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CryoCool Neslab
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NESLAB
Instruments, Inc.

CryoCool Units



Mechanical
Refrigeration Systems to Minus 100°C

VAPOR FREEZING TRAP COOLERS

Replace dry ice and liquid nitrogen

CryoCool

MODELS CC60, CC80, CC100

Neslab CryoCool refrigeration systems are designed to provide the low temperatures needed for vapor and freezing traps on a continuous basis.

The units can achieve temperatures as low as -100°C , -80°C or -60°C in Dewar flasks or other well insulated, low heat gain containers.

CryoCools have been successfully substituted for dry ice and liquid nitrogen in many applications. For example, they have been used for refrigerating vacuum system cold traps, freeze dryer traps and shelling systems, gas chromatograph fraction collection, and similar uses.

An important advantage of CryoCool units is their ability to run continuously without attention. This allows vacuum systems to stay pumped down over long periods and achieve best operation conditions.

CryoCool units have been used successfully with systems ordinarily trapped with liquid nitrogen. For example, mass spectrometers with oil diffusion pumps have been run at the 10^{-7} to 10^{-9} mm. level without excessive background peaks.

The use of any of the three basic CryoCool models allows long term operation of cold traps without the necessity of constant attention or the danger of trap warm-up. Overnight, weekend, or vacation period operation of traps is feasible. Requirements for handling and storage of dry ice and liquid nitrogen, and attendant hazards, are eliminated.

INSTALLATION

CryoCool units have no special installation requirements other than those associated with air cooled refrigeration systems; free air access must be allowed to the units; ambient air temperature must be below 30°C for efficient operation; and line voltage must be maintained at 120 volts $\pm 10\%$.

OPERATION

Standard CryoCool units are supplied with a flexible immersion probe — Neslab's Flexevap — that can be shaped to fit a variety of traps and containers.

In use the CryoCool probe is generally immersed in a heat transfer fluid that does not freeze or become exceedingly viscous at the lowest temperature of operation (denatured ethyl alcohol is suitable throughout the temperature range).

The single power switch is turned "on" — that's all. The CryoCool will then reduce the temperature to the lowest achievable under existing load conditions.



CryoCool CC60



CryoCool CC80

When maximum efficiency and temperature uniformity under load is desired, stirring is required. When unstirred the vessel will show some temperature layering, with the coldest — most dense — zone at the bottom.

In a silvered Dewar flask filled with 4 liters of alcohol the temperatures indicated by asterisks (guaranteed capacity points, TABLE I) will be reached in about one hour. Under no added heat load the temperatures will continue to decline, although at a slower rate, until the minimum temperature obtainable is reached.

DESCRIPTION

CryoCool units are constructed with full hermetic compressors, using a variety of halogenated compounds as refrigerants. The Model CC60 uses one ¼ H.P. compressor; the CC80 employs two ⅙ H.P. compressors in cascade configuration; and the CC-100 uses two ¼ H.P. cascaded compressors.

Units contain various combinations of oil separators; interlocks for pressure and temperature; safety pressure unloaders etc., as required for continuous, safe, troublefree operation.

Refrigerant is pumped through the coaxial connecting hose to the immersion probe where it expands, cools the probe, and is returned to the compressor for recycling. The probe in turn cools the heat transfer fluid by conduction only.

CryoCool units are designed for low temperature operation only. We do not recommend continuous operation of the probe at temperatures above -20°C. (If cooling is required at higher temperatures we suggest that you consider Neslab models

TABLE I
CryoCool Continuous Load Capacity

Temperature °C °F		CryoCool Model					
		CC60 Watts BTU/hr.		CC80 Watts BTU/hr.		CC100 Watts BTU/hr.	
-40	-40	80	273	115	392	—	—
-50	-58	40*	136*	100	341	160	546
-60	-76	10	34	70*	238*	135	460
-70	-94	—	—	45	153	100*	341*
-80	-112	—	—	10	34	70	238
-90	-130	—	—	—	—	35	119
-100	-148	—	—	—	—	~ 0	~ 0

*Indicates guaranteed **minimum** capacity at listed temperature. Other values are approximate.

For comparison the cooling effect of the evaporation of physical refrigerants is as follows:

LN₂ 153 BTU/liter
CO₂ 246 BTU/lb

PBC-4, or PBC-2 Portable Bath Coolers; or the ERIC Extended Range Immersion Cooler.)

