.80	6.94	.44 X 1.00	5	168
500	RM0500U85	0.085	280	13.75	9.75	11.43	4.80	8.44	.44 X 1.00	5	225
500	RM0500U96	0.096	317	22.00	10.75	20.50	6.00	8.75	0.75	6	282
600	RM0600U20	0.020	147	13.75	8.25	11.43	4.80	6.56	.44 X 1.00	5	115
600	RM0600U40	0.040	223	13.75	8.25	11.43	4.80	6.94	.44 X 1.00	5	177
600	RM0600U65	0.065	290	13.75	9.75	11.43	4.80	8.44	.44 X 1.00	5	230
600	RM0600U80	0.080	340	22.50	12.63	20.50	7.50	8.75	0.75	6	310
700	RM0700U41	0.041	276	22.50	13.00	20.25	6.00	8.25	0.56	6	240
700	RM0700U68	0.068	400	22.50	14.25	22.00	7.50	9.75	0.75	6	403
750	RM0750U15	0.015	209	18.00	8.25	14.00	6.00	6.25	0.563	6	159
750	RM0750U25	0.025	250	18.00	9.25	14.00	6.00	7.25	0.563	6	184
750	RM0750U36	0.036	293	18.00	9.75	14.00	6.00	7.75	0.563	6	236
750	RM0750U60	0.060	415	22.50	13.50	20.75	7.50	8.25	0.75	6	403
900	RM0900U13	0.013	216	18.00	12.00	14.00	6.00	7.25	0.56	6	159
900	RM0900U26	0.026	286	18.00	13.00	14.00	6.00	8.25	0.56	6	259
900	RM0900U32	0.032	400	18.00	13.63	14.00	6.00	10.25	0.75	6	340
900	RM0900U43	0.043	441	22.50	14.00	20.50	7.50	8.75	0.75	6	434
900	RM0900U53	0.053	490	22.50	13.00	21.50	7.50	10.25	0.75	6	546
1000	RM1000U11	0.011	179	18.00	12.50	18.00	6.00	9.25	0.75	6	200
1000	RM1000U18	0.018	232	22.50	13.75	20.50	7.50	11	0.75	6	282
1000	RM1000U29	0.029	377	22.50	13.75	20.50	7.50	7.25	0.75	6	394
1000	RM1000U38	0.038	416	22.50	14.00	20.50	7.50	10.25	0.56	6	450
1000	RM1000U48	0.048	490	22.50	15.00	20.50	7.50	11.25	0.75	6	642
1200	RM1200U10	0.010	228	18.00	13.50	14.00	6.00	8.25	0.563	6	205
1200	RM1200U15	0.015	287	18.00	14.00	18.50	6.00	10.75	0.75	6	300
1200	RM1200U18	0.018	395	18.00	14.25	18.38	7.50	8.25	0.75	6	343
1200	RM1200U24	0.024	440	22.50	14.00	20.50	7.50	9.25	0.75	6	444
1200	RM1200U30	0.030	490	22.50	14.00	17.00	7.50	10.25	0.75	6	534
1200	RM1200U40	0.040	576	22.50	17.00	19.50	7.50	11.75	0.563	6	600

