

Hypertherm[®]

Water Chiller

Model D

Installation & Operation
Manual
802410 - Rev. 1



Hypertherm[®]

Water Chiller

Model D

Installation & Operation Manual

**IM-241
(P/N 802410)**

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ATTENTION



Genuine Hypertherm parts are the factory-recommended replacement parts for your Hypertherm system. Use of other than genuine Hypertherm parts may be cause for invalidation of the Hypertherm warranty.

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HYPERTHERM, Inc. warrants that Products shall be free from defects in materials and workmanship, under proper and normal use for which such Equipment is recommended, for a period of two (2) years, except only with respect to the Torch, for which the warranty period shall be one (1) year, from the date of its delivery to you or to a customer by you, BUT IN NO EVENT SHALL THIS WARRANTY EXTEND BEYOND 36 MONTHS FROM THE DATE OF ORIGINAL DELIVERY TO YOU BY HYPERTHERM.

HYPERTHERM, at its sole option, shall repair, replace, or adjust, free of charge, any Products covered by this warranty which shall be returned with HYPERTHERM's prior authorization (which shall not be unreasonably withheld), properly packed, to HYPERTHERM's place of business in Hanover, New Hampshire, all costs, insurance and freight prepaid, and which examination proves not to be free from defects in materials and workmanship. HYPERTHERM shall not be liable for any repairs, replacements, or adjustments of Products covered by this warranty, except those made pursuant to this paragraph or with HYPERTHERM's written consent. This warranty shall not apply to any Product which has been mishandled, incorrectly installed, modified or assembled by you or any other person. HYPERTHERM shall be liable for breach of this warranty only if it receives written notice of such breach within the applicable warranty period specified herein above. THE FOREGOING SHALL CONSTITUTE THE SOLE REMEDY TO DISTRIBUTORS OR THEIR CUSTOMERS FOR ANY BREACH BY HYPERTHERM OF ITS WARRANTY.

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Except only in cases of Products not manufactured by HYPERTHERM or manufactured by a person other than HYPERTHERM not in strict conformity with HYPERTHERM's specifications, and in cases of designs, processes, formulae or combinations not developed or purported to be developed by HYPERTHERM, HYPERTHERM agrees to indemnify, protect and hold harmless Distributors and their customers against any and all liability or claims in any manner imposed upon or accruing against Distributors and their customers because of the use in or about the construction or operation of Equipment or any design, system, formula, combination, article or material which infringes or alleges to infringe on any patent or other right. Distributors shall notify HYPERTHERM promptly upon learning of any action or threatened action in connection with any such alleged infringement, and each party may appoint its own counsel for any such action or threatened action.

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Section 1 SAFETY

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SAFETY

SAFETY

High Voltage



WARNING



SHOCK HAZARD: Always turn off power at the water chiller and remove power at the main power disconnect box by setting switch to OFF before servicing. In the U.S., use a "lock-out/tag-out" procedure until the service work is complete. In other countries, follow appropriate local or national codes. Note that if power is required for servicing, dangerous voltages exist within the water chiller which could cause serious injury or death. If questions or problems arise during servicing, call the Hypertherm Technical Service department at 1-800-643-9878.

Freon Gas



WARNING



VAPOR AND LIQUID HAZARD: The water chiller refrigeration system uses Freon 22 (R-22) gas as the refrigerant. This gas is under pressure throughout the entire refrigeration system. A refrigerant overcharge, under certain circumstances, can lead to a compressor housing seam separation or rupture causing a freon leak. Refer to the *Refrigeration System* section in the Schreiber Chiller Manual for detailed information.

A full face shield must be worn whenever work is being performed on the refrigeration equipment. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Intentional misuse can be fatal. Vapor reduces oxygen available for breathing and is heavier than air. Liquid contact can cause frostbite. Evaporating freon can cause rapid drying of the skin and membranes in the eyes. Refer to the Material Safety Data Sheets (MSDS) for Freon 22 in Appendix.

Freon Leak Detectors (Phosgene Gas)



WARNING



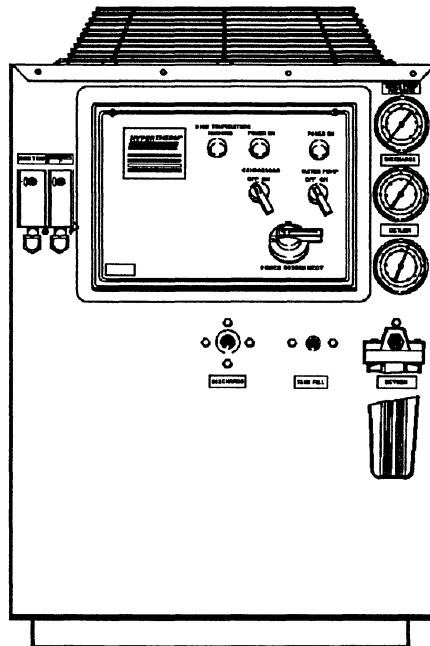
POISONOUS GAS: Certain types of freon leak detectors (commonly referred to as Halide leak detectors) produce phosgene gas. This gas is poisonous. When using this type of leak detector, take precautions to avoid breathing these fumes. Use this detector only in well-ventilated areas.

