Single, cost-effective luminaire control

September 2018
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Introduction to this guide

In this document, you will find necessary information required to design this product into a luminaire and configure it to suit specific applications. This design-in guide covers the module functionality, mechanical mounting, wiring details, access control and configuration details, application notes and frequently asked questions.

More information or support
For further information or support, please consult your local Signify sales representative or visit our website.
http://www.lighting.philips.co.uk/oem-emea/support/technical-downloads
Warnings and instructions

- The EasyAir SNO110 is a Sensor Ready (SR) device and therefore is to be used together with a Philips Outdoor Xitanium SR LED driver via an SR connector.
- Do not apply mains power directly to the device.
- Do not cover the device during operation or mount the node below the luminaire. For mounting instructions, refer to section Mechanical design-in.
- Make sure that the device is not damaged during shipment and handling.
- The application area of EasyAir SNO110 is outdoor environment such as urban local roads, bicycle or pedestrian streets, squares, city centres or open parking areas. It has no protection against aggressive chemicals.
- Make sure that the EasyAir SNO110 device is not covered by metal to allow expected GPS reception and Bluetooth communication.
Introduction of EasyAir

**Product description**

EasyAir SNO110 is ideally suited for outdoor applications and is intended for individual pole control. It contains Global Navigation Satellite System (GNSS) receiver to obtain date and time information in real time. On/off switching as well as a 5-step DynaDimmer scheduling are based on the location and the accurate date and time and can be configured via the built-in Bluetooth communication. Therefore, this device can easily replace photocell or LineSwitch-based control mechanism. EasyAir SNO110 operates with Xitanium SR drivers via 3 wire interface through the standardized interface SR connector [1]. The result is a long-lasting, cost-effective and easy-to-design-in solution ideal for energy savings. An intuitive app called EasyAir SNO allows for quick and easy access control and configuration of the device during and after installation.

Typical application areas for the SNO110 are stand-alone control for:
- Residential or Urban area,
- City center, Shopping area
- Pedestrian, bicycle roads,
- Squares, Campus, Parking, etc.
Product characteristics

EasyAir overview
EasyAir SNO110 contains multiple functions in one housing and is powered by an SR driver. The following images show the primary functions included in the sensor:

SR interface
EasyAir SNO110 is powered via SR interface using three wires. It is connected to Xitanium SR drivers (sXt) via the universal SR connector. The device needs the auxiliary 24V supply which is supplied via SR connector from the SR driver. See Figure 3. More information on SR Connector is available on our website.

SimpleSet
The SimpleSet interface allows working with EasyAir SNO110 using Near Field Communication (NFC) in both powered or non-powered states. NFC is a short-range, low power wireless link evolved from radio-frequency identification (RFID) technology that can transfer small amounts of data between two devices held a few millimeters from each other. This interface is ideally used prior to installation on the luminaire to configure the device and is enabled within the Android app “EasyAir SNO110”, available for free on Google Play Store. All parameter settings for lighting control can be configured via NFC.

The optimal working of NFC is dependent on the smartphone used. Note that the position of the NFC reader on a smartphone varies per brand/model used. For details on supported smartphones and the location of its NFC reader, please refer to our website.

Note: EasyAir SNO110 is not currently supported via MultiOne.
**Radio Frequency**

The RF antenna allows wireless communication between a smartphone and SNO110 device using Bluetooth Low Energy (BLE) standard, currently maintained by Bluetooth SIG. An EasyAir SNO110 should not be covered by metal and always be exposed to free air to ensure there is good range for communication. The maximum pole height that can be reached is up to 18m. The maximum distance from smartphone to SNO110 can be 30m at the height of 18m, provided there is clear line of sight with no obstacles.

**Note:** EasyAir SNO110 should be powered up for RF communication.

**Note:** The general requirement of a smartphone suitable for EasyAir SNO110 is Android 5.0 or higher, and Bluetooth 4.2 or higher.

**Global Navigation Satellite System**

In EasyAir SNO110, Global Positioning System (GPS) is the used GNSS variant to retrieve clock and positioning information. This information enables accurate timing used for the DynaDimmer scheduling feature. Through GPS and time zone set by the user via the app, the local time (including daylight saving time) is known by the device.

**Note:** At power-up, the EasyAir SNO110 takes about 45 seconds to lock the GNSS satellites and have reliable position and time information. Only after ~45 seconds, it will start to control the light.

