The following procedure provides information for making all three phase (180 - 253 VAC for low voltage or 342 - 528 VAC for high voltage) electrical connections to the Compressor.

1. Cut a 10 AWG (6.00 mm^2), 3 conductor cable with ground to an appropriate length.
2. Install a #10 ring tongue terminal on the end of each conductor using the appropriate size double crimping tool.
3. Remove the Rear Panel as shown in Figure 1.
4. Remove the System Circuit Breaker Terminal Cover as shown in Figure 1.
5. Install the cable into the Compressor through the cable strain relief as shown in Figure 1, Detail C.
6. Remove the 10-32 nut and install the grounding wire on the ground stud as shown in Figure 1, Detail C. Replace the nut and tighten to 18 in.-lbs (0.21m-kg).
7. Remove the screws from the Compressor circuit breaker terminals X, Y, and Z.

NOTE: The phase order in which the conductor terminal lugs are connected to circuit breaker terminals X, Y and Z will be determined during the Phase Check Procedure. For installation where one of the three phase legs is at or near ground potential, connect that leg to terminal Y on the Compressor.

8. Install the conductor terminal lugs to the circuit breaker terminals X, Y and Z in Figure 1, Detail C.
9. Allow enough cable to stay in the circuit breaker area to prevent strain on the electrical connections and tighten the screws on the cable strain relief.
10. Install the power source end of the power cable according to local electrical codes.
11. Install the System Circuit Breaker terminal cover.

Phase Check

1. Apply 200/230, 380/480 VAC power to the On-Board *IS* Compressor circuit.

NOTE: The System Circuit Breaker (CB1) will trip immediately during step 2 if the power phase connections are not correct.

2. Set the System Circuit Breaker (CB1) to the ON position.
3. If the System Circuit Breaker trips, refer to step 4. If the System Circuit Breaker does not trip, refer to step 5.
4. If the circuit breaker trips, perform the following steps:
   a. Set the System Circuit Breaker (CB1) to the OFF position.
   b. Disconnect the power cord from the power source.
   c. Remove the circuit breaker terminal cover.
   d. Reverse the wiring order of Compressor circuit breaker terminals X and Y.
   e. Torque the circuit breaker terminal screws to 12 in.-lbs.
   f. Install the circuit breaker terminal cover.
   g. Repeat steps 1- 3 of this procedure.
5. Make sure the Power On indicator is illuminated.
6. Set the System Circuit Breaker (CB1) to the OFF position.
7. Install the rear panel.

Startup

Refer to the **On-Board *IS Cryopump System Operation Guide***, CTI-Cryogenics part number 8040647, for instructions about starting the On-Board *IS* 1000 Compressor and the On-Board *IS* Cryopump System.

Product Information and Technical Support

Please visit the Helix Technology Corporation Website located at http://www.helixtechnology.com to obtain additional product information or call the GUTS® (Guaranteed Uptime Support) Service Center for 24 hour, 7 day per week support by dialing:

800-367-4887 - Inside the United States of America

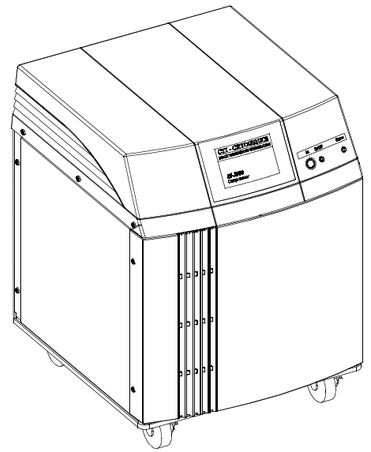
508-337-5599 - Outside the United States of America

CTI-CRYOGENICS
HELIX TECHNOLOGY CORPORATION

On-Board *IS* 1000 Compressor Quick Installation Guide

Part Number 8040645, Revision 15, 07/13/2005

ECO Number 17233



ON-BOARD *IS* 1000 COMPRESSOR SPECIFICATIONS

ELECTRICAL	LOW VOLTAGE	HIGH VOLTAGE
OPERATING VOLTAGE RANGE:	180-253 VAC 50/60HZ	342-528 VAC 50/60HZ
PHASE:	3	3
NOMINAL INPUT POWER:	5.8 KW @ 180-208 VAC	5.2 KW @ 460 VAC
NOMINAL POWER FACTOR:	0.9	0.9
RATED FULL LOAD LOCKED ROTOR (FL/LR):	19/85	10/42
MINIMUM ELECTRICAL SERVICE:	30 AMPS	20 AMPS

