NSC4000-SLT & NSC1000-ULT BHO EXTRACTION

60 lbs/hr Solvent Condensed and Subcooled to -54°C (-65°F)

CALCULATIONS

From 50°C (122°F) Condensed and Subcooled to -20°C (-4°F):

Flowing System	Yes	
Material being cooled flowing through chiller?	No	
Fluid	70/30 (Butane/Propane)	
Inlet Temperature	50	°C
Desired Outlet Temperature	-20	°C
Ambient	90°F	
Required dT	-10	°C
Flow Rate: (60 lbs/hr)	1.00	lb/min

Condensing Temperature = -13.34C (8.06F)

Absolute minimum capacity	13470	BTU/hr
	3.95	kW

WARNING PHASE CHANGE!!! - Assumes phase change happens at -13.2°C

Chiller Options at -30°C fluid outlet and 90°F Ambient

Chiller Model	Capacity (BTU/hr)	Capacity (Watts)	% Oversized
NSC2000-ULT	26,000	7,613	93%
NSC4000-SLT	23,700	6,940	76%

NSC4000-SLT has 20,900 BTU/hr (6,120.5 Watts) at -30C (-22F) Chiller Fluid Temperature at 100F Ambient = 55% overersized.

Calculations

Inlet Temperature	50.00	°C
Outlet Temperature	-20.00	°C
Flow Rate	0.00000	m^3/min
Specific Heat (Liquid)	2.3500	kJ /kg °K
Specific Heat (Gas)	1.7080	kJ /kg °K
Density	613.9	kg/m^3
Mass flow rate	0.0075599	kg/sec
Volume	0.2	m^3
Mass	116.2	kg
Static System Power	0.0	kW
Heat of Vaporization	397.9	kJ/kg
Condensing Temperature	-13.2	°C
Start Phase	Gas	
End Phase	Liquid	
Phase Change Energy	3.0080736	kW
Flowing System Power (Gas)	0.8156247	kW
Flowing System Power (Liquid)	0.121399	kW
Flowing System Power	3.9450972	kW
Required dT	-10	°C

		100F	110F
NSC4000-SLT		0.55	0.34
Ambient	Watts	BTU/hr	
90F	6940	23700	
70F	8579	29300	
	81.95	280	
100F	6120.5	20900	
110F	5301	18100	

From -20°C (-4°F) Subcooled to -54°C (-65°F):

Flowing System	Yes	
Material being cooled flowing through chiller?	No	
Fluid	70/30 (Butane/Propane)	
Inlet Temperature	-20	°C
Desired Outlet Temperature	-54	°C
Ambient	90°F	
Required dT	-10	°C
Flow Rate: (60 lbs/hr)	1.00	lb/min

Condensing Temperature = -13.34C (8.06F)

Absolute minimum capacity	2070	BTU/hr
	0.61	kW

Chiller Options at -64°C fluid outlet and 90°F Ambient

Chiller Model	Capacity (BTU/hr)	Capacity (Watts)	% Oversized
NSC1000-ULT	3,800	1,113	84%
NSC2000-ULT	13,600	3,982	557%

NSC1000-ULT has 2,650 BTU/hr (776.5 Watts) at -64C (-83F) Chiller Fluid Temperature at 100F Ambient = 28% overersized.

Calculations

Inlet Temperature	-20.00	°C
Outlet Temperature	-54.00	°C
Flow Rate	0.00000	m^3/min
Specific Heat (Liquid)	2.3500	kJ /kg °K
Specific Heat (Gas)	1.7080	kJ /kg °K
Density	613.9	kg/m^3
Mass flow rate	0.00755987	kg/sec
Volume	0.2	m^3
Mass	116.2	kg
Static System Power	0.0	kW
Heat of Vaporization	397.9	kJ/kg
Condensing Temperature	-13.3	°C
Start Phase	Liquid	
End Phase	Liquid	
Phase Change Energy	0	kW
Flowing System Power (Gas)	0	kW
Flowing System Power (Liquid)	0.60403388	kW
Flowing System Power	0.60403388	kW
Required dT	-10	°C

