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**EC365/HPDST  
Hand Programmer  
for the**

**SunTracker™ II  
EC365/DST Series  
Controller System**



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# Introduction

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The Sun Tracker II Controller System is an efficient method of controlling lighting loads based on sunrise, sunset and a fixed ON/OFF schedule, without the use of a photocell. The system consists of two types of hardware; the EC365/DST Series Load Controller and the EC365/HPDST Hand Programmer. The electronic controller is installed at or near the load. It provides no dials or keyboard except for an override button and a status LED. All programming is done with the hand programmer. It is then a quick and simple procedure to transfer the program into the controller. It is also easy to verify or review the program at a later time.

The EC365/HPDST hand programmer will save the user's program and maintain the correct time of day as well as sunrise/sunset times while the hand programmer is OFF. This eliminates the need to manually adjust the time of day and sunrise and sunset each time the hand programmer is turned ON.

One hand programmer can be used to program a large number of controllers. On site programming time and errors are eliminated and productivity will increase by reducing programming time.

There are two versions of the controller. The first version (EC365/DST2) incorporates a two pole, 40 amp contractor. The second version (EC365/DST1) uses a single pole, 30 amp relay. This booklet contains information on specifications and programming instructions for the complete Sun Tracker II EC365/DST Series Controller System.

# Specifications

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## Programming Capabilities

- **24-Hour Programming** - provides precise, minute-by-minute control. Program flexibility is achieved by providing a fixed ON event and a fixed OFF event in addition to the Sunrise and Sunset.
- **365-Day Calendar** - for selectable daylight savings time adjustment and automatic leap year correction.
- **Astro Dial** - automatically adjusts sunrise and sunset times throughout the year.
- **Skip-A-Day** - regular programming can be skipped for any day(s) of the week.
- **Offset to Sunrise and/or Sunset** - allows the controller to turn lights ON shortly before or after sunset and/or OFF shortly before or after sunrise.
- **Adjustable Latitude** - from 10° to 70°, northern or southern hemisphere.
- **Manual Override** - temporarily reverses current output state - lights that are OFF turn ON and lights that are ON turn OFF. Begins immediately and remains in effect until override is reset or until the next sunrise, sunset or ON/OFF event is reached.

## Specifications (cont.)

- **Low Battery Indicator** - will indicate "low battery" on the hand programmer display.
- **Program Enable Module** - eliminates tampering with programming.
- **Double Transmission Capability** - eliminates the possibility of errors while loading the program into the controller or reading program from the controller.

## Electrical Specifications

### Power Requirements and Ratings

#### Controller:

Input:	Voltage	Hertz
	120 Vac	60 Hz

Output - EC365/DST1: 30A Resistive at 120 Vac; SPST  
EC365/DST2: 40A Resistive at 120-277 Vac; DPST

## **Specifications (cont.)**

### **Power Outage Carry-Over (Controller)**

**Batteryless Carry-Over** - Utilizes a special capacitor to maintain time and program in the event of a power outage for a minimum of 48 hours. Eliminates the need to replace batteries and to reset controls.

### **Memory Capabilities (Hand Programmer)**

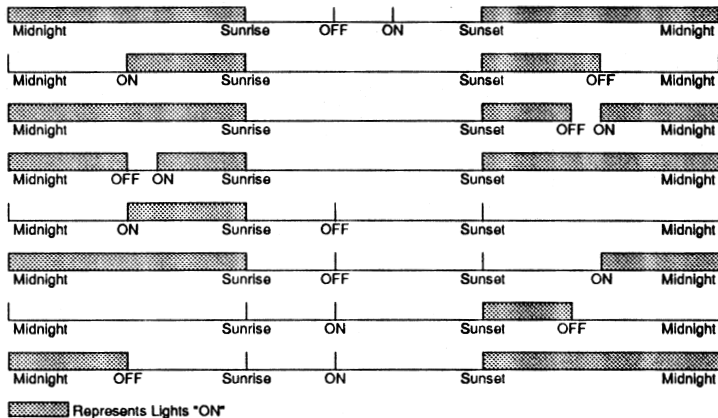
**DISPLAY and BACKUP Memories** - The hand programmer provides both a DISPLAY and a BACKUP memory. The DISPLAY memory is the memory that the user can view and modify via the keyboard. The DISPLAY memory is transferred to the controller during a SEND or transferred from the controller during a READ. The BACKUP memory will save the program and keep the time of day and sunrise/sunset information while the hand programmer is turned OFF. The user can copy the DISPLAY memory to the BACKUP memory using a SAVE command. The BACKUP memory is automatically copied to the DISPLAY memory each time the hand programmer is turned ON.

