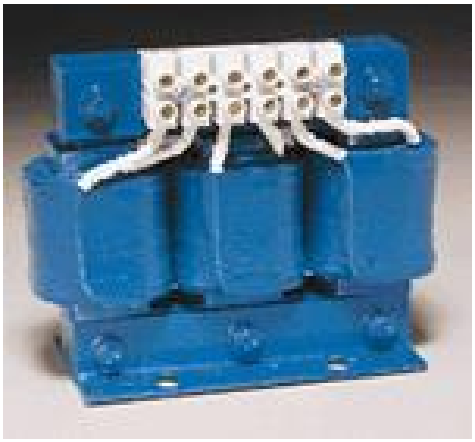
Shop "Tech Talk" October 2007

Q. I have read about using line reactors with AC drives. Could you explain when and how to use them to offset problems that may occur with the use of AC drives?

A. There's no doubt about it. These devices can take the heart ache out of several problems you may encounter.

Though the picture looks like a transformer, the line reactor is simply 3 equal inductors or coils each wound on a lamination stack. Each coil has an input and an output terminal. Each coil is inserted in the circuit in series with the line current feeding the drive or the load. Because the reactor can be wired ahead of the drive or after the drive as in diagrams below it should more properly be called a line / load reactor.



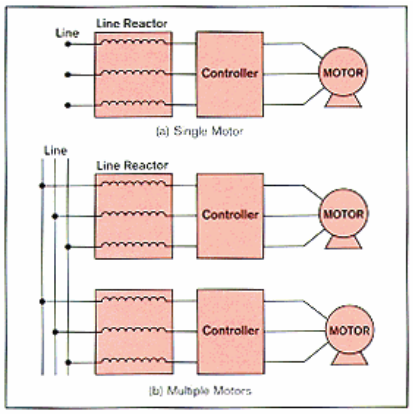


Figure 2. Typical Line Reactor Configuration

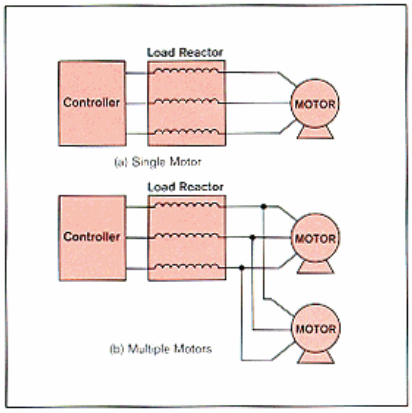


Figure 3. Typical Load Reactor Configuration

1.The reactors we sell are made by MTE and can be used in conjunction with AC or DC drives or other sensitive electronic equipment and should more properly be called a Harmonic Compensated Reactor (HCLR), as it is especially designed to handle the drive waveform's harmonic content.

2.The reactor acts as a current limiting device and filters the waveform and attenuates electrical noise and harmonics associated with the inverter / drive . In this respect, the line reactor even surpasses the isolation transformer at a fraction of the transformer's cost (approx. 1/5 of the transformer cost)

Percentage Impedance of Line / Load Reactors

Reactors are normally available in 2 types, a 3% impedance version and a 5% impedance version.

***The use of each kind is summarized on the next page*.**

If you applied a 3 % impedance reactor ahead of a drive at 460v, 3 phase input voltage, to the reactor there would be a 3% voltage drop or approx. 13.8 volts at the input terminals of the drive if the rated current of the reactor was flowing.

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Problem Solved or Benefit Derived by Using an MTE Harmonic Compensated Line / Load Reactor

	Problem Soved Or Benefit Derived	Brief Explanation	% Imped-ance Reactor Required	Placement Of Reac-tor With Re-spect To Drive
1	Voltage Transient Pro-tection	The reactor (HCLR) has significant inductance so opposes any rapid power surges	3%	Ahead
2	Drive Nuisance Tripping	The HCLR is extremely resistive to spikes on power line which would normally cause drive to trip	3%	Ahead
3	Capacitor Switching Spike Protection	When the local utility switches power factor correction ca-pacitors onto the electrical power grid it creates voltage spikes. The reactor virtually eliminates this problem	3%	Ahead
4	Motor Short Circuit Protection	If motor shorts out, the reactor will provide current limit-ing to safer values, also will slow down the short circuit cur-rent rise time giving the drive more time to react	3%	After
5	Multiple Motor Applica-tions	When using multiple drives on a common power line use one HCLR per controller. This provides filtering between each controller (reduces crosstalk) and also provides opti-mum surge protection for each unit	3%	Ahead
6	Voltage Notch Reduction (SCRs)	Normally caused when SCRs are used in electrical controls and we experience line voltage distortion in the form of “notches” in the wave-form.	3%	Ahead
7	Current Surge Protec-tion	Reactor acts as a current-limiting device and absorbs surges caused by machine jams, load swings & other appli-cation changes	3%	After
8	Line Harmonic Reduc-tion	Will virtually eliminate the higher order harmonics (11th& Up) and will substantially reduce the lower order 5th & 7. In most cases will allow you to meet IEE 519 specifications.	5%	Ahead
9	Motor Temperature Re-duction	Harmonics are reduced, causing motor watts loss to be re-duced, thus reducing heat that would otherwise be spent in the motor windings. A HCLR can reduce temperatures as much as 20 to 40 degrees C	5%	After
10	Motor Noise Reduction	By reducing harmonics, the presence of higher frequencies is diminished and thus the audible noise is reduced , typi-cally 3 to 6 dB	5%	After
11	Motor Efficiency Im-provement	Harmonics are reduced, causing motor watts loss to be re-duced thus efficiency improved. The HCLR attempts to create a perfect sine wave, thus improving motor efficiency	5%	After
12	Protect Motors With Long Lead Lengths	Long lead lengths can lead to voltage doubling because of reflected waves. The HCLR is protected against these high voltages by their windings having a dielectric strength of 4,000V	5%	After