NWL
Transforming The Future Of Power Technology
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Nanocrystalline Core AC and DC Common Mode Inductors

Superior Performance in High Frequency, High Power Applications

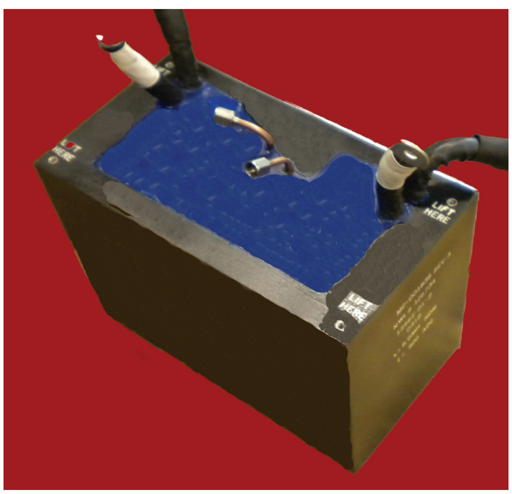
Normal three phase power systems have sinusoidal, balanced and symmetrical voltages; PWM-switched three phase power supplies such as variable frequency drives (VFD) or adjustable speed drives (ASD) have naturally occurring imbalances between phases as a consequence of high frequency conversion. This imbalance creates a potential between the inverter output and earth, forcing currents through stray impedances in the motor cables and windings.

Common mode currents can damage bearings in motors that are fed from PWM drives. High frequency bearing currents are induced in the motor shaft due to asymmetrical flux within the motor. The inverter voltage pulses and leakage capacitance of the motor windings provide a path for currents to flow to earth. The induced voltage may be high enough to damage the insulation of the oil on the bearings which will cause bearing currents. Having current flowing at this point will cause premature wear of the bearings and can lead to motor failure.

Inductors used in high power, high frequency applications must be able to tolerate high differential currents as well as high common mode currents. One way to overcome these currents is to increase the number of turns per winding. The core must have high permeability, low magnetostriction, and high saturation. The best material for this application is an amorphous nanocrystalline material. With respect to core geometry, a C-core is more suitable for more demanding uses, as opposed to the more common toroid.

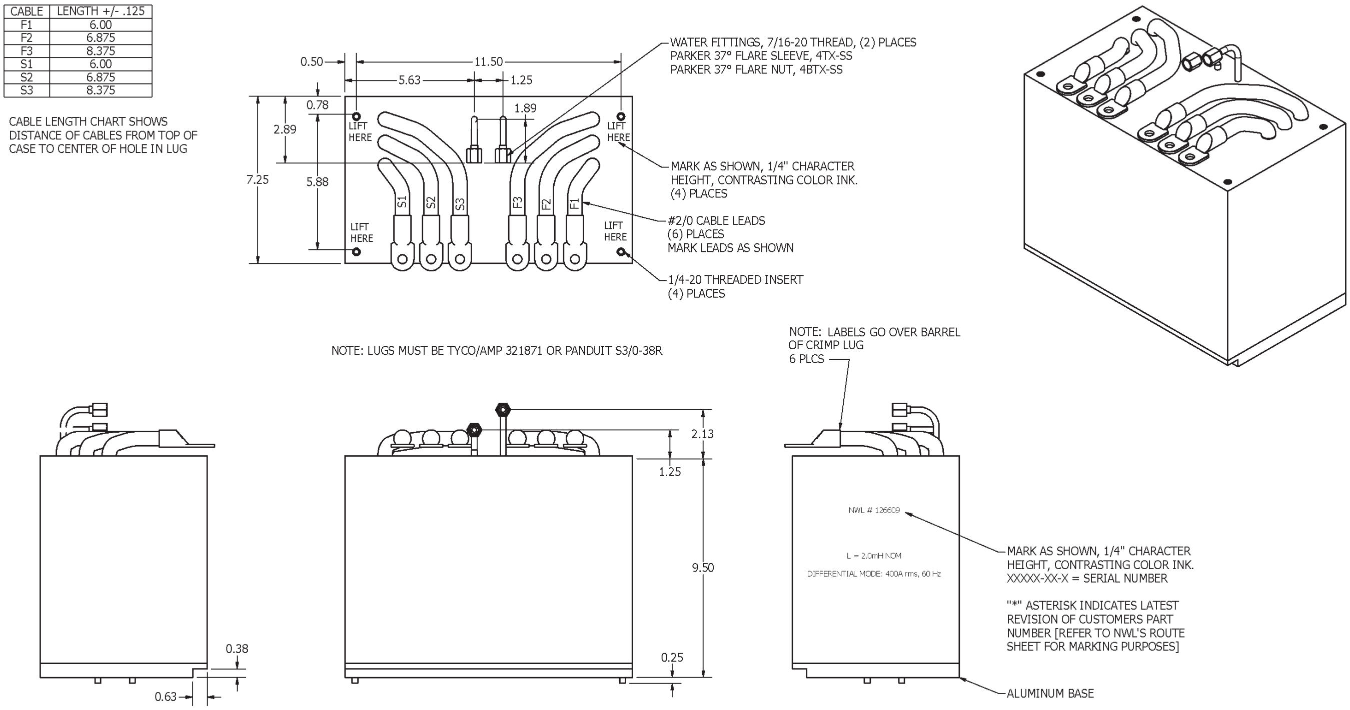
NWL has designed and built a product family of this type of common mode inductor. We offer three winding units for use in the three phase AC lines, or two winding units for use on the DC side of the inverter. In order to minimize the ill effects of high leakage inductance between the windings, NWL employs an interleaved approach. It is evident that high leakage inductance between windings on a common magnetic core structure will increase the differential inductance. This in turn will provide additional flux density in the core structure. Indirect water cooling is an option for both AC and DC inductors for high efficiency thermal management. Our common mode inductors have proven themselves in the most challenging military and industrial environments. Robust, reliable and rugged. That's the NWL way.

