3M Science. Applied to Life.™

Heat transfer applications using 3M™ Fluorinert™ Electronic Liquids

Thermal management requirements are diverse, complex and demanding. Choose the brand that has set the standard in the electronics industry for over 40 years – 3M™ Fluorinert™ Electronic Liquids. With excellent dielectric properties and a wide range of boiling and pour points, these liquids meet your unique thermal management needs including direct contact heat transfer, electronic cooling, manufacturing and testing applications.

Property	Unit	3M™ Fluorinert™ Electronic Liquids						
		FC-3284	FC-72	FC-770	FC-3283	FC-40	FC-43	FC-70
Boiling Point	°C	50	56	95	128	165	174	215
Pour Point	°C	-73	-90	-127	-65*	-57	-50	-25
Molecular Weight	g/mol	299	338	399	521	650	670	820
Critical Temperature	°C	161	176	238	235	270	294	335
Critical Pressure	MPa	1.94	1.83	2.47	1.22	1.18	1.13	1.03
Vapor Pressure	kPa	35	30	6.6	1.4	0.29	0.19	0.02
Heat of Vaporization	kJ/kg	105	88	86	78	68	70	69
Liquid Density	kg/m^3	1710	1680	1793	1820	1855	1860	1940
Coefficient of Expansion	K^{-1}	0.0016	0.0016	0.0015	0.0014	0.0012	0.0012	0.0010
Kinematic Viscosity	cSt	0.42	0.38	0.79	0.75	2.2	2.5	12
Absolute Viscosity	cP	0.71	0.64	1.4	1.4	4.1	4.7	24
Specific Heat	J/kg-K	1100	1100	1038	1100	1100	1100	1100
Thermal Conductivity	W/m-K	0.062	0.057	0.063	0.066	0.065	0.065	0.070
Surface Tension	mN/m	13	10	15	15	16	16	18
Solubility of Water in Fluid	ppm by weight	14	10	14	7	<7	7	8
Dielectric Strength, 0.1" gap	kV	>40	>40	>40	>40	>40	>40	>40
Dielectric Constant @ 1kHz	-	1.9	1.8	1.9	1.9	1.9	1.9	2.0
Volume Resistivity	Ohm-cm	10^{15}	10^{15}	10^{15}	10^{15}	10^{15}	10^{15}	10^{15}

*Fluid is considered super cooled at this temperature. Talk to a Tech Service Engineer for more information.

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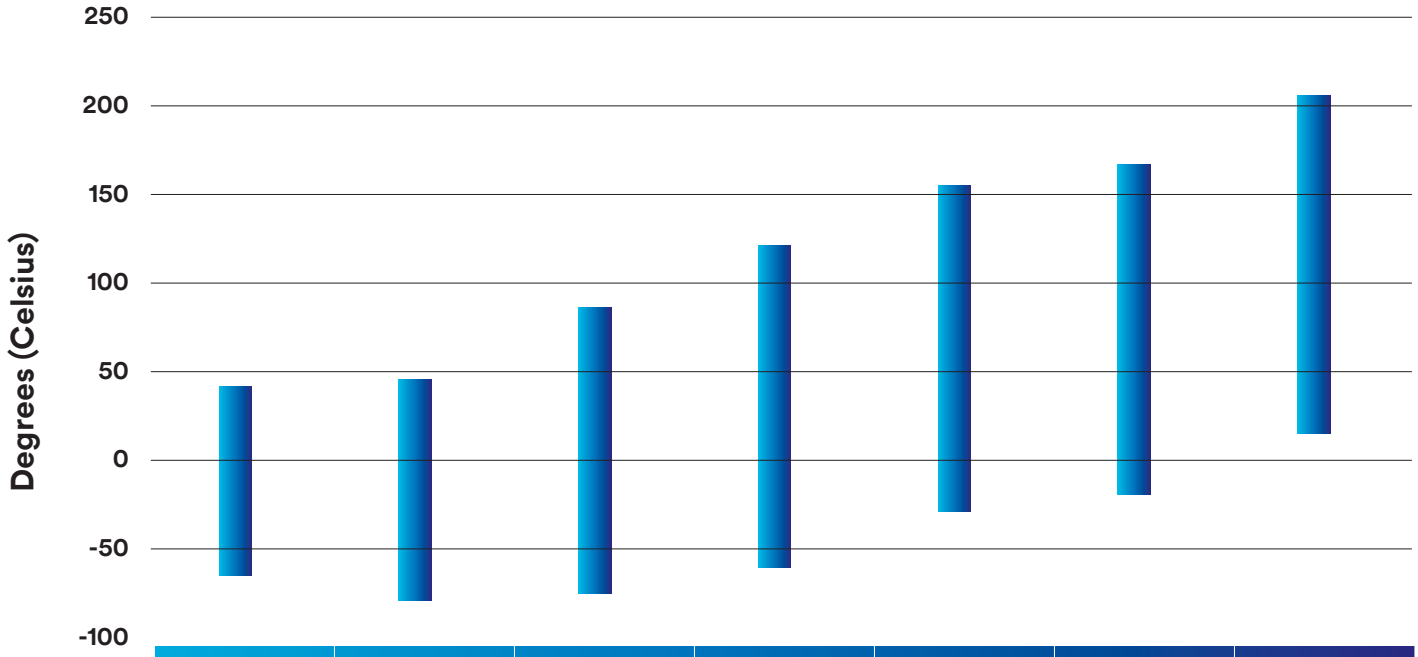
Typical Operating Temperature Range for Pumped Single Phase Systems*

Operating Temperature Range



	FC-3284	FC-72	FC-770	FC-3283	FC-40	FC-43	FC-70
High**	40	45	85	120	155	165	205
Low***	-65	-80	-75	-60	-30	-20	15

* For two phase systems, contact your 3M technical service representative.
** Typical value is 10°C below the boiling point.
*** Typical value is the measured or calculated temperature at 20-30 cSt viscosity, fluid may be super cooled.

We are confident that 3M has the right solution for your heat transfer application. To learn more about 3M™ Fluorinert™ Electronic Liquids visit 3M.com/Electronics. You can also explore our other heat transfer fluids, 3M™ Novec™ Engineered Fluids, at 3M.com/Novec.

Have questions? Need technical assistance? Contact your 3M technical service representative. We're here to help.

Electronics Materials Solutions Division
3M Center, Building 224-3N-11
St. Paul, MN 55144-1000 USA

Web www.3M.com/Electronics
Phone 1-800-810-8513