The 9 volt battery will provide up to 6 months of carry-over, depending on how often the hand programmer is used. A low battery indication flashes on the display when the battery needs replacing. The BACKUP memory will function 2-3 minutes without a battery. This prevents memory loss during battery replacement.

## Application Notes:

The SunTracker II follows the fixed ON/OFF schedule with the stipulation that the load is kept OFF during daylight hours (between Sunrise and Sunset). The Sunrise and Sunset are simply disabling and enabling functions. The ON event and OFF event are always present. The operation of the SunTracker II is determined by the placement of the ON and OFF events. See the application alternatives diagram below.

### Application Alternatives - ON/OFF



**Note:** On a day skipped, the load is held off after the occurrence of the "ON" event. Normal operation is resumed following the "ON" event of the next day.

## Application Note:

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### Offset to Sunrise and Sunset

With this feature, the SunTracker can be programmed to turn the lights ON a set amount of time before or after sunset. The control can also be programmed to turn the lights OFF a set amount of time before or after sunrise.

1. Find out today's sunrise and sunset times.
2. Program today's sunrise and/or sunset with the desired offset calculated in.

Example:

1. Today's sunrise and sunset times are 5:38 A.M. and 7:52 P.M. respectively. The lights are to be turned OFF half an hour before sunrise and ON half an hour after sunset.  
Actual sunrise time - 1/2 hour = programmed sunrise time.  
5:38 A.M. - 30 minutes = 5:08 A.M.  
Actual sunset time + 30 minutes = 8:22 P.M.
2. Program 5:08 A.M. as the sunrise time and 8:22 P.M. as the sunset time.

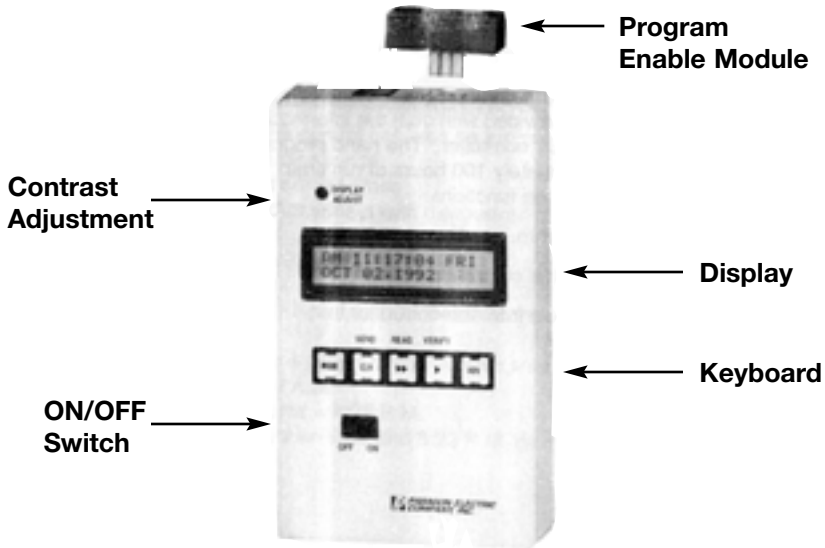
## **The Hand Programmer**

The hand programmer is a microprocessor-based device used to program the SunTracker II Series controller. The hand programmer is compact and easy to program. Utilizing an electrical cable (provided with unit) the information is loaded from the programmer to the EC365/DST controller. The hand programmer operates on a 9-volt battery providing approximately 100 hours of run time.

The hand programmer has three functions:

1. To create and store a program.
2. To enter the program into the controller.
3. To read and verify a program from the controller.

## Define the Keyboard



**NOTE:**The display's view angle can be adjusted with a small screwdriver for better viewing.

## Defining The Keyboard (cont.)

**MODE Key** - cycles through the different programming categories in this order:

1. Time and Date
2. "Send, Read or Verify" functions
3. Sunrise and Sunset Times
4. ON/OFF Events
5. Skip-A-Day
6. Latitude/Hemisphere
7. Daylight Savings Time
8. "Save Program"

**CLR Key** - clears the parameter above the cursor. Note: In the time-of-day mode, the CLEAR key clears the seconds regardless of where the cursor is positioned.

