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iNELS Air

AirIM-100NB

Universal input

NB-IoT

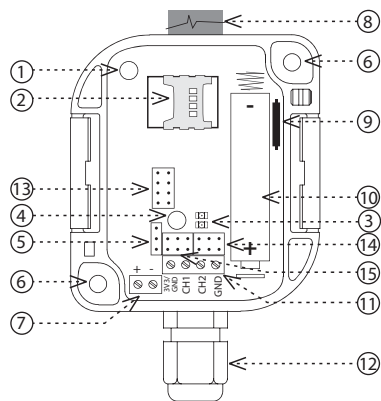## Characteristics

- The Universal input is used to detect device statuses which ensure the smooth and trouble-free operation both in the residential and industrial sectors.
- The Universal input has a pulse, analog, binary input and terminals for connecting the temperature sensor.
- In conjunction with the sensor it is used, for example, for monitoring the level, temperature, gas, water or electricity, flooding...
- It provides a quick solution to learn about the critical condition of your device which you can immediately respond to (e.g. service interference).
- Using the universal sensor will help you eliminate financial losses caused by device malfunctions, or report the need for action in advance.
- For each power meter it is necessary to have one Universal input AirIM-100.
- With the wireless solution and NB-IoT communication, it can communicate instantly to your chosen location and be operated immediately.
- Data is sent to the server from which it can be subsequently displayed as a smartphone, application, or Cloud notification
- Anti-sabotage: If access to the device is unauthorized, a message is immediately sent to the server.
- Power supply: 5-12 V DC or 1x 3.6 V batteries SAFT.
- In the case of external power, the battery is automatically disconnected and serves as backup power.
- Protection degree IP65.

General instrucions

Internet of Things (IoT)

- The IOT wireless communications category describes the Low Power Wide Area (LPWA). This technology is designed to provide full-range coverage both inside and outside buildings, energy-saving and low-cost operation of individual devices. The NarrowBand network is available to use this standard.
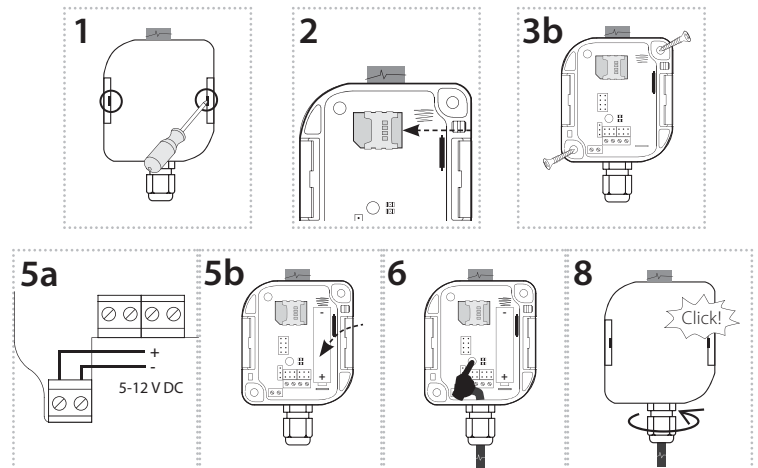
Information about the NarrowBand network

- The network provides two-way communication and the only one to use the licensed LTE band. Our devices allow band 1 (2100MHz), Band 3 (1800MHz), Band 8 (900MHz), Band 5 (850MHz), Band 20 (800MHz) and Band 28 (700MHz).
- It uses this SIM card technology for each device.
- The advantage of NarrowBand is the use of already built-up grids, which ensures sufficient reception outside and inside buildings.
- For more information on this technology, please visit www.vodafone.cz

Caution for proper operation:

- Products are installed according to the wiring diagram given for each product.
- For proper device functionality, it is necessary to have sufficient coverage of the selected network at the installation site.
- At the same time, the device must be registered in the network. Successful device registration on a given network requires a charge for traffic.
- Each network offers different tariff options - it always depends on the number of messages you want to send from your device. Information on these tariffs can be found in the current version of the ELKO EP pricelist.