All dimensions in inches



## Standard Three Phase Line Reactor Enclosed Specification Charts

Current (Amps)	Part Number	Inductance (mH)	Watts Loss	Dimensions					Mtg Slot/ Hole Size	Dim. Fig. # (Page 117)	Case Style	Enclosed Weight (Lbs.)
				W	D	H	Mtg. W	Mtg. D				
2	RM0002M12E	12.0	7	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	9
2	RM0002M20E	20.0	9	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	10
2	RM0002M32E	32.0	13	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	10
4	RM0004M12E	12.0	21	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	11
4	RM0004M22E	22.0	25	10.00	8.00	8.00	7.00	6.50	0.188	3	N1	15
4	RM0004N30E	3.00	7	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	9
4	RM0004N65E	6.50	13	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	10
4	RM0004N91E	9.10	15	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	10
8	RM0008N15E	1.50	11	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	10
8	RM0008N30E	3.00	25	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	10
8	RM0008N50E	5.00	31	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	11
8	RM0008N75E	7.50	31	10.00	8.00	8.00	7.00	6.50	0.188	3	N1	16
12	RM0012N13E	1.30	23	10.00	8.00	8.00	7.00	6.50	0.188	1	N1	10
12	RM0012N25E	2.50	26	10.00	8.00	8.00	7.00	6.50	0.188	3	N1	15
12	RM0012N31E	3.10	30	10.00	8.00	8.00	7.00	6.50	0.188	3	N1	16
12	RM0012N42E	4.20	34	10.00	8.00	8.00	7.00	6.50	0.188	3	N1	17
12	RM0012N51E	5.10	39	10.00	8.00	8.00	7.00	6.50	0.188	3	N1	20
18	RM0018N15E	1.50	29	10.00	8.00	8.00	7.00	6.50	0.188	3	N1	16
18	RM0018N25E	2.50	40	10.00	8.00	8.00	7.00	6.50	0.188	2	N1	20
18	RM0018P80E	0.80	19	10.00	8.00	8.00	7.00	6.50	0.188	3	N1	14
25	RM0025N12E	1.20	44	10.00	8.00	8.00	7.00	6.50	0.188	2	N1	17
25	RM0025N20E	2.00	59	14.00	14.00	12.00	10.00	10.50	0.188	3	N2	35
25	RM0025P50E	0.50	23	10.00	8.00	8.00	7.00	6.50	0.188	2	N1	14
35	RM0035N12E	1.20	75	14.00	14.00	12.00	10.00	10.50	0.188	3	N2	43
35	RM0035N17E	1.70	90	14.00	14.00	12.00	10.00	10.50	0.188	3	N2	52
35	RM0035P40E	0.40	36	10.00	8.00	8.00	7.00	6.50	0.188	2	N1	16
35	RM0035P80E	0.80	51	14.00	14.00	12.00	10.00	10.50	0.188	3	N2	24
45	RM0045N12E	1.20	100	14.00	14.00	12.00	10.00	10.50	0.188	3	N2	52
45	RM0045P30E	0.30	33	10.00	8.00	8.00	7.00	6.50	0.188	2	N1	20
45	RM0045P70E	0.70	64	14.00	14.00	12.00	10.00	10.50	0.188	3	N2	39
55	RM0055P25E	0.25	39	10.00	8.00	8.00	7.00	6.50	0.188	2	N1	19
55	RM0055P50E	0.50	75	14.00	14.00	12.00	10.00	10.50	0.188	3	N2	43
55	RM0055P85E	0.85	110	14.00	14.00	12.00	10.00	10.50	0.188	3	N2	52
80	RM0080P20E	0.20	88	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	43
80	RM0080P23E	0.23	70	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	50
80	RM0080P40E	0.40	138	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	53
80	RM0080P70E	0.70	140	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	80
110	RM0110P15E	0.15	86	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	44
110	RM0110P18E	0.18	95	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	52
110	RM0110P30E	0.30	123	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	69
110	RM0110P45E	0.45	130	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	80
130	RM0130P10E	0.10	95	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	44
130	RM0130P20E	0.20	115	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	58
130	RM0130P30E	0.30	142	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	70
130	RM0130P37E	0.37	143	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	92
160	RM0160P15E	0.15	129	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	63
160	RM0160P23E	0.23	142	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	83
160	RM0160P32E	0.32	141	23.90	25.00	28.75	22.75	9.00	0.56	4	NH6	164
160	RM0160U75E	0.08	100	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	46

Note: Please refer to Pages 260 to 264 for enclosure dimensional specifications

All dimensions in inches



## Standard Three Phase Line Reactor Enclosed Specification Charts

Current (Amps)	Part Number	Inductance (mH)	Watts Loss	Dimensions					Mtg Slot/Hole Size	Dim. Fig. # (Page 117)	Case Style	Enclosed Weight (Lbs.)
				W	D	H	Mtg. W	Mtg. D				
200	RM0200P11E	0.11	114	23.90	25.00	28.75	22.75	9.00	0.56	4	NH6	112
200	RM0200P19E	0.190	138	23.90	25.00	28.75	22.75	9.00	0.56	4	NH6	153
200	RM0200P24E	0.240	164	19.40	20.20	21.50	18.00	9.00	0.56	4	NH5	165
200	RM0200U55E	0.055	89	14.00	14.00	12.00	10.00	10.50	0.188	4	N2	154
250	RM0250P15E	0.150	188	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	179
250	RM0250P19E	0.190	203	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	197
250	RM0250U45E	0.045	90	23.90	25.00	28.75	22.75	9.00	0.56	4	NH6	100
250	RM0250U90E	0.090	131	23.90	25.00	28.75	22.75	9.00	0.56	4	NH6	125
320	RM0320P13E	0.13	245	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	187
320	RM0320P16E	0.160	270	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	206
320	RM0320U40E	0.040	94	23.90	25.00	28.75	22.75	9.00	0.56	4	NH6	129
320	RM0320U75E	0.075	184	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	147
320	RM0320U96E	0.096	214	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	167
400	RM0400P11E	0.11	278	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	216
400	RM0400P14E	0.14	305	23.90	25.00	28.75	22.75	9.00	0.56	6	NH6	313
400	RM0400U30E	0.030	130	23.90	25.00	28.75	22.75	9.00	0.56	4	NH6	121
400	RM0400U61E	0.061	177	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	175
400	RM0400U82E	0.082	210	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	208
500	RM0500U25E	0.025	152	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	160
500	RM0500U50E	0.05	196	23.90	25.00	28.75	22.75	9.00	0.56	5	NH6	211
500	RM0500U57E	0.057	217	26.00	25.00	38.00	21.50	19.00	0.56	5	NH3	245
500	RM0500U85E	0.085	280	26.00	25.00	38.00	21.50	19.00	0.56	5	NH3	302
500	RM0500U96E	0.096	317	26.00	25.00	38.00	21.50	19.00	0.56	6	NH3	359
600	RM0600U20E	0.020	147	26.00	25.00	38.00	21.50	19.00	0.56	5	NH3	192
600	RM0600U40E	0.040	223	26.00	25.00	38.00	21.50	19.00	0.56	5	NH3	254
600	RM0600U65E	0.065	290	26.00	25.00	38.00	21.50	19.00	0.56	5	NH3	307
600	RM0600U80E	0.080	340	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	417
700	RM0700U41E	0.041	276	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	347
700	RM0700U68E	0.068	400	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	510
750	RM0750U15E	0.015	209	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	266
750	RM0750U25E	0.025	250	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	291
750	RM0750U36E	0.036	293	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	343
750	RM0750U60E	0.060	415	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	510
900	RM0900U13E	0.013	216	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	266
900	RM0900U26E	0.026	286	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	366
900	RM0900U32E	0.032	400	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	447
900	RM0900U43E	0.043	441	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	541
900	RM0900U53E	0.053	490	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	653
1000	RM1000U11E	0.011	179	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	277
1000	RM1000U18E	0.018	232	32.00	29.50	41.00	23.50	23.50	0.56	6	NH4	432
1000	RM1000U29E	0.029	377	39.50	34.00	51.50	24.00	32.00	0.69	6	NJ1	544
1000	RM1000U38E	0.038	416	26.00	25.00	38.00	21.50	19.00	0.56	6	NH3	684
1000	RM1000U48E	0.048	490	39.50	34.00	51.50	24.00	32.00	0.69	6	NJ1	792
1200	RM1200U10E	0.010	228	39.50	34.00	51.50	24.00	32.00	0.69	6	NJ1	355
1200	RM1200U15E	0.015	287	39.50	34.00	51.50	24.00	32.00	0.69	6	NJ1	432
1200	RM1200U18E	0.018	395	39.50	34.00	51.50	24.00	32.00	0.69	6	NJ1	493
1200	RM1200U24E	0.024	440	39.50	34.00	51.50	24.00	32.00	0.69	6	NJ1	594
1200	RM1200U30E	0.030	490	39.50	34.00	51.50	24.00	32.00	0.69	6	NJ1	684
1200	RM1200U40E	0.040	576	39.50	34.00	51.50	24.00	32.00	0.69	6	NJ1	850

