

CABLEGUARDIAN F.A.Q.

FREQUENTLY ASKED QUESTIONS

WHAT IS CABLEGUARDIAN?

CableGuardian is an innovative and award winning system, developed by Viper Innovations, which brings together core to earth and core to core monitoring technologies into a single platform to enable continuous remote monitoring, as well as fault diagnosis and location, on live electrical systems.

WHAT ARE THE BUSINESS BENEFITS OF CABLEGUARDIAN?

CableGuardian improves the safety and performance of your business by enabling the user to predict and prevent cable failures to the maximum possible extent by measuring line voltage and current, insulation resistance, insulation capacitance and volt-drop to allow the user to monitor cable and switchgear degradation from a very wide range of causes and interject well before a failure occurs. It also enables the user, via the SSTDR technology, to restrict delay per incident to the lowest possible level by being able to pinpoint the location of a catastrophic cable failure, for example cable theft, to prevent the need for time consuming fault finding.

CableGuardian also allows you to avoid having to effect manual cable testing and many elements of standard maintenance by providing continual monitoring of your system, enabling OPEX reductions whilst providing unparalleled insights into asset condition to enable you to squeeze maximum life from every component of your asset.

WHAT DOES A CABLEGUARDIAN SYSTEM LOOK LIKE?

A CableGuardian system may consist of a single or

multiple CableGuardian nodes, depending on the system monitoring requirements and the level of fault location granularity desired. The system was originally designed for use on the UK Rail network, specifically to monitor trackside Signalling Power Supply Systems, and CableGuardian Nodes may be deployed in Tier 3 (Network), Tier 2 (Sub-Network) and Tier 1 (Sub-Network Section) configurations in accordance with Network Rail standard NR/L2/SIGELP/27725. Please contact Viper Innovations to discuss specific system requirements.

DOES TIER 1 MONITORING MEAN I NEED A UNIT IN EVERY LOC?

No – Tier 1 monitoring simply refers to any configuration that has at least one monitoring unit installed in a trackside location part way along a feeder. So a system with Tier 2 feeder level monitoring at a principal supply point (PSP) plus one additional trackside unit on any of these feeders would be classed as a Tier 1 system. The number of trackside units is at the discretion of the customer. Of course the option is available to have a unit in every LOC if this is justified by the customer's business case.

WHAT DOES A CABLEGUARDIAN NODE LOOK LIKE?

Each CableGuardian node consists of a CableGuardian unit, a directional measurement coil and appropriate wiring harnesses to connect the unit to the electrical system being monitored. A cellular aerial is also required if the cellular communications interface is to be utilised. Each CableGuardian unit employs two advanced measurement technologies:

- Firstly, Viper's well proven and highly accurate

F.A.Q. CONTINUED

line integrity monitoring technology measures the Insulation Resistance (IR), Insulation Capacitance (IC) and electrical parameters of live cables and system components.

- Secondly, the live conductors are continuously monitored for short and open circuits using ground-breaking Spread Spectrum Time Domain Reflectometry (SSTDTR).

WHICH NETWORK IS USED FOR THE CELLULAR COMMUNICATIONS INTERFACE?

Each CableGuardian unit is provisioned with a network agnostic cellular SIM card which is designed to provide access to most of the major UK cellular network providers. The CableGuardian unit can connect to 4G, 3G and 2G networks (in order of preference) and will connect to the network with the strongest signal. In the event that a network signal is lost, the CableGuardian unit will attempt to connect to the next strongest signal.

HOW DOES A CABLEGUARDIAN SYSTEM WORK?

Each CableGuardian unit is required to be connected to the power supply being monitored in order for low voltage measurement signals to be injected into the system (NOTE: the measurement signals do not, in any way, interfere with the power supply being monitored).

