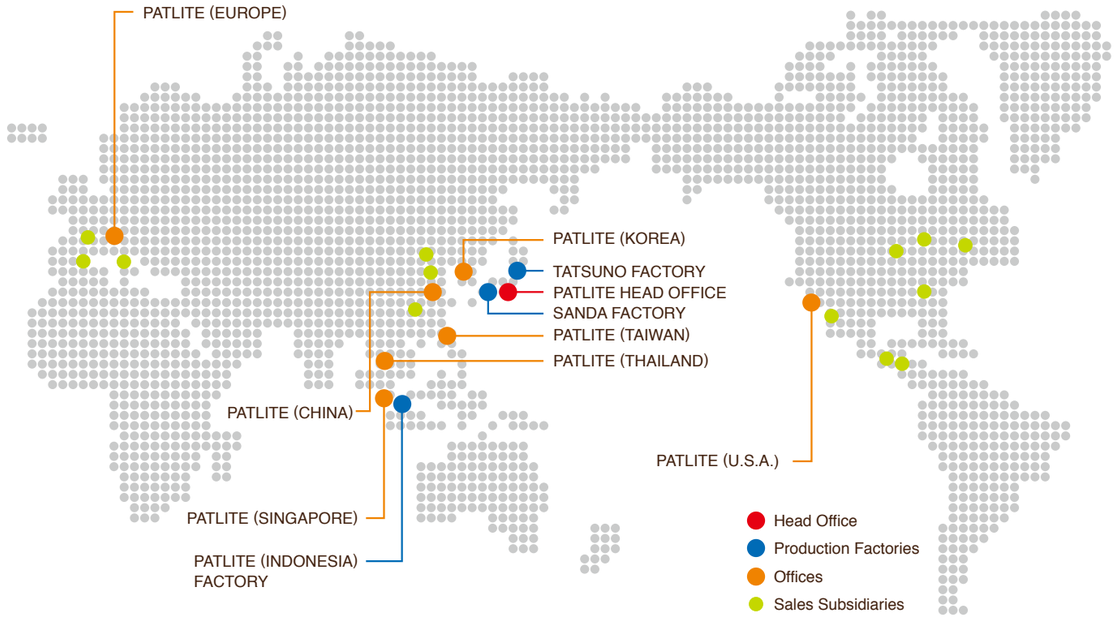
## *PATLITE* Global Network





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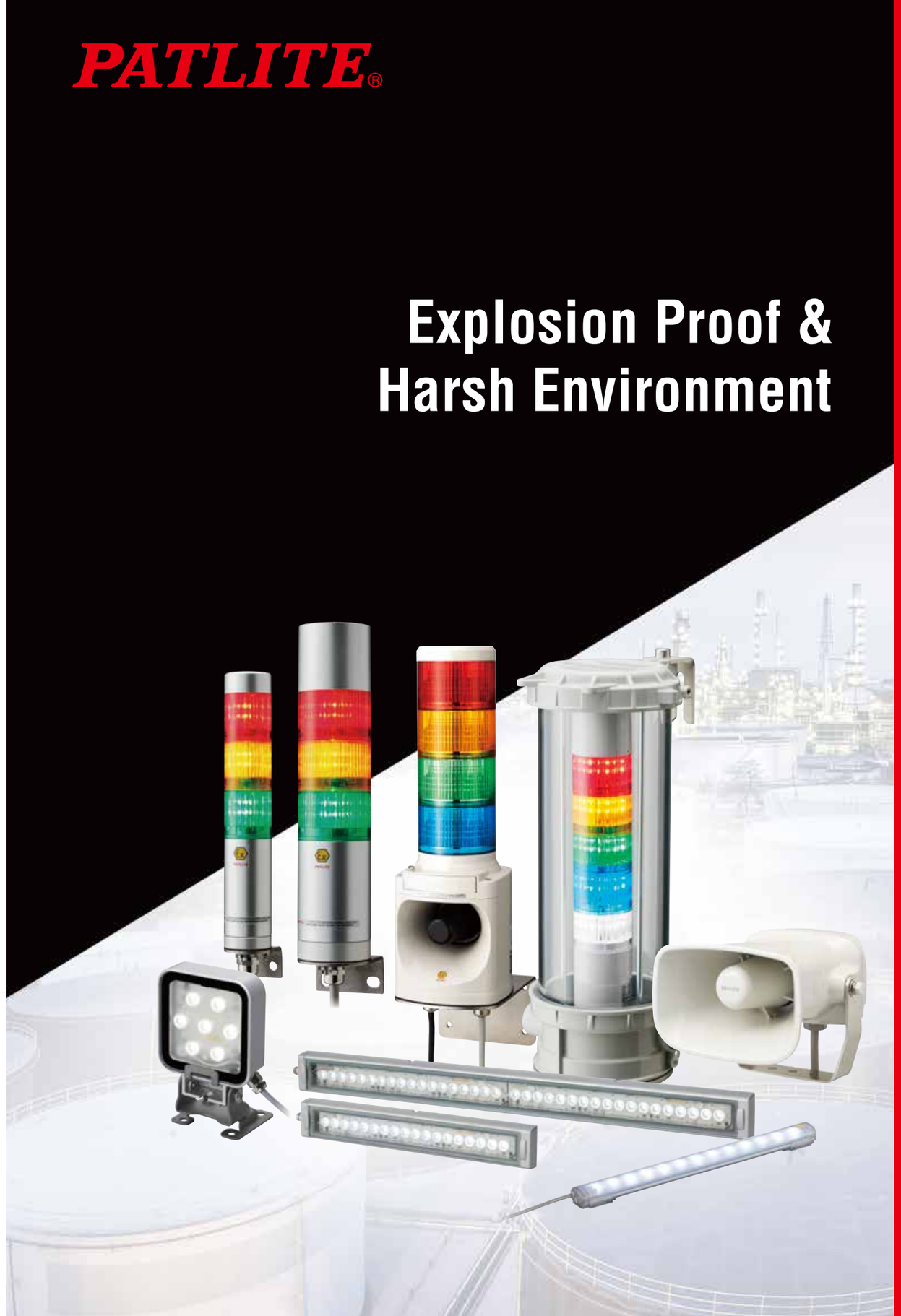
**⚠ CAUTION**

To ensure correct use of these products, read the "Instruction Manual" prior to use. Failure to follow all safeguards can result in fire, electric shock, or other accidents.Specifications are subject to change without notice.


O-AH07 | EN | 1811 A


PATLITE®

# Explosion Proof & Harsh Environment



www.patlite.com

# “New Frontiers in Safety, Security and Comfort” is PATLITE`s mission.

PATLITE offers state-of-the-art equipment for process and industrial automation for over 60 years. Our innovative and robust design, backed by a powerful commitment and years of knowledge, has made PATLITE the world’s best known manufacturer of the visual and audible signaling products. We are also dedicated to the development of products that are safe in harsh and explosive environments to demonstrate our strong commitment to serving the industry with unique and innovative solutions.

In order to identify the diversified needs of our customers, and respond quickly and satisfactorily to those needs, we have implemented the POP (Point of Production) System together with a lean-manufacturing cell-based assembly system (combination, single, and flexible assembly). These new systems allow us to handle any order rapidly from single items to customized item orders.

We've also reduced development time and production cost by having our own in-house machinery to design and manufacture metal moldings for making injection molded parts.

From designing to production, from raw material to the finished product, we also manage our quality control throughout the entire process. This is how we maintain our world class quality reputation for visual, audible signaling and networking information products.

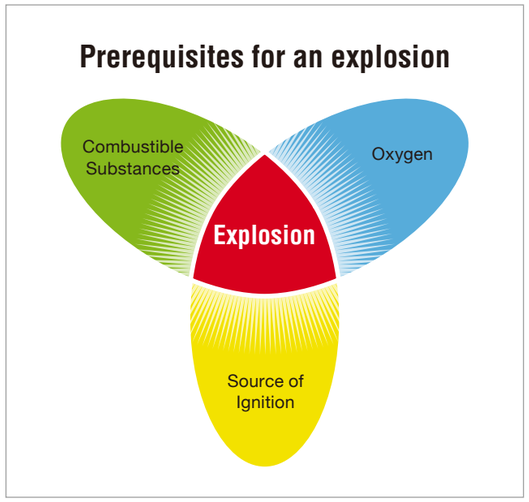
## Wide-range of Innovative and World-class Quality Products

## How an Explosion Occurs

An explosion can only occur if there is a combination of the following three factors.

- Source of ignition
- Oxygen
- Combustible substances

Combustible substances can exist in the form of gases, vapor, mist or dust.  If one component is missing, no explosion will take place.




## How to minimize an explosion

The followings are protective measures to minimize the risk of an explosion.

- Limit concentration to a safe level
- Avoid combustible substances
- Increase ventilation
- Prevent the ignition
- Restrict explosive effects to a negligible level

## An explosive environment is categorized in three segments, Zone 0, Zone 1 and Zone 2, depending on the hazardous level of gases and vapors

**Zone 0**
An area where an explosive atmosphere consisting of a mixture of air containing flammable substances in the form of gas, liquid, or vapor continuously present or is frequently present for a longer period of time.

