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**1. General**

The X-Eye presence sensors can detect if a person or object is in front of the sensor and - if so - indicate the distance of the person or object in relation to the sensor. 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**

The X-Eye Presence sensors are available in 3 different models:



XY-116



XY-146



XY-176

Each model has a specific detection range and sensor dimension:

	XY-116	XY-146	XY-176
minimum detection range	5cm	10cm	25cm
maximum detection range	80cm	150cm	500cm
beam angle	5.5 °	5.5 °	5.5 °

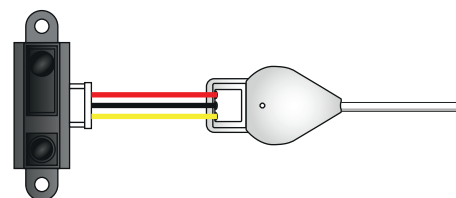
The X-Eye Presence sensor is also available as an embedded on-board interface (micromodule) on the XN-135M3 controller. In this integrated cost-effective form factor, the sensor can be connected directly to the XN-135M3 controller using a CA3-S4C sensor cable. The functionality of the sensor is the same. The correlation of the product codes is as follows:

- XY-116 | XN135M31 (controller) + S-CM01 (sensor) + CA3-34C (sensor cable)
- XY-146 | XN135M34 (controller) + S-CM04 (sensor) + CA3-34C (sensor cable)
- XY-176 | XN135M37 (controller) + S-CM07 (sensor) + CA3-54C (sensor cable)



# PRODUCT MANUAL | X-EYE PRESENCE SENSOR

The X-Eye Presence sensors utilize Infrared proximity technology to detect if a person or object is present. The working principle is that an IR beam is transmitted, which is reflected back by the nearest person or object in front of the sensor. Based on the angle of the reflected IR beam, the distance of the person or object in front of the sensor is calculated.



### 3. Functionalities and API commands

The X-Eye Presence sensors provide the following functionalities:

- 1. Presence & Proximity detection** - detects if a person or object is present and indicates the distance

This information is translated into an API message which has the following format:

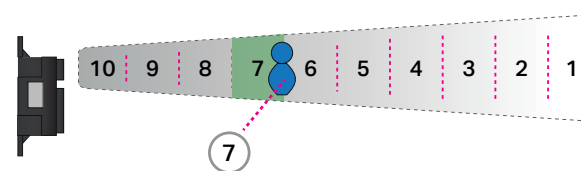
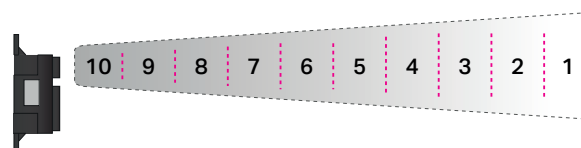
**X001A[X]**                      X= distance zone                      value between **1-10**

The following section will cover this functionality 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 - Presence & Proximity detection

The X-Eye Presence sensor divides its detection range into 10 distance zones. Each time a person or object in front of the sensor move into a new distance zone, an API command is triggered, indicating the current distance zone. In the table below, the absolute distance ranges for the default distance zones are provided:

Zone	XY-116	XY-146	XY-176
10	5-10 cm	10-20 cm	25-100 cm
9	10-15 cm	20-30 cm	100-125 cm
8	15-20 cm	30-40 cm	125-150 cm
7	20-25 cm	40-50 cm	150-175 cm
6	25-30 cm	50-60 cm	175-200 cm
5	30-40 cm	60-80 cm	200-250 cm
4	40-50 cm	80-100 cm	250-300 cm
3	50-60 cm	100-120 cm	300-400 cm
2	60-80 cm	120-150 cm	400-500 cm
1	>80 cm	>150 cm	>500cm



#### Example commands

Person detected in distance zone 4  
**X001A[4]**

Person detected in distance zone 7  
**X001A[7]**

Person detected in distance zone 10  
**X001A[10]**

No person detected (distance zone 1)  
**X001A[1]**

When implementing distance zone triggers, consider the following:

- When no person is in front of the sensor, the distance zone will be 1.
- If the position of a person overlaps multiple distance zones, only the number of the slot which is closest to the sensor is given.
- The absolute physical distance ranges of the distance zones can be customized. Please see section 5 "Settings", page 6.