SECTION 3

Note: Please refer to Pages 260 to 264 for enclosure dimensional specifications

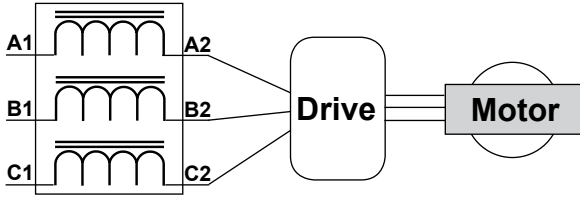
All dimensions in inches



# Application and Connection Diagrams

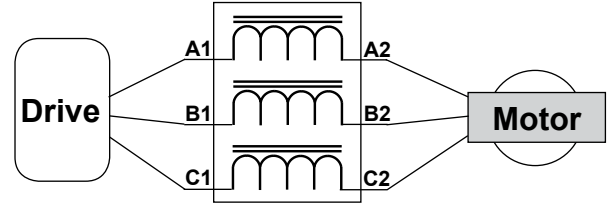
## INPUT SIDE OF DRIVE

Installed on the input side of drives, reactors will reduce line notching, limit current and voltage spikes and surges from the incoming line and will reduce harmonic distortion from the drive onto the line. Units are installed in front of the drive or inverter as shown.



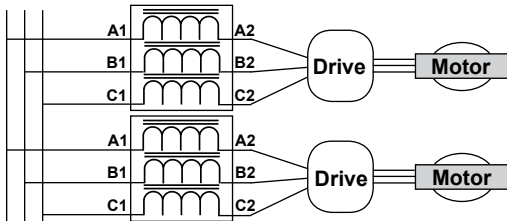
## OUTPUT SIDE OF DRIVE

On the output side between the motor and the controller, reactors protect the controller from short circuits at the load. Motor performance improves. Voltage and current waveforms from the supply are enhanced reducing motor overheating and noise emissions.



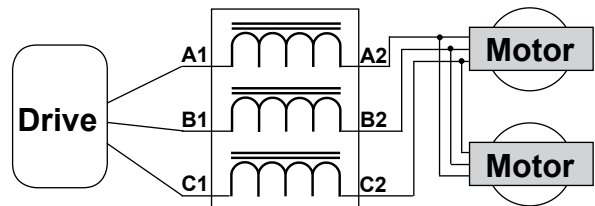
## MULTIPLE DRIVES

Individual line reactors are recommended when multiple drives are installed on the same power line. Individual reactors eliminates cross talk between multiple drives and provides isolated protection for each controller for its own specific load.



## MULTIPLE MOTORS

A single reactor can be installed when the application calls for multiple motors on the same drive. The reactor is sized based on the total horsepower of all the motors. Recommended for simultaneous operating motors only.



SECTION 3

# Termination Details

CONNECTOR DETAIL		
Open Style Ref.	Type	Range/Dia.
Figure #1	Terminal Block	#12 - #22
Figure #2	Terminal Block	#4 - #18
Figure #3	Terminal Block	#4 - #18
<u>All Others:</u>		
80 to 200 amps	Terminal Pad	.313" dia. (diagram 1A)
Above 200 amps	Terminal Pad	.5" dia. (diagram 1B)

