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2 / 19

Instructions Manual

Installation guide kalo

1   Wi-Fi cloud monitoring system

The SensoScientific WiFi cloud monitoring system receives and logs all data received from the Wi-Fi node assigned to it. The computer being used must be able to access the following cloud URL*:

https://cloud.sensoscientific.com/Account/Login.aspx
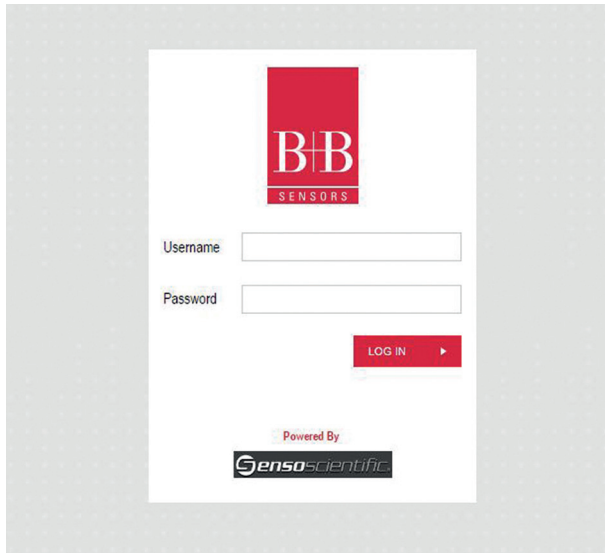
For more detail please read the Wi-Fi cloud monitoring system user manual.

Figure 1 SensoScientific Wi-Fi cloud monitoring system login page

*Please confirm with your IT department that the computer has access to the URL if accessing from a private network or a network behind a firewall.

2   Wi-Fi node description

The Wi-Fi node is a standalone, embedded wireless 802.11 b/g (Wi-Fi – RF Frequency 2.4 to 2.497 GHz) networking module capable of collecting, storing and transmitting data wirelessly.

Because of its small form factor and extremely low power consumption, the Wi-Fi node has a long battery life of about up to 4 years based on standard 20 minutes sample rate. The battery type is used for Wi-Fi node is 3.6 V AA lithium thionyl. The Wi-Fi node incorporates a 2.4 GHz radio, processor, TCP/IP stack, real time clock, crypto accelerator, power management and analog node interfaces.

The transmitter passes information to a standard access point which can be accessed by any Wi-Fi-enabled network. Each transmitter monitors against preset conditions that are defined by the user and can provide audio and visual alerts.

Additional alerts can be provided through a variety of methods such as SMS, text message, voice, pager, cell phone, fax and e-mail. Information recorded to the database is time-stamped and cannot be altered through the user interface.

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3 / 19

Instructions Manual

Installation guide kalo

Wi-Fi node specifications include:

Data buffer
- Single probe node (PN B10-100) – 400 readings
- Dual probe node (PN B11-100) – 100 readings
- Humidity/Temperature (PN B13-100) – 100 readings

Wireless
- IEEE 802.11 b/g
- Up to 54 Mbps
- Optional external antenna for extended range

802.11 Security
- WPA2-PSK (AES)
- WPA1-PSK (TKIP)
- WPA1+2 PSK (AES+TKIP)
- WEP (40 bit, 128 bit)
- PEAP MS-CHAP

Secure communication protocol
- TCP/IP is used (unlike UDP protocol, TCP/IP guarantees data is delivered to the receiver and acknowledgement is sent back to node)

Network
- IP based
- DHCP or static support
- Very small bandwidth footprint (less than 500 bites per package)

User interface
- Four different color LEDs for multiple status indication
- Five input control buttons
- Micro USB connector for easy configuration

Physical dimensions
- Height: 4"3/4 (120 mm)
- Width: 3" (76 mm) - 4" (100 mm) with vial
- Thickness:
    - 1"1/4 top (32 mm)
    - 2"1/8 bottom (54 mm)

3   Wi-Fi Signal verification

Prior to physically mounting the node on the unit, signal needs to be verified.

1. Power on the node. All LEDs will begin to flash. The red LED will remain on until it communicates through the Wi-Fi and reaches the cloud system. If the green LED is flashing, the node has successfully connected and received acknowledgement back from the system assuring correct time synchronization.