# PRODUCT MANUAL | X-EYE PRESENCE SENSOR

The X-Eye Presence sensor can also indicate the distance as a raw decimal value

**X001A[X]**                      X= raw distance value      value between 1-255

Per default, the detected distance is always indicated as distance zones and not via raw decimal values. In order to activate distance indication via raw decimal values, send the following setting: **x001s[4:1]**

The raw decimal value is a unfiltered direct AD conversion of the analog signal provided by the core IR measurement component of the sensor and will fluctuate highly **We therefore recommend to not use Raw Distance Value mode for normal operation.** Instead, the Raw Distance Value mode is intended to be used a reference for when wanting to create custom distance zone ranges.

Please see section 5 "Settings", page 6, for more information on creating custom distance zone ranges

### Example commands

Raw distance value of detected distance is "7"  
**X001A[7]**

Raw distance value of detected distance is "51"  
**X001A[51]**

Raw distance value of detected distance is "178"  
**X001A[178]**

## 4 - Installation requirements and guidelines

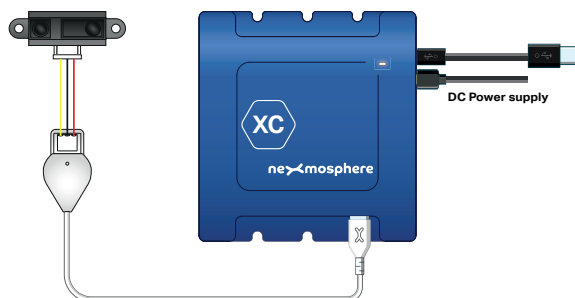
When integrating an X-Eye Presence sensor into your digital signage installation, several installation requirements and guidelines need to be taken into account in order for the sensor to perform optimal and operate stable.

### 4.1 Electrical installation requirements

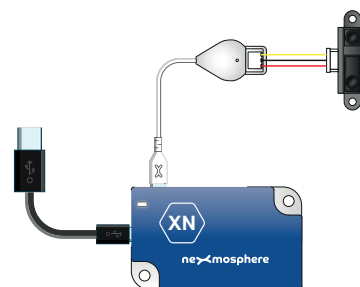
The long-range X-Eye Presence sensor (**XY-176**) draws a peak current of 350mA. When connecting multiple XY-176 sensors to a controller, please make sure that the total amount of required current is within the specification of the controller and its power supply source. For example: when using a XN-185 controller connected to a 5V/2A USB power supply, the maximum amount XY-176 Presence sensors which can be connected to the controller is 5. ( $2A / 0.35A = 5.7 \approx 5$  sensors)

### 4.2 Connection Diagrams

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



Example connection to XC Controller

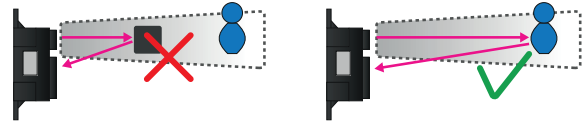


Example connection to XN Controller

## 4.3 Hardware integration guidelines

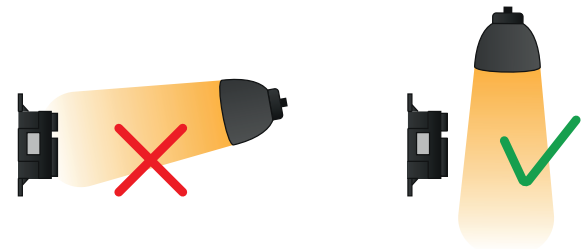
### Clear view in front of sensor

Objects in front of the sensor interrupt the IR beam and cause inaccurate sensor output. Make sure the sensor has a clear view and is not obstructed by any objects within its detection range.