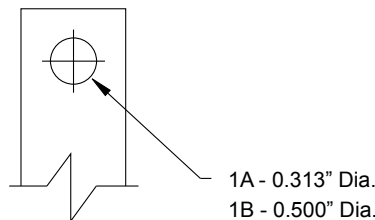


DIAGRAM 1

# RM Line Reactor Cross-Reference Table

MTE Part Number	Current (Amps)	HPS Part Number	Induct. (mH)	TCI Part Number
RL-00201	2	RM0002M12	12.000	KLR2A
RL-00202	2	RM0002M20	20.000	KLR2C
RL-00203	2	RM0002M32	32.000	*
RL-00404	4	RM0004M12	12.000	*
RL-00401	4	RM0004N30	3.000	KLR4B
RL-00402	4	RM0004N65	6.500	KLR4A
RL-00403	4	RM0004N91	9.100	KLR4C
RL-00801	8	RM0008N15	1.500	KLR8B
RL-00802	8	RM0008N30	3.000	KLR8A
RL-00803	8	RM0008N50	5.000	KLR8C
RL-00804	8	RM0008N75	7.500	*
RL-01201	12	RM0012N13	1.300	KLR12B
RL-01202	12	RM0012N25	2.500	KLR12A
RL-01203	12	RM0012N42	4.200	KLR12C
RL-01802	18	RM0018N15	1.500	KLR16A
RL-01803	18	RM0018N25	2.500	KLR16C
RL-01801	18	RM0018P80	0.800	KLR16B
RL-02502	25	RM0025N12	1.200	KLR25A
RL-02503	25	RM0025N20	2.000	KLR25C
RL-02501	25	RM0025P50	0.500	KLR25B
RL-03503	35	RM0035N12	1.200	KLR35C
RL-03501	35	RM0035P40	0.400	KLR35B
RL-03502	35	RM0035P80	0.800	KLR35A
RL-04503	45	RM0045N12	1.200	KLR45C
RL-04501	45	RM0045P30	0.300	KLR45B
RL-04502	45	RM0045P70	0.700	KLR45A
RL-05501	55	RM0055P25	0.250	KLR55B
RL-05502	55	RM0055P50	0.500	KLR55A
RL-05503	55	RM0055P85	0.850	KLR55C

MTE Part Number	Current (Amps)	HPS Part Number	Induct. (mH)	TCI Part Number
RL-08001	80	RM0080P20	0.200	KLR80B
RL-08002	80	RM0080P40	0.400	KLR80A
RL-08003	80	RM0080P70	0.700	KLR80C
RL-10001	100	RM0110P15	0.150	KLR110B
RL-10002	100	RM0110P30	0.300	KLR110A
RL-10003	100	RM0110P45	0.450	KLR110C
RL-13001	130	RM0130P10	0.100	KLR130B
RL-13002	130	RM0130P20	0.200	KLR130A
RL-13003	130	RM0130P30	0.300	KLR130C
RL-16002	160	RM0160P15	0.150	KLR160A
RL-16003	160	RM0160P23	0.230	KLR160C
RL-16001	160	RM0160U75	0.075	KLR160B
RL-20002	200	RM0200P11	0.110	KLR200A
RL-20003	200	RM0200P19	0.190	KLR200C
RL-20001	200	RM0200U55	0.055	KLR200B
RL-25003	250	RM0250P15	0.150	KLR250C
RL-25001	250	RM0250U45	0.045	KLR250B
RL-25002	250	RM0250U90	0.090	KLR250A
RL-32003	320	RM0320P13	0.130	KLR300C
RL-32001	320	RM0320U40	0.040	KLR300B
RL-32002	320	RM0320U75	0.075	KLR300A
RL-40003	400	RM0400P11	0.110	KLR360C
RL-40001	400	RM0400U30	0.030	KLR360B
RL-40002	400	RM0400U61	0.061	KLR360A
RL-50001	500	RM0500U25	0.025	KLR480B
RL-50002	500	RM0500U50	0.050	KLR480A
RL-50003	500	RM0500U85	0.085	KLR480C
RL-60001	600	RM0600U20	0.020	KLR600B
RL-60002	600	RM0600U40	0.040	KLR600A
RL-60003	600	RM0600U65	0.065	KLR600C



## DV/DT Filters

The advent of pulse width modulated (PWM) inverters with IGBT high speed transistors has resulted in smaller more cost effective drives and increased switching speeds. A waveform with increased harmonics at higher frequencies is the result of these much faster switching devices, usually at frequencies of 10,000 to 20,000 Hertz.

Drives and motors often need to be separated by significant distances. For deep wells or mines, the motors are usually controlled on the surface. As a result, the distance between the drive and the motor creates long motor lead lengths. In some plant applications, the motors can withstand the harsh environment, but the sensitive variable frequency drive cannot. This again results in long lead lengths to the motor.

Most manufactures of variable frequency drives will publish a recommended maximum distance between their equipment and the motor. Sometimes these recommendations create application difficulties, thus increased motor lead lengths are inevitable.

