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1. General

The XE Ambient Light sensor measures the intensity of the light in the environment in which it is placed, facilitating applications such as the adjustment of display brightness levels based on environmental light conditions. This document provides explanation of the available functionalities and instructions on how to install and integrate the sensor into your digital signage installation.

The information in this document is created for users who are familiar with the Nexmosphere API and are able to control a basic setup with a Nexmosphere API controller. If this is not the case yet, please read the general documentation on the Nexmosphere serial API first.

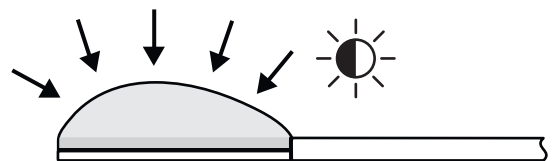
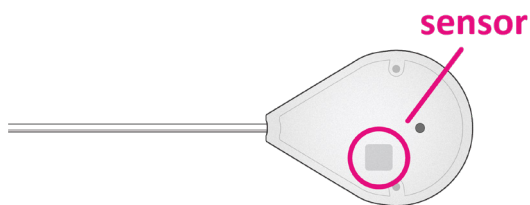
2. Product overview

	XE-A20
Ambient light measurement	✓



XE-A20

The XE Ambient Light sensor measures the intensity of ambient light and can be adhered to any object or surface. The device consists of one small sensor that is hidden beneath a translucent diffusing cover that measures the intensity of the incoming light (in Lux).



3. Functionalities and API commands

The XE Ambient Light sensor provides the following functionality:

1. **Ambient light measurement** - measures the ambient light intensity and triggers in ranges or Lux

The following sections will cover each of these functionalities in detail. Please note that for each API example in this document, X-talk interface address 001 is used (X001). When the sensor is connected to another X-talk channel, replace the "001" with the applicable X-talk address.

3.1 Ambient light measurement

When the sensor is connected, it will immediately start measuring the current ambient light intensity. Per default, the sensor will send out an API command when the measured light intensity enters a new range, varying from 1 to 9. This API message has the following format:

X001B[Ar=*] *Light intensity range in 1 - 9

The default light intensity values per range are as follows.

Range	Light intensity
1	0 - 1 lux
2	1 - 50 lux
3	50 - 250 lux
4	250 - 1.000 lux
5	1.000 - 5.000 lux
6	5.000 - 15.000 lux
7	15.000 - 40.000 lux
8	40.000 - 80.000 lux
9	80.000 - 120.000 lux

There are four different range mappings available that can be used to adjust the light intensity values of the ranges. More information can be found on page 4 of this document, setting 7.

In addition to the default range triggers, the XE Ambient Light sensor can also be set to provide the absolute light intensity value (in lux) as output. In order to do so, the output mode must be adjusted by sending the following setting command.

X001S[4:2] Set output mode to Lux

The API command for light intensity value output will have the following format:

X001B[Av=XXXXXX] XXXXXX = 0 - 120.000 lux

Example API messages

Light intensity measured of 6.000 lux
X001B[Ar=6]

Light intensity measured of 55.000 lux
X001B[Ar=8]

Example API messages

Light intensity measured of 550 lux
X001B[Av=000550]

Light intensity measured of 98.000 lux
X001B[Av=098000]

Data requests

The light intensity values can also be requested at any time by sending one of the following API commands:

X001B[LUX?] Request current light intensity (lux) value

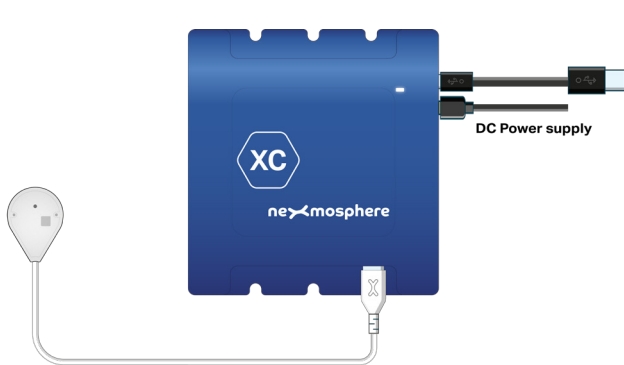
The reply will be identical to the triggered light intensity value API message such as listed above.

