



**SmartTR**<sup>📶</sup>  
Wireless Lighting Control System



# SmartTR<sup>®</sup>



## Introduction

The Thorlux Smart System exploits the latest 'Digital Technology' to provide a simple, effective method of lighting control which minimises energy consumption whilst retaining high levels of user comfort. Projects utilising the Thorlux Smart System can frequently benefit from savings in excess of 70% energy when compared with conventional technology.

A discrete sensor integral to the luminaire monitors ambient light and presence controlling output to the correct level, and ensuring that the area is only illuminated when occupied.

Individual Thorlux Smart luminaires may be linked using a 'Motionline' two wire low voltage bus allowing luminaires to communicate within a group. If any one luminaire detects movement all connected luminaires within the group will illuminate.

This valuable feature is designed to eliminate the possibility of a user being isolated in a small pool of light, surrounded by intimidating darkness. Motionline ensures that there will always be a well lit comfortable environment. Motionline wiring also allows other digital signals, for example from wall mounted touch sensitive Smart Scene plates, enabling scene control of individual luminaires or groups of luminaires.

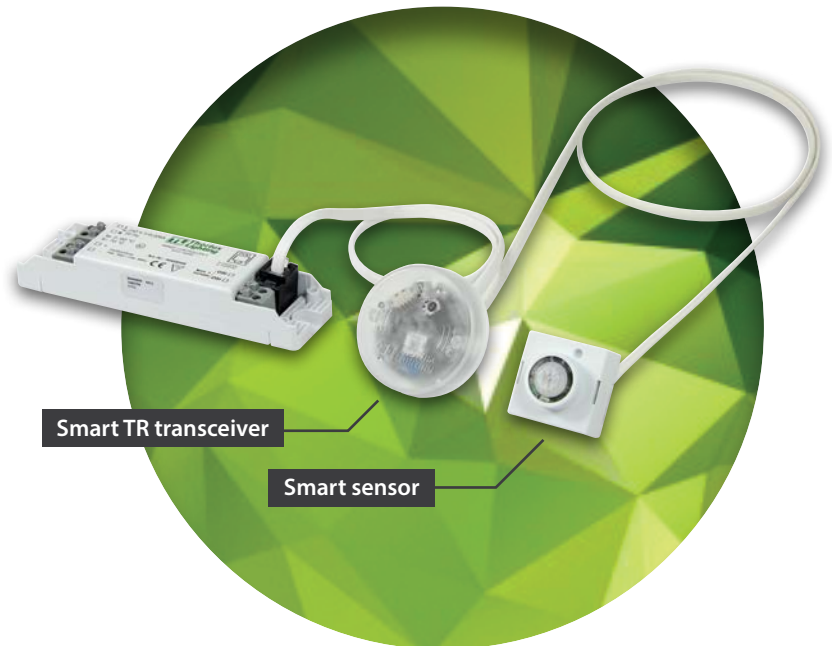
In some cases it can be time-consuming and costly to make interconnections between luminaires, for example in surface mounted retrofit installations, or in external areas such as open car parks. Thorlux has therefore developed the Smart System further, to its next generation, and now provides the option of full wireless control between Smart luminaires. This new enhanced system, patent granted June 2014, is named **Smart TR**.

## How does Smart TR work?

The factory fitted addition of a Smart TR transceiver, to a Thorlux Smart luminaire, introduces the latest "mesh" wireless technology and replaces the wired Motionline communication signals between luminaires with sophisticated, trouble free wireless transmissions.

Each transceiver can be individually programmed with a Smart Programmer, during commissioning, and assigned to work exclusively within a particular building, or group created within that building. It is also possible to create situations where different parts of a building communicate – for example, when presence is detected in the offices, the corresponding corridors or staircases can be kept illuminated.

Smart TR uses 868MHz secure radio communication chosen for its excellent transmission distance and object penetration, especially useful within buildings. Each luminaire acts as a wireless node, repeating each command received onto the next luminaire, providing a robust system that will always find a communication path.





Operational frequency 868MHz – relatively long wavelength compared to common 2.4GHz systems – provides greater distance and penetration of signals.



Intelligent algorithm with low transmission of data – transmits less than 1% of total time (99% of time wireless is off) – reduces wireless traffic increasing reliability.



Mesh network – data can be transmitted from one device to another ensuring high signal reliability.



Good connectivity – software uses simple wait before transmit logic to ensure error free transmissions.



Smart Programmer used for commissioning – simple, fast, individual, setting of operational parameters from ground level.



Available in most Thorlux Smart fittings, including the Smart External range – seamless introduction of wireless communication to a Smart System.