Once the measurements have been taken, the CableGuardian unit transmits its data, via a secure internet connection, to the remotely hosted CableGuardian “Data Storage and Analytics System”. This system analyses the raw data to monitor cable degradation and determines the location of any cable or conductor faults on the live power network. All of the resulting information is displayed clearly, in real-time, on a user-friendly and intuitive web portal.

WILL CABLEGUARDIAN WORK ON MY SYSTEM?

CableGuardian has been designed for operation on live, low voltage, unearthed (IT – Isol -Terre) power

distribution systems operating at up to 690V AC, specifically to monitor trackside Signalling Power Supply Systems on the UK Rail network. However, options to adapt the technology for other applications may be possible. Please contact Viper Innovations to discuss specific requirements.

WILL CABLEGUARDIAN WORK ON HIGH VOLTAGE POWER CABLES?

The maximum Line Voltage that can be connected directly to the CableGuardian unit is 690 VAC. However, the measurement technology within the unit has been adapted for applications running at higher voltages and options to adapt the technology for further applications may be possible. Please contact Viper Innovations to discuss specific requirements.

DOES CABLEGUARDIAN WORK ON 4-CORE CABLES?

Yes.

DOES CABLEGUARDIAN WORK ON ARMoured CABLES?

Armoured cabling should have no effect on the CableGuardian system operation, as long as the armour is stripped back at the point where the measurement coils are fitted.

HOW IS CABLEGUARDIAN INSTALLED AND CONNECTED TO A SYSTEM?

CableGuardian nodes are designed for installation into new or existing legacy trackside Signalling Apparatus Housings (SAH), such as Principal Supply Points (PSP), Location Cases (LOC), Functional Supply Points (FSP), Distribution Isolation Transformer Assemblies (DITA) and Annexe Cases. A range of Viper supplied electrical connection harnesses, measurement coils and other ancillary equipment is available to meet the specific needs of system applications, including non-intrusive connection whilst the signalling power supply is live. Please contact Viper Innovations to discuss specific requirements.

F.A.Q. CONTINUED

IS A FUNCTIONAL EARTH CONNECTION REQUIRED FOR EACH NODE?

Yes – Each CableGuardian unit requires a local Functional Earth (FE) connection in order to provide a reference for Network Insulation Resistance and Insulation Capacitance measurements. This local connection enables each unit to record more accurate measurements relative to their position in the network than would be achieved using a single Earth reference located elsewhere in the system (for example, at the PSP). It also ensures that multiple redundancy is provided for the Earth reference which would not be provided by a measurement system employing a single Earth reference point (i.e. risk of a single point of system failure). An additional benefit of the local FE connection is that it allows the IR/IC data on the CableGuardian Web Portal to be used to indicate a problem with a specific Earth connection at trackside equipment, which is especially useful for equipment with Protective Earth arrangements as it can provide warning of a potential safety issue.

IS CABLEGUARDIAN COMPATIBLE WITH CLASS I & CLASS II ISOLATION?

Yes – CableGuardian is a fully approved Class II isolated device which meets all requirements for Protection Class II in accordance with IEC 61140 for use in Class II applications. Therefore, it is fully compatible with both Class I and Class II isolated systems.

DOES THE REQUIREMENT FOR A FUNCTIONAL EARTH CONNECTION COMPROMISE CLASS II SYSTEM INTEGRITY?

No – Class II integrity is unaffected by the Functional Earth connection which is permitted for measurement purposes.

WHAT POWER SUPPLY DO I NEED TO PROVIDE FOR CABLEGUARDIAN?

Each CableGuardian unit has the ability to be powered via two alternative supply methods:

- Directly from the “Line Supply” being monitored (350V – 690V AC).

- Via “Domestic Supply” (110V/230V AC), separate from the “Line Supply” being monitored.