Description

1. Tamper
2. NanoSIM slot
3. LED indication
4. Button SET
5. Setting pins for 3V3 / GND clamp
6. Hole for mounting on the wall Ø 4.3 mm / 0.2"
7. Power terminal
8. Antenna
9. Magnetic contact
10. Battery
11. Sensor connection terminal
12. Bushing M16x1.5 for connecting cable with max. diameter of 10 mm
13. Programming pins
14. Setting pins for CH2 clamp
15. Setting pins for CH1 clamp

Cloud app assignment

It is done in your Smartphone application. Enter the relevant information on the product cover into the application.

Set the sensing type (sensor LS, WS, MS or pulse output S0).

Assembly

1. Using a flat-blade screwdriver gradually slide it into one groove and the other in the lid and swing open the cover.
2. Carefully insert nanoSIM (the device must not be energized when inserting or replacing nanoSIM!)
3. The product can be attached in two ways:
   a) Directly on a flat surface by gluing * - apply a suitable adhesive to the bottom of the base. Place the base in the desired location and let it dry.
   b) Using a suitable fastener ** by screwing - drill holes into the base with two holes of suitable diameter corresponding to the position of the holes in the bottom of the box. Place the base at the desired location and attach it with suitable bonding material according to the substrate.
4. Thread the sensor through the bushing and plug it in according to the required function - see chapter Functions, remove jumpers (only after setting the function).
5. Connect the supply voltage (via the power supply the transmitter functionality message is sent to the application)
   a. on the clamp
   b. Insert the battery and check the correct location.
6. Set the required function (see chapter Function)
7. Fill the jumpers onto the adjustment pins (see the Function chapter).

8. Replace and snap the front cover. When closing, the handles have to be snapped to their original position. To ensure the degree of protection, tighten the grommet carefully.

* The glue must meet the optimal conditions for product placement (influence of temperature, humidity …)

** For example, a screw or screw of max. Ø 4 mm can be used as a suitable fastener material, 13 mm (distance to the partition in the box) must be added to the required length for attachment to the substrate.

Safe handling

When handling a device unboxed it is important to avoid contact with liquids. avoid unnecessary contact with the components of the device. Do not touch the metal objects inside the unit.

Recommendations for installation

• Ensure the correct location - see Warning.
• Prior to attaching the AirIM-100, check the length of the connected sensor and the location of the scanned device.
• The working position is arbitrary but the grommet should not be directed upwards.
• The product does not require special handling and maintenance.

Function

When the power is connected, the transmitter sends the initial message to the server. Any unauthorized interference with a device, regardless of the feature set, immediately sends the message to the server.

1. **S0** - pulse counting S0
  • Checking the correct pulse readings: after setting the longer push (> 2) function of the SET button, the LED will be activated, which will flash when counting the pulse. The LED flashes with a short press or automatically after 5 minutes.
  • Measured values send the sensor every 4 hours, or immediately when the 5000 pulse limit is exceeded.
  • Recommended accessories: cable for S0 output

2. **Energy measurement** - pulse counting from active sensor LS, MS, WS
  • Checking the correct pulse readings: after setting the longer push (> 2) function of the SET button, the LED will be activated, which will flash when counting the pulse. The LED flashes with a short press or automatically after 5 minutes.
  • Measured values send the sensor every 4 hours, or immediately when the 5000 pulse limit is exceeded.
  • Recommended accessories
    - LS (LED sensor): is particularly suitable for power meters that support LED pulse sensing
    - MS (magnetic sensor): is particularly suitable for gas meters that support magnetic sensing.
    - WS (magnetic sensor for water meter): it is particularly suitable for water meters that support magnetic sensing.
  • Wiring of LS, MS and WS sensors: (+) brown wire, (-) white wire, (OUT) green wire.

3. **Flood Detection** - Flood Sensor
  • Flood detection - by connecting sensing contacts (by flooding with water).
  • Scans every 4 seconds. The status report sends the sensor data every 12 hours, or immediately when detected.
  • Recommended accessories: flood sensor FP-1

4. **Opening detection** - Window / Door Magnetic Sensor (integrated inside the unit)
  • Activation occurs when the magnet is attaching / removed from the sensor.
  • The sensor sends a data message every 12 hours. In case of a state change, it sends the data message immediately.
  • Recommended accessories: Magnet D / WD
  • Note: The universal sensor has a magnet sensor located only on one side, so be careful about the correct position relative to the magnet.