**NOTE: If the CLR Key is depressed while turning ON the ON/OFF switch of the hand programmer, the RAM memory is cleared. (Program Enable Module must be installed.)**

**▶▶Key** - (fast roll) rapidly scrolls the data prompted over the cursor.

**▶ Key** - (slow roll) slowly scrolls the data prompted over the cursor.

**ADV Key** - advances within each MODE which may entail several steps. Use ADV to progress to each step within a MODE.

**NOTE: Three keys have dual functions: the Send, Read, and Verify functions are not utilized to program the hand programmer. They are used to load the program into the controller. These three functions are used only when the hand programmer is connected to a controller. For more information on these functions see pages 19-22.**

## Program Enable Module:

The program enable module must be plugged in to allow any changes to be made to the program or time of day. Also, the DISPLAY memory can neither be cleared nor saved without the program enable module. The module is not needed for SENDING, READING or VERIFYING. All the program information can be viewed with or without the program enable module.

## **Before You Begin Programming . . .**

. . . you should gather the following details:

### **Latitude**

SunTracker II Controllers use latitude to pinpoint your location. As the seasons change, the sun moves north and south of the equator, changing the number of daylight hours for each position on the globe. The controller utilizes latitude and other basic parameters to track the sun and its effect on your location. See page 11 - 13 or consult an atlas to obtain your latitude to the nearest degree.

Latitude\_\_\_\_\_

### **Today's Sunrise and Sunset Times**

The controller will calculate future sunrise and sunset times once the current sunrise and sunset times have been entered. To determine the time of today's sunrise and sunset, consult your local newspaper or the nearest Weather Service.

Sunrise\_\_\_\_\_

Sunset \_\_\_\_\_

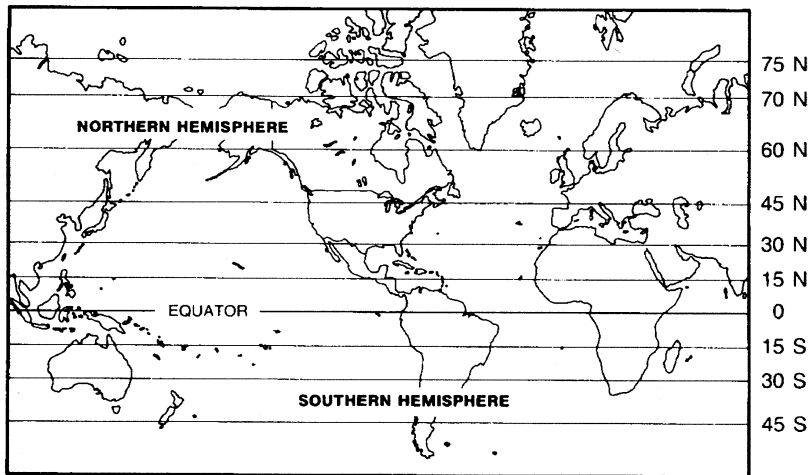
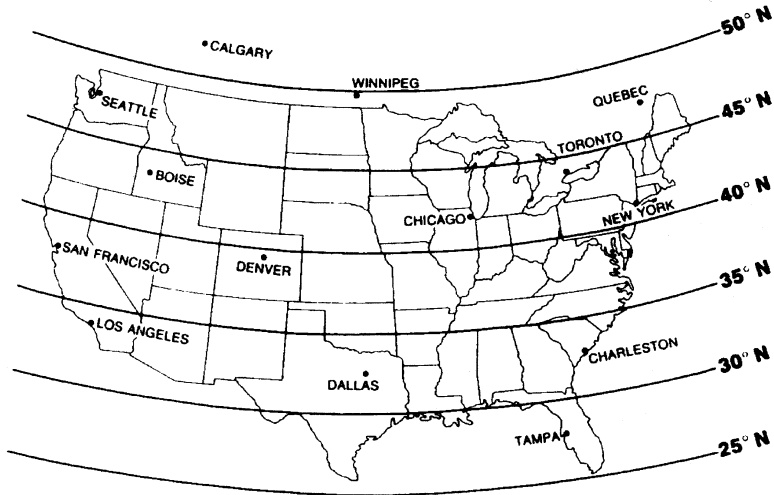