Section 2 DESCRIPTION & SPECIFICATIONS

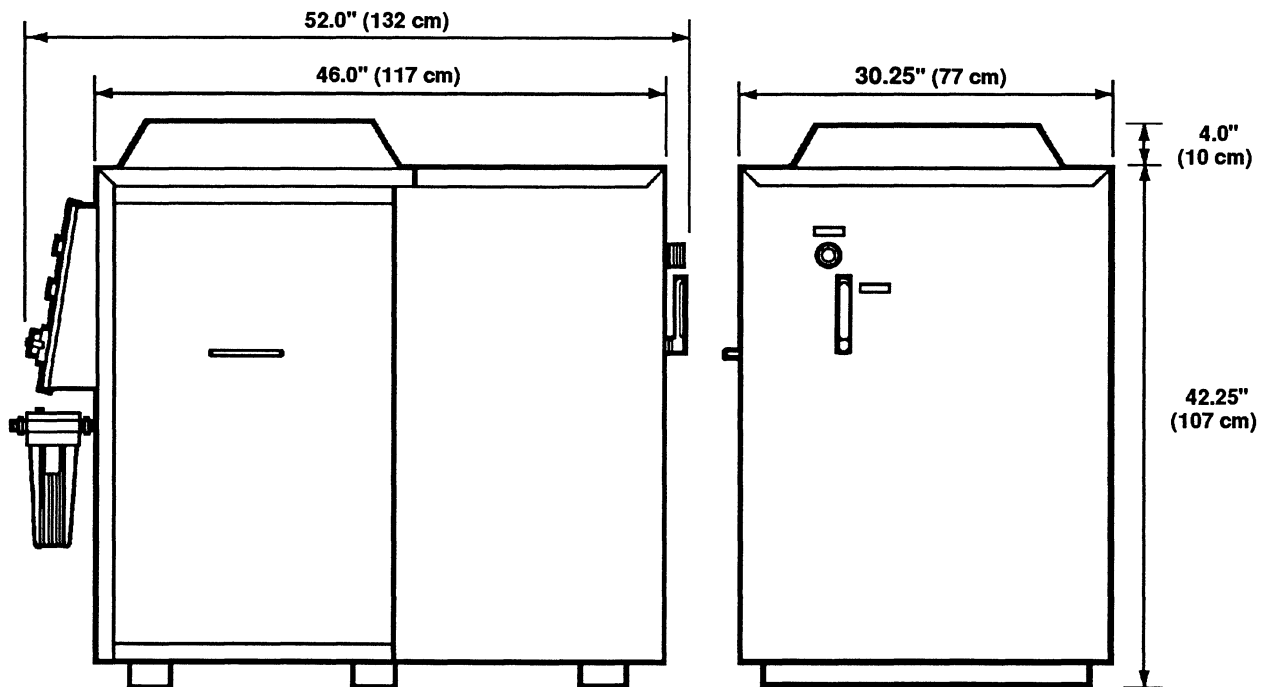
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DESCRIPTION & SPECIFICATIONS



Front



Side

Rear

Figure 2-1 Water Chiller - Model D

DESCRIPTION & SPECIFICATIONS

INTRODUCTION

The Model D Water Chiller is manufactured by Schreiber Engineering Corporation to Hypertherm Corporation's specifications.

This refrigeration unit is capable of reducing the electrode coolant water temperature to well below the ambient air temperature and facility water supply temperature. This capability greatly increases the life of the electrode and nozzle. This unit is available in three configurations in order to satisfy the torch cooling requirements (see Figure 2-1).

This manual provides the user with installation and operation information. It also provides routine checks that can be performed on a weekly and monthly basis. A spare parts list is provided, so that customers are able to purchase selected stocked items. Refer to the Schreiber instruction manual for detailed electrical and refrigeration information and drawings, troubleshooting, and product information.

Read and understand the installation requirements carefully, so that the water chiller can be installed with minimum trouble and to allow maximum performance. Installation and service of the electrical and plumbing systems must conform to local and national codes. This work should only be performed by licensed personnel. If you need assistance, call Hypertherm Technical Service at 1-800-643-9878.

Read and understand the information contained in Section 1, *Safety*. Observe all safety precautions throughout the manual.

SPECIFICATIONS

Capacities and Physical Parameters

Capacities and Physical Parameters	Water Chiller Configurations		
	One-Torch, 600 Amp	Two-Torch, 600 Amp	One-Torch, 1000 Amp
Capacity	3 Ton	5 Ton	5 Ton
BTU/Hour	30,000 @ 90°F (32°C)	60,000 @ 90°F (32°C)	60,000 @ 90°F (32°C)
Pump Motor	3/4 HP	1 HP	3/4 HP
Water Pump (maximum water flow)	2.5 gpm @ 185 psi (9.5 l/m @ 12.8 bar)	5.0 gpm @ 185 psi (19 l/m @ 12.8 bar)	2.5 gpm @ 185 psi (9.5 l/m @ 12.8 bar)
Make-up Water	0.5 gpm (1.9 l/m)	1.0 gpm (3.8 l/m)	0.5 gpm (1.9 l/m)
Tank Capacity	45 gallons US (171 liters)	45 gallons US (171 liters)	45 gallons US (171 liters)
Refrigerant Freon 22	8 pounds	14 pounds	14 pounds
Weight	700 pounds (318 kg)	745 pounds (338 kg)	745 pounds (338 kg)
Cabinet Dimensions (all units)	46.0" long x 30.25" wide x 42.25" high (117 cm L x 77 cm W x 107 cm H)		

DESCRIPTION & SPECIFICATIONS

Power Specifications

Part Number	Voltage*	Phase	Frequency (Hz)	Amps
One-Torch, 600 Amp Units				
039099	200	3	50/60	18.0
039116	240	3	60	18.0
039102	380	3	50/60	17.5
039101	415	3	50/60	16.0
039103	440	3	60	9.0
039098	480	3	60	8.5
039100	575	3	60	8.0
Two-Torch, 600 Amp Units				
039105	200	3	50/60	26.5
039117	240	3	60	26.5
039108	380	3	50/60	25.0
039107	415	3	50/60	23.5
039109	440	3	60	14.5
039104	480	3	60	14.0
039106	575	3	60	11.0
One-Torch, 1000 Amp Units				
039111	200	3	50/60	26.5
039118	240	3	60	26.5
039114	380	3	50/60	25.0
039113	415	3	50/60	23.5
039115	440	3	60	14.5
039110	480	3	60	14.0
039112	575	3	60	11.0

*Input voltage $\pm 10\%$

Section 3 INSTALLATION

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INSTALLATION

INSTALLATION

Inspect Water Chiller

- Look for any physical damage that may have occurred during shipping.
- Ensure the water filter was shipped with the water chiller.

Claims

Damage During Shipment

If your unit was damaged during shipment, you must file a claim with the carrier. Hypertherm will furnish you with a copy of the bill of lading upon request. If you need additional assistance, call Hypertherm Customer Service at 1-800-643-0030.

Defective or Missing Merchandise

If any of the merchandise is defective or missing, call your distributor. They will be able to help you. If you need additional assistance, call Hypertherm Customer Service at 1-800-643-0030 or Technical Service at 1-800-643-9878.