**Light sensor**

The light sensor measures the ambient light level. The light sensor works as a backup in case *Mains Switching* feature is disabled (= Astroclock switching enabled) and the SNO110 device does not receive a GPS signal. In this case the light will be switched on when the ambient light level drops below a predefined threshold and will automatically switch off the light when there is enough daylight. This backup mechanism is automatically activated and deactivated within the SNO110 device.
Lighting control

Clock and Position
As EasyAir SNO110 has an internal GNSS receiver, it has information on time and position via the satellites. With the time zone set by the user via the app, it can accurately determine the exact time at any location.

Astroclock switching
Depending upon the specific geographical location and the Earth’s rotation, the daily sunrise/sunset timing differ. For example, the sun sets down quickly in areas near the Equator, resulting in a very short twilight. However, in regions near Poles, the sun lingers along the horizon and the twilight period lasts longer. This leads to the need to have adaptive scheduling for correct night time illumination.

When Astroclock switching is enabled (=Mains switching disabled), the EasyAir SNO110 will accurately switch on/off the light taking the time zone and location into account. Via the EasyAir SNO app, the user should define the preferred sun elevation angle at which to switch on/off. For information and details on twilight and sun elevation angle, see the sub-section below.

Twilight
Twilight is defined in three distinct phases and is based on the elevation of the sun from the horizon: civil, nautical, and astronomical. Sunset and sunrise are when the sun is at 0° elevation on the horizon. Refer Figure 5 and Table 1 for details on different zones within twilight and the corresponding sun elevation angle. For e.g. if a user would like to switch on/off the lights during golden hour, he/she could choose to set an elevation angle of -2° to the device via the EasyAir SNO app.

![Figure 5 - Twilight zones between day and night. Also note the sun elevation angles at every stage.](image-url)
### Light Phase and Sun Elevation Angle

<table>
<thead>
<tr>
<th>Light Phase</th>
<th>Sun Elevation Angle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day</td>
<td>Above 6°</td>
</tr>
<tr>
<td>Evening magic hours</td>
<td>Golden hour: From 6° to -4°</td>
</tr>
<tr>
<td>Blue hour</td>
<td>From -4° to -6°</td>
</tr>
<tr>
<td>Evening Twilight</td>
<td>Civil Twilight: From 0° to -6°</td>
</tr>
<tr>
<td>Nautical Twilight</td>
<td>From -6° to -12°</td>
</tr>
<tr>
<td>Night</td>
<td>Astronomical Twilight: From -12° to -18°</td>
</tr>
<tr>
<td>Morning Twilight</td>
<td>Astronomical Twilight: From -18° to -12°</td>
</tr>
<tr>
<td>Nautical Twilight</td>
<td>From -12° to -6°</td>
</tr>
<tr>
<td>Civil Twilight</td>
<td>From -6° to 0°</td>
</tr>
<tr>
<td>Morning magic hours</td>
<td>Blue Hour: From -6° to -4°</td>
</tr>
<tr>
<td>Golden Hour</td>
<td>From -4° to 6°</td>
</tr>
</tbody>
</table>

Table 1 - Light phase and corresponding sun elevation angle.

The device can be set in the range from +4° to -4°, default setting is -0.833°.

**Note:** When Mains Switching is on, (i.e. the Astroclock switching will be disabled) in this mode the daily power on/off switching is provided by the installation. In this case the accurate time (UTC) in the GNSS information will be used to control the DynaDimmer scheme.

**DynaDimmer Scheduling**

A real-time DynaDimmer schedule can be enabled in EasyAir SNO110. This is possible as EasyAir SNO110 has the local time information available via satellites through its GNSS receiver. Together with the time zone information from the app, the EasyAir SNO110 device can also account for the daylight saving start/end time. This results in very accurate timing information when compared to a photocell-based scheduling, without any deviation between different devices mounted on poles in the same street. This helps prevent “pop-corn” effect between luminaires on the same street.

The DynaDimmer setting consists of:
- Zero to maximum five dimming steps with
  - start time (in hh:mm, local time)
  - light level (in %)
- fade time (in seconds)
Note: The DynaDimmer function in the Xitanium SR driver will automatically be disabled. When the EasyAir SNO110 is removed, the internal configured DynaDimmer in the SR driver will be activated again.

Adjustable Light Output
Usually, all luminaires are shipped with a fixed light output. However, on site, it is possible that the installer prefers to modify the maximum light output. Such flexibility is supported in EasyAir SNO110.