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4 / 19

Instructions Manual

Installation guide kalo

2. Once LED stops flashing, place node inside the unit, press the OK button on the node, and close the unit door. Wait approximately 10-15 seconds, open the unit door and take note of the flashing LED, if Green LED continues flashing, you can go ahead and install the node. Signal is OK.

3. If the **green** LED is not flashing, take the node out, power it off for 3 seconds, & power on again. Repeat steps 1 & 2. If the node does not acknowledge a **green** LED at any time, DO NOT INSTALL THE NODE. For further technical assistance, please contact our technical support team.

Take note if any other LEDs flash when the node is inside or out of the unit and the action that may need to be required:

BLUE - No acknowledge, re-start the node by powering OFF and ON the node. If issue persists, contact SensoScientific technical support.

YELLOW - Low signal/no IP obtained. Move node as close as possible to the Wi-Fi access point. If issue persists, contact your facility information solution, additional access point may be required.

BLUE + GREEN - No acknowledge, re-start node by powering OFF and ON, if issue persists, contact your facility information solution, as the unit may need to be re-registered to the centralizer due to its connection request not being accepted by the server.

YELLOW + BLUE - No Wi-Fi network available, access point will be required. Once the troubleshooting has been completed, this includes adding any additional access points; verify node has proper communication to the server by repeating steps 1-3, if connection was successful at first, this additional step is not required, verify node is powered ON when ready to install.

4 Wi-Fi node installation guideline

Prior to mounting the node, note the MAC address printed on the label in the back of the node. This MAC address along with a customer provided asset tag number, unit name, and room location will help identify the node when configuring the settings in the cloud system. It is important that the MAC address along with a location is noted for tracing purposes. This will help identify where they have been placed, keep track and count of the nodes already installed and avoid any discrepancies.

Figure 2. Barcode label with MAC address

Figure 3. Insertion of batteries

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5 / 19

Instructions Manual

Installation guide kalo

Battery

Insert four AA 3.6 V Lithium Thionyl Chloride batteries (provided) correctly by removing cover and inserting the negative side down. Once batteries are inserted, close compartment.

**CAUTION- Pay attention to the battery orientation, placing incorrectly can cause undesirable operation of the device. **

*CAUTION-USE PROVIDED BATTERIES ONLY!
This device only works with 3.6 V Lithium Thionyl Chloride batteries. Using any other type of battery chemistry may cause permanent damage to the device.

Optional Wi-Fi node accessories

The optional accessories that can be added to the nodes and customers may order them based on their needs are as follow:

Blue medical vial

Temperature nodes come with a blue medical vial even though there is an optional use for it. The vial needs to be filled with a solution, such as Propylene Glycol. The blue medical vial is used to maintain the temperature on the node. Diluting portions of the solution are strictly based on the customer procedures. SensoScientific does NOT provide any type of solution. The diluted or non-diluted solution must be provided by the customer.

Fill line

Figure 4. Vial fill line

Water bag

You can mount the temperature node inside the unit or outside, depending on the type of node you are installing. We recommend to use a water bag protection when installing the temperature node inside a freezer to protect the node from damaging. Follow the procedures below on how to install a node when using the water bag.
• Unzip bag, place the node inside properly.
• Once the node is inside, take note of the additional plastic folded inside of the bag. You will need to pull out towards the back of the unit to properly fit the node. Refer to images below:

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6 / 19

Instructions Manual

Installation guide kalo

Figure 5 Node placed inside the water bag

Figure 6 Pull excess towards the back

Figure 7 Note flat surface when pulled back, once it is properly fitted, zip the bag, fold the zip lock, and stick to velcro

Figure 8 Fold and velcro shut

- Once you have properly enclosed the water bag, you can mount/stand the unit in designated area. If node is being installed in a Refrigerator/Freezer refer to images below:

Figure 9 Mounting the node in a refrigerator

Figure 9 Mounting the node in a refrigerator

- When mounting, it's best to install with the antenna facing in, to prevent any tampering. If space is limited, simply stand the sensor with the buttons facing in towards the walls to avoid any contact with the buttons displayed in the front.

Figure 10 Mounting the node in a limited space

Figure 10 Mounting the node in a limited space

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7 / 19

Instructions Manual

Installation guide kalo

• **Wall mount**

All types of nodes can be installed using an optional wall mount as well.

The installation procedure is as follow:

• Choose designated area.
• Mount to wall using drywall screws provided.
• Clip on the node.
• If you wish not to mount on the wall, the node can be mounted through the back using a zip tie.