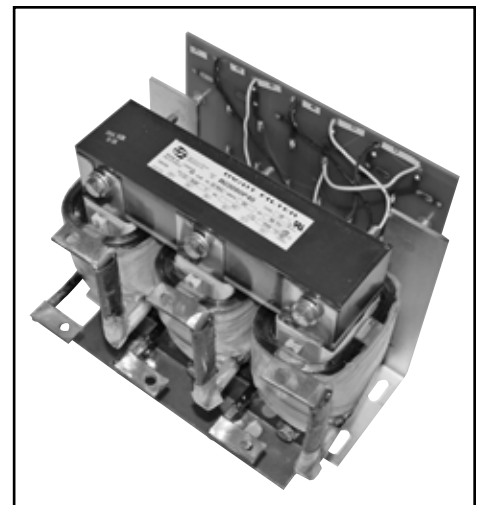
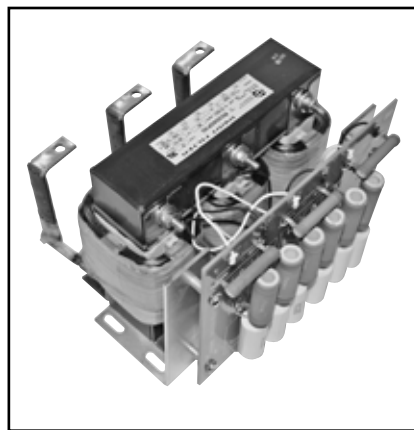
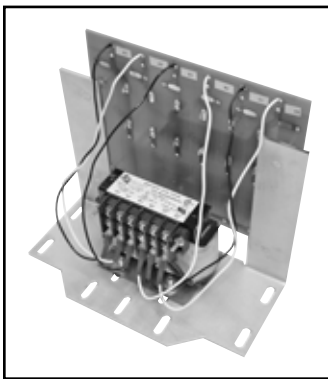
DV/DT is explained as the steep-front voltage pulses that travel down these long leads in the circuit to the motor and subsequently reverted back in a “reflective wave”. When the conductors are long enough, usually 20 feet or more, the time for reflection matches the time for transmission resulting in a high amplitude ‘standing wave’ on the circuit. Voltage spikes of up to 2100 volts are frequently experienced for 600 volt systems and motor winding failures are the result.

A DV/DT filter, combines the current limiting ability of an AC line reactor plus a resistive capacitance circuit that forms a damped, low pass filter. It provides protection for the motor by slowing the rate of voltage increase and minimizing the peak voltage that occurs at the motor terminals.

The cost of a DV/DT Filter is a little more than the cost of the reactor and can be mounted next to the drive, or inside the PWM enclosure.

### APPLICATIONS

The HPS RC series DV/DT filters are specifically designed for drive/motor applications with long lead lengths (usually where the motor cable length is 20 feet and greater). They should always be installed next to the IGBT variable frequency drive. Typical installation applications include production process lines, conveyor systems and deep wells.





## TYPICAL “RC” DV/DT FILTERS PERFORMANCE

The RC series DV/DT filters combine appropriate values of inductance, capacitance and resistance to form a filter which reduces DV/DT and peak voltages from the PWM voltage waveform. This combined with a 3% impedance reactor, that will reduce motor heating harmonics, will significantly increase the life of the motor.

Long lead length motor drive applications can experience motor terminal peak voltage spikes twice the DC bus voltage, and higher. Therefore motor terminal voltage peaks of 1200 volts for 480V drives and 1600 volts for 600V drives are not uncommon. The highest peak voltages will typically occur in lower HP applications.

## Standard “RC” DV/DT Filter Specifications

**RATINGS:**

Nominal Inductance +/- 10% @ rated current.  
95% of nominal inductance @ 150% rated current.  
50% of nominal inductance @ 350% of rated current.

The above performance indicates that even at very substantial overload conditions (even beyond what other equipment in the circuit could tolerate), the RM Line Reactor will still provide current limiting performance against total harmonic distortion generated by the drive system.

**TEMPERATURE RISE:**

115° C on units up to 160 amps; average ambient of 40° C.  
115° C on units larger than 160 amps; average ambient of 60° C.

**INSULATION SYSTEM:**

200° C Temperature Class up to 160 amps  
220° C Temperature Class over 160 amps

**FREQUENCY:**

60 Hz Fundamental Current Maximum.

**COOLING METHOD:**

Natural convection

**SYSTEM VOLTAGE:**

600 Volts Maximum

**APPROVALS:**

UL File No.: E61431  
CSA File No.: LR 3902

**SOUND LEVEL:**

2 to 18 amps:	58 dBA
130 to 320 amps:	70 dBA
25 to 100 amps:	64 dBA
400 to 600 amps:	75 dBA

**ENCLOSURE: (when specified)**

NEMA 2 or NEMA 3R

**HARMONIC WITHSTAND:**

Hammond DV/DT filters are designed to withstand harmonics associated with the output side of variable speed drives including IGBT type inverters.

**SWITCHING FREQUENCY:**

2.5 KHz up to 20 KHz.



# “RC” DV/DT Filter Selection

## SELECTION GUIDELINES

HPS RC filters are current rated devices. Therefore, to properly size and select the correct unit for your application, it is necessary to know the total motor load on the inverter. All RC filters are designed to be located next to the output terminals of the drive with symmetrical configured *three phase* cable used to connect the RC filter to the motor. Placement of these filters anywhere else will negatively impact the units performance.

The DV/DT filters have had the reactor selected in such a manner that the 3% impedance is approximately maintained at both the 600 and 480 system voltage level. Utilizing a 3% reactor provides optimum performance and protection for the motor. Using smaller impedance reactors will not protect against the same current peaks and motor performance would therefore be diminished.

**DV/DT Filter Part Number Guide**

RC 0002 M 32 \* \_

↑ RC 0002

↑ M

↑ 32

↑ \*

↑ \_

Further suffix to follow.  
Add suffix “E” for Enclosure.

