WS-8157
ATOMIC CLOCK WITH OUTDOOR WIRELESS TEMPERATURE AND WEATHER FORECAST
Instruction Manual

## FEATURES:

ATOMIC CLOCK:

LCD1 display

LCD2 display

Hanging holes

Function keys

Battery cover

Foldable stand
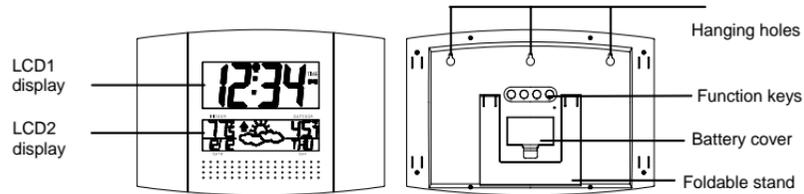
- WWVB Radio controlled time with manual time setting
- 12/24 hour time display
- Time display: hour, minute, second
- Alarm setting with snooze function
- Calendar display
- Weekday display (4 languages to choose from: English, French, Spanish and German)
- Time zone setting
- Daylight savings time ON/OFF option (DST)
- ºC or ºF temperature display selectable
- Indoor temperature display
- Outdoor temperature display via 433MHz transmission
- Wall mount or freestanding
- Weather forecast for next 12 to 20 hours based on changing air pressure

OUTDOOR TEMPERATURE TRANSMITTER:

Holder
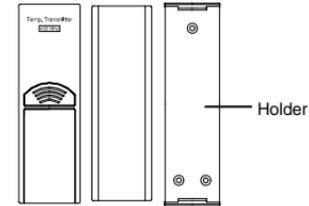
- Remote transmission of outdoor temperature to the atomic clock by 433 MHz signals
- Wall mounting case

TO INSTALL AND REPLACE BATTERIES IN THE ATOMIC CLOCK
The atomic clock uses 2 x AA, 1.5V batteries. To install and replace the batteries, please follow the steps below:
1. Insert finger or other solid object in the space at the bottom center of the battery compartment and lift up to remove the cover.
2. Insert batteries observing the correct polarity (see marking inside battery compartment).
3. Replace compartment cover.
DO NOT SET THE CLOCK.

TO INSTALL AND REPLACE BATTERIES IN THE TEMPERATURE TRANSMITTER
The transmitter uses 2 x AA,1.5V batteries. To install and replace the batteries, please follow the steps below:
1. Remove the cover.
2. Insert the batteries, observing the correct polarity (see marking inside battery compartment).
3. Replace the battery cover on the unit.
Alkaline batteries are recommended for use in both units. Avoid using rechargable batteries.

SETTING UP:

Alkaline batteries are recommended for use in both units. Avoid using rechargable batteries.

NOTE: Do not set the clock until the outdoor temperature is displayed.
1. **Place batteries in the outdoor transmitter first, then into the atomic clock. DO NOT PRESS ANY BUTTONS FOR 10 MINUTES.**
2. After the 10 minutes both the Indoor and Outdoor areas on your clock should have a temperature showing. If not, remove both sets of batteries, wait 10 minutes and repeat step one.
3. **After the clock receives the outdoor temperature, set your time zone using the manual settings below. The default (factory) time zone is Eastern Standard Time.**
4. After the clock receives the outdoor temperature the WWVB time code reception will automatically start. This reception typically takes between 5-10 minutes in good conditions. If after 10 minutes the WWVB time has not been received, use the *"SET"* key to manually enter the set-up mode and change either the time or date in order to activate the WWVB reception (see manual settings below). The clock will then automatically attempt to receive the WWVB time from 12:00 am through 6:00 am each day (attempts WWVB reception every full hour within this time frame). When this is successful, the received time will override the manually set time. The date is also updated with the received time (Please refer to notes on "**Radio controlled time**" and "**Manual time setting**").

Note:
In the event of changing batteries of the unit ensure that the batteries do not spring free from the contacts. Always wait at least 10 minutes after removing the batteries before reinserting, otherwise start up and transmission problems may occur.

