This Operation Manual is part of this product and must stay with it. It contains important notes on setup and operation. Please keep that in mind when handing this product over to any third party.

A Table of Contents can be found on Page 28 of this manual.

Keep this Operation Manual in a safe place for further reference.



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# 1. Introduction

Dear Customer,

We want to thank you for purchasing this Professional Remote Weather Station.

Its design and construction corresponds to all United States requirements with regard to electro magnetic compatibility. The unit carries the FCC sign, its conformity has been proven, the respective depositions and documents are deposited with the manufacturer.

In order to maintain this condition and ensure safe operation the user must observe this operation manual!

With this product you have purchased a device that has been designed using the latest technologies. Its operation is simple and straight forward. For better understanding and optimum use of this product however please read this manual closely and carefully.

# 2. Intended Use

This Professional Remote Weather Station serves to acquire and process weather data such as wind direction and strength, precipitation, air pressure, temperature and humidity around the home and office. The manufacturer and supplier cannot accept any responsibility for any incorrect readings and any consequences that occur, should any inaccurate reading take place. This product is not to be used for medical purposes or for public information. This product has been designed for strict use in the home and office as an indicator of the future weather conditions and is not 100% accurate. Weather forecasts and barometric readings given by this product should be taken only as an indication and not as being totally accurate.

The Base Station is approved for operation with four Type Mignon AA, IEC LR6, 1.5V batteries. The Base Station is to be used within dry, closed rooms only; outdoor use is not permitted. Contact to moisture must be avoided in any case. The Remote Indoor Sensor operates on two Mignon AA, IEC LR6, 1.5V batteries, all other sensors receive their operating power from solar cells with rechargeable Lithium battery backup (included).

Any other use outside the above described will lead to damage of this product. It is further connected with dangers such as short circuit, fire, electrical shock, etc. The entire product may not be opened, altered or modified in any way!

## Table of Contents

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## 3. Safety Notes

Any damages caused by failure to comply with this Operation Manual will lead to invalidation of guarantee! We furthermore cannot be held liably for any consequential damages caused by this!

In case of damages to personnel or property caused by improper handling or failure to comply with the safety notes in this manual we cannot be held liable. In any such case the guarantee will invalidate.

For reason of safety and licensing (FCC) any modification and/or alteration of the device is strictly forbidden.

Only Type Mignon AA, IEC LR6, 1.5V batteries (preferrably alkaline batteries) may be used to power the Indoor Sensor and Base Station.

Do not expose the Base Station to high temperatures, moisture or severe vibration as well as to any mechanical stress.

Do not leave used-up batteries in the device since even leakproof batteries may corrode and set free chemicals which may be dangerous to your health and may also ruin the device.

Incorrect polarity of the batteries will in any case lead to immediate destruction of the unit.

This product as well as the installed batteries are no toys and must be kept out of the reach of children.

Do not expose batteries to open fire because of danger of explosion.

This product is not to be used for medical purposes or for public information.

Do not put the Base Station into operation immediately after it has been moved from any cold environment to a warm room. The condensed water possibly developing may under unfavorable conditions damage the device. **Leave the device switched off until it has reached room temperature.**

## 4. Product Description

The Professional Remote Weather Station represents an extremely comfortable high quality Universal Weather System able to collect, process and display data from up to 9 external Remote Temperature and Humidity Sensors as well as one Remote Wind Sensor and one Remote Rain Volume Sensor.

Measuring capabilities of the Weather Station

- Room temperature and humidity with air pressure as well as one of 8 further temperatures with assigned humidity.
- Temperature selectable in degree Fahrenheit or Celsius
- Up to 9 different combined humidity/temperature measuring points of which two can be simultaneously displayed.

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- Calculation and display of the windchill equivalent temperature (perceived temperature).
- Dew points, which are separately computed for every one of the 9 temperature/humidity sensors.
- Air pressure, selectable in inHg or hPa.
- Air pressure tendency (constant, increasing, strongly increasing, decreasing, strongly decreasing).
- Graphic display of the air pressure changes within the last 24 hours.
- Icon display for weather forecast (sunny, bright, cloudy, rainy).
- Wind strength, selectable in mph, km/h, m/s, knots or Beaufort.
- Wind direction in form of a compass with display of the variations of wind direction (in place of the wind strength the wind direction can be displayed with a 5° resolution).
- Storage of minimum and maximum measured values for all sensors incl. assigned time and date assertion (in case of wind strength the assigned wind direction is additionally displayed).
- Acquisition of rain volume with < 0.5 mm resolution (total, 24h, 1h).
- Programmable alarm cababilities at various weather conditions, e.g. danger of frost, storm, adverse air pressure or temperature tendencies, e.g. at sea or in the mountains or as an indication for the so called bio weather.
- All important weather informations are simultaneously displayed on the LCD, making it unnecessary to perform any special handling of the device to recognize the present weather.
- Several Base Stations can be operated simultaneously in order to display the sensor data at various places at the same time. Additional Base Stations can be ordered optionally.

**Please read this Operation Manual carefully and completely before first setup in order to avoid functional disturbances and mishandling. Especially observe the notes on mounting and calibration of the measurement sensors.**

The indoor and outdoor sensor system of the Weather Station works by exclusive use of remote data transmission. Remote sensors can thus be placed and mounted as far as 330 ft (100 m) from the Base Station in open f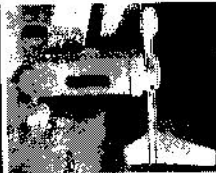ield (strongly depending on th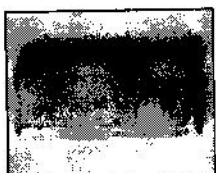e local environmental conditions). The outdoor sensors get their operating power from integrated solar cells. Please therefore carefully observe the notes on placing and mounting of these components in order to guarantee regular function of the total system.

**Note!**
**Please note that for operation of the Weather Station there is at least one Remote Sensor necessary since the Base Station itself does not contain any sensors.**

## 5. Shipment Contents

Before setting up the Weather Station please check the shipment's entirety by use of the following list.

| Unit | consisting of | Fittings | Picture |
| --- | --- | --- | --- |
| Base Station | | | see cover |
| Remote Wind Sensor | Sensor Head, Holder Tube, Mast/Wall Holder | 1 x Magnet 4Dia.x15<br>2 x Bracket for Mast Holder<br>4 x Washer 15Dia. for M6<br>4 x Nut M6<br>2 x Screw M3.5x6x0.6<br>2 x Screw M3.5x12x0.6<br>4 x Screw 5Dia.x55 incl. Dowel | |
| Remote Rain Volume Sensor | | 1 x Magnet 4Dia.x15<br>8 x Screw 3.5Dia.x30 incl. Dowel | |
| Remote Indoor Sensor | | | |
| Remote Outdoor Sensor | Sensor Head, Mast/Wall Holder | 1 x Magnet 4Dia.x15<br>2 x Bracket for Mast Holder<br>4 x Washer 15Dia. for M6<br>4 x Nut M6<br>2 x Screw M3.5x6<br>4 x Screw 5Dia.x55 incl. Dowel | |

## 6. Description of Measuring Devices (Sensors)

The sensor concept of the Professional Remote Weather Station consists of two sensor groups. For operation of the Weather Station a Remote Indoor Sensor is generally necessary. It transmits a fixed data telegram determining the display of temperature and humidity in the display section for the indoor values in the upper left part of the LCD. The sensor is immediately operable since addressing is only necessary in very rare exceptional cases.