5. **Analog measurement. Voltage 0 - 10 V**
  • Measured at 10 second intervals. Report on the measured values, the sensor sends:
    - every hour
    - immediately if it measures the change by more than 1V since the last measurement
    - Immediately when dropping below 1 V
    - immediately when the 9 V is exceeded

6. **Analog measurement. Current 0 - 20 mA**
  • Measured at 10 second intervals. Report on the measured values, the sensor sends:
    - every hour
    - immediately if it measures the change by more than 1mA since the last measurement
    - Immediately when dropping below 4 mA
    - immediately when the 19 mA is exceeded

7. **Battery measurement 12/24 V** - voltage measurement 0 - 24V
  • Measured at 10 second intervals. Report on the measured values, the sensor sends:
    - every hour
    - immediately if it measures the change by more than 1V since the last measurement
    - Immediately when dropping below 22 V
    - immediately when the 24 V is exceeded

8. **Temperature measurement**
  • The temperature is measured every 5 minutes. The sensor reads out the measured value message:
    - every hour
    - immediately if it measures the change of ± 5 ° C since the last measurement
    - immediately at 30 °C
    - Immediately when the temperature drops below 0 °C
  • Recommended accessories: TC or TZ temperature sensor

9. **HTM2500LF** - Temperature and Humidity Sensor Measurement HTM2500LF
  • Temperature and humidity read every 5 minutes. Report on the measured values, the sensor sends:
    - every hour
    - immediately if it measures the change of ± 5 °C since the last measurement
    - Immediately when a change is measured of more than ± 20% RH from the last measurement
  • Recommended accessories: HTM2500LF sensor
  • HTM2500LF sensor wiring: (+) white wire, (-) black and brown wire, (H) yellow wire, (T) green wire.

10. **Alarm function** - check the contact
  • A contact status message is sent every 12 hours. When there is change (connection / disconnection contact) message is sent immediately.
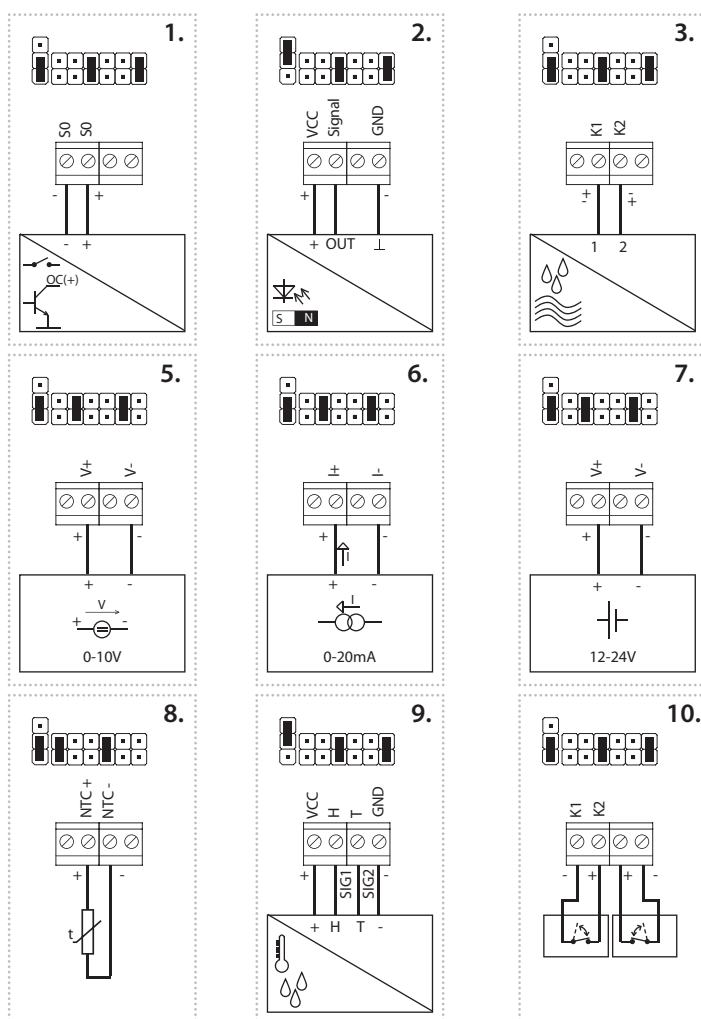

Setting functions 1-3, 5-10:

• Long press SET (> 5s) to enter programming mode.
• The green LED will flash by function (function 1 - 1x, 2 - 2x ...).
• Short (<1s) by pressing the SET button to move upwards in the function selection, press (> 2 / <5s) longer to go down the function selections.
• Pressing the button (> 5s) long saves the set function and restarts the device.

