GigaTera Ecology Service System

LED Lighting Control System Solution

| Roadway Control | Wireless Control | Wired Control | Sensor Control |

GigaTera® *Beyond light* by KMW

GESS™

GESS™ (GigaTera® ecology Service System)

Nowadays, lighting is not merely about the traditional concept of "lighting up the darkness," but rather about controlling the intensity of lighting automatically based on the movement of people or objects, traffic, and even the sun.

There are similar requirements of the control system to save energy.
In the past, power saving alone was good enough, but there is an increasing demand for a new control system that takes into consideration the economical impact s for energy consumption and maintenance costs that extend the system easily as well as environmental aspects to minimize carbon emissions and light pollution.

Developed based on this trend, the GigaTera® GESS™ lighting control system is an eco-friendly system with minimized energy consumption and emissions.

In addition, it has wireless, wired, and sensor control systems to provide the most stable and economical lighting control solutions ever.

Support for different controls

The **GESS**™ control system provides different support, including support for road-way lighting as well as wireless, wired, and sensor controls where even hybrid controls can be implemented through a combination of any of the above upon the customer's request.
With this hybrid control, a customized control system can be implemented based on usage conditions with the obvious advantage of energy savings and services.

Application of the standard lighting control protocol

The **GESS**™ control system supports wireless and wired standard protocols.

From individual to group controls

The **GESS**™ control system provides individual and group controls.
With this functionality, the user can set different on/off times and intensities in different areas for optimal energy savings and automatically or manually control the lighting with a GUI or central console without visiting the site.
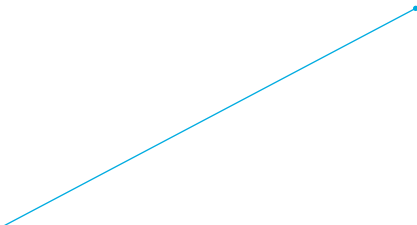
Reliable system

The **GESS**™ control system is a solution dedicated to GigaTera® LED lighting, making it more reliable than other control systems. The main GigaTera® roadway lighting products, META and HERA, have a wireless node system (ZB Node). Indoor lighting products, such as Bela, Verona, and Galaxy, have the 1-10V, DMX-512, DALI control board, and indoor ceiling lighting products, including the IBL, NANA, and SORA, detects the sensors.
Different GigaTera® lighting products are perfectly controlled by the **GESS**™ system.

Energy and maintenance cost savings

The **GESS**™ control system can reduce energy consumption and maintenance costs.

GESS ROAD

Roadway
Lighting
Control

Applications

Highway
Roadway
Street

Roadway lighting control solution

Normal highway roadway lighting and security lights on narrow roads can be efficiently managed by adopting wireless control for the control and maintenance without the need for separate cabling.
The **GESS** roadway lighting control is a dedicated system for GigaTera® roadway lighting that provides support for remote intensity control through 2G, 3G, and 4G cellular network communications to achieve additional energy savings and uniformity as well as to create a mesh network, self-diagnosis, system error reporting, and real-time monitoring by implementing higher electrical efficiency by reducing the amount of costs and time required for operation and maintenance.

Advantages

Standard protocol and communication system

- Support for 2G / 3G / 4G and Ethernet communications
- XML-based flexible connection structures and HTML5-based connections with different browsers
- Application of a TALQ international standard for the first time in Korea

Easy extension of system and equipment

- Easy installation of additional gateway and nodes
- Flexible equipment with a minimum of 200 nodes for each channel
- Total of up to 16 multiple channels

Intuitive user interface

- 1 to 1 matching on Google Maps by communicating with actual roadway lighting
- Real-time state of installed roadway lighting
- Application of cutting-edge HTML5
- Support for screen widget

Important equipment

Server (**GESS** control system) Roadway Lighting Control Interface S/W

The **GESS** control system is a Unix-based Linux system that provides a Graphic User Interface (GUI) for the intuitive and efficient monitoring and management of roadway lighting.