Position Water Chiller

Position the water chiller in an area that has the following:

- A minimum of 24 inches (70 cm) of space in front of the condenser inlet. **Restriction of air to condenser will not only affect the efficiency of unit, but will also damage the refrigeration system.**
- A minimum of 12 feet (3.7 m) of ceiling space over the discharge fan to avoid recirculation of condensed air. If the ceiling is lower than 12 feet (3.7 m), a straight duct through the ceiling should be installed. **Recirculation of condensed air can cause the unit to cut off.**
- A level surface to ensure proper functioning of the water level control switches. The unit should be bolted to the floor, and, if possible, a floor drain should be located nearby.
- Easy access to the line voltage disconnect box in an emergency situation.
- Easy access to the water chiller control panel and service door.

After positioning the water chiller, water and power must be installed. Installation and service of the electrical and plumbing must conform to national and local codes. This work should be performed only by qualified licensed personnel. If you need assistance, call Hypertherm Technical Service at 1-800-643-9878.

INSTALLATION

Supply Water Requirements

A clean water source (make-up water) capable of delivering cooling water is required:

- For one-torch water chillers between 30 - 120 psi (2.0 - 8.2 bar) at 0.5 gpm (1.9 l/m).
- For two-torch water chillers between 30 - 120 psi (2.0 - 8.2 bar) at 1.0 gpm (3.8 l/m).

Refer to the table below to determine maximum and minimum water purity by the methods indicated. Water purity should be between the maximum and minimum purity for proper performance of the torch nozzle. Excessive deposits on the nozzle will alter water flow and produce an unstable arc. Water that is too pure can also cause problems. For example, using deionized water that is very pure will cause leeching problems with the water chiller and the plasma system plumbing. Using deionized water between the maximum and minimum purity range is compatible with the water chiller and the plasma system plumbing. Use water purified by any method (deionization, reverse osmosis, sand filters, water softener, etc.) as long as water purity meets the specification. Contact a water specialist for advice in this area.

Water Purity	Water Purity Measurement Methods			
	Conductivity $\mu\text{S/cm}$ at 25° C	Resistivity $\text{m}\Omega\text{-cm}$ at 25° C	Dissolved Solids (ppm of NaCl)	Grains per Gallon (gpg of CaCO_3)
Pure Water (ref. only)	0.055	18.3	0	0
Maximum Purity	0.5	2	0.206	0.010
Minimum Purity	18	0.054	8.5	0.43
Max. Potable Water (ref. only)	1000	0.001	495	25

Power Requirements

Line Disconnect Switch

Use a separate line disconnect switch with fuses for the water chiller. The disconnect box allows the operator to turn the unit off in an emergency situation. The box should be located on a wall easily accessible to the operator. The interrupt level must be equal to or exceed the continuous rating of the fuses. Use SLO-BLO fuses and size according to table below.

Line Disconnect Switch Sizing Requirements

Unit	Input Voltage* (VAC) (Phase) (Hertz)			Rated Input Current (Amps)	Recommended SLO-BLO Fuse Size (Amps)
Water Chiller (1 T, 600 Amp)	200	3	50/60	18.0	30
	240	3	60	18.0	30
	380	3	50/60	17.5	30
	415	3	50/60	16.0	30
	440	3	60	9.0	20
	480	3	60	8.5	20
	575	3	60	8.0	20

*Input voltage $\pm 10\%$

INSTALLATION

Line Disconnect Switch Sizing Requirements (Continued)

Unit	Input Voltage* (VAC) (Phase) (Hertz)			Rated Input Current (Amps)	Recommended SLO-BLO Fuse Size (Amps)
Water Chiller (2 T, 600 Amp & 1 T, 1000 Amp)	200	3	50/60	26.5	50
	240	3	60	26.5	50
	380	3	50/60	25.0	50
	415	3	50/60	23.5	40
	440	3	60	14.5	30
	480	3	60	14.0	30
	575	3	60	11.0	20

*Input voltage \pm 10%

Power Cables

The input power cable requirements for each of the water chillers are listed below. Use 4-conductor power cables. Determine AWG/MCM wire sizes according to the data below and by applicable national and local electrical codes.

Power Cable Sizing Data

Unit	Input Voltage* (VAC) (Phase) (Hertz)			Rated Input Current (Amps)
Water Chiller (1 T, 600 Amp)	200	3	50/60	18.0
	240	3	60	18.0
	380	3	50/60	17.5
	415	3	50/60	16.0
	440	3	60	9.0
	480	3	60	8.5
	575	3	60	8.0
Water Chiller (2 T, 600 Amp & 1 T, 1000 Amp)	200	3	50/60	26.5
	240	3	60	26.5
	380	3	50/60	25.0
	415	3	50/60	23.5
	440	3	60	14.5
	480	3	60	14.0
	575	3	60	11.0

*Input voltage \pm 10%

Power Cable Connections

Connect the power cable to the disconnect inside of the control panel (see Figure 3-1).

1. Insert the power cable through the strain relief of the water chiller.
2. Connect the power leads to the **L1 (U)**, **L2 (V)**, and **L3 (W)** terminals of the disconnect. Make sure that all electrical connections are tight to avoid excessive heating.
3. Connect the ground lead to the chassis ground terminal on the wall.

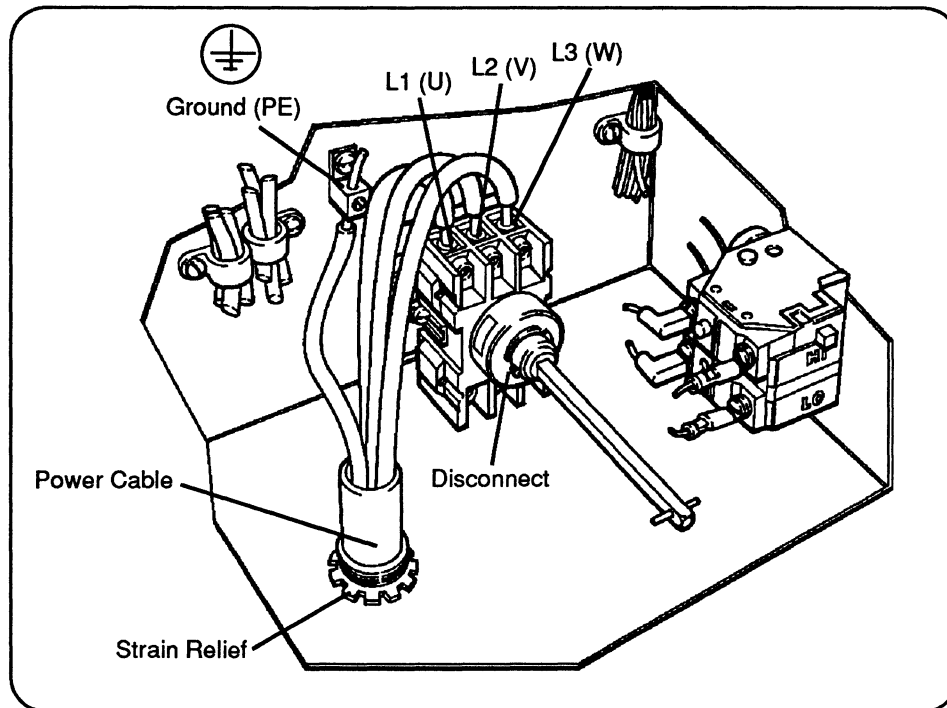


Figure 3-1 Power Cable Connections

Water Filter Installation

Install the water filter as follows:

1. Install the either of the following fittings into the **RETURN** water inlet on the water chiller.
 - one-torch system 1/2 NPT # 6 X 37° flare
 - two-torch system 1/2 NPT # 8 X 37° flare (in plastic bag shipped with water chiller)
2. Connect the water filter to the fitting. **Ensure that arrow on top of the filter is pointing towards the RETURN inlet.**
3. Connect the other end of the water filter to the return hose. Refer to the *Water Hose Connections* paragraph below.

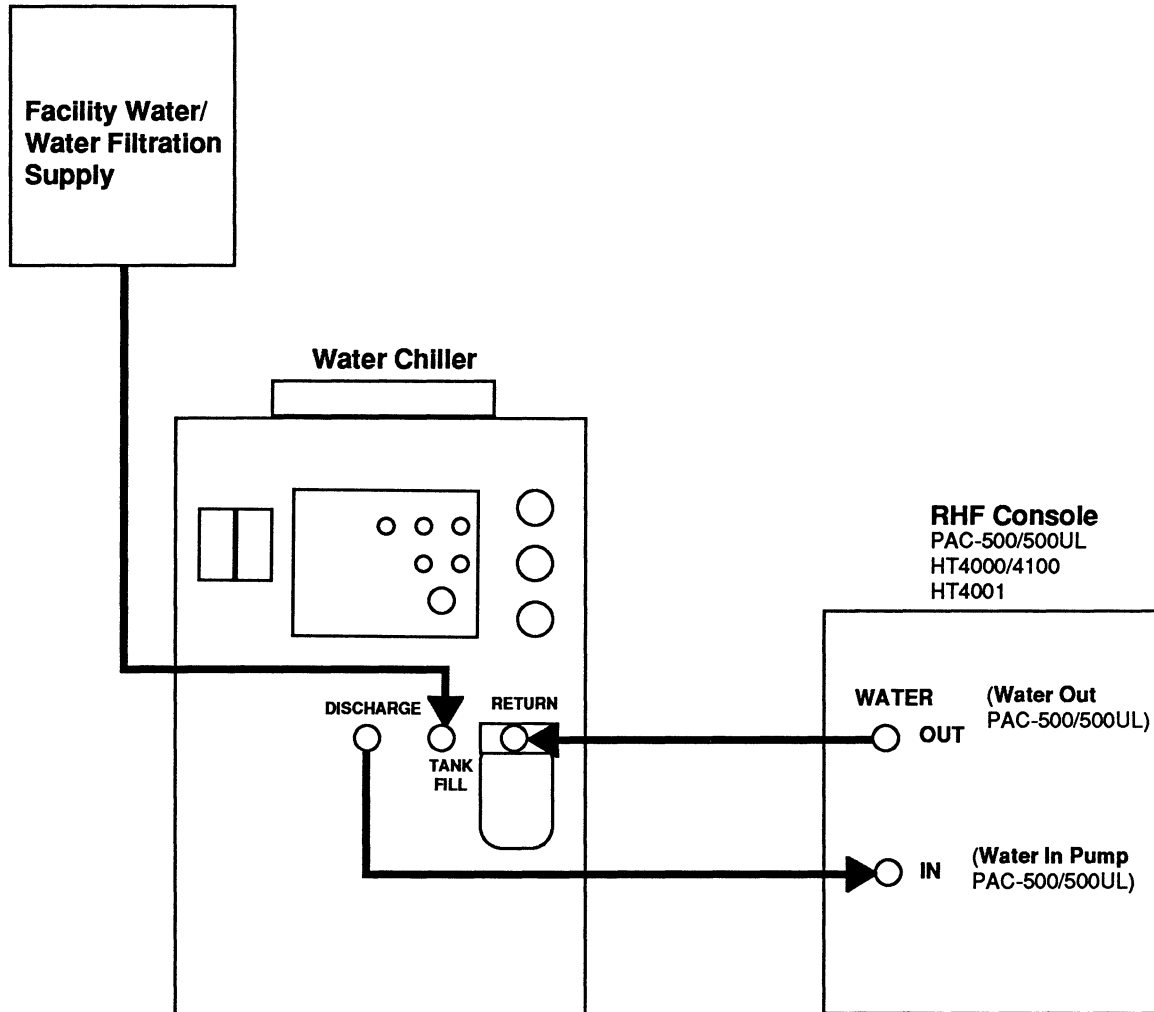
Water Hose Connections

Use the following figures to make the water hose connections:

Figure 3-2 Water Chiller One-Torch 600 Amp & One -Torch, 1000 Amp Plumbing Diagram

Figure 3-3 Water Chiller Two-Torch, 600 Amp Plumbing Diagram

INSTALLATION



Water Chiller Fittings

- For one-torch systems, use 1/2 NPT # 6 X 37° flare fittings.