Figure 8. World Latitude Map

# U.S. Latitude Chart

ALBANY, NY	43 N	DULUTH, MN	47 N	NASHVILLE, TN	36 N	TOLEDO, OH	42 N
ALBUQUERQUE	35 N	ERIE, PA	42 N	NEWARK, NJ	41 N	TOPEKA, KS	39 N
AMARILLO, TX	35 N	FAIRBANKS, AK	65 N	NEW ORLEANS, LA	30 N	TRENTON, NJ	40 N
ANCHORAGE, AK	61 N	FARGO, ND	47 N	NEW YORK, NY	41 N	TUCSON, AZ	32 N
APPLETON, WI	44 N	FORT SMITH, AR	36 N	OKLAHOMA CITY	35 N	TULSA, OK	36 N
ATLANTA, GA	34 N	FORT WORTH, TX	33 N	OMAHA, NE	41 N	TWO RIVERS, WI	44 N
AUSTIN, TX	30 N	GREAT FALLS, MT	47 N	PHILADELPHIA, PA	40 N	WASHINGTON, DC	39 N
BALTIMORE, MD	39 N	GREEN BAY, WI	44 N	PHOENIX, AZ	33 N	WAUSAU, WI	45 N
BILOXI, MS	30 N	HONOLULU, HI	21 N	PITTSBURGH, PA	40 N	WILMINGTON, DE	40 N
BIRMINGHAM, AL	34 N	HOUSTON, TX	30 N	PORTLAND, ME	44 N	WICHITA, KS	38 N
BOISE, ID	44 N	INDIANAPOLIS	40 N	PORTLAND, OR	46 N		
BOSTON, MA	42 N	JACKSON, MS	32 N	PROVIDENCE, RI	42 N		
BRIDGEPORT, CN	41 N	JACKSONVILLE, FL	30 N	RACINE, WI	43 N		
BUFFALO, NY	43 N	KANSAS CITY, MO	39 N	RALEIGH, NC	36 N		
CHARLESTON, SC	33 N	LA CROSSE, WI	44 N	RICHMOND, VA	37 N		
CHARLESTON, WV	38 N	LAS VEGAS, NV	36 N	RICHPORT, CT	41 N		
CHEYENNE, WY	41 N	LITTLE ROCK, AR	35 N	ROCHESTER, NY	43 N		
CHICAGO, IL	42 N	LOS ANGELES, CA	34 N	ST LOUIS, MO	39 N		
CINCINNATI, OH	39 N	LOUISVILLE, KY	38 N	ST PAUL, MN	45 N		
CLEVELAND, OH	41 N	MADISON, WI	43 N	SALT LAKE CITY	41 N		
COLUMBIA, SC	34 N	MANITOWOC, WI	44 N	SAN ANTONIO, TX	30 N		
COLUMBUS, OH	40 N	MARINETTE, WI	45 N	SAN DIEGO, CA	33 N		
CONCORD, NH	43 N	MARQUETTE, MI	47 N	SAN FRANCISCO	38 N		
CORPUS CHRISTI	28 N	MEMPHIS, TN	35 N	SANTA ANA, CA	34 N		
DALLAS, TX	33 N	MIAMI, FL	26 N	SEATTLE, WA	48 N		
DENVER, CO	40 N	MILWAUKEE, WI	43 N	SIoux FALLS, SD	44 N		
DES MOINES, IA	42 N	MINNEAPOLIS, MN	45 N	SPRINGFIELD, IL	40 N		
DETROIT, MI	42 N	MOBILE, AL	31 N	SUPERIOR, WI	47 N		
DUBUQUE, IA	42 N	MONTPELIER, VT	44 N	TAMPA, FL	28 N		



**U.S. Latitude Map**

## Programming Instructions

1. Plug Program Enable Module into top of hand programmer. This allows the program to be changed.
2. Slide the ON/OFF switch to ON position. "STATUS UPDATE" will appear followed by the time and date.

NOTE: To clear memory, hold down the CLEAR key while turning the hand programmer ON.

3. **Set The Clock.** The cursor should be under the hours location.  
**Press ►► or ►** to program the hours.  
**Press ADV** to move the cursor to the minutes location.  
**Press ►► or ►** to program the minutes.

