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MTE CORPORATION

## Benefits of Using Line/Load Reactors

Guard-AC line/load reactors help keep your equipment running longer by absorbing many of the power line disturbances which otherwise damage or shut down your inverters, variable speed controllers, or other sensitive equipment. They are the modern technology solution to inverter and drive application problems. Guard-AC reactors are harmonic compensated & IGBT protected to assure optimum performance in the presence of harmonics. They are very effective at reducing harmonics produced by inverters and drives, and in most cases will help you to meet IEEE 519. Use our harmonic compensated reactors on either the input or output of an adjustable speed drive/inverter. There is no need to de-rate our "harmonic compensated" reactors for harmonics.

Guard-AC reactors are manufactured to the exacting standards of MIL-1-45208, VDE-0550, are UL recognized & CSA certified. All UL approvals are for USA & Canada.

- UL-506 File #E53094 (lamp through 1200 amps)
- CSA File #LR29753-13 (1200 amps or less) 9
- UL-508 File #El80243 (1 amp through 1200 amps)

All higher current reactors offer UL recognized insulation systems and construction.



Impedance Rating

3% impedance reactors
are typically sufficient
to absorb power line spikes
and motor current surges.
They will prevent nuisance tripping
of drives
or circuit breakers
in most applications.

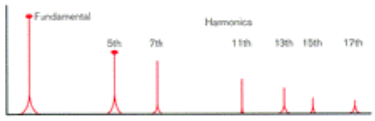
## 3-Phase Reactors

### Line/Load Reactors

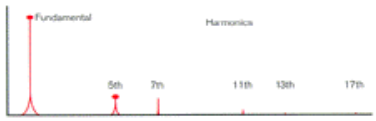
- Protect Motors from Long Lead Effects
- Reduce Output Voltage dv/dt
- Virtually Eliminate Nuisance Tripping
- Extend Semiconductor Life
- Reduce Harmonic Distortion
- Reduce Surge Currents
- Reduce Motor Temperature
- Reduce Motor Audible Noise
- Improve True Power Factor
- Helps Meet IEEE 519 or IEC 1000-3-4

5% impedance reactors
are best for
reducing harmonic currents
and frequencies.
Use them when
you must comply with
IEEE 519,
to reduce
motor operating temperature,
or to
reduce motor noise.

Typical Harmonic Distortion of PWM Inverter Without Reactor




Typical Harmonic Distortion of PWM Inverter With 5% Impedance Reactor




## Harmonic Reduction

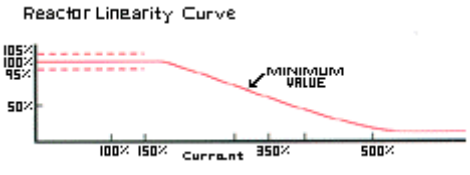
Because all standard Guard-AC reactors are compensated for harmonics (current and frequency), they are extremely effective at reducing the amount of harmonics which are produced by a drive/inverter. Use 5% impedance, harmonic compensated reactors for best reduction of harmonic distortion.

### Percent Harmonics vs Total Line Impedance
### Total Input Impedance

| Harmonic | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% |
|---|---|---|---|---|---|---|---|---|
| 5th | 40 | 34 | 32 | 30 | 28 | 26 | 24 | 23 |
| 7th | 16 | 13 | 12 | 11 | 10 | 9 | 8.3 | 7.5 |
| 11th | 7.3 | 6.3 | 5.8 | 5.2 | 5 | 4.3 | 4.2 | 4 |
| 13th | 4.9 | 4.2 | 3.9 | 3.6 | 3.3 | 3.15 | 3 | 2.8 |
| 17th | 3 | 2.4 | 2.2 | 2.1 | 0.9 | 0.7 | 0.5 | 0.4 |
| 19th | 2.2 | 2 | 0.8 | 0.7 | 0.4 | 0.3 | 0.25 | 0.2 |
| %THID | 44.13 | 37.31 | 34.96 | 32.65 | 30.35 | 28.04 | 25.92 | 24.68 |
| TRMS | 1.09 | 1.07 | 1.06 | 1.05 | 1.05 | 1.04 | 1.03 | 1.03 |

## Reactor Linearity

This curve illustrates the linearity of Guard-AC reactors. Even at 150 percent of their current rating, these reactors still have 100% of their nominal inductance. This assures maximum filtering of distortion even in the presence of severe harmonics and best absorption of surges. The typical tolerance on rated inductance is plus-or-minus 5 percent.



## You Benefit From These Unique Features

**Harmonic Compensation** makes Guard-AC reactors suitable for use on either the drive input or drive output. They are designed to carry full rated fundamental current plus handle current and frequencies associated with harmonics-up to 50 percent more.

**Terminals** are provided as standard to save installation cost and minimize panel space. Finger proof (IP20) terminals are provided through 80 amps, solid copper box lugs above that to 400 amps.

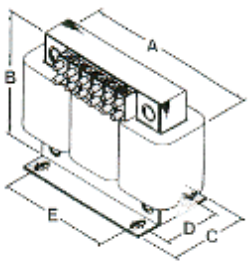
**Epoxy Impregnation** minimizes audible noise in the reactor and enhances structural integrity.