This addressing is only necessary if – within the sensor's transmission range (up to 330 ft, (100 m)) – two Base Stations with respective assigned Indoor Sensors need to be operated (Base Station 1 showing the data of Indoor Sensor 1, Base Station 2 showing the data of Indoor Sensor 2). The Rain Volume Sensor as well as the Wind Sensor also have fixed addressing and belong to this group since their measured values too have their fixed location in the display.

The second group of sensors are the optionally obtainable types WS 2210-22, WS 2210-27, WS 2210-28 as well as the Remote Outdoor Sensor (included with basic shipment). These sensors transmit their data signal to be displayed in the outdoor section in the upper right part of the LCD. It is possible to operate up to 8 sensors which can be selected through the sensor selection in the display. It is thus necessary to assign a respective address to each sensor determining their fixed location in the upper right display section. Therefore please observe for these three types in the notes on addressing.

**Remote Indoor Sensor**

The Remote Indoor Sensor included with the basic shipment requires two Type Mignon AA, IEC LR6, 1.5V batteries for operation. It contains one respective sensor for temperature, humidity and air pressure. The data of the Remote Indoor Sensor generally appear in the indoor display section in the upper left part of the LCD. Besides indoor temperature and indoor humidity it measures the air pressure prerequisite for the display of air pressure, air pressure tendency, weather tendency and air pressure history.

**Remote Wind Sensor**

The Remote Wind Sensor simultaneously acquires wind direction and wind strength at its mounting location. It is operated by a solar cell with a battery backup during darkness and provides addressing which cannot be altered by the user.

**Remote Rain Volume Sensor**

The Remote Rain Volume Sensor also works with solar power supply and provides addressing not alterable by the user. The funnel has a 5.12 in diameter, which represents an area of 25.574 in², the calculation base for the rain volume. The amount of water flowing through the funnel initiates a number of pulses. These pulses are converted to in or mm in the Base Station and then displayed.

**Remote Outdoor Sensor**

The Remote Outdoor Sensor included with the basic shipment allows the transmission of the temperature and humidity values at its mounting location. This sensor can be addressed freely for display within the outdoor display section in the upper right part of the LCD (see Display Overview). By default all Remote Outdoor Sensors are set to Sensor 1. Individual addressing is however possible.
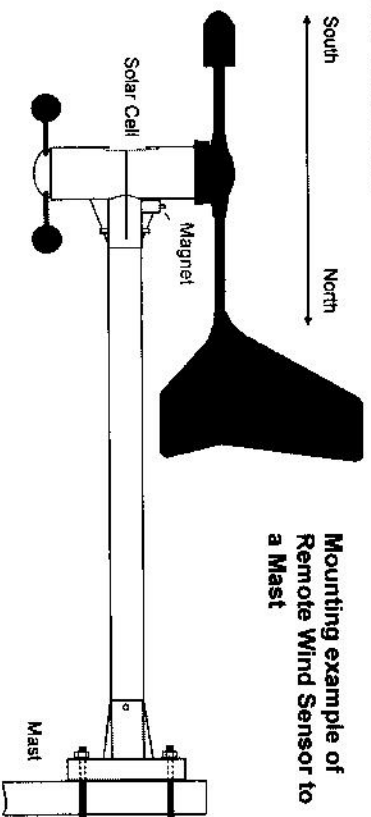
## 7. Mounting

**Base Station**

The Base Station can be placed on any smooth surface (e.g. table, bookshelf, etc.) by means of a swivel-mounted control unit or wall mounted at any desired location by means of a hanging hole at the back of the device.

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**Important Note!**
It is recommended to check that the 433MHz signals are properly received before permanently mounting the Professional Weather Station (drilling of holes, etc.). Should the Weather Station not pick up signal from the desired location a slight relocation will help in most any case. Once the signals are received, the system can be mounted permanently.
Mounting is but a preparation for the setup. Just before the final setup of the Base Station the magnets have to be placed into the sensors.

**Recommendation!**
In order to test all sensor functions at first setup the sensors can prior to mounting be placed on a smooth surface (table, etc.) and put into operation (see Item 8 Setting Up).

**Remote Wind Sensor**

South — North

Solar Cell

Magnet

Mast

Mounting example of Remote Wind Sensor to a Mast

Mounting takes place either to a mast or at the upper rim of a wall. It is important to mount the device in such a way that the solar cell in the sensor housing is pointing in a southerly direction. It is further important to mount the device in a zone not prone to wind shadow, i.e. the wind must be allowed to travel freely about the sensor from all directions. Remove the transport protection from the sensor head and make sure that weather-vane and wind wheel can move freely and easily. Put sensor head, holding tube and mast/wall holder together and fix the components by use of the supplied screws. For basic mounting the Wind Sensor must be pointing exactly in a southerly direction (solar cell to the south) in order to provide an exact northerly reference point for the evaluation electronics.

**Note!**
An exact southerly alignment of the sensor in respect of its solar cell is very important since this alignment will provide the reference point for the Wind Direction Sensor.
In order to obtain correct measuring values exact perpendicular mounting of the sensor to the mast must be observed. Axial stress to weather-vane and wind wheel should be avoided.

**Remote Indoor Sensor**
Mount the sensor to its desired location. Keep in mind that the sensor is not designed to operate outdoors or in rooms prone to excessive humidity. Data of the Indoor Sensor are

generally displayed in the display section in the upper left part of the LCD. After insertion of the batteries the sensor is immediately operable.

**Remote Outdoor Sensor**

The mounting of the sensor should take place anywhere to the west or north since temperatures in meteorology usually are measured in the shadow. It can however be mounted at any other location if desired. It simply must be observed that the solar cell powering the sensor does have to point towards the light in any case. The sensor must not be obstructed by any close impediments such as leaves or the like since this will prevent the solar cell from efficiently powering the sensor. A thinkable mounting location would e.g. be a spot beneath the roof extension.

The sensor is designed for wall or mast mounting, which can be performed in the following way:

Either mount the wall holder of the sensor in an exact perpendicular position to a wall by means of four screws or to a mast by use of the supplied mounting bracket. Place the sensor into the wall holder and secure both parts by use of the supplied screw. Ensure that the large protective hood lies on top and the solar cell is pointing towards the light.