**Zone 1**
An area where an explosive atmosphere consisting of a mixture of air containing flammable substances in the form of gas, liquid, or vapor can occasionally occur during normal operating conditions.

**Zone 2**
An area where an explosive atmosphere consisting of a mixture of air containing flammable substances in the form of gas, liquid, or vapor is not likely to occur under normal conditions.  However, if it occurs, it will only be for short period of time.

# Various Applications for Explosion Proof and Harsh Environments

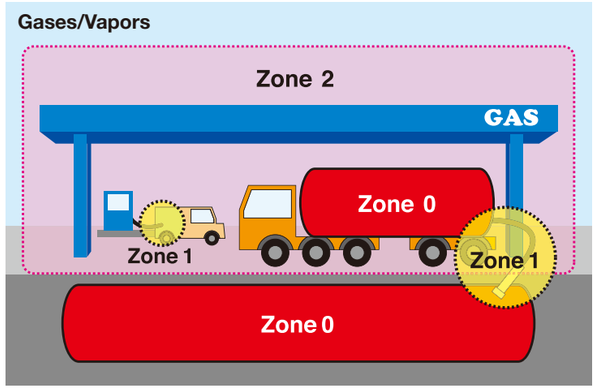
| Branch | Explosion Hazard |
|---|---|
| Power Generation Companies | ● Lump Coal Dust |
| Woodworking Industry | ● Saw Dust ● Fine Wood Chips |
| Metal-work Operations | ● Explosive Metal Dust ● Spark-ignitable Metal Dust |
| Food/Beverage Industry | ● Ignitable Grain Dust ● Explosive Sugar Dust |
| Refinery Industry | ● Hydrocarbons close to their flash-points ● Oil Processing Plants |
| Waste Disposal Companies | ● Waste-water Treatment Gases |
| Landfills/Civil Engineering | ● Flammable Landfill Gases ● Uncontrolled Gas Emissions<br>● Flammable Gas from poor ventilation sources |
| Pharmaceutical Industry | ● Alcohol Solvents ● Materials explosive when mixed |
| Gas Suppliers | ● Natural Gas Leakage ● Natural Gas Emissions |
| Paint-spraying Operations | ● Overspray in Spray-paint Bays ● Solvent Vapor Emissions |
| Recycling Operations | ● Unemptied flammable gas/liquid containers<br>● Biodegradable Material Emitting Explosive Gases |
| Chemical Industry | ● Flammable Gases ● Flammable Liquids ● Flammable Solids |
| Agriculture | ● Bio-gas Production Plants ● Bio-gas Located on Farms |



# Classification of Hazardous Areas

## ■ Gases/Vapors

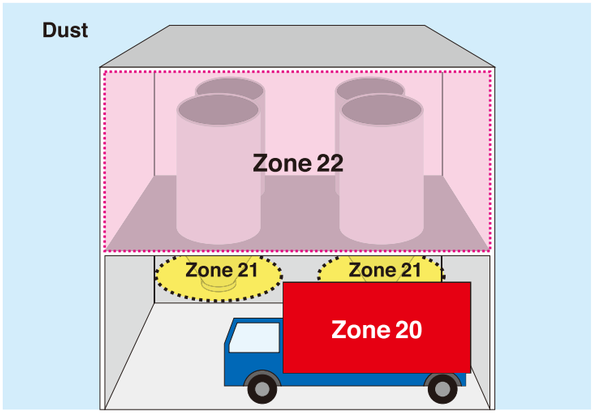
The tank is filled with flammable liquid. The inside of the tank is defined as Zone 0, because the explosive gas/oxygen mixture is continuously present.
Vapor may escape on occasion through the vent on the top of the tank, therefore the area around the vent is categorized as Zone 1.
The vapor may also run down the outside of the tank, developing another explosive environment, so the area around the tank is categorized as Zone 2.




| | | Constant Exposure | Occasional Exposure | Rare and Temporary |
|---|---|---|---|---|
| ATEX | EN60079-10 | Zone 0 | Zone 1 | Zone 2 |
| IEC | IEC60079-10 | Zone 0 | Zone 1 | Zone 2 |
| US | NEC505 | Zone 0 (Class I ) | Zone 1 (Class I ) | Zone 2 (Class I ) |
| | NEC500 | Division 1 (Class I) | | Division 2 (Class I) |

## ■ Dust

At a mill with a feed hopper and filter: A product, which causes dust particles mixed with air to cause a flammable mixture, is loaded into a hopper.
Inside the feed hopper and filter, it is categorized as Zone 20.
While the product is being loaded, the mixture of dust and air causes a potentially explosive compound in the area where the product is loaded into the hopper, so the area outside the hopper is categorized as Zone 21.
Around the hopper where a potential flammable atmosphere exists temporarily is categorized as Zone 22.

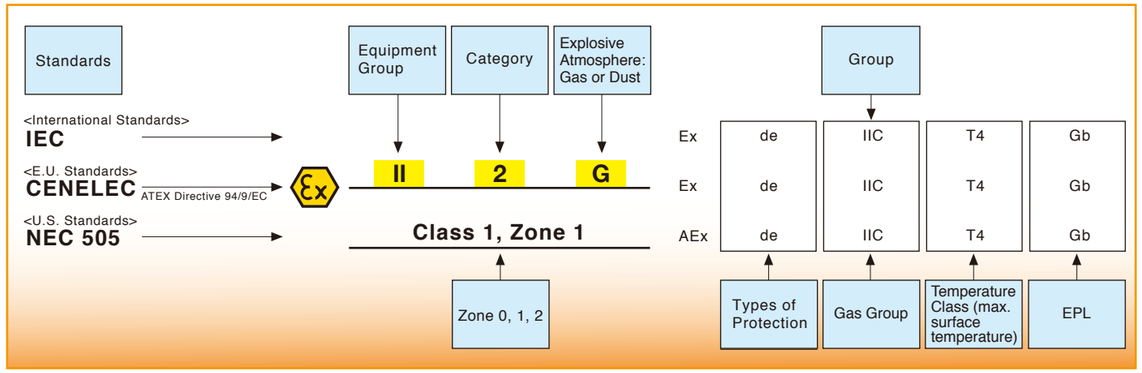



| | | Constant Exposure | Occasional Exposure | Rare and Temporary |
|---|---|---|---|---|
| ATEX | EN61241-10 | Zone 20 | Zone 21 | Zone 22 |
| IEC | IEC61241-10 | Zone 20 | Zone 21 | Zone 22 |
| US | NEC505 | Zone 20 (Class II) | Zone 21 (Class II) | Zone 22 (Class II) |
| | NEC500 | Division 1 (Class II) | | Division 2 (Class II) |

## Relationship of IEC, CENELEC, NEC 505 and NEC 500

IEC: International Electrotechnical Commission
CENELEC: European Committee for Electrotechnical Standardization
NEC: National Electrical Code

| IEC/CENELEC | Zone 0 | | Zone 1 | | Zone 2 | |
|---|---|---|---|---|---|---|
| USA:NEC 505 | Zone 0 | | Zone 1 | | Zone 2 | |
| USA:NEC 500 | Division 1 | | | Division 2 | | |
| | Explosive Material | Class | Group | Explosive Material | Class | Group |
| | Gas, Vapor or Liquid | I | A, B, C, D | Gas, Vapor or Liquid | I | A, B, C, D |
| | Dust | II | E, F, G | Dust | II | E, F, G |
| | Fibers | III | —— | Fibers | III | —— |



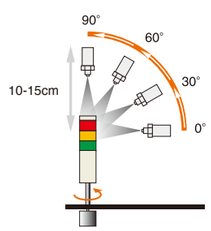

*EPL:Equipment Protection Level

## IP Protection Rate: Index of Ingress Protection

**IP □□ IEC60529**

| | | | |
|---|---|---|---|
| 5 | The entrance of dust is not closed completely, but dust may not go into the device in such manner as to impair the optimal operation or safety of the device. | 5 | No detrimental effect occurs when a jet-stream is applied to the test sample from any direction. (TEST: 12.5 liter/min. of water is sprayed with a jet nozzle, having an internal diameter of 6.3mm, and a distance from the test sample of 2.5m - 3m away) |
| | | 6 | No detrimental effect occurs when water is sprayed onto the test sample by a jet-stream from any direction. (TEST: 100 liter/min. of water is sprayed with a jet nozzle, having an internal diameter of 12.5mm, with a distance of 2.5m - 4m away from the test sample) |
| | | 7 | Water must not enter into the device. No detrimental effect occurs when the device is submerged in a depth of 1 meter of water for 30 minutes. |
| 6 | No intrusion of dust into the device occurs. | 8 | Water must not enter into the device. No detrimental effect occurs when the device is continuously submerged. The test conditions are to be mutually agreed upon by the manufacturer and user. |

**IP69K** IP69K is the German DIN 40050 PART9 standard. It is defined as a protection regulation for high temperature and high-pressurized water. Water is heated up to 80 ˚C and sprayed at a water pressure in the range from 80 to 100 bars at 14 to 16 liters per minute at the test object. The test object is at a distance of 100 to150 mm from the nozzle and sprayed in all directions at 0, 30, 60, and 90 degrees, then sprayed at a horizontal angle while it is being rotated, all done for a period of 30 seconds without being affected by water penetration.




