



Blik Water datasheet



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Blik Sensing B.V. Duivenkamp 351 3607BB Maarssen The Netherlands blik-sensing.nl Part numbers: Node WA-NL-F Battery WA-BP-LC Plummet WA-PB-16 Configuration Cable WA-CV-A

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Overview

Blik Water is a Blik product line for remote monitoring of (ground)water levels. The Blik Water system works autonomously and measures water and air pressures at fixed intervals which are transmitted wirelessly to the Blik Water Dashboard. This dashboard then converts these raw observed data points into accurate water levels.

There are 4 main components that work together to monitor and provide insight into the groundwater level:

- 1. The digital plummet: permanently installed in the monitoring well at a fixed depth below ground level. The plummet contains a pressure sensor that measures the water pressure.
- 2. The node: contains the control, storage and communication of the system. The node is installed at ground level. The digital plummet, battery and antenna are connected to the node. It measures the air pressure and water pressure (using the digital plummet), stores them together with the time, and sends them to the Blik Dashboard via the wireless LoRaWAN network. The last 10,000 measurements are also stored in onboard memory.
- 3. The battery: the energy source from which the entire system is powered. This is a lithium battery that can last up to 8 years when the node is set at a measuring interval of 1 hour (with average mobile network range).
- 4. The dashboard: where the measurements are stored permanently. They can be viewed and downloaded in graphs per location. The dashboard also validates incoming measurements and can provide notifications if limit values are exceeded.



Figure 1: System overview. WA-NL-F node center, antenna left, WA-BP-LC battery pack right, WA-PB-16 plummet front.

The complete measuring system will usually be installed in a flush street-level well covered with a composite lid or in a more rugged composite or metal tube protruding from the soil. The digital plummet is suitable for installation in monitoring wells with an inner diameter of at least 1 inch (26mm). The factory standard cable length of the plummet is 16 feet, 4 inches making it suitable for monitoring wells up to 14 feet, 9 inches deep. Note; cable lengths are customisable: plummets with cable lengths of up to 700 feet are available on order.



Figure 2: Installation of complete system in well

Principles of measurement

The level of the groundwater is determined by measuring the water pressure at a known depth: the mounting height of the digital plummet. Because the air above the water column affects this measured pressure, the local air pressure must also be measured. This measurement is taken by the node, which is why it is important that the node is **not** submerged in water.



Figure 3: schematic representation of the applied principles in below-ground level well

A number of quantities must be known and validated in order to perform a correct measurement. It is of vital importance that these are measured and entered correctly upon installation:

- 1. Depth of plummet
- 2. Top of the monitoring well compared to ground level

After installation the system measures:

- 3. Air pressure (and air temperature)
- 4. Water pressure

With the above four figures, the height of the water column above the level plummet can be calculated, and thus also the groundwater level relative to the top of the well (and relative to ground level).

Storage and transmission of data

The node not only transmits measurements, but also stores these measurements **locally**. This ensures that no measurements are lost if the connection to the wireless network is disrupted. Up to **10,000 measurements** can be stored locally. At the standard measurement interval of 1 hour, this means **just over a year of measurements (59 weeks)** can be safely stored locally.

Per measurement, the following data points are stored locally on the node:

- 1. Time of day
- 2. Measured local air pressure
- 3. Measured local air temperature
- 4. Measured water pressure
- 5. (Measured water temperature, if the digital plummet is calibrated)

These measurements can be requested on site using a laptop with **a configuration cable**, and are sent (after this has been activated) via the wireless LoRaWAN network to the Blik Water dashboard.

Transmission over LoRaWAN (wireless network)

The LoRaWAN network does not guarantee that every measurement can be sent immediately, nor that the measurement is actually successfully transferred. To ensure that all measurements arrive at the dashboard all measurements are labeled with a serial number, and the dashboard regularly requests the node to resend measurements that have not been received. In most applications this guarantees that all measurements will eventually appear on the dashboard, albeit with some delay when network disruption has occurred.

With very poor reception or when the system is set to measure more than once every 30 minutes, the throughput speed of the LoRaWAN network may be insufficient to keep up with the measurements. In these cases not all measurements will appear on the dashboard and they will have to be retrieved manually using the configuration cable before the local storage capacity of 10,000 measurements is exhausted. In the event the local storage on the node is exhausted, the oldest measurements will be discarded to make room for new ones.

Technical Specifications

Node WA-NL-F

Length x width x height	50 mm x 40 mm x 25mm approx. 2 inch x 1.6 inch x 1 inch
Rated Protection	IP-68 (72 hours at 2 meters depth)
Communication	LoRaWAN
Local configuration	With Blik Water configuration cable
Measuring interval	Configurable in Blik Water dashboard
Local storage	10000 measurements
Battery life monitoring	Yes, via Blik Water dashboard
Time sync	With configuration cable, corrections via LoRaWAN
Max error margin of air pressure	± 50 Pa
Max error margin of air temperature	± 0.5 °C (approx. ± 1.8 °F)
Materials	Acrylonitrile butadiene styrene, Polyurethane
Operating temperature	-4 °F to 175 °F

Digital plummet WA-PB-16

Length	100 mm including protective cover
	approx. 4 inch
Diameter	19 mm
	approx. 3/4 inch
Rated protection	IP-68 (multiple years in water)
Mount	Reinforced sleeve with hook
Operating pressure range	0,8 1,6 bar (other ranges on request)
Max pressure limit	4x pressure range
Max error margin of water pressure	± 0.1 %FS = ± 0.8 cm H ₂ O
	approx. ± 0.1 %FS = $\pm 1/3$ inch H ₂ O
Typical margin or error of water pressure	± 0.4 cm H ₂ O
	approx. ± 0.16" H ₂ O
Max drift water pressure	0.1 %FS/year
Max margin of error water temperature	0.6 °C
	approx. 1 °F
Material	Stainless steel 1.4435 (316L)
Operating temperature	14 °F to 158 °F
Weight	8.82 ounces

Battery WA-BP-LC

Height	80 mm (approx. 3 1/6 inch)
Diameter	42 mm (approx 1.65 inch)
Rated protection	IP-68 (72 hours at 2 meters depth)
Expected battery endurance	>8 years at 1/hour measurement
Battery-type	Lithium-thionyl-chloride (LTC)
Capacity	8500 mAh
Voltage	3.6 V
Material	Polymer
Bedrijfstemperatuur	-22 °F to 158 °F