

# Wide-area lightning rod JLR / ESE-1000



## Principles and characteristics ESE-1000

## Lightning protection range of JLR/ESE-1000

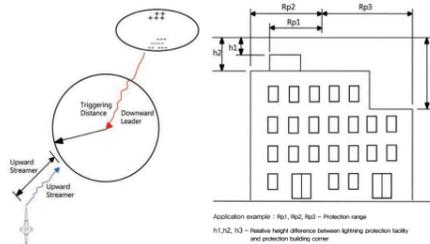
## Protection radius according to relative height

This design method reduces the contact time between the Upward Streamer and the Downward Leader(Dart Leader) from the thundercloud. so It protects a wider range than general lightning protection system. It is used according to French Standard 17-102. Unlike the CV method, the protection range is set by the gain distance of the early streamer emission and the lightning distance by the rotating sphere without consideration of the field concentration factor of the ground due to lightning. But, because the rolling sphere method is applied, it can be applied up to a maximum height of 60m.

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JLR / ESE-1000 operates a high-voltage pulse oscillator according to the electric field strength induced by the electric charge of the thunderclouds and forms a high voltage on the electrodes in the Venturi Tube. So intermittent corona discharge causes high voltage pulses to be emitted through the central final tip to generate an up streamer.

The special effect of the ESE-1000 is that it discharges early by shortening the contact time between this Upward streamer and the Downward leader coming from thundercloud. so It protects a wider range than general lightning protection system.



It is set in accordance with the French Standard (17-102 Para. 5.2.3.2) or the formula below.

$Rp = \sqrt{h(2D-h) + \Delta L(2D + \Delta L)}$  (for  $h \geq 5m$ )  
 where  
 Rp : Protection Radius  
 h : Height of lightning protection system (standards to be protected)  
 D : Triggering Distance  
 $D : 10 \times I^{2/3}$  (m), I = lightning return current (kA)  
 Level 1 (high protection) : 20 m (3 kA)  
 Level 2 (improved protection) : 45 m (10 kA)  
 Level 3 (standard protection) : 60 m (15 kA)

$\Delta L = \nu (m/\mu s) \times \Delta T (\mu s)$   
 where  
 $\nu = 1 m/\mu s$  (Upstream streamer forward distance),  $\Delta T$  = Early-onset time difference ( $\mu s$ )

Protection Level	Current (Maximum)	Probability of exceeding	height (m)									
			2	4	5	7	10	14	20	45	60	
Level 1	3 kA	99 %	32	64	79	79	79	80	80	-	-	
Level 2	10 kA	93 %	40	78	97	98	99	101	102	105	-	
Level 3	15 kA	85 %	44	87	107	108	109	111	113	120	120	

\* When the average  $\Delta T$  value of the test result is 68.4  $\mu s$  - The protection radius is 116 m

# Smart Lightning Warning System / ESLW-I



## Product Introduction

## Performance comparison with existing products



Lightning in natural phenomena cause a lot of damages such as power system, buildings and life on the ground. As the spread of computers, information and communication devices and electronic devices has increased, all social systems such as intelligent buildings, automation of factories, computerization of office and administration, finance and traffic communication have become advanced and networked through computer. The failure of electronic devices causes social disruption and enormous economic losses.

In recent years, the number of lightning strikes has become more frequent due to abnormal weather phenomena, and its intensity has also become stronger, causing more losses in civilized modern industrial societies. Currently, most of the industrial facilities are mainly driven by power sources, and accordingly, reliable power supply is required. Over the past several decades, damage from lightning to ground, as well as from aircraft and ships has been damaging, and a reliable lightning alarm system must be introduced as a countermeasure against such lightning accidents.

Smart lightning warning system ESLW-I consists of a sensor for measurement of Ground-Level Electric Field and electric radiation and a main control panel equipped with a 7-inch touch screen equipped with the latest program, that displays status and alarms in real time.

Based on the information of thundercloud collected through the above system, it predicts the risk of expected lightning strike. Based on this, it is possible to prevent the damage cause by lightning in advance and secure the reliability of the power system and establish a stable industrial structure.

With the antenna configuration, The field-mill sensor detects the change of the electric field caused by the thunderstorm in real time and the lightning sensor(lightning position sensor) detects the lightning position to 30 [km] And informs the lightning information by sound and visual alarm.

The data collected through the antenna are connected to the main control panel. The touch screen can be used to check the status of the lightning strikes and the operation of the equipment in real time. The alarm phase is Normal, Warning, Alert, Clear. And the sensitivity of the antenna is composed of 3 levels of Low, Normal and High, so it can be adjusted according to the surrounding environment of each site.

- It is linear by applying field-mill type measurement sensor, and can measure high sensitivity from low electric field.
- Graphical representation of location information and progress direction in case of lightning strike.

Specifications	Existing Products	ESLW-I
Type	Point electrode corona	Field-mill
Alarm phase	3 or 4 step	4 step
Display	LED light	LED light / Graphic Display
Alarm method	Flash light / External siren alarm	Internal buzzer / Flash light / External siren alarm
Data Management	Download real-time and historical data	
	Connect with PC and download	Download as USB connector
Lightning information	Lightning potential alarm	Lightning potential alarm
Lightning location information	Lightning progress information	
Remote monitoring	X	Real-time monitoring possible at distances up to 1 km
Temperature and humidity function	X	Temperature and humidity display on touch screen

# Chemical Ground Electrode(Chem-Rod)

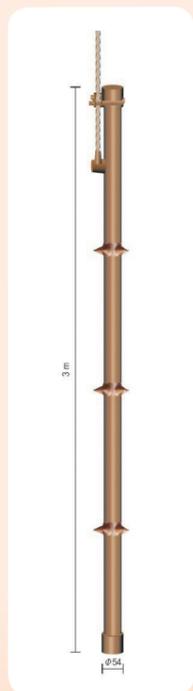
## Overview of Chem-Rod Grounding System

Chem-Rod Grounding System is the most efficient system that maintains low grounding resistance for more than 30 years regardless of ground soil type, geological structure, soil composition, moisture content and seasonal temperature change.

