



Parker Hannifin Corporation
Precision Cooling Business Unit
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System Characteristics	Benefit to you
System is hermetic	<ul style="list-style-type: none"> No end user maintenance required
Scalable, able to handle high heat loads in high ambient environments	<ul style="list-style-type: none"> In most cases we can eliminate the chiller
No water treatments <ul style="list-style-type: none"> No special freeze protection, R134a freezes at -103°F No biocides, no micro bacteriological growth No particle or carbon filters to change 	<ul style="list-style-type: none"> Maintenance costs are reduced or eliminated No drip catching buckets Packaging is simplified
Dielectric fluid is inherently safer <ul style="list-style-type: none"> If there should be a leak it will flash to gas & not harm the electronics Fluid will not ionize in high amp/voltage situations 	<ul style="list-style-type: none"> Leaks are a recoverable event Lowers warranty costs Electronics are not damaged
System is Isothermal, all coldplates remain close to the same temperature	<ul style="list-style-type: none"> Simpler, serial plumbing Less CTE (coefficient of thermal expansion) Issues Better thermal control
System optimizes dynamically to varying heat loads by simply boiling more	<ul style="list-style-type: none"> Longer IGBT MTBF Simple (no) controls
Low Fluid Flow Rates <ul style="list-style-type: none"> No cavitation inside the cold plate No flow corrosion 	<ul style="list-style-type: none"> Smaller pump means less costs Cold plates last the life of the system Smaller size Less weight
Cooling system will not form a battery with dissimilar metals <ul style="list-style-type: none"> No galvanic corrosion No copper scavenging 	<ul style="list-style-type: none"> Pump maintenance is eliminated Cold plates last the life of the system Heat transfer remains as the engineer designed
Low relative flow rates, 3gph per 1kW of heat dissipated	<ul style="list-style-type: none"> Smaller pumps, smaller line sets, less fluid volume
Fluid saturation temperature can be set via system pressure	<ul style="list-style-type: none"> Allows for precise control of junction temperature High saturation temperature means you can use a smaller condenser Or smaller fans Or dissipate heat in a high ambient environment
Cold has no impact on fluid viscosity	<ul style="list-style-type: none"> System needs no special start up procedure
System temperature always remains above dewpoint	<ul style="list-style-type: none"> No sweating line sets No electrical failures
No risk of blocking micro channel cold plate structure	<ul style="list-style-type: none"> Reduces or eliminates this maintenance issue
No de-rating because of altitude	<ul style="list-style-type: none"> Only requires a larger condenser
System does not have to be de-rated due to temperature	<ul style="list-style-type: none"> Allows you to use the proper size silicon No ethylene glycol necessary