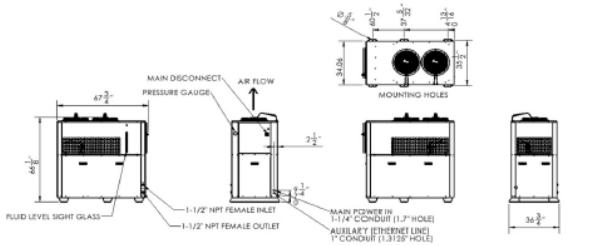
		100F	110F
NSC1000-ULT		0.28	-0.27
Ambient	Watts	BTU/hr	
90F	1113	3800	
70F	1786	6100	
	33.65	115	
100F	776.5	2650	
110F	440	1500	

NSC4000-SLT

AG-CHILL

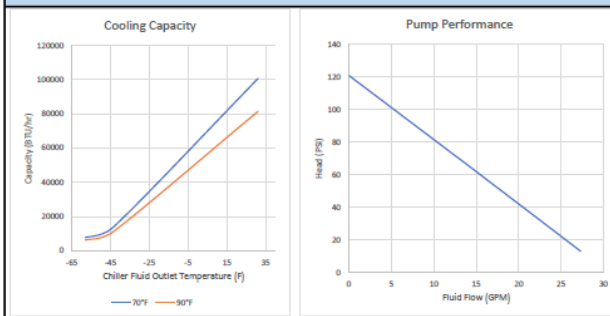
4 Ton Air Cooled Super Low Temp Chiller

Dimensional Drawings



LENGTH	WIDTH	HEIGHT	WEIGHT	TANK CAPACITY	FLUID CONNECTIONS
65"	34"	66"	1000 lbs	15 Gallon Stainless Steel	3/4" NPT

Chiller Performance



AG-Optimists, LLC
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Salt Lake City, UT 84119
(541) 610-6858
www.ag-chill.com

All Information Is For Reference Only

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NSC4000-SLT

AG-CHILL

Standard Features and Benefits

Performance	Working Temperature Range	-58°F(-50°C) to 10°F(-12°C)	
	Temperature Stability	±2	
	Cooling Capacity at 70F	-58°F (-50°C) - 7,800 BTU/hr (2,290 Watts) -43.6°F (-42°C) - 13,800 BTU/hr (4,040 Watts) 31.1°F (-0.5°C) - 100,700 BTU/hr (29,510 Watts)	
	Ambient Temperature (Standard)	20°F - 100°F	
	Pump Performance	0 GPM @ 121 PSI 13.7 GPM @ 67 PSI 27.3 GPM @ 13 PSI	
User Interface	Controls	Electronic Programmed Temperature Controller (PLC) with Constant (Setpoint & Process) Temperature Readout	
	Additional Features	Fluid Level Indicator, Touch Screen Controls	
Refrigeration Circuit	Compressor	Bitzer 2 Stage Reciprocating	
	Heat Exchanger	Brazed Plate Heat Exchanger	
	Refrigerant	R404a	
	Additional Features	Access Ports, Service Valves, Filter Drier, Sight Glass, Liquid Receiver, Suction Accumulator, Thermostatic Expansion Valve (TXV)	
	Max Heat Rejection	116,200 BTU/hr (34.0 kW)	
Process Fluid Circuit	Pump	Continuous Duty, 2.2kW Vortex Pump	
	Inlet/Outlet	3/4" NPT	
	Reservoir	15 Gallon Stainless Steel	
	Additional Features	Inline Strainer, Inlet and Outlet Temperature Sensors, Pump Discharge Pressure Transducer	
Construction	Frame	Galvanized Steel	
	Enclosure	Powder Coated Steel Enclosure with Easy Access Panels	
Quality	Warranty	1 Year Standard Warranty	
	UL/CSA Certified (Full Assembly)	Certified for Outdoor Use ETL 3170655, UL STD 61010-2-011, CAN/CSA STD, C22.2 No. 61010-2-011	
	Manufacturing	Manufactured in the U.S.A. Certified ISO 9001:2015 Company	
Power	Available Voltages	Max Amps (FLA)	Recommended Breaker/Service (MCA)
	480VAC / 3P / 60Hz (STANDARD)	33 Amps (std)	38.5 Amps (std)

Optional Upgrades

UPGRADES	Extended Ambient (-15°F) Crating	External Temperature Monitoring Alternate Pumps	Controller Auto Start Remote Start
	More Options and Customization Available - Contact Factory for More Information		