### Interference external light sources

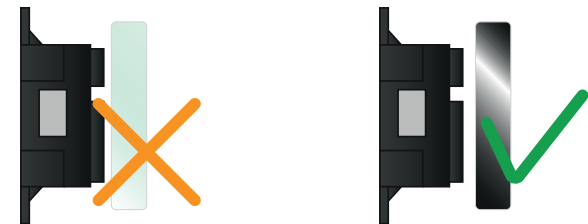
Bright light sources aimed directly into the sensor or onto the detection surface can cause inaccurate sensor output. Make sure that the sensor is positioned in such a way that it's not directed towards any (strong) light source, such as a halogen lamp or (compact) fluorescent lamp.



In practice, this also means that the sensor is not suitable for outdoor applications as the sun will cause interference on sunny days.

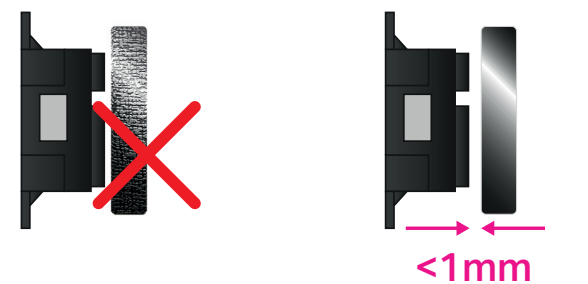
### Placing sensor behind (transparent) material

In case the sensor needs to be placed behind a transparent front panel such as glass or acrylic, make sure the material has a high transmittance with an emitted spectrum wavelength of 850nm (+/-70nm).



Please note that most commonly used types of glass and acrylic do not have a transmittance in the IR spectrum and can therefore not be placed in front of the sensor. We recommend to use black "IR acrylic", typically used for example in remote controls. Or alternatively, make a cut out in the front panel (see next section).

The material in front of the sensor needs to be completely smooth (e.g. no sand brushing or markings). The clearance between the sensor and the front panel needs to be 1mm or less.

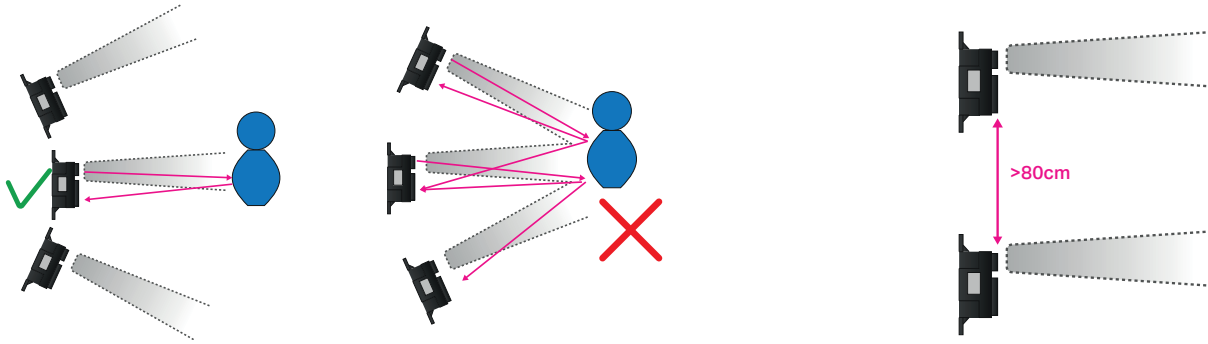


### Panel cut out

Both the transmitting and the receiving lens of the sensor need to have a clear view of the person standing in front of it. When placing the sensor behind a front panel which does not have a transmittance in the IR spectrum (see previous section), a cut out needs to be made. The recommended mechanical dimensions of the cut out are provided in the datasheets of the X-Eye Presence sensor and are marked with magenta lines in the mechanical drawings.