During darkness and periods of bad weather with a relative lack of sunlight an internal battery system buffered by the solar cell will take care of the sensor's power supply.

**Remote Rain Volume Sensor**

Generally mount the Remote Rain Volume Sensor with its solar cell pointing in a southerly direction.

The Rain Volume Sensor must be securely mounted to an exact horizontal surface by means of its mounting holes in the bottom part of the housing. Prior to this remove the upper part from the lower portion by pressing and turning the upper part clockwise with regard to the bottom part. Remove the transport protection from the seesaw in the lower part of the sensor and check by tilting that the seesaw can move freely and easily to its both endpositions.

A cavity in form of a „T" in the bottom part of the Rain Volume Sensor can be filled with water and thus allows an exact horizontal alignment without any other auxiliary means. Fill a small amount of water into this cavity and align the bottom part of the sensor by principle of a spirit-level. After marking the exact mounting position the water can be removed. Observe the southerly alignment for the solar cell. By doing this the short leg of the engraved spirit-level must point to the north.

Magnet

Direction South

Spirit-Level

Equal water level at all three ends
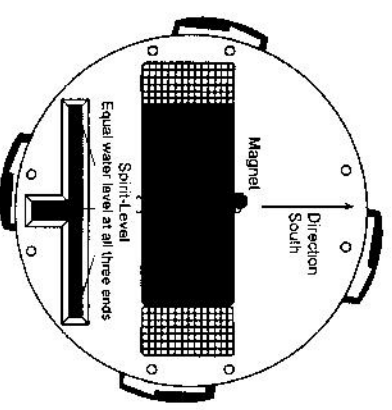
**Alignment of Rain Sensor, Use of Spirit-Level and Position of Pick-up Magnet**

In order to reach the best possible remote transmission (high transmission range) it is recommended not to mount the Rain Volume Sensor too close to the ground. Mounting the unit at a height of appr. 1 m also reduces the danger of pollution (especially the solar cell). Observing the correct polarity insert the color marked magnet into the holder.
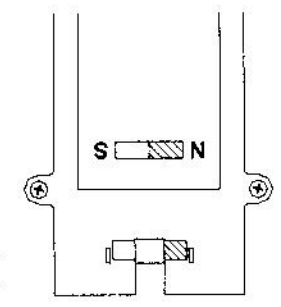
**Important Note!**
In order to avoid start-up problems make sure that the color marked magnet is inserted observing the correct polarity as shown in the illustration opposite.

After securely screwing the bottom part of the sensor to the mounting surface replace the upper part as follows:

On the side of the counting seesaw for the rain volume in the bottom part of the sensor there is a bar magnet mounted in the center initialising the counting pulses for the electronics.

The top of the housing has now to be replaced in such a way that the solar cell is also placed on the side of the magnet with the electronics part also directly opposite and the three retaining hooks exactly fitting into the holders in the bottom part. Turn the upper part carefully in a counter-clockwise direction until the retaining hooks tightly lock into place. The Remote Rain Volume Sensor is now operable. For testing purposes very slowly pour a small amount of water into the funnel. The collected amount will later be computed and displayed in Liter/m² or mm in the Base Station.

**Note!**
When mounting the Remote Rain Volume Sensor make sure that the collected water can drain off easily without any obstruction (even in case of sleet or snow).

S    N

**Polarity of the Color Marked Magnet must correspond to the Imprint**

**8.    Setting Up**

Before setting up, the Intended Use as well as the various Safety Notes and the Specifications have to be closely observed. Make sure before setting up that the device does fit the intended purpose for which you want to use it.

**Activating the Sensors**

The Outdoor Sensors for wind measurement, acquisition of rain volume and measurement of outdoor temperature and humidity are for power supply equipped with a solar cell as well as a Lithium buffer battery for periods of darkness and bad weather.

In order to protect the precious batteries from over-discharging during long storage periods without incidence of light to the solar cell (e.g. when packaged), the power supply is only activated by means of a small magnet which must be inserted into the sensor from the outside prior to first setup. The magnet belonging to the respective sensor should thus only be inserted a short time before the Base Station is put into operation.

**Important Note!**
In order to unambiguously assign the sensor data the Base Station should only be put into operation after all sensors have been operating for at least 10 minutes.
This point is important since all sensors will at first work in a test mode (insertion of magnets into the Outdoor Sensors and insertion of batteries into the Indoor Sensor). During this test phase the data transmission takes place at a 4 second pace (approx.) rather than the 3 minute scan applying later on.

As with the Remote Outdoor Sensor the magnet for activation of the system must be inserted into an opening provided for at the back of the unit. The magnet must tightly be pressed into the opening and will stick out by appr. 0.157 in (4 mm).
The activation of the Remote Wind Sensor also takes place by inserting a small magnet into the opening provided for. In this case the magnet holder is placed above the holder tube mounting (opposite the solar cell).
In order to insert the magnet into the Remote Rain Volume Sensor the upper part has first to be removed by pressing and turning the upper part in a clockwise direction with regard to the lower part. In the center of the electronics casing there is a holder for the bar magnet activating the electronics. Insert the color marked magnet according to its correct polarity into the holder (also see Page 35).
After pressing the magnets into their holders the sensors will take up data transmission.

The Remote Indoor Sensor needs two Mignon AA, IEC LR6, 1.5V batteries for operation.
To insert the batteries the battery compartment needs to be opened. Insert the batteries observing the correct polarity in accordance to the engraved polarity marking in the battery compartment. Replace the cover of the battery compartment.
Approximately 12 minutes after activating the last sensor, insert four Mignon AA, IEC LR6, 1.5V batteries into the Base Station observing the correct polarity.
Upon inserting the batteries into the Base Station a short initializing phase takes place during which all segments of the LCD will shortly be displayed. Following this segment test the Base Station will automatically switch into a so called test mode during which each data reception is shown on the display and acknowledged by the sound of a signal tone. For better distinction there generally is only the display of the sensor received last while the data of all previously received sensors are being erased. The perfect reception of all sensor data can thus be checked quickly and easily.

**Note!**
Under critical reception conditions this test mode also helps to find the best possible location for good reception. To do this the respective sensor simply must also be set to its test mode in order to transmit a data telegram every 4 seconds.
In order to activate this test mode the batteries from the Remote Indoor Sensor and the magnets from the Outdoor Sensors have to be removed and re-inserted after a waiting period of at least 60 seconds.
After approximately 30 minutes the Base Station will automatically terminate this test mode and switch over to its normal reception mode. By pressing any function key the test mode can be terminated earlier at any time.

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**Important Note!**
For unambiguous assignment of the sensor data, the test mode at the Base Station should generally not be terminated as long as there is any sensor still in test mode.