IP69K Test Procedure



# Types of Protection

According to EN Standard Series EN 60079, explosion protected electrical equipment can have various types of protection according to its construction.
The table below for Gas and Dust shows an overview of the standardized protections and describes its basic principal, as well as its practical applications.

Select the suitable PATLITE explosion-safe and intrinsically-safe products according to the specific application and type of protection.

## Gas

| Type of Protection | Marking | Diagram | Definition | Applications |
|---|---|---|---|---|
| General requirements<br>EN 60079-0<br>IEC 60079-0 | | | | |
| Flameproof Enclosure "d"<br>EN 60079-1<br>IEC 60079-1 | Ex d | | Parts which can cause ignition while in a potentially explosive environment are encased in an enclosure which can withstand the pressure to contain it when the explosive mixture ignites inside so it is not transmitted into the environment. | Switch Gear, Control Gear,<br>Display Units, Control Systems,<br>Motors, Transformers,<br>Heating Equipment, Light Fittings |
| Increased Safety "e"<br>EN 60079-7<br>IEC 60079-7 | Ex e | | Preventative safety precautions are applied to prevent the possibility of excessive temperatures, the occurance of sparks or electrical arcing within the equipment enclosure or on exposed parts of the equipment that would not be a hazard in conditions where ignition sources are not present. | Terminal Boxes, Connection Boxes,<br>Control Boxes (for installing Ex-components with different types of protection)<br>Squirrel-cage Motors, Light Fittings |
| Intrinsic Safety "i□"<br>EN 60079-11<br>IEC 60079-11 | Ex ia<br>Ex ib<br>Ex ic | | Equipment used in a potentially explosive environment contains intrinsically safe electrical components only. The electric circuit is intrinsically safe when no sparks or internal heat produced under normal operating conditions and specific fault conditions is not capable of causing ignition in a given explosive atmosphere. | Measurement and Control Technology,<br>Communication Technology, Sensors,<br>Actuators.<br>ia = use in Zone 0, 1, 2<br>ib = use in Zone 1, 2<br>[Ex ib] = associated equipment - installation in safe areas |
| Oil Immersion "o"<br>EN 60079-6<br>IEC 60079-6 | Ex o | | Electrical equipment or parts are immersed in a protective fluid (such as oil), to prevent the ignition of a potentially explosive atmosphere which may be located over or outside the equipment. | Transformers,<br>Starting Resistors |
| Pressurized Enclosure "p□"<br>EN 60079-2<br>IEC 60079-2 | Ex p | | Inside the enclosure, a positive internal pressure in relation to the surrounding atmosphere is maintained with the supply of a constant flow of protective gas (when necessary) to dilute any combustible mixtures. | Switch Gear, Control Cabinets, Analyzers,<br>Large Motors.<br>px = use in Zone 1, 2<br>py = use in Zone 1, 2<br>pz = use in Zone 2 |
| Powder Filling "q"<br>EN 60079-5<br>IEC 60079-5 | Ex q | | The casing of the electrical equipment is packed with fine granular material to make it impossible for any electric arc created inside the casing under certain operating conditions to ignite the potentially explosive environment outside the casing. Ignition cannot be the result from flames or the raised temperature on the surface of the casing. | Sensors,<br>Display Units,<br>Electronic Ballasts,<br>Transmitters |
| Encapsulation "m□"<br>EN 60079-18<br>IEC 60079-18 | Ex m | | Parts which can cause ignition in a potentially explosive environment by sparking or heating are enclosed in a compound to contain and isolate it from the ignition of an explosive environment. | Switch Gear with small breaking capacities,<br>Control and Signalling Units,<br>Display Units,<br>Sensors.<br>ma = use in Zone 0, 1, 2<br>mb = use in Zone 1, 2 |
| Type of Protection "n□"<br>EN 60079-15<br>IEC 60079-15 | Ex nA<br>Ex nR<br>Ex nL | | Electrical equipment cannot cause the ignition of a potentially explosive atmosphere (defined under abnormal operating conditions and during normal operation). | All Electrical Equipment for Zone 2<br>nA = non-sparking equipment<br>nC = sparking equipment in which contacts are conveniently protected<br>nL = energy-limited equipment<br>nR = restricted breathing |

## Dust

| Type of Protection | Marking | Diagram | Definition | Applications |
|---|---|---|---|---|
| General requirements<br>EN-IEC 60079-0<br>IEC 60079-0 | | | | |
| Protection by Enclosures "t"<br>EN-IEC 60079-31<br>IEC 60079-31 | Ex t | | Dust is incapable of ingressing the enclosure at all or the quantity is at a safe degeree, which allows the ignitable equipment to be mounted inside. The surface temperature of the enclosure will not cause ignition to the surrounding explosive atmosphere. | Switch Gear, Control Gear,<br>Connections, Terminal Boxes,<br>Motors, Light Fittings.<br>td A21 = According to Method A for Zone 21<br>td B21 = According to Method B for Zone 21 |
| Pressurized Enclosure "pD"<br>EN-IEC 61241-4<br>IEC 61241-4 | Ex pD | | Inside the enclosure, a positive internal pressure in relation to the surrounding atmosphere is maintained with the supply of a constant flow of protective gas (when necessary) to dilute any combustible mixtures. | Pumps |
| Intrinsically Safe "i"<br>EN-IEC 60079-11<br>IEC 60079-11 | Ex ia<br>Ex ib<br>Ex ic | | Equipment used in a potentially explosive environment contains intrinsically safe electrical components only. The electric circuit is intrinsically safe when no sparks or internal heat produced under normal operating conditions and specific fault conditions is not capable of causing ignition in a given explosive atmosphere. | Measurement and Control Technology,<br>Communication Technology, Sensors,<br>Actuators.<br>iaD = use in Zone 20, 21, 22<br>ibD = use in Zone 21, 22<br>[Ex ibD] = Associated Electrical Equipment - Installation in Safe Areas |
| Encapsulation "m"<br>EN-IEC 60079-18<br>IEC 60079-18 | Ex ma<br>Ex mb | | Parts which can cause ignition in a potentially explosive environment by sparking or heating are enclosed in a compound to contain and isolate it from the ignition of a layer of dust or cloud. | Small capacity Switch Gear,<br>Controlling and Signalling Units,<br>Display Units,<br>Sensors.<br>maD = use in Zone 20, 21, 22<br>mbD = use in Zone 21, 22 |

Zone 1, Zone 2, Zone 21, Zone 22

# Maintenance Free LED Signal Towers

QUINT Ex

Flameproof signal ST towers can be operated in hazardous areas of Zone 1 or 2 (Group IIA, IIB, IIC, Temperature class T5 and T6) or in Zone 21 or 22, dust group IIIC, T120°C and it consists of a flameproof and dustproof enclosure „EX-d“ in which signal modules are installed.
For connecting there are Ex cable glands or line bushings available which are approved for hazardous areas.
ST comply with guideline 2014/34/EU and are designed, manufactured and tested in accordance with EN 60 999 and EN ISO 9001 it can be used in hazardous areas Zone 1, 2, 21 and 22 according to the certified max. surface / ambient temperature.

ST-PA-LR6-02



ST-PA-LR6-M2

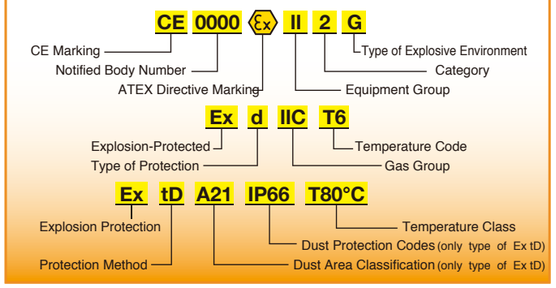
## Protection Method (ATEX/IEC)

**Flame-proof Enclosure Type "d"**
In flame-proof enclosures, an explosion is contained.

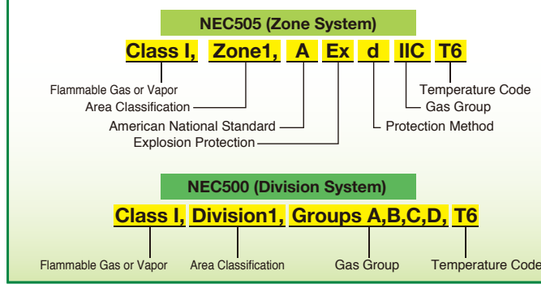
**Protection Type "t"**
Dust-protected and flame-proof enclosure.