Figure 11 Wall mount

Figure 12 Zip-Tie mount

5 Wi-Fi node functionality and installation

5.1 One-temperature sensors (B10-100 / B10-200)

The one-temperature sensor node with optional LCD display is designed to transmit one temperature reading instantaneously to the monitoring system every 10 or 20 minutes depending on the user's preference. Each sensor monitors against preset conditions (minimum and maximum alarm limit temperatures) that are defined by the user and can provide audio and visual alerts. The user can choose either to have internal or external sensor probes. The one-temperature sensor node without LCD is called B10-100. The one-temperature sensor node with LCD is called B10-200. The following figure shows the sensors with external probes:

Figure 13 B10-100/ B10-200 One-temperature sensors

<u>Installation</u>: Please refer to installation guideline for installing the node on page 5.

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8 / 19

Instructions Manual

Installation guide kalo

5.2 Dual-temperature sensors (B11-100/B11-200)

The double-temperature sensor node with optional LCD display is designed to transmit two temperature readings that can be taken at two different locations instantaneously to the monitoring system every 10 or 20 minutes depending on the user's preference. Each sensor monitors against preset conditions (minimum and maximum alarm limit temperatures) that are defined by the user and can provide audio and visual alerts. The user can choose either to have internal or external sensor probes. The double-temperature sensor node without LCD is called B11-100. The double-temperature sensor node with LCD is called B11-200. The following figure shows the sensors with external probes:

Figure 14 B11-100/B11-200 Double-temperature sensors

<u>Installation</u>: Please refer to installation guideline for installing the node on page 5.

5.3 Temperature / humidity sensors (B13-100/B13-200)

The temperature/humidity sensor node with optional LCD display is designed to transmit the temperature and humidity readings instantaneously to the monitoring system every 10 or 20 minutes depending on the user's preference. Each sensor monitors against preset conditions (minimum and maximum alarm limits) that are defined by the user and can provide audio and visual alerts. The user can choose either to have internal or external sensor probes. The temperature/humidity sensor node without LCD is called B13-100. The temperature/humidity sensor node with LCD is called B13-200. The following figure shows the sensors with external probes:

Figure 15 B13-100 /B13-200 Temperature/humidity sensors

<u>Installation</u>: temperature/humidity nodes shall be installed in a location where movement and airflow are minimized in order to keep the highest accuracy and consistency of the readings. The ambient environment needs to be stable. Examples of non-convenient locations are proximity to a door, to a window, to an AC conditioner etc. Please refer to installation guideline for installing the node.

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9 / 19

Instructions Manual

5.4 Universal sensors

Wi-Fi universal transmitter supports one external instrument via terminal block and works in conjunction with 4-20 mA, 0-5 V,and 0-10 V output device. The universal nodes are called B14-101 for 4-20 mA, B15-101 for 0-5 V,and B16-101 for 0-10 V applications of universal nodes for monitoring includes but not limited to:

• Pressure differential gauge sensor (B14-101-DP)
• CO_2 sensor (B14-101-CO2)

• Differential pressure sensor (B14-101-DP)
The DP monitor is designed for high performance applications such as those found in critical medical and pharmaceutical enviroments. The very low differential pressure transducer is offered in a din rail or a base mount versionand features easy to access pressure ports and electrical connections. Pressure ranges are available as low as 0.1 in W.C. up to 10 in W.C full scale. The pressure transducers sense differential or gauge (static) pressure and convert this pressure difference to a proportional high level analog output for both unidirectional and bidirectional pressure ranges, with choice of ±0.25 %, ±0.50 % or ±1.0 % full scale accuracy. In addition, the low differential pressure transducer can be configured with an optional visual display for local viewing.

Figure 16 B14-101/ B15-101/ B16-101

Figure 17 B14-101-DP Differential pressure sensor

• CO_2 sensor (B14-101-CO2)
The CO_2 monitors with optional LCD screens are designed to measure carbon dioxide in harsh and humid environments. The ABS plastic housing is dustproof and waterproof to IP65 standards with a choice of several measurement ranges; up to 20 % of CO_2. The patented sensor has unique reference measurements capabilities. Its critical parts are made of silicon; giving the sensor outstanding stability over both time and temperature. By lengthening the calibration intervals, the user saves both time and money. The CO_2 monitor's probes are interchangeable and can be removed and reattached or replaced at any time without the need for calibration and adjustment. The probes can be attached directly to the CO_2 monitor body or, when used with a cable, installed remotely into hard-to-reach places or areas with dangerously high levels of CO_2. This CO_2 monitor is recommended to be used with the universal transmitter node B14-x00 or B16-x00 for Wi-Fi data logging.