After the test mode has finished (up to twenty minutes), it is necessary to set the time and date. Press the two arrow keys (←) and (→) and the "Calibr." key at the same time; "0000 inHg" will be displayed. Press the left arrow key twice to enter the time and date mode. Press the "-" key to advance the hour (please note the AM/PM setting), press the "+" key to advance the minutes, press the "Unit" key to advance the month, and press the "Sensor" key to advance the day. It is important to set the time and date after set up of the sensors to avoid problems.

For easy setup the Base Station can also be carried close to the mounting locations of the sensors. This way the correct data transmission of the sensors can be checked.
The data of mounted sensors will after the test phase be transmitted at an approximate 3 minute pace and will be displayed in the various display sections of the LCD.
After all sensors have been received, their function can be tested as follows:

Indoor and Outdoor Temperature Sensors can be slightly warmed or cooled. A change of temperature and humidity will be seen on the base station. This however may take up to 8 minutes.

The wind wheel of the Remote Wind Sensor should be turned at a moderate speed for one to two minutes. The weather-vane of the sensor should be pivoted. The changes will also become visible on the LCD.

To test the Remote Rain Volume Sensor at first the "**Rain**" key can be pressed several times to get "**Total**" rain display in case other rain records are being displayed. The display "Total" will appear. Now press the "**Reset**" key for about 3 seconds until a beep tone sounds. Very slowly pour a small amount of water into the funnel, observing that there is no slack water in the funnel at any time (this test should preferably be performed in kitchen or bath to avoid inconvenient splashes). Latest after 3 minutes the display of the rain volume will be updated.

## 9. Display Overview

**Note!**
Unlike the real display the following illustration shows every display combination possible in order to give a description of their appearance.
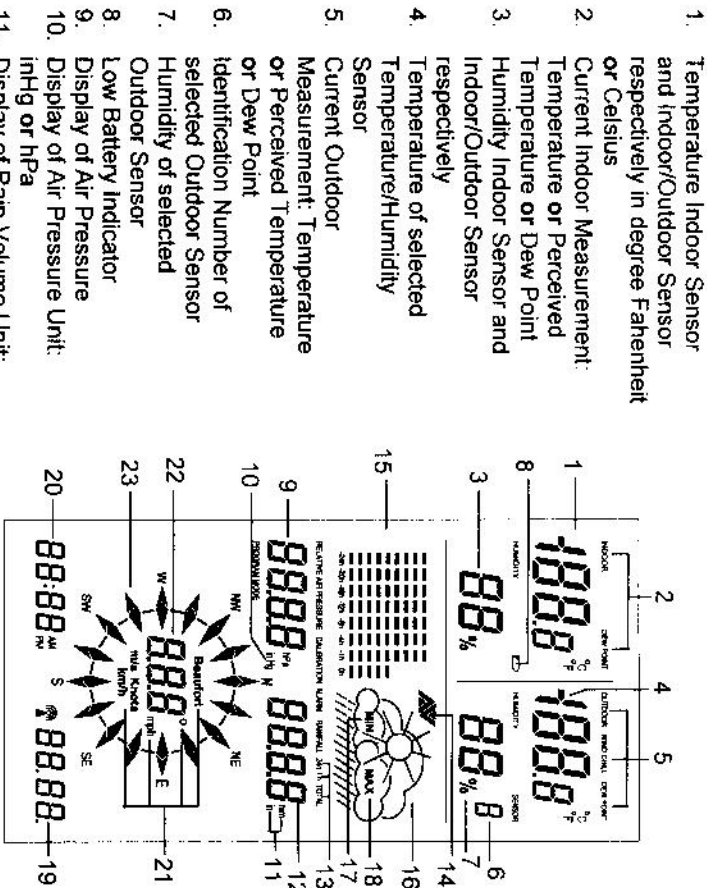


1. Temperature Indoor Sensor and Indoor/Outdoor Sensor respectively in degree Fahrenheit **or** Celsius
2. Current Indoor Measurement: Temperature **or** Perceived Temperature **or** Dew Point
3. Humidity Indoor Sensor and Indoor/Outdoor Sensor respectively
4. Temperature of selected Temperature/Humidity Sensor
5. Current Outdoor Measurement: Temperature **or** Perceived Temperature **or** Dew Point
6. Identification Number of selected Outdoor Sensor
7. Humidity of selected Outdoor Sensor
8. Low Battery Indicator
9. Display of Air Pressure
10. Display of Air Pressure Unit: inHg **or** hPa
11. Display of Rain Volume Unit: in **or** mm
12. Display of Rain Volume
12. Display of Time Period of Rain Volume: Total **or** last 24 Hours **or** last Hour
14. Display of Air Pressure Tendency
15. Display of Air Pressure History of last 24 Hours
16. Icons for Weather Forecast
17. Display for Poll of Minimum Values
18. Display for Poll of Maximum Values
19. Display of Date of the Day
20. Display of Time
21. Display of Wind Strength Unity: mph, Knots **or** km/h **or** m/s **or** Beaufort
22. Display of Wind Strength **or** Wind Direction (in 5° Steps)
23. Compass, Display in 22.5° Steps with Display of Deviation Range at Changing Winds

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## 10. Operation

After the installation of the Remote Sensors and the following setup of the Base Unit (test mode of the Base Unit should generally be terminated **after** the test mode of the last sensor) the transmitted and computed data will show on their respective display sections on the LCD. If this is not the case please observe the notes on debugging on Page 47-48.

**Note!**
Please note that data can only be displayed if there is a respective sensor installed.
**E.g. without a Rain Volume Sensor there will be no display of rain volume.**

**Since all relevant data is simultaneously displayed in the first place, operation will essentially be limited to simple selection of further sensors or further weather data by repeated pressing of the respective function keys.**

Item "Operation" solely pertains to operation in **Normal Mode** with the upper key imprints being applicable.

Programmable functions are thoroughly covered in Item "Programming Mode" with the lower key imprints being applicable.

**Indoor**
In normal operating mode the indoor display in the upper left of the LCD displays the temperature and humidity at the location of the Indoor Sensor.

By once pressing the "**Indoor**" key the **Dew Point** will be displayed. The Dew Point is that point in temperature at which condensation of humidity begins and the so called "Dewing" takes place, i.e. the humidity is condensing and will precipitate in liquid form. So the dew point for e.g. air with a water-vapour content of 17.4 g/m³ lies at a temperature of 68°F (20°C). If the dew point for water-vapor drops below 32°F (0°C), the precipitation will take place as snow or hard-frost. The dew point depends upon the concurrence of a certain air pressure, temperature and humidity at the same time.

One more pressing of the "Indoor" key will lead back to the normal temperature display.

