

CA5000-C

Liquid CO₂ Freezer Backup System



OPERATING INSTRUCTIONS MANUAL



HAMPSHIRE CONTROLS CORPORATION

ONE GROVE STREET / P.O. BOX 516, DOVER, NEW HAMPSHIRE USA 03821

TEL. (603) 749-9424 FAX (603) 749-9433

U.S. TOLL FREE (866) 496-9424

WEB SITE: <http://www.hampshirecontrols.com>

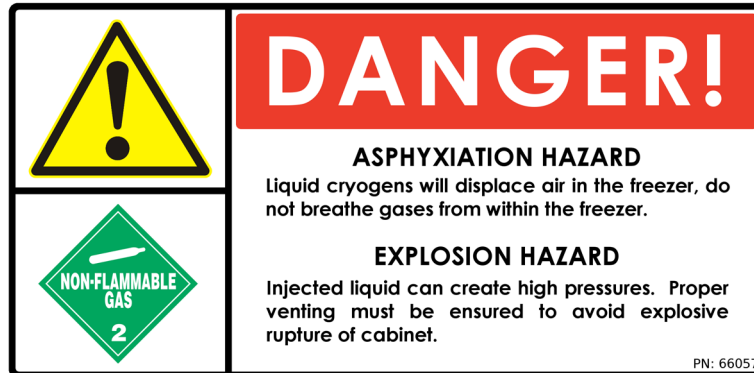
E-MAIL: sales@hampshirecontrols.com

TABLE OF CONTENTS


SAFETY WARNINGS	2
Unpacking Information	4
Customer Supplied Parts	4
Introduction	5
Features	5
Specifications	6
Installation	7
Interconnections	7
Sensor Probe	7
CO ₂ Tank and Delivery Tube	8
Door Safety Switch	9
Battery-Valve Module (BVM)	9
Door Switch, Relay, Control Cable, Power	10
Operational Check	10
Operating Mode Instructions	11
Programming Mode Instructions	12
Detailed Description of Programming Parameters	14
Standard Alarm Parameters	14
Hi (High Alarm Setting)	14
Ad (Alarm Delay Period)	14
rd (Relay Delay Period)	15
SIL (Alarm Silence or Mute Period)	15
CO ₂ Control Parameters	16
SP (Setpoint)	16
On (On Time)	16
OFF (Off Time)	17
Timers and Manual Valve Control	17
SUS (Suspend)	17
Pur (Purge)	18
CCO (Current CO ₂ Usage)	18
CSt (CO ₂ Started 'CSt' Minutes Ago)	19
tCO (Total CO ₂ Usage)	19
All Parameters and Settings	20
Periodic Maintenance	21
Replacement Parts	22
Troubleshooting Guide	23
Limited Warranty	24

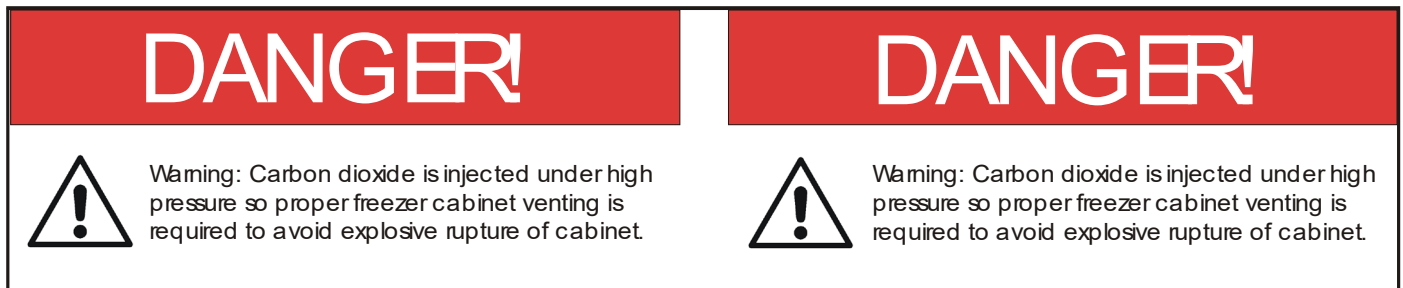
SAFETY WARNINGS


Please read this manual in its entirety before beginning installation.





 Injected liquid CO₂ gas is under extremely high pressure, so proper system venting is required.

 CO₂ gas exhaust from an operating CA5000-C Liquid CO₂ Freezer Backup System suppresses oxygen levels in enclosed spaces. The facility must have appropriate ventilation, and CO₂ and/or oxygen monitoring equipment should be installed in compliance with local, national, or regional regulations.




 The CA5000-C Liquid CO₂ Freezer Backup System must be installed, and periodically tested, according to Hampshire Controls' instructions, by a qualified refrigeration technician, or other qualified personnel, in compliance with local, national, or regional regulations. The CA5000-C Liquid CO₂ Freezer Backup System will not operate during a power failure if it is not properly installed.


 This product contains a sealed lead-acid rechargeable battery. Do not use if battery is damaged or leaking. Replace the battery with a Hampshire Controls' recommended battery only. Always recycle used batteries.


 Do not modify or change system components. Using this equipment in a manner other than expressly intended may cause serious injury or death. Hampshire Controls shall not be liable for any incidental or consequential damages. The user assumes all risk and liability associated with the use of this product.


 All connections from the CO₂ supply cylinder to the freezer require a minimum static pressure rating of 1500 psi.


CA5000-C Liquid CO₂ Backup System Operating Instructions


 Liquid CO₂ is extremely cold and can cause frostbite on unprotected skin. Always wear protective clothing and eyewear when working with liquid refrigerants. Liquid CO₂ must be handled safely by qualified personnel in compliance with local, national, or regional regulations.

 O.S.H.A. regulations have been established for the safe handling, use, and storage of high-pressure gas cylinders. Please consult a current edition of the O.S.H.A. regulations to ensure compliance with applicable safety requirements and lockout/tagout requirements. Pressurized gas cylinders must be handled safely by qualified personnel in compliance with local, national, or regional regulations.

 Empty the contents of the freezer and allow it to warm to ambient temperature prior to performing any work inside the enclosed space. Working in the freezer chamber at its operating temperature may result in frostbite or other physical harm.

 Place the CA5000-C Liquid CO₂ Freezer Backup System Battery-Valve Module (BVM) in a secure, stable location 1) as close as possible to the ultra-low temperature (ULT) freezer inlet port to allow for maximum length of the CA5000 output tube within the freezer, and 2) where there is easy access to the POWER cord and CONTROL CABLE. Do not place the BVM in a location where there would be risk of the BVM falling or in a location where it would represent a tripping hazard.

 The CA5000-C Liquid CO₂ Freezer Backup System has battery backup. Therefore, in the event of an emergency requiring the complete shutdown of the CA5000 system, both the POWER cord and the CONTROL CABLE must be disconnected, either on one end or the other. Place the CA5000-C Liquid CO₂ Freezer Backup System BVM in a secure, stable location with easy access to the POWER cord and CONTROL CABLE connections.

 There are numerous interconnections between the CA5000-C Liquid CO₂ Freezer Backup System Controller and BVM, the liquid CO₂ supply, the ULT freezer, and line power, including: the tubing from the liquid CO₂ supply to the BVM, the liquid CO₂ output tubing from the BVM to the ULT freezer, the CONTROL CABLE from the CA5000 Controller to the BVM, the DOOR SWITCH cable from the BVM to the ULT freezer door, the POWER cord from line power to the BVM, and the type T THERMOCOUPLE PROBE from the CA5000 Controller to the ULT freezer. Place the CA5000-C Liquid CO₂ Freezer Backup System BVM in a secure, stable location as close as possible to the ULT freezer inlet port to minimize the distances of the interconnections. Organize and secure the interconnections in the safest possible configuration to minimize the risk of misidentifying the interconnections and to avoid tripping and/or equipment falling hazards.

