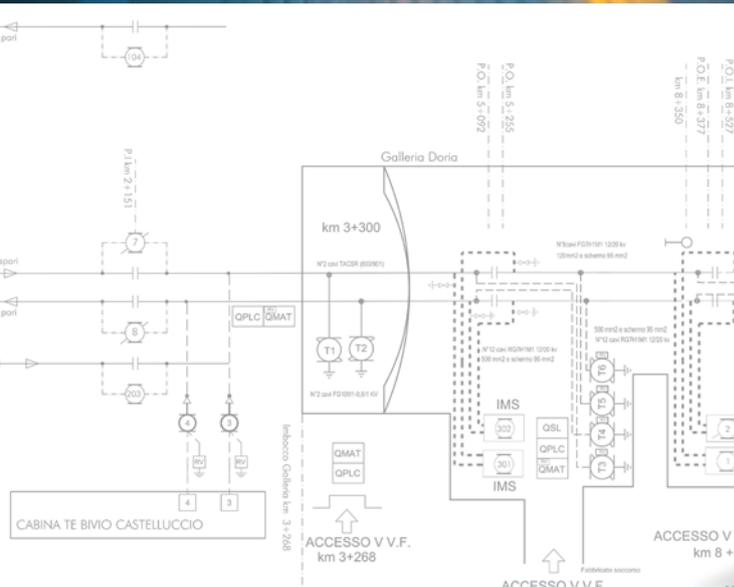


Railway Energy System

Safety in tunnel





INTRODUCTION

In case of a tunnel accident, the hazards for passengers and rescue services are not only fire and smoke but also power-voltage on overhead lines. A fast evacuation is crucial and the railway service operator must ensure that overhead line is disconnected and earthed before rescue services enter the tunnel.

The emergency tunnel earthing system of overhead line is an integrated automatic system that allows the safe management of the disconnectors and the earthing of overhead line in the tunnel.

The system allows the disconnecting and earthing by a remote Control Centre or by a local control and display unit installed in all tunnel accesses, with a simply and comprehensive way for operators and rescue services.

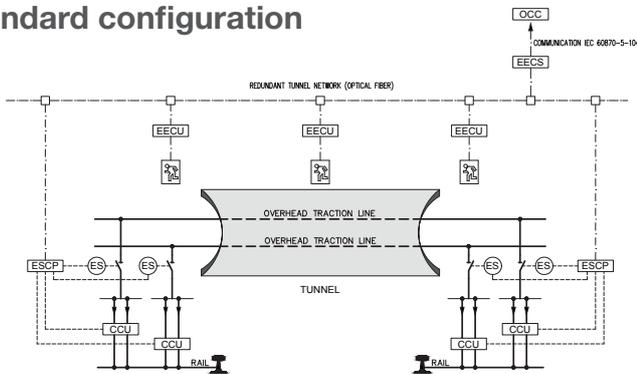
This system is the response of technical specification for interoperability relating to "Safety in railway tunnels TSI – SRT" in European railway systems (2008/163/EC); the EU specification requires a way of earthing the overhead line for tunnels over 1 km long.

This system is designed for the safety earthing of the overhead line in short time under emergency and the achievement of high levels of SIL (Safety Integrity Level) and can be realized in different version according to specific requests from local railway company, in particular:

- standard configuration with no SIL requirement
- SIL3 certified according to IEC 61508, IEC 61511
- SIL 4 certified according to EN 50126, EN 5128, EN 50129

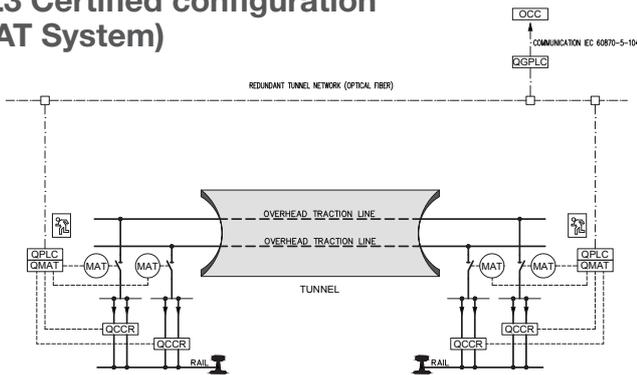
SYSTEM ARCHITECTURE

Standard configuration



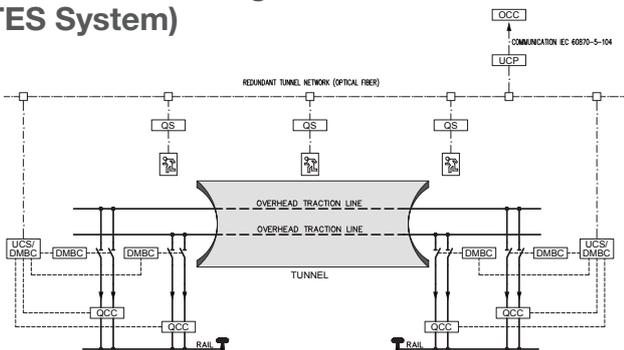
- OCC = Operation Control Center
- EECS = Emergency Earthing Control System
- EECU = Emergency Earthing Control Unit
- CCU = Continuity Control Unit
- ESCP = emergency Earthing Switch Control Panel
- ES = emergency Earthing Switch

