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Z-Weather Wind and Weather Sensor Manual



Z-Weather Sensor – Manual

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Quick Start

This Quick Start is intended for experienced users, who don't want to read the complete manual. It focusses on the core configuration parameters of Z-Weather and assumes detailed knowledge of Z-Wave systems. Skip to the "Behavior within the Z-Wave Network" chapter on page 5 if you are new to Z-Wave and would like to have a detailed introduction.

Before you can configure and use Z-Weather, the unit needs to be fully charged. In order to charge Z-Weather, place it in a location with direct sunlight exposure for 3-4 hours. Without direct sun light, charging may take 12 hours. To check if Z-Weather has been charged sufficiently, press the button located under the cup anemometer. If the LED blinks after pressing the button, Z-Weather is charged and operational.

Button Functions

Function	Trigger Operation
Battery Check	Push button once
Add/Remove	Push button 3x within 1.5 seconds
Wake up	Push button 1x within 1.5 seconds
Factory Reset	Hold button for more than 2 seconds, then release

Z-Wave Parameter

Z-Weather will wake up depending on the available energy between every 5 minutes at noon in summer and every 5 hours in the second half of the night at winter solstice.

Parameter	Description
Basic Get	Reads wind speed
Basic Set	No function

Command Class Configuration

Parameter	Description
Parameter 1	Wind speed action threshold (same as Basic Set) Value between 1 and 30 m/s Default 6 m/s 0 means off
Parameter 2	Twilight action threshold Value between 0 and 100% Default value: 37% (street lightning)

At threshold, a BASIC_SET is send to the associated nodes of group 2-4. The basic set value can be changed using the ASSOCIATION_COMMAND_CONFIGURATION.

Group	Description	Detail
Group 1	Lifeline	One node
Group 2	Too much wind	Up to 5 nodes, default BASIC_SET 00
Group 3	Getting bright	Up to 5 nodes, default BASIC_SET 00
Group 4	Getting dark	Up to 5 nodes, default BASIC_SET FF

COMMAND_CLASS_POWERLEVEL

Parameter	Constraint
Timeout	<< 30 seconds
Test frame count	<< 1000

Product Description

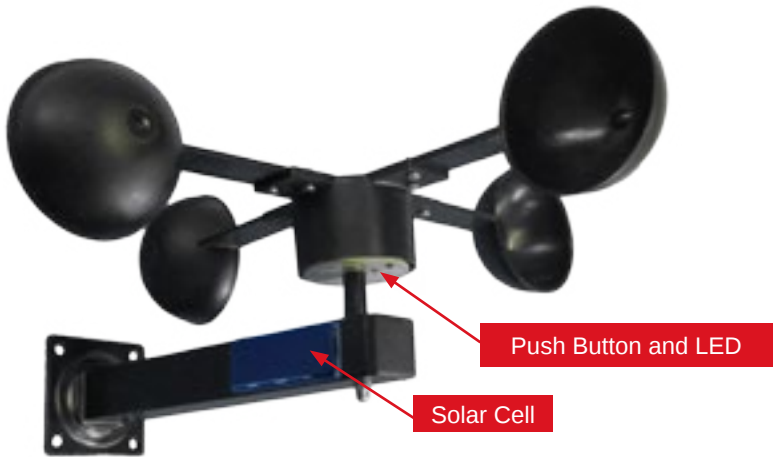
Z-Weather is a cup anemometer for Z-Wave installations. It continually measures the wind speed and can, for example, trigger closing of the awning and blinds if it is too windy. It also measures the amount of rotation, enabling calculation of the wind yield per day or per year. In addition, Z-Weather includes sensors for humidity, temperature, air pressure and dew point, essentially providing the core sensors of a weather station.

Z-Weather is powered by a solar cell and stores energy on an internal capacitor, enabling continuous operation, even with few sun for a couple of days. It does not use any batteries and is completely maintenance free. Using the built-in solar cell it also measures the ambient light and the solar yield. This information can be used to turn on the outdoor light at dusk time and turn the light off in the morning.

Z-Weather's wind yield and solar yield metering can be used as a calculation base for planning a wind generator or a solar panel on the roof of a house.

Z-Weather can be included and operated in any Z-Wave network with Z-Wave certified devices from other manufacturers and/or other applications.

All non-battery operated nodes within the Z-Wave network will act as repeaters regardless of vendor to increase reliability of the network and will enable Z-Weather to be contacted reliably even in larger installations.



Z-Weather and its operating elements

During normal operation, Z-Weather is limiting continuous measurement to wind speed and solar radiation, other sensors are operating only on demand. This conservative energy management ensures continuous operation with the limited energy harvested from the solar cell powering Z-Weather. The Z-Wave radio frequency transmitter is turned off most of the time and is turned on if there is too much wind, at twilight time and on a continuous base, depending on the energy budget. The wake up interval is between five minutes at noon in summer and five hours in the second half of the night in winter. Z-Weather also wakes up on pushing the button.