**Continue these two steps to program the seconds, day, month, date and year.**

4. Press MODE

**READY TO SEND,  
READ TO VERIFY**

Since programming has not been completed, go to step 5.

## Programming Instructions (cont.)

5. Program the Sunrise\Sunset times.

Press **MODE**.

**SUNRISE - AM 12:00**  
**SUNSET - PM 12:00**

Press **▶▶** or **▶** to program the Sunrise time.

Press **ADV**.

Press **▶▶** or **▶** to program the Sunset time.

6. Program the ON/OFF times

Press **MODE**.

**ON - PM 12:00**  
**OFF - PM 12:00**

Press **▶▶** or **▶** to program the ON time.

Press **ADV**.

Press **▶▶** or **▶** to program the OFF time.

## Programming Instructions (cont.)

### 7. Program Skip-A-Day

Press **MODE**.

<b>DAYS</b>	<b>S M T W T F S</b>
<b>SKIPPED</b>	<b>S S</b>

Press **▶▶** or **▶** to toggle the skip feature on the selected day.

Press **ADV** to advance the cursor to the next day.

### 8. Programming LATITUDE/HEMISPHERE

Press **MODE**.

<b>LATITUDE</b>	<b>10°</b>
<b>HEMISPHERE</b>	<b>NORTH</b>

Press **▶▶** or **▶** to program the latitude.

Press **ADV**.

Press **▶▶** or **▶** to select hemisphere.

## Programming Instructions (cont.)

### 9. Program the Daylight Savings Time changes.

Press **MODE**.

**SPRING DST  
NOT USED**

Press **▶▶** or **▶** to program the date in which Spring Daylight Savings Time begins.

Press **ADV**.

**FALL DST  
NOT USED**

Press **▶▶** or **▶** to program the date in which fall standard time begins.

**NOTE: Press CLR if not used.**

**Programming is now completed.**

### 10. Saving the Program

Press **MODE**.

**PRESS ADV KEY TO  
SAVE PROGRAM**

Press **ADV** to save the program into the **BACKUP** memory.

## Programming Instructions (cont.)

### 11. To Check Program For Errors

**Press MODE** until the time and date are shown. ADVANCE through each mode as above. If changes are made, follow the corresponding programming step(s), then SAVE (step 10).

### 12. To prevent changes or tampering with the program, remove the Program Enable Module. With the module removed, only the following operations can be performed.

- 1. Reviewing the time of day and program.
- 2. Sending the program to the controller
- 3. Reading the program from the controller
- 4. Verifying the information

**NOTE: SEND, READ and VERIFY are functions reserved for loading and reading the program to and from the EC365/DST Controller. For a description of these functions, see pages 19-26.**

## Loading The Program Into The Controller

This section describes the process of loading the schedule from the hand programmer into the controller, and also, reviewing the program from the controller to the hand programmer. The hand programmer is compact and easy to use. It operates on a 9-volt battery which usually provides 100 hours of power. If the battery is low, the display will flash "LOW BATTERY." The battery can be accessed through the back opening of the hand programmer. The electrical cable (provided) is required to send the schedule from the hand programmer to the controller.

Three operations can be performed between the hand-programmer and the controller:

1. SEND the program to the controller. If this function is selected, the hand programmer will automatically send the program to the controller, and the controller will send it back to check transmission integrity. The new program is in the controller and will automatically replace any previous programming.

**Note: If the SEND or READ transmission is not successful, the display will read FAIL. If transmission is successful, the hand programmer will advance to the time and date mode.**

## **Loading The Program Into The Controller (cont.)**

2. READ the program schedule from the controller. This function will transfer the schedule from the controller to the hand programmer. It is typically used to audit a previous program in a controller.
  
3. VERIFY is used to compare the controller's programming with the master program (BACKUP) in the hand programmer. First, the controller's programming is copied into the hand programmer using the READ command. Secondly, using the VERIFY command, the hand programmer compares the controller's program in the DISPLAY memory to the master program in the BACKUP memory. The display will show PASS or FAIL.

## Defining The Keyboard

### Keys For Loading And Reviewing The Program

The following keys are used to load and review the program to and from the controller. They are the same keys as the CLR, ►► and ► keys, respectively.

**Send Key** - allows you to load the program from the hand programmer to the controller. A new program loaded into the controller will automatically replace an older version.

**Read Key** - allows you to read the program from the controller to the hand programmer. This function is necessary to review the contents of a previously programmed controller.