Inductance Value

The inductance value is preceded with a letter to designate the position of the decimal point to determine the inductance. The letters are as follows:

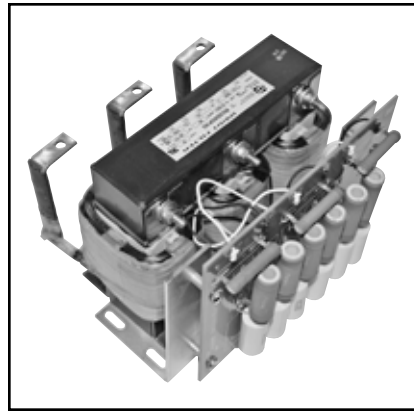
- ‘M’     XX. mH
- ‘N’     X.X mH
- ‘P’     0.XX mH
- ‘U’     .OXX mH or  
          XX.0 uH

Example: M32 is 32.0 mH

4 digits for current rating DV/DT Filter

**Note:** As all characters of the P/N represent performance values of the reactor, P/N's are not completely sequential. They are sorted by current rating.

\* Add the Suffix “E” to the standard part number below for an Enclosed unit.

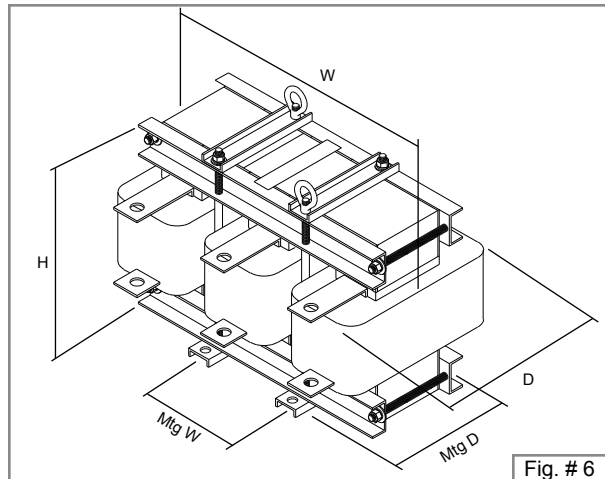
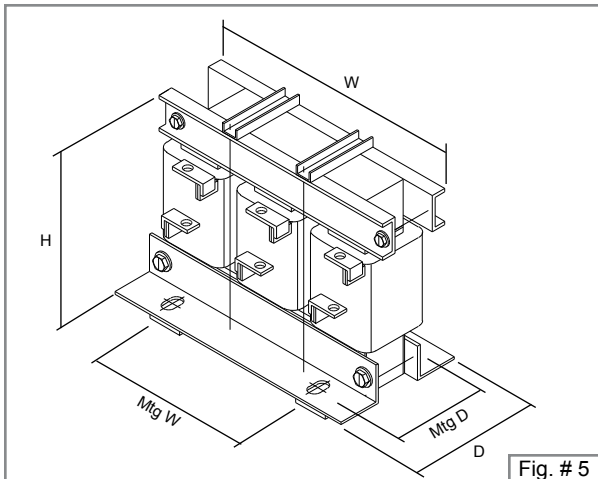
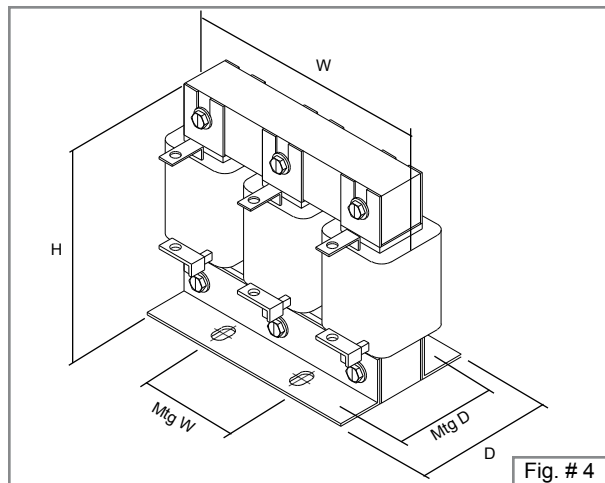
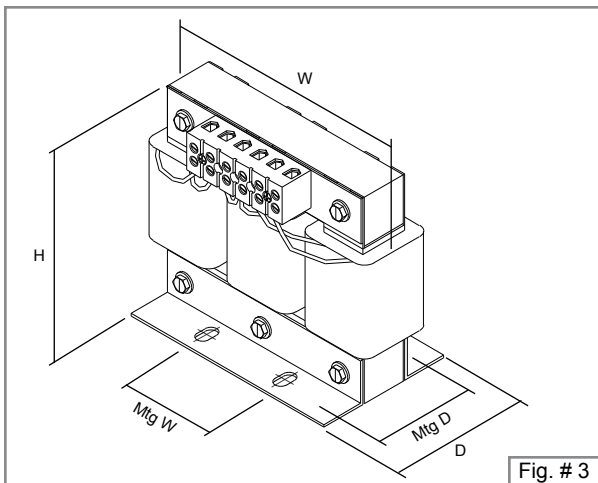
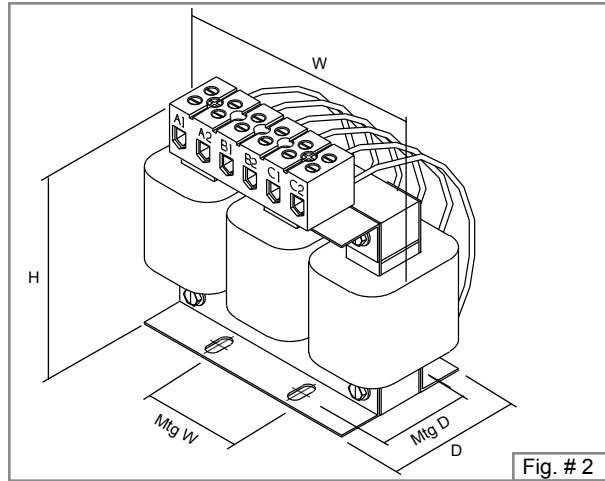
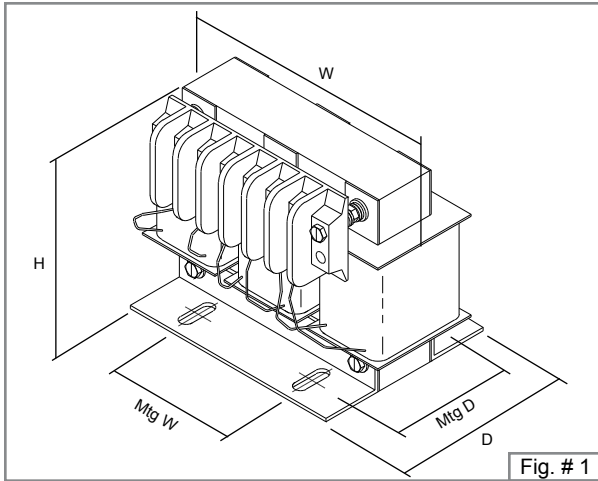