## Multiple sensors / Clearance

When using multiple X-Eye Presence sensors in one application, make sure that they do not point to the same location. This can cause cross interference as the reflecting beam of a sensor can reach the receiver of an adjacent sensor, resulting in unstable behavior of the sensor. Therefore, when using multiple sensors facing in the same direction, it is recommended that:



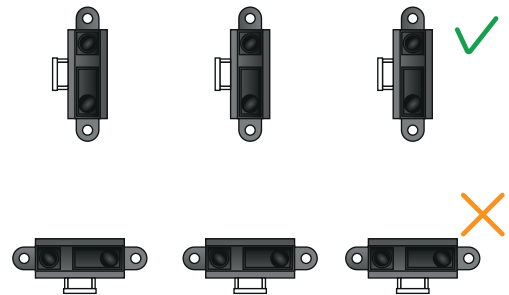
- the sensors are placed at an outwards directed angle, so that the beams of the sensors diverge and are not parallel to each other

and/or

- that each sensor is placed with a minimum clearance of >80cm.

and/or

- the sensors are placed in vertical position. This reduces the chance of cross interference due to the shape and mechanical dimensions of the sensor's casing.



## Narrow detection beam

All X-Eye Presence sensors have a narrow detection beam angle of approximately 5.5°. Please take this into consideration when designing your setup and determining the position of the sensor.



## Ambient temperature

The ambient temperature has a minor influence on the detection range and the distance zones mentioned on the previous pages. The default distance zones are divided in such a way that the X-Eye Presence sensor works most accurately in the temperature range between 16-26 degrees Celsius (61 to 79 Fahrenheit). When operation at colder or warmer temperatures is expected, it is recommended to create custom distance slots. Please refer to the API document for instructions on how to do so, or contact [support@nexmosphere.com](mailto:support@nexmosphere.com) for help.

## 5 - Settings

The X-Eye Presence sensor has multiple settings which determine the behaviour and output of the sensor. 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

- 1. LED on x001s [1:1]
- 2. LED off x001s [1:2]
- 3. LED on, blink at trigger (default) x001s [1:3]
- 4. LED off, blink at trigger x001s [1:4]

### Setting 4: Output mode

- 1. Config: Raw distance data x001s [4:1]
- 2. Normal: Distance zones (default) x001s [4:2]

For more info, please see section 3.1, page 2 and 3.

### Setting 5: Sample interval

Set sample interval x001s [5:X]

X is a value between **1-250** and its default value is **10**. It indicates the interval in mS at which a sample is taken from the distance measurement data. **So the lower the X value, the longer the time between two outputs and vice versa.** Please note that typically this setting does not need to be adjusted.

### Setting 10-29: Custom distance zone values

The total range of raw distance values is 1-255. The raw distance value is a unfiltered direct AD conversion of the analog signal provided by the core IR measurement component of the sensor. This means that the raw distance value has a direct correlation with the physical distance measured. There are 10 distance zones available in which the total range of raw distance values is allocated. Per default, the distance zones are divided as indicated in the tables below. Setting 10-29 can be used to overwrite the default raw distance values for each distance zone, facilitating custom distance zones.

Set lower value distance zone 1	x001s [10:X]
Set upper value distance zone 1	x001s [11:X]
Set lower value distance zone 2	x001s [12:X]
Set upper value distance zone 2	x001s [13:X]
Set lower value distance zone 3	x001s [14:X]
Set upper value distance zone 3	x001s [15:X]
Set lower value distance zone 4	x001s [16:X]
Set upper value distance zone 4	x001s [17:X]
Set lower value distance zone 5	x001s [18:X]
Set upper value distance zone 5	x001s [19:X]
Set lower value distance zone 6	x001s [20:X]
Set upper value distance zone 6	x001s [21:X]
Set lower value distance zone 7	x001s [22:X]
Set upper value distance zone 7	x001s [23:X]
Set lower value distance zone 8	x001s [24:X]
Set upper value distance zone 8	x001s [25:X]
Set lower value distance zone 9	x001s [26:X]
Set upper value distance zone 9	x001s [27:X]
Set lower value distance zone 10	x001s [28:X]
Set upper value distance zone 10	x001s [29:X]

Please note that typically it is not necessary to create custom distance zones, as for most application the default distance zones provide enough information to build the desired application.