**Verify Key** - allows you to compare the controller's program to the master program in the hand programmer. This command ensures that a controller in the field possess the most current program. If the two programs are identical, the display will show PASS. FAIL will appear if the two programs do not match.

**NOTE: To utilize the VERIFY command, the controller program must first be loaded into the hand programmer with the READ command.**

## Connecting The Hand Programmer To The Controller

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1. **Connect** the 6-pin end of the cable to the hand programmer.
2. **Connect** the 4-pin end of the cable to the electronic controller.

**NOTE: Connect or disconnect cable by grasping plastic connector. Do not pull on cable.**

## Sending And Reviewing The Program

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1. **Slide ON/OFF switch to ON position.**

Display will show "STATUS UPDATE" while the BACKUP memory is being copied to the DISPLAY memory. When updating is finished, the display will show the time and date.

2. **Send The Program.**

Press **MODE**.



**READY TO SEND  
READ OR VERIFY**

Press **SEND** to send or load the program to the controller.

**Note: FAIL will appear in the display if the program is not transferred to the controller correctly. Check that the cable is connected properly.**

3. Disconnect cable and turn off the hand programmer. Loading is complete.

## Sending And Reviewing The Program (cont.)

### Reading And Verifying The Program

Ocasionally you may want to **READ** the programs or **VERIFY** programs in controllers, especially if programming changes are made frequently.

**Read The Program.** Turn ON/OFF switch ON. Display will show "STATUS UPDATE," followed by time and date.

Press **MODE**.



**READY TO SEND  
READ OR VERIFY**

**Press READ.** The controller's program and time-of-day will be copied into the hand programmer's DISPLAY memory.

If the program was read properly, the display will advance to the TIME and DATE screen. You may now disconnect the cable to the controller or turn to the VERIFY instructions on the next page.

## Sending And Reviewing The Program (cont.)

**Verify The Program.** This function is used to verify that the controller's program is identical to the master program in the hand programmer.

**NOTE:** You must always complete the **READ** instructions, before you are able to **VERIFY** a program.

AM 08:31:03 MON  
FEB 21,1992

Press **MODE**.

READY TO SEND  
READ OR VERIFY

Press **VERIFY**. If **PASS** is displayed, the program in the controller matches the master program in the **BACKUP** memory of the hand programmer. If **FAIL** appears, either the programs are not identical, or the controller's program was not **READ** into the hand programmer.

Disconnect the cable from the controller and turn hand programmer OFF.

## Status Indicator (controller)

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The green LED indicator located on the black panel of the controller displays the controller's current operating status. The LED indicator provides four different signals. These signals will help you to recognize the controller's current mode of operation or diagnose potential problems.

1. **The load is ON.** When the green light flashes ON 3 seconds and OFF 1 second repeatedly, the load is energized.
2. **The load is OFF.** When the green light flashes ON 1 second and OFF 3 seconds repeatedly, the load is deenergized.
3. **No Programming Schedule.** When the green light is constantly ON, the power has been applied to the controller, but programming instructions have not been loaded.
4. **Controller is Non-Operational.** When the green light is constantly OFF, either the power has not been connected to the controller or the controller has malfunctioned. If the power has been connected properly and the green LED indicator is OFF, then the controller may not be functional.

# NOTES

# NOTES

## **Maple Chase Company Product Warranty**

The products manufactured by Maple Chase Company and used in commercial, industrial or institutional applications are warranted to be free from defects in workmanship or material under normal use and service, for a period of one (1) year from the date of purchase by the end user (whether separately or as a component of other products), or eighteen (18) months from the date of manufacture of the Maple Chase Company products, whichever is less.

Maple Chase Company's obligation under this warranty is limited to replacing or repairing, free of charge, any product returned to Maple Chase Company with transportation charges prepaid, providing that Maple Chase Company's examination discloses to its satisfaction that such product is defective.

This warranty does not apply to damage caused by misuse, neglect, accident or mishandling, or to products which have been subject to repair by anyone other than Maple Chase Company, opened or taken apart, or which have not been properly installed or have been used other than in accordance with Maple Chase Company's instructions.

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**Maple Chase Company**  
2820 Thatcher Road  
Downers Grove, Illinois 60515  
Made in Mexico

Telephone           + 1 800 732 8400

ISO 9002 registered

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