## Standard Markings

### Marking for ATEX Directive (CENELEC Standard)




### Markings for North America (NEC Standards)




## Explosion-Proof Protection

| | Europe (ATEX Directive / (CENELEC) International (IEC) | | | | North America Class I | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | NEC505 | | | NEC500 | |
| Protection Method | Protection Code | Zone | CENELEC ATEX | IEC IECEx | Protection | Zone | US | Division | US |
| Flameproof | Ex d | 1, 2 | EN60079-1 | IEC60079-1 | AEx d | 1, 2 | ANSI/ISA 60079-1 | 1, 2 | FM3615 UL1203 |
| Increased Safety | Ex e | 1, 2 | EN60079-7 | IEC60079-7 | AEx e | 1, 2 | ANSI/ISA 60079-7 | — | |
| Intrinsic Safety (2 faults) | Ex ia | 0, 1, 2 | EN60079-11 | IEC60079-11 | AEx ia | 0, 1, 2 | ANSI/ISA 60079-11 | 1, 2 | FM3610 UL913 |
| Intrinsic Safety (1 fault) | Ex ib | 1, 2 | EN60079-11 | IEC60079-11 | AEx ib | 1, 2 | ANSI/ISA 60079-11 | — | |
| Purged/Pressurized | Ex p | 1, 2 | EN60079-2 | IEC60079-2 | AEx p | 1, 2 | ANSI/ISA 60079-2 | 1, 2 | FM3620 NFPA496 |
| Encapsulation | Ex m | 1, 2 | EN60079-18 | IEC60079-18 | AEx e | 1, 2 | ANSI/ISA 60079-18 | — | |
| Non-incendiaries | — | | — | — | — | | | 2 | FM3611 UL1604 |
| Type-n | Ex n | 2 | EN60079-15 | IEC60079-15 | AEx n | 2 | ANSI/ISA 60079-15 | — | |

## Zone Classification

| | CENELEC IEC | NEC505 | Hazardous Area Classification |
|---|---|---|---|
| Gases Vapors | Zone 0 | Class I Zone 0 | An area where the mixture of explosive gas is continuously present or present for long periods. |
| | Zone 1 | Class I Zone 1 | An area where the mixture of explosive gas can be present during normal operation. |
| | Zone 2 | Class I Zone 2 | An area where the mixture of explosive gas is not normally present, but if it occurs, it will only be for brief periods of time. |
| Dust | Zone 20 | — | An area where the mixture of incendiary dust is continuously present or present for long periods. |
| | Zone 21 | | An area where the mixture of incendiary dust can be present during normal operation. |
| | Zone 22 | | An area where the mixture of incendiary dust is not normally present, but if it occurs, it will only be for brief periods of time. |

## ATEX Directive (CENELEC)

| Equipment Group | Category-Protection Level | Explosive Environment | Flammable Substances | Hazardous Areas |
|---|---|---|---|---|
| I -mines | M1- Very High Level | Constant Exposure | Methane Coal Dust | — |
| | M2- High Level | Ocassional Exposure | | — |
| II -other areas | 1- Very High Level | Constant Exposure | Gases Vapors Mists Dust | Zone 0 (Gases) Zone 20 (Dust) |
| | 2- High Level | Ocassional Exposure | | Zone 1 (Gases) Zone 21 (Dust) |
| | 3- Normal Level | Rare and Temporary | | Zone 2 (Gases) Zone 22 (Dust) |

## ATEX/IEC Classification for Gases & Temperature Coding

| | T1 (450°C) | T2 (300°C) | T3 (200°C) | T4 (135°C) | T5 (100°C) | T6 (85°C) |
|---|---|---|---|---|---|---|
| I | Methane | — | — | — | — | — |
| IIA | Acetone Ethane Propane | Ethyl Alcohol Cyclohexane n-butane | Gasoline Aircraft fuel Diesel fuel | Acetaldehyde | — | — |
| IIB | Lighting gas Acrylonitrile | Ethylene Ethylene oxide | Ethylene Glycol Hydrogen sulphide | Ethyl-ether | — | — |
| IIC | Hydrogen | Acetylene | — | — | — | Carbon bisulfide |



Zone 2, Zone 22

# Visual/Audible Signaling Products & LED Work Lights

A wide range of visual and audible signaling products, as well as super bright LED light bars, designed for use in hazardous locations that require the ATEX Directive 94/9/EC (CENELEC Standard). These unique and innovative models meet the criteria for Zone 2 (gas) and Zone 22 (dust) atmospheres.

LR4-EX Series
LR6-EX Series

LKEH-FE-EX
LKEH-FV-EX

EHS-EX Series
EHV-EX Series

CLA-EX Series

CLN-24-CD-PT-EX

CLK-EX Series

| LED Signal Towers | | | | Hazardous Area | |
|---|---|---|---|---|---|
| Model Selection | Page | CENELEC Standard | Explosion Safety | Gas | Dust |
| LR4-EX Series | 11 | EN 60079-0 A11, EN 60079-15, EN 60079-31 | CE Ex II 3 G Ex nA IIC T4 Gc, II 3 D Ex tc IIIC T80°C Dc IP65 | Zone 2 | Zone 22 |
| LR6-EX Series | 12 | | | | |

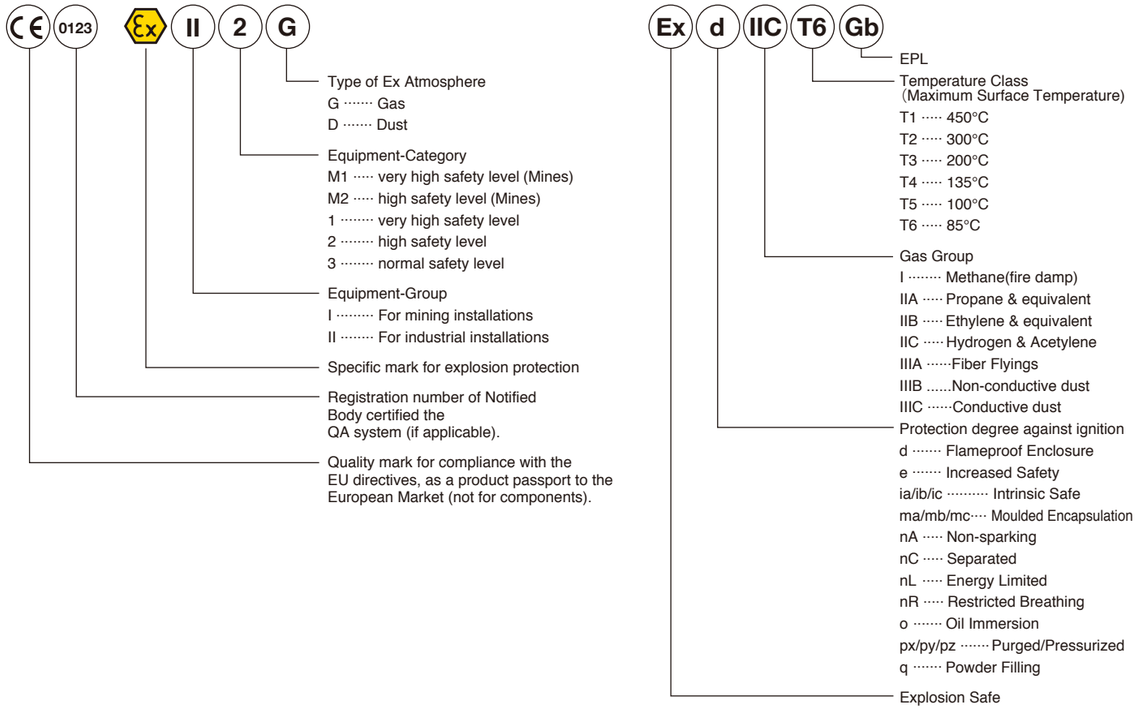
| MP3 Field Programmable Annunciator integrated with LED tower | | | | Hazardous Area | |
|---|---|---|---|---|---|
| Model Selection | Page | CENELEC Standard | Explosion Safety | Gas | Dust |
| LKEH-FV-EX Series | 13 | EN 60079-0, EN 60079-15, EN 60079-31 | CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIB T85°C Dc IP54 | Zone 2 | Zone 22 |

| Melodies & Chimes Horns | | | | Hazardous Area | |
|---|---|---|---|---|---|
| Model Selection | Page | CENELEC Standard | Explosion Safety | Gas | Dust |
| LKEH-FE-EX Series | 13 | EN 60079-0, EN 60079-15, EN 60079-31 | CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIB T85°C Dc IP54 | Zone 2 | Zone 22 |
| EHS-EX Series | 14 | | CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIC T85°C Dc IP65 | | |
| EHV-EX Series | | | | | |

| Super Bright LED Work Lights | | | | Hazardous Area | |
|---|---|---|---|---|---|
| Model Selection | Page | CENELEC Standard | Explosion Safety | Gas | Dust |
| CLN-24-CD-PT-EX | 15 | EN 60079-0, EN 60079-15, EN 60079-31 | CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIC T135°C Dc IP65 | Zone 2 | Zone 22 |
| CLK-EX Series | 16 | | | | |
| CLA-EX Series | 17 | | | | |

* These products are manufactured by PATLITE, converted and certified to explosion-safe by Artidor, and sold by PATLITE.