Via the EasyAir SNO app, it is possible to adjust the light output between 10% and 100% of the maximum possible light output of the luminaire. This percentage is referred to as the Adjustable Light Output (ALO) factor. ALO can be set in steps of 1% either via NFC or BLE through the app. This percentage will also be used for the DynaDimmer levels. For example, if ALO is configured at 80% and light-level in a DynaDimmer step is 50% the light output will be set 40%.

Manual Light Control
It is possible to have a manual light control of light during configuration of EasyAir SNO110 device. Not only can an installer test the light levels to determine the desired ALO but can also ensure that the Bluetooth communication is working optimally.

Note: The ‘manual light control’ is a test; and once the screen on the app is closed, the device goes back to as previously configured.

![Figure 7 - Configure screen of EasyAir SNO app. The right side screenshot shows the manual light control.](image-url)
System overview

In this section, the working of EasyAir SNO110 is outlined in detail. Figure 8 shows the building blocks of the system:

1. A luminaire consisting of an outdoor SR driver, SR connector and EasyAir SNO110
2. A smartphone with the latest EasyAir SNO App and a robust internet connection
3. Cloud (on the backend side) to enable secure connection with SNO110 device

Register” on the login screen.

Figure 8 - System overview

Figure 9 - Login screen of EasyAir SNO app. Any user can register by clicking on 'Register' button.
Immediately upon registration, the user will receive a confirmation email to validate their email address. Once validated, the user can move on with accessing the app.

**Forgot Password?**
It is also possible to recover credentials via “I forgot my password” button on the login page [www.componentcloud.philips.com/#/login](http://www.componentcloud.philips.com/#/login).

**Note:** It is important to have a stable and robust internet connection. This will help in reliable setup and working of SNO110 installation.

**Note:** For more information on app, please refer our app manual - [www.docs.lighting.philips.com/en_gb/oem/download/xitanium/Instructions_EasyAir_SNO110_App.pdf](http://www.docs.lighting.philips.com/en_gb/oem/download/xitanium/Instructions_EasyAir_SNO110_App.pdf).

**Access Control**
Once the luminaire and the smartphone with EasyAir SNO app are ready, the installer can get started with working with EasyAir SNO110. Each SNO110 device is unique and in order to prevent unauthorized access to SNO devices, each device can be exclusively assigned to a single user account. Once assigned, only that user will be able to access the SNO device thereafter. Factory new SNO device(s) are not assigned to any user, i.e. not owned by anybody. The first user who makes connection with the device (either via NFC or BLE) automatically get ownership of the device. Obtaining ownership of the device is called ‘Claiming’ inside the EasyAir SNO App. Once the device is claimed, no other user can modify the light control settings or behavior. However, some basic information of a device, like its Unique ID can be obtained from the device by anyone, even if it is not owned by that person. For transfer of ownership or reset of devices, contact your local Signify sales representative or email us at philips_apps_helpdesk@signify.com.
**Configuration**

The configuration allows to setup the switching light behavior along with the dimming schedules. There are two possible options to have light switching – (1) via mains switching where switch on/off of lights is through the mains grid or (2) automatically aligned with sunrise/sunset timing with the elevation angle offset configured (Astroclock switching as described above).

Following parameters can be set for light control via the EasyAir SNO app:

- **Time zone**: This feature influences the dimming schedule
- **Mains switching**: Enabling this feature implies that light control is not via Astroclock switching. Mains grid will be used to switch on/off the luminaire on a pole
- **Elevation Angle**: This feature influences the astroclock on/off switching. Refer the section above for more details
- **Adjustable Light Output**: This allows the change of maximum light output level of a luminaire. The dimming schedule light levels will be a percentage of this value.
- **Dimming schedule**: This feature allows to set DynaDimmer schedule upto 5 steps

**Note**: The mains switching or Astroclock switching define the overall on/off switching behaviour and dimming schedule works once the lights switch on (defined by Mains or Astroclock switching)

Configuration can be done via NFC or Bluetooth. In both cases, a secure connection is setup via the cloud.
## Device Information

Following information is available:

<table>
<thead>
<tr>
<th>Device name</th>
<th>For device identification; can be modified by installer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global product code</td>
<td>Device 12NC</td>
</tr>
<tr>
<td>BLE MAC address</td>
<td>A 6-byte in hexadecimal format and separated by colons (example - 00:11:22:33:FF:EE)</td>
</tr>
<tr>
<td>Software version</td>
<td>Firmware version available on device</td>
</tr>
<tr>
<td>Unique product ID</td>
<td>128 bit code as a unique identifier of the device</td>
</tr>
<tr>
<td>GPS</td>
<td>Device location coordinates – latitude, longitude</td>
</tr>
<tr>
<td>Time</td>
<td>Local time at the location of the device</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>If no errors, the status is OK. Else, a 3-byte hexadecimal code appears (example: FFFFBC)</td>
</tr>
</tbody>
</table>
Mechanical design-in

Dimensions

Figure 11 – Dimensions of EasyAir SNO110

Wiring (SR Connector)

EasyAir SNO110 is fitted on SR connector via twist and lock mechanism. The SR connector is connected via 3 wires to SR-, SR+ and AUX (+24V) terminals of Xitanium SR outdoor driver.

Figure 12 – Wiring of EasyAir SNO110 to Xitanium SR outdoor driver
EasyAir SNO110 installation

It is important to note that the orientation of mounting is important for optimal performance of EasyAir SNO110; and therefore, it is recommended to have GPS antenna and BLE receiver placed in appropriate directions.

Referring Figure 13, if a luminaire is placed along the Z-axis, the antenna of EasyAir SNO110 should be along Y-axis as shown in Figure 13 and Figure 14.

Figure 13 – Placement of luminaire and EasyAir SNO110 along a road

Figure 14 – Two possible ways to install EasyAir SNO110 to ensure that the antenna is along Y-axis
To ensure that the antenna of SNO110 is along the Y-axis, the SR connector should be installed correctly. Refer Figure 15 for correct installation of SR connector, where the Zhaga X-axis should be parallel to the road i.e. along the X-axis in Figure 13, and the Zhaga Y-Axis should be perpendicular the road i.e. along the Y-axis in Figure 13. For more information on the cut-out, please visit the website of TE Connectivity or refer Zhaga Book 18 standard [1].

**Note:** Make sure that the mounting of EasyAir SNO110 via twist and lock mechanism on SR connector does not cause any rotation of both SR connector and SNO110. The mounting torque of the nut of the SR connector is important to be taken care of, please visit TE application note for more details [2].

**Note:** EasyAir SNO110 can be mounted on the top of the luminaire only, with a maximum angle of 45° w.r.t. the horizon.

**Note:** Once EasyAir SNO110 is connected through the SR connector to the SR Driver, the driver’s built-in dynadimmer will be disabled if it was enabled before.

![Figure 15 - Installation positions of SR connector (top view) for correct mounting of EasyAir SNO110](image-url)
# FAQ

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can EasyAir SNO110 work with other nodes from SR partners?</td>
<td>Currently EasyAir SNO110 is standalone only. Multi-master functionality is not supported.</td>
</tr>
<tr>
<td>How do I mount the SR connector?</td>
<td>The SR connector is a universal socket from Zhaga Book 18. It is manufactured by Tyco Electronics. Please refer the application note supplied by TE; also available on our website.</td>
</tr>
<tr>
<td>Can EasyAir SNO110 work with multiple SR drivers in one luminaire?</td>
<td>This functionality is currently not supported. Only 1:1 configuration is supported in this release.</td>
</tr>
<tr>
<td>Does the DynaDimmer of the driver interfere with DynaDimmer of SNO?</td>
<td>No. As soon as EasyAir SNO110 is connected, the DynaDimmer function of the SR driver is automatically disabled.</td>
</tr>
<tr>
<td>I don't see my EasyAir SNO110 device in the list of scanned devices.</td>
<td>Follow the steps – Disconnect Bluetooth on your smartphone, re-connect Bluetooth and then re-scan on EasyAir SNO app. In case the issue persists, re-start the app and work again after a gap of 2-3 mins.</td>
</tr>
</tbody>
</table>

**References**

4. [www.lighting.philips.co.uk/oem-emea/support/technical-downloads](http://www.lighting.philips.co.uk/oem-emea/support/technical-downloads)
Contact details

For product information, please visit our website or contact your local Signify sales representative.

**Website:**
Connected lighting:
[www.lighting.philips.co.uk/oem-emea/products/connected-lighting](http://www.lighting.philips.co.uk/oem-emea/products/connected-lighting)

Technical downloads:
[www.lighting.philips.co.uk/oem-emea/support/technical-downloads](http://www.lighting.philips.co.uk/oem-emea/support/technical-downloads)
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