FUNCTION KEYS
The atomic clock has four easy to use keys:
SET key : To enter into the set mode for the following functions: time zone, DST ON/OFF (daylight saving time), language, hour, minute, year, month, day, weekday, 12/24 hour, ºC or ºF temperature display
+ key : To toggle between the second, temperature or weekday display
To change any values in manual set mode
ALM key : To enter into the alarm set mode
To set the alarm ON/OFF
SNZ key : To activate the snooze function during alarm

To display the alarm time in normal mode display
To exit the setting modes

ATOMIC CLOCK LCD SCREEN DESCRIPTIONS
The atomic clock's LCD is divided into 2 sections and once the batteries are inserted, all the segments will light up briefly before displaying the information for time, date, indoor and outdoor temperatures.
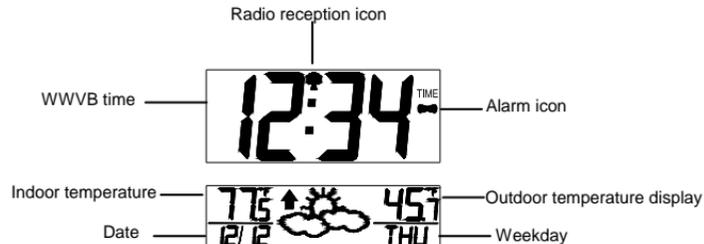

WEATHER FORECAST

 The weather forecasting feature is estimated to be 75% accurate. The weather forecast is based solely upon the change of air pressure over time. The WS-8157 averages past air-pressure readings to provide an accurate forecast, creating a necessity to disregard all weather forecasting for 12-24 hours after the unit has been set-up, reset, or moved from one altitude to another (i.e. from one floor of a building to another floor). In areas where the weather is not affected by the change of air pressure, this feature will be less accurate.

Weather Icons

There are 3 possible weather icons that will be displayed in the LCD 2:

Sunny—indicates that the weather is expected to improve (not that the weather will be sunny).
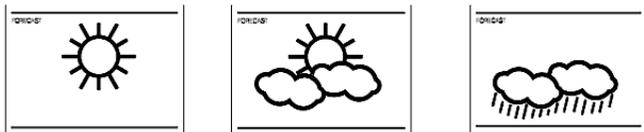
Sun with Clouds—indicates that the weather is expected to be fair (not that the weather will be sunny with clouds).
Clouds with Rain—indicates that the weather is expected to get worse (not that the weather will be rainy).

The weather icons change when the unit detects a change in air pressure. The icons change in order, from "sunny" to "partly sunny" to "cloudy" or the reverse. It will not change from "sunny" directly to "rainy", although it is possible for the change to occur quickly. If the symbols do not change then the weather has not changed, or the change has been slow and gradual.

Weather Tendency Arrows

Other possible displays in LCD 2 are 2 weather tendency arrows, one that points up (on the left side of the forecast) and one that points down (on the right side of the forecast). These arrows reflect current changes in the air pressure. An arrow pointing up indicates that the air pressure is increasing and the weather is expected to improve or remain good. An arrow pointing down indicates that the air pressure is decreasing and the weather is expected to become worse or remain poor. No arrow means the pressure is stable.

MANUAL SETTINGS

Note:
If the atomic clock has already successfully received the WWVB time signal and displays the correct time and date, then the Manual settings can be skipped.
After completion of the above described procedures in "**Setting up"** the manual setting modes can be entered by pressing and holding the **SET** key for 3 seconds. The following settings can now be programmed:
- Time zone setting
- DST ON/OFF
- Language display setting
- Manual time setting
- Year setting
- Month setting
- Date setting
- Weekday setting
- 12/24 hour time display setting
- ºC or ºF setting

TIME ZONE SETTING

After entering the manual setting mode as described above, the time zone can be set between the –1 to –12 hour or Greenwich Mean Time (GMT) range in LCD2. To do this:
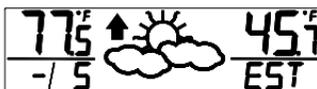
1. The time zone (LCD2) will start flashing (Default setting "-5h"). Select the desired time zone by pressing and releasing the **+** key.
   Note: The time zones from –4 to –10 hours will be displayed with 3 characters abbreviations:
   - -4 ATL (Atlantic time),
   - -5 EST (Eastern time; default time zone),
   - -6 CST (Central time),
   - -7 MST (Mountain time),

- -8 PST (Pacific time),
- -9 ALA (Alaska time),
- -10 HAW (Hawaii time).
- "GMT" will be displayed if set to GMT (0).

2.   Press and release the **SET** key to enter the **"DST Setting"**.

DST SETTING (daylight saving time)
1.   The ON digit will start flashing on LCD1. Set the DST ON or OFF by pressing the **+** key.
2.   Press and release the **SET** key to enter the **"Language Setting"**.