## Markings



Zone 1, Zone 2, Zone 21, Zone 22

# ST-PA-LR6 Explosion Proof

ST-PA-LR6-02　ST-PA-LR6-M2

Wall Mount

Horizontal Mount

## ■ Descriptions

The ST-PA-LR6 models are innovative LED maintenance-free Explosion-proof Signal Towers. Their robust design, along with pressure and flame-proof housing is ideal for use in potentially flammable and hazardous explosive environments, such as chemical, petrochemical, combustible dust, mineral/natural gas production; as well as for the food and beverage industries.

## ■ Features

- Housing: Aluminum alloy
- Glass: Borosilicate glass
- Terminals: Easy wire connection to the Signal Tower by opening the bottom.
- Mounting: Upright, Wall Mount, Vertical-mount, and Horizontal Mount.
- Voltage: 24V DC, 100-240V AC are available.
- Wire core size: 0.5mm²~2.5mm², AWG20~AWG14

## ■ ST-PA-LR6 is covered by the specifications shown in the shaded areas below

| Country | Area Classification | Classification of hazardous areas | | | Patlite Model ST-PA-LR6 | | |
|---|---|---|---|---|---|---|---|
| | | Constant Exposure | Occasional Exposure | Rare and Temporary | Conformity hazardous areas | Explosive atmosphere | Certification authority |
| Europe | ATEX Directive 94/9/EC | Zone 0 Zone 20 | Zone 1 Zone 21 | Zone 2 Zone 22 | Zone 1,2 Zone 21,22 | Gas Dust | EPS |

*The ATEX directive is a CENELEC standard.

## ■ Specifications

| Type | ST-PA-LR6502WJBWRYGBC | ST-PA-LR65M2WJBWRYGBC |
|---|---|---|
| Rated voltage | 24V DC | 100-240V AC |
| Operating temp. | ATEX Directive:-20°C～+50°C (no ice) | |
| Lighting pattern | Flashing (60±12 flashes per minute) / Continuous lighting | |
| Protection Rating | IP66 | |
| Mounting type | Outdoor & Indoor　Upright & Sideways | |
| Mass (Main body) | 5.7kg | 6.7kg |
| Cable | 10m Cable 10×0.75mm² | 10m Cable 12×0.75mm² |
| Material | Upper & Lower case : Aluminum alloy<br>Glass case : Borosilicate glass<br>Bracket : Stainless steel | |

## ■ Cerfitications

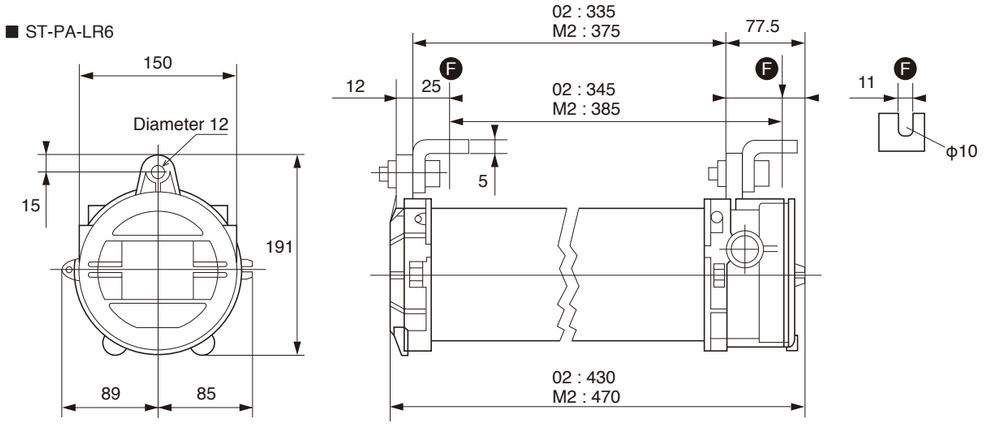
| | |
|---|---|
| Certifications | EPS 16 ATEX 1099<br>IECEx EPS 16.0046<br>TC-RU C-DE.ME92.B.00342 |
| Marking | Ex II 2G Ex db IIC T6/T5 Gb<br>Ex II 2G Ex tb IIIC T120°C Db |
| Standards | EN 60079-0, EN 60079-1, EN 60079-31 |
| Guideline | 2014/34/EU |
| Production Certification | EPS 13 ATEX Q 594 |
| CE | CE 2004 |



## Testing Authority EPS

## Dimensions

■ ST-PA-LR6



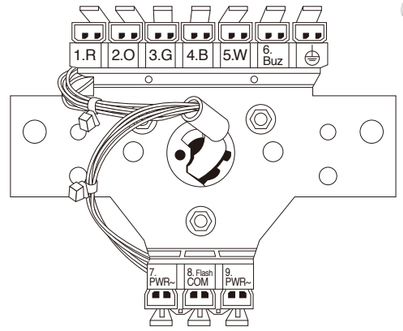

(Unit: mm)

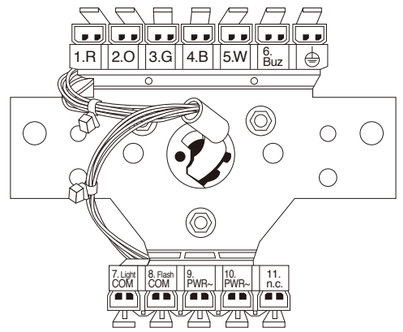
## Wiring Diagram

## ■ The colors are wired to table

| Color of wire of signal tower | Wire no. of linebushing ST-PA-LR6-02 | Wire no. of linebushing ST-PA-LR6-M2 |
|---|---|---|
| Red (Light) | R : 1 | R : 1 |
| Orange (Light) | O : 2 | O : 2 |
| Green (Light) | G : 3 | G : 3 |
| Blue (Light) | B : 4 | B : 4 |
| White (Light) | W : 5 | W : 5 |
| Violet | Buz : 6 | Buz : 6 |
| Green/yellow | PE | PE |
| Yellow | PWR+ : 7 | Light COM : 7 |
| Brown | Flash COM : 8 | Flash COM : 8 |
| Grey | PWR- : 9 | PWR~ : 9 |
| Black | | PWR~ : 10 |
| | | n.c. 11 |

## ■ Internal Connection



Zone 2, Zone 22

# LR4-EX SERIES Explosion Proof

CE Ex II 3 G Ex nA IIC T4 Gc, II 3 D Ex tc IIIC T80°C Dc IP65 2014/34/CATEX: EN 60079-0:2012 / A11:2013, EN 60079-15:2010, EN 60079-31:2014

## Explosion Proof Signal Tower Ø40mm

### Description

Explosion-safe Signal Tower featuring an LED light that is versatile and energy-efficient. The vertical and horizontal cut lenses in combination with a double-reflection system enhances the LED light diffusion to create a unique, full and brilliant light. The lenses and main body are made of polycarbonate material with characteristics to withstand harsh environments. In addition to its “continuous lighting” condition, the Signal Tower can also be ordered with flashing / non-flashing functions.

### Features

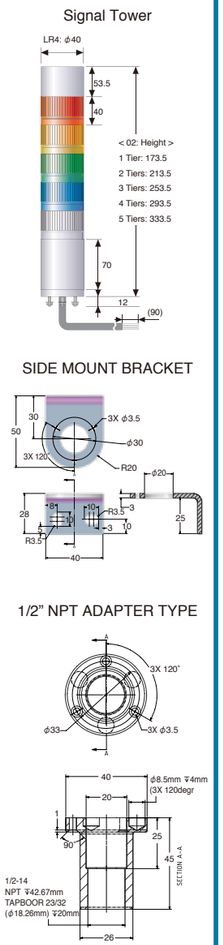
- Explosion-safe for gas and dust
- Suitable for Zone 2 and Zone 22
- CE compliance in accordance to ATEX
- A Uniform 360° Light-Emitting Design
- Unique Method of Fully Enclosed Sound Module
- 1 to 5 tiers are available
- 1/2” NPT adapter for pole mount is available as an option
- Available with “flashing/non flashing” and four audible buzzer alarm sounds
- Ingress protection of IP65
- Wall-mount or 1/2" NPT mount

Side mount bracket　1/2 inch NPT

Two types of mounting available

screws tightened

### Dimensions

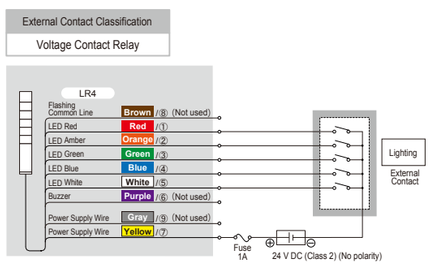



### Specifications

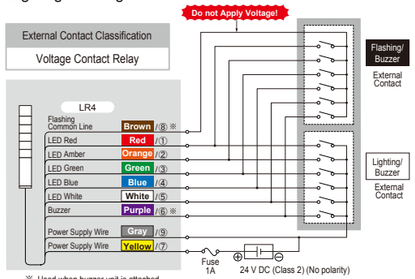
| | |
|---|---|
| Explosion-safety: | CE Ex II 3 G Ex nA IIC T4 Gc, II 3 D Ex tc IIIC T80°C Dc IP65 |
| CE conformities: | EN 60079-0:2012 / A11:2013, EN 60079-15:2010, EN 60079-31:2014 |
| Certification: | EC-Declaration of conformity |
| Ambient Temperature: | -20 °C to +50 °C |
| Ingress Protection: | IP65 to EN 60529 |
| Material: | PC towerbody |
| Lighting Source: | A Uniform 360° Light-Emitting Design |
| Acoustical Source: | Buzzer 85 dB (1m) with four different tones |
| Rated Voltage: | 24V DC |
| Module Colors Available: | Red, Amber, Green, Blue, Clear/white |
| Cable: | Factory sealed cable, Ø 8 mm, length 3 meter |

| CURRENT RATINGS | | | |
|---|---|---|---|
| LED | | BUZZER | |
| Signal Line Current | | Signal Line Current | Inrush Current |
| Red, Amber | Green, Blue, Clear | | |
| approx. 40 mA | | approx. 40 mA | approx. 250 mA |

Lighting 24V DC




Lighting/Flashing/Alarm 24V DC




※ Used when buzzer unit is attached.