CryoCools are designed to run continuously and do not cycle on/off. They will come to an equilibrium temperature dependent on existing load conditions. Under essentially "no load" the CC60 will reach -60°C; the CC80 will reach -80°C; and the CC100 will attain -100°C.

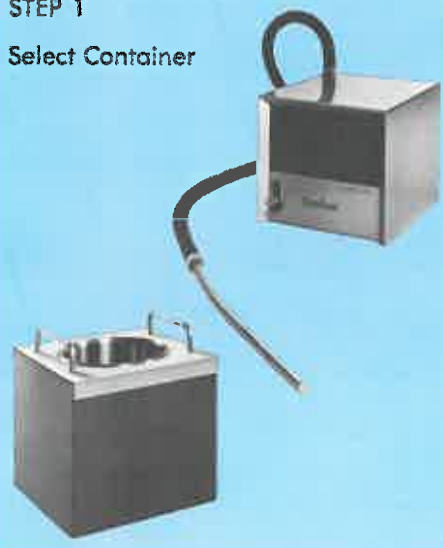
If temperatures between -20°C and the achievable low point are required they can be obtained by heating the immersion fluid with a small regain heater controlled by an adjustable auto transformer or on/off sensor and relay.

EASY TO USE:

The CryoCool probe can be used straight, coiled or bent into a variety of shapes. The immersion probe can be inserted into LN₂ traps through the existing fill hole. If your trap has a fill hole less than 0.65" I.D. specify the optional FV 0.46" diameter probe. In some instances where probes cannot be used, heat transfer fluid cooled by a CryoCool can be pumped through coils, traps, etc.

STEP 1

Select Container



STEP 2

Insert probe into heat transfer fluid

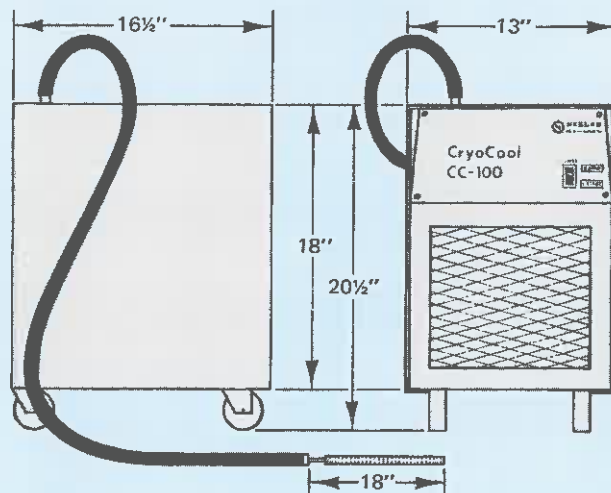
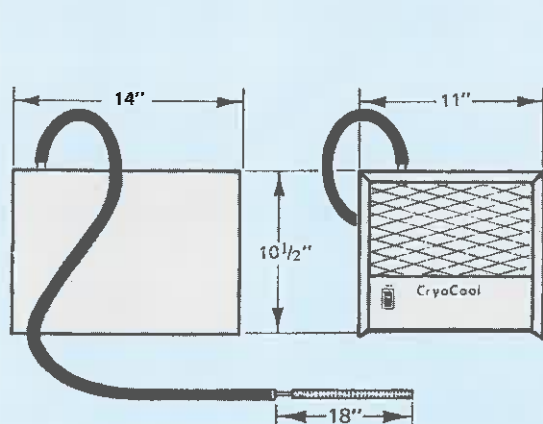


STEP 3

Turn CryoCool "on"