CA5000-C Liquid CO₂ Backup System Operating Instructions

Unpacking Information

The CA5000-C Liquid CO₂ Backup System is shipped in a single custom box. Please check the carton for the following:

- ❑ **CA5000 Controller:** alarm display module
- ❑ **CA5000 Battery-Valve Module (BVM)**
- ❑ **Control Cable:** CA5000 Controller to CA5000 BVM
- ❑ **Door Switch:** magnetic door interlock switch
- ❑ **Door Switch Cable**
- ❑ **Type T Thermocouple Probe**
- ❑ **Power Adapter:** input: 100-240 VAC, 50-60 Hz, 1 A maximum; output: 15 VDC, 2.4 A, 36 W
- ❑ **CO₂ Input Fitting:** 1/4" 45° flare nut CO₂ input fitting on CA5000 BVM (**LIQUID CO₂ FROM TANK**)
- ❑ **CO₂ Output Tubing:** 0.125" OD x 0.055" ID by 8' copper output tube with 1/8" female compression fitting connector for the CA5000 BVM (**GAS TO FREEZER**).

Customer Supplied Parts

Some parts and materials must be supplied by the installer or a gas supply company:

- ❑ CGA 320 CO₂ tank with **siphon feed**, 50 pounds or larger -OR- central **liquid** CO₂ supply (pressure <1000 psi)
- ❑ CGA 320 adapter for CO₂ tank*
- ❑ Copper tubing, flexible or semi-flexible to connect tank CGA 320 and Hampshire Controls supplied 1/4" 45° flare nut (**LIQUID CO₂ FROM TANK**)*
- ❑ Freezer vent to release excess pressure, preferably from the top of the cabinet.

Marked * are available as kit **A84000-19, CA5000-C Liquid CO₂ Freezer Backup System Installation Kit** from Hampshire Controls.

CA5000-C Liquid CO₂ Backup System Operating Instructions

Introduction

The Hampshire Controls Corporation CA5000 system is a unique combination of field proven, highly reliable Hampshire Controls alarm systems and a liquid CO₂ injection system, providing security for your products stored at ultra-low temperatures. It offers multiple user-programmable control setpoints, alarm setpoints and alarm delay timers. Parameters are stored in non-volatile memory and are maintained even when power is lost.

The customer-supplied liquid CO₂ is maintained at high pressure, ready to be injected into an ultra-low temperature (ULT) freezer cabinet or other ULT storage system. When a malfunction occurs and the freezer warms above the user-defined setpoint, a controlled amount of liquid CO₂ is injected into the freezer. Since the boiling point of CO₂ is -78.5 °C, the injected CO₂ boils and absorbs heat, protecting your product by maintaining the cabinet at temperatures as low as -70 °C.

The CA5000 is simple to operate. Plug in the CA5000, place the temperature probe in the freezer chamber to be monitored, and the CA5000 will display the temperature at that location. Pushing combinations of the three CA5000 pushbuttons allows the user to program the alarm set points, CO₂ injection temperature setpoint, and the other controls.

FEATURES

- ❑ Freezer cabinet temperature can be maintained as low as -70 °C. (Hampshire Controls recommends a -60 °C setpoint.)
- ❑ Backup times of 10 hours or more on one standard 50-lb. cylinder of CO₂ with a -60°C setpoint.
- ❑ Independent user-programmable controls for system alarms and liquid CO₂ injection.
- ❑ Visible and audible indicators for system status.
- ❑ Multiple programmable delays are available to minimize nuisance or false alarms.
- ❑ Relay output included for central alarm systems or automatic dialers.
- ❑ A door interlock switch prevents CO₂ injection while freezer door is open.
- ❑ An internal backup battery with integrated charger keeps the system running for at least 24 hours after a power outage.
- ❑ BAT indicator warns of a disconnected or low voltage backup battery condition.

SPECIFICATIONS

Table 1: CA5000-C Liquid CO₂ Freezer Backup System Specifications

<i>CA5000-C Liquid CO₂ Freezer Backup System</i>	
Backup Time (50-lb CO₂ cylinder)	>10 hours at -60 °C setpoint
CO₂ Supply Pressure	<1000 psi (20 °C)
Backup Temperature Setpoint Range	-70 °C to 0 °C
Type T Thermocouple Probe Range	-200 °C to +50 °C (factory calibration guaranteed for 1 year)
Accuracy	±2 °C
Resolution	1 °C
Freezer Door Switch Input (Interlock)	Door must be closed for CO ₂ injection
Output Relay (SPDT Contact)	Normally open (NO) or normally closed (NC), 30 VDC/1 A max (non-inductive)
Power Adapter	
Input (Fluctuation)	100-240 VAC (fluctuation not to exceed ±10% of nominal), 50-60 Hz, 1A max
Output	15 VDC, 2.4A, 36 W
Battery Backup	12 VDC, 12 Ah sealed, lead-acid rechargeable. Typically, >48 hours backup. Replace the battery with a Hampshire Controls' recommended battery only.
CA5000 Controller	5.0" (w) by 4.25" (h) by 1.75" (d), black Bakelite case, 1 lb.
CA5000 BVM	6.25" (w) by 5.0" (h) by 10.0" (d), painted steel case, 14 lbs.
Environmental Conditions	
Facilities	Intended for indoor (laboratory) use
Altitude	Up to 2,000 meters (6,600')
Temperature Range	0 °C to +40 °C
Maximum Relative Humidity	60% (0 °C to +40 °C)
Ventilation	Compliance with ANSI/ASSP Z9.5-2022 recommended.
Pollution Degree	POLLUTION DEGREE 2: only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is expected.

Installation

NOTE: The CA5000-C Liquid CO₂ Freezer Backup System must be installed according to Hampshire Controls' instructions, by a qualified refrigeration technician, or other qualified personnel, in compliance with local, national, or regional regulations. Maintaining the safety of ULT freezer while installing the CA5000-C Liquid CO₂ Freezer Backup System, and when the installation is complete, is the responsibility of the installer.

NOTE: DO NOT USE AN IMPROPERLY RATED POWER ADAPTER. The CA5000-C Liquid CO₂ Freezer Backup System POWER adapter is compatible with 100-240 VAC, 50-60 Hz, 1 A max input and outputs 15.0 VDC, 2.4 A, 36 W.

INTERCONNECTIONS

Table 2: CA5000-C Liquid CO₂ Freezer Backup System Interconnections

CA5000 LABEL	FROM:	TO:	DESCRIPTION
THERMOCOUPLE	CA5000 Controller , 2-pin rectangular connector	ULT freezer	Type T thermocouple temperature probe, 10' lead, (p/n 48264)
GAS TO FREEZER	CA5000 BVM , 1/8" female compression fitting	ULT freezer	CO ₂ delivery tube, 1/8" OD copper tubing, 8' length, (p/n A84000-21)
LIQUID CO₂ FROM TANK	CO ₂ tank, CGA 320 siphon feed	CA5000 BVM , 1/4" 45° flare fitting	CO ₂ supply tube, 1/4" OD copper tubing, 6' length, (p/n A84000-19)
DOOR SWITCH	ULT freezer door	CA5000 BVM , 3-pin circular connector	Door status monitor, 2-conductor cable, 10' lead, (p/n A84000-22)
CONTROL CABLE	CA5000 Controller , 6-pin circular connector	CA5000 BVM , 6-pin circular connector	Power from BVM to Controller , CO ₂ valve control from Controller to BVM , 6-conductor cable, 10' lead, (p/n A84000-06)
RELAY: SPDT CONTACT	CA5000 Controller	Facility alarm, auto dialer, <i>etc.</i>	Rating 30 VDC, 1 A (non-inductive)
POWER	Line power, 100-240 VAC, 50-60 Hz, 1 A max	CA5000 BVM , power jack, 15.0 VDC, 2.4 A, 36 W	Power adapter, international blades included, 5' cord, (p/n 29032)

SENSOR PROBE

The probe supplied with the CA5000 is a highly accurate type T thermocouple sensor. It has excellent long-term stability and should not need recalibration in normal usage. However, if the probe is subjected to temperature extremes outside of the normal operating range of the unit, or if the probe is damaged, it must be replaced.

If the CA5000 Freezer Backup display shows a continuous reading of an unreasonable value (for example, "1999"), then the probe has either failed or is disconnected. Verify proper connection, and replace

CA5000-C Liquid CO₂ Backup System Operating Instructions

the type T thermocouple probe, as required (see **Table 4. Replacement Parts**, p/n **48264**, **Type T Thermocouple Temperature Probe**).