**Wind**
Pressing of the "**Wind**" key leads to the **Change of Units for the Display of Wind Strength** respectively and the change from the display of the wind strength to a **Digital Display of Wind Direction** in 5° steps within the compass (digital display field). The order of changes and displays will be as follows:

- Wind Strength in mph
- Wind Strength in knots
- Wind Strength in m/s
- Wind Strength in km/h
- Wind Strength in Beaufort
- Display of Wind Direction in place of Wind Strength
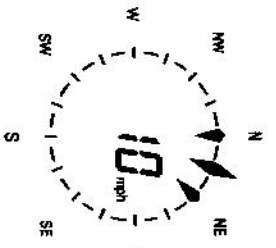
**Display of Wind Strength in the Digital Display Field in mph**
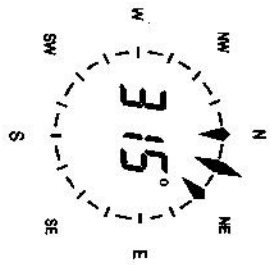


**Display of Wind Direction in the Digital Display Field**



RAINFALL 24h

0.57 in

## Rain

Pressing of the "Rain" key successively leads to the display of the Rain Volume of the Last Hour (interval between the 30th minute and the 30th minute of the respective hour), the Rain Volume of the Last 24 Hours (interval between 7.30h and 7.30h of the respective day) and the Total Rain Volume (since start of measurements at Setup and since last Reset) in the right center of the LCD. Times and time intervals are in conformity with the International Rules for Professional Weather Services.

**Basic display:**
Press once: Total Rain Volume
Press twice: Rain Volume of the last Hour
Press three times: Rain Volume of the last 24 Hours
Return to Total Rain Volume (see illustration at right)

If the "Reset" key is pressed for appr. 2 seconds during display of the Total Rain Volume, the accumulated value of the Total Rain Volume will be erased and reset to zero. Time and date of the reset will be stored in the weather station's memory. Time and date of the last reset can at any time be displayed by briefly pressing the "Reset" key.

If during switching of the Rain Volume Mode from Total to 1h or from 1h to 24h the "Rain" key is held down for a longer period of time, the display will switch to an accumulating counter. This mode of operation is indicated in the display by the symbol "r" in front of the numerical value. Now e.g. during a rain shower the „running up" of the 1h resp. 24h counter can be observed.

## Minimum/Maximum Function

The Min/Max function allows the display of the minimum and maximum values of all measurements since the last reset of the Min/Max memory. If desired, the time and date of the appearance of the respective minimum and maximum values can also be displayed.

**Display of the Minimum/Maximum Values**
Press once: Display of all Minimum Values
Press twice: Display of all Maximum Values
Press three times: Return to Display of the Current Values

---

During simultaneous display of all minimum or maximum values there will be for the present be no additional display of time and date. There will also be no display of air pressure tendency and no air pressure history. Instead there will be the respective display MIN or MAX in the right center of the LCD. If the clock not been manually set, then there will be no storage of any minimum or maximum values.

**Display of Single Values with their respective Time and Date**
If during display of the minimum or maximum values one of the Arrow keys (←) or (→) is pressed, nothing but the minimum or maximum value of the indoor temperature with its respective assigned time and date will be displayed.

Now by use of the Arrow keys and the Min/Max key each single minimum or maximum value with its assigned time and date of storage can be selected. Additionally with the maximum wind strength the wind direction at the time of storage will be displayed.

**Note!**
During this display mode all other sections of the LCD will stay invisible.

**Selective Reset of Stored Values**
If during display of any selected minimum or maximum values the "Reset" key is pressed for appr. 2 seconds, the respectively assigned minimum or maximum values will be erased and reset.

**Reset of all Stored Values**
If during display of the minimum or maximum values the "Reset" key is pressed for appr. 2 seconds, all stored values will be erased and reset.

## Alarm Function

As soon as any measurement of the Weather Station exceeds or falls below a set alarm value, the air pressure tendency display, air pressure history, weather icon and wind direction display will generally be switched off. The display then only shows the particular section of the LCD where the value has fallen outside of the set alarm window. The symbol "ALARM" will also be displayed instead of the time.

If this does apply to more than one display or measurement section, their display will also be shown in case of alarm.

By use of the "Sensor" key the alarm settings of the Outdoor Sensors can be scanned. The alarm arriving first will including its assigned sensor identification be shown in the display.

In case of alarm the Weather Station will stay in the „Alarm" display mode until the "Alarm" key is pressed and the display has thus returned to the display of their current values.

In case of alarm there will additionally be an acoustic signal, which is composed of five single tones. The signal will be repeated every 30 minutes for a total time span of max. 7.5 hours. The alarm will be terminated when the values of the respective measurement section have returned to within their programmed value range as well as after additionally pressing the "Alarm" key (Return to the display mode for the current data).

**Sensor Selection**

The "Sensor" key allows in all operating modes of the Weather Station the selection of the Outdoor Temperature/Humidity Sensors. The selected sensor will in the "Sensor" display section be displayed with its assigned identification number.

**Outdoor**

In normal operating mode the outdoor display in the upper right of the LCD displays the temperature and humidity at the location of the Outdoor Sensor selected by use of the "Sensor" key.

By once pressing the "Outdoor" key the **Dew Point** will be displayed. By twice pressing the "Outdoor" key the temperature display in this section will change to the display of the **Windchill Equivalent Temperature** (Perceived Temperature). Windchill display will of course only be possible if a Remote Wind Sensor is part of the Weather Station System. One more pressing of the "Outdoor" key will lead back to the normal temperature display.

The Windchill Equivalent Temperature (Perceived Temperature) is a fictive temperature which is perceived by man under certain conditions instead of the really measured current temperature and which can be taken to determine the comfort stage of a person wearing suitable clothing at a certain temperature and wind strength. These conditions are represented by a temperature of 91.4°F (33°C) and a wind strength of 5,816 mph (2.6 m/s). Windchill is defined as the cooling effect on bare human skin at an assumed constant skin surface temperature of 91.4°F (33°C).

The "Perceived Temperature" is approximately comparable to the so called "felt" or "sensed" temperature, which is additionally considering the radiation effect of the sun, light reflection of the clouds, wave length of light, etc.

This display does only make sense however if the Remote Outdoor Sensor responsible for this display is placed at an adequate location. It is e.g. possible to place such a sensor at a roofed terrace which is exposed to outdoor temperature and wind. Windchill display will of course only be possible if a Remote Wind Sensor is part of the Weather Station System.

**11. Programming Mode**

In programming mode all the minimum and maximum value settings for the alarm functions can be performed.

Please observe that for this mode only the imprints below the functions keys will apply. If the "Store" key is pressed or no key is pressed for about 60 seconds the device will automatically switch back to its normal operating mode.

In order to enter the **Programming Mode** both Arrow Keys (←) and (→) must be pressed simultaneously. The display will now show the set minimum alarm value. Weather icons, air pressure tendency display, air pressure history and compass will be switched off.

