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SenlabD

TOR-LAB-xxNS©

FIRMWARE VERSIONS 1.3 / 2.1

User guide

SENSING-LABS

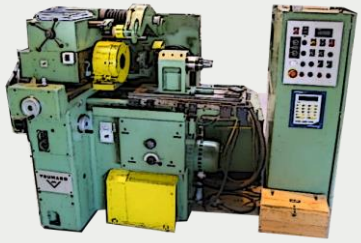
VERSION 02 - REV K / JUNE 2021

Table des matières

Thank you for your choosing our Senlab product!
We hope you will find the instructions on this user manual clear and easy to follow.

General overview

The Senlab Digital (SenlabD) sensor is a smart LoRaWAN™ radio device with a digital input for 'on/off' or 'close/open' state detection. Therefore, SenlabD can monitor the status of relays, transistors or switches.



SenlabD can be configure to fit with various detection need (see Application features for more details):

- **Real-time alert**: a message is sent as soon as the state change
- **Logging state detection**: transmission at least every X hour of all state detection
- **Advanced state configuration**: state duration to validate open or close detection

The input is open when the electronic circuit between the wires *Input1* and *Ground* detects an open circuit.

The minimum time to receive two "event messages in live depends of ISM rules (freq. band and duty cycle) and LoRa SF: from a few second to 3 minutes maximum. In all cases, all state detection will be stored and send.

Check "SenlabV2" Application Note for V2.0 full specs: network migration, re-join…

Any question about your sensor compatibility? Please contact your distributor.

Part number	Casing type	Protection level	Dimension
TOR-LAB-13NS	Outdoor	IP68	102x56x35mm cable: 50cm
TOR-LAB-41NS	Indoor v2	IP30	91.5x50x25mm

Outdoor

Indoor v2

3 steps are required to make your senlabD fully operational, described below.

Provisioning of the device

You have to be sure that your **Senlab device has been well commissioned** to be able to reach your LoRaWAN network.

- ✓ Contact if needed your distributor to get your Senlab configuration
- ✓ Required information for provisioning the device into your LoRa system are listed in the following table:

Warning, don't unprovision device from your system before stopping it!
(refer application features to stop the application via RF)

	devEUI	appEUI	appKey	appSkey	NwkSkey	netId	devAddress
Case 1 : OTAA / PUBLIC Typical configuration for Network Operator based architecture	X	required	required				
Case 2 : ABP / PUBLIC Typical configuration for Private mono gateway network	X			required	required		required
Case 3 : ABP / PUBLIC Sensing-Labs SLgateway V2 configuration (local network)	X	Optional*		Optional*	Optional*	Optional*	Optional*

(*) If asked when ordering, devices are already provisioned into your SLgateway. If not, you need these parameters.

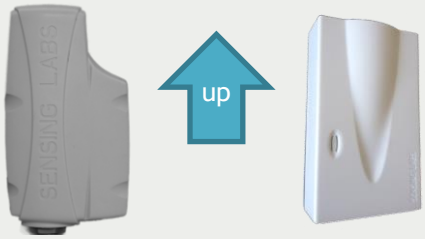
- ➢ Network & Application configuration of Senlab device can be done:
  - o At factory (for minimal batch of 1000 devices)
  - o By your distributor (more often)
  - o By yourself (if you have your own SLsetting tool)
- ➢ Please refer to parameter list described into the Application features chapter to fit to your use case and get a "Plug&Play" device.
- ➢ **All application configuration can also be dynamically adjusted Over The Air** (via downlink request)

On-site installation

Device positioning

You have first to find the best position to your Senlab:

- ✓ Prefer vertical position (***antenna part upwards*** as on following pictures)
- ✓ Avoid positioning the external cable pulled vertically under the device (prefer coiled positioning or use the rear gutters for outdoor version)
- ✓ Avoid direct sun light exposure or heater system proximity



Device is not designed for an installation above 2 meters.

