

# INDUSTRIAL SMART SOLUTION FOR THE IMPLEMENTATION OF SAFETY INTERLOCKING LOGIC

Since its creation in 2001, CLEARSY has been offering more and more innovative solutions to secure transport, especially in urban areas. For almost 10 years, CLEARSY has been offering to drive interlocking via SIL4 certified off-the-shelf PLCs, in competition with traditional wired logic solutions based on NS1 type gravity relays or dedicated computers. This smart solution allows for easy design, certification, deployment and of course maintenance throughout the life of the system, as well as easy renewal.



## High safety solution

The architecture proposed by CLEARSY is based on a HIMA safety PLC (standard products - SIL4 certified PLC for railways) coupled with CLEARSY RS4 relays (also SIL4 certified) interfacing with the controlled equipment.

Based on the signalling principle diagrams and technical drawings, CLEARSY implements the interlocking logic in the PLCs and validates it according to a process that complies with the railway standards, in particular the EN50128. All the documents are then presented to an independent certifier (ISA) to obtain a positive SIL4 evaluation report.

The RS4 relay ensures the interface with the trackside equipment while guaranteeing a level of insulation (2 KVA) and

the maintenance of the SIL4 safety level.

All the documents and software sources are then transmitted to the customer (dedicated solution - non-proprietary) which allows him, if he wishes, to be autonomous in the management of the solution and its possible evolutions, or even in its porting to a more recent PLC.

## Scalable and easy to integrate system

The fact of having programmed logic makes it much easier to evolve. Indeed, it is enough to implement the evolution and to re-run the automatic tests in the laboratory to validate the modification and the non-regression. Thus, all the cabling and deployment elements are not necessarily revalidated on site (except for new interfaces if necessary). The effort required is

therefore less and the execution schedule is limited and controlled. These potential changes can therefore be made at any time during the development cycle or the life of the project without calling into question the work already done.

This architecture, which can be repeated for each project, also makes it possible to anticipate supplies much better, as they are only a function of the number of inputs/outputs (regardless of the technical plans). Unlike relay logic, where it is not possible to know a priori how many relays are needed without having finalised the design studies for the logic. The same applies to the design of the cabinets, which can be done at the same time as the logic studies. This means that the design and manufacturing schedules can be significantly optimised.

In addition, especially for complex interlocking, the space requirement is drastically reduced with this type of solution because:

- The only safety relays required are at the interfaces with a limited need for useful contacts
- There is no need for a bulky NS1 type chassis
- All the logic is contained in the PLC

Finally, RS4 relays are not subject to gravity, so they are not subject to the installation constraint associated with the proximity of the tracks (RS4 relays are compatible with on-board vibration-shock standards).

### Performance

CLEARSY's experience in this type of project allows us to have a very efficient and industrialized process, with automated test tools that, in case of zone modification, lead to a drastic reduction of the evolution cost compared to other solutions.

The development time is also short, obtaining a positive SIL4 evaluation by the external body in an average of 2 months after the reception of the inputs for an area of up to approximately 60 routes.

With the CLEARSY solution, the larger the area (number of routes, track equipment...) the greater the cost and cabinet volume difference compared to a relay logic-based solution, while reducing the field test time thanks to the exhaustive pre-validation in the factory.



### References

Since 2017 CLEARSY has participated in the deployment of more than 30 manoeuvring zones in the following projects, in partnership with MOBILITY:

- LUXEMBOURG Tramway (50 routes - in operation since 2017)
- NICE Tramway (138 routes - in operation since 2018)
- CAEN Tramway (67 routes - in operation since 2019)
- PARIS Tramway T12 & T13 (115 routes - in operation since 2020)
- BORDEAUX Tramway (18 routes - in progress)
- Corsica railway (in progress)



# CLEARSY

## Safety Solutions Designer

THE MORE AUTOMATED THE SYSTEMS ARE,  
THE MORE RELIABLE AND SAFE THEY HAVE TO BE.

CLEARSY has been innovating for 20 years by designing and deploying safer systems, based on the software tools and secure computer we develop.



Energy/Nuclear  
Transport  
Defence



25%  
Exportation



Software  
Hardware  
Safety



Turnkey industrial  
Equipment  
Supplier