Note:
The DST default is "ON", meaning that the WWVB will automatically change the time according to Daylight Saving Time in the spring and fall. For areas that do not recognize DST changes (Arizona and parts of Indiana) turn the DST "OFF".

LANGUAGE SETTING
The weekdays can be displayed in LCD2 with the pre-set languages: US English, French, Spanish and German.
1.   Set the desired language for the weekday display in LCD 2 by use of the **+** key.
2.   Press and release the **SET** key to enter the mode **"Manual Time Setting"**.

MANUAL TIME SETTING
In case the atomic clock is not able to detect the WWVB-signal (disturbances, transmitting distance, etc.), the time can be manually set. The clock will then work as a normal Quartz clock.

Note: In 12 hours mode the time will be displayed with an additional **"PM"** for the time from 12:00 noon until 11:59.
1.   The hour digits will start flashing on LCD1.
2.   Set the desired hours by pressing and releasing the **+** key followed by pressing the **SET** key.
3.   Now the minute digits will start flashing.
4.   Set the desired minutes by pressing and releasing the **+** key . If the **+** key is held, the units will increase by 5.
5.   Press and release the **SET** key to move to the **"Year Setting"**.

Note:
The unit will still try and receive the signal every day despite it being manually set. When it does receive the signal, it will change the manually set time into the received time. During reception attempts the WWVB tower icon will flash. If reception has been unsuccessful, then the WWVB tower icon will not appear but reception will still be attempted the following hour.

WWVB time reception takes place from 12:00 am through 6:00 am each day (attempts WWVB reception every full hour within this time frame). When the time signal is received for example at 1:00 am, the atomic clock will not attempt to receive the WWVB signal for the remaining hours until 6:00 am. Therefore, the next signal attempt will take place between 12:00 am and 6:00 am the next day. The other times WWVB reception takes place, are upon setup and after manual time set exiting mode. Reception is generally not possible during daylight hours due to the interference of the sun.

YEAR SETTING
The year can be selected sequentially from 2000 to 2049 and will then start over again (default setting 2000). Only the last 2 digits of the year will be visible on LCD2 .
1.   The year digits will start flashing on LCD2. Select the desired year by use of the **+** key.
2.   Press and release the **SET** key to switch to the **"Month Setting"**.

MONTH SETTING
1.   The month digits on LCD2 will start flashing. Set the desired month by use of the **+** key.
2.   Press and release the **SET** key to move to the mode **"Date Setting"**.

DATE SETTING
1.   The digits for the date will start flashing on LCD2 (Default setting 1). Set the desired date by use of the **+** key.
      Note: The date can only be set in conjunction with the selected month. For example, it is not possible to set the date 30 if the month of February is selected.
2.   Press and release the SET key to enter the **"Weekday Setting"**.

WEEKDAY SETTING
1.   The weekday symbols will be displayed on LCD2 in the pre-set language and flashing. Set the desired weekday by use of the **+** key.
2.   Press and release the **SET** key to enter the mode **"12/24 Hours Time Display Setting"**.

12/24 HOURS TIME DISPLAY SETTING
1.   The **"12h"** or **"24h"** will start flashing in LCD1 (Default setting 12h). Select the desired time display mode by use of the **+** key.
2.   Press and release the **SET** key to enter the **"ºC/ºF Temperature Setting"**.

°C OR °F TEMPERATURE SETTING

1. The characters **"°C"** or **"°F"** will start flashing on LCD1 (Default setting °F). By use of the **+** key select **"°C"** for temperature display in degrees Celsius or **"°F"** for degrees Fahrenheit.
2. Press and release the **SET** key to exit the setting mode and switch back to the normal display mode.

EXIT THE MANUAL SETTING MODES

- To return to the normal display mode from anywhere in manual setting mode simply press the **SNZ** key anytime.
- If no keys are pressed for at least 15 seconds in setting mode, the atomic clock will automatically switch back to normal display mode.

ALARM SETTING

To enter into the alarm setting mode:
1. Hold the **ALM** key for 4 seconds. The hour digits start flashing.
2. Press and release the + key to set the hour.
3. Press and release the **ALM** key to set the minutes. The minute digits start flashing.
4. Press and release the + key to set the minutes.
5. Press and release again the **ALM** key to exit the Alarm setting mode or wait for 15 seconds automatic timeout.