Due to differences in probe locations within the ULT freezer and in probe calibrations, the temperature on the CA5000 Controller temperature display might not directly agree with the interior temperature display for the ULT freezer. If the two temperatures are within 5 °C of each other, then the CA5000-C CO₂ Freezer Backup System will perform as expected. However, if the separation between the two temperatures is greater than 5 °C, then the CA5000-C CO₂ Freezer Backup System Controller and the Type T Thermocouple Temperature Probe should be returned to Hampshire Controls for temperature recalibration.

Probe Installation

NOTE: The probe **MUST** be installed in freezer cabinet air and cannot be used in simulated product bottles. Insertion of the probe in simulated product bottles will delay the response time of the CA5000 Backup System and place freezer contents at risk.

When installing the sensor in a cabinet or enclosure (particularly freezers), use proper techniques to prevent room moisture from getting into the cabinet. Whenever possible, install the probe through an existing access or pass-thru port provided by the freezer manufacturer and reseal the port.

Inside the cabinet, route the probe wire so that it will not become snagged during loading, unloading, maintenance, or cleaning procedures.

Probe Location

Install the sensor probe in a location where it will respond to the average temperature of the space being monitored, and not to local conditions caused by routine door openings. The probe location should be optimized to provide an accurate temperature reading for the freezer cabinet without generating false or nuisance alarms. For example, locating the sensor probe on the bottom of a chest freezer will result in delayed alarms relative to locating the sensor probe near the top of the freezer. However, locating the sensor too close to the top of the chest freezer could result in frequent nuisance alarms caused by lid openings. Choose a probe location that offers the desired storage temperature safety for the freezer contents while keeping nuisance alarms at a tolerable level. Do not install the probe in a location where the sensor will be subject to frost buildup. Routinely inspect the probe tip to ensure that it is not embedded in frost buildup.

CO₂ TANK AND DELIVERY TUBE

Install the CO₂ output tube (0.125" OD x 0.055" ID by 8' copper) onto the CA5000 BVM connector labelled "GAS TO FREEZER" using the 1/8" compression fitting and route the tubing into the ULT freezer. The output from the CO₂ delivery tube within the ULT freezer should be located near the CA5000 temperature probe, but the CO₂ flow should be directed away from the temperature probe. **For clarity, the CO₂ output flow must not directly impact the CA5000 type T thermocouple temperature probe.** The CO₂ delivery tube output and CA5000 temperature probe should be at approximately the same height within the freezer cabinet and near the back of the cabinet (opposite of the freezer door). Use care to install the CO₂ delivery tube where it will not be blocked by freezer contents. The cold CO₂ is heavier than air, so it will fill the freezer from the bottom up.

Install a 50 lb. (or larger) siphon-withdrawal liquid CO₂ tank with CGA 320 output fitting. Connect the CO₂ supply tubing to the CGA 320 tank output fitting first, then purge the supply tubing of any contaminants by rapidly cracking open, and then closing, the CO₂ tank valve. Finally, connect the CO₂ supply line to the 1/4" 45° flare fitting on the CA5000 BVM labelled "LIQUID CO₂ FROM TANK."

NOTE: THE CO₂ TANK MUST NOT EMPLOY A REGULATOR.

NOTE: DO NOT REPLACE THE 1/4" 45° FLARE FITTING WITH ANOTHER TYPE OF FITTING. The 1/4" 45° flare fitting and the CGA 320 tank output fitting require no Teflon tape or other thread sealant,

CA5000-C Liquid CO₂ Backup System Operating Instructions

which if applied improperly can result in the contamination, and probable partial or complete failure, of the CA5000 BVM CO₂ injection valve.

Hampshire Controls recommends 1/4" OD – 3/16" ID copper tubing for the CO₂ supply line. A convenient installation kit is available, **A84000-19, CA5000-C Liquid CO₂ Freezer Backup System Installation Kit**, consisting of a CGA 320 fitting to mate to the CO₂ tank, 6' of 1/4" OD - 3/16" ID copper tubing, and a female 1/4" fitting to mate to the 1/4" 45° flare fitting on the CA5000 BVM labelled "LIQUID CO₂ FROM TANK." Make certain that there are no CO₂ leaks anywhere in the supply line. Typically, CO₂ leaks can be detected by ice or frost buildup or by condensation.

During a tank change, be certain to purge the delivery tubing of any high-pressure gas after closing the empty CO₂ supply tank valve. When installing the new tank, also be certain to purge the system of any air in the delivery tubing after opening the CO₂ supply tank valve. Purging is accomplished via manual valve control **Pur (Purge)** as described in this manual (p. 18).

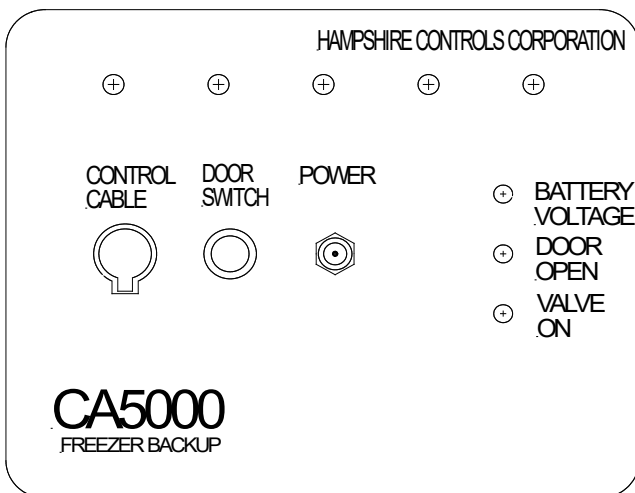
DOOR SAFETY SWITCH

Install the supplied CA5000 Door Switch so that it will activate upon the opening the freezer or cabinet door. When installed and properly wired, the CA5000 Door Switch will interrupt the injection of CO₂ into the freezer. The CA5000 Door Switch interlock circuit is factory shipped to accept a closed contact (NC) for normal operation. Verify this functionality by observing the visual "OPEN DOOR" LED indicator on the CA5000 BVM as described below. Confirm that the CO₂ injection halts when the red door-open LED indicator is illuminated.

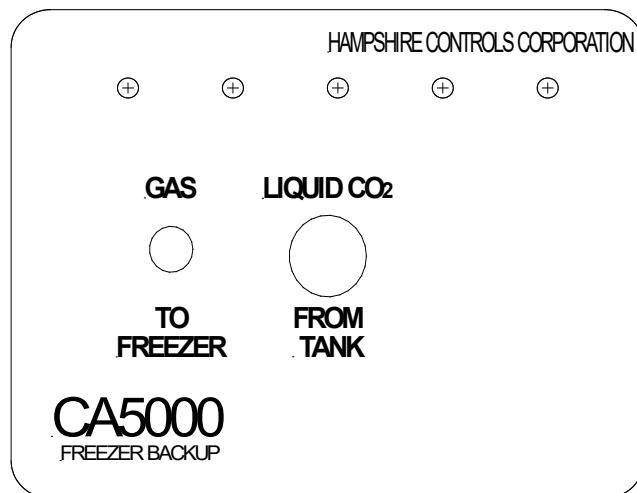
BATTERY-VALVE MODULE (BVM)

The CA5000 BVM contains the backup battery, the backup battery charging and logic circuits, and the liquid CO₂ injection valve. On the front face of the CA5000 BVM, there is a 6-pin CONTROL CABLE connector, a 3-pin connector for the DOOR SWITCH interlock cable, and a POWER jack for the supplied power adapter. The rear panel of the CA5000 BVM has LIQUID CO₂ FROM TANK connector for the siphon-feed liquid CO₂ tank and a GAS TO FREEZER connection for CO₂ output tube.

BVM FRONT VIEW



BVM REAR VIEW



Visual LED indicators display system status:

CA5000-C Liquid CO₂ Backup System Operating Instructions

- ❑ BATTERY VOLTAGE: Green indicates the battery and charger are operating normally, flashing red indicates a low or discharged battery.
- ❑ DOOR OPEN: Red indicates that the door is open.
- ❑ VALVE ON: Yellow indicates that power is applied to the solenoid valve and, if a CO₂ tank is connected, open, and not empty, then CO₂ should be flowing.