By once pressing the "**Min/Max**" key, the maximum alarm value will be displayed. By again pressing the "**Min/Max**" key, the system will return to the display of the minimum alarm value. The alarm values, such as for exceeding or falling below a certain ground temperature, for a certain wind strength, etc., can now be set in Programming Mode. By pressing the "**Store**" key the Programming Mode can be left.

---

**Setting of the Minimum/Maximum Alarm Values**

By use of the Arrow keys (←) and (→) and possibly the "Sensor" key select the desired measuring point or measuring value respectively. All other displays will stay switched off.

**Minimum/Maximum Selection**

In this mode the minimum or maximum values can be arbitrarily set by use of the "Min/Max" key. The key functions as well as the functional sequences are identical to the ones in item **Minimum/Maximum Function** above. If desired, it is this way possible to either firstly set all minimum values, followed by all maximum values or immediately set all assigned minimum and maximum values to each respective measuring point. Only one maximum value can be set for the wind strength. In order to enter this value a switch from Min to Max must be performed.

**Setting of Values**

By use of the "+" and "−" keys the desired numerical values can now be set. By holding the keys down, the device will automatically count up or down.

There is the additional possibility to speed up the counting by a factor of 10 by simultaneously pressing the "**Fast**" key and either the "+" or the "−" key.

**12. Calibration**

All one time settings will be performed in Calibration Mode. This applies to the Altitude Correction for the Barometric Air Pressure and the Calibration of the Rain Volume Sensor as well as the setting of the desired Units for Air Pressure and Rain Volume. The time and date can also be set in Calibration Mode. Further, if desired, the addresses of the Indoor Sensor to be received, of the Wind Sensor and of the Rain Volume Sensor can be changed in this mode.

The Calibration Mode can be entered by simultaneously pressing the (←), "**Calibr.**" and (→) keys. The respective display section can then be reached by use of the (←) and (→) keys.

**Setting of the Altitude Correction for the Barometric Air Pressure**

After selecting the air pressure display section the altitude of your location with regard to sea-level (H.a.SL – Height above Sea-Level) can directly be entered in Meters (values from 0 to 1999 m possible) by use of the "+" and "−" keys and possibly the "**Fast**" key. The setting of display units in hPa or inHg is of no significance for the Altitude Correction for the Barometric Air Pressure.

By pressing the "**Store**" key the set value is stored and the display will return to normal operating mode.

**Calibration of the Rain Volume Sensor**

**Note!**

The Rain Volume Sensor by design and manufacturing already offers a very high accuracy and will for normal operation not require any special calibration. Calibration may only be necessary for extremely high accuracy demands.

Before starting the calibration of the Rain Volume Sensor any possibly already accumulated rain volume value has to be erased and reset to 0 in normal display mode according to item **Rain** of this manual (leaving the Programming Mode).

Following this procedure pour exactly one Liter of water during an arbitrary time span very slowly into the funnel of the Rain Volume Sensor.

**Caution!**
Fast pouring will corrupt the measuring results! Pour the water so slow into the funnel, that there is no slack water in the funnel at any time.

**Recommendation!**
In order for the water not to run too fast into the funnel, thus causing a faulty calibration, place a small cup made of synthetic material into the bottom using a sharply pointed tool. Prepare the cup by piercing a small hole into the funnel very slowly drop by drop. The water will now enter the funnel very slowly drop by drop.

Because of the 5.118 in (130mm) diameter of the funnel, representing an area of 20.574 in$^2$, the amount of 1 Liter of water will yield a nominal rain volume of 2.97 in. After the entire amount of water has run through the funnel the actual value (displayed value) will show on the display, in the ideal case 2.96 in (75.3 l/m$^2$).

The ratio of Target Value to Actual Value will yield the Calibration Factor. Since this calibration factor may have already been entered at an earlier date, it has to be included in the calculation.
The new Calibration Factor can be computed in the following equation:

$$\text{New Calibration Factor} = \frac{\text{Target Value (e.g. 2.96 in) x Old Calibration Factor}}{\text{Actual Value (Display after passing 1 Liter of Water)}}$$

The old calibration factor can be viewed by simultaneously pressing the (←) and (→) keys as well as the "Calibr." key in Calibration Mode. Select the display field for the Rain Volume Sensor by use of the (←) key.
Correct the calibration factor to its new value by use of the "+" and "−" keys and possibly the "Fast" key.
By pressing the "Store" key the set value is stored and the display will return to the normal operating mode.
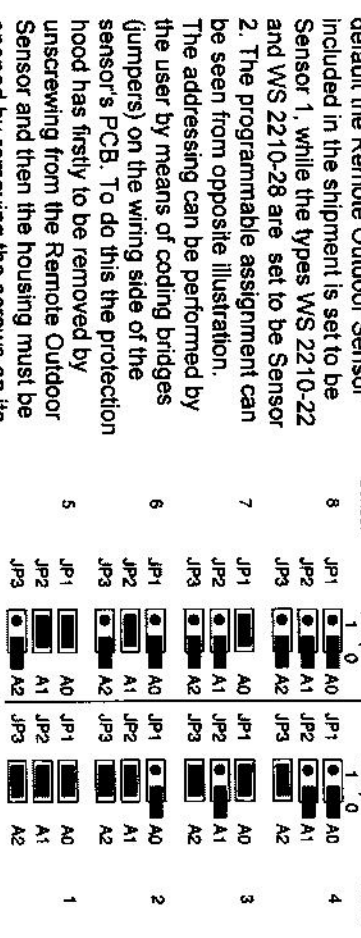
**Change of Units**
If the "Unit" key is pressed in Calibration Mode, the display section "Rain" will allow the selection of the units in or mm and the display section "Air Pressure" will allow the selection of the units in Hg or hPa, and the display section "Indoor temperature" will allow the selection of the units °F or °C.

**Manual Time Setting**
To do so press the Arrow (←) key twice in Calibration Mode. The display will show time and date only. Setting is then performed according to Table 1 (see Page 45). After entering the time and date the "Store" key must be pressed.

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**Table 1: Setting of Time and Date**

| Function | Key |
| --- | --- |
| Hours | - |
| Minutes | + |
| Month | Unit |
| Date of Day | Sensor |
| Storing | Store |

**Addressing of Remote Sensors WS 2210-22, WS 2210-28 (optionally) and Remote Outdoor Sensor**

The outdoor sensor concept allows the simultaneous operation of up to 8 outdoor sensors. Their data are displayed in the upper right display section for the outdoor values. Each sensor in the system is assigned a sensor address, allowing the receiver to integrate the sensor into the overall system free from interference. By default the Remote Outdoor Sensor included in the shipment is set to be Sensor 1, while the types WS 2210-22 and WS 2210-28 are set to be Sensor 2. The programmable assignment can be seen from opposite illustration.
The addressing can be performed by the user by means of coding bridges (jumpers) on the wiring side of the sensor's PCB. To do this the protection hood has firstly to be removed by unscrewing from the Remote Outdoor Sensor and then the housing must be opened by removing the screws on its back. Both types WS 2210-22 and –28 only need to have their back covers unscrewed.
Following this the coding bridges can be set according to the addressing table opposite.