Chem-Rod Grounding System uses the grounding method using the "Highly conductive ground rod of strong alkaline electrolytes", and it is a new grounding method developed to satisfy the modernization of highly integrated computational and communication service and high reliability operation quality.

It is particularly well suited for systems that require extremely stable grounding performance, such as computational or telecom grounding, as well as grounding systems that provide the best solution for that are difficult to obtain low ground resistance for rock or soil layers.

## Chemical Ground Electrode System Configuration



- Electrolytic Conductive Grounding Rod (Rechargeable electrolyte of Bentonite main component)
- Chem Earth (Grounding Rod outer layer reducing agent)
- Access Well (Maintenance area)
- Pigtail Connector (to ground grid or down conductor)



- Method according to geological condition
  - Vertical Type / - Horizontal Type
- Applicable length
  - 1.2m, 3m, 6m length is supplied. If more than 6m is required, you can extend and construct in the field by using 3m extension rod.
- How to order
  - Type : (V) Vertical Type / (H) Horizontal Type("L" Type)
  - Length : 1.2m, 3m, 6m, More than 6m use 3m extension type
  - Ground connection : 1.2 m Standard, nominal name see chart
  - Ground direction : (D) Down, (U) Up
- Ground wire standard
  - 70 SQ (mm<sup>2</sup>), 95 SQ (mm<sup>2</sup>)

### Comparing grounding resistance change characteristics according to season, climate and aging (Durability)

Method Characteristic	Chem-Rod	Driven Rod	Cause of change
Weather change	- Almost none. (Stable at a value lower than the initial value)	- Usually shows a difference of more than 500Ω from 20Ω.	- Moisture content changes during the rainy season and dry season
Seasonal change		- Usually shows a difference of more than 300Ω from 100Ω.	- Four Seasons Climate Change
Temperature change			- Summer and winter temperature changes
Aging	- Almost no aging. - Guaranteed 30 years of stable grounding resistance.	- Aging is very large. Due to reduced grounding resistance, it must be fully repaired and rebuilt within 3 to 5 years.	- Corrosion caused by soil contact (Risk of trouble due to grounding)
Performance Comparison	- Chem-Rod Grounding System always maintain stable grounding resistance regardless of external changes after construction.	- As the season, climate, and temperature change, the grounding resistance changes significantly, and over time, the ground performance degrades significantly and increases significantly above the initial grounding resistance.	

# CHEM EARTH (25Kg)

## Overview



Chem-Earth is a natural mineral component such as silicate. It is excellent in adhesion and compressibility to the grounding rod. It prevents corrosion of the grounding rod and absorbs moisture up to 15 times its self volume, and maintains the condition like Gel. The photoionic electrolyte is a reducing agent that helps to have a low resistance value by properly reacting with the moisture in the surrounding soil and has a gentle effect on maintaining the stable resistance value. There is no aging change, it has a reduction effect of construction cost by more than 50% compared with the existing construction method in terms of long-term maintenance. Various types of grounding electrodes can be made according to site conditions, and it can be used in combination with various methods such as underground cable, boring, mesh and ground rod. The constructed ground electrode forms a hardened body with high strength, so it does not cause environmental pollution because There is no leakage due to rainwater or underground water.

### Advantages of Chem Earth

- Permanently maintain low grounding resistance
- High electrical conductivity: effective on any soil
- Non-corrosive / - Pollution-free: No effect on groundwater
- Dough or powder can be applied as it is
- Hygroscopicity: can be applied even in places where water
- Reduced cost compared to chemical ground rod is difficult to obtain

### How to use

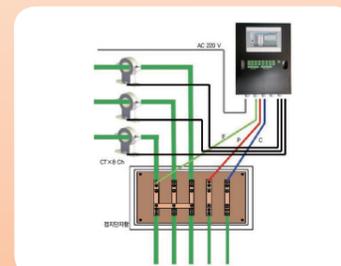
Mix Chem Earth (25 kg) with 50L of water, and apply to the earth pole according to each method. In places where it is difficult to use water, such as mountainous areas, it absorbs moisture even when it is used without mixing with water, and exhibits its original performance.

### Application field

- Power plant / - Communication facilities / - Industrial facilities
- Oil painting industry facilities / - Public facilities / - Defense facilities / - Other facilities

# Integrated Grounding Monitoring System

## Overview and Key Features



- Overview The integrated ground monitoring system measures and displays the ground resistance in real time. so, Users can easily grasp the change in ground resistance, It can detect the problem in the power system by measuring the leakage current flowing into each grounding. In addition, It has a purpose of stably operating and protecting the power supply and communication equipment by discriminating the abnormality of the grounding system.

### Ground resistance measurement function

Measuring method	Ground resistance measurement method by voltage drop method
Number of Channels	1 CH
Measurement range	0 ~ 100 [Ω]
Resolving power	0.01 [Ω]
Display	Check 'FAULT' measurement connection / 'OVER' Ground resistance exceeds 100 [Ω]

### Leakage current measurement function

Measuring method	Noncontact current measurement method using CT
Number of Channels	8 CH
Measurement range	0 ~ 10 [A]
Resolving power	0.01 [A]
Display	'OVER' Leakage current value exceeds 10 [A]

### Surge Counter Function

Number of Channels	1 CH
Scope of Operation	500 [A] ~ 40 [kA] [8/20 [us]]
Display	0 ~ 9999 / When '9999' is exceeded, Data is updated from 1

Product installation diagram