Restart

• Open the cover. Power interruption (remove the battery from the device).
• Press SET> 1min.
• Connect power (insert battery). Close the cover.

Replacing batteries
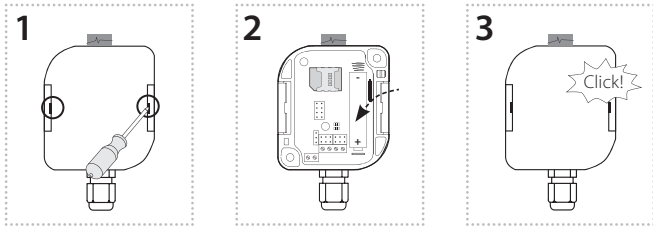
1. Using a flat-blade screwdriver gradually slide it into one and then the other groove in the lid and swing open the cover.
2. Remove the discharged battery and insert a new battery into the holder. Beware of polarity. Both LEDs will flash 3 times (see device status indication).
3. Replace and snap the front cover.

Notice:

Only use batteries designed for this product correctly inserted in the device! Immediately replace weak batteries with new ones. Do not use new and used batteries together. If necessary, clean the battery and contacts prior to using. Avoid battery shorts! Do not dispose of batteries in water or fire. Do not dismantle batteries, do not try to charge them and protect them from extreme heating - danger of leakage! Upon contact with acid, immediately rinse the affected area with a stream of water and seek medical attention. Keep batteries out of the reach of children. If it is suspected that the battery has been swallowed or somehow placed inside the body, consult a doctor immediately. Give the doctor information about the type of battery (from battery case, device or its manual, etc.) to determine the chemical composition of the battery. Batteries must be recycled or returned to an appropriate location (e.g. collection container) in accordance with local legal provisions.

Device states

Unit initialization	Indication	
Start	3 x R + G blinks	power supply (external or battery), reset unit
Search for BTS * 2)	2 x flashes R (2xR _ 2xR _ ...)	Connection to the network
SIM ERR *2) ERR *2)	5 x flashes R (repeatedly)	SIM Error - cannot be loaded (SIM card insertion and rotation check) / or NB-IoT MODULE error
Successful network connection * 2)	1 x flashes R	start unit ok

Measurement		
Tamper	without indication	opening the cover
Magnet	3 x flashes G	non contact / contact magnet
SET button short press (< 2s)	1 x flashes G	test, cancel, „long press"
SET button longer press (> 2s / <5s)	2 x flashes G	setting mode (signaling of measurement / pulses)
Measurement signaling * 1)	1 x flashes G	impulse LS / MS / WS / S0, temperature measurement, ...

Communication		
Communication	1 x flashes R	sending / receiving data

Other known states		
Does not respond to the SET button	any LED lights	it is necessary to disconnect the power supply (external or battery), after 60 seconds after the LED goes out, insert the battery
The unit is still in reset	still indicates start	the battery may be discharged
The unit does not respond even after removal insert the battery	without indication	a discharged battery or a damaged product

When the tamper is pressed, the LED is turned off!

Note:
R... LED red
G... LED green
* 1) Indicates only when you press SET> 2 s (setting mode)
* 2) Planned

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Byte Function / Bit	0-14	15	16	17 (7)	(6)	(5)	(4)	(3)	(2)	(1)	(0)	18	19	20	21
S0	IMEI	0x01 - notification 0x02 - heartbeat	0x01				Reserved for future use			Tamper: 1 - opened 0 - closed	Battery: 1 - low level 0 - OK	Counter[0]	Counter[1]	Counter[2]	Counter[3]
ENERGY_METERING	IMEI	0x01 - notification 0x02 - heartbeat	0x02				Reserved for future use			Tamper: 1 - opened 0 - closed	Battery: 1 - low level 0 - OK	Counter[0]	Counter[1]	Counter[2]	Counter[3]

