SENSING LABS

SenlabA

4MA-LAB-*xx*NS©

User guide

SENSING-LABS

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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 Analog (SenlabA) sensor is a smart LoRaWAN™ radio device with an analog 4-20mA input.
The SenlabA product is intented to be connected to **any sensors with 4-20mA output**, to it 50cm free ended cable.

4-20mA

> ⚠️ Warning, the 4-20mA current loop must be powered by an external power supply, or by the sensor (transmitter).
> The SenlabA is only passive current sensor, it doesn't provide power for the loop.

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

Part number	Casing type	Protection level	Dimension
4MA-LAB-13NS	Outdoor	IP67	102x56x35mm
4MA-LAB-41NS	Indoor v2	IP30	91.5x50x25mm

Outdoor   Indoor v2

> ⚠️ Warning, take care to respect the operating temperature of the senlab:
> -20°C to +70°C for outdoor and 0°C to +55°C for indoor version

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

Provisioning of the device → On-site installation → Activation of the device

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.

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

On-site installation

➢ 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 cable pulled vertically under the device (prefer coiled positioning or use the rear gutters for outdoor version)

> 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

| Device type	Device mounting
All versions	Stick the product to the wall or cabinet with a double-sided adhesive tape
Indoor version	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 version	Use plastic cable ties with screw mount

➢ WIRING DIAGRAM: The Senlab must be plugged to 4mA sensor as follow
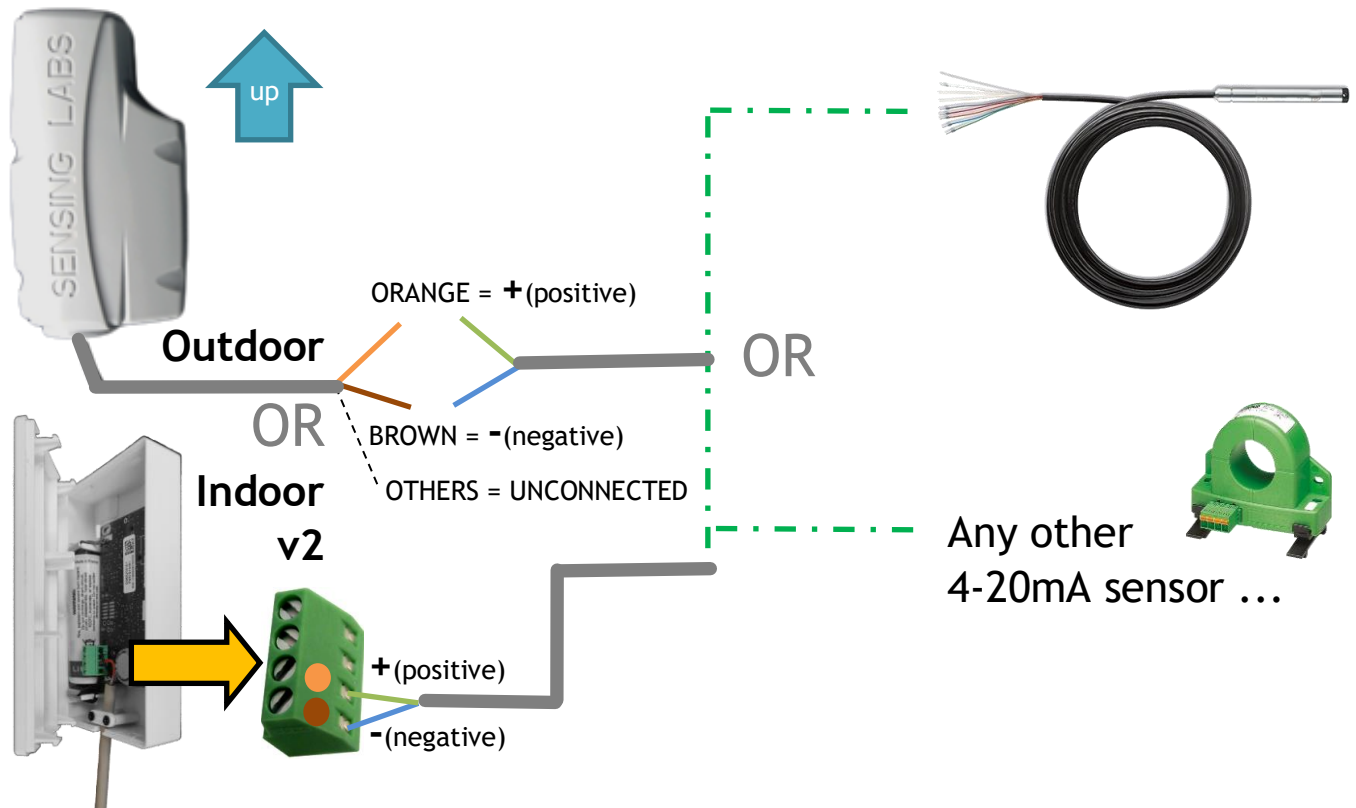
Now the device is well physically installed and plugged, you need to activate it in order to start current measurement as well as radio connection.