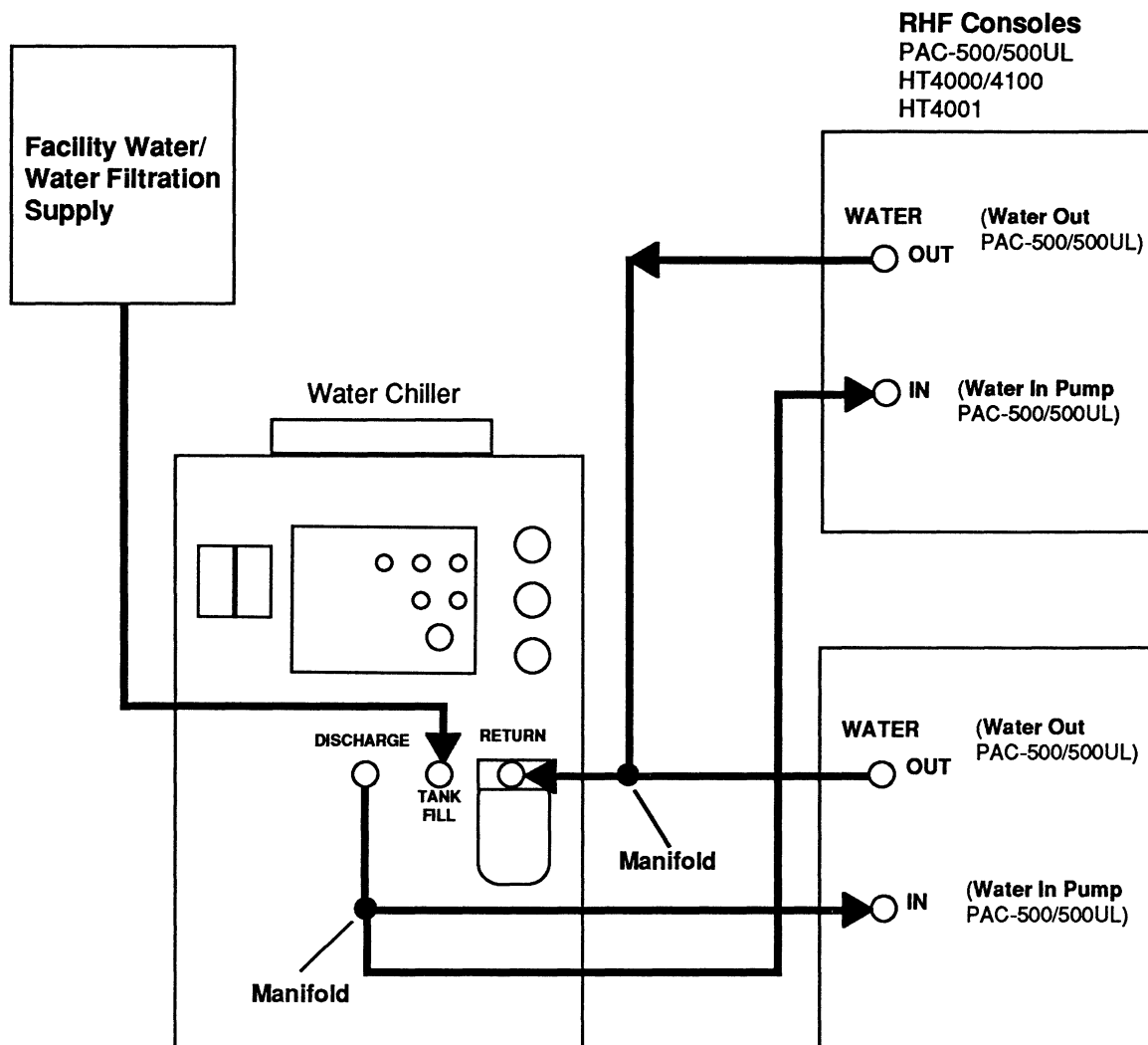
Water Hoses and Fittings

- Tank fill hose customer supplied. Use a # 6 hose.
- Discharge and return hoses can be purchased through Hypertherm. Use 3/8-inch ID hoses with # 6 JIC swivel fittings.

Never use teflon tape on any joint preparation. A liquid pipe-thread sealant is recommended.

Figure 3-2 Water Chiller One-Torch 600 Amp & One -Torch, 1000 Amp Plumbing Diagram

INSTALLATION



Water Chiller Fittings

- For two-torch systems, use 1/2 NPT # 8 X 37° flare fittings (in plastic bag shipped with water chiller).

Water Hoses and Fittings

- Tank fill hose is customer supplied. Use a # 6 hose.
- Discharge and return hoses can be purchased through Hypertherm (two sets of hoses required for two-torch systems). Use 1/2-inch ID hoses with # 8 JIC swivel fittings.
- Two manifolds tees are required for two-torch systems. Can be purchased through Hypertherm with part number 029018.

Never use teflon tape on any joint preparation. A liquid pipe-thread sealant is recommended.

Figure 3-3 Water Chiller Two-Torch, 600 Amp Plumbing Diagram

INSTALLATION

OPERATIONAL SETUP AND CHECKOUT

After all power and water connections have been made, setup and checkout the water chiller. Refer to the controls and indicator descriptions in Section 4, *Operation*.

1. Supply make-up water to the **TANK FILL** inlet.
2. At the control panel:
 - Ensure the **COMPRESSOR** and **WATER PUMP** switches are **OFF**.
 - Set the **POWER DISCONNECT** switch to **I (On)**.

Caution: Apply power to the water chiller for 3 hours before operating. This allows the built-in compressor crankcase heater to remove the Freon from the compressor to prevent damage. Ensure the **COMPRESSOR** switch remains **OFF** during this period.

3. The water tank should start filling as soon as power is applied. When the water level reaches the red level line on the **LEVEL** sight glass on the rear of the chiller, the fill water should stop.
4. After the 3 hour warm-up period, check that the water pump and fan rotate clockwise (cw).
 - To check the fan rotation, turn the **COMPRESSOR** switch **ON** and **OFF** quickly and observe that the fan rotates clockwise and that the air is exhausting from the unit.
 - To check the pump rotation, remove the access panel. Turn the **WATER PUMP** switch **ON** and **OFF** quickly and observe that the pump rotates clockwise through the slot on the pump. This is a two person operation.
5. If the pump and/or fan rotations are reversed, proceed as follows:



WARNING



SHOCK HAZARD: Always turn off power at the water chiller **POWER DISCONNECT** and remove power at the main power disconnect box by setting switch to **OFF** before servicing. In the U.S., use a "lock-out/tag-out" procedure until the service work is complete. In other countries, follow appropriate national or local codes. Note that dangerous voltages exist within the water chiller which could cause serious injury or death.

- If the pump and fan rotations are reversed, reverse any two of the three-phase power leads L1, L2, and L3 at the disconnect located inside the control panel (see Figure 3-1).
- If either the pump or fan rotation is reversed, reverse any two of the three-phase power leads T1, T2, and T3 at their respective contactors inside the control panel.
- Reapply power and check pump and/or fan rotations again.