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10 / 19

Instructions Manual

Installation guide kalo

Figure 18. B14-101-CO$_2$ Carbon dioxide sensor
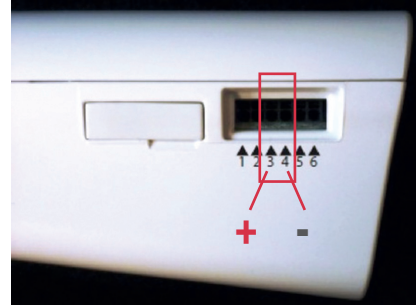

Figure 19 Input pins on the universal nod

Installation: The universal node can be connected to a 2, 3 or 4 wire transmitter.

NOTE: Please pay careful attention to the polarity of the connection to avoid undesirable operation or damage of the transmitter or universal node.

• The input pins on the universal node are pin 3 [+] and pin 4 [-] (figure 19).

* If the node transmitter has inter nal power supply, the 2 signal outputs ar e connected as shown:
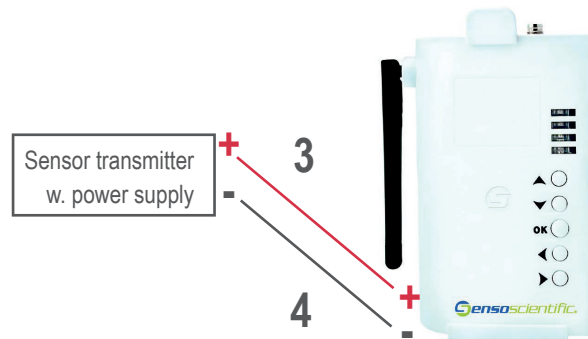

Figure 20 Connect positive signal output of the node transmitter to pin 3 [+] of the universal node and connect negative signal of transmitter to pin 4 [-] of the universal node

Example of a 4-20 mA universal node

For a 4-20 mA transmitter with external power supply and 2 signal outputs, the connection is established as shown:
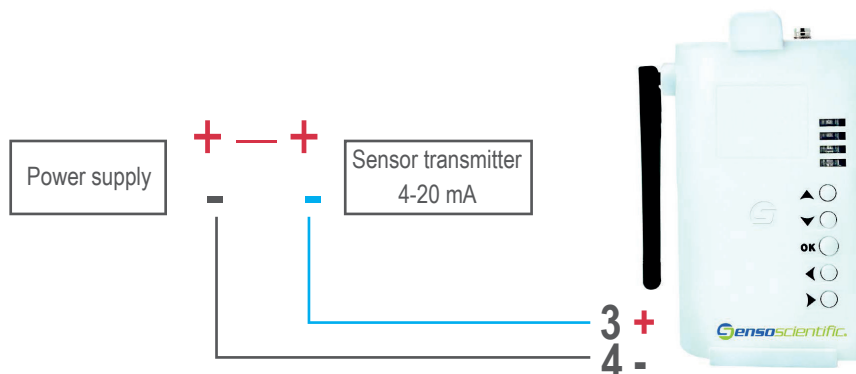

Figure 21 Connect negative signal output of 4-20 mA node transmitter to pin 3 [+] of universal node and connect pin 4 [-] of universal node to negative pin of the external power supply.

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11 / 19

Instructions Manual

Installation guide kalo

Some node transmitters have 3 wire connections; 2 pins are to be connected to the power supply and the 3rd pin is the signal output:
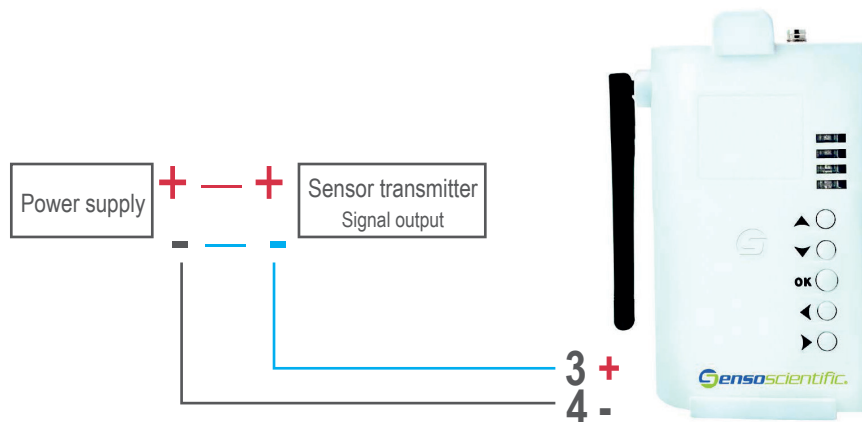