DOWNLINK

Function	0	1	2	3	4	5	6	7
S0	0x01	Heartbeat period	0x00	0x00	Threshold 1H	Threshold 1L	Threshold 2H	Threshold 2L
ENERGY_METERING	0x02	Heartbeat period	0x00	0x00	Threshold 1H	Threshold 1L	0x00	0x00

Notes

Name	Unit	Example
Counter [0 – 3]	pulse	Counter[0] = 0x01 Counter[1] = 0x02 Counter[2] = 0x03 Counter[3] = 0x04 Counter = 0x01020304 = 16909060 pulses

Heartbeat period	0 - 127 [x min]	heartbeat message period
	128 - 255 [(x - 127) h]	
Threshold 1H 1L	0 - 65535	Input 1 - pulses threshold
Threshold 2H 2L	0 - 65535	Input 2 - pulses threshold

Graph

Energy metering

UPLINK

Byte Function / Bit	0-14	15	16	17 (7)	(6)	(5)	(4)	(3)	(2)	(1)	(0)
FLOOD_SENSOR	IMEI	0x01 - notification 0x02 - heartbeat	0x03				Flood: 1 - alarm 0 - OK		Reserved for future use	Tamper: 1 - opened 0 - closed	Battery: 1 - low level 0 - OK
WINDOW_SENSOR	IMEI	0x01 - notification 0x02 - heartbeat	0x04	Reserved for future use			Reserved for future use		Window sensor: 1 - opened 0 - closed	Tamper: 1 - opened 0 - closed	Battery: 1 - low level 0 - OK

DOWNLINK

Function	0	1	2	3	4	5	6	7
FLOOD_SENSOR	0x03	Heartbeat period	Measurement period	0x00	0x00	0x00	0x00	0x00
WINDOW_SENSOR	0x04	Heartbeat period	Blocking time	0x00	0x00	0x00	0x00	0x00

Notes

Heartbeat period	0 - 127 [x min]	heartbeat message period
	128 - 255 [(x - 127) h]	
Measurement period	1 - 10 [s]	Contact check period
Blocking time	0 - 10 [s]	Blocking time after closing / opening of contact

UPLINK

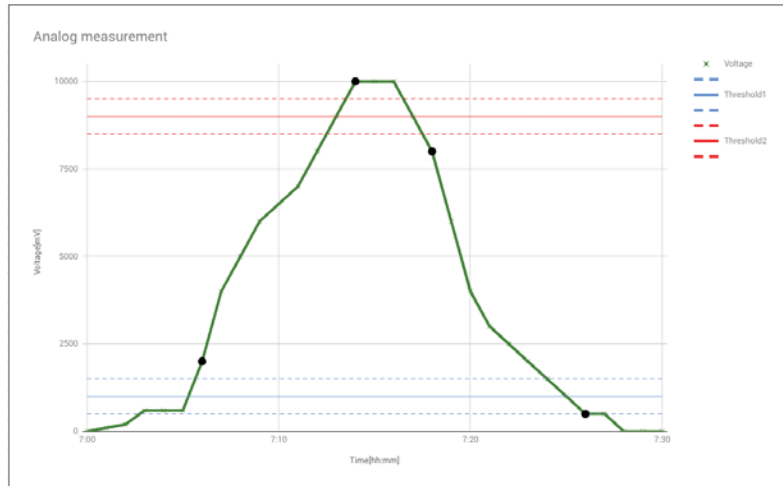| Function / Byte	0-14	15	16	17 (7)	17 (6)	17 (5)	17 (4)	17 (3)	17 (2)	17 (1)	17 (0)	18	19
Bit				7	6	5	4	3	2	1	0		
VOLTAGE_0_10	IMEI	0x01 - notification 0x02 - heartbeat	0x05	Reserved for future use						Tamper: 1 - opened 0 - closed	Battery: 1 - low level 0 - OK	Voltage[0]	Voltage[1]
CURRENT_0_20	IMEI		0x06									Current[0]	Current[1]
BATTERY_12_24	IMEI		0x07									Voltage[0]	Voltage[1]