Monitoring

- Real-time monitoring for all field data
  (on/off state, blackout, communication, and power consumption)
- Vocational and point information on roadway lighting
- Support for different layout screens to display information

State

- Alarming and identifying the local situation about any faults
- Support for the alarm system with different channels
  (automatic SMS or e-mail notifications)
- Support for selective automatic/manual controls
- Power on/off, time settings, intensity controls, and power down through remote controls

Communication

- Real-time processing
- Provides storage and inquiries for filter data for abnormal system operations
- Local equipment controller and data interface

Management

- Statistic analysis and report generation on problems that have arisen
- System privilege, group management, and vocational search
- User access and system usage state

Gateway

Communication and commands provided using 2G, 3G, and 4G communications between the **Gess** system and the node while monitoring and controlling the node using the wireless control. Further, it uses a built-in GPS to synchronize the timer and to monitor power consumption. It can also be attached to posts or walls. One gateway can control up to 200 roadway lightings, but up to 3,200 roadway lightings can be controlled by over 16 channels.

*LOS (Line of Sight): Linear distance without any obstacles

| * Notes	Up to monodirectional *LOS@200M is valid between the gateway and the first node.
	Up to LOS@200M is valid among the nodes.
	Wireless repeaters can be installed to cover great distances and overcome communications faults.

Node

A node is built-in a luminaire by default so that it can receive control commands from a control system through the gateway and transfer it to the luminaire.

A node supports the PWM/1-10V intensity control, power on/off, monitoring for power consumption by unit time/voltage/current, and *OTA updates.

*OTA (over-the-air): Wireless data exchange method

System configuration

Multi-channel
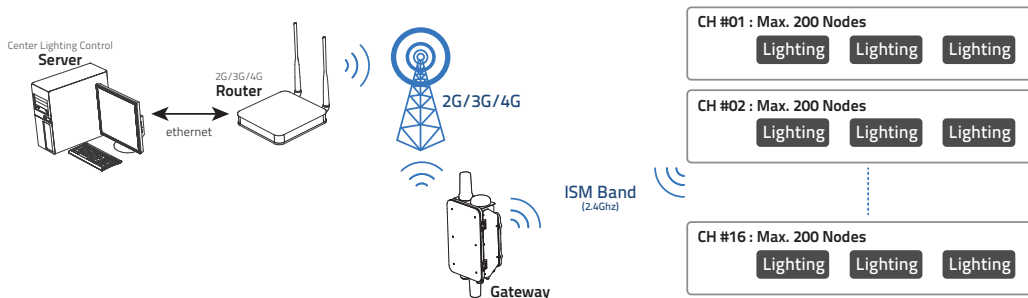
*ISM Band means bandwidth available for industry, science, and medicine.

Advantage of the multi-channel method

One gateway can use multiple channels so that a system can provide smooth communication in diverse conditions, and the server can control more nodes.

* Notes	Up to monodirectional *LOS@200M is valid between the gateway and the first node.
	One channel can be used to control up to 200 roadway lightings.
	One gateway can have a minimum of one but a maximum of 16 channels.

Security

Web security

Server access can be limited by applying the user firewall function and configuring a designated IP and port for it.

Mobile app security

For the installation and maintenance of a luminaire for a mobile app, the server collects the value of mobile devices on which the app is installed in order to allow access only if the value matches the pre-registered user ID.

Roadway Lighting Control

Main functions of the server

Selective control system

Features
- Control by individual, group, channel, and gateway
- 1 to 100 step brightness control
- Log file of successful/failed controls
- Broadcasting / Grouping / Request transfer according to the target control scope

Benefits
- Quick control of roadway lighting
- Different node icon colors for diverse brightness
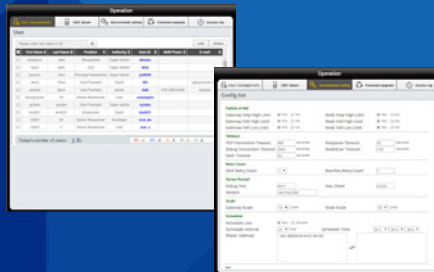
Lighting control for emergencies
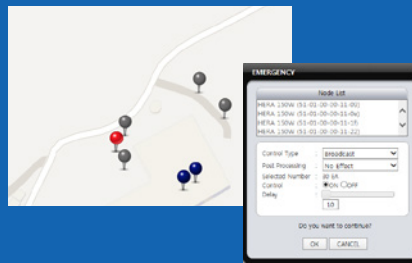
Features
- Roadway lighting control for emergencies
- Node flickering on the screen during an emergency
- Delay settings to deal with flickering

