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NOKEVAL



Ovazone-Core-Node-T...

Ovazone-Core-Router

Manual

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Introduction

Ovazone-Core-T-... is an indoor air quality wireless transmitter and part of Nokeval Ovazone product family. The basic model Ovazone-Core-T-RH-Lux measures temperature, humidity and illumination. The purpose of the illumination measuring is concluding if a room (the lights) is in use and whether the sun shines inside; it is not accurate.

When the model name has a –CO2 suffix, the device also measures carbon dioxide concentration up to 2000 ppm. **This model needs to see fresh air at least once a week to be able to auto calibrate itself.** This model is not suitable for premises that are continuously occupied; such premises result carbon dioxide measurement to show smaller values than in reality.

Ovazone-Core-Router is a device without sensors. It can be used to extend the coverage of the wireless network as it works as a repeater.

The devices work with a battery, but they can be powered with an external 5 V power with a USB cable or a 2-wire cable.

Ovanet is Nokeval's second generation radio network, which uses Wirepas Connectivity technology and Nokeval's own additions. The network uses 2.4-2.48 GHz band, which is available all over the world. The product names basically begin with the Ovazone prefix.

Every device in the network, also the battery powered ones, will function as a repeater by assisting devices located far away from the gateway, effectively forming a mesh network.

The network has node devices producing measurement data, and one or more gateways. The gateway connects the network to other systems. Examples of the gateway devices are Ovazone-Wave-Link and Ovazone-Cell-Link. They are used to deliver the data of the radio network to the Ovaport service.

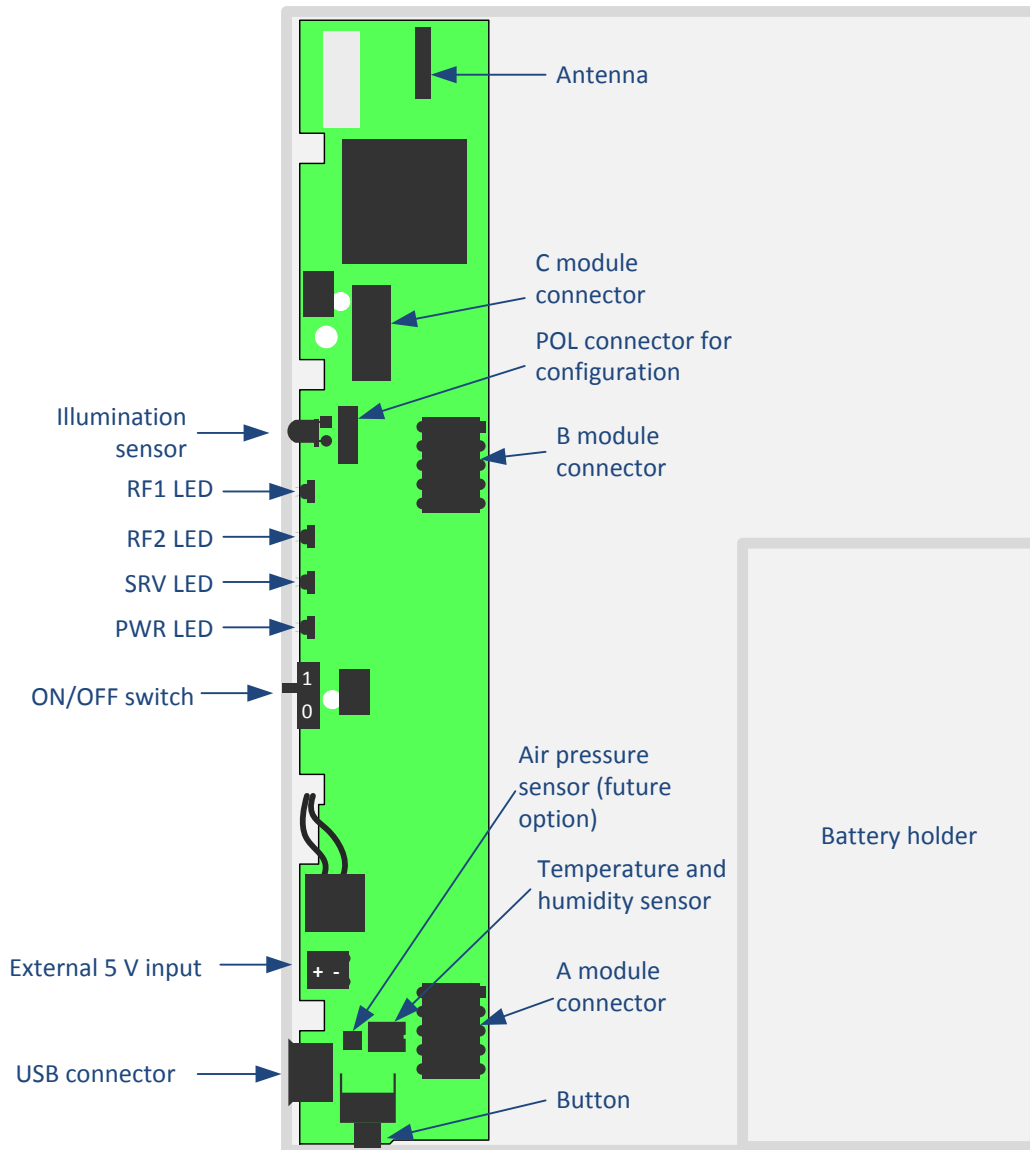
Each device, including nodes and gateways, has to be set to the same Ovanet network. The Ovanet network number has to be chosen between 1-16777214. It should be generated with a random number generator, to minimize the probability to accidentally choose the same network number as in another network located nearby. By default, the devices are set to the network number 6829663, which can be used if there are no other Ovanet or Wirepas Connectivity networks within a couple of hundred meters. If two networks have the same number by accident, the node devices may connect to a wrong network and the data is not delivered to the desired gateway.