4. Installation requirements and guidelines

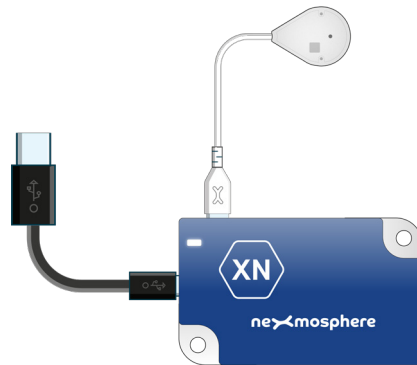
When integrating an XE Ambient Light sensor into your digital signage installation, several installation requirements and guidelines need to be taken into account in order for the sensor to perform optimal and operate stable.

4.1 Connection Diagrams

The XE Ambient Light sensor can be connected to any X-talk interface and is therefore compatible with all Xperience controllers. Make sure the XE Ambient Light sensor is connected to the X-talk interface before powering the Xperience controller. Otherwise, the sensor will not be recognized by the Xperience controller and no output will be provided.



Example connection to XC Controller



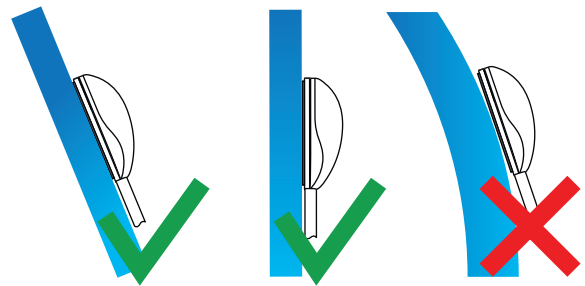
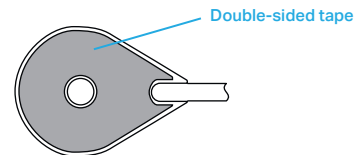
Example connection to XN Controller

4.2 Hardware integration guidelines

Installation with double sided tape

The XE Ambient Light sensor is typically installed using the double-sided tape. Using this method, the sensor securely mounts on any flat surface, horizontal vertical or angled. Furthermore, this tape is easily removable and non-marking.

Additionally, the XE Ambient Light sensor should be installed in a dry and dust-free environment.



5. Settings

The XE Ambient Light sensor has multiple settings which determine the behaviour and output of the interface. The settings can be adjusted by sending X-talk setting commands via the API. After a power cycle, the settings always return back to default.

Setting 1: Status LED behaviour

- 2. LED off X001S[1:2]
- 4. LED off, blink at trigger (default) X001S[1:4]

Setting 4: Trigger mode

- 1. Trigger on range change (default) X001S[4:1]
- 2. Trigger on value change (%) X001S[4:2]
- 3. No triggers, use data requests X001S[4:3]

When set to 4:1, the sensor will trigger when the light intensity reaches another range. When set to 4:2, the sensor will switch to triggering each time the absolute light intensity (lux) changes with 1%. When set to 4:3, the sensor will only trigger when any of the API commands for data requests are send (see page 3). For more info, please see section 3, page 2.

Setting 5: Value change percentage trigger

Any number between 1-100 X001S[5:X]

This setting adjusts the percentage that the measured lux value must change before a trigger is sent. It applies when setting 4 (trigger mode) is set to 2 (trigger on value change %).