TO DEACTIVATE THE ALARM:

Alarm icon (((•))) (ON)

The alarm will be automatically ON when the alarm time is set. To deactivate the alarm (OFF), press and release once the **ALM** key in normal mode display. The alarm icon will disappear, the alarm is now off.

SNOOZE SETTING

The snooze can only be activated during alarm time for a snooze duration of 10 minutes by pressing the SNZ key on the back of the clock

OUTDOOR TEMPERATURE TRANSMITTER:

The temperature is measured and transmitted to the atomic clock every 1 minute. The atomic clock will update the temperature display every 5 minutes.

The range of the outdoor temperature transmitter may be affected by the temperature. At cold temperatures the transmitting distance may be decreased. Please bear this in mind when positioning the transmitter. Also the batteries may be reduced in power during periods of extreme cold temperatures.

433MHz RECEPTION CHECK FOR OUTDOOR TEMPERATURE TRANSMITTER

The atomic clock will receive the temperature data within 4 minutes. If the temperature data is not being received 4 minutes after setting up (the display shows "- - -"), then please check the following points:

1. The distance of the atomic clock or outdoor temperature transmitter should be at least 6 feet (2 meters) away from any interfering sources such as computer monitors or TV sets.
2. Avoid placing the receiver onto or in the immediate proximity of metal window frames.
3. Using other electrical products such as headphones or speakers operating on the same signal frequency (433MHz) may prevent correct signal transmission and reception.
4. Neighbors using electrical devices operating on the 433MHz signal frequency can also cause interference.

Note:
When the 433 MHz signal is received correctly, do not re-open the battery cover of either the outdoor temperature transmitter or atomic clock, as the batteries may spring free from the contacts and force a false reset. Should this happen accidentally then reset all units (see **Setting up** above) otherwise transmission problems may occur.

The maximum transmission range is 82 feet (25 meters) from the outdoor temperature transmitter to the atomic clock (in open space). However, this depends on the surrounding environment and interference levels. If no reception is possible despite the observation of these factors, all system units have to be reset (see **Setting up**).

CHANGING THE DISPLAY MODE (DAY, SECONDS, AND TEMPERATURES)

There are four possible display modes to view the day, seconds, and temperatures.
The *month&date/weekday/indoor temperature/outdoor temperature is the default.*

To change the display:

1. Press the + key. The display should now show the *month&date/weekday/seconds/outdoor temperature.*
2. Press the + key a second time and the display will now show the *month&date/weekday/indoor temperature/seconds.*
3. Press the + key third time and the display will now show the *month&date/seconds/indoor temperature/outdoor temperature*
4. Press the + key a fourth time and the display will return to the normal display.

WWVB RADIO CONTROLLED TIME
The NIST radio station, WWVB, is located in Ft. Collins, Colorado and transmits the exact time signal continuously throughout the United States at 60 kHz. The signal can be received up to 2,000 miles away through the internal antenna in the atomic clock. However, due to the nature of the Earth's Ionosphere, reception is very limited during daylight hours. The atomic clock will search for a signal every night when reception is best. The WWVB radio station derives its signal from the NIST atomic clock in Boulder, Colorado. A team of atomic physicists continually measures every second of every day to an accuracy of ten billionths of a second a day. These physicists have created an international standard, measuring a second as 9,192,631,770 vibrations of a Cesium 133 atom in a vacuum. This atomic clock regulates the WWVB transmitter.

Once the outdoor temperature is displayed on the atomic clock, the WWVB tower icon in the clock display will start flashing in the top center of the LCD. This indicates that the clock has detected a radio signal and is trying to receive it. When the time code is received, the WWVB tower becomes permanently lit and the time will be displayed.
If the tower icon flashes, but does not set the time or the WWVB tower does not appear at all, then please take note of the following:
- Recommended distance to any interfering sources like computer monitors or TV sets is a minimum of 6 feet (2 meters).
- Within ferro-concrete rooms (basements, superstructures), the received signal is naturally weakened. In extreme cases, please place the unit close to a window and/ or point its front or back towards the Fort Collins, Colorado, transmitter.
- During nighttime, the atmospheric disturbances are usually less severe and reception is possible in most cases. A single daily reception is adequate to keep the accuracy deviation below 1 second.

Note:

In case the atomic clock is not able to detect the WWVB-signal (disturbances, transmitting distance, etc.), the time can be manually set (please refer to notes on **Manual time setting**) .

