



# BUE S7 level-crossing protection system

Fail-safety with cost-effective standard industrial components

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# BUE S7 level-crossing protection system

## Functions and costs made to measure

*Safety is the prime necessity in public transport systems, also at level crossings. The level-crossing protection systems from Siemens are always state-of-the-art and operate safely and reliably. They demonstrate the expertise of Siemens in the field of level-crossing protection.*

### It pays to depend on BUE S7

#### Fail-safe controllers comprising standard industrial components

The BUE S7 level-crossing protection system made by Siemens is a fail-safe, low-cost solution which consists of known and highly reliable industrial components of the Simatic® S7-300F standard automation system family used all over the world. Signaling and safety systems from Siemens made up of these standard industrial components have proven to be very successful.

### Mastering dangers

#### For safety at level crossings

The BUE S7 level-crossing protection system

- > has been designed for use on private, rapid-transit, industrial and secondary railways
- > is suitable for use on single- or double-track lines
- > can be initiated/normalized separately for each track
- > is available with or without barriers and as a half-barrier system with or without a level-crossing wicket gate
- > can be main signal-interlocked and monitoring signal-interlocked
- > can be combined with a road signaling system (BÜSTRA)

Train or shunting movements can take place simultaneously on each track. The control equipment is accommodated in control cabinets or trackside equipment houses.

### When the train comes

#### The functional sequence

When a train approaches the level crossing, the BUE S7 level-crossing protection system is initiated automatically by the train, manually or by the interlocking. The initiation information is transmitted to the Simatic S7-300F controller for processing. The controller generates commands for the activation of road signals and lowering of barriers.

Once the road signals have been switched on and barriers (if any) are down and provided that all related units work properly, the associated monitoring signal is switched on or the main or shunt signal cleared. When the train leaves the level-crossing section, the system is normalized by the train after traversal of the normalization elements and reset.

Features
> Scalable in function
> Price depends on the range of functions selected
> Cost-effective
> Low life-cycle costs
> High availability, low maintenance requirements and easy servicing
> Use of fail-safe processors with type approval from the Federal Railways Office in Germany (EBA)
> Already available outdoor equipment can be reused
> Easy extendibility due to modular design
> Temperature range of -25 °C to +60 °C without additional air conditioning
> LED signal light units can be used



# Safe operation with the Simatic S7-300F

## Safe interaction of road and rail traffic

### The processor

The central component of the Simatic S7-300F controller is a central processing unit approved for safety systems. This controller receives and processes the input data, verifies the results obtained and only outputs them as indications and commands if all conditions have been met.

### Coded-processing principle

The controller operates according to the coded-processing principle. Data from the peripherals is read in using fail-safe input boards and data to the peripherals is output using fail-safe output boards working according to the 2-out-of-2 principle.

Data exchange between the controller and boards is performed via the fail-safe PROFIsafe transmission system.

### Well defined, complete and error-free

#### The software

The software comprises the system program and the system configuration parameters. It is written in the STEP7 programming language. The software is checked for correct performance of all the functions required for the particular system.

### Many and varied

#### Functions and features

##### Initiation and normalization

- > Automatically by the train through wheel detectors, vehicle sensors, rail treadles, track vacancy detection systems or track-installed switching contacts
- > Manually by manual switching devices
- > By radio or infrared facilities
- > By train sequence operation

##### Integrated into interlockings

- > Suitable for integration into all interlocking systems

##### Combined with road signaling systems

- > BÜSTRA interface

##### Road signals

- > Max. 32 (yellow/red)
- > Alternating light/flashlight with a maximum of 32 lamps
- > Conventional dual-filament lamp or LED can be used

##### Barrier drives

- > Max. 16

### Monitoring signals

- > Max. eight (BÜ 0/1), white flashing light for indicating a properly protected level crossing
- > Max. four (SO 16), white steady light for indicating a properly protected level crossing (optionally with active marker light)
- > Max. four F0 stop aspects and four F1 proceed aspects
- > Conventional dual-filament lamp or LED can be used

### Our services

Use our expert knowledge to your benefit in the fields of

- > project engineering
- > construction coordination
- > commissioning
- > training
- > maintenance and inspection



**Multi-level diagnostic concept**

The BUE S7 system has an integrated three-level diagnostic system. This permits tailored, economical diagnostics of faults and failures.

**Diagnostic CPU**

The first configuration level indicates faults and failures via LEDs. These indications enable fast on-site diagnostics and, in conjunction with the evaluation of the other status indications, fast and efficient fault recovery.