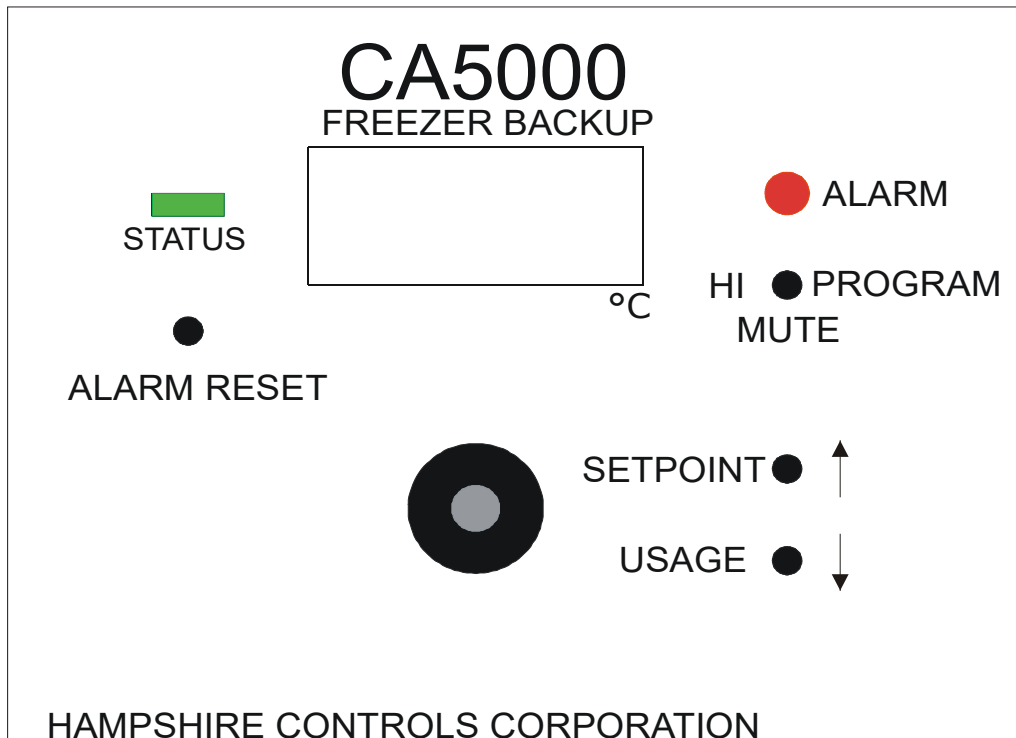
DOOR SWITCH, RELAY, CONTROL CABLE, POWER

Connect the DOOR SWITCH wiring to the CA5000 BVM and the CA5000 Controller output alarm RELAY to your facilities' systems as required. Connect the CONTROL CABLE to the CA5000 Controller and CA5000 BVM. Plug the CA5000 system AC adapter into a 100-240 VAC, 50-60 Hz outlet (international blades supplied) and into the POWER jack on the CA5000 BVM. If the temperature where the probe is located is within the CA5000-C Controller's operating range (-200 to +50°C), then the CA5000 Controller display will show the current probe temperature.

OPERATIONAL CHECK

If the display is blank, verify power is supplied to the CA5000 BVM. If the CA5000 Controller STATUS LED is lit, then the CA5000 Controller has power. If not, then verify that the power adapter is plugged into the CA5000 BVM and into line power, and that the CONTROL CABLE between the CA5000 Controller and the CA5000 BVM is connected on both ends.

The STATUS LED indicator flashes every second. This indicates that the CA5000 is operating normally.



FRONT PANEL DISPLAY

In Operating Mode, the CA5000 displays the temperature at the thermocouple probe location, and provides alarms and outputs based on user-specified parameters.

CA5000-C Liquid CO₂ Backup System Operating Instructions

- ❑ The **ALARM RESET** button is a system reset, which clears alarms and sets the values of the **CCO (Current CO₂ Usage)** and **CSt (CO₂ Started 'CSt' Minutes Ago)** injection start times to 0 minutes.
- ❑ The **PROGRAM** button displays the **Hi (High Alarm Setting)** temperature at which a warning alarm is sounded. This button also mutes the beeper after an alarm for a preset time interval (**SIL (Alarm Silence or Mute Period)**). Each successive press of this button resets the mute timer. Additionally, this button accesses Programming Mode.
- ❑ The **SETPOINT/↑** button displays the **SP (Setpoint)** temperature at which CO₂ injection begins.
- ❑ The **USAGE/↓** button displays the **CCO (Current CO₂ Usage)** in minutes since the last **ALARM RESET**.

Operating Mode Instructions

The CA5000 constantly compares the probe's temperature to the user-specified **Hi (High Alarm Setting)** temperature to determine out-of-range status. An out-of-range state is a temperature that is equal to, or warmer than, the user-defined **Hi (High Alarm Setting)**. The STATUS LED flashes green when the temperature is in-range. The CA5000 will not alarm until the out-of-range state has continued for the specified **Ad (Alarm Delay Period)**.

When an alarm condition occurs, the beeper sounds, the ALARM LED flashes, and the STATUS LED blinks red. Pressing the **PROGRAM/MUTE** button silences the beeper for the user-specified time (**SIL (Alarm Silence or Mute Period)**) and changes the alarm sound to short chirps. After the user-programmed **SIL (Alarm Silence or Mute Period)** elapses, if the CA5000 is still in an alarm condition, the beeper will resume at full volume.

When the probe temperature exceeds the **SP (Setpoint)** temperature and both the **Ad (Alarm Delay Period)** and the **rd (Relay Delay Period)** have expired, CO₂ is injected into the freezer cabinet, and the alarm LED changes to blinking amber/red. The amber/red blinking LED indication persists and does not clear until the unit **ALARM RESET** is pressed. This provides the user with a visual indicator that a fault occurred, and CO₂ has been injected into the ULT freezer.

The **PROGRAM** button has the following functions:

- ❑ In Operating Mode, pressing the **PROGRAM** button displays the user defined **Hi (High Alarm Setting)**.
- ❑ When alarming, pressing the **PROGRAM** button mutes the beeper for the **SIL (Alarm Silence or Mute Period)**.
- ❑ Extended pressing of the **PROGRAM** button until "Hi" is displayed puts the CA5000 into Programming Mode and mutes the beeper.
- ❑ In Programming Mode, continued individual presses of the **PROGRAM** button will cycle through the list of user parameters (see "**Detailed Description of Programming Parameters**" p. 14 - 19).

The **SETPOINT/↑** button has the following functions:

- ❑ In Operating Mode, pressing the button displays the CO₂ injection control **SP (Setpoint)**.
- ❑ In Programming Mode, pressing the button increases the displayed parameter value.

The **USAGE/↓** button has the following functions:

- ❑ In Operating Mode, pressing the button displays the **CCO (Current CO₂ Usage)** in minutes.
- ❑ In Programming Mode, pressing the button decreases the displayed parameter value.

Other Alarms

Should a problem arise with line power or the backup battery, a "**BAT**" indicator will be displayed on the CA5000 Controller, the ALARM LED will flash, and the beeper will sound. After confirming that the AC

CA5000-C Liquid CO₂ Backup System Operating Instructions

adapter is powered and is connected (try re-plugging both ends), contact Hampshire Controls for service or for a replacement battery. Replace the battery with a Hampshire Controls' recommended battery only.

When the ULT freezer door has not been properly closed, after a fixed time of 15 minutes, the “dor” fault indication will be displayed on the CA5000 Controller, the red ALARM LED will flash, and the beeper will sound. Pressing the **MUTE** button will cause the beeper to sound short ‘chirps’, but the ALARM LED continues to flash, and the chirping remains audible, until the freezer door is closed.