### How to Order

**LR4-502WJBU-RYGBC-EX**

- Tiers: 1 - 5
- Rated Voltage: 02: 24V DC
- Buzzer: N: Continuous Lighting; B: Alarm
- Bracket Code: WJ : Side mount; NJ : NPT Adaptor
- LED Module Color: R: Red; Y: Amber; G: Green; B: Blue; C: Clear / White (Top to bottom)



Zone 2, Zone 22

# LR6-EX SERIES Explosion Proof

CE Ex II 3 G Ex nA IIC T4 Gc, II 3 D Ex tc IIIC T80°C Dc IP65 2014/34/(ATEX): EN 60079-0:2012 / A11:2013, EN 60079-15:2010, EN 60079-31:2014

## Explosion Proof Signal Tower Ø60mm

### Description

Explosion-safe Signal Tower featuring an LED light that is versatile and energy-efficient. The vertical and horizontal cut lenses in combination with a double-reflection system enhances the LED light diffusion to create a unique, full and brilliant light. The lenses and main body are made of strong synthetic materials with characteristics to withstand harsh environments. In addition to its “continuous lighting” condition, the Signal Tower can also be ordered with flashing / non-flashing functions

### Features

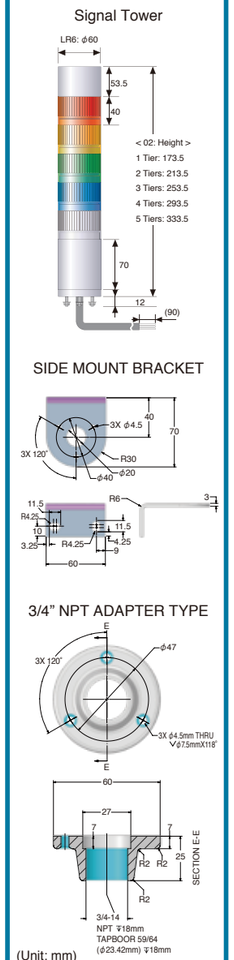
- Explosion-safe for gas and dust
- Suitable for Zone 2 and Zone 22
- CE compliance in accordance to ATEX
- A Uniform 360° Light-Emitting Design
- Unique Method of Fully Enclosed Sound Module
- 1 to 5 tiers are available
- 3/4” NPT adapter for pole mount is available as an option
- Available with “flashing/non flashing” and four audible buzzer alarm sounds
- Ingress protection of IP65
- Wall mount or 3/4" NPT mount

Side mount bracket　3/4 inch NPT

Two types of mounting available

screws tightened

### Dimensions

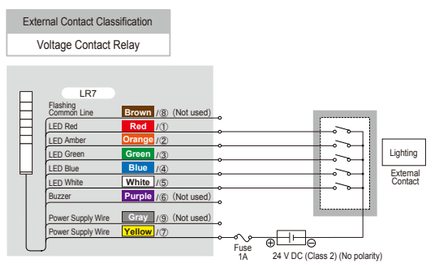



### Specifications

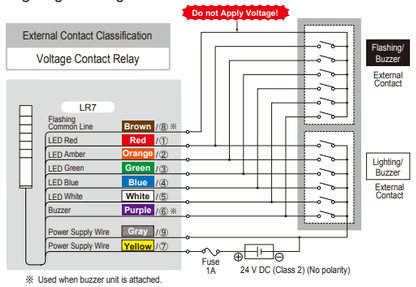
| | |
|---|---|
| Explosion-safety: | CE Ex II 3 G Ex nA IIC T4 Gc, II 3 D Ex tc IIIC T80°C IP65 |
| CE conformities: | EN 60079-0, EN 60079-15, EN 61241-0, EN 61241-1 |
| Certification: | EC-Declaration of conformity |
| Ambient Temperature: | -20 °C to +50 °C |
| Ingress Protection: | IP65 to EN 60529 |
| Material: | PC towerbody |
| Lighting Source: | A Uniform 360° Light-Emitting Design |
| Acoustical Source: | Buzzer 88 dB (1m) with four different tones |
| Rated Voltage: | 24V DC |
| Module Colors Available: | Red, Amber, Green, Blue, Clear/white |
| Cable: | Factory sealed cable, Ø 8 mm, length 3 meter |

| CURRENT RATINGS | | | |
|---|---|---|---|
| LED | | BUZZER | |
| Signal Line Current | | Signal Line Current | Inrush Current |
| Red, Amber | Green, Blue, Clear | | |
| approx. 40 mA | | approx. 40 mA | approx. 250 mA |

Lighting 24V DC




Lighting/Flashing/Alarm 24V DC




※ Used when buzzer unit is attached.

### How to Order

**LR6-502WJBU-RYGBC-EX**

- Tiers: 1 - 5
- Rated Voltage: 02: 24V DC
- Buzzer: N: Continuous Lighting; B: Alarm
- Bracket Code: WJ : Side mount; NJ : NPT Adaptor
- LED Module Color: R: Red; Y: Amber; G: Green; B: Blue; C: Clear / White (Top to bottom)

Zone 2, Zone 22

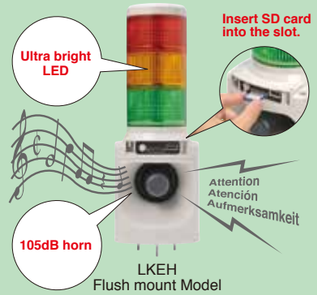
# LKEH-FE-EX, LKEH-FV-EX Explosion Proof

CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIB T85°C Dc IP54 94/9/Ex(ATEX)CENELEC:EN 60079-0, EN 60079-15, EN 60079-31

## 105dB(A)
## MP3 Field Programmable Annunciator, Melody Horn

- Explosion-safe for gas and dust
- Suitable for Zone 2 and Zone 22
- CE compliance in accordance to ATEX
- Super bright LED colors correspond to different voice, sounds, chimes and melodies.
- Voice alert messages of up to 63 seconds (64kbit/s) with 5 channels can be played back.
- 32 combinations of sounds, chimes and melodies are pre-recorded.
- 8 sounds can be played back by a bit input, and 32 sounds by binary input.
- Volume is adjustable from 0 to 105dB at 1 meter.
- Field programmable with MP3 by SD card for the model LKEH-FV-EX.
- Well visible with the super bright 100mm diameter LED from far distance.
- Robust design to withstand against 2G vibration.
- The body is made of Acrylonitrite-Ethylene-Styrene for weather resistance.
- Easy to control by only one common wire for both LED units and audible signals.
- NPN is standard. PNP open collector type is also available on order.

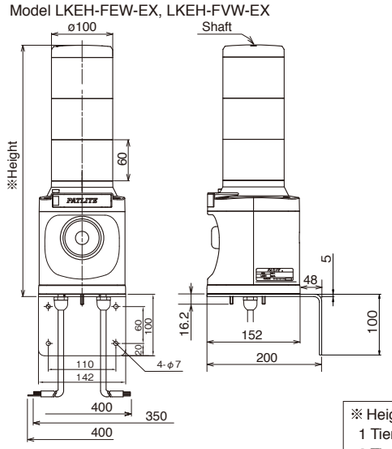
LKEH
Wall mount Model




LKEH
Flush mount Model

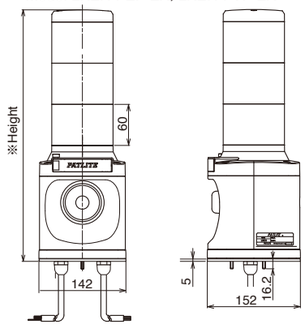
## Dimensions

Model LKEH-FEW-EX, LKEH-FVW-EX

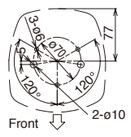



※ Height
1 Tier: 270
2 Tiers: 330
3 Tiers: 390
4 Tiers: 450

Model LKEH-FEF-EX, LKEH-FVF-EX




Mounting Dimension




(Unit : mm)

## Sound Selection Charts

- Pre-recorded on model LKEH-FE-EX.
- 8 sounds can be played back by a bit input, and 32 sounds by binary input.

| | | | |
|---|---|---|---|
| Beep | Stutter + Bell | Inverted Revelle | Annie Laurie |
| Stutter | Synthesized Melody | Galactic Motor | London Bridge |
| Bell | Chime | Ringing Phone | Mary`s Lamb |
| Yelp | Call Sign | Two Tone | Camptown Races |
| Rapid Hi Lo | Train Ride | Alarm Clock | Amaryllis |
| Melody Chime | Galloping Hi Lo | Ringing Hi Lo | Symphony #40 |
| Synthesized Piano | Alien Chatter | Fur Elise | Ave Maria |
| Synthesized Bell | Falling Crystals | Minuet | Grandfather's Clock |

| Model | MP3 | Power |
|---|---|---|
| LKEH-FEF-EX/LKEH-FEW-EX | —— | 14.2W |
| LKEH-FVF-EX/LKEH-FVW-EX | Supports | 14.2W |

SD card(SD-2GP) for the model LKEH-FVF-EX and LKEH-FVW-EX sold separately.