INSTALLATION

6. Set the **WATER PUMP** switch to **ON**. While the pump is running, check all the water supply lines in the plasma system for leakage. Tighten any connections that leak. Set the **WATER PUMP** switch to **OFF**.
7. Ensure the torch is positioned over the water table. Remove the electrode from the torch assembly. Set the **WATER PUMP** switch to **ON** and observe the water coming out of the torch. Set the **WATER PUMP** switch to **OFF**.
8. Replace the electrode in the torch.
9. Set the refrigeration system temperature controller **DEGREES F** thermostat to 50° F (10° C) temperature. The chilled water temperature range is between 35° and 70° F (2° - 22° C) with a $\pm 1.5^\circ$ F (0.8° C) temperature differential. **Note: If the temperature is set below 36° F (2° C), propylene glycol must be added to the water tank.**

<p>Caution: Always use propylene glycol. Do not use antifreeze which contains corrosion inhibitors which will damage the torch coolant system.</p>

10. Set the high temperature setpoint **HIGH TEMP** thermostat between 5° and 10° F (-15° and -12° C) above the **DEGREES F** thermostat setting.
11. Set the **COMPRESSOR** switch to **ON**. Listen for the compressor and fan to start running. Note that there can be a $\pm 2^\circ$ to 3° F (1.1° to 1.6° C) difference between the **DEGREES F** thermostat and **DISCHARGE** temperature gauge. Use the **DISCHARGE** temperature gauge as a only a guide. Once set, the **DEGREES F** thermostat will control the water temperature automatically. The **WATER PUMP PRESSURE** gauge should read 185 psi (12.8 bar) outlet water pressure.
12. The water chiller is now ready daily operation. Refer to Section 4, *Operation*.

Section 4 OPERATION

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OPERATION

CONTROLS AND INDICATORS

Front Panel

- **HIGH TEMP** thermostat
Sets the chilled water high temperature set point which should be between 5° and 10° F (-15° and -12° C) above the **DEGREES F** thermostat setting. Closes when high temperature set point is reached causing the **HIGH TEMPERATURE WARNING** indicator to blink.
- **DEGREES F** thermostat
Sets the desired chilled water temperature. Opens when set temperature has been achieved. The chilled water temperature range is between 35° and 70° F (2 - 22° C) with a $\pm 1.5^\circ$ F (0.8° C) temperature differential. **Note: If the temperature is set below 36° F (2° C), propylene glycol must be added to the water tank.**
- **DISCHARGE** gauge
Indicates the discharge water temperature.
- **RETURN** gauge
Indicates the return water temperature.
- **WATER PUMP PRESSURE** gauge
Indicates the water pump output pressure.
- **HIGH TEMPERATURE WARNING** blinking indicator
Indicates that the chilled water temperature, as set by the **HIGH TEMP** thermostat, is too high.
- **COMPRESSOR - OFF/ON** switch
Turns compressor on and off.
- **POWER ON** indicator
Indicates compressor is On.
- **WATER PUMP - OFF/ON** switch
Turns pump on and off.
- **POWER ON** indicator
Indicates water pump is On.
- **POWER DISCONNECT - I/O (On/Off)** switch
Applies and removes input power to water chiller.

Rear Panel

- **LEVEL** water level sight glass
Indicates water level in tank. The water level should be kept within 1 inch of the red level line.