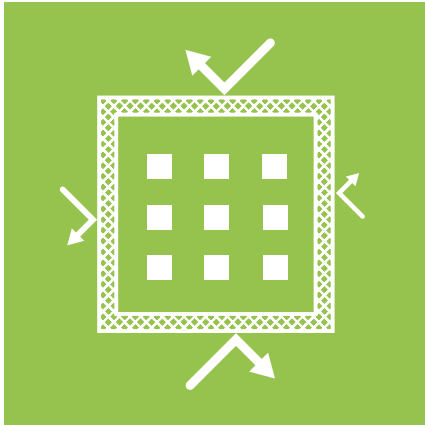


Designed and manufactured by Thorlux in the UK – a one stop shop for luminaires, controls and connectivity.

## How does Smart TR prevent cross-talk between different groups?

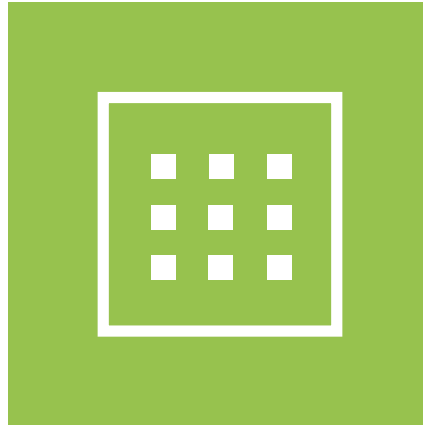
### Addressing

Each Smart TR module can be addressed to suit its application. The following parameters are programmable:



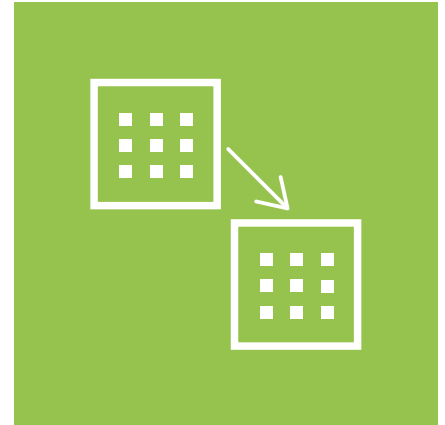
#### Building Address

Identifies devices that are within the same system and forms the boundary for the wireless mesh to prevent adjacent buildings communicating.



#### Group Address

The control group, all luminaires with the same building address and the same group address will work together for presence detection and scene control. Up to 254 different zones can be created in one building.



#### Link Address

Allows presence detection communication signals to be transmitted between different groups of luminaires. Each group can be set to transmit or receive an independent link address enabling occupancy in one area to keep another linked unoccupied area illuminated.

## When to select Smart TR?

The Smart System is designed to work “out of the box” stand-alone, or to automatically work in groups when wired together using the Motionline. The Smart System is amazingly simple to use and install. Smart TR adds wireless connectivity to the Smart System and should be selected when luminaires are difficult to wire together into groups - for example luminaires mounted within a concrete staircase where channelling the walls to lay Motionline cables would be time-consuming and intrusive, or in an open car park where digging trenches to lay cables would be expensive. In recessed ceiling applications we continue to recommend the use of the Motionline wired connection provided by LCM interconnecting cables as this method will provide the most cost effective and simplest solution.

Smart TR must be commissioned as it has to be assigned Building Addresses and Group addresses. Commissioning is extremely simple using the hand held Smart Programmer (catalogue number **LCM 10777B**) or Thorlux commissioning engineers can complete this task for you.





# Internal & External Installations



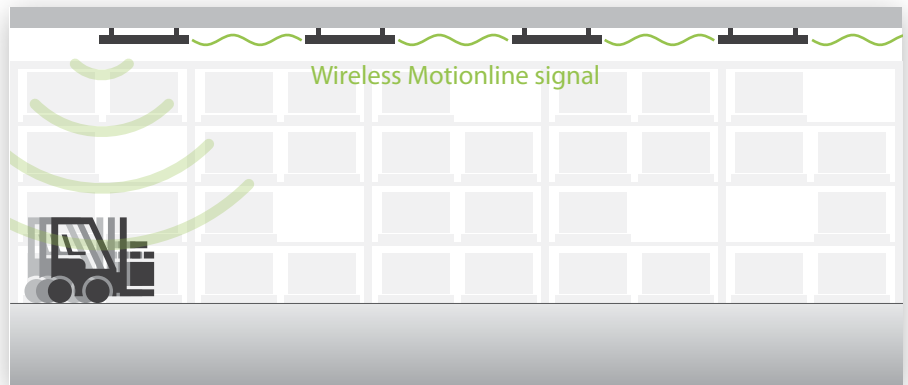
## Internal installations

If any one Smart TR luminaire detects movement all luminaires within the group will illuminate. This valuable feature is designed to eliminate the possibility of a user being isolated in a small pool of light, surrounded by intimidating darkness. The Motionline ensures that there will always be a well lit comfortable environment.