DOWNLINK

Function	0	1	2	3	4	5	6	7
VOLTAGE_0_10	0x05	Heartbeat period	Measurement period	Threshold difference	Threshold 1U	Threshold1D	Threshold 2U	Threshold 2D
CURRENT_0_20	0x06	Heartbeat period	Measurement period	Threshold difference	Threshold 1U	Threshold1D	Threshold 2U	Threshold 2D
BATTERY_12_24	0x07	Heartbeat period	Measurement period	Threshold difference	Threshold 1U	Threshold1D	Threshold 2U	Threshold 2D

Notes

Name	Unit	Example
Voltage [0 – 1]	mV	Voltage[0] = 0x15 Voltage[1] = 0x7C Voltage= 0x157C = 5500mV
Current [0 – 1]	µA	Current[0] = 0x2E Current[1] = 0xE0 Current= 0x2EE0 = 12000µA

Heartbeat period	0 - 127 [x min]	heartbeat message period
	128 - 255 [(x - 127) h]	
Measurement period	1 - 10 [s]	Measurement period for Voltage / Current
Threshold difference	0 - 50 [100*mV] / 0 - 50[100*uA]	Threshold difference for Voltage / Current
Threshold 1U	0 - 100[100 * mV] 0 - 200[100*uA]	Threshold level for Voltage / Current 1, input 1
Threshold 1L	0 - 100[100 * mV] 0 - 200[100*uA]	Threshold level for Voltage / Current 2, input 1
Threshold 2U	0 - 100[100 * mV] 0 - 200[100*uA]	Threshold level for Voltage / Current 1, input 2
Threshold 2L	0 - 100[100 * mV] 0 - 200[100*uA]	Threshold level for Voltage / Current 2, input 2

Graph

UPLINK

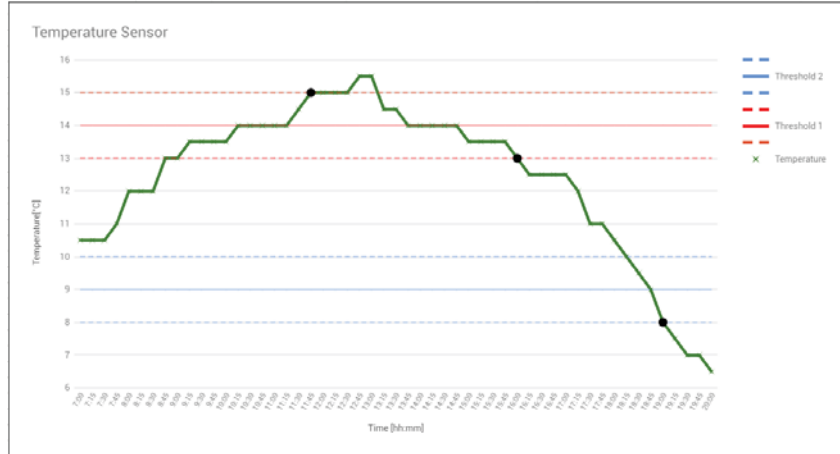| Function / Byte	0-14	15	16	17 (7)	17 (6)	17 (5)	17 (4)	17 (3)	17 (2)	17 (1)	17 (0)	18	19
Bit				7	6	5	4	3	2	1	0		
TEMPERATURE_SENSOR	IMEI	0x01 - notification 0x02 - heartbeat	0x08	Reserved for future use						Tamper: 1 - opened 0 - closed	Battery: 1 - low level 0 - OK	Temperature[0]	Temperature[1]

DOWNLINK

Function	0	1	2	3	4	5	6	7
TEMPERATURE_SENSOR	0x08	Heartbeat period	Measurement period	Threshold difference	Threshold 1H	Threshold 1L	Threshold 2H	Threshold 2L

Notes

Name	Unit	Example
Temperature [0 – 1]	[10*] °C	Temperature[0] = 0x01 Temperature[1] = 0x04 Temperature = 0x0104 = 260 = 26.0°C