Activation of the device

To activate the Senlab device, you have to use a magnet (min pulling force 1Kg).
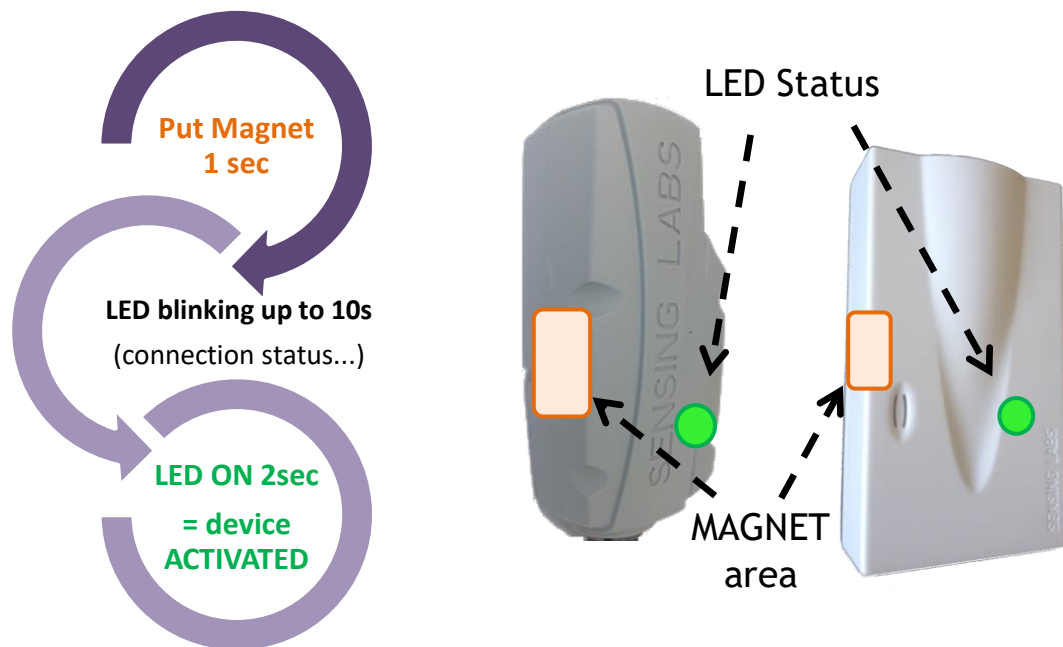
✓ Remove the magnet as soon as the LED flashes!
✓ If activation fails (No solid LED ON 2sec), Senlab will come back in storage mode.
✓ After successful activation, device will send its RESTART message (start event)

> ⚠ 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

Deactivation of the device

Senlab can be deactivated (storage mode): all measurement and radio transmissions will be stop until activation process. That means **you need a physical access to the Senlab to active it again**.
There are 2 ways to deactivate a Senlab:

➢ **Over the Air**: By sending a Downlink request STOP application (via your LoRaWAN frame management system)
➢ **With physical access (only for test devices)**: By holding the magnet during 20 seconds, then the LED stay ON for 4 seconds.

Application features (datalog mode)

This chapter describes the SenlabA application features available in datalog mode (accessible via SLgateway or SLcodec – refer respective User Guide for more details)

Measure data

ID	Description	Type	Unit	Range
current	Measured current of 4-20mA connected sensor	FLOAT	mA	0...25
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	-	-

Configuration requests

Parameter ID	Description	Type	Unit	Range
Datalog configuration (ID = request_write_datalog_cfg)				
log_period	Device will measure every X minutes	UINT16	Minute	1...1440 (1440= 24h)
log_tx_period	Device will send logged measure every X minutes (must be a multiple of log_period)	UINT16	Minute	3...1440
log_tx_random_activation (optional)	Maximize device datalog reliability	BOOL	-	-
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				

Standard mode (1 log per transmission)

This chapter describes the SenlabA application standard frame formats for decoding device payload by yourself.

Uplink message RESTART - FPort 4 (for device configured in standard mode)

This frame is automatically sent after a successful network connection for informing the application layer of its activation.

ID (1B)	DEV_EUI (8B)	APP_TYPE (1B)	Version (3B)	Ext ID (1B)	Log Period (2B)	Tx Period (2B)	Max batt. Level (4B)
0x00	LSB first	SenlabA: 0x41	Major Minor Revision	0x00	0xLLLL	0xTTTT	0xBBBBBBBB

- ✓ 0xLLLL: the log period expressed in 2 seconds units
- ✓ 0xTTTT: the transmit period expressed in 2 seconds units
- ✓ 0xBBBBBBBB: the maximum battery level used for battery life calculation expressed in mAs

Uplink message DATALOG - FPort 3 (format valid for one log per transmission only)

ID (1B)	BATTERY_LEVEL (1B)	Internal data (n bytes)	Log value (Last 2B)
0x00	0xBB	Confidential (**Length is variable**)	0xAAAA MSB first

- ✓ 0xBB: the battery level expressed in 1/254 %
- ✓ 0xAAAA: input current expressed in 1/200 mA as a 2 bytes unsigned int [0-25mA]

Downlink request STOP APPLICATION – FPort 2

This operation (request/response) will stop the Senlab application (stop of radio transmission). After response confirmation, new activation of device will be necessary.

Request	ID (1B)	STOP PARAM. (2B)	Response	ID (1B)	STATUS (1B)	STOP PARAM. (2B)
	0x01	0x0700		0x81	0x00 OK 0x01 KO	0x0700

> ⚠ To use full power of Senlab datalog mode (up to 24 log per transmission), you have to use SLcodecs tool.
>
> • Refer to the "SLCodecs Application Note" or contact us to get more information about SLcodecs integration and usage

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.

Indoor V2 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.

Security

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 is comprised between 0°C and +55°C.

Legals

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