**Covers large areas**

**Low installation cost**

**Non-invasive retro-fit solution**



## External installations



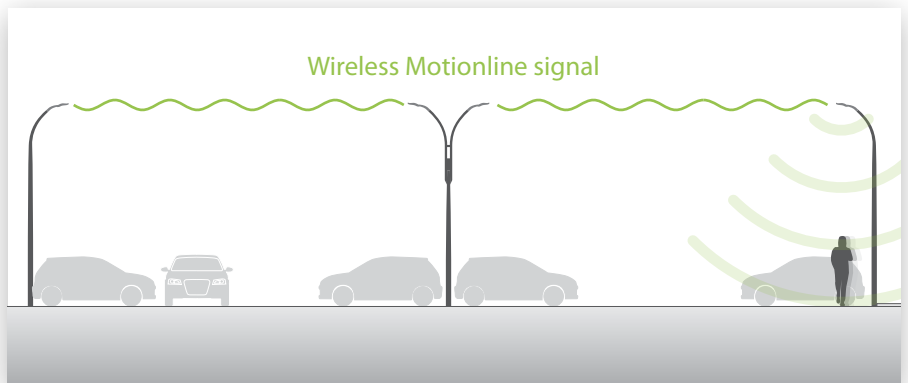
Highly efficient LED luminaires can be easily controlled by the exterior version of Smart - Smart External, but the cost of installing a buried cable to carry Motionline can be prohibitively expensive.

Smart External TR reduces cost by providing wireless transmission of the Motionline signal between luminaires.

**Covers large areas**

**Low installation cost**

**No need to bury additional cables**

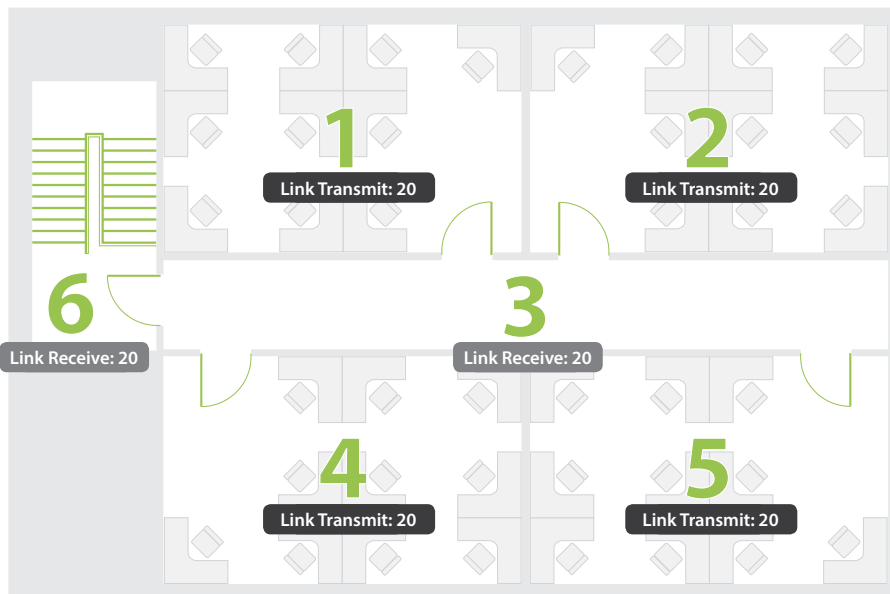




## Smart TR linking feature

The Link Address feature of Smart TR provides additional communication within a building, across different groups, to provide linking, such that when one group is switched on another group can be switched on too – often known as “Corridor Hold”.

### Example of Corridor Hold



### Programming:

All areas are set to the same unique building address.

The link “transmit” and link “receive” address is set to 20. (Up to 254 different link transmit and link receive addresses may be set across a building.)

Each area is set to its own group address (1 to 6)

The four offices (1,2,4,5) are set to transmit link address 20.

The stairwell (6) and corridor (3) are set to receive link address 20.

### Operation:

The stairwell (6) and corridor (3) will illuminate when occupancy is detected then switch off when vacated.

However, if any of the offices (1,2,4,5) are occupied then the stairwell (6) and corridor (3) will remain illuminated.

Each office will operate independently.

It may be desirable to only set half of the luminaires in the stairwell (6) and corridor (3) to remain illuminated and this can be achieved by selecting certain luminaires to link ‘receive’ but not others.