Unit will attain lowest temperature for model and load





SPECIFICATIONS	CC60	CC80	CC100
COMPRESSORS (hermetic)	1/4 H.P. single	1/6 H.P. x 1/6 H.P. cascaded	1/4 H.P. x 1/4 H.P. cascaded
INSULATED COAXIAL HOSE			
Length (inches)	50	65	65
Diameter (inches)	1 1/4	1 1/4	1 1/4
Min. Bend Radius (inches)	3	3	3
IMMERSION COOLING PROBE*			
(Nickel plated bronze)			
Length (inches)	18	18	18
Diameter (inches)	0.65	0.65	0.65
Min. Bend Radius (inches)	1 1/2	1 1/2	1 1/2
OPERATING CHARACTERISTICS			
air temperature @ 1.8 - 25°C			
Low temperature			
under "no load" conditions	-60°C	-80°C	-100°C
Load Handling (with agitation)	40 watts	70 watts	100 watts
minimum	(136 BTU/hr.) @ -50°C	(238 BTU/hr.) @ -60°C	(341 BTU/hr.) @ -70°C
POWER**			
60 cycle, single phase			
Voltage ±10%	120	120	120
Amps (max.)	4.4	5.5	8
WEIGHT (Shipping)	55 lbs.	95 lbs.	110 lbs.
*Optional Immersion Heads: All CryoCool units are available with alternate immersion cooling probes as follows: Type FV—Similar to the standard Flexevap probe except 25 inches long and 0.46 inches in diameter Type R—Non-flexible 1 1/4 inches diameter x 7 3/4 inches long **All CryoCool units are available for 220-volt 50 cycle operation. Specify at time of order.			



NESLAB
Instruments, Inc.

Temperature Controlled *Liquid* Systems

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(603)436-9444

OPERATING INSTRUCTIONS

MODELS CC-60, CC-80, CC-100

Cryocool units

1. Unpacking:

Retain all cartons and packing material until the unit is tested and found in good operating condition. Transportation companies will generally not honor a damage claim if the cartons are not available for examination. If the unit shows physical damage or does not operate properly call your delivering carrier and request an inspection for a damage claim.

2. Description, applications, operation, See attached CryoCool leaflet:

Model CC-60; This model is a single-stage refrigeration system and is operated with a single switch. Power on, is indicated by an indicator light.

Model CC-80 and CC-100; These models are two stage refrigeration systems and each is operated by a single power switch. Three lights will come on; one indicating power on, one indicating the first or high temperature stage is operating and one indicating the second or low temperature stage is operating. When switching on the power, all indicator lights will generally go on. (CC-80 only). It is normal for the low stage light to cycle off one or two times before the unit is in full operation. If unit is switched off, allow unit to remain off approximately 5 minutes before attempting to restart. Failure to allow this time for pressure to equalize could cause compressor overload to cycle off temporarily.

Maintenance

Check air intake area for dirt and dust build up. Clean when necessary for free air passage. No other routine maintenance is required.

Service

If unit malfunctions, contact Neslab or your distributor for instructions.

REPLACEMENT PARTS LIST - CRYOCOOLS

CC-60, CC-80 and CC-100

NG202	Refrigeration compressor for CC-60	115 V, 60 HZ
NG204	Refrigeration compressor for CC-60	220 V, 50 HZ
NG200	Refrigeration compressor for CC-80	115 V, 60 HZ
NG201	Refrigeration compressor for CC-80	220 V, 50 HZ
NG203	Refrigeration compressor for CC-100	115 V, 60 HZ
NG205	Refrigeration compressor for CC-100	220 V, 50 HZ
NG401	Fan Motor	115 V, 60 HZ
NG402	Fan Motor	220 V, 50 HZ
NJ313	Switch for CC-60	
NJ309	Switch for CC-6	220V, 50 HZ
NJ312	Switch for CC-80/CC-100	all voltages
NJ326	Fuse	220 V, 50 HZ
NJ328	Fuse Holder/CC-60	All voltages
NJ329	Fuse	115V, 60 HZ
NJ360	10A Circuit breaker for CC-80	115V, 60 HZ
NJ359	5A Circuit breaker for CC-80	220V, 50 HZ
NJ361	15A Circuit breaker for CC-100	115V, 60 HZ
NJ360	10A Circuit breaker for CC-100	220V, 50 HZ
NA108-2	Immersion cooling probe complete assembly with flexible hose Model CC-60	
NA108R-2	Immersion cooling probe complete assembly with flexible hose Model CC-60, Type R	
NA108FV-2	Immersion cooling probe complete assembly with flexible hose Model CC-60 Type FV probe	
NA141-2	Immersion cooling probe complete assembly with flexible hose Model CC-80	
NA141R-2	Immersion cooling probe complete assembly with flexible hose Model CC-80, Type R	
NA141FV-2	Immersion cooling probe complete assembly with flexible hose Model CC-80 Type FV	

PAGE TWO

NA112-2	Immersion cooling probe complete assembly with flexible hose Model CC-100
NA112R-2	Immersion cooling probe complete assembly with flexible hose Model CC-100 Type R
NA112FV-2	Immersion cooling probe complete assembly with flexible hose Model CC-100 Type FV