**Change of Base Address for Sensors with fixed Assignment**
Setting of addresses for the Remote Indoor Sensor, Remote Rain Volume Sensor and Remote Wind Sensor is not required under normal operating conditions.
Multi functional operation is a special feature, allowing to generally operate an arbitrary number of Base Units within the transmission range of the Remote Sensors. One Base Station can be placed in the living room, one in the office, etc., all displaying the same data.

If in every room, in which a Base Station (Display Unit) has been placed, the indoor temperature of this particular room needs to be displayed on the upper left section of the LCD, then the indoor sensors for temperature/humidity and air pressure need to be assigned different base addresses according to the illustration.

| Sensor | | Jumper 1 0 | | Sensor | | Jumper 1 0 |
| --- | --- | --- | --- | --- | --- | --- |
| 8 | JP1 / JP2 / JP3 | A0 / A1 / A2 | | 1 | JP1 / JP2 / JP3 | A0 / A1 / A2 |
| 7 | JP1 / JP2 / JP3 | A0 / A1 / A2 | | 2 | JP1 / JP2 / JP3 | A0 / A1 / A2 |
| 6 | JP1 / JP2 / JP3 | A0 / A1 / A2 | | 3 | JP1 / JP2 / JP3 | A0 / A1 / A2 |
| 5 | JP1 / JP2 / JP3 | A0 / A1 / A2 | | 4 | JP1 / JP2 / JP3 | A0 / A1 / A2 |

In order for the Base Station to exclusively receive its assigned sensor here also a respective address has to be set. To change the base address in Calibration Mode the (←)key must be pressed three times and the desired base address selected by use of the "Indoor" key.

The base addresses of the Wind Sensor and the Rain Volume Sensor can also be changed in this operating mode which however is only necessary in very rare cases. A change of address is only required if two neighbouring Wind Sensors or Rain Volume Sensors are placed within the reception range of the Base Station. The base address of the Wind Sensor and the Rain Volume Sensor can only exclusively be changed by the manufacturer, thus requiring the units to be shipped back to the manufacturer, if necessary.

| Adresse | Jumper 0 1 | | | Adresse | Jumper 0 1 | | |
|---|---|---|---|---|---|---|---|
| 7 | JP1 A0 | JP2 A1 | JP3 A2 | 3 | JP1 A0 | JP2 A1 | JP3 A2 |
| 6 | JP1 A0 | JP2 A1 | JP3 A2 | 2 | JP1 A0 | JP2 A1 | JP3 A2 |
| 5 | JP1 A0 | JP2 A1 | JP3 A2 | 1 | JP1 A0 | JP2 A1 | JP3 A2 |
| 4 | JP1 A0 | JP2 A1 | JP3 A2 | 0 | JP1 A0 | JP2 A1 | JP3 A2 |

## Note on Storage of Solar Powered Outdoor Sensors

These sensors receive their operating power from a solar cell which also powers an internal battery to be used during periods of darkness and bad weather.

If any such sensor is taken out of operation for a longer time period without any light there still is no danger for the internal battery as long as the small magnet required for activation of operating power has been removed.

This way a sensor in its packaging can be stored for several years.

## 13. Battery Change

### Remote Indoor Sensor, Remote Sensors WS 2210-22, WS 2210-27 and WS 2210-28

The batteries in these sensors have a life expectancy of up to 3 years (Alkaline Batteries). They have to be changed, if the display of the respective sensor in the base station fails to appear for a time period exceeding 24 hours and any general and longer lasting interference of the transmission path is out of the question. The latter can generally be recognized if the data transmission of other sensors being close to the one missing also do not work properly (see Item Interferences).

Batteries can be changed by opening the battery compartment of the sensor, removing of the used-up batteries and replacing them with new Type Mignon AA, IEC LR6, 1.5V batteries under observance of the correct polarity as marked in the battery compartment.

After replacing of the battery cover the sensor is ready to operate again. Latest after the Base Unit has performed its standard search routine (see Item Interferences), the data of the sensor must again appear on the display.

### Base Station

The Base Unit indicates low running batteries by a battery icon in the top portion of the LCD.

Since stored data may be lost during battery change it is recommended to call off and note all data, if required, prior to battery change. Then open the battery cover on the top of the standing base, remove the used-up batteries and replace them with four new Type

---

Mignon AA, IEC LR6, 1.5V batteries under observance of the correct polarity as marked in the battery compartment.

The end user is obliged by law (Battery Regulations) to properly dispose of all used-up batteries and accumulators (button cell to lead-acid accumulator). Disposal of such items is strictly forbidden.

Used-up batteries can be returned to all municipal recycling centers which are obliged to accept such items.

Please participate in the preservation of the environment!

**Note!**
Other parts of the system do not require any battery changes since they are powered by solar cells. Integrated buffer batteries will cover periods of darkness and bad weather.

## 14. Interferences

If any sensor has not been received for a period of 12 hours, its display will cease to show its values on the LCD. If by temporary disturbances of the transmission path the synchronization between sensor and base unit is interrupted (transmission only takes place in a very small time window), the base station will scan all sensor transmitters for minutes at 8.00h a.m. and 6.00h p.m. every day. Latest after that time a temporarily interrupted reception should be resumed.

**Possible interferences preventing correct display of transmitted measurement values:**

**Undefined values after setting up.**
In order to immediately receive defined data and ensure the correct assignment of all data telegrams to their display section make sure, that the test mode of the Base Station is only be terminated after all sensors have ended their test phase.

**No reception – distance between transmitter and receiver too long.**
Reduce distance between transmitter and receiver. Use Repeater (WS-2210-12) to extend transmission distance.

**No reception – highly shielding materials between transmitter and receiver (thick walls, steel concrete, isolating aluminum foil, etc.).**
Find different location for transmitter and/or receiver. See also Item Transmission Range.

**Low batteries in transmitter or receiver.**
Change batteries. Observe low battery indicator.

**Transmitter is superposed by interfering sources** (e.g. wireless radio, headset, speaker, etc.).
Remove interfering source. Find different location for transmitter and/or receiver. Has no reception taken place for the last 12 hours, the respective measuring point is shut down

and no measuring value will show, since the system is assuming a sensor no longer in existence. In order to save battery power there will be no more reception attempts. Every day at 8.00h a.m. and 6.00h p.m. the receiver will automatically start a new synchronization whereby a sensor not received for more than 12 hours will be incorporated into the system again.