**IGBT Protection** allows all MTE standard reactors to be used on the output of variable frequency drives including IGBT types with switching frequencies up to 20 KHZ. A premium dielectric system is utilized to protect the first, last and end turns from the potentially high circuit peak voltages and fast dv/dt which are experienced in applications with long leads between the inverter & motor. Additionally, the general dielectric system of each reactor is UL approved (UL-506) for 4000 volts rms.

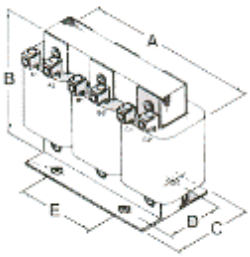
**High Saturation Current Rating** of Guard-AC reactors maximizes their surge current protection capability. Guard-AC reactors absorb many of the power line disturbances which cause nuisance trips on voltage source inverters.

**Motor Protection** Reactors help to protect motors from the high peak voltages & fast rise times (dv/dt) which can be experienced in IGBT inverter applications when the distance between the inverter and motor is long.

**Outline Dimensions** All Guard-AC reactors are supplied with field wiring terminals, as illustrated. Units rated 80 amperes or below are supplied with the international terminal block as shown. Reactors rated above 80 amperes thru 400 amperes are supplied with solid copper box lugs. Larger reactors are supplied with copper tab type terminals. Refer to these outline drawings and the table refer to the specifications document for reactor dimensions.



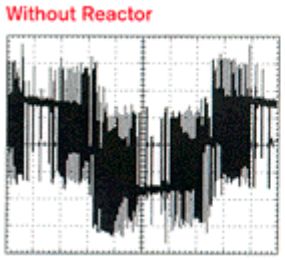
(80 amperes and below)

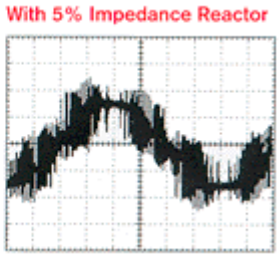


(above 80 amperes)

## Motor Protection

Reactors help to protect motors from the high peak voltages & fast rise times (dv/dt) which can be experienced in IGBT inverter applications when the distance between the inverter & motor is long.

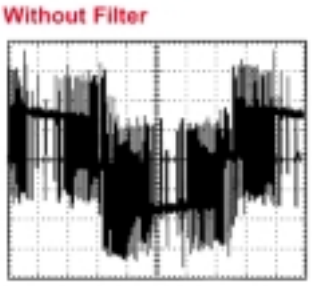


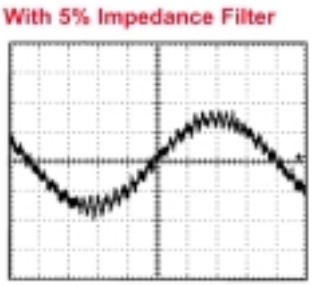




## LC Type (dv/dt) Long Lead Filters

These filters are available to improve the inverter output wave form from a PWM type to a nearly sinusoidal waveform.

Capacitor modules are also available for addition in the field when you already have our 5% impedance reactor installed. Ask for our IGBT Long Lead Filter brochure for more details.

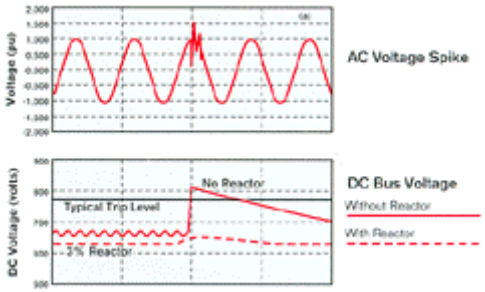



## Voltage Spike Protection

A 3% impedance reactor is very effective at protecting against damage to or nuisance tripping of AC voltage source inverters, due to voltage spikes.

Voltage spikes on the AC power lines cause elevation of the DC Bus voltage which may cause the inverter to "trip-off" & indicate an over-voltage protection condition. Use reactors to absorb these line spikes and offer protection to the rectifiers & DC Bus capacitors while minimizing nuisance tripping of the inverter.



## NEMA 1 Cabinets

All Guard-AC reactors are available as either open type or in a NEMA Type 1 general purpose enclosure. To order a reactor mounted in a cabinet, simply change the second last digit of the part number from "0" to "1". Example RL-00802 becomes RL-00812.

| Reactor Part Number | Type | W | H | D | WT. (lbs) | Cabinet |
|---|---|---|---|---|---|---|
| RL-002XX, RL-004XX, RL-008XX, RL-012XX, RL-01801, RL-01802 | Wall Mount | 8 | 8 | 6 | 7 | CAB-8 |
| RL-01803, RL-025XX, RL-035XX RL-045XX, RL-055XX, RL-080XX, RL-100XX, RL-130XX, RL-160XX, RL-200XX, RL-25001 | Floor | 13 | 13 | 13 | 31 | CAB-13 |
| RL-25002, RL-25003, RL-320XX, RL-400XX, RL-500XX, RL-600XX | Floor | 17 | 24 | 17 | 45 | CAB-17 |
| RL-750XX | Floor | 24 | 30 | 24 | 83 | CAB-24 |

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