Benefits
- Short response time with notified emergency through an indicator
- Intense monitoring system for a certain area

## Much convenience for an administrator

Features
- Privilege control (access management)
- Different privileges for five different classes
- Automatic SMS notifications for alarms
- Flexible system operation with free configuration

Benefits
- Eliminated risk by offering different privileges with class
- User class: Super Administrator, Administrator, Operator, Visitor, and Developer

Intuitive roadway lighting control based on Google Maps
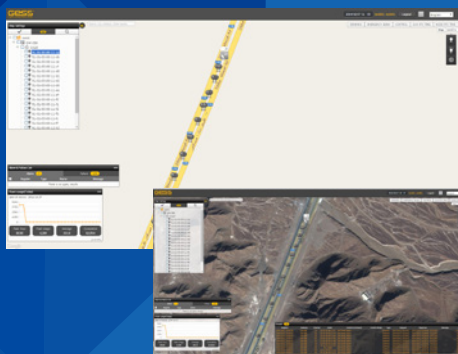
Features
- Intuitive roadway lighting control through Google Maps
- GIS-based wide-screen layout
- Real-time indication of on/off/error state of roadway lighting
- Indication of state of gateway
- On/off and brightness control for individual/multiple/channel/ gateway control
- Quick inquiry based on lighting state

Benefits
- Working convenience by monitoring and controlling roadway lighting
- Shorter response time to a fault through real-time monitoring
- Intuitive energy consumption monitoring system

Different equipment management functions
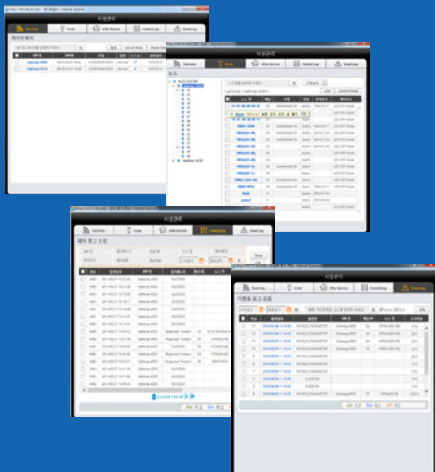
Features

- Gateway and node information management
- Collection and set-up for gateway and node data
- Gateway and node reset
- Service history for maintenance
- Inquiry for failure and repair history through mobile device
- Inquiry for control log with different conditions
- Inquiry for event log

Benefits

- Immediate collection of gateway and node configuration data
- System configuration for monitoring local situation regarding the basis of settings

## Monitoring of power consumption and different statistical reports

Features

- Visualization of the collected power consumption data
- Peak times, peak power value, and sum
- Understanding total power consumption by identifying by time
- Offering of the top 10 power consumption lists for each node
- Power trends, control log analysis, and fault analysis report
- Statistic reports of different conditions by gateway and node

Benefits

- Power consumption trends through visualization
- Specific control mode for nodes with high power consumption
- Development of response strategy by analyzing the data of power consumption and faults
- Development of the analytical fault forecast foundation by analyzing the trend of faults

Configuration of different control modes
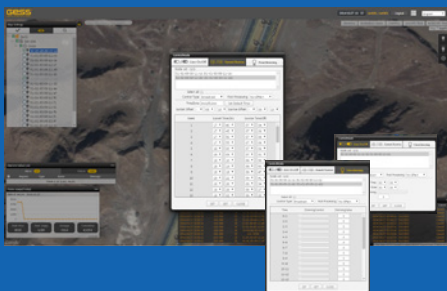
Features

- Different lighting controls for each node
- On/off time setting
- Sunrise/sunset time settings
- Brightness control time settings
- Sunrise/sunset default time settings based on location

Benefits

- Support for default values by latitude and longitude
- Operational convenience with sunrise/sunset time settings

GESS AIR

Wireless Lighting Control

Applications

Industrial high bay
Sports lighting
High mast
Floodlight

Wireless control solution

A wireless control function can be implemented by connecting the built-in wireless node (ZB Node) and the local wall-mounting switch (IPC controller) or a master unit.
The wireless control solution is based on the ISM Band 2.4 GHz and can be implemented in central and local controls. The wall-mounting switch (IPC controller) can be used for either one, while the master unit can be used for the central control configuration. The central control requires an operation PC for the GUI program.

