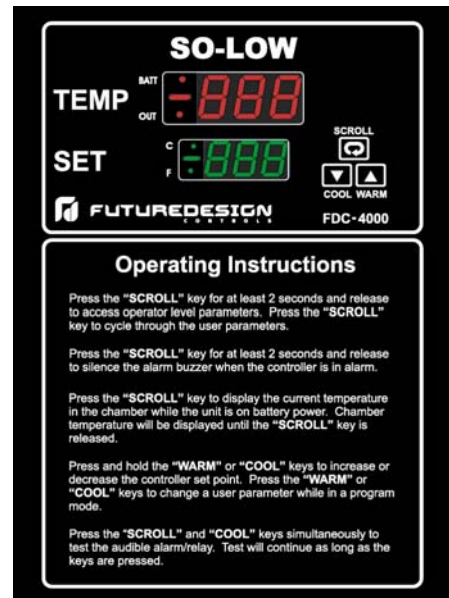


## FDC-4000 Chamber Controller

### 1-1 Features

- \* Simple operation
- \* Type "T" Thermocouple / RTD Input
- \* User selection of active probe (1 or 2)
- \* Degrees F or C operation
- \* Low voltage operation
- \* Deviation alarm operation with adjustable delay
- \* Power failure alarm operation
- \* Ring back alarm function
- \* Low battery indication
- \* Adjustable hysteresis for control/alarm outputs
- \* Process value offset adjustment
- \* "Ring Back" mode for audible alarm
- \* "Wake" mode for battery operation indication of PV
- \* Control/Alarm relay (DPDT) output contacts
- \* Audible alarm buzzer standard
- \* Optional RS485 Serial Communications



The FDC-4000 microprocessor-based controller incorporates dual, easy to read 4-digit LED displays. The LED displays indicate process value and set point, as well as other controller operations. This unit features keys to select the various operator views as well as control parameters. The FDC-4000 has been designed specifically for low temperature chamber operation, providing simple to use, "hassle" free operation for startup and operation of the chamber.

The FDC-4000 incorporates a 1 amp (DPDT) control relay output and a 1 amp (DPDT) alarm relay output as standard. Programmable deviation alarm set points allow the operator to monitor/indicate alarm conditions above and below chamber operational settings. "Ring Back" operation allows an operator to silence the internal alarm buzzer for a programmable length of time. If the "Ring Back" time has elapsed and the alarm condition still exists, the alarm buzzer will re-energize to alert the operator to the pre-existing alarm condition.

Power failure mode will alert the operator when main power to the chamber is lost. During power failure, the alarm buzzer will sound and the alarm contact will be energized while on battery backup. While operating on battery backup power, pressing the "Scroll" key will display the current chamber temperature on the top LED display until the key is released.

The FDC-4000 controller has been designed to operate on a 6VDC battery during power fail conditions. The battery backup is required when using the FDC-4000. The controller incorporates a charging circuit for 6VDC rechargeable batteries. A jumper (H7) on the main board allows selection for rechargeable or non-rechargeable battery operation. The FDC-4000 monitors battery condition and will alarm if the battery voltage is low.

# 1-2 Keys and Display

The FDC-4000 is programmed by using three keys on the front panel. The available key functions are listed in following table.