Figure 22 Connect signal output pin of the node transmitter to pin 3 [+] of universal node and connect pin 4[-] of the universal node to the negative output of the external power supply
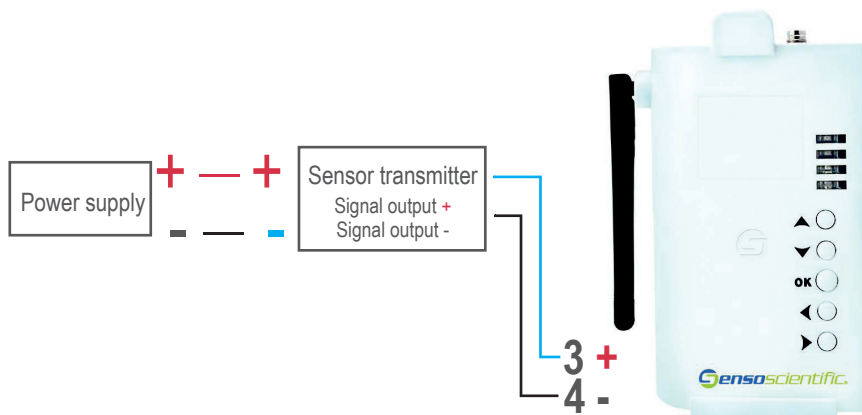

Figure 23 Positive signal output of the transmitter connects to pin 3 [+] of universal node and negative signal output of node transmitter connects to pin 4 [-] of universal node

Wire connection to universal node (4-20 mA)
The universal node has a spring cage connector for easy wire connection or removal. To connect a wire a small flat screwdriver or any fine tip tool can be used.

The steps are explained below:

Step 1 – Use the fine tip tool to press down into the top rectangular opening, this will open the spring cage mechanism.
Step 2 – Insert the wire on the circular opening while pressing down the tool.
Step 3 – Once the wire has been inserted, remove the tool and the spring cage will secure the wire. Tug the wire slightly to check that the wire is properly secured.

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12 / 19

Instructions Manual
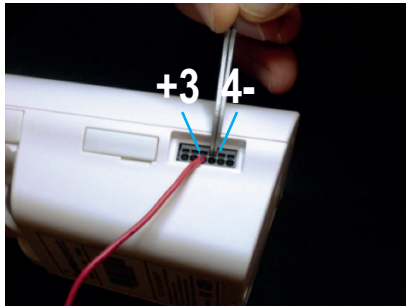
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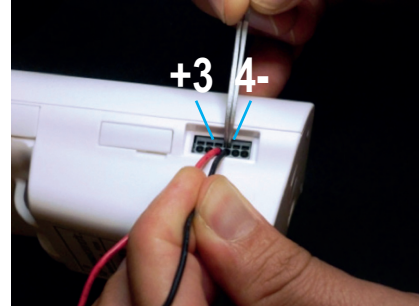**Figure 24** Pressing down into the top rectangular opening
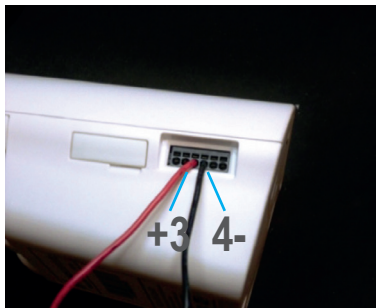

Figure 25 Inserting the wire

Figure 26 Removing the tool

Optional external power supply for universal nodes

The universal nodes (B14-101, B15-101, B16-101) have the option to use an external 120 V AC/DC power supply. The DC jack connector is on the right side of the universal node.