Heartbeat period	0 - 127 [x min]	Heartbeat message period
	128 - 255 [(x - 127) h]	
Measurement period	1 - 255 [s]	Measurement period for temperature
Threshold difference	0 - 100 [10 * °C]	Threshold difference for temperature
Threshold 1H 1L	-400 - 1200 [10 * °C]	Threshold level 1 for temperature
Threshold 2H 2L	-400 - 1200 [10 * °C]	Threshold level 2 for temperature

Graph

Temperature Sensor

UPLINK

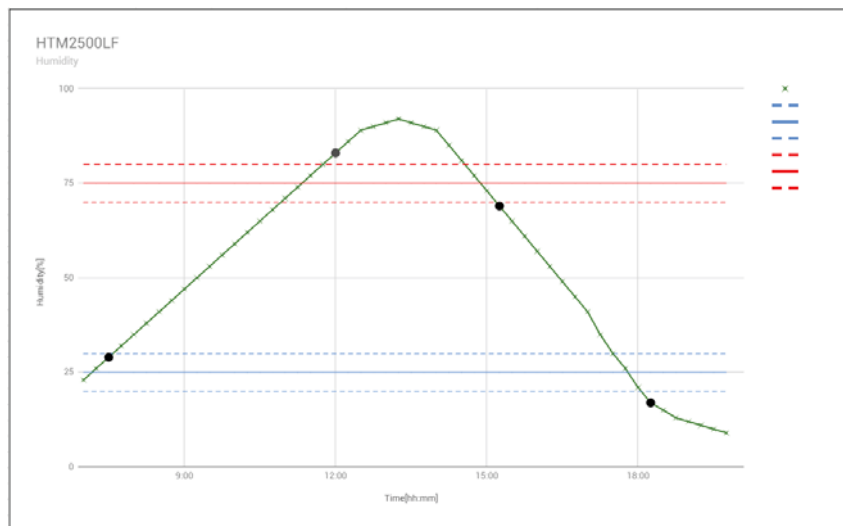| Function \ Byte	0-14	15	16	17								18	19	20	21
Function \ Bit				7	6	5	4	3	2	1	0				
HTM2500LF	IMEI	0x01 - notification 0x02 - heartbeat	0x09	Reserved for future use						Tamper: 1 - opened 0 - closed	Battery: 1 - low level 0 - OK	Humidity[0]	Humidity[1]	Temperature[0]	Temperature[1]

DOWNLINK

Function	0	1	2	3	4	5	6	7
HTM2500LF	0x09	Heartbeat period	Measurement period	Threshold Temperature difference	Threshold Humidity 1	Threshold Humidity 2	Threshold Temperature 1	Threshold Temperature 2

Notes

Name	Unit	Example
Temperature [0 – 1]	[10*] °C	Temperature[0] = 0x01 Temperature[1] = 0x04 Temperature = 0x0104 = 260 = 26.0°C
Humidity [0 – 1]	[10*] %	Humidity[0] = 0x02 Humidity[1] = 0x5D Humidity = 0x025D = 605 = 60.5%

Heartbeat period	0 - 127 [x min]	Heartbeat message period
	128 - 255 [(x - 127) h]	
Measurement period	1 - 255 [s]	Measurement period for temperature / humidity
Threshold Temperature difference	0 - 50 [°C]	Threshold difference for temperature / humidity
Threshold Humidity 1	0 - 100 [%]	Threshold level 1 for humidity
Threshold Humidity 2	0 - 100 [%]	Threshold level 2 for humidity
Threshold Temperature 1	-40 - 120 [°C]	Threshold level 1 for temperature
Threshold Temperature 2	-40 - 120 [°C]	Threshold level 2 for temperature

Graph

UPLINK

	Byte	0-14	15	16	17							
	Bit				7	6	5	4	3	2	1	0
ALARM		IMEI	0x01 - notification 0x02 - heartbeat	0x0A	Reserved for future use				External contact: 1 - closed 0 - opened	Reserved for future use	Tamper: 1 - opened 0 - closed	Battery: 1 - low level 0 - OK

DOWNLINK

Function	0	1	2	3	4	5	6	7
ALARM	0x0A	Heartbeat period	Blocking time	0x00	0x00	0x00	0x00	0x00

Notes

Heartbeat period	0 - 127 [x min]	Heartbeat message period
	128 - 255 [(x - 127) h]	
Blocking time	0 - 10 [s]	Blocking time after closing / opening of contact