Each device has a unique Ovanet address. It is set at the factory and there is no need to change it. The address is visible in the back label of the device.

The devices automatically change their radio frequency seeking suitable frequencies in the crowded 2.4 GHz band. However, at power-up the devices need to find other devices in the network, for which a common radio frequency is needed. All the devices of the network need to be set to the same radio channel between 1-28. Usually the default channel 1 is ok.

There is no need to configure any other radio network settings. The network searches automatically for the best connections and updates them if needed.

The open space range between the nodes is about 200 meters and indoor range is some tens of meters depending on the construction materials. Placing the devices near a metal surface will decrease the range.



Installation

Attachment

Attach the device to the measuring location with one of the following ways:

- Set it standing on a shelf, on top of a cabinet or some other suitable surface.
- Screw two screws to a wall, one 60 mm higher than the other and leave them projecting a little.
- Attach the wall holder to a wall with two countersunk head screws and snap the device to the wall holder.
- You can also order separate Ovazone-Core-Node-case magnetic attachment set (product code 97407), screw it behind the device and snap the device itself to an iron based surface.

Power supply

If you use the device with a battery, open the case cover by pushing the top part of the case and pulling the cover away from the case. Unless already present, set a D battery to the battery holder according to the illustration inside. The battery is worth using even when an external power is connected, because the battery is used during a power outage.

If you want to supply the device with a USB charger, plug one to the micro USB connector at the left side of the case. A 500 mA charger is sufficient. When the supply is on, a LED lights green on the PCB.

Alternatively, an external 5 V DC supply can be connected to the round holes of the push-in spring connector J11 with 0.2-0.5 mm² conductors, the positive wire to the left. Strip the wires approximately 6 mm. The cables can be detached by pushing a small flat screwdriver or some other spike to the rectangular holes. Again when the supply is on, a LED lights green on the PCB.

The external supply cable can be pushed to the grooves back side of the case. The blocks located in both ends of the grooves can be punched or bent away.

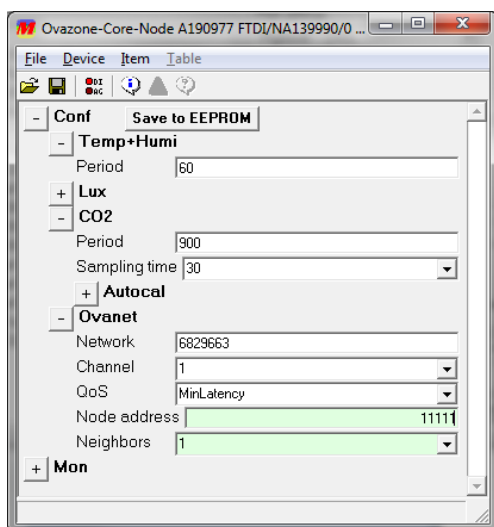
Power up

Slide the ON/OFF switch to position 1. The PWR LED should be lit green for a moment.