*ISM band means bandwidth available for industry, science, and medicine

System features

- Individual lighting brightness level scheduling with GUI-based program (* central control)
- On/off and brightness control of group/zone luminaire using a wall-mounting switch (IPC controller)
(* local control)
- One group can have six zones and control of up to 200 luminaires. (* for IPC-06Z)
- Stable data communication with Daisy chain and ring tone network topology

Important equipment

GUI operation program

This is a PC operation program used to facilitate lighting controls and settings for the central control system of luminaires.

*Features	Lighting state monitoring
	On/off control
	Brightness control

USB Converter Unit

It is connected to a USB port and converts a received control signal to the RS-485 communication signal before transferring it to the master unit.

Wall-mounting switch - IPC (Intelligent Power Controller)

The wall-mounting switch controls each product through communication with the built-in wireless node (ZB Node) and can support both local and central controls.

- 1–10 V brightness control
- On/off control for each zone and group
- Wireless sensor network control
- Easy group and zone settings using a remote controller
- Scheduler through the central control

- Power controller reception function for maximum power load
- Connected control of power controller (brightness control scenario)
- Real-time monitoring with LED indicator

Master unit - Wireless (Master Unit-W : Wireless Lighting Control Unit)

This is a unit intended for the transfer of the control command of the GUI operation program to a node unit, and the unit only supports a central control. A master unit can control and monitor up to 200 node units.
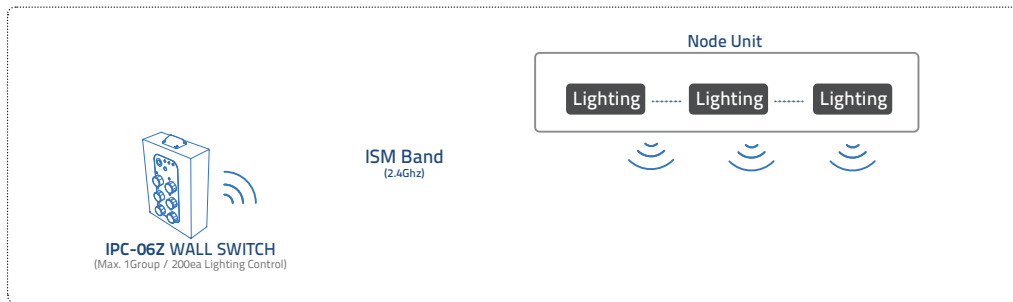
Node

Node is basically built within a luminaire and receives a control signal from the control system through the gateway and transfers it to the luminaire.
A node supports the PWM/1–10 V intensity control, power on/off, monitoring for power consumption by the unit time / voltage / current, and *OTA updates.
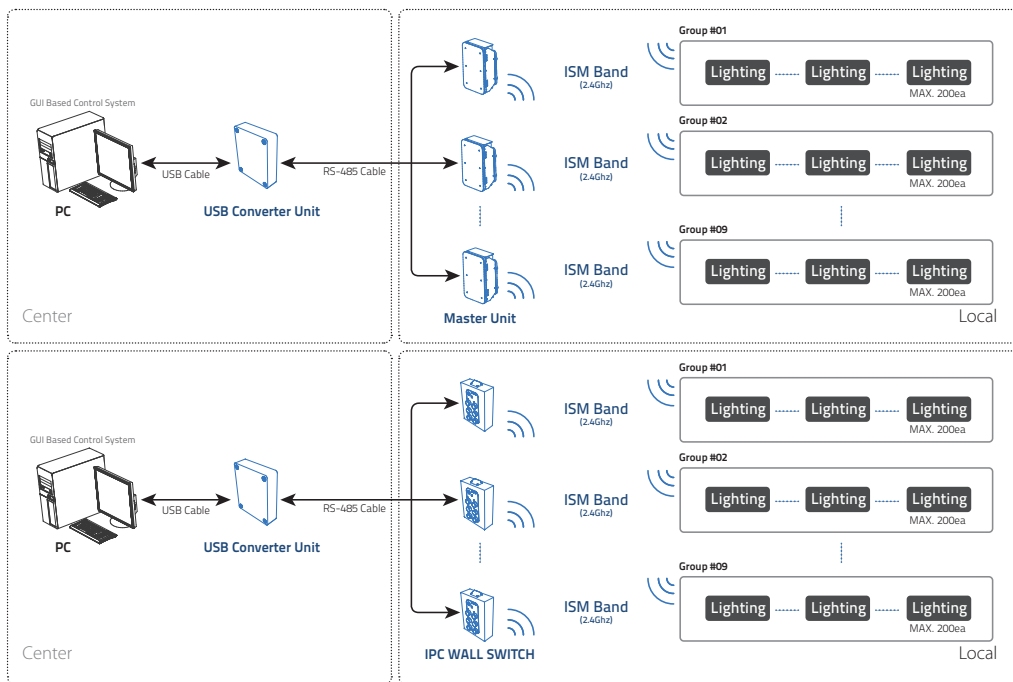
*OTA (over-the-air): Wireless data exchange method