POSITIONING
Before permanently mounting ensure that the atomic clock is able to receive WWVB signals from the desired location. Also, extreme and sudden changes in temperature will decrease the accuracy of the atomic clock, and changes in elevation will result with inaccurate temperatures readings for the next 12 to 24 hours. These changes will require a 12 to 24 hour wait before obtaining reliable data.

To achieve a true temperature reading, avoid mounting where direct sunlight can reach the outdoor temperature transmitter. It is recommended to mount the outdoor temperature transmitter on a North-facing wall or in any well shaded area. The maximum transmitting range is 82 feet (25 meters) obstacles such as walls, concrete, and large metal objects can reduce the range.

Place both units in their desired location, and wait approximately 10 minutes before permanently mounting to ensure that there is proper reception. The outdoor temperature transmitter is not waterproof and should not be placed anywhere it will become submerged in water or be directly in the rain.

POSITIONING THE ATOMIC CLOCK:
There are two possible ways to mount the atomic clock:
- use of the foldout table stand, or
- wall mounting

FOLDOUT TABLE STAND

The foldout table stand leg is located on the backside. Pull the stand out from the bottom center edge of the atomic clock, below the battery compartment. Once the foldout table stand is extended, place the atomic clock in an appropriate location.

WALL MOUNTING
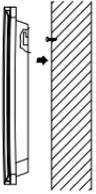
1) Using a straightedge, horizontally space at 2-3/4 of an inch (70 mm) three screw positions on a wall.
2) Install three mounting screws (not included) into a wall within transmission range—leaving approximately 3/16 of an inch (5mm) extended from the wall.
3) Place the atomic clock onto the screws, using the hanging holes on the backside. Gently pull the atomic clock down to lock the screws into place.
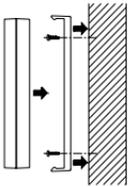
Note:
Always ensure that the atomic clock locks onto the screws before releasing.

POSITIONING THE OUTDOOR TEMPERATURE TRANSMITTER
The outdoor temperature transmitter can be mounted in two ways:
- with the use of screws, or
- using the adhesive tape.

MOUNTING WITH SCREWS

1) Remove the mounting bracket from the outdoor temperature transmitter.
2) Place the mounting bracket over the desired location. Through the three screw holes of the bracket, mark the mounting surface with a pencil.
3) Where marked, start the screw holes into mounting surface.
4) Screw mounting bracket onto the mounting surface. Ensure that the screws are flush with the bracket.

MOUNTING WITH ADHESIVE TAPE
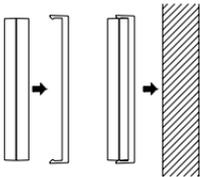
1) With a nonabrasive solution, clean and dry the back of the mounting bracket and the mounting surface to ensure a secure hold. The mounting surface should be smooth and flat.
2) Remove the protective strip from one side of the tape. Adhere the tape to the designated area on the back of the mounting bracket.

3) Remove the protective strip from the other side of the tape. Position the outdoor temperature transmitter in the desired location, ensuring that the atomic clock can receive the signal.

TROUBLESHOOTING:

Problem:	The LCD is faint.
Solution:	1) Replace the batteries.
Problem:	No reception of WWVB signal
Solution:	1) It may help reception to face the front of the atomic clock in the general direction of Ft. Collins, Colorado. 2) Wait overnight for signal. 3) Be sure the atomic clock is at least 6 feet (2 meters) from any electrical devices, i.e. TV sets, computers, or other radio controlled clocks. 4) Remove batteries for five minutes, reinsert and leave the unit alone overnight without pressing any keys.
Problem:	Hour is incorrect (minute and date are correct).
Solution:	1) Be sure the correct time zone and daylight saving time are selected.
Problem:	"OF.L" appears in the indoor temperature section of the LCD
Solution:	1) Move the atomic clock to an area with warmer or cooler surrounding temperature. Current surrounding temperatures are outside measuring range.
Problem:	"--.-" appears in the outdoor temperature section of the LCD.
Solution:	1) Remove the batteries of both units for one minute, then reinsert them again. Make sure the batteries are new and fresh. 2) Move the atomic clock closer to the transmitter or place the transmitter closer to the atomic clock. Make sure the clock is at a receivable range from the transmitter. 3) Move the units to another location. Interferences from other electrical devices operating on the same signal frequency (433MHz) may prevent correct signal transmission and reception.
Problem:	"OF.L" appears in the outdoor temperature section of the LCD.
Solution:	1) Wait until the current surrounding temperature cools down or increases. Current temperature is outside of the measuring range of the transmitter. The outdoor temperature will be displayed again once the current surrounding temperature is within the range of the transmitter.