Programming Mode Instructions

1. From Operating Mode, place the CA5000 in Programming Mode to access the desired parameters (see **Table 3. CA5000-C Liquid CO₂ Freezer Backup System – All Parameters and Settings**, p. 20) as follows. While in Programming Mode, a small arrow is shown in the upper-left corner of the LCD display:
 - ❑ **Standard Alarm Parameters:** Press and hold the **PROGRAM** button until “Hi” is displayed.
 - ❑ **CO₂ Control Parameters:** Press and hold the **SETPOINT**↑ and **PROGRAM** buttons simultaneously until “SP” is displayed.
 - ❑ **Timers and Manual Valve Controls:** Press and hold the **USAGE**↓ and **PROGRAM** buttons simultaneously until “SUS” is displayed.
2. The LCD display will show the first parameter that may be programmed (see the **Detailed Description of the Available Programming Parameters** on p. 14 - 19). The name of the parameter will flash briefly on the display followed by the current value of the parameter.
3. The flashing **STATUS** tricolor LED indicates the current state of the CA5000:
 - ❑ **Green** = Operating Mode, freezer temperature displayed.
 - ❑ **Amber** = Programming Mode
 - ❑ **Red** = Alarming. Freezer temperature above **Hi (High Alarm Setting)**.
4. To change the value of any parameter, press the **SETPOINT**↑ or **USAGE**↓ buttons. Pressing either button will change the parameter value by ±1.
5. Pressing and holding either the **SETPOINT**↑ or **USAGE**↓ button for a half-second will change the parameter value by ±10. It will continue to step by ±10 on subsequent button presses, provided that the next button press occurs within approximately 1 second.
6. Waiting more than 1 second before the next press of the **SETPOINT**↑ or **USAGE**↓ button will cause the step size to revert to ±1.
7. Once the CA5000 is in Programming Mode, each time the **PROGRAM** button is pressed, the CA5000 steps to the next parameter. As the CA5000 steps to the next parameter, the value of the previous parameter is saved. Once the final parameter in the category (**Standard Alarm Parameters**, **CO₂ Control Parameters**, or **Timers and Manual Valve Controls**) is reached, pressing the **PROGRAM** button again saves the final parameter value and causes the CA5000 to exit Programming Mode and return to Operating Mode.
8. While in Programming Mode, if no buttons are pressed for approximately 30 seconds, then the CA5000 will revert to Operating Mode.
9. The **ALARM RESET** button is a system reset which clears alarms, returns the CA5000 to Operating Mode, and sets the **SUS (Suspend)**, **CCO (Current CO₂ Usage)**, and **CSt (CO₂ Started ‘Cst’ Minutes Ago)** timers to 0 minutes.

The CA5000 functions as a freezer temperature monitor, a ULT freezer coolant injection device, and an audio, visual, and output relay alarm system. The CA5000 goes into alarm mode when the temperature

CA5000-C Liquid CO₂ Backup System Operating Instructions

sensed by the type T thermocouple probe exceeds the **Hi (High Alarm Setting)**. Alarm system attributes are controlled by three additional **Standard Alarm Parameters**: **Ad (Alarm Delay Period)** – a delay (minutes) after the temperature first exceeds the **Hi (High Alarm Setting)** before the CA5000 goes into alarm mode, **Rd (Relay Delay Period)** – a delay (minutes) after the temperature sensed by the type T thermocouple probe exceeds the **SP (Setpoint)** before the CO₂ coolant injection valve and the output relay are engaged, and **SIL (Alarm Silence or Mute Period)** – the time (minutes) for which the audio alarm is muted (chirping) when the **MUTE** button is pressed.

There are three **Coolant Control Parameters**: **SP (Setpoint)**, **On (On Time)**, and **OFF (Off Time)**. When the temperature sensed by the type T thermocouple rises above the **SP (Setpoint)**, the CA5000 injects CO₂ for **On (On Time)** seconds, then waits **OFF (Off Time)** seconds before determining if more cooling is required to cause the temperature to fall below the **SP (Setpoint)**.

The CO₂ coolant injection valve can be manually controlled by the **Timers and Manual Valve Control** parameters **SUS (Suspend)** - disengages the CO₂ injection valve, and **Pur (Purge)** - engages the CO₂ injection valve. CA5000 firmware also monitors three timers: **CCO (Current CO₂ Usage)** – time (minutes) the CO₂ injection valve has been engaged since the **ALARM RESET**, **CSt (CO₂ Started 'CSt' Minutes Ago)** – time (minutes) since the **SP (Setpoint)** temperature was exceeded and the CO₂ injection valves was first engaged, and **tCO (Total CO₂ Usage)** – the total time (minutes) the CO₂ injection valve has been engaged since the CO₂ coolant tank was first installed.

NOTE: In addition to clearing a CA5000 temperature alarm condition, pressing the **ALARM RESET** button will also reset the **CSt (CO₂ Started 'CSt' Minutes Ago)**, the **SUS (Suspend)**, and **CCO (Current CO₂ Usage)** timers to 0 minutes. Previous data related to CO₂ injection valve timing will be lost. Therefore, if this data is required for maintenance or engineering purposes, then these values should be recorded **BEFORE** the **ALARM RESET** button is pressed. However, the **tCO (Total CO₂ Usage)** timer continues to accumulate until it is manually reset to 0 minutes (typically upon the installation of a new CO₂ coolant tank). The **tCO (Total CO₂ Usage)** value can be reset to 0 minutes by following the **tCO (Total CO₂ Usage)** programming instructions on p. 19.

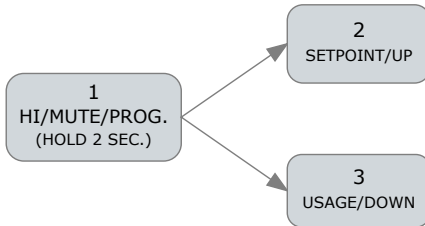
Detailed Description of the Available Programming Parameters

Standard Alarm Parameters

(Press and hold the PROGRAM button to activate)

Hi (High Alarm Setting)

In Operating Mode, the ALARM will activate if the CA5000 temperature probe indicates a temperature greater than or equal to the **Hi (High Alarm Setting)** °C. The **Hi (High Alarm Setting)** can be set between -200 °C and 50 °C. The CA5000-C **Hi (High Alarm Setting)** default is -65 °C.

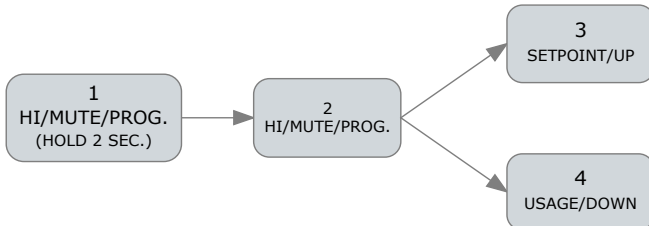


From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** button until the display reads “Hi”. Release the button, and the display will show the current **Hi (High Alarm Setting)**.
2. Press **SETPOINT/↑** to increase the **Hi (High Alarm Setting)**.
3. Press **USAGE/↓** to lower the **Hi (High Alarm Setting)**.

Ad (Alarm Delay Period)

If desired, the CA5000 will not provide an ALARM until the out-of-range state has continued for a specified time (**Ad (Alarm Delay Period)** minutes). The **Ad (Alarm Delay Period)** is used to prevent transient or nuisance alarms and may be set from 0 to 30 minutes. The CA5000 default **Ad (Alarm Delay Period)** is 5 minutes.



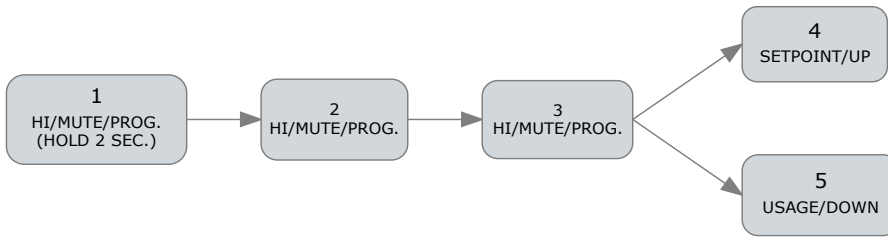
From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** button until the display reads “Hi”.
2. Press the **PROGRAM** button a second time, the display will read “Ad” momentarily, and then display the current **Ad (Alarm Delay Period)** value.
3. Press **SETPOINT/↑** to increase the **Ad (Alarm Delay Period)**.
4. Press **USAGE/↓** to decrease the **Ad (Alarm Delay Period)**.