Installation Guidelines

Before you can configure and use Z-Weather, the unit needs to be fully charged. In order to charge Z-Weather, place it in a location with direct sunlight exposure for 4-6 hours. Without direct sun light, the charging may take up to 12 hours. To check if Z-Weather has been charged sufficiently, press the button located under the cup anemometer. If the LED blinks after pressing the button, Z-Weather is charged and operational.

Most of Z-Weather's sensors are placed inside the top of the ball-bearing cup anemometer and they are measuring the environmental parameters inside the black round housing. If the sun is shining and Z-Weather is placed in direct sunlight, the housing will warm up and the temperature is higher than the temperature outside the housing. Thus a place in the shadow is the best choice for placing Z-Weather. Even though Z-Weather is powered by a solar cell, it is not required to place Z-Weather exposed to direct sun light and there is no need to face

it south. The solar cell will produce sufficient energy to power Z-Weather, even if the solar cell is facing north and the device is in the shadow all day.

Behavior within the Z-Wave Network

On factory default the device does not belong to any Z-Wave network. The device needs to join an existing wireless network to communicate with the devices of this network. This process is called **Inclusion**. Devices can also leave a network. This process is called **Exclusion**. Both processes are initiated by the primary controller of the Z-Wave network. This controller will be turned into exclusion respective inclusion mode. Please refer to your primary controllers manual on how to turn your controller into inclusion or exclusion mode. Only if the primary controller is in inclusion or exclusion mode, this device can join or leave the network. Leaving the network – i.e. being excluded – sets the device back to factory default.

If the device already belongs to a network, follow the exclusion process before including it in your network. Otherwise inclusion of this device will fail. If the controller being included was a primary controller, it has to be reset first.

Press the button 3 times within 1.5 seconds to add Z-Weather to the network. Z-Weather sends a NIF (Network Information Frame) and waits 4 seconds for inclusion to the Z-Wave network. If no controller includes Z-Weather, it goes to sleep after 4 seconds. Make sure to first instruct the inclusion controller to add a node and then press the Z-Weather button 3 times to add the device to the network.

Default Function after Adding to the Network

Z-Weather wakes up regularly from time to time, if the button is pressed or unscheduled on the following events:

Wind speed is higher than 6 m/s (22 Km/h)	Association Group 2
At the end of the dawn if it becomes bright	Association Group 3
At the end of the dusk if it becomes bright	Association Group 4

After wake up, Z-Weather first serves the associated groups. This is in all cases Group 1 “Lifeline” where it sends all readings to. In case of an unscheduled event, the associated groups 2-4 are also served. Finally it sends a Wake Up Notification and goes to sleep if the controller does not require further communication.

Operating the Device

All electronic components of Z-Weather are positioned inside the ball-bearing cup anemometer. At the bottom of the anemometer a button and a red LED is located. The LED lights up if the button was pressed and Z-Weather has enough energy to wake up and communicate wirelessly via Z-Wave. Using the button, the following commands can be performed:

Button Commands

Push 1x	Wake up	Push the button once within 1.5 seconds. The LED blinks once indicating that Z-Weather is active. Z-Weather sends a Z-Wave Wake Up Notification if has been added to the network, no action is performed.
Push 3x	Add to or remove from network	Push the button 3 times within 1.5 seconds. The LED is blinking 3 times and the Network Information Frame (NIF) is sent to the Z-Wave network or removing it if it was previously added to the network.
Push and Hold	Reset to factory settings	Hold the button longer than 1.5 seconds and then release. The LED blinks longer than when pressing the button once. Z-Weather performs a factory reset and all configuration parameters are reset to their default values.

If the LED is not blinking after releasing the button, Z-Weather has not enough energy and must be charged for several hours in bright sunlight.

Z-Wave Parameter

Z-Weather will wake up depending on the available energy between every 5 minutes at noon in summer and every 5 hours in the second half of the night at winter solstice.

Parameter	Description
Basic Get	Reads wind speed
Basic Set	No function

Command Class Configuration

Parameter	Description
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Group 3	Getting bright	Up to 5 nodes, default BASIC_SET 00
Group 4	Getting dark	Up to 5 nodes, default BASIC_SET FF

COMMAND_CLASS_POWERLEVEL

Parameter	Constraint
Timeout	<< 30 seconds
Test frame count	<< 1000

Internal Energy Management

Z-Weather is maintenance free and works environmentally friendly using solar power, it does not contain any batteries. The solar cell charges an internal capacitor, which buffers all harvested energy and powers the electronic components during the night.