MAXIMUM INLET TEMPERATURE: 90º F (32º C)

MINIMUM INLET TEMPERATURE: 50º F (10º C)

FLOW RATE: 2.75 ±1.25 gpm (10.4 ± 4.7 lpm)
NOTE: Refer to user manual for requirements at 60HZ, 375V or lower

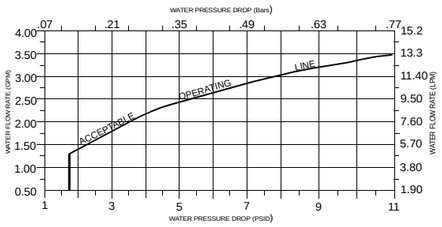
PRESSURE DROP (INLET-TO-OUTLET): Refer to chart (at right)

MAXIMUM INLET PRESSURE: 100 PSI (6.9 bars)

ALKALINITY: 6.0 - 8.0 pH

CALCIUM CARBONATE: <75 PPM

DEIONIZED WATER: Do not use above 100,000 OHM-CM.



***NOTE:** This chart defines the water flow rate through the Compressor as a function of the pressure drop from water inlet to water outlet. You must provide the correct pressure drop in your water supply system to ensure that the water flow condition meets the requirements specified.*

PART NUMBER: 8135921GXXX LV, 8135926GXXX HV

INPUT POWER CABLE (Customer Supplied): 600 VAC, 10 gauge, 3 Conductor With Ground

NOMINAL HELIUM PRESSURE: 340 - 350 psig (23.4 - 24.1 bar) @ 60HZ, 355 - 365 psig (24.5 - 25.2 bar) @ 50 HZ

AMBIENT OPERATING TEMPERATURE: 50 - 100º F(10 - 38º C)

INTERFACE: Cryopump power receptacle mates with CTI-Cryogenics supplied cryopump power cable for single pump use. Mates with remote junction box for multiple cryopump use.

GAS SUPPLY AND RETURN CONNECTOR: 1/2 inch Aeroquip® self-sealing couplings

REMOTE CONTROL RECEPTACLE: 24 VAC, 2.7A inductive, mates with supplied P5 connector p/n MS3106a

ADSORBER SERVICE SCHEDULE: 3 years

Before You Start

1. Follow all safety precautions.
2. Make sure the On-Board *IS* Cryopump has been installed according to the directions found in the appropriate ***On-Board IS Cryopump Quick Installation Guide***.

Compressor Safety

NOTE: Read this Instruction Guide and follow these safety guidelines before installing, operating or servicing On-Board products.

⚠WARNING

High Voltage

To avoid severe injury or loss of life from high voltage electric shock, turn off all electrical power before proceeding and adhere to all local electrical codes.

Disconnected: when the power entry module is set to OFF, or the power cord is detached from the power entry module.

On-Board *IS* 1000 Compressor Installation

1) Connect **cooling water out** line. Use thread sealant and 1/2 x 14 FNPT with Maximum pressure = 100 psig/6.9 bars. See Figure 1**A** and Figure 2.
2) Connect **cooling water in** line. See Figure 1**B** and Figure 2.
3) Connect **helium return line**. See Figure 1**C** and Figure 5.
4) Connect **helium supply line**. See Figure 1**H** and Figure 5.
5) Verify the helium pressure. See Figure 1**D** and Table 1.
6) Connect the **EMO remote** cable, if available. See Figure 1**E** and Figure 3.
7) Connect the power cable to the **system circuit breaker**. See Power Cable Connections, Figure 1**G**, and Figure 4.
8) Perform the **Phase Check**. See the Phase Check section in this Guide.
9) Connect the logic module. See Figure 1**F** and the On-Board *IS* Controller Quick Installation Guide for instructions.
10) Start up the cryopump system. Refer to the **On-Board *IS Cryopump System Operation Guide***, CTI-Cryogenics part number 8040647, for instructions about starting the On-Board *IS* 1000 Compressor and the On-Board *IS* Cryopump System.