UPLINK

	Byte	0-14	15	16	17								18	19	20
	Bit				7	6	5	4	3	2	1	0			
All functions		IMEI	3	Version FW	SubVersion FW								Version FW Narrowband	SubVersion FW Narrowband	

Technical parameters

AirIM-100NB

Power supply	
Battery power:	1x 3.6V LS 14500 Li-SOCl$_2$ AA
Battery life by frequency *:	
1x 10 minutes	1.9 years
1x 60 minutes	3.2 years
1x 12 hours	3.6 years
1x 24 hours	3.6 years
External power supply:	5 – 12 V DC (on terminal)
Supply voltage tolerance:	+10 %; -15%
Standby consumption:	0.2 mW
Transmitting power consumption:	850 mW

Setting	
Setting:	With a message from the server using setting pins, SET button, programming cable
Alarm Detection:	message to the server
Battery status view:	only when the battery is powered by a message on the server

Control	
Control:	button SET Magnetic contact Tamper

Analog inputs	
Thermal:	TC / TZ**
Voltage:	AIN 0(1) - 10 V
Current:	AIN 0(4) - 20 mA
Battery measurement:	12 V/24 V
Flooding:	Flood probe**

Digital inputs	
Inputs:	IN1, IN2
Supported sensors for energy measurements:	LS (LED sensor)** MS, WS (magnetic sensor)** SO (Contact, open collector)

Detection of the magnet sensor	
Closed:	< 1.5 cm
Open:	> 2 cm
Reliability:	99.9 %

Other supported sensors	
Flood probe:	FP-1**
Tempe. and humidity measurement:	HTM2500LF**

Temperature measurement range	
Thermo sensor TC:	0. .. 70 °C
Thermo sensor TZ:	-40 .. 125 °C
Sensor HTM2500LF:	-40 .. 85 °C

Communication	
Protocol:	NB-IoT
Transmitter frequency:	LTE Cat NB1***
Range in open space:	Approx. 30 km (Depending on network coverage)
Transmission power (max.):	200 mW / 23 dBm

Other parameters	
Working temperature:	-30…+60°C (Pay attention to the operating temperature of batteries)
Storage temperature:	-30…+70°C
Operating position:	any
Mounting:	glue / screws
Protection degree:	IP65
Connecting External Power:	terminals, wires 0.5 – 1 mm^2
Connection of the sensor:	terminals, wires 0.5 – 1 mm^2
Cable gommet:	M16 x 1.5 for cable ø max. 10 mm
Dimension:	182 x 62 x 34 mm
Weight:	108 g (without battery)

* Values are calculated under ideal conditions and may vary depending on the type of sensor connected
** Not included in the package
*** Multiple frequency bands of B1 / B3 / B5 / B8 / B20 / B28

Warning

Read the operating instructions before installing the device and putting it into operation. Instruction manual is designated for mounting and also for user of the device. It is always a part of its packing. Installation and connection can be carried out only by a person with adequate professional qualification upon understanding this instruction manual and functions of the device, and while observing all valid regulations. Trouble-free function of the device also depends on transportation, storing and handling. In case you notice any sign of damage, deformation, malfunction or missing part, do not install this device and return it to its seller. It is necessary to treat this product and its parts as electronic waste after its lifetime is terminated. Before starting installation, make sure that all wires, connected parts or terminals are de-energized. While mounting and servicing observe safety regulations, norms, directives and professional, and export regulations for working with electrical devices. Do not touch parts of the device that are energized – life threat. To ensure the transmission of the radio signal, make sure that the devices in the building where the installation is installed are correctly located. Unless otherwise stated, the devices are not intended for installation in outdoor and damp areas, they must not be installed in metal switchboards or in plastic cabinets with metal doors - this prevents transmission of the radio frequency signal. iNELS Air is not recommended for controlling life-saving instruments or for controlling hazardous devices such as pumps, heaters without thermostat, lifts, hoists, etc. - radio frequency transmission may be overshadowed by obstruction, interference, transmitter battery may be discharged etc., thereby disabling the remote control.

The company ELKO EP, as the manufacturer, is entitled to make technical modifications to the product, in the technical specification and product manual, without prior notification.