When first operating Z-Weather after installation, it is required to fully charge the device by placing it in direct sunlight for 4-6 hours. Even though the capacitor is pre-charged at the factory, the capacitor has most likely lost most of its energy and does not provide sufficient power for operating Z-Weather immediately after unpacking. If the capacitor is completely empty it must be charged from 0% to 100% which takes longer than in subsequent charging cycles. Once Z-Weather is installed and operating, it is charged on a day by day base and the capacitor will never be discharged completely.

If the capacitor is completely discharged, which only can happen at time of delivery if Z-Weather was stored at a dark place for weeks, charging may need up to 6 hours in direct sunlight during summer and up to 2 days during winter solstice and grey sky. In order to check the functionality of Z-Weather and test whether the device has sufficient energy to operate, press the button located under the anemometer. If the LED blinks, Z-Weather has enough energy to operate.

It is good practice to perform the initial setup of Z-Weather at noon. After the first charging cycle is completed, the device will have stored enough energy for setup and adding the device to the Z-Wave network. However if you want to experiment with settings, or use the power consuming POWERLEVEL command class, Z-Weather may quickly use up all its energy reserve and may need to be charged again. If you configure Z-Weather at noon, the device had the entire morning for a full charge, has strong sun light when it uses the most energy (during configuration) and has the complete afternoon for recharging.

As a rule of thumb: After pressing the button eight times, Z-Weather will have used up the energy stored. When the energy has been used up, the LED does not blink and Z-Weather needs to be charged for approximately 1-2 hours.

Node Information Frame

The Node Information Frame (NIF) is the business card of a Z-Wave device. It contains information about the device type and the technical capabilities. The inclusion and exclusion of the device is confirmed by sending out a Node Information Frame. Beside this it may be needed for certain network operations to send out a Node Information Frame. Once included a simple click on button (3) will issue a Node Information Frame.

Command Classes

Z-Weather supports the following Z-Wave command classes:

COMMAND_CLASS_BASIC	Version 1
COMMAND_CLASS_ZWAVEPLUS_INFO	Version 2
COMMAND_CLASS_MANUFACTURER_SPECIFIC	Version 2
COMMAND_CLASS_DEVICE_RESET_LOCALLY	Version 1
COMMAND_CLASS_ASSOCIATION_GRP_INFO	Version 1
COMMAND_CLASS_LANGUAGE	Version 1
COMMAND_CLASS_ASSOCIATION	Version 2
COMMAND_CLASS_MULTI_CHANNEL_ASSOCIATION	Version 2
COMMAND_CLASS_POWERLEVEL	Version 1
COMMAND_CLASS_VERSION	Version 2
COMMAND_CLASS_BATTERY	Version 1
COMMAND_CLASS_WAKE_UP	Version 2
COMMAND_CLASS_SENSOR_MULTILEVEL	Version 6

COMMAND_CLASS_METER	Version 3
COMMAND_CLASS_MULTI_CMD	Version 1
COMMAND_CLASS_ASSOCIATION_COMMAND_CONFIGURATION	Version 1
COMMAND_CLASS_CONFIGURATION	Version 1

Technical Data

Dimensions (Legth x Width x Height)	33 x 30 x 11 cm
Weight	300 g
Protection Marking	IP 34 (IEC/EN 60529)
Additional Protection	Against bedewing
Control Elements	1 push button, 1 LED
Maximum Wind Speed	160 Km/h
Maintenance	Maintenance free, no batteries to change
Z-Wave Device Type	None listening Routing Sensor Multilevel
Z-Wave Plus Role Type	Reporting sleeping slave
Z-Wave Plus Node Type	Multilevel Sensor
Z-Wave Plus Icon Type	Multidevice Multilevel Sensor
Z-Wave SDK	6.51
Explorer Frames	Yes
FLiRS	No

Explanation of Z-Wave specific Terms

- **Controller** is a Z-Wave device with capabilities to manage the network. Controllers are typically gateways, remote controls or battery operated wall controllers.
- **Slave** is a Z-Wave device without capabilities to manage the network. Slaves can be sensors, actuators and even remote controls.
- **Primary Controller** is the central organizer of the network. It must be a controller. There can be only one primary controller in a Z-Wave network.
- **Inclusion** is the process of bringing new Z-Wave devices into a network.
- **Exclusion** is the process of removing Z-Wave devices from the network.
- **Association** is a control relationship between a controlling device and a controlled device.
- **Wake up Notification** is a special wireless message issued by a Z-Wave device to announce that is able to communicate.
- **Node Information Frame** is a special wireless message issued by a Z-Wave device to announce its capabilities and functions.

Support

Should you encounter any problem, please give us an opportunity to address it before returning this product. Most questions regarding Z-Wave wireless communication standard can be answered through the international community at www.zwave.info.

If your question can't be answered there, please contact us by email: info@popp.eu

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Phone: +44 (0) 20 7419 5726

eMail: info@popp.eu

Web: www.popp.eu