SIL3 Certified configuration (MAT System)



- OCC = Operation Control Center
- QGPLC = Emergency earthing control system
- QPLC = Emergency earthing switch control unit
- QCCR = Continuity control unit
- QMAT = Emergency earthing switch control panel
- MAT = Emergency earthing switch

SIL4 Certified configuration (STES System)



- OCC = Operation Control Center
- UCP = Emergency earthing control system
- QS = Emergency earthing control unit
- QCC = Continuity control unit
- UCS/DMBC = Emergency earthing switch control panel
- DMBC = Emergency earthing switch

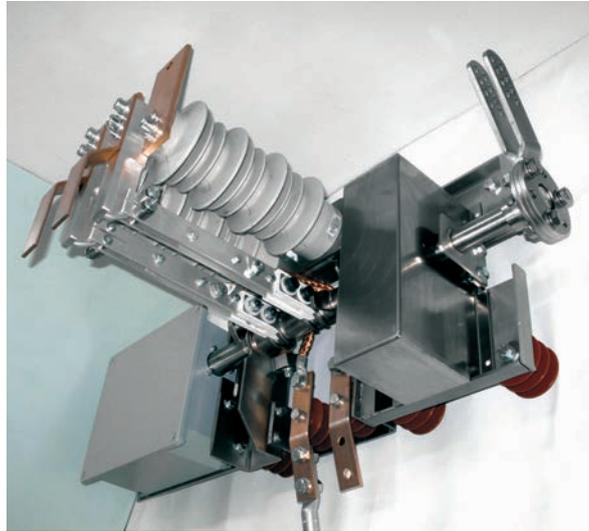
EARTHING SWITCH DEVICE

The earthing switch disconnecter devices are realized in accordance with the EN standard and are available in external version (for pole or wall) or in switchboard version for positioning on the ground near the overhead line. In both cases the short-circuit motorized device is for AC and DC traction system and is single pole or two-pole.

The earthing switch disconnecter devices have been certified by Italian Railway authority (RFI) for emergency tunnel earthing system.



Single-pole or two-pole, earthing switch with withdrawable execution in cubicle for outdoor or for installation in tunnel



Single-pole or two-pole, earthing switch for assembling on pole or wall

CONTINUITY CONTROL UNIT

This equipment is very important for the whole system: it checks the cable connection between the Earthing switch and the ground in order to guarantee the earthing of overhead line. It is applicable to 3kVdc and 25kVac systems and is designed and certified in accordance with European Railway standard.

The CONTINUITY CONTROL UNIT has been certified SIL3 and SIL4 by Independent Assessor (TÜV).



OPERATOR CONTROL AND DISPLAY UNIT

The "OPERATOR CONTROL AND DISPLAY UNIT" is the on-site interface for operators. It is managed by an Intelligent Electronic Device and is equipped with an emergency push-button, through which the overhead line is earthed in case of emergency, and coloured lights (red-green-yellow) that correspond to the earthing status of overhead line in the tunnel. It includes an Intelligent Electronic Device for communication with earthing system of overhead line system through tunnel network.

Earthing switch control panel

This panel is for the management of earthing switches: it is equipped with local command in case of emergency and the remote command is by an Intelligent Electronic Device for communication with earthing system of overhead line system through tunnel network and for data acquisition from Continuity Control Device.



CENTRAL UNIT

The emergency tunnel earthing system of overhead line is an integrated automatic system composed by different Intelligent Electronic Devices installed in each panel and connecting through tunnel network; the network is redundant and with optical fiber link.

The central unit is the core of the system and is the interface with Remote Control (OCC) through IEC Standard protocol.

The Central Unit includes a SCADA system for the supervision of the entire system, showing the earthing switch device status, overhead line condition including continuity control device and detailed diagnostic of all the equipment of the system, useful for maintenance schedule.

CERTIFICATION

The emergency tunnel earthing system of overhead line have been installed in many railway tunnels and has been certified by Independent Assessor (TÜV and Bureau Veritas) as follow:

- SIL3 certified according to IEC 61508, IEC 61511
- SIL 4 certified according to EN 50126, EN 50128, EN 50129



The information in this document contains general description of the technical options which do not always have to be present in individual cases. Therefore, the required performance characteristics must be defined in individual cases during conclusion of the contract. In view of the constant evolution in standards and design, and due to the continuous development, the characteristics of the elements contained in this catalogue are subject to changes without prior notification. These characteristics, as well as the availability of components, are subject to confirmation by Mont-Ele's Technical Sales Department. Not valid as a contractual item.

All right reserved. No part of this publication may be reproduced without the permission of Mont-Ele srl. Mont-Ele is a registered trademark.

Cod. SAF-01

www.mont-ele.it