Setting 6: Sample averaging

- 1. No averaging X001S[6:1]
- 2. Running AVG 2 samples (default) X001S[6:2]
- 3. Running AVG 4 samples X001S[6:3]
- 4. Running AVG 8 samples X001S[6:4]
- 5. Running AVG 16 samples X001S[6:5]
- 6. Running AVG 32 samples X001S[6:6]
- 7. Running AVG 64 samples X001S[6:7]
- 8. Running AVG 128 samples X001S[6:8]

This setting determines the number of samples which are averaged to calculate the sensor's output. The higher the number of samples, the less responsive the sensor will be to change, but also the more stable in case of challenging environments. The lower the number of samples, the more responsive the sensor will be to change. Please note that typically this setting does not need to be adjusted.

Setting 7: Range mapping

- 1. Full range (default) X001S[7:1]
- 2. Low light X001S[7:2]
- 3. Medium light X001S[7:3]
- 4. Maximum light X001S[7:4]

There are four preconfigured range mappings for four different lighting conditions. See the table below for the specific light intensity values (lux) per range mapping.

Table (setting 7): Light intensity value differences (in lux) per range mapping

Range	Full range	Low light	Medium light	Maximum light
1	0 - 1 lux	0 - 1 lux	0 - 1.000 lux	0 - 10.000 lux
2	1 - 50 lux	1 - 20 lux	1.000 - 2.000 lux	10.000 - 20.000 lux
3	50 - 250 lux	20 - 100 lux	2.000 - 4.000 lux	20.000 - 40.000 lux
4	250 - 1.000 lux	100 - 250 lux	4.000 - 7.000 lux	40.000 - 60.000 lux
5	1.000 - 5.000 lux	250 - 500 lux	7.000 - 14.000 lux	60.000 - 80.000 lux
6	5.000 - 15.000 lux	500 - 1.500 lux	14.000 - 25.000 lux	80.000 - 100.000 lux
7	15.000 - 40.000 lux	1.500 - 4.000 lux	25.000 - 35.000 lux	100.000 - 120.000 lux
8	40.000 - 80.000 lux	4.000 - 8.000 lux	35.000 - 60.000 lux	120.000 - 140.000 lux
9	80.000 - 120.000 lux	8.000 - 12.000 lux	60.000 - 80.000 lux	140.000 - 150.000 lux

6. Quick test

In order to test if the XE Ambient Light sensor is installed correctly, please follow the test procedure below:

Step 1 - Setup

Connect the XE Ambient Light sensor to an Xperience controller and power the Xperience controller.

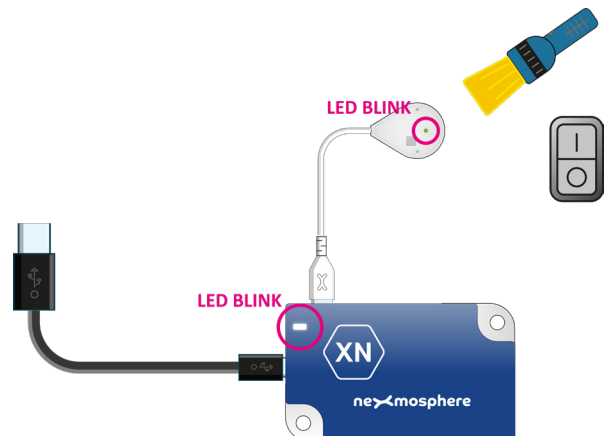
The green status LED of the XE should blink once. The status LED of the controller will start to blink and once power-up is completed will be lit continuously.



Step 2 - Test

Place the XE Ambient Light sensor in an environment that is situated in another light range, considering the nine default ranges of the light intensity. This can, for example, be done by aiming a flashlight on the sensor or switching off the light (or on).

Both the green status LED of the sensor and the status LED of the controller should blink each time a different range is detected.



In case any of the steps above does not provide the expected result, please check the installation guidelines in this document.

For a full test we recommend to connect the setup to a mediaplayer or PC and test all API commands listed in this document (see section 3, page 2-3). For more information on how to setup a test for your controller, please see the Quick Start Guide of the Xperience controller you are using. These are available on nexmosphere.com/support-documentation

Please contact support@nexmosphere.com for any support questions you may have.