Figure 27 External power supply connector

5.5 Water leak sensors (B17-100)

Wi-Fi water leak transmitter supports one external water leak sensor. It is designed to transmit instantaneously the information of whether there is a water leak or not in a certain location to the monitoring system. The sensor can be customized to the surface you want to detect if there is a leak. We provide both punctual (spot) and long surface (moccasin) sensors for water leak.

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13 / 19

Instructions Manual

Installation guide kalo

The **spot water leak sensor** can detect any conductive non-flammable liquid. It is ideal anywhere water damage could occur and it has automatic reset 6 foot jacketed lead standard. Custom lead lengths are also available depending on the need. The sensor is available in 5 vdc, 12 vdc and 24 vdc and it can come either in closed or open loop versions.

The **water moccasin sensor** is built into a 10 foot mesh water strip sensor for perimeter or large area flood detecting. It is ideal for basement floor/walls, computer server rooms, water pipes, attics or anywhere water damage could occur. It has automatic reset andcan be provided with up to five 10 foot extension probes. Each sensor monitors against preset conditions that are defined by the user (sending alarm for either dry or wet) and can provide audio and visual alerts.

Figure 28 Spot water leak sensor

Figure 29 Moccasin water leak sensor

<u>Installation</u>:
Spot water leak node
The 2500 open loop sensors use an external power source which will energize a built-in relay contact when water is detected. The relay output can be wired directly to the node.

Figure 30 2500 Water leak sensor

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14 / 19

Instructions Manual

Installation guide kalo

Moccasin water leak node

For installation to the B17-100 node, the red wire is connected to the auxiliary 12 volt supply and the black wire is connected to the negative. The green and white wires can then be connected to the number 1 and 2 pins of the node.

For area flood detecting, this sensor can be installed by securing the supplied cable ties to the mesh stripping then mount the cable tie to floor or wall base board at the area to be monitored using the supplied screws.

For water pipe leak detecting, this sensor can be installed by securing the mesh stripping to the water pipe with either the supplied cable tie or water proof tape.

For horizontal installed pipe the mesh should be secured along the bottom of the pipe, and for vertical piping the mesh should spiral around the pipe.

When connecting the sensors to the B17-100 node, the red wire is connected to the positive side of the auxiliary power supply and the black wire is connected to the negative. The green and white wires can then be connected to the number 1 and 2 pins of the node.
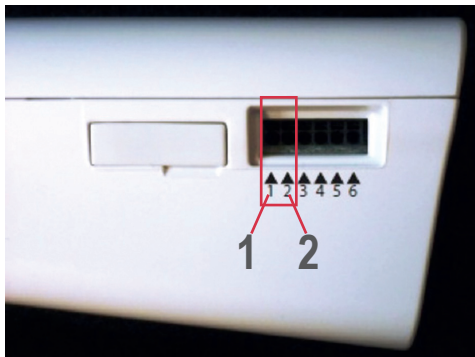

Figure 31 Input pins for the water leak sensor on the B17-100 node

The B17-100 node has a spring cage connector for easy wire connection or removal. To connect a wire a small flat screwdriver or any fine tip tool can be used. The steps are explained below:

Step 1 – Use the fine tip tool to press down into the top rectangular opening, this will open the spring cage mechanism.
Step 2 – Insert the wire on the circular opening while pressing down the tool.
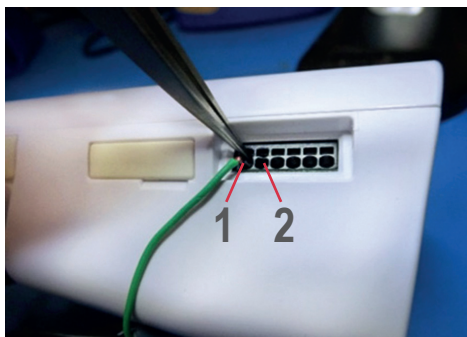

Figure 32 Pressing down into the top rectangular opening

Figure 33 Inserting the wire

Step 3 – Once the wire has been inserted, remove the tool and the spring cage will secure the wire. Tug the wire slightly to check that the wire is properly secured.
Step 4 – For the auxiliary power supply, the red wire is connected to the positive side of the auxiliary power supply and the black wire is connected to the negative.

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15 / 19

Instructions Manual

Installation guide kalo

Figure 34 Removing the tool

Figure 35 Auxiliary power supply connection

5.6 Dry contact - Open/Closed sensor (B18-100)

Wi-Fi Open/Closed and dry contact transmitter supports one internal dry contact sensor. It is designed to transmit instantaneously the information of whether a device (Example: a Freezer) is open or closed to the monitoring system. Each sensor monitors against preset conditions that are defined by the user (sending alarm for either open or closed) and can provide audio and visual alerts.