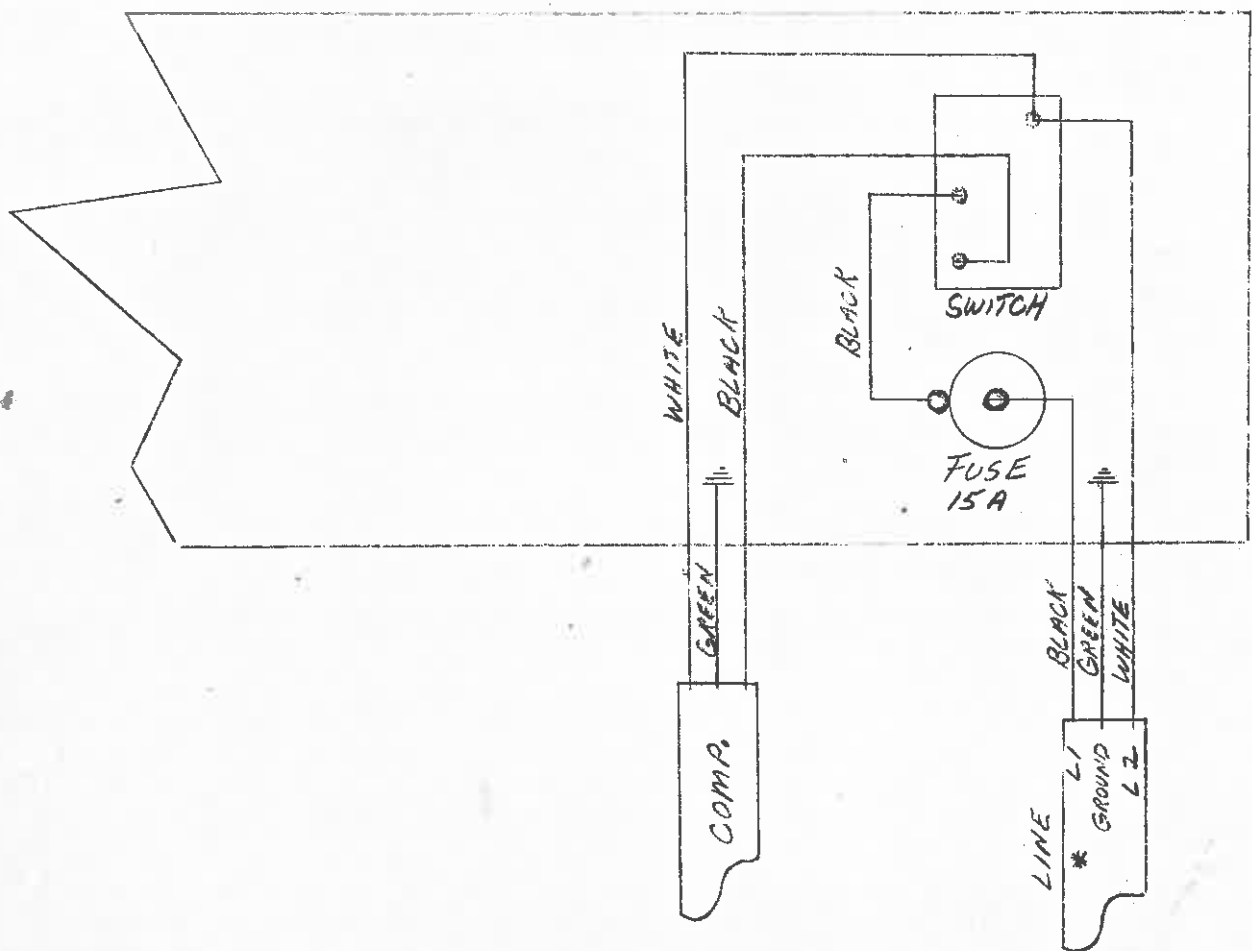
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Temperature Controlled *Liquid* Systems