## How to Order

**LKEH-302FVF-RYG-EX**

- Model
- Tiers: 1~4
- Type: FV:Voice Synthesizer; FE: 32 sounds
- Mounting: F: Flush mount; W: Wall mount
- Color: R: Red; Y: Amber; G: Green; B: Blue; C: Clear/White Top to Bottom

## Specifications

| Model | Rated Voltage | Voltage Range | MP3, Melody | Operating Temperature Range | Recordable Duration | Sound Pressure (at 1m) | Messages | Mass |
|---|---|---|---|---|---|---|---|---|
| LKEH-FEF-EX | 24V DC | 24VDC±10% | Type-E | -10°C to +50°C, Humidity 85% or less | Prerecorded | 105dB | 8ch bit input, 32ch binary input | 2.8Kg |
| LKEH-FEW-EX | | | Type-E | | Prerecorded | | 8ch bit input, 32ch binary input | 3.2Kg |
| LKEH-FVF-EX | | | MPEG1-Audio layer III, 64kbit/s | | 63 sec. | | 5ch bit input, 31ch binary input | 2.8Kg |
| LKEH-FVW-EX | | | MPEG1-Audio layer III, 64kbit/s | | 63 sec. | | 5ch bit input, 31ch binary input | 3.2Kg |

The mass indicated is based on a 3 tiered LED Model LKEH. The mass will change in conjunction with the number of tiers. Add or remove 0.2 Kg per module.



Zone 2, Zone 22

# EHS-EX, EHV-EX Explosion Proof

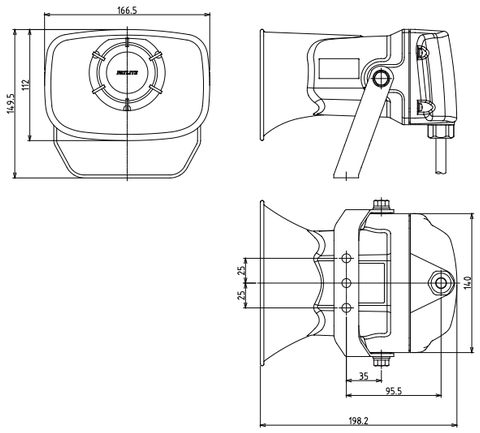
CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIC T85°C Dc IP65 94/9/EC(ATEX)CENELEC:EN 60079-0, EN 60079-15, EN 60079-31

## 105dB (at 1m) Melodies & Chimes Horn

- Protection Rating of IP65.
- Explosion-Safe for gas and dust
- Suitable for Zone 2 and Zone 22
- CE Compliance in accordance to ATEX
- EHS-EX comes with 32 preloaded melody and alarm sounds with adjustable volume up to 110dB (@ 1m).
- Robust, indoor and outdoor use with vibration resistance up to 4.5G.
- EHV-EX comes with 63 preloaded crisp and clear melody and alarm sounds with adjustable volume up to 110dB (@ 1m).
- EHV-EX offers a field-programmable MP3 function with a maximum of 220 sec. of recording time (@ 64kbps) and an adjustable volume up to 105dB (@ 1m).
- Ideal for plant-wide notification, public address and process control.
- UL464, CSA-C22.2 NO.205-M1983, FCC Part 15 Subpart B Class 4.
- CE, RoHS Compliant (EHS-M1 and EHV-M1 Only).

EHS-EX
EHV-EX

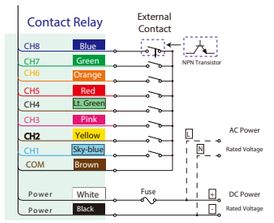
## Dimensions



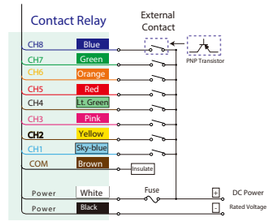

(Unit: mm)

## Wiring Diagram

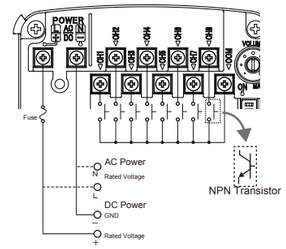
Non-voltage (NPN) Wiring



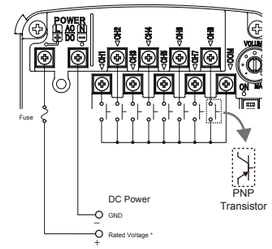

PNP Wiring




Terminal (NPN)




Terminal (PNP)




## How to Order

**EHV- □□G-EX**

- Model: EHS: Melody / Alarm Horn; EHV: MP3 Alert Horn
- Rated Voltage: M1: 12-24V DC
- Melody/Alarm Type: G: Type G (EHV); E: Type E (EHS)
- Wiring Type: H: Cable; T : Terminal*

## Specifications

| Model | Rated Voltage | Voltage Range | Power Consumption | Rated Current Consumption | Sound Pressure (max) | Operating Temperature Range | No. of Playback Messages | Protection Rating | Wiring Type | Mass |
|---|---|---|---|---|---|---|---|---|---|---|
| EHS-M1HE-EX | 12 - 24V DC | 10.8V to 26.4V DC | 4W (at 24V DC) | 450mA (max) | Alarm: 110dB (at 1m) | -20 °C to +50°C (Less than 85% RH) | Bit Input: 8 Binary Input: 32 | IP65 | Cable | 1.25kg |
| EHS-M1TE-EX | | | | | | | | | Terminal | |
| EHV-M1HG-EX | 12 - 24V DC | 10.8V to 26.4V DC | 4W (at 24V DC) | 400mA (max) | Alarm: 110dB (at 1m) MP3: 105dB (at 1m) | -20 °C to +50°C (Less than 85% RH) | Bit Input: 8 Binary Input: 63 | IP65 | Cable | 1.25kg |
| EHV-M1TG-EX | | | | | | | | | Terminal | |

Note 1: The sound pressure level is based on measurements under controlled conditions (voice-synthesized 1 kHz sine wave played back from a distance of 1 meter), therefore the surrounding environmental conditions and message content will result in different values for the sound pressure level.
Note 2: Even when starting two or more units simultaneously, a lag will occur during message playback.
MPEG Layer-3 audio coding technology licensed from Fraunhofer IIS and Thompson Licensing.(Model EHV)

Zone 2, Zone 22

# CLN-24-CD-PT-EX Explosion Proof

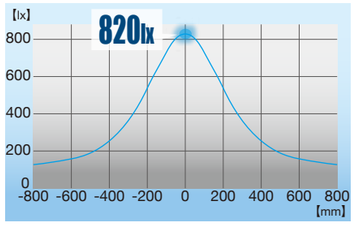
CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIC T135°C Dc IP65 94/9/Ex(ATEX)CENELEC:EN 60079-0, EN 60079-15, EN 60079-31

## Water/Oil Resistant LED Work Light

- 820 lx brightness, equivalent to a 40 watt incandescent bulb
- 60,000 hrs., or about 7 years of long service life (*1)
- IP66G, IP67G, IP69K protection (*2)
- 24V DC (Polarized)
- IEC62471 Compliance (Photobiological Safety Standard)
- Daylight Color Temperature (6,500K) suitable for very detailed work
- Comes with a flexible stainless-steel angle bracket for versatile installation (*3)
- Wide operating ambient temperature range (-40°C to +60°C)
- Low current draw of 174mA
- Very compact, light-weight and durable design
- (Thickness) 22.2mm X (Width) 85mm X (Height) 128mm

CLN-24-CD-PT-EX

## ■ Light Distribution Characteristics




High power LED with 820 lx provides sufficient illumination with only a 174mA current draw.

Stainless steel flexible angle bracket allows a versatile installation, instantly enabling direct illumination to the work area.

## ■ Floor Mount

## ■ Wall Mount

## ■ Ceiling Mount

※ The pan/tilt brackets can also be removed for Rear Attachment applications.

Color temperature of 6,500K is suitable for detailed and fine work, while providing photobiological safety.