Case1- Local control

Node Unit

Lighting ----- Lighting ----- Lighting

ISM Band
(2.4Ghz)

IPC-06Z WALL SWITCH
(Max. 1Group / 200ea Lighting Control)

*Wireless repeater is recommended for areas with poor signal reception

Case2- Central control

GUI Based Control System

PC

USB Cable

USB Converter Unit

RS-485 Cable

Master Unit

Center

ISM Band
(2.4Ghz)

Group #01
Lighting ----- Lighting ----- Lighting
MAX. 200ea

Group #02
Lighting ----- Lighting ----- Lighting
MAX. 200ea

Group #09
Lighting ----- Lighting ----- Lighting
MAX. 200ea

Local

GUI Based Control System

PC

USB Cable

USB Converter Unit

RS-485 Cable

IPC WALL SWITCH

Center

ISM Band
(2.4Ghz)

Group #01
Lighting ----- Lighting ----- Lighting
MAX. 200ea

Group #02
Lighting ----- Lighting ----- Lighting
MAX. 200ea

Group #09
Lighting ----- Lighting ----- Lighting
MAX. 200ea

Local

*Wireless repeater is recommended for areas with poor signal reception

*GeSS supports a portable over the air control (POC) system.
(Refer to page 13 for more information)

Wall-mounting switch - IPC wall switch specifications

Model name	Control group	Control zone	Controlled luminaire
IPC-01Z	Group 1	Zone 1	up to 200
IPC-02Z	Group 1	Zone 2	up to 200
IPC-03Z	Group 1	Zone 3	up to 200
IPC-06Z	Group 1	Zone 6	up to 200
IPC-12Z	Group 2	Zone 12	up to 400
IPC-18Z	Group 3	Zone 18	up to 600
IPC-24Z	Group 4	Zone 24	up to 800

Master Unit - Master unit specification

Model name	Control type
Master Unit-AIR	Wireless Lighting Control Unit
Master Unit-WIRE	Wired Lighting Control Unit

GESS WIRE

Wired Lighting Control

Wired control solution

The **GESS** supports the RS-485 communication protocol.
The RS-485 communication protocol can create a network of units connected to a single RS-485 serial port with a multidrop function. One master unit can be connected with up to 32 slave units while providing a maximum of 1.2 km of serial communications.

Applications

Indoor
Industrial high bay
Floodlights

Important equipment

GUI operation program

This is a PC operation program that facilitates lighting control and settings for the central lighting control system.

*Features	Lighting state monitoring
	On/off control
	Brightness control

USB Converter Unit

It is connected to a USB port and converts a received control signal to a RS-485 communication signal and transfers it to the master unit.

Master unit - wired (Master Unit-C : Wired Lighting Control Unit)

This is a unit to transfer the RS-485 signal of the control command of the GUI operation program to a slave unit. It can control and monitor up to 32 slave units.