**Note!**
**Every newly added Remote Sensor (e.g. after a battery change) will automatically be entered into the system and its respective data will be displayed.**

Quite frequently interferences are only of a temporary nature (e.g. R/T operation) or can easily be overcome. If there are wireless headsets, remote babysitters or other devices working on a 433MHz basis in your house or vicinity, their switch-on time is mostly limited. Furthermore most of these devices allow the change to an interference-free frequency. Such measures will effectively overcome interferences.

**Remote Sensor does interfere with other devices in the 433MHz range.**
The transmissions of the Remote Outdoor Sensor can temporarily (for about 200 ms every 3 minutes) interfere with other devices working on the same channel. These interferences are of very short duration and can thus be neglected. If possible, the channel should be changed at the respective device.

## 15. Transmission Range

The transmission distance in open field with free range of sight between transmitter and receiver reaches under optimum conditions 330 ft (100 m). Walls and even steel concret constructions will be penetrated at a considerable loss of transmission distance. A loss of distance can have the following reasons:

- High frequency interferences of any kind.
- Constructions of any kind or vegetation.
- Especially for the Wind Sensor the transmission distance can be influenced by metal roofs or aluminum foil roof isolation.
- The distance of transmitter and receiver to conducting planes or object (including the human body or the ground) does influence the transmission characteristics and thus the transmission distance.
- Broad band interferences in municipal areas can reach levels reducing the signal/noise ratio over the entire frequency band, thus also reducing the transmission distance.
- Devices working at closely neighbouring frequencies may also influence reception.
- Poorly shielded PCs can irradiate the receiver and thus reduce transmission distance.
- For extension of transmission distance the optionally available Repeater can be used.

## 16. Cleaning and Maintenance

- Clean the housing and screen of the Base Station only with a soft, damp cloth. Do not use abrasives or solvents.
- Ensure that the Remote Rain Volume Sensor does not collect leaves or other dirt.
- Remove the funnel from the Rain Sensor every now and then and clean it under

running water. Also clean the seesaw of the sensor with a damp cloth and check by lightly tapping with your finger that it can move freely from side to side. Do **not** clean the funnel with attached bottom part of the Rain Sensor nor the bottom part itself under running water. This may bear the danger of water entering the unit's electronic parts.

- Do not immerse the Base Station in water.
- Please do not attempt any repairs on your own. It is recommended to have repairs only performed by trained personnel at the point of purchase. Opening or improper handling of the units will void the warranty.

## 17. Disposal

If the Professional Remote Weather Station happens to become inoperable and must be disposed of please do this in accordance with the valid legal regulations.

## 18. Specifications

Measuring Interval Outdoor Sensor: ................ Appr. 3 minutes
Measuring Interval Indoor Sensor: ................ Appr. 3 minutes
Transmission Frequency: ................ 433.92MHz
Transmission Distance in Open Field: ................ 330 ft max. (100 m max.)
Temperature Range Indoor: ................ 32°F to 158°F (0°C to +70°C)
Temperature Range Outdoor: ................ -22°F to 158°F (-30.0°C to +70°C)
Resolution: ................ 0.1°F (0.1°C)
Accuracy: ................ ±2°F (±1°C)
Measuring Range Rel. Humidity: ................ 20% to 95%
Resolution: ................ 1%
Accuracy: ................ 8%
Measuring Range Air Pressure: ................ 23.62 to 32.48 inHg (800 to 1100 hPa)
Resolution: ................ 0.03 inHg (1 hPa)
Accuracy: ................ ±0.03 inHg (±1 hPa)
Air Pressure Variation: ................ Bar Diagram, Scaling 2 hPa/ 1.5 mmHg per Divider
Rain Volume Display: ................ 0 to 157.4 in (0 to 3999 mm)
Resolution: ................ <0.02 in (< 0.5 mm)
Accuracy: ................ 0.04 in (2%±1 mm)
Wind Strength: ................ 0 to 124 mph (0 to 200 km/h)
Resolution: ................ 0.1 mph (0.1 km/h)
Accuracy: ................ 0.6 mph (3%±1 km/h)
Wind Direction: ................ Grafical Resolution 22.5 Degrees, Numerical Resolution 5 Degrees
Power Supply Base Station: ................ 4 x Type Mignon AA, IEC LR6, 1.5V (Alkaline)
Measurements Base Station (L x W x H): ................ 6.49 x 1.18 x 6.29 in (165 x 30 x 337 mm)

# WARRANTY INFORMATION

La Crosse Technology, Ltd provides a 1-year limited warranty on this product against manufacturing defects in materials and workmanship.

This limited warranty begins on the original date of purchase, is valid only on products purchased and used in North America and only to the original purchaser of this product. To receive warranty service, the purchaser must contact La Crosse Technology, Ltd for problem determination and service procedures. Warranty service can only be performed by a La Crosse Technology, Ltd authorized service center. The original dated bill of sale must be presented upon request as proof of purchase to La Crosse Technology, Ltd or La Crosse Technology, Ltd's authorized service center.

La Crosse Technology, Ltd will repair or replace this product, at our option and at no charge as stipulated herein, with new or reconditioned parts or products if found to be defective during the limited warranty period specified above. All replaced parts and products become the property of La Crosse Technology, Ltd and must be returned to La Crosse Technology, Ltd. Replacement parts and products assume the remaining original warranty, or ninety (90) days, whichever is longer. La Crosse Technology, Ltd will pay all expenses for labor and materials for all repairs covered by this warranty. If necessary repairs are not covered by this warranty, or if a product is examined which is not in need or repair, you will be charged for the repairs or examination. The owner must pay any shipping charges incurred in getting your La Crosse Technology, Ltd product to a La Crosse Technology, Ltd authorized service center. La Crosse Technology, Ltd will pay reasonable return shipping charges to the owner of the product.

Your La Crosse Technology, Ltd warranty covers all defects in material and workmanship with the following specified exceptions: (1) damage caused by accident, unreasonable use or neglect (including the lack of reasonable and necessary maintenance); (2) damage occurring during shipment (claims must be presented to the carrier); (3) damage to, or deterioration of, any accessory or decorative surface; (4) damage resulting from failure to follow instructions contained in your owner's manual; (5) damage resulting from the performance of repairs or alterations by someone other than an authorized La Crosse Technology, Ltd authorized service center; (6) units used for other than home use (7) applications and uses that this product was not intended or (8) the products inability to receive a signal due to any source of interference.. This warranty covers only actual defects within the product itself, and does not cover the cost of installation or removal from a fixed installation, normal set-up or adjustments, claims based on misrepresentation by the seller or performance variations resulting from installation-related circumstances.

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

This warranty gives you specific legal rights. You may also have other rights specific to your State. Some States do no 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:

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