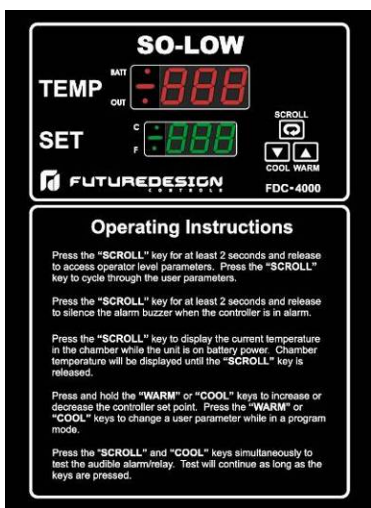
**Table 1.1 Keypad Operation**

TOUCH KEYS	FUNCTION	DESCRIPTION
	Warm Key	Press and hold to increase control set point. Press to change lower display program parameter.
	Cool Key	Press and hold to decrease control set point. Press to change lower display program parameter.
Pressing  key while in normal control mode	Scroll Key	Press and hold for at least 2 seconds and release (while in normal control mode) to access operator level parameters. Press to cycle through all user parameters.  Press and hold for 2 seconds to silence audible alarm under normal power or on battery power. While unit is in an alarm condition, the external alarm relay contacts will remain energized until the alarm condition no longer exists.  Press and hold to display chamber temperature while the controller is on battery power. Chamber temperature will be displayed until key is released. Alarm contact will remain energized while operating on battery power.
Press both keys simultaneously for more than 2 seconds 	Current Power Reading	Displays current AC power (i.e. 110VAC). If power is < 90VAC or > 190VAC, unit will display 90. Mode is only active during normal control mode when top display is reading process value and lower display is reading set point. N/A on battery power.
Press both keys simultaneously for more than 2 seconds 	Alarm Test	Energize audible alarm and alarm relay output as long as keys are pressed when under normal power or battery power. Mode only active during normal control mode when top display is reading process value and lower display is reading set point.

**Note:** When controller is displaying temperature in normal control mode, press and hold warm/cool to change the set point value. This set point mode does not apply to power off modes. Process value and set point will not display a decimal point.

Upper display used to display process value or menu prompt and error code. Blank when on battery power unless "Scroll" button is pressed. Lower display is used to show the set point value or parameter value and is blank while on battery power.

Status for battery, control output and temp units.



**Figure 1.1 Front Panel Description**

3 Buttons for ease of control setup and set point adjustment.

Operating instructions on front panel for customer ease of use.

**Table 1.2 Display Form of Characters**

A	À	E	É	I	Í	N	Ñ	S	Š	X	
B	b	F	F	J	J	O	o	T	t	Y	Y
C	Č	G	G	K	Ķ	P	P	U	u	Z	
c	č	H	H	L	L	Q		V	v	?	?
D	d	h	h	M	m	R	r	W		=	=


☐: Confused Character

**Table 1.3 Input Ranges**

Input Type	PT.DN	T_TC
Range Low	-230 °C (-382 °F)	-250 °C (-418 °F)
Range High	400 °C (752 °F)	300 °C (572 °F)

## 1-3 Parameter Descriptions

**Table 1.4 Parameter Descriptions**

Contained In	Parameter Notation	Display Prompt	Parameter Description	Range	Default Value
<b>User Menu</b>  Each time   key is pressed	INU	<i>inu</i>	Input Unit Selection	$\text{°C}$ Degree C units $\text{°F}$ Degree F units	<i>°F</i>
	INS	<i>ins</i>	Control Input Selection	Low: 1 High: 2	1
	SHF	<i>shf</i>	PV Shift (offset) Value	Low: -20.0 High: 20.0	0.0
	ASP	<i>asp</i>	Alarm Deviation Value	Low: 0 High: 100	18 °F (10 °C)
	AHY	<i>ahy</i>	Hysteresis Control for Alarm	Low: 0.1 High: 30.0	0.1
	ADL	<i>adl</i>	Alarm Delay Time	Low: 0 Secs High: 999 Secs	0
	OHY	<i>ohy</i>	Control Output ON-OFF Hysteresis	Low: 0.1 High: 30.0	0.1
	RB	<i>rb</i>	Alarm RingBack Time	Low: 0 Mins High: 60 Mins	0
	DOR	<i>dor</i>	Door Sensor Delay Time	Low: 0 Mins High: 120 Mins	0
	ID	<i>id</i>	Communications Address	Low: 1 High: 256	1
<b>Notes</b> Each time the scroll key is pressed, the upper display will cycle through the parameters in the order shown above. The upper display will show the prompt and the lower display will show the value for edit. Press the “Warm” or “Cool” key to change the value of the parameter. After the last user prompt is displayed, pressing the “Scroll” key will return the unit back to the normal control mode (PV = top display, SP = lower display). The unit will also revert back to the normal display mode if the user does not press a key for ~45 seconds.  Above prompts will only be displayed if configured for viewing in the factory mode. If no prompts are configured for view, pressing the “Scroll” key will have no affect on the display.					
<b>Parameter Definitions</b> INU: Temperature units selection for controller (degrees F or C). INS: Control probe input selection (probe 1 or probe 2) SHF: PV offset value that is added or subtracted from PV to adjust temperature reading (linear adjustment). ASP: Alarm deviation set point in degrees. AHY: Alarm output hysteresis set in degrees. ADL: Alarm delay time set in seconds. Time delay begins when alarm deviation set point is exceeded. OHY: Control output hysteresis set in degrees. RB: RingBack time set in minutes. Time delay is activated after alarm silence button is pressed if alarm is active. RingBack will be active during normal and battery power conditions. DOR: Door open alarm delay time set in minutes. Time begins when door switch opens. Value of 0 disables door alarm. ID: Controller address for optional RS485 serial communications.					