Slave Unit

This module is built-in a luminaire to analyze the control commands received from the master unit and to control the lighting system.
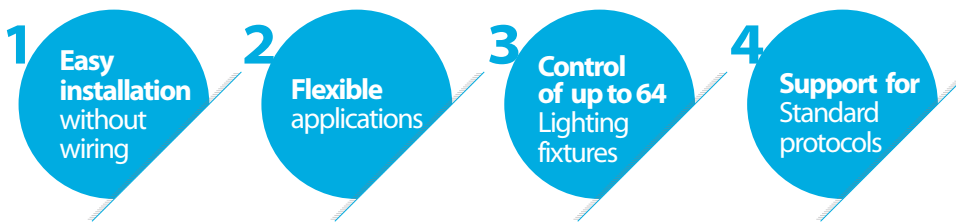
System configuration (RS-485)
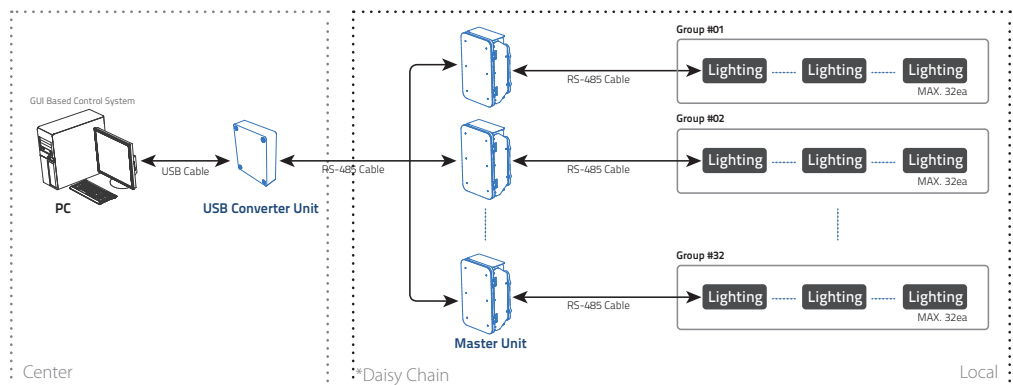
Wired control solutions

The GESS supports the DALI protocol.
The digital addressable lighting interface (DALI) is a standard lighting protocol to offer a flexible and intelligent alternative to indoor lighting controls and provides individual and group controls through unlimited bi-directional communications. With the double-wire control line, DALI can control up to 64 luminaires and up to 16 groups individually or through a broadcast mode. The recommended communication distance is 300m or less.
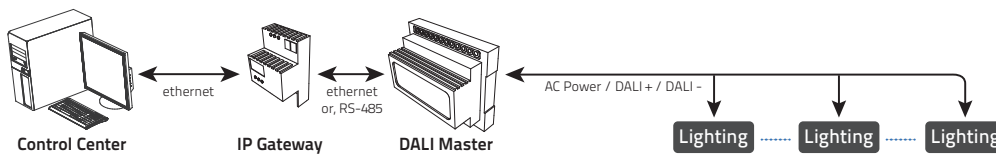
System features

1 **Easy installation** without wiring

2 **Flexible** applications

3 **Control of up to 64** Lighting fixtures

4 **Support for** Standard protocols

System functionality

0–10 V brightness control | Individual and group on/off control | DALI protocol communication
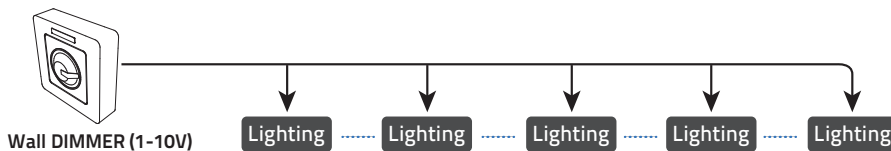
System configuration (DALI)

Control Center ← ethernet → **IP Gateway** ← ethernet or, RS-485 → **DALI Master**

AC Power / DALI + / DALI –

Lighting .... Lighting .... Lighting

* IP Gateway and DALI Master are not provided.

The GESS supports a 1–10 V interface.
The 1–10 V interface offers better performance per price and controls a minimum brightness of 1 V to a maximum of 10 V of brightness.

System configuration (1-10V)

Wall DIMMER (1-10V)

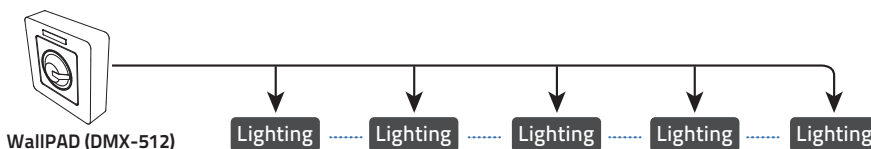Lighting .... Lighting .... Lighting .... Lighting .... Lighting

* The wall dimmer (1–10 V) is not provided.