CARE AND MAINTENANCE:
- Avoid placing the units in areas prone to vibration and shock as these may cause damage.
- Avoid areas where the units can be exposed to sudden changes in temperature, i.e. direct sunlight, extreme cold and wet/moist conditions as these will lead to rapid changes which reduces the accuracy of readings.
- When cleaning the LCD and casing, use a soft damp cloth only. Do not use solvents or scouring agents.
- Do not submerge the units into water.
- Immediately remove all low powered batteries to avoid leakage and damage. Replace only with new batteries of the recommended size.
- Do not make any repairs to the units. Please return it to the original point of purchase. Opening and tampering with the units may invalidate the warranty.

SPECIFICATIONS:
Temperature measuring range
Indoor: +32ºF to +122ºF with 0.2ºF resolution
           0ºC to +50ºC with 0.1ºC resolution
           ("OF.L" displayed if outside this range)
Outdoor : -21.8ºF to +157.8ºF with 0.2ºF resolution
             -29.9ºC to +69.9ºC with 0.1ºC resolution
             ("OF.L" displayed if outside this range)
Temperature checking interval
Indoor: every 10 seconds
Outdoor: every 5 minutes
Transmission distance: maximum 82 feet (25 meters) in open field, depending upon surrounding
                        structures, mounting location and possible interfering sources
Power source (Alkaline batteries recommended)
Atomic clock : 2 x AA, 1.5V batteries
Transmitter: 2 x AA, 1.5V batteries
Battery life: about 12 months
Dimensions (L x W x H)
Atomic clock : 12.20" x 1.18" x 8.03" / 310 x 30 x 204mm
Transmitter: 1.57" x 0.9" x 5.04" / 40 x 23 x 128 mm

LIABILITY DISCLAIMER:
- The manufacturer and supplier cannot accept any responsibility for any incorrect readings and any consequences that occur should an inaccurate reading take place.
- This product is only designed for use in the home or office.
- This product is not to be used for medical purposes or for public information.
- The specifications of this product may change without prior notice.
- This product is not a toy. Keep out of the reach of children.
- No part of this manual may be reproduced without written authorization of the manufacturer.

BATTERIES CHANGE:
For best performance, batteries should be replaced at least once a year to maintain the best running accuracy. Ensure that the batteries used are new and the correct size.

Please help in the preservation of the environment and return used batteries to an authorized depot.

WARRANTY INFORMATION

La Crosse Technology provides a 1-year warranty on this atomic clock. Contact La Crosse Technology immediately upon discovery of any defects covered by this warranty.

Before sending the atomic clock in for repairs, contact La Crosse Technology. The atomic clock will be repaired or replaced with the same or similar model.

This warranty does not cover any defects resulting from improper use, unauthorized repairs, faulty batteries, or the clocks inability to receive a signal due to any source of interference.

LA CROSSE TECHNOLOGY WILL NOT ASSUME LIABILITY FOR INCIDENTAL, CONSEQUENTIAL, PUNITIVE, OR OTHER SIMILAR DAMAGES ASSOCIATED WITH THE OPERATION OR MALFUNCTION OF THIS TEMPERATURE CLOCK. THIS PRODUCT IS NOT TO BE USED FOR MEDICAL PURPOSES OR FOR PUBLIC INFORMATION. THIS PRODUCT IS NOT A TOY. KEEP OUT OF CHILDRENS' REACH.

This warranty gives you specific legal rights. You may also have other rights specific to your State. Some States do not allow the exclusion of consequential or incidental damages; therefore the above exclusion of limitation may not apply to you.

For warranty work, technical support, or information contact:

La Crosse Technology, Ltd
2809 Losey Blvd. S.
La Crosse, WI 54601
Phone: 608.782.1610
Fax: 608.796.1020
e-mail
support@lacrossetechnology.com
(warranty work)

sales@lacrossetechnology.com
(information on other products)

Or visit us on the internet at
www.lacrossetechnology.com

FCC ID: OMO-01RX (receiver)
OMO-01TX (transmitter)

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

1. THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND
2. THIS DEVICE MUST ACCEPT INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

V1