Device mounting

Device type	Device mounting
All versions	Stick the product to the wall or cabinet with a double-sided adhesive tape
Indoor versions	Screw the rear side of the product to the wall with countersunk screws make sure the screw heads don't exceed from the plastic side once installed
Outdoor versions	Use plastic cable ties with screw mount

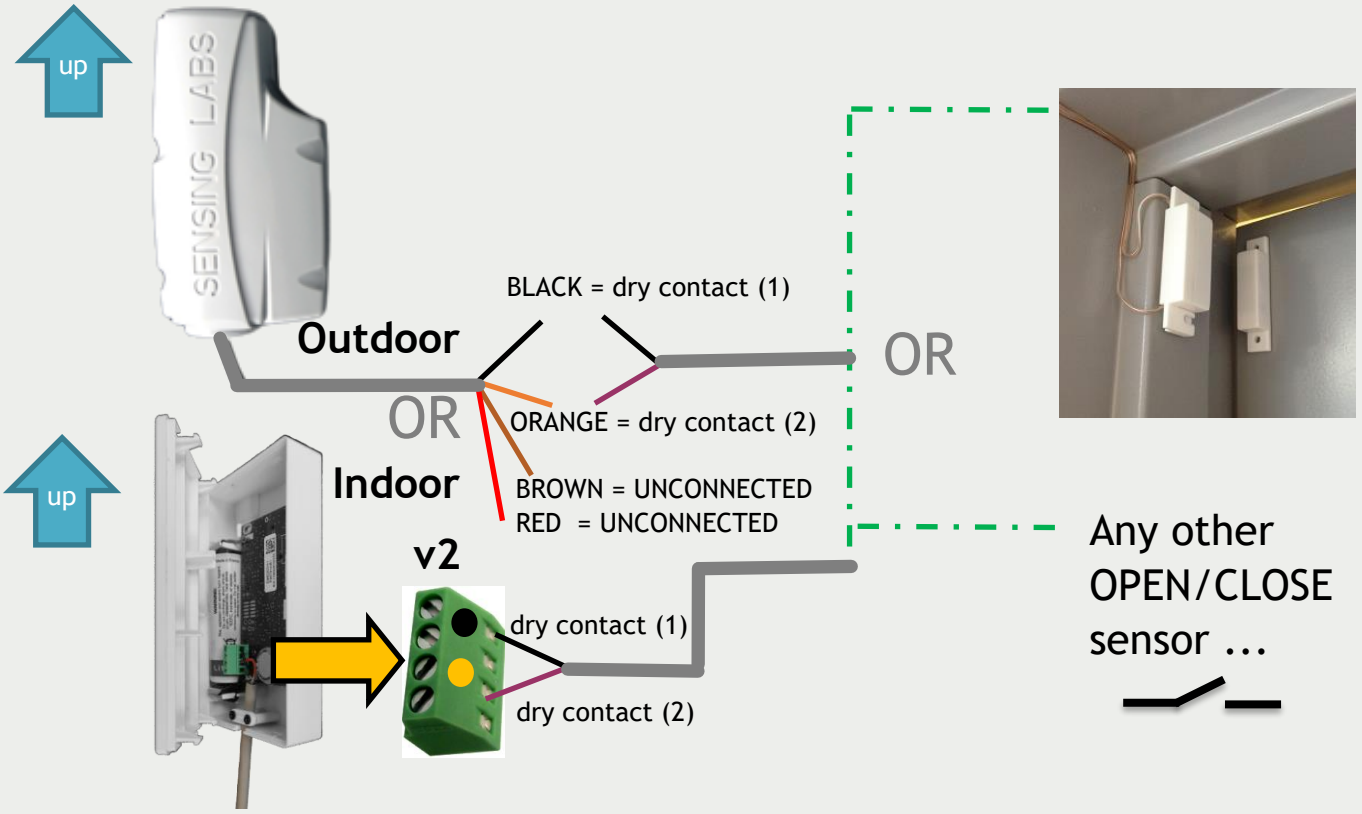
Refer to « Application Note Senlab installation » for full recommendation.

For best radio performance:

- Positioned the upper part of the device upwardly in a free space area
- avoid positioning the Senlab against a metallic element

Wiring diagram

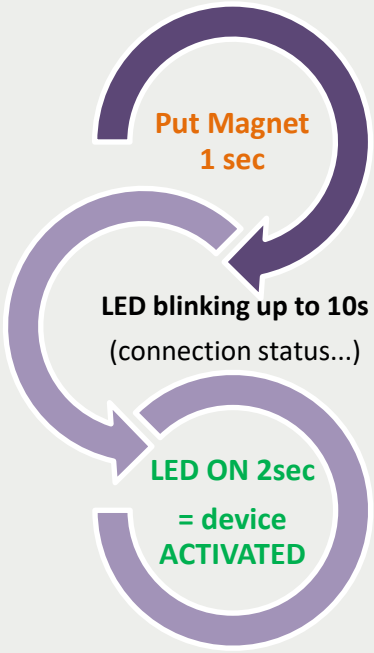
- The Senlab must be plugged to Digital sensor as follow