NWL two winding DC common mode inductors prior to packaging and resin impregnation. The C-core construction enables multiple windings.

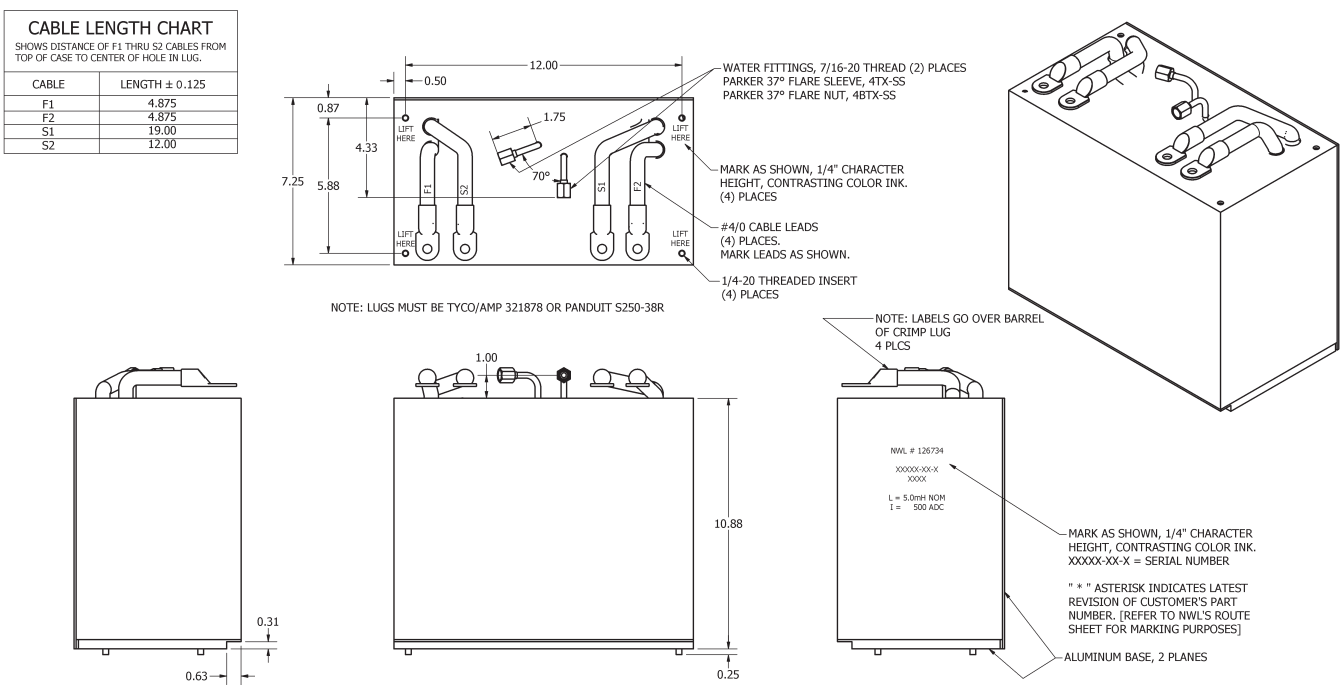


Completed DC water cooled CMI

AC Common Mode Inductor Overview Drawing



DC Common Mode Inductor Overview Drawing



NWL Part #	Type	Inductance (mH)	Diff. current (A rms)	Common mode Current/Freq	Dimensions (in)			Weight (lbs)
					Length	Width	Height	
129237	AC 3 ph	3	70	20A @ 20 kHz	12	7	5	50
126609	AC 3 ph	2	400	10 A @ 5 kHz 2 A @ 10 kHz	13	7	12	125
131213	DC 2 wire	3	500	10 A @ 5 kHz 2 A @ 10 kHz	13	7	11	175
126734	DC 2 wire	5	500	10 A @ 5 kHz 2 A @ 10 kHz	13	7	11	175
131175	AC 3 ph	2	600	5 A @ 1 kHz 5 A @ 10 kHz 2 A @ 20 kHz	16	8	12	275