## “RC” DV/DT FILTER SELECTION TABLE FOR 600V OR 480V, 3% IMPEDANCE, 60 Hz

Current (Amps)	Part Number	Inductance	Watts Loss	Dimensions					Mtg Slot/Hole Size	Dim. Fig. # (Page 118)	Encl. Fig. #	Weight (Lbs.)	Enclosed Weight (Lbs.)
				W	D	H	Mtg. W	Mtg. D					
2	RC0002M12	12.0	62	9.00	6.18	7.40	8.25	2	.28 x .88	7	N1	4	11
4	RC0004N65	6.50	68	9.00	6.18	7.40	8.25	2	.28 x .88	7	N1	5	12
8	RC0008N30	3.00	80	9.00	6.18	7.40	8.25	2	.28 x .88	7	N1	5	12
12	RC0012N25	2.50	81	9.00	6.18	7.40	8.25	2	.28 x .88	8	N1	10	17
18	RC0018N15	1.50	84	9.00	6.18	7.40	8.25	2	.28 x .88	8	N1	11	18
25	RC0025N12	1.20	99	9.00	6.18	7.40	8.25	2	.28 x .88	8	N1	12	19
35	RC0035P80	0.80	106	9.00	6.18	7.40	8.25	2	.28 x .88	9	N2	19	36
45	RC0045P70	0.70	119	9.00	6.42	7.40	8.25	2	.28 x .88	9	N2	24	41
55	RC0055P50	0.50	130	9.00	6.27	7.40	8.25	2	.28 x .88	10	N2	28	45
80	RC0080P40	0.40	193	9.00	7.83	7.40	8.25	2	.28 x .88	10	N2	38	55
110	RC0110P30	0.30	423	14.0	8.70	11.62	3.6/4.8	4.20	.44 X 1.25	11	NH5	55	95
130	RC0130P20	0.20	415	14.0	8.20	11.62	3.6/4.8	3.73	.44 X 1.25	11	NH5	44	88
160	RC0160P15	0.15	429	14.0	8.70	11.62	3.6/4.8	4.23	.44 X 1.25	11	NH5	49	89
200	RC0200P11	0.11	414	14.0	9.23	11.62	3.6/4.8	4.23	.44 X 1.25	11	NH6	55	115
250	RC0250U90	0.090	431	14.0	9.73	11.62	3.6/4.8	4.70	.44 X 1.25	11	NH6	68	128
320	RC0320U75	0.075	484	14.4	9.50	11.43	4.80	5.94	.44 X 1.00	12	NH6	90	150
400	RC0400U61	0.061	477	14.4	11.5	11.43	4.80	6.44	.44 X 1.00	12	NH6	118	178
500	RC0500U50	0.05	496	14.4	11.5	11.43	4.80	6.44	.44 X 1.00	12	NH3	154	231
600	RC0600U40	0.040	523	14.4	12.0	11.43	4.80	6.94	.44 X 1.00	12	NH4	180	287