The GESS supports the DMX-512 protocol.
The following system configuration is available and can control up to 256 lights.

System configuration (DMX-512)

WallPAD (DMX-512)

Lighting .... Lighting .... Lighting .... Lighting .... Lighting

* The WallPAD(DMX-512) is not provided.

GESS™ SENSE

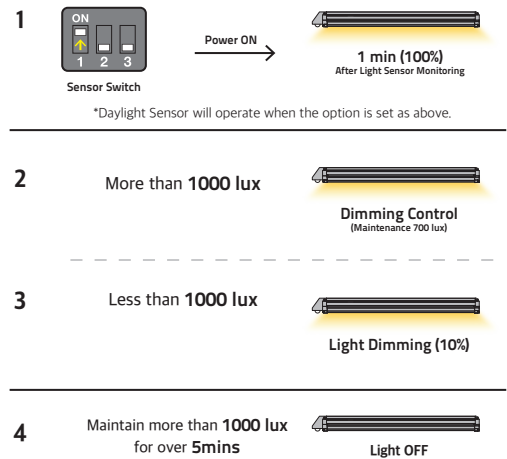# Sensor Lighting Control

Daylight sensor

An office or workplace requires specific and uniform illumination. For energy savings, the reduced visual dissatisfaction of the worker, and the efficiently maintained illumination, technology is required to detect the light and thus the automatically control luminaires. It is more effective to control luminaires by setting and applying certain conditions to an illumination sensor rather than relocating a sensor or considering a block condition upon the environmental conditions. GESS™ technology aids in the effective illumination controls for ceiling and roadway lighting.

Operation of the illumination sensor

• When a luminaire is energized after setting a switch, 100% illumination is maintained for 1 min., while the sensor measures environmental illumination.

• Illumination is maintained if it measures less than 1000 lux, and 700-lux.

• 10% of full illumination is maintained if it measures 1,000 lux or higher.

• The luminaire is automatically turned off if the measure of 1,000 lux or higher is maintained for 5 mins.

1 | Sensor Switch | Power ON → | 1 min (100%) After Light Sensor Monitoring |

*Daylight Sensor will operate when the option is set as above.

2 | More than **1000 lux** | Dimming Control (Maintenance 700 lux)

3 | Less than **1000 lux** | Light Dimming (10%)

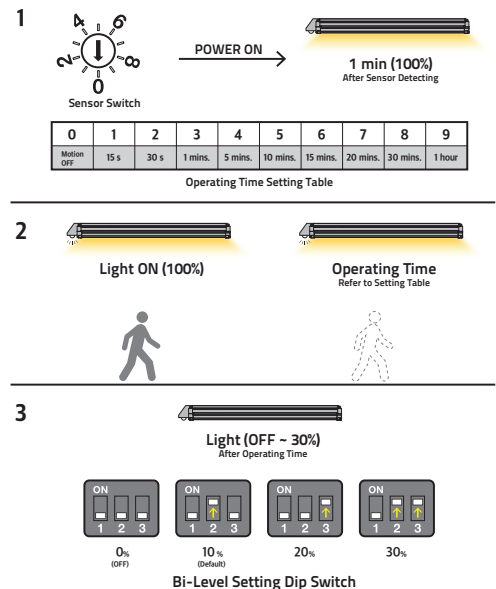**4** | Maintain more than **1000 lux** for over **5mins** | Light OFF

Occupancy sensor

Large buildings or workplaces can save a considerable amount of energy just by turning off the lighting when unnecessary so a sensor system is increasingly essential for energy conservation and environmental conservation. An occupancy sensor detects if someone is present in a certain room and automatically controls the brightness. GESS™ uses the PIR type for low ceilings and a microwave type for high ceilings.

Operation of occupancy sensor

• If the luminaire is energized, 100% illumination is maintained for 1 min., while the sensor detects the environment.

• The duration of the 100% illumination can be set in 10 steps from 15 sec. to 1 hr.
If an occupancy sensor detects movement, brightness is maintained at 100%.