The power supply option may depend on the install location and the electrical supplies available at that location. The method is selected using an appropriate Viper Innovations supplied connection harness – no modifications or alterations are required to the CableGuardian unit itself. Where a “Domestic Supply” is derived from the “Line Supply” (e.g. inside FSP, LOC, DITA, etc), it is recommended that the CableGuardian unit is powered directly from the “Line Supply” as connections to the “Line Supply” are required to enable injection of measurement signals onto the Signalling Power Supply anyway. Each CableGuardian unit requires 25 Watts of electrical power.

IS CABLEGUARDIAN COMPATIBLE WITH AN EXISTING THIRD PARTY IMD?

Measurement signals and methods used by each Insulation Monitoring Device (IMD) equipment vendor are very different and if operated concurrently, the IMDs will interfere with each other causing misleading results. Therefore, existing IMD equipment must be decommissioned and disconnected from the Signalling Power Supply system in order to operate CableGuardian equipment.

DO WE REQUIRE A SITE SURVEY?

CableGuardian nodes are designed to be installed into new or existing legacy trackside Signalling Apparatus Housings (SAH) from different suppliers. For new equipment, Viper provide support and guidance to designers to ensure correct integration of the CableGuardian equipment and a range of “CableGuardian Ready” FSP, DITA and Annexe Case designs are already available to purchase from the suppliers. Due to the variation of designs between legacy SAH equipment installed on the Rail network, a site survey may be necessary to confirm enough space

F.A.Q. CONTINUED

is available for the CableGuardian equipment, either inside the SAH or as part of an Annexe Case. Viper can provide guidance, either by supporting a trackside site survey or by reviewing detailed drawings and photographs of the SAH. Support can also be provided to SAH and Annexe Case suppliers to overcome specific site installation challenges. Please contact Viper Innovations to discuss specific requirements.

ARE SPECIALIST TOOLS REQUIRED TO INSTALL CABLEGUARDIAN?

No specialised tooling or test equipment is required to install CableGuardian.

IS SPECIALIST TRAINING REQUIRED TO INSTALL CABLEGUARDIAN?

CableGuardian equipment has been designed to be quick and easy to install. There are no specific competence or training requirements for personnel to install CableGuardian units and ancillary equipment into trackside locations. All installation information and operating instructions are provided in the CableGuardian “Installation, Operations and Maintenance Manual” (document number 5796-137438). However, Viper would be very happy to provide guidance and support, including site visits.

WHAT IS THE TEST & MAINTENANCE SCHEDULE?

CableGuardian equipment requires no periodic testing, calibration or maintenance.

ARE CABLEGUARDIAN UNITS REPAIRABLE IN THE FIELD?

CableGuardian equipment is not intended to be repaired whilst in the field. A front panel mounted fuse protects the internal power supply and is the only part serviceable by the end-user. The fuse must be replaced as described in the CableGuardian “Installation, Operations & Maintenance Manual” (document number 5796-137438). For all other faults, please contact Viper Innovations to discuss return of the equipment for investigation.

CAN CABLEGUARDIAN BE USED FOR PORTABLE FAULT FINDING?

Yes – CableGuardian equipment has been used to provide portable IR surveys and fault finding services. Please contact Viper Innovations for more details.

IS THE CABLEGUARDIAN WEB PORTAL SECURE?

Yes – The Web Portal has been designed with cyber security in mind including the use of individual User profiles and CAPTCHA authenticity tools.

WHAT IF I HAVE MORE QUESTIONS?

Further information including a full product guide, case studies, and other useful resources can be found on the Viper Innovations website. Please use the “Contact Us” form to send an enquiry and we would be delighted to answer your questions and discuss specific system requirements.

www.viperinnovations.com



Portishead Office
Unit 3, Marine View Office Park, 45 Martingale
Way, Portishead, Bristol, BS20 7AW



+44 (0)1275 787878



enquiries@viperinnovations.com



Aberdeen Office
Kettock Lodge, Aberdeen Innovation Park,
Balgownie Drive, Bridge of Don, Aberdeen, AB22 8GU



+44 (0)1224 519944



enquiries@viperinnovations.com