**Note:** Please refer to pages 260 to 264 for enclosure dimensional specifications

# Open Style "RM" Reference Drawings



SECTION 3

# Open Style "RC" Reference Drawings

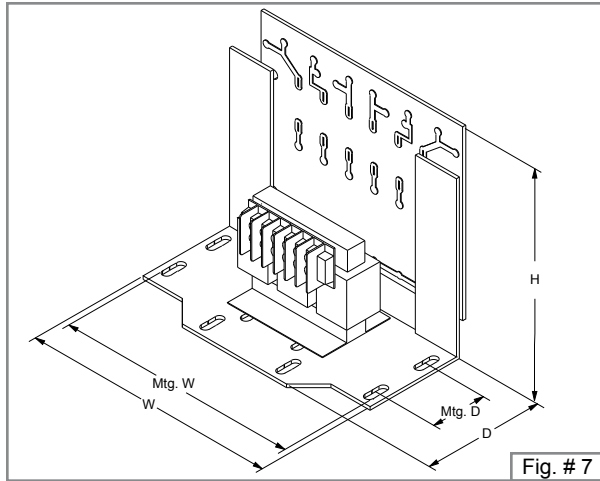


Fig. # 7

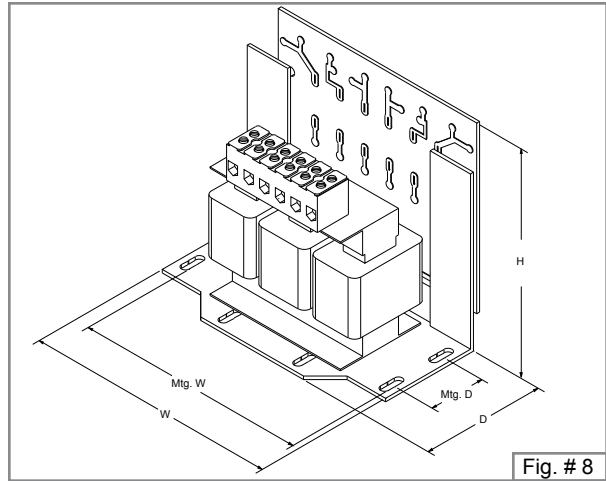


Fig. # 8

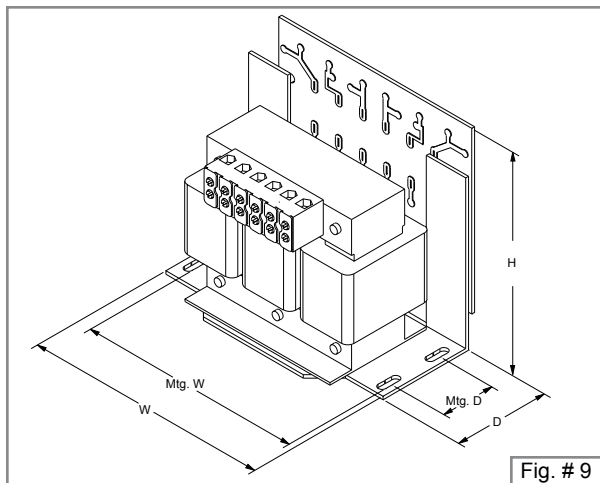


Fig. # 9

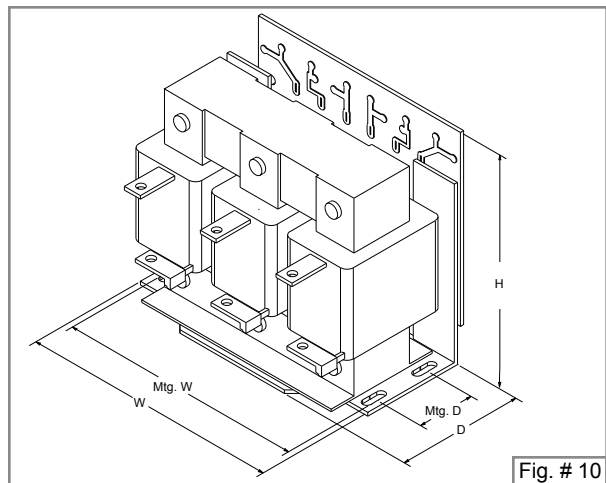


Fig. # 10

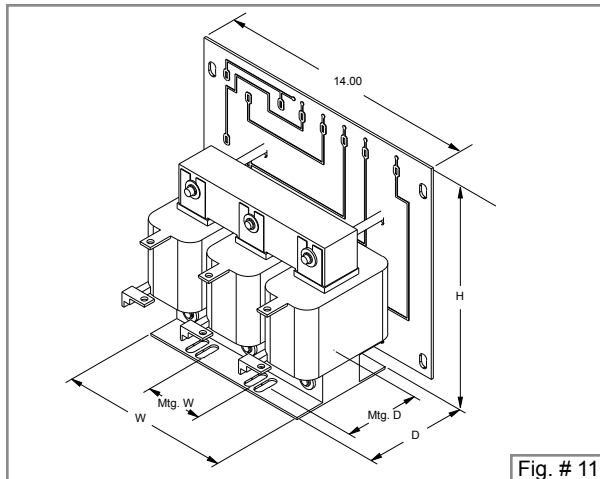


Fig. # 11

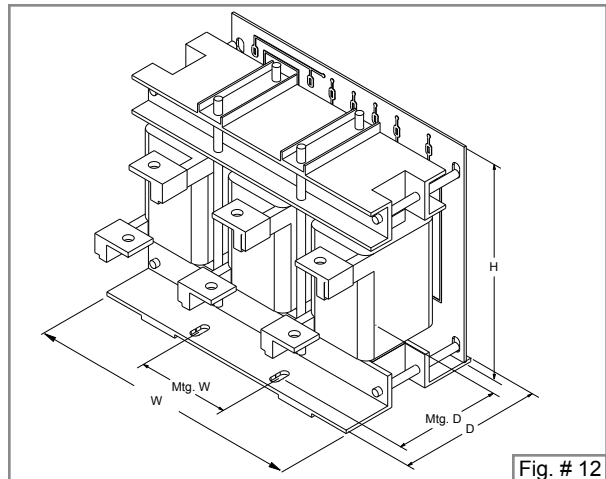


Fig. # 12

SECTION 3