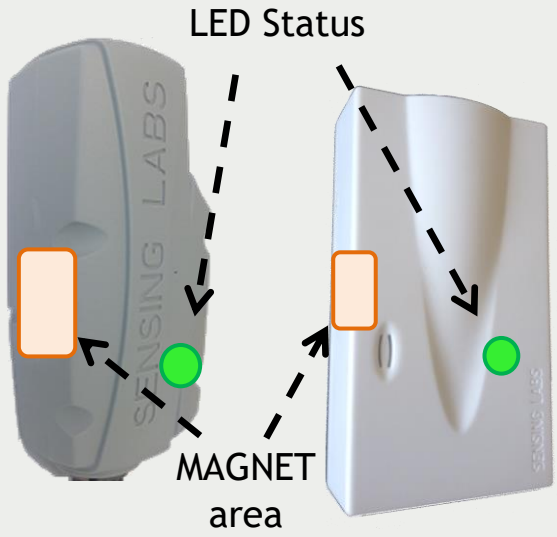


Now the device is well physically installed and plugged, you can start the activation process.

Activation of the device

To activate the Senlab device, you have to use a magnet (min pulling force 1Kg).



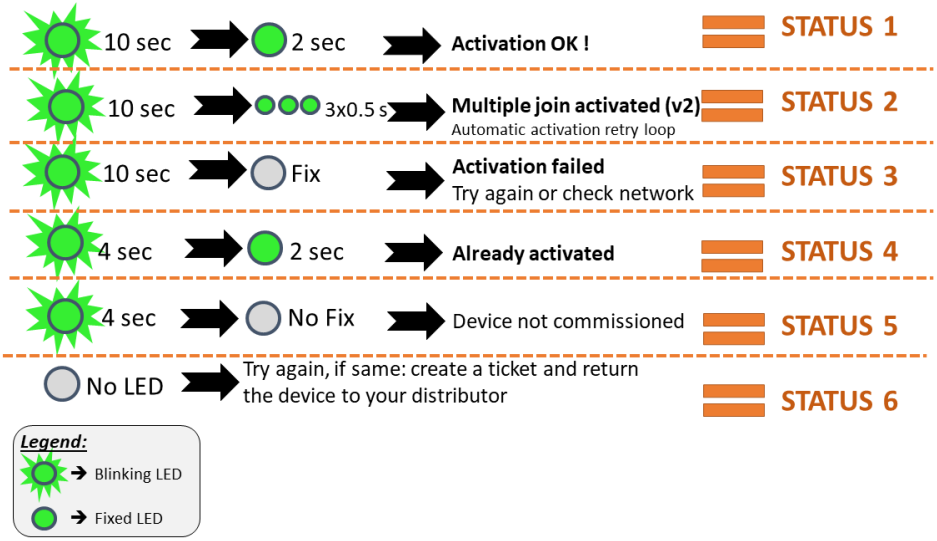


- ✓ Remove the magnet as soon as the LED flashes!
- ✓ If activation fails (No solid LED ON 2sec), Senlab will come back in storage mode.
- ✓ After successful activation, device will automatically send its START message

Once activated, if you pass the magnet one more time, the device will indicate its activation status after 3s LED blinking:

--> Solid LED ON 2sec will confirm that device is activated

LED Status meaning



Deactivation of the device

If you decide to deactivate Senlab, no more transmissions will be sent → That means that you need a physical access to the Senlab to active it again.
Many ways are possible:

- **Over the Air**: by sending the downlink request "STOP application" (via your LoRaWAN system)
- **With physical access (with SLsetting tool)**: by using SLsetting "disconnect" action
- **With physical access (only for test devices)**: By holding the magnet during 20 seconds until the LED stay ON for 5 seconds.

Application features

This chapter describes the SenlabD application features available (accessible via SLgateway or SLcodecs)

SenlabD logs event (new **state** detection) depending of its configuration:

- ✓ state is "1" when contact gets open more than X seconds (1 sec by default)
- ✓ state is "0" when contact gets close more than X seconds (1 sec by default)

Logged event can be transmitted according to following conditions:

- ✓ Immediately: as soon as the state change
  OR
- ✓ After X events and no later than X seconds after the oldest stored event

In all cases, at least one transmission will be notified if no transmission has happened during X minutes (1 hour by default).