Distance Zone
1
2
3
4
5
6
7
8
9
10

XY-116			
default raw distance value		default physical distance	
lower value	upper value	lower value	upper value
1	24	80cm	infinity
2	25	30	60cm
3	31	36	50cm
4	37	44	40cm
5	45	56	30cm
6	57	66	25cm
7	67	82	20cm
8	83	106	15cm
9	107	152	10cm
10	153	255	5cm

XY-146			
default raw distance value		default physical distance	
lower value	upper value	lower value	upper value
1	26	150cm	infinity
2	27	32	120cm
3	33	38	100cm
4	39	48	80 cm
5	49	64	60cm
6	65	76	50cm
7	77	94	40 cm
8	95	122	30cm
9	123	154	20cm
10	155	255	10cm

XY-176			
default raw distance value		default physical distance	
lower value	upper value	lower value	upper value
1	76	500cm	infinity
2	77	80	400cm
3	81	90	300cm
4	91	98	250cm
5	99	108	200cm
6	109	124	175cm
7	125	126	150cm
8	127	136	125cm
9	137	146	100cm
10	147	255	25cm

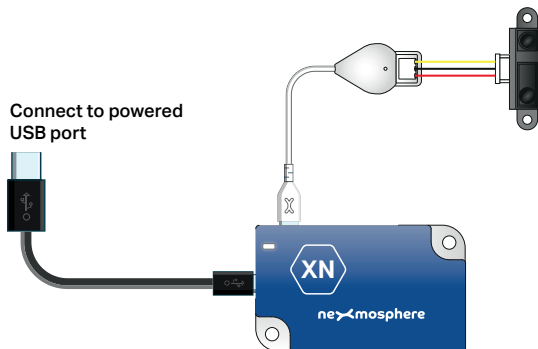
## 6. Quick test

In order to test if the X-Eye Presence sensor is installed correctly, please follow the test procedure below:

### Step 1 - Setup

First, connect the X-Eye Presence sensor to an Xperience controller. Secondly, power the Xperience controller.

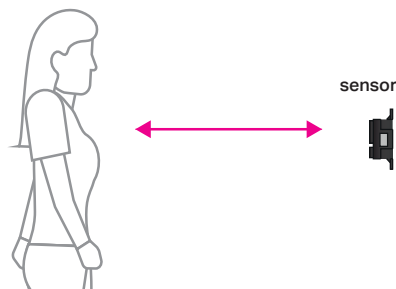
The green status LED of the X-Eye Presence sensor should go on. The status LED of the controller will start to blink and once power-up is completed will be lit continuously



### Step 2 - Test detection

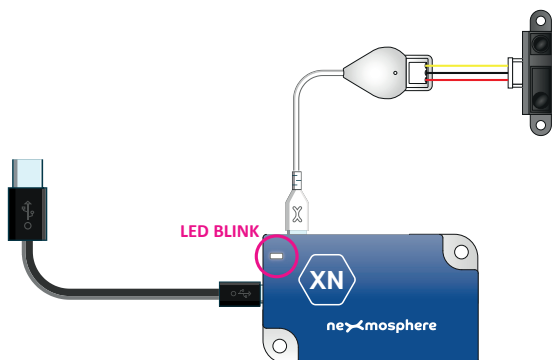
Stand +/-30cm in front of the X-Eye Presence sensor.

Both the green status LED of the sensor and the status LED of the controller should blink.



Move in perpendicular direction towards or away from the sensor

Both the green status LED of the sensor and the status LED of the controller should blink each time you enter a new distance zone.



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](https://nexmosphere.com/support-documentation)

Please contact [support@nexmosphere.com](mailto:support@nexmosphere.com) for any support questions you may have.