CA5000-C Liquid CO₂ Backup System Operating Instructions

rd (Relay Delay Period)

The **rd (Relay Delay Period)** delays activation of both the CA5000 BVM CO₂ injection valve and the CA5000 Controller output RELAY. The **rd (Relay Delay Period)** may be set from 0 to 30 minutes. The CA5000 default **rd (Relay Delay Period)** is 5 minutes.

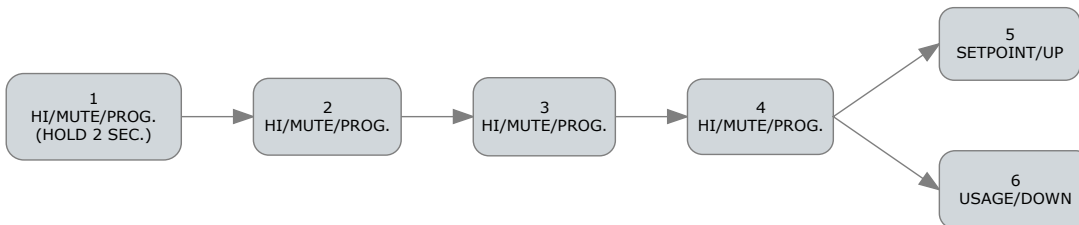


From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** button until the display reads “Hi”.
2. Press **PROGRAM** a second time.
3. Press **PROGRAM** a third time, the display will read “rd” momentarily, and then display the current **rd (Relay Delay Period)**.
4. Press **SETPOINT/↓** to increase the **rd (Relay Delay Period)**.
5. Press **USAGE/↓** to decrease the **rd (Relay Delay Period)**.

SIL (Alarm Silence or Mute Period)

The **SIL (Alarm Silence or Mute Period)** sets the number of minutes the beeper will chirp after the **MUTE** button is pressed during an alarm condition. If the alarm condition persists after the **SIL (Alarm Silence or Mute Period)** elapses, then the beeper will resume at full volume. The **SIL (Alarm Silence or Mute Period)** may be set from 5 to 120 minutes. The CA5000 default **SIL (Alarm Silence or Mute Period)** is 25 minutes.



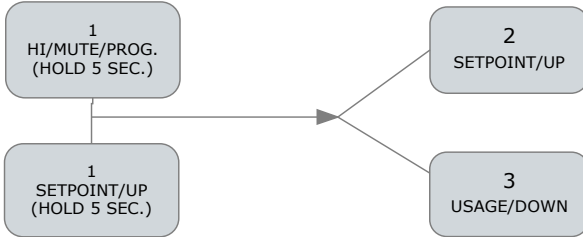
From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** button until the display reads “Hi”.
2. Press **PROGRAM** a second time.
3. Press **PROGRAM** a third time.
4. Press **PROGRAM** a fourth time, the display will read “SIL” momentarily, and then display the current **SIL (Alarm Silence or Mute Period)** value.
5. Press **SETPOINT/↑** to increase the **SIL (Alarm Silence or Mute Period)**.
6. Press **USAGE/↓** to decrease the **SIL (Alarm Silence or Mute Period)**.

CO₂ Control Parameters

SP (Setpoint)

The **SP (Setpoint)** is the temperature (°C) at which CO₂ will be injected into the ULT freezer or other target cabinet. The **SP (Setpoint)** range is from the **Hi (High Alarm Setting)** up to +40°C. Note that if the **SP (Setpoint)** is encountered, activation of the CO₂ injection valve is delayed by the **rd (Relay Delay Period)**.

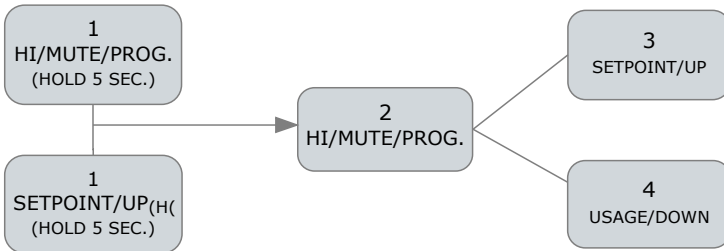


From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** and **SETPOINT**↑ buttons simultaneously until the display reads “**SP**”. Release the buttons, and the display will show the current **SP (Setpoint)**.
2. Press **SETPOINT**↑ to raise the CO₂ injection **SP (Setpoint)** temperature.
3. Press **USAGE**↓ to lower the CO₂ injection **SP (Setpoint)** temperature.
4. Press the **PROGRAM** again to adjust the CO₂ injection **On (On Time)**.

On (On Time)

The **On (On Time)** is the CO₂ injection time interval into the ULT freezer or other target cabinet. The **On (On Time)** may be set from 5 to 900 seconds. The CA5000 default **On (On Time)** is 20 seconds.



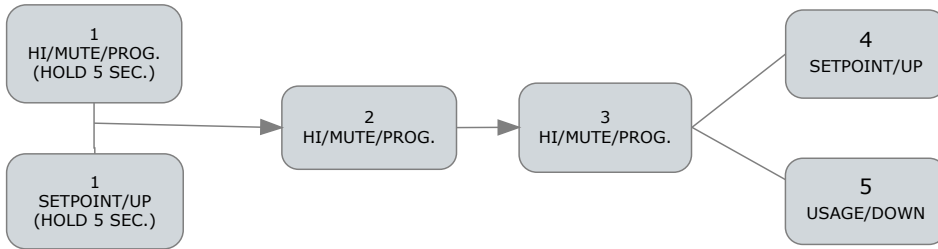
From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** and **SETPOINT**↑ buttons simultaneously until the display reads “**SP**”. Release the buttons.
2. Press **PROGRAM**, the display will read “**On**” momentarily, and then display the current **On (On Time)**.
3. Press **SETPOINT**↑ to increase the CO₂ injection **On (On Time)**.
4. Press **USAGE**↓ to decrease the CO₂ injection **On (On Time)**.

CA5000-C Liquid CO₂ Backup System Operating Instructions

OFF (Off Time)

The **OFF (Off Time)** is the time interval (seconds) between CO₂ injections. The **OFF (Off Time)** may be set from 10 to 900 seconds. The CA5000 default **OFF (Off Time)** is 40 seconds.



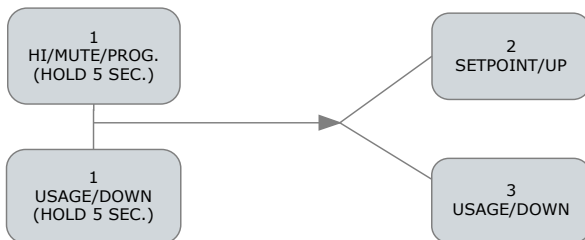
From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** and **SETPOINT**↑ buttons simultaneously until the display reads “SP”. Release the buttons.
2. Press **PROGRAM**, the display will read “On” momentarily.
3. Press **PROGRAM** again, the display will read “Off” momentarily, and then display the current **OFF (Off Time)**.
4. Press **SETPOINT**/↑ to increase the **OFF (Off Time)** CO₂ injection interval.
5. Press **USAGE**/↓ to decrease the **OFF (Off Time)** CO₂ injection interval.

Timers and Manual Valve Control

SUS (Suspend)

The **SUS (Suspend)** stops CO₂ injection for a specified time from 1 to 59 minutes. Both CO₂ injection **SP (Setpoint)** and **Hi (High Alarm Setting)** are ignored during the **SUS (Suspend)** period. The STATUS LED continues to flash green/red as normal, and a fast, short blink of the ALARM LED indicates this suspended 'no-alarm' mode. When the **SUS (Suspend)** time expires, the CA5000 system returns to normal monitoring mode. The **SUS (Suspend)** timer is displayed while in this mode, and the current freezer probe temperature can be displayed at any time by pressing the **USAGE**/↓ button. The timer is reset to zero by pressing the **ALARM RESET** button, or by manually setting the **SUS (Suspend)** time to 0 minutes.