**Note:** When in User Menu or Factory Mode, the upper LED will display the programming prompt and the lower LED will display the numeric parameter adjustment to match upper display prompt. Warm/Cool buttons will adjust the lower display value.

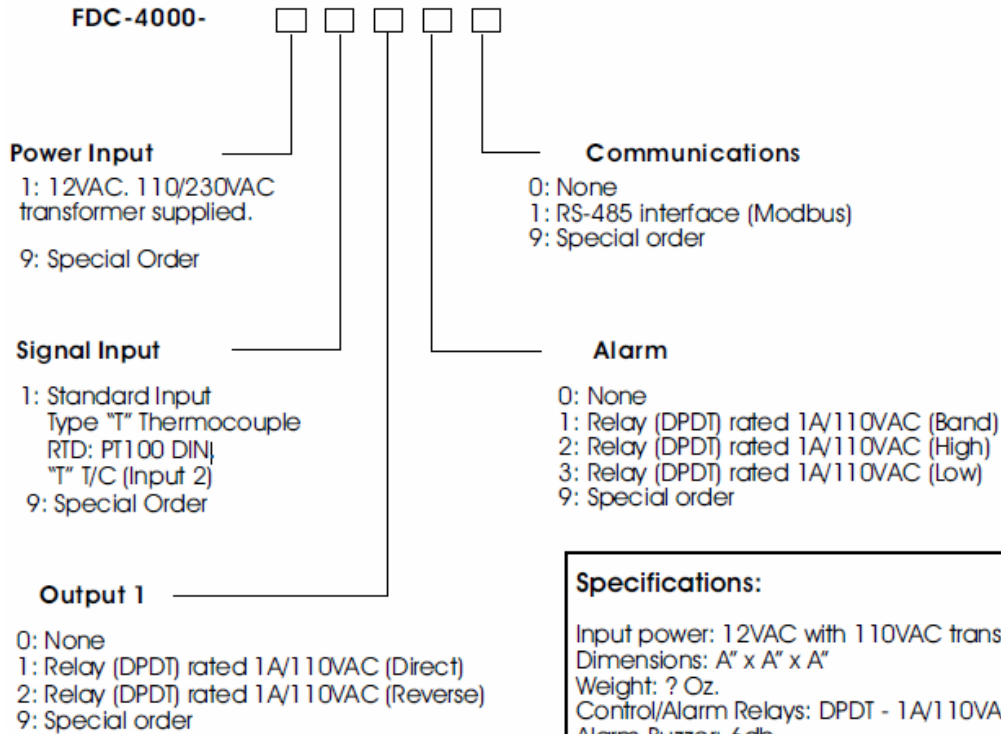
## 1-4 Control/Alarm Hysteresis Operation

Control type for relay output 1 is cooling (direct) only. Control hysteresis (prompt OHY) is designed for safe sided operation. The control relay output will work in the following manner when the main control set point is adjusted for -80 Deg (C or F), with a control hysteresis setting of 2.0 deg. The control output relay will be energized until the temperature reaches -82 deg and then de-energize. Whenever the temperature rises to -80 deg or above, the control output relay will energize to maintain cooling in chamber.

Alarm type for relay 2 is a “deviation” alarm type only. The deviation set point (prompt ASP) follows the main controller set point and is divided evenly above and below the main controller set point (i.e. main control set point of -80 deg with 10 deg deviation setting equals alarm set points at -70 deg and -90 deg). The alarm is energized only when the temperature is outside of the alarm band.

Alarm hysteresis (prompt AHY) is designed for safe sided operation. The alarm relay output will work in the following manner when the main control set point is adjusted for -80 Deg (C or F), with an alarm deviation set point of 10 deg and an alarm hysteresis setting of 2.0 deg. The alarm output relay will energize immediately when the temperature is above -70 deg or below -90 deg. When the temperature falls within the band plus hysteresis (-68 or -88) the alarm relay will de-energize.

## 1-5 Part Number



### Specifications:

Input power: 12VAC with 110VAC transformer supplied  
Dimensions: A" x A" x A"  
Weight: ? Oz.  
Control/Alarm Relays: DPDT - 1A/110VAC  
Alarm Buzzer: 6db  
Battery Backup Power: 6VDC required.  
Recommended Battery: Best Buy BP1 .2-6

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### RETURN MATERIAL AUTHORIZATION:

Please contact Future Design Controls for Return Material Authorization Number prior to returning to factory.

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