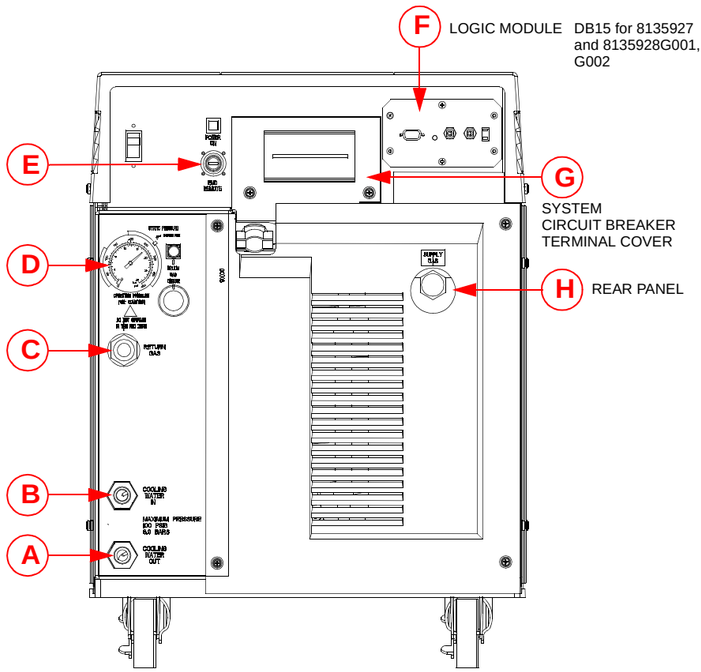


Figure 1: On-Board *IS* 1000 Compressor Installation Points

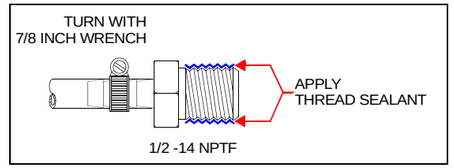


Figure 2: Water Line Connection

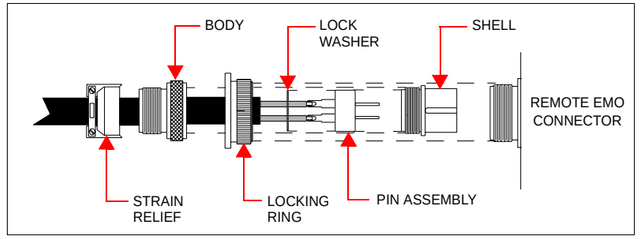


Figure 3: EMO Cable Connections

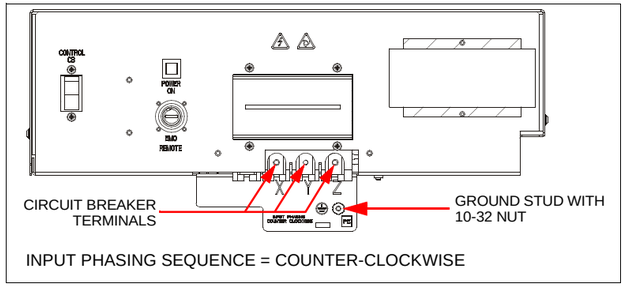


Figure 4: System Circuit Breaker Power Cable Connections

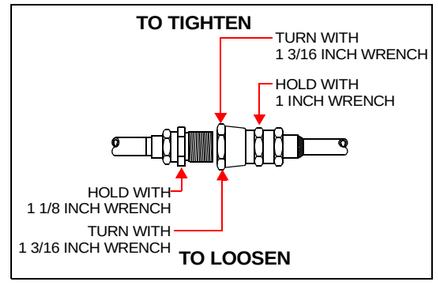


Figure 5: Helium Flex Line Connections

Static Helium System Pressure Verification

The proper static helium system pressure is necessary so that the cryopumps operate at maximum performance as well as to assure that the Compressor operates below the maximum design motor winding temperature. This maximizes the life of the Compressor motor.

1. Make sure the On-Board *IS* 1000 Compressor and On-Board *IS* Cryopumps are OFF.
2. Make sure all system helium connections have been made.
3. Allow all system components to acclimate to a temperature between 60º F and 80º F (15.5º C - 26.6º C).
4. Read the Compressor helium pressure gauge located on the Compressor rear panel (see Figure 1**D**). Compare the gauge reading to the appropriate 50/60 HZ line frequency value (depending upon your system installation) indicated in Table 1.

Table 1: On-Board *IS* 1000 Compressor Static Helium System Pressure

Line Frequency	Helium ("OFF" Condition) Charge Pressure
50/60 Hz	340 - 350 psig (23.4 - 24.1 bar)
50 Hz*	355 - 365 psig (24.5 - 25.2 bar)
* This helium charge pressure is only required when supplying helium to six (6) On-Board *IS* Cryopumps from one On-Board *IS* 1000 Compressor operating at 50 Hz.	

Power Cable Connections

NOTE: Input phasing sequence = counter-clockwise. Make sure that the lockout procedure (as defined by the facility) has been followed before initiating the following procedure.

CAUTION

Equipment Failure

To avoid equipment failure, use a 10 gauge, 3 conductor cable with ground rating at 600 VAC.