



## CASE STUDY

# How Ferraris Power Helped Korea's Largest Utility Company Secure Its Underground Vaults

## The Problem

Korea's largest utility is responsible for maintaining safe conditions in thousands of underground vaults throughout the country. To accomplish this, they need to install and power a network of monitoring sensors and connectivity hardware at each location. While batteries could provide these systems with the necessary power, the utility is weary of frequent service calls required to replace depleted batteries or batteries damaged from the harsh environment. Alternatively, transformers could be deployed in each vault to step down power from existing high voltage power lines in the vaults, to the few watts required to power the sensors – but this makes little sense due to prohibitive cost and installation requirements. The utility's system integrator needs a power supply for the sensor suites that would provide the lasting stability of a transformer, with the ease of deployment and cost-effectiveness of a battery. The system integrator contacts Ferraris Power for a solution.

### Low Cost

Cost Effective vs Transformers  
No Battery Replacement Trips

### Reliable

Reduce Maintenance Expenses  
Robust Solid State Device

### Simple

Contactless Installation  
Eliminate Downtime

### Scalable

No Load Limitations  
Linear Power Scalability

## Our Solution

The system integrator's underground monitoring systems consisted of 5 environmental sensors and a communications router, requiring 10W of DC power. Ferraris Power worked with the system integrator to incorporate the Tolenoid™ C contactless electromagnetic field harvesting modules as a power source for the monitoring systems. After surveying the underground power vaults, Ferraris Power attached four Tolenoid™ C power supplies in series to the cross bonding ground wires of the 154kV transmission lines running through the power vaults. Using the simple installation process, the Tolenoid™ C power supplies were installed in only 30 minutes, to provide power to the sensor arrays and minimize street level traffic interruptions.

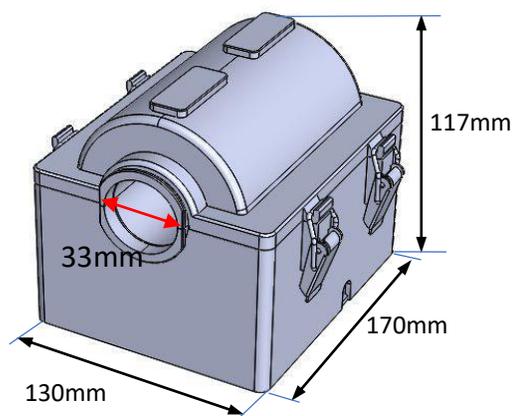


# The Results

With over 100 Tolenoid™ C power supplies installed since 2015, the deployed units have operated without incident, providing uninterrupted power to the underground monitoring systems. No additional maintenance calls have been required. No busy streets have been closed, while utility crews cordon off manhole cover entrances just to replace a battery underground. Deployment of the remote monitoring sensor arrays drove down vault inspection time from 4 hours to 10 seconds, resulting in \$1,200 annually in operational savings for the utility at each site. With nearly 2,500 vaults to safeguard, this represents over \$2.6 million in annual savings. Furthermore, the utility now retrieves data 260 times per year, rather than twice per year prior to installation. This increased transparency into every vault’s environmental condition protects both field crews and customers, and allows the utility to react to issues before they become disasters.



Tolenoid™ C power supplies attached to the cross-bonding ground cables in the underground power vaults, powering the sensors and communications modems



Tolenoid™ C			
		Min.	Max.
Primary Line Electrical Ratings	Current (A)	10A	650A
	Voltage (V)		10kV
	Line Diameter (mm)	33mm	
Environmental Characteristics	Operating Temp.	-25° C to 70° C	
	Water / Dust Proof	IP65 / IP67	
Physical Characteristics	Dimensions (mm)	170 x 130 x 117	
	Weight (g)	2130	
	Case Material	Plastic (ABS)	

Approximate\* Tolenoid™ C Output (DC W) [based on 12V 60W SMPS]

Tolenoid™ C Count	Primary Line Current									
	10 A	15 A	30 A	45 A	60 A	75 A	90 A	105 A	210 A	
1	0.50	1.21	5.80	10.87	15.93	20.98	25.80	30.84	60.00	
2	0.97	3.38	12.52	24.83	36.36	47.62	58.58	60.00	60.00	
3	1.93	5.56	21.47	39.01	56.67	60.00	60.00	60.00	60.00	
4	2.90	7.75	29.16	53.37	60.00	60.00	60.00	60.00	60.00	

\* Values were obtained in laboratory settings. Actual production values may vary due to conditions of live environment.

## About Ferraris Power

Ferraris Power was founded in 2012 with a mission to innovate industrial grade power supplies for the smart grid, by harnessing energy from an abundant but unutilized source - the electromagnetic fields emitted from power lines.

Utilizing proprietary scaling technology to harvest and convert electromagnetic energy into DC electricity, Ferraris Power solutions are designed to operate simply by attaching onto any operating AC power line. Capable of generating mW to kW loads, Ferraris Power solutions enable users to power and deploy their smart infrastructure more quickly, and cost effectively.