Figure 36 Open/Closed senso**r**

<u>Installation</u>:The Open/Closed node B18-100 has a spring cage connector for easy wire connection or removal. To connect a wire a small flat screwdriver or any fine tip tool can be used. The steps are explained below:

Step 1 – Use the fine tip tool to press down into the top rectangular opening, this will open the spring cage mechanism.
Step 2 – Insert the wire on the circular opening while pressing down the tool.

Figure 37 Inserting the wires

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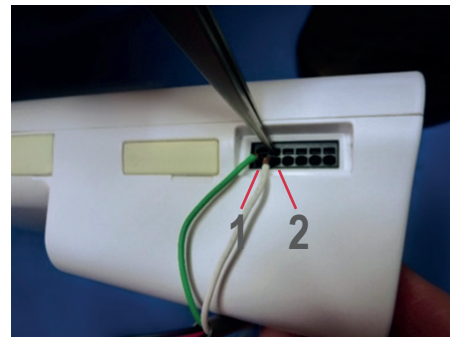
16 / 19

Instructions Manual

Installation guide kalo

Step 3 – Once the wire has been inserted, remove the tool and the spring cage will secure th the wire. Tug the wire slightly to check that the wire is properly secured.

Figure 37 Inserting the wires

Optional external power supply for Open/Closed nodes
The Open/Closed nodes have the option to use an external 120V AC/DC power supply. The DC jack connector is on the right side of the node.

Figure 39 External power supply connector

5.7   Vaccine sensors

Vaccine sensors are designed to transmit instantaneously temperature readings to which the vaccines are exposed to the monitoring system. It transmits information to a standard access point which can be accessed by any Wi-Fi-enabled network.

Each vaccine transmitter monitors against preset conditions and can provide audio and visual alerts. Additional alerts can be provided through a variety of methods such as SMS, text message, voice, pager, cell phone, fax and e-mail. Information recorded (in °F and °C) to the database is time-stamped and cannot be altered through the user interface. The vaccine sensors need to be used with external 120 V AC/DC power supply. The DC jack connector is on the right side of the node.

There is 2 types of vaccine sensors: those for the refrigerator and those for the freezer depending on the type of vaccines to monitor.

Vaccine refrigerator sensor (B10-202)
This type of sensor is used for the vaccines that need to be stored in the refrigerator. It is set by default to a minimum temperature alarm limit equal to 2 °C and to a maximum temperature alarm limit equal to 8 °C which can be changed by the user through the cloud or the centralizer monitoring system. These alarm limits, along with the current temperature recorded are displayed on the LCD.

- To read the temperature every 15 minutes (sample rate = 15 minutes), the switch on the left side of the node needs to be up. The LEDs should start blinking which means the sample rate is 15 minutes.

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17 / 19

Instructions Manual

Installation guide kalo

Figure 40 Vaccine refrigerator node with switch up

- To read the temperature every 5 minutes (sample rate = 5 minutes), push the switch on the left down, then turn off and then on the node.

Figure 41 Vaccine refrigerator node with switch down

Vaccine freezer sensor (B10-203)

This type of sensor is used for the vaccines that need to be stored in the freezer. It is set by default to a minimum temperature alarm limit equal to -50 °C and to a maximum temperature alarm limit equal to -15 °C which can be changed by the user through the cloud or the centralizer monitoring system. These alarm limits, along with the current temperature recorded are displayed on the LCD.

- To read the temperature every 15 minutes (sample rate = 15 minutes), the switch on the left side of the node needs to be up. The LEDs should start blinking which means the sample rate is 15 minutes.

Figure 42 Vaccine freezer node with switch Up

- To read the temperature every 5 minutes (sample rate = 5 min push the switch on the left down, then turn off and then on the node.

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18 / 19

Installation guide kalo

Figure 43 Vaccine freezer node with switch down

6 FCC Approval statement

FCC ID: U30-G2M5477
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 any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and transceiver.
• Connect the equipment into an outlet on a circuit different from that to which the transceiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

This equipment has been certified to comply with the limits for a class B computing device, pursuant to FCC rules. In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

7 Serviceadress

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19 / 19