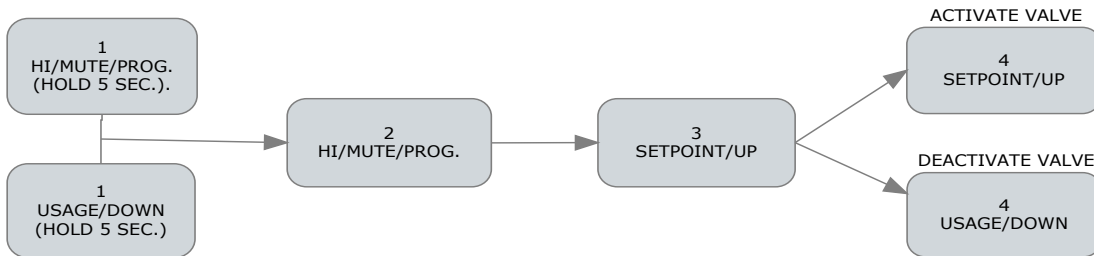
From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** and **USAGE**↓ buttons simultaneously until the display reads “SUS”. Release the buttons, and the display will show the current **SUS (Suspend)** time.
2. Press **SETPOINT**/↑ to increase the **SUS (Suspend)** time.
3. Press **USAGE**/↓ to decrease the **SUS (Suspend)** time.

CA5000-C Liquid CO₂ Backup System Operating Instructions

Pur (Purge)

The **Pur (Purge)** control activates the CO₂ injection valve. Use the **Pur (Purge)** to manually clear the CO₂ delivery tube of high-pressure gas and air when changing CO₂ tanks, for safety purposes, or maintenance purposes. **Pur (Purge)** can be set to 0 (CO₂ valve off) or 1 (CO₂ valve on). **Pur (Purge)** is only active while in Programming Mode, and upon exiting Programming Mode, the **Pur (Purge)** value always resets to 0 (CO₂ valve off). The user must confirm the **YES** prompt by hitting the **SETPOINT/↑** button before the **Pur (Purge)** is set to 1 (CO₂ valve on).

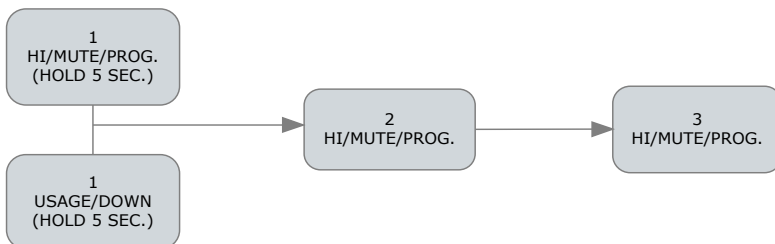


From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** and **USAGE**↓ buttons simultaneously until the display reads “**SUS**”. Release the buttons.
2. Press **PROGRAM** and the display will read “**Pur**”.
3. Press **SETPOINT/↑** for a **YES** prompt to confirm the **Pur (Purge)** ‘CO₂ valve on’ request.
4. Press **SETPOINT/↑** to activate the CO₂ valve, and the CA5000 display will read “**1**”. Pressing the **USAGE/↓** button will set the displayed value to “**0**” and deactivate the CO₂ valve.

CCO (Current CO₂ Usage)

The **CCO (Current CO₂ Usage)** reports the amount of time in minutes the CO₂ valve has been open since the last **ALARM RESET**. The **CCO (Current CO₂ Usage)** is reset to 0 minutes by pressing the **ALARM RESET** button.



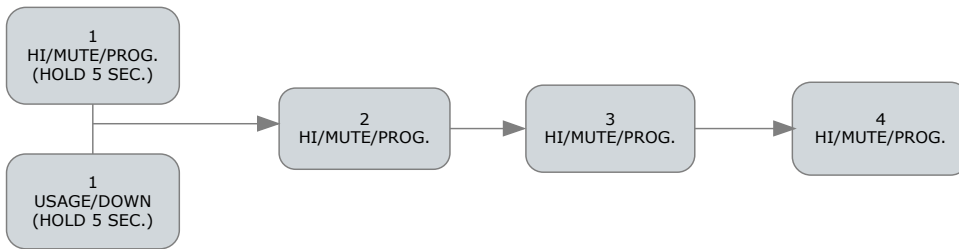
From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** and **USAGE**↓ buttons simultaneously until the display reads “**SUS**”. Release the buttons.
2. Press **PROGRAM** and the display will read “**Pur**”.
3. Press **PROGRAM** again, the display will read “**CCO**” momentarily, and then the current **CCO (Current CO₂ Usage)** time in minutes will be displayed.

CA5000-C Liquid CO₂ Backup System Operating Instructions

CSt (CO₂ Started 'CSt' Minutes Ago)

The **CSt (CO₂ Started 'CSt' Minutes Ago)** reports the number of minutes since the start of the most recent CO₂ injection into the ULT freezer or target cabinet. The **CSt (CO₂ Started 'CSt' Minutes Ago)** value is reset to zero by pressing the **ALARM RESET** button.

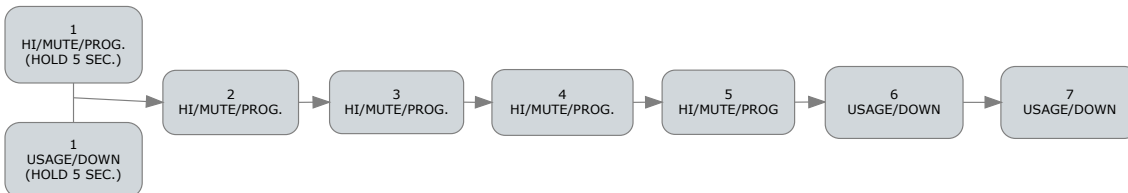


From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** and **USAGE** ↓ buttons simultaneously until the display reads “**SUS**”. Release the buttons.
2. Press **PROGRAM** and the display will read “**Pur**”.
3. Press **PROGRAM** again and the display will read “**CCO**”.
4. Press **PROGRAM** again, the display will read “**CSt**” momentarily, and then the current **CSt (CO₂ Started 'CSt' Minutes Ago)** value will be displayed.

tCO (Total CO₂ Usage)

The **tCO (Total CO₂ Usage)** reports the total CO₂ usage in minutes since the current CO₂ tank was installed and the user or installer reset the **tCO (Total CO₂ Usage)** value to 0 minutes. **tCO (Total CO₂ Usage)** may only be reset to 0 minutes using the method described here.



From Operating Mode:

1. Place the system in Programming Mode by pressing and holding the **PROGRAM** and **USAGE** ↓ buttons simultaneously until the display reads “**SUS**”. Release the buttons.
2. Press **PROGRAM** and the display will read “**Pur**”.
3. Press **PROGRAM** a second time and the display will read “**CCO**”.
4. Press **PROGRAM** a third time and the display will read “**CSt**”.
5. Press **PROGRAM** a fourth time, the display will read “**tCO**” momentarily, and then display the current **tCO (Total CO₂ Usage)** in minutes.
6. Press **USAGE** ↓ to display a **YES** prompt before resetting the **tCO (Total CO₂ Usage)** to 0 minutes, if desired.
7. Press **USAGE** ↓ a second time to reset **tCO (Total CO₂ Usage)** to 0 minutes.