871 ISLINGTON STREET, PORTSMOUTH, NEW HAMPSHIRE 03801 • (603) 436-9444

Models PBC-4 & CC-60

WIRING DIAGRAM



NOTE: *

220V 50HZ MODELS

L1 = BROWN

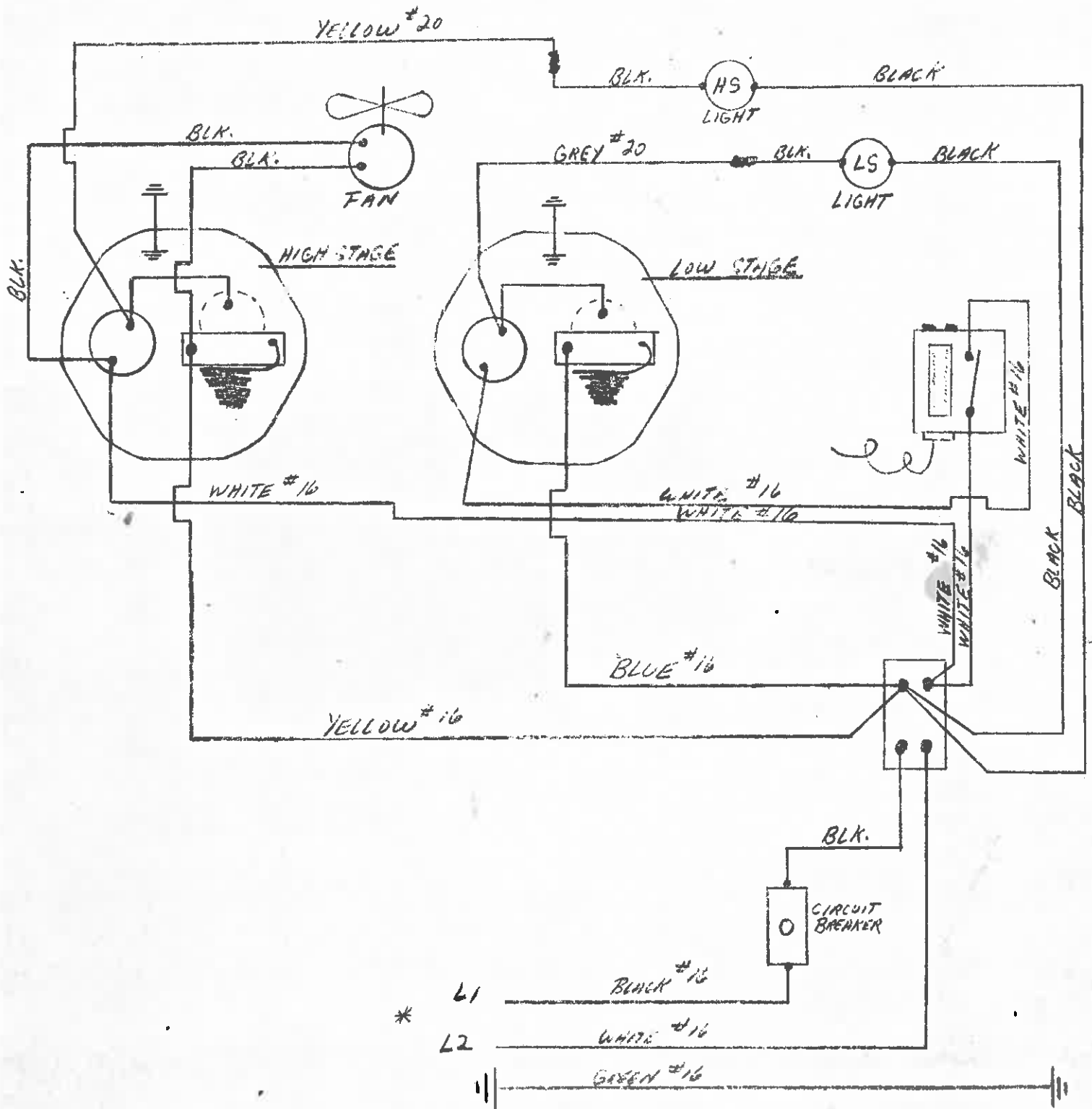
L2 = BLUE

GROUND = YELLOW/GREEN

FUSE = 10A

Model CC-80F

WIRING DIAGRAM



NOTE: ON 220V, 50HZ MODELS

L1 = BROWN

L2 = BLUE

GROUND = YELLOW/GREEN

NOTE: *

220V 50 Hz MODELS

L1 = BROWN

L2 = BLUE

GROUND = YELLOW, 5MM.
CIRCUIT BREAKER 10A

WIRING DIAGRAM

Model CC-100F