• If an occupancy sensor does not detect any movement, the brightness is adjusted to a preset bi-level value.

• The bi-level value can be changed using a DIP switch setting ranging from 0% (off) to 30%.

1 | Sensor Switch | POWER ON → | 1 min (100%) After Sensor Detecting

0	1	2	3	4	5	6	7	8	9
Motion OFF	15 s	30 s	1 mins.	5 mins.	10 mins.	15 mins.	20 mins.	30 mins.	1 hour

Operating Time Setting Table

2 | Light ON (100%) | Operating Time (Refer to Setting Table)

3 | Light (OFF ~ 30%) After Operating Time

| 0% (OFF) | 10% (Default) | 20% | 30% |

Bi-Level Setting Dip Switch

Integrated sensor control (Occupancy sensor + Daylight sensor)

Integrated sensor controls are the best sensor control solutions for combining the occupancy and daylight sensors for automatic control and to optimize the conservation of energy.

Integrated sensor operation

- If an occupancy sensor detects a movement, a luminaire is turned on, and the illumination is controlled by the daylight sensor.

- If the sensor does not detect any movement, the brightness is adjusted to the preset bi-level value.

- If the daylight sensor that measures 1000 lux or higher is maintained for 5 mins., the luminaire is automatically turned off.
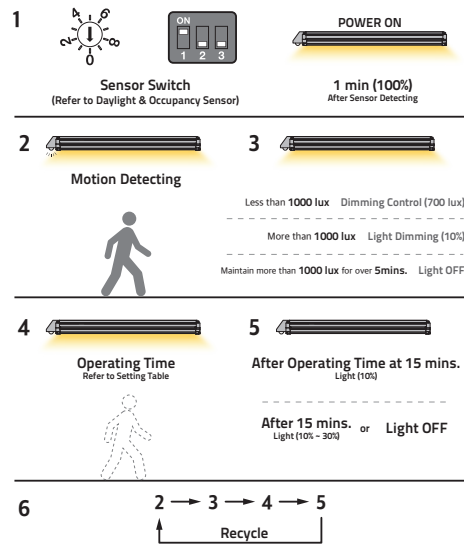
GeSS™
Control System Matrix

Product	GeSS Road	GeSS Air	GeSS Wire				GeSS Sense			PE Cell
			1-10V	DALI	DMX-512	RS-485	Daylight	Occupancy	Integrated	
ASL	✓	✓								
HERA	✓	✓					✓			NEMA compatible
META	✓	✓					✓			GigaTera products
SERA	✓	✓								
SETA	✓	✓					✓			GigaTera products
VEGA	✓	✓					✓			NEMA compatible
LUNA			✓							
SEGA		✓					✓			
IBL		✓	✓	✓			✓	✓	✓	
NANA								✓		
SORA								✓		
WAPA		✓					✓			
SUFA		✓	✓			✓				
MAHA		✓	✓			✓				
BELA			✓	✓	✓					
VERONA			✓	✓	✓					
GALAXY			✓	✓	✓					

POC
Portable Over the air Control

The portable over the air control (POC) is a luminaire control system that configures and changes the channel, group, and zone of the wireless node.

Application of POC

It can configure the channel, group, and zone for a luminaire as well as set values.

POS system

NoteBook

• This is the equipment to install the POC program and to connect to a USB dongle for lighting settings.

Coordinator Dongle

• There are indoor and outdoor models for the partial grouping of multiple luminaires and functional settings.

• It offers on/off brightness control, subzone settings, on/off settings, voltage and current limit alarm, brightness control setting by time, and node search functions.

• If the luminaires are grouped with a master unit or an PC wall switch an OTA dongle is used instead of a coordinator dongle.

▼ GeSS USB Dongle

OTA Dongle

• It configures a different function for luminaires grouped by a coordinator dongle.

• It offers channel configuration, luminaire search, subzone settings, on/off settings, and brightness settings, data initialization, and firmware updates.

POC Software

• This is the software required to be installed on a laptop facilitating installation for the configuration of luminaires by providing a GUI-based control screen for the functions of the dongle connected to a USB port.

• The POC software is optimized for Windows XP and 7.

GESS™

GigaTera® Ecology Service System

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