CA5000-C Liquid CO₂ Backup System Operating Instructions

All Parameters and Settings

Table 3: CA5000-C Liquid CO₂ Freezer Backup System – All Parameters and Settings

		Low Limit	High Limit	Factory Default	Unit	Resets?
Standard Alarm Parameters						
Hi	High Alarm Setting <i>Note that this temperature must be below the SP (Setpoint) injection temperature in CO₂ Control Parameters (below).</i>	-200	50	-65	°C	No
Ad	Alarm Delay Period	0	30	5	Minutes	No
Rd	Relay Delay Period	0	30	5	Minutes	No
SIL	Alarm Silence or Mute Period	5	120	25	Minutes	No
CO₂ Control Parameters						
SP	Setpoint Temperature at which to initiate liquid CO ₂ injection. <i>Note that this temperature cannot be set below (colder) than the Hi (High Alarm Setting) temperature in Standard Alarm Parameters (above).</i>	Hi	40	-60	°C	No
On	On Time (for CO ₂ valve)	5	900	20	Seconds	No
OFF	Off Time (for CO ₂ valve)	10	900	40	Seconds	No
Timers and Manual Valve Control						
SUS	Suspend Deactivates CO ₂ injection valve.	0	59	0	Minutes	Automatic
Pur	Purge Activates CO ₂ valve to purge delivery tube	0	1	0	-	Automatic
CCO	Current CO₂ Usage	-	-	-	Minutes	Automatic
CSt	CO₂ Started 'CSt' Minutes Ago CO ₂ injection timer	-	-	-	Minutes	Automatic
tCO	Total CO₂ Usage	-	-	-	Minutes	Manual

- ❑ To edit the **Standard Alarm Parameters**, press and hold the **PROGRAM** button until “**Hi**” is displayed.
- ❑ To edit the **CO₂ Control Parameters**, first press the **SETPOINT**↑ button, and while holding it, also press and hold the **PROGRAM** button until “**SP**” is displayed.
- ❑ To access the **Timers and Manual Valve Control**, first press the **USAGE**↓ button, and while holding it, also press and hold the **PROGRAM** button until “**SUS**” is displayed.

CA5000-C Liquid CO₂ Backup System Operating Instructions

Periodic Maintenance

Hampshire Controls Corporation recommends the following monthly maintenance to ensure proper CA5000 operation:

- ❑ Test the system to verify proper injection of CO₂ into the ULT freezer or target cabinet. Use the **Pur (Purge)** command as described in the **Timers and Manual Valve Control** section (p. 18) of this manual.
- ❑ Inspect the type T thermocouple probe within the ULT freezer or target cabinet and confirm that there is no frost buildup on the tip of the probe.
- ❑ Test functionality of the DOOR SWITCH interlock circuit. Opening the ULT freezer door should cause the CA5000 BVM “DOOR OPEN” LED to illuminate and CO₂ injection, if active, should cease.
- ❑ Test all external systems activated by the CA5000 Controller output RELAY.
- ❑ Confirm that all CA5000 visual indicators function and illuminate properly at the expected times.
- ❑ Confirm that there is sufficient CO₂ remaining in the CO₂ cylinder. The 50-lb CO₂ cylinder must be full or nearly full to provide the specified 10 hours of freezer backup time with a -60 °C setpoint.
- ❑ After 3 years (36 months) of use, replace the internal battery in the CA5000 BVM. Replace the battery with a Hampshire Controls’ recommended battery only (p/n **68112 CA5000 Battery, 12 V – 12 Ah, Lead Acid, Rechargeable**). Installation should be performed only by a qualified service technician. Recycle or dispose of the used battery properly.

Cleaning Instructions: Moisten a microfiber cloth with a mixture of 70% isopropyl alcohol and 30% water. Gently wipe the surfaces of the CA5000 Controller and CA5000 BVM. Clean the CA5000 Controller display screen, carefully wiping in one direction.

CA5000-C Liquid CO₂ Backup System Operating Instructions

Replacement Parts

Table 4: CA5000-C Liquid CO₂ Freezer Backup System Replacement Parts

All replacement parts are exclusively sold by, and must be ordered from, Hampshire Controls. Part replacement, and any repairs, must be performed only by a qualified service technician. Replace the battery with a Hampshire Controls' recommended battery only.

**HAMPSHIRE
CONTROLS
PART # (P/N)**

DESCRIPTION

HAMPSHIRE CONTROLS PART # (P/N)	DESCRIPTION
F84000	CA5000-C Liquid CO ₂ Freezer Backup System
A84000-11	CA5000-C Liquid CO ₂ Freezer Backup System Battery-Valve Module (BVM)
F82040-230	CA5000 Freezer Backup Controller
48264	CA5000 Type T Thermocouple Temperature Probe, 10' Lead
A84000-21	CA5000-C CO ₂ Delivery Tube, 1/8" OD Copper Tubing, 8' Length
A84000-19	CA5000-C Liquid CO ₂ Freezer Backup System Installation Kit
40052	CA5000 Door Switch
A84000-22	CA5000 Door Switch Cable, 2-Conductor, 10' Lead
A84000-06	CA5000 Control Cable, 6-Conductor Cable, 10' Lead
29032	Universal Power Supply, International Blades Included, 5' Cord Input: 100-240 VAC, 50-60 Hz, 1 A max Output: 15 VDC, 2.4A, 36 W
68112	CA5000 Battery, 12 V – 12 Ah, Lead-Acid, Rechargeable
68034	CA5000 Freezer Backup Controller Wall Mounting Bracket

Troubleshooting Guide

CA5000 Temperature Display Is Blank

- ❑ Verify power adapter is connected to line power and to the POWER connector on the Battery-Valve Module (BVM)
- ❑ Verify the CONTROL CABLE is installed between the CA5000 Controller and the CA5000 Battery-Valve Module (BVM).

CA5000 Temperature Display Reads '1999'

- ❑ If the display shows a continuous reading of **1999**, then the probe or associated wiring has failed. Confirm connections or replace the **Type T Thermocouple Temperature Probe (p/n 48264)** as necessary.

CA5000 Temperature Display Does Not Agree with ULT Freezer Temperature

- ❑ Due to differences in probe locations within the ULT freezer and in probe calibrations, the temperature on the CA5000 Freezer Backup Controller display might not directly agree with the interior temperature display for the ULT freezer. If the two temperatures are within 5 °C of each other, then the CA5000 Freezer Backup System will perform as expected. However, if the separation between the two temperatures is greater than 5 °C, then the CA5000 Controller and the Type T Thermocouple Temperature Probe should be returned to Hampshire Controls for temperature recalibration.
- ❑ If the temperature on the CA5000 Freezer Backup Controller display must be in direct agreement with the ULT freezer temperature display, and the temperatures are within 10 °C of each other, then a temperature offset can be added to the CA5000 Freezer Backup Controller temperature display. To add a temperature offset, press **USAGE/↓**, then add **SETPOINT/↑** and then **PROGRAM**. Release **USAGE/↓** and wait for "OFS" on the display. Adjust the displayed temperature offset using the **USAGE/↓** (down) and **SETPOINT/↑** (up) buttons. Press the **PROGRAM** button to return to the temperature display.

CA5000 Display Reads: 'xx' (numeric value)

- ❑ The **SUS (Suspend)** timer is active. To view the actual CA5000 freezer probe temperature, press the **USAGE/↓** button.
- ❑ To exit **SUS (Suspend)** mode, press **ALARM RESET**, or press and hold the **USAGE/↓** and **PROGRAM** buttons simultaneously, to adjust the **SUS (Suspend)** timer to 0 minutes.

Constant Alarm Condition

- ❑ Verify that the parameters are programmed correctly for your CA5000 installation and for the ULT freezer or target cabinet being monitored. See p. 14 - 19 for programming instructions.

CA5000 Locks Up or Does Not Respond

- ❑ Pressing **ALARM RESET** might resolve the issue.
- ❑ If not, disconnect, and then reconnect, the CONTROL CABLE from the CA5000 BVM to reboot the CA5000 Controller.

CA5000-C Liquid CO₂ Backup System Operating Instructions

Limited Warranty

Hampshire Controls Corporation warrants each manufactured item against defects in material and workmanship, when used as recommended, for a period of one year from original purchase. Products believed to have such defects must be returned to the factory by prepaid transportation.

Hampshire Controls' obligation under this warranty is limited to the repair or replacement, at its option, of those items which upon examination prove to be defective. Such repair or replacement will be made without charge.

This warranty will be void if repairs or alterations are made or attempted without factory authorization; or if the item has been subject to misuse, negligence or accident.

Hampshire Controls Corporation assumes no liability for consequential damages of any kind. The purchaser, by acceptance of the product, assumes all liability of the consequence of its use or misuse.

Hampshire Controls Corporation makes no other warranty, whether expressed or implied, in connection with the sale or use of its products.



Physical Address:

1 Grove Street
Dover, NH 03820

Mailing Address:

PO Box 516
Dover, NH 03821

T (603) 749-9424 / (866) 496-9424

F (603) 749-9433

www.hampshirecontrols.com

Specifications subject to change without notice.
Refer to www.hampshirecontrols.com for latest specifications.