The **current state** (state of the event at radio transmission time) is also included into the datalog message.

Measure data

ID	Description	Type	Unit	Range
current_state	Is the circuit between 2 wires is open? When last radio message is transmitting	UINT8	NA	0…1
state	Log of the 2 wires contact state	UINT8	NA	0…1
battery_current_level	Battery level of the device	UINT8	%	1…100

Event data

ID	Description	Type	Unit	Range
start_event	Happens when device is restarted on the field	BOOL	-	-

Online describe on http://codec.slbase.io/senlabD

Configuration requests

Parameter ID	Description	Type	Unit	Range
Digital configuration (*Since V1.3*) (ID = request_write_digital_cfg)				
is_open_enable	True if open state must be detected (event)	BOOL	NA	-
open_debounce	Open state duration for validation rising event	UINT8	Second	0...255*
is_close_enable	True if close state must be detected (event)	BOOL	NA	-
close_debounce	Close state duration for validation falling event	UINT8	Second	0...255*
max_events_nb	Max number of event detection before notification	UINT8	NA	1…12
max_latency	Max latency after oldest stored event before notification	UINT16	Second	0…65535
keep_alive	Longest period without message	UINT8	x10min	1…72 (12h)
Reset battery level (ID = request_reset_battery_level) *Must be used after battery replacement only*				
NO PARAMETERS				
Stop application (ID = request_stop_application) *Warning: activation with magnet will be mandatory to reactivate the device*				
NO PARAMETERS				
Get Version *(since FW V1.3)* (ID = request_get_version)				
NO PARAMETERS	Ask the device to return it configuration and FW version			

* open and close debounce duration:
set 0 sec only of electronic switch (after a transistor for example).
Else, for dry contact, minimum duration to set is 1 sec.

Battery replacement (Indoor version only)

Replacement battery must by a Lithium 3,6V AA type with 50mA min of supported continuous current → Contact your distributor to get original battery reference.

Senlab indoor have the capability to keep activation status during a few minutes, so the process is:

1. Open the casing
2. Remove the old battery and, **during the same minute**, put the new battery
3. Check if the device activation is still OK (see "Activation of the device" chapter)
4. In case activation lost, you need to activate the device again
5. Close the casing
1. Send the configuration request "request_reset_battery_level" to the device, using your application

ATTENTION:

EN: There is a risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to instructions.
FR: Il y a risque d'explosion si la batterie est remplacée par une batterie de type incorrect. Mettre au rebut les batteries usagées conformément aux instructions.

Technical characteristics

ISM Radio bands usage

Senlab globally communicates over frequencies in the 865-870MHz radio band with a maximum transmission power of 25mW e.r.p (+14dBm e.r.p).
More precisely, the following table describes the different sub-bands, as defined per Annex 1 of ERC Recommendation 70-03 (13 October 2017), which can be used by Senlab:

Frequency Band		Power	Spectrum Access
h1.3	865-868MHz	25mW e.r.p	1% duty-cycle
h1.4	868-868.6MHz	25mW e.r.p	1% duty-cycle

Note that 1% duty-cycle for sub-band h1.3 is allowed by ERC/REC 70-03 Annex 1 Note 5 as its usage is limited to 865-868MHz.

V1.0.3 LoRaWan stack compliant

Senlab FW	LoRaWan stack compliant
1.1.X	V1.0.0
1.2.X / 1.3.X / 1.4.X	V1.0.1
2.0.X	V1.0.3

Nothing to configure for the user, no change for the application layer, but this information could be useful if you need to connect Senlab device to LoRaWan network.

More information on LoRa Alliance®

LoRaWan Adaptive Data Rate (ADR)

Senlab devices are compatible with ADR and support from DR0 (SF12) to DR5 (SF7).
For any problem with ADR, check the FAQ Senlab on Help Center.

Electrical safety

All circuits are SELV (Safety extra low voltage), including interface circuits which are only used for measurement (signals without power, these circuits are considered LPS).

Ambient temperature of use

The ambient temperature of use depends of the version:

Indoor version	From 0°C to +55°C
Outdoor version	From -20°C to +70°C

Legals

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