OPERATION

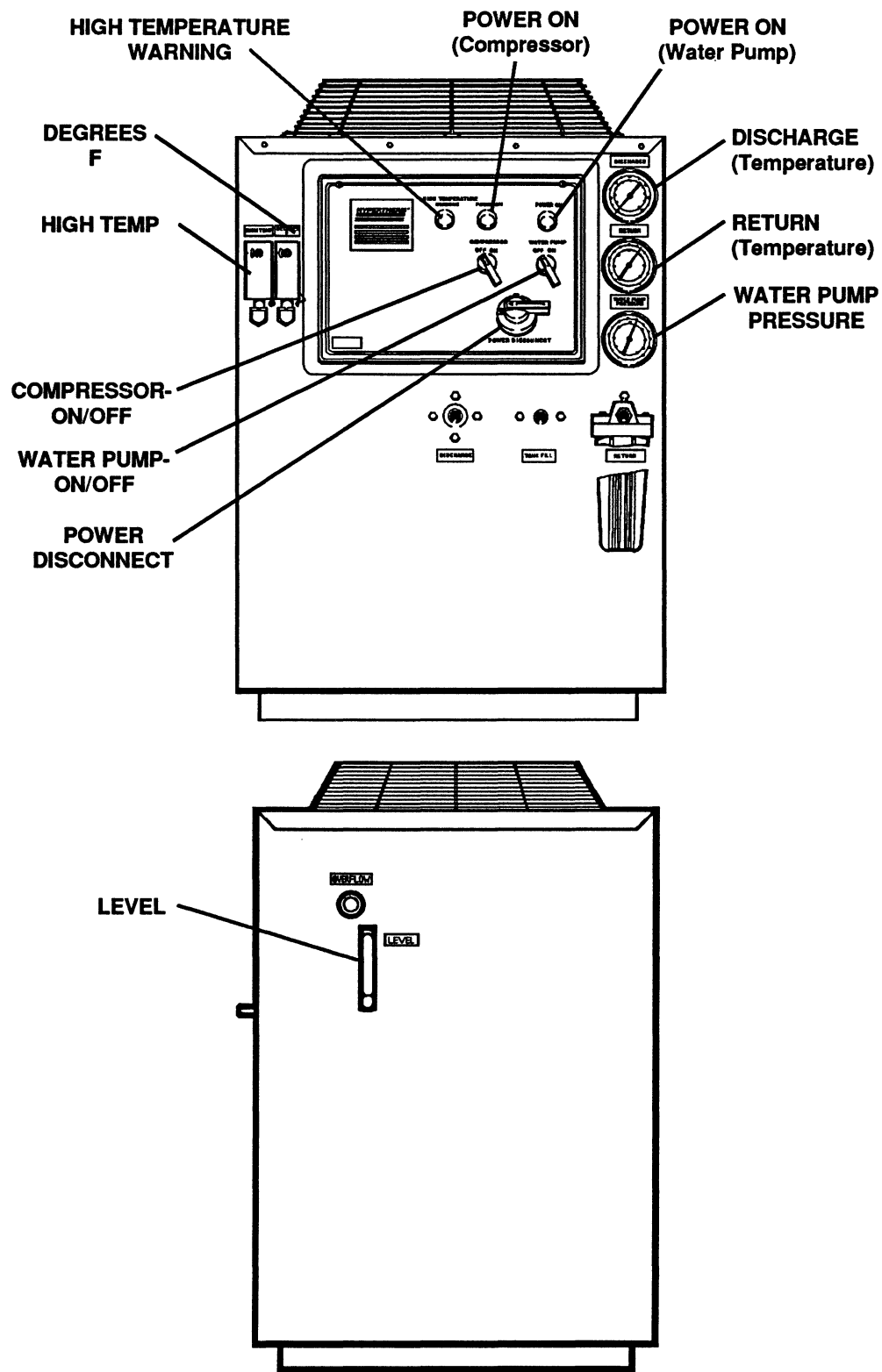


Figure 4-1 Controls and Indicators

OPERATION

DAILY OPERATION

On a daily basis only the **WATER PUMP - OFF/ON** and **COMPRESSOR - OFF/ON** switches are needed to operate the water chiller. When the water chiller is not in use, keep both switches in the **OFF** position. The only time a crankcase heater delay period is required is when the main power has been turned off for a period of over 12 hours. When this occurs, allow three hours for the heater to drive the Freon out of the compressor.

ROUTINE CHECKS

Weekly

- Check the following controls and indicators.

The **DEGREES F** thermostat should be set at the desired temperature.

The **HIGH TEMP** thermostat should be set between 5° and 10° F (-15° and -12° C) above the **DEGREES F** thermostat setting.

The **WATER PUMP PRESSURE** gauge outlet pressure should be at 185 psi (12.8 bar).

The water level in the **LEVEL** sight glass should be at least within one inch of the red line.

- Check for water leaks.
- Refrigeration leaks will not be obvious, and likely will not be discovered until all of the Freon charge has been lost, causing the compressor to shut down. If a refrigeration leak is suspected, contact a qualified refrigeration technician.
- Check the filter element. The filter element, located in the filter housing on the front panel of the water chiller, needs to be inspected and replaced as needed. The frequency of replacement depends on water quality conditions. Filters should be examined weekly until an appropriate inspection frequency can be determined. Refer to Section 5, *Spare Parts* for the filter element replacement part number.

Monthly

- Clean the condenser coils. The best way is to clean the coils with compressed air, but care should be taken not to blow debris into other parts of the water chiller.
- Clean the heat exchanger in the water tank.

Section 5 SPARE PARTS

In this section:

Introduction.....	5-2
Spare Parts	5-2

SPARE PARTS

INTRODUCTION

The replacement parts carried by Hypertherm are listed below. Refer to the Schreiber instruction manual for a complete list of spare parts.

SPARE PARTS

Part No.		Description	Quantity Per Unit
Schreiber	Hypertherm		
R146-1 R182 R183	040141 040142 040143	Refrigeration	
		Refrigeration sight glass	1
		High pressure switch	1
		Low pressure switch	1
E101 E103 E130 E126 E122 E124-3 E134 E136 E160	040144 040145 040146 040147 040148 040149 040150 040151 040152	Electrical	
		Disconnect	1
		Contactor, 30 amp	2
		Thermostat	1
		Pilot light	2
		On/off switch	2
		Pilot light bulbs, 24V	2
		Dial thermometer	2
		Water pressure gauge	1
		Pressure gauge	1
P151-WSG R50-BB	040153 040154	Plumbing	
		Water sight glass only	1
		Replacement water filter	1

Appendix FREON 22 SAFETY DATA

In this section:

Freon 22 Material Safety Data Sheets (MSDS)	1- 6
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DUPONT CANADA INC.

MATERIAL SAFETY DATA SHEET

"FREON" 22
CEF00022 Revised 5-OCT-1996 Printed 25-NOV-1997

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Material Identification

Corporate MSDS Number : DU000025
Formula : CHClF2
Molecular Weight : 86.47

Product Use

Refrigerant

Propellant/Blowing Agent

Tradenames and Synonyms

CHLORODIFLUOROMETHANE

Company Identification

MANUFACTURER/DISTRIBUTOR

DuPont Canada, Inc.
P.O. Box 2200
Streetsville
Mississauga, Ontario L5M 2H3

PHONE NUMBERS

Product Information : 1-800-387-2122
Transport Emergency : 1-613-348-3616 (24 HOURS)
Medical Emergency : 1-613-348-3616 (24 HOURS)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
*METHANE, CHLORODIFLUORO	75-45-6	100 WT%

* Disclosure as a toxic chemical is required under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

NOTICE FROM DUPONT: The information on this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

HAZARDS IDENTIFICATION

Potential Health Effects

Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness or death. Intentional misuse or deliberate inhalation may cause death without warning. Vapor reduces oxygen available for breathing and is heavier than air. Liquid contact can cause frostbite.

HUMAN HEALTH EFFECTS:

Skin contact with the liquid may include frostbite. Prolonged overexposure may cause defatting or dryness of the skin. Eye contact with liquid may include eye irritation with discomfort, tearing, or blurring of vision.

Inhalation may include temporary nervous system depression with anesthetic effects such as dizziness, headache, confusion, incoordination, and loss of consciousness.

Higher exposures may lead to temporary alteration of the heart's electrical activity with irregular pulse, palpitations, or inadequate circulation. Fatality may occur from gross overexposure.

Individuals with preexisting diseases of the central nervous or cardiovascular system may have increased susceptibility to the toxicity of excessive exposures.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, immediately remove to fresh air. Keep person calm. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

In case of contact, flush area with lukewarm water. Do not use hot water. If frostbite has occurred, call a physician.

EYE CONTACT

(FIRST AID MEASURES - Continued)

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

Ingestion is not considered a potential route of exposure.

Notes to Physicians

Because of possible disturbances of cardiac rhythm, catecholamine drugs, such as epinephrine, should only be used with special caution in situations of emergency life support.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point : Will not burn
Autodecomposition : 632 C (1170 F)

Other burning materials may cause HCFC-22 to burn weakly.