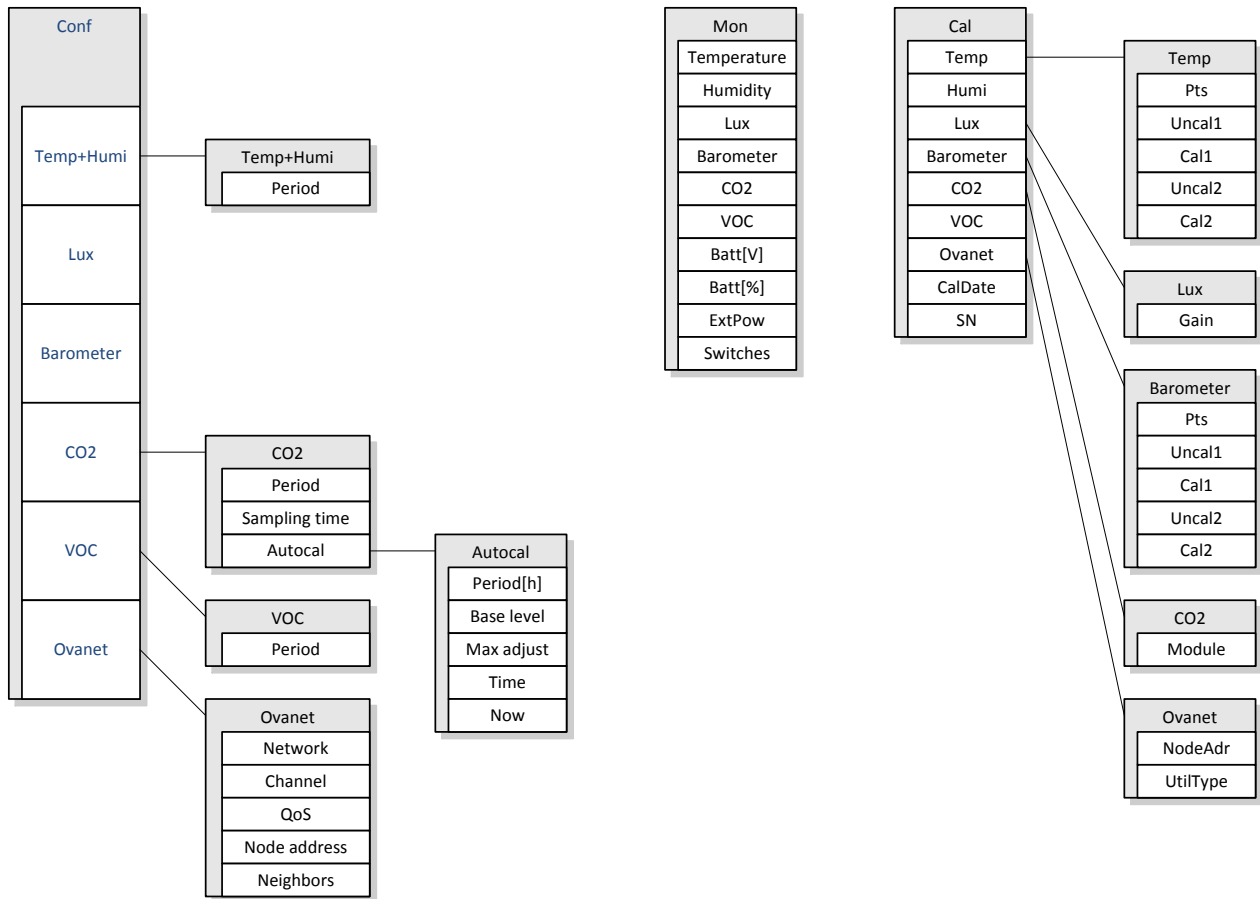
Configuration

The device works with its default settings, but you can change the settings if needed:

- Open the case cover by pushing the top part of the case and pulling the cover away from the case.
- Connect a Nokeval DCS772 programming cable and a POL-3PIN adapter to your computer.
- Connect the POL-3PIN adapter to the J6 POL connector of the device. The polarity does not matter.
- Launch the Mekuwin program (available for free at www.nokeval.com).
- In Mekuwin, choose Port=DCS772, Protocol=SCL, Baud=9600, Address=0 or 126. Click Direct.
- A new window will open. It has branches for different configurations.