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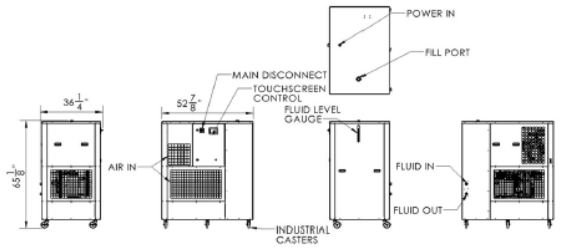
NSC1000-ULT

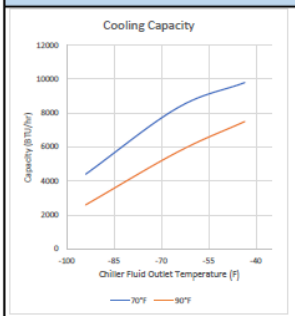
1 Ton Air Cooled Ultra Low Temp Chiller

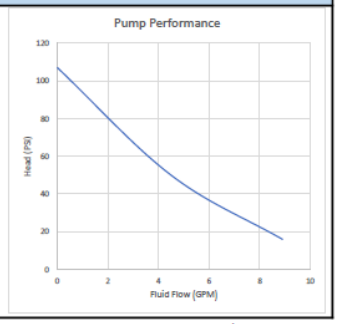
Dimensional Drawings



LENGTH	WIDTH	HEIGHT	WEIGHT	TANK CAPACITY	FLUID CONNECTIONS
36 1/4"	52 7/8"	65 1/8"	1150 lbs	5 Gallon Stainless Steel	1/2" NPT

Chiller Performance





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NSC1000-ULT

Standard Features and Benefits

Performance	Working Temperature Range	-112°F(-80°C) to 70°F(21°C)	
	Temperature Stability	±2	
	Cooling Capacity at 70F	-94°F (-70°C) - 4,400 BTU/hr (1,290 Watts) -65°F (-53.9°C) - 8,300 BTU/hr (2,430 Watts) -43.6°F (-42°C) - 9,800 BTU/hr (2,870 Watts)	
	Ambient Temperature (Standard)	40°F - 100°F	
	Pump Performance	0 GPM @ 107 PSI 4.5 GPM @ 50 PSI 8.9 GPM @ 16 PSI	
User Interface	Controls	Electronic Programmed Temperature Controller (PLC) with Constant (Setpoint & Process) Temperature Readout	
	Additional Features	Fluid Level Indicator, Touch Screen Controls	
Refrigeration Circuit	Compressor	Copeland Scroll	
	Heat Exchanger	Brazed Plate Heat Exchanger	
	Refrigerant	R404a/R508b	
	Additional Features	Access Ports, Service Valves, Filter Drier, Sight Glass, Liquid Receiver, Thermostatic Expansion Valve (TXV), Fan Cycling, Oil Separator	
	Max Heat Rejection	31,450 BTU/hr (9.2 kW)	
Process Fluid Circuit	Pump	Continuous Duty, 0.75kW Vortex Pump	
	Inlet/Outlet	1/2" NPT	
	Reservoir	5 Gallon Stainless Steel	
	Additional Features	Inline Strainer, Inlet and Outlet Temperature Sensors, Pump Discharge Pressure Transducer	
Construction	Frame	Galvanized Steel	
	Enclosure	Powder Coated Steel Enclosure with Easy Access Panels	
Quality	Warranty	1 Year Standard Warranty	
	UL/CSA Certified (Full Assembly)	ETL 3170655, UL STD 61010-2-011, CAN/CSA STD, C22.2 No. 61010-2-011	
	Manufacturing	Manufactured in the U.S.A. Certified ISO 9001:2015 Company	
Power	Available Voltages	Max Amps (FLA)	Recommended Breaker/Service (MCA)
	208-240VAC / 3P / 60Hz (STANDARD) 480VAC / 3P / 60Hz	25 Amps (std)	30 Amps (std)

Optional Upgrades

UPGRADES	Process Heating UL/CSA Outdoor Certified Extended Ambient (-15°F)	External Temperature Monitoring Alternate Pumps	Controller Crating
	More Options and Customization Available - Contact Factory for More Information		

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