Chlorodifluoromethane is not flammable at ambient temperatures and atmospheric pressure. However, chlorodifluoromethane has been shown in tests to be combustible at pressures as low as 60 psig at ambient temperature when mixed with air at concentrations of 65 volume % air. Experimental data have also been reported which indicate combustibility of "FREON" 22 in the presence of certain concentrations of chlorine.

Fire and Explosion Hazards:

Cylinders may rupture under fire conditions. Decomposition may occur.

Extinguishing Media

As appropriate for combustibles in area. Extinguishant for other burning material in area is sufficient to stop burning.

Fire Fighting Instructions

Use water spray or fog to cool containers. Self-contained breathing apparatus (SCBA) is required if cylinders rupture or contents are released under fire conditions.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Accidental Release Measures

Ventilate area, especially low or enclosed places where heavy vapors might collect. Remove open flames. Use self-contained breathing apparatus (SCBA) for large spills or releases.

HANDLING AND STORAGE

Handling (Personnel)

Use with sufficient ventilation to keep employee exposure below recommended limits. "FREON" 22 should not be mixed with air for leak testing. In general, it should not be used or allowed to be present with high concentrations of air above atmospheric pressure. Contact with chlorine or other strong oxidizing agents should also be avoided.

Storage

Clean, dry area. Do not heat above 52 C (125 F).

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Normal ventilation for standard manufacturing procedures is generally adequate. Local exhaust should be used when large amounts are released. Mechanical ventilation should be used in low or enclosed places.

Personal Protective Equipment

Impervious gloves and chemical splash goggles should be used when handling liquid. Under normal manufacturing conditions, no respiratory protection is required when using this product. Self-contained breathing apparatus (SCBA) is required if a large release occurs.

Exposure Guidelines

Applicable Exposure Limits

METHANE, CHLORODIFLUORO

PEL (OSHA)	: None Established
TLV (ACGIH)	: 1,000 ppm, 3,540 mg/m ³ , 8 Hr. TWA, A4
AEL * (DuPont)	: None Established

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point	: -40.8 C (-41.4 F)
Vapor Pressure	: 151 psig @ 25 C (77 F)
Vapor Density	: 3.03 (Air=1.0) @ 25 C (77 F)
% Volatiles	: 100 WT%
Evaporation Rate	: >1 (CCl ₄ =1.0)
Solubility in Water	: 0.3 WT% @ 25 C (77 F)
pH	: Neutral
Odor	: Slight ethereal
Form	: Liquified Gas.
Color	: Clear, Colorless.
Liquid Density	: 1.194 g/cm ³ @ 25 C (77 F)

STABILITY AND REACTIVITY

Chemical Stability

Material is stable. However, avoid open flames and high temperatures.

Incompatibility with Other Materials

Incompatible with alkali or alkaline earth metals--powdered Al, Zn, Be, etc.

Decomposition

Decomposition products are hazardous. HCFC-22 can be decomposed by high temperatures (open flames, glowing metal surfaces, etc.) forming hydrochloric and hydrofluoric acids, and possibly carbonyl halides.

Polymerization

Polymerization will not occur.

TOXICOLOGICAL INFORMATION

Animal Data

INHALATION:

4 hour, LC50, rat: 220,000 ppm.

The compound is a skin irritant and a slight eye irritant, but is not a skin sensitizer in animals.

Effects from single high exposures include central nervous system depression, anesthesia, rapid breathing, lung congestion and microscopic liver changes. Cardiac sensitization occurred in dogs at 50,000 ppm or greater from the action of exogenous epinephrine.

No toxic effects or abnormal histopathological observations occurred in rats repeatedly exposed to concentrations ranging from 10,000 to 50,000 ppm (v/v). Long-term exposures to 50,000 ppm (v/v) of vapors produced organ weight increases and a decrease in body weight gain, but no increased mortality or adverse hematological effects. In chronic inhalation studies, HCFC-22, at a concentration of 50,000 ppm (v/v), produced a small, but statistically significant increase of late-occurring tumors involving salivary glands in male rats, but not female rats or male or female mice. In the same studies, no increased incidence of tumors was seen in either species at concentrations of 10,000 ppm or 1,000 ppm (v/v).

Long-term administration in corn oil produced no effects on body weight or mortality.

HCFC-22 was mutagenic in some strains of bacteria in bacterial cell cultures, but not mammalian cell cultures or animals. It did not cause heritable genetic damage in mammals.

A slight, but significant increase in developmental toxicity was observed at high concentrations (50,000 ppm) of HCFC-22, a concentration which also produced toxic effects in the adult animal. Based on these findings, and other negative developmental studies, HCFC-22 is not considered a unique hazard to the conceptus. Studies of the effects of HCFC-22 on male reproductive performance have been negative. Specific studies to evaluate the effect on female reproductive performance have not been conducted, however, limited information obtained from studies on developmental toxicity do not indicate adverse effects on female reproductive performance at concentrations up to 50,000 ppm.

ECOLOGICAL INFORMATION

Ecotoxicological Information

Aquatic Toxicity:

HCFC-22

48 hour EC50 - Daphnia magna: 433 mg/L

DISPOSAL CONSIDERATIONS

Waste Disposal

Comply with Federal, State, and local regulations. Reclaim by distillation or remove to a permitted waste disposal facility.

TRANSPORTATION INFORMATION

Shipping Information

DOT/IMO

Proper Shipping Name : CHLORODIFLUOROMETHANE

Hazard Class : 2.2

UN No. : 1018

DOT/IMO Label : NONFLAMMABLE GAS

Shipping Containers

Tank Cars.

Tank Trucks.

Cylinders.

Shipping Information -- Canada

TDG

Proper Shipping Name : CHLORODIFLUOROMETHANE

PIN No. : 1018

TDG Class : 2.2

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute : Yes

Chronic : No

Fire : No

Reactivity : No

(REGULATORY INFORMATION - Continued)

Pressure : Yes

HAZARDOUS CHEMICAL LISTS

SARA Extremely Hazardous Substance: No

CERCLA Hazardous Substance : No

SARA Toxic Chemical - See Components Section

Canadian Regulations

CEPA Status : Compliant.

WHMIS Classification:

CLASS A Compressed Gas

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating

Health : 1

Flammability : 0

Reactivity : 1

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS : FLUOROPRODUCTS

Address : DuPont Canada Inc.

Box 2200, Streetsville

Mississauga, Ontario, L5M 2H3

Telephone : 905-821-5925

Indicates updated section.

End of MSDS