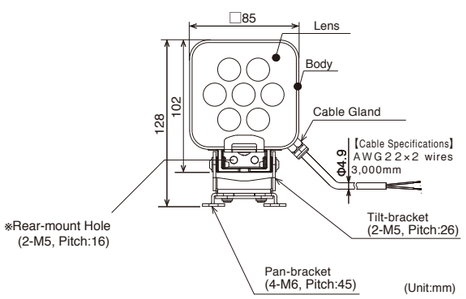
Natural light distribution when illuminating a wider work area with an equivalent to a 40W incandescent bulb with 550 lumens.

## ■ Specifications

| Model | CLN-24-CD-PT-EX |
|---|---|
| Color Code (Color) | CD (Daylight) |
| Color Temperature (typ.) | 6500K |
| Illumination (typ.) (Centered at 24VDC) 1m | 820 lx |
| Total Luminous Flux (typ.) | 550 lm |
| Rated Voltage | 24V DC (Polarized) |
| Operating Voltage Range | 24V DC ±10% |
| Rated Current/Power Consumption | 174mA ±10% / 4.2W |
| Operating Ambient Temperature | -40°C to +60°C (90% RH, No Condensation) |
| Main Unit Material | Body: Aluminum Alloy, Lens: Tempered Glass |
| Protection Rating | IP66G/67G (JIS C 0920)/69K (DIN 40050 part 9) (excluding cable end) |
| Mounting Location/Direction | Indoor / Any Direction |
| Insulation Resistance | DC 500V 5MΩ or more |
| Withstand Voltage | 500VAC for 1 minute (Between terminals and chassis) |
| Vibration Resistance | 30Hz total amplitude 0.3mm[P-P]<br>Back and forth, up and down, right and left for 2 hours each<br>Total amplitude 0.3mm[P-P] (10-57Hz), Acceleration 19.6m/s[2] |
| Mass (Tolerance ±10%) | 430g |

*1 : The typical value of LED brightness is 70% of the original specification, but may vary depending on actual applications.
*2 : IP66G and IP67G are Japanese Industrial Standards (JIS C0920-2003), and IP69K is the German DIN 40050 PART9 Standard.
*3 : CLN-24-CD-PT-EX Work Light can only be installed where risk of mechanical danger is limited to 2 Joules of impact energy

## ■ Dimensions






Zone 2, Zone 22

# CLK-24-EX Explosion Proof

CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIC T135°C Dc IP65 94/9/Ex(ATEX)CENELEC:EN 60079-0, EN 60079-15, EN 60079-31

## Water/Oil Resistant LED Work Light

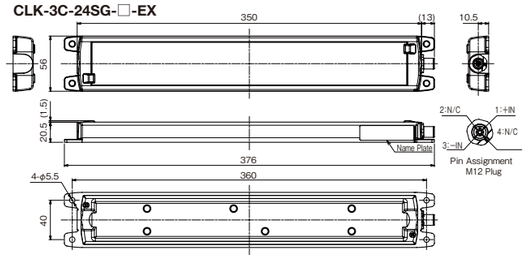
- Explosion-safe for gas and dust
- Suitable for Zone 2 and Zone 22
- CE compliance in accordance to ATEX
- 250mm long (2S), 350mm long (3S/3C), 650mm long (6S/6C)
- 1200 lx (3S/3C), 2100 lx (6S/6C)
- 24V DC, 522mA (3S/3C)
- LED color: CD 6,500K, CN 5,000K
- IP66G, IP67G, IP69K rated
- -40°C ～ +60°C
- Tempered glass lens
- Aluminum housing
- Stainless steel housing is available for 350mm long model

CLK3S-24AG-CD-EX

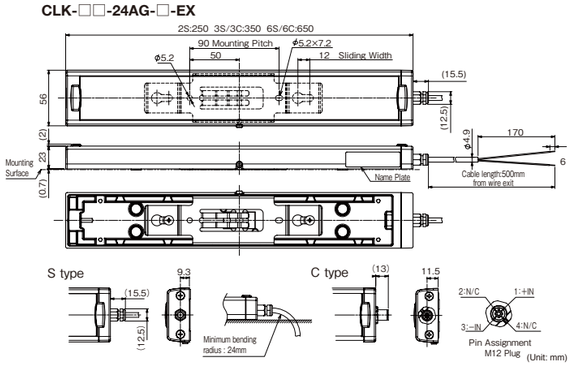
CLK6C-24AG-CD-EX

## ■ Dimensions

CLK-3C-24SG-□-EX




CLK-□□-24AG-□-EX




## ■ How to Order

**CLK-□□-24□□-□-EX**

- Model
- Illumination Area Size
  2: 200mm 3: 300mm 6: 600mm
- Wiring Specifications
  S: Side-exiting Cable C: M12 Conector
- Color
  CD: Daylight
  CN: Natural White
- AG: Aluminum & glass
  SG: Stainless steel & glass

## ■ Specifications

| Model | CLK-□□-24□□-□-EX |
|---|---|
| LED Color | Day light(CD) / Natural White(CN) |
| Rated Voltage | 24V DC |
| Operating Voltage Range | Rated Voltage ± 10% |
| Current Consumption | 522mA ± 40mA (3S/3C type) |
| Light Source | High intensity LED × 18 elements (3S/3C type) |
| Luminous Intensity at Optical Center (lx at 1m) | 1200 (3S/3C type) |
| Main Body | Housing: Aluminum, Cover: Tempered glass |
| Operating Temperature Range | -40°C~+60°C (No condensation 90%RH or less) |
| Mounting Direction | Any Direction (for indoor use only) |
| Protection Rating | IP66G/IP67G (IEC 60529)/IP69K (DIN 40050 part 9) |
| Vibration Resistance | 19.6m/s2 |
| Mass | 1490g (3C type) |

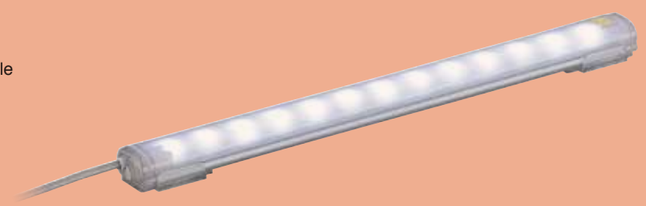
The LED Worklight may only be installed in places where risk of mechanical danger is limited to an impact energy of 2 Joules (1 Kg mass dropped at 20cm height).

# CLA-EX Explosion Proof

CE Ex II 3GD Ex nA IIC T4 Gc, Ex tc IIIC T135°C Dc IP65 94/9/Ex(ATEX)CENELEC:EN 60079-0, EN 60079-15, EN 60079-31

## Water Resistant LED Work Light

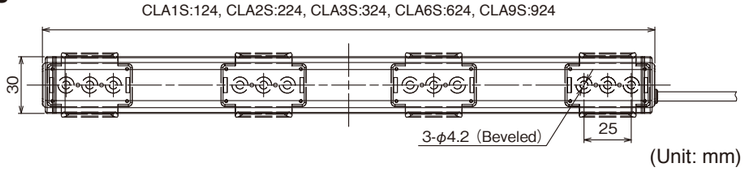
- Explosion-safe for gas and dust
- Suitable for Zone 2 and Zone 22
- CE compliance in accordance to ATEX
- 100mm(140 lx), 200mm(270 lx), 300mm(400 lx), 600mm(650 lx), 900mm(810lx), 24V DC (polarized)
- Cable Length: 3m
- IP66, IP67 and IP69K rated
- -40°C ～ +60°C
- Polycarbonate Mounting brackets available



CLA3S-24-CD-30-EX

## ■ Dimensions

CLA1S:124, CLA2S:224, CLA3S:324, CLA6S:624, CLA9S:924




(Unit: mm)

## ■ How to Order

CLA□S-24-□□-30-EX

LED color
**CD** Daylight 6800K

Length
**1** 100mm **6** 600mm
**2** 200mm **9** 900mm
**3** 300mm

## ■ Options

**Rear Attachment (Magnetic Mount) Model SZ-310ARM**

**Side Attachment (Screw Mount) Model SZ-310AS**

**Side Attachment Model SZ-310ASB**

*Stainless steel brackets are also available.

## ■ Specifications

| Models | Luminous Color | Length | Rated Voltage | Operating Voltage Range | Rated Current Consumption | Center Radiation (lx/50cm) | Mounting Direction | Vibration Resistance | Mass |
|---|---|---|---|---|---|---|---|---|---|
| CLA1S-24-CD-30-EX | Daylight | 100mm | 24V DC (Polarized) | 24V DC±10% | 104mA | 140 | Any Direction (Indoor Use) | 19.6m/s$^2$ | 80 g |
| CLA2S-24-CD-30-EX | Daylight | 200mm | | | 208mA | 270 | | | 130 g |
| CLA3S-24-CD-30-EX | Daylight | 300mm | | | 240mA | 400 | | | 180 g |
| CLA6S-24-CD-30-EX | Daylight | 600mm | | | 480mA | 650 | | | 340 g |
| CLA9S-24-CD-30-EX | Daylight | 900mm | | | 720mA | 810 | | | 500 g |

MEMO