## Standards compliance

### BS EN 55015:2013

Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

### BS EN 61547:2009

Equipment for general lighting purposes. EMC immunity requirements

### BS EN 61000-3-2:2014

Electromagnetic compatibility (EMC). Limits. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)

### EN 300 220-1 V2.4.1

Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment to be used in the 25 MHz to 1 000 MHz frequency range with power levels ranging up to 500 mW; Part 1: Technical characteristics and test methods

### EN 301 489-3 V1.6.1

Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 3: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 246 GHz

### BS EN 60950-1:2006+A2:2013

Information technology equipment. Safety. General requirements

### BS EN 62311:2008

Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

## Programming Smart TR

The Smart Programmer used to configure the Smart sensors is also used to set up the Smart TR transceivers.

Catalogue number **LCM 10777B**





## How to specify

### Short specification text

Intelligent luminaire fitted with integral Smart sensor providing daylight harvesting, maintained illuminance, presence/absence detection and scene setting. The system shall be capable of group presence communication ensuring luminaires can illuminate in groups and with individual scene setting control. Optional 868 MHz wireless mesh connectivity with building wide link address capability. All aspects are programmable from floor level using an infra-red remote control programmer.

### Full specification text

Each luminaire shall be equipped with an 'intelligent' electronic sensor providing movement detection, light level sensing and an infra-red receiver for programming and remote control. Luminaires shall be capable of being linked together to form motion groups. Linking shall be possible using a two core bus or wirelessly using an 868 MHz transceiver. Movement detected by one sensor will be signalled to all other sensors in its group. No bus power supply or other ancillary control devices will be required to facilitate such operation. Sensors shall be capable of 'absence' mode operation in conjunction with a scene control plate or infra-red handset.

Each sensor shall provide individual dimming of the luminaire and maintain a set illumination level. Grouped dimming shall not be acceptable for daylight control. Sensors shall be fully programmable and reconfigurable using a hand held infra red programmer. The programmer shall be capable of reading back and displaying current sensor settings and power/maintenance monitoring information from individual luminaires. Monitoring can be reset by the user. Sensors to be capable of operating DALI and DSI digital ballasts.

#### 'Touch' scene control

Sensors shall be capable of responding to scene controls from a wall-mounted, touch sensitive control plate or a hand-held remote controller. Each sensor shall be individually programmed and reconfigurable for each scene.

The system shall be capable of setting either fixed scenes which are a percentage of full output, or automatic scenes which will maintain an illumination level expressed as a percentage of the standard light level setting.

Scene control plates shall be of the capacitive sensing type. Each function shall have a status LED which will display the current system status. Scene plates shall be printed to suit the application, and matching infra-red remote controllers shall also be available. Remote controllers should be supplied with wall brackets and optional locking mechanisms.

Each control group shall be capable of using multiple scene control plates and its current setting will automatically display on all scene plates. When the area is vacated the whole system should automatically revert to 'ECO' energy saving mode.

#### Wireless connectivity

Luminaires shall be capable of being inter-connected wirelessly. Operational frequency shall be 868 MHz with low data rates - less than 1%. The system shall work on a mesh networking principle and be capable of adding link addresses across a building. Programmable settings can be altered from floor level using an infra-red programming device.

#### Addition of non-intelligent 'slave' luminaires

The system shall be capable of switching non-intelligent 'slave' luminaires based upon movement detection of the main group of intelligent luminaires and shall be capable of being reconfigured for all conditions - i.e. normal (automatic/ECO) operation, scene and vacant conditions.

#### Addition of non-wireless standard Smart luminaires

##### Modular wiring

Recessed luminaires shall be supplied complete with a 6-way modular wiring Tee-piece to include an unswitched and switched mains supply. Interconnecting leads shall be used to provide rapid installation and flexibility for future modifications to the system. Leads shall be factory tested for circuit continuity/polarity and high voltage tested for insulation quality.

##### Conventional wiring

Luminaires shall have a two-pole terminal block for connection of the motion link between luminaires.

#### Environmental credentials

The manufacturer shall be independently certified to ISO14001. The manufacturer's processes shall be carbon offset via a quantifiable carbon offsetting scheme and shall include emissions from the lighting manufacturer's vehicles used for delivery and other project associated mileage.

### Selecting Smart TR

Simply remove the 'D' suffix from the Smart luminaire catalogue number and replace with 'TR'.

Eg. RL 14437D will become RL 14437TR

### Design Considerations

Wireless transmission distance will vary depending upon the type of luminaire and its location. Maximum achievable for an open area external site is approximately 70m from one Smart TR transceiver directly to another, reducing significantly indoors particularly where transmissions may be affected by thick concrete walls or metallic structures. Wireless mesh technology significantly improves transmission distances by propagating signals through many Smart TR devices rather than simply point to point.



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