Menu chart



Conf menu settings

Temp + Humi -> Period

This setting determines the measuring and transmitting period of temperature and humidity. The allowed range is 5...7200 seconds. The real transmitting period may vary a bit. The default is 240. This setting has strong impact on the battery life. Avoid using too short periods, because it will cause faster battery exhaustion. By setting the period to value 0, the measurement is turned off.

Lux

This setting determines the measuring and transmitting period of illumination in the same way as the previous setting.

CO2 -> Period

See Temp + Humi -> Period.

CO2 -> Sampling time

This setting determines how many seconds CO₂ concentration is measured. The bigger the value, the less noisy reading, but the battery is exhausted faster. A suitable value is 30 seconds.

CO2 -> Autocal -> Period (h)

This setting determines how many hours passes before the device performs an auto calibration. A good period setting is 192 hours which is a little more than a week as the device timer is not accurate.

CO2 -> Autocal -> Base level

The device looks for the lowest reading from the period and if that differs from this setting, the device adjusts the future measurement readings down or up as needed. This is what the auto calibration means. The base level is typically 400, which is the clean air concentration or a little more.

CO2 -> Autocal -> Max adjust

This setting limits the maximum adjust that is done at a time. Good value is 50.

CO2 -> Manuical

This allows manually calibrating the CO2 offset. Enter the real CO2 level and press the Now button. Wait a moment.

VOC -> Period

See Temp + Humi -> Period on page 6.

Ovanet -> Network

This setting determines the Ovanet network address. It has to be the same on all the radio devices including the gateway device.

Ovanet -> Channel

This setting determines the Ovanet network channel. It has to be the same on all the radio devices including the gateway device.

Ovanet -> Auth and Cipher

If you want an encrypted radio network, enter two keys. Every device in the network must share the same keys. The key can be any text string (a Fowler-Noll-Vo hash will be generated of it) or a 128-bit hexadecimal value beginning with 0x.

Ovanet -> QoS

This setting must not be touched unless Nokeval support tells you to do so.

Ovanet -> Node address

This shows the unique address of the device, same as in the label. The node address cannot be changed.

Ovanet -> Neighbours

This shows how many other devices this device has been networked with.

Mon menu

In the mon(itor) menu, you can watch the measurement readings.

Mon -> Temperature

The temperature reading in °C.

Mon -> Humidity

The relative humidity reading in %RH.

Mon -> Lux

The illumination reading in lx.

Mon -> Barometer

The air pressure reading. The feature is not yet in use.

Mon -> CO2

The carbon dioxide concentration in ppm.

Mon -> VOC

The VOC measurement reading in ppm. The feature is not yet in use.

Mon -> Batt[V]

The battery voltage.

Mon -> Batt[%]

The estimated remaining battery capacity in percents.

Mon -> ExtPow

Is the external power connected.

Mon -> Switches

The ON/OFF switch and the button status for the manufacturer's testing.

Cal menu

The calibration menu settings are only for the manufacturer use, and they are not explained in this manual.

Using with Ovaport

The device sends the measurement data with its device address using the channels as follows:

Channel	Physical quantity	Unit
1	Temperature	°C
2	Relative humidity	%RH
3	Illumination	lx
4	Air pressure	mbar
5	Carbon dioxide concentration	ppm
6	VOC	ppm

Usage

Power up and shutdown

If the device is not needed for a while, switch it off by sliding the ON/OFF switch to position 0. The device will not measure nor transmit measurement data anymore. The device is not participating the radio network which may affect the range of the other devices in the network.

Power up the device by sliding the ON/OFF switch to position 1. The device will immediately measure all the physical quantities and transmit them as soon as possible.

If the device is not used for months, it is recommended to remove the battery.

LED indicators

Normally all the indicators are dark to avoid attracting tamperers.

At the bottom of the device there is a button that can be pressed with a ballpoint pen or similar object. By pressing the button once, the device lights up the indicators for five seconds and indicates different states:

RF1	Not in use (except in radio coverage state).
RF2	Ovanet radio network. Green = OK. Red = problem. If red, check that the distance to the gateway or another Ovanet device is short enough. If that does not help, check that all the devices have the same network address and channel configured.
SRV	Sensors. Green = OK. Red = problem. If red, check with the Mekuwin program Diag function which sensor has the problem. The device probably needs service.
PWR	Power indicator. Green = OK, red = battery is exhausted or missing.

By pressing the button twice, the device goes for 15 minutes to an active state, where it lights the indicators continuously and sends the measurement readings frequently. Press the button once to exit this state. Even without pressing the button, the device will return to the normal state in 15 minutes.

By pressing the button three times, the device goes to the radio coverage mapping state. The RF1 indicator is constantly lit. In addition, one indicator is lit for each radio network neighbor. The indicators are green if the radio network forms a connection all the way to the gateway. If not, the indicators are red. Press the button once to exit this state. Even without pressing the button, the device will return to the normal state in 15 minutes.

Maintenance

Now and then, press the button with a ballpoint pen or any other sharp object to light up the indicators. If the PWR indicator is red, change a new battery of LR20 type a.k.a. D type, unless you use the device with the external power and do not need the battery backup.

If any of the other indicators are red, see chapter LED indicators on page 9.

If there is visible dust inside the device, blow it away periodically with pressurized air while avoiding too strong pressure.

The enclosure exterior can be wiped with a damp cloth soaked in soap or isopropanol, but no drop of liquid must enter the device.

Specifications

Environment

Storage temperature	-40...+70 °C without the battery, max 50 °C with the battery
Operation temperature	+5...+60 °C
Operation humidity	5...95 %RH, non-condensing
Protection class	IP30
Enclosure material	Plastic (PC+ABS)
Compatibility	Ovazone series devices and Ovaport service

Measurements

Weight	About 370-390 g including the wall holder and a battery depending on the model
Maximum dimensions	Height 160 mm Width 100 mm Depth 45 mm

Internal battery

Type	Energizer EN95 or some other high quality LR20 D size 1.5 V alkaline battery.
Battery life	1-7 years depending on the model and the measurement period and the radio network traffic amount. Typically, about 2 years.

External supply USB

Connector	Micro USB Type B 5 V 100 mA, no suspend function
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External supply with a cable

Note! The USB connector must not be used if an external supply is in use.

Connector	push-in spring connector for 0.2-0.5 mm ² conductors, peeled 6 mm
Voltage	5 V ±0.5 V
Consumption	Average about 5 mA, momentarily max 100 mA

Radio

Antenna	Internal antenna
Frequency	2.400-2.485 GHz worldwide license-free ISM band
Transmitting power	max 5 dBm E.R.P.
Open space range	about 200 m
Indoor range	10 to 30 m typically
Buffer memory	300 packets, with the default period about 8-10 h.

Temperature measurement

Measurement range	-25...+60 °C
Accuracy	±0,5 °C in the range of +15...+35 °C ±1,5 °C in the range of +5...+50 °C
Step response time	30 s (63 % of a step change)

Humidity measurement

Measurement range	0...95 %RH non-condensing
Accuracy	±5 %RH with humidity of 10...90 %RH and temperature of +5...+50 °C

Illumination sensor

Range	0...2000 lx or wider
Accuracy	Only for purpose of identifying if the lights are on or if it is sunny.

Carbon dioxide concentration (with the factory installed CO2 card)

Measurement range	0-2000 ppm
Accuracy	±50 ppm + 3% from the reading

The models (not all are available yet)

Ovazone-Core-T-RH-LUX (basic model)

Ovazone-Core-T-RH-BARO-LUX (air pressure sensor support added)

Ovazone-Core-T-RH-LUX-CO2 (carbon dioxide concentration sensor added)

Ovazone-Core-T-RH-LUX-CO2-VOC (volatile organic compound sensor added)

Ovazone-Core-T-RH-LUX-CO2-VOC-UNI

Ovazone-Core-T-RH-LUX-SERIAL-UNI

Ovazone-Core-Router (repeater for expanding the radio network)

Conformity

EMC immunity	EN 61326
EMC emissions	EN 61326, class B
R&TTE directive	EN 300 220
	EN 301 489
	EN 300 339

Warnings



The device must not be disposed of in household waste. Observe local regulations concerning the disposal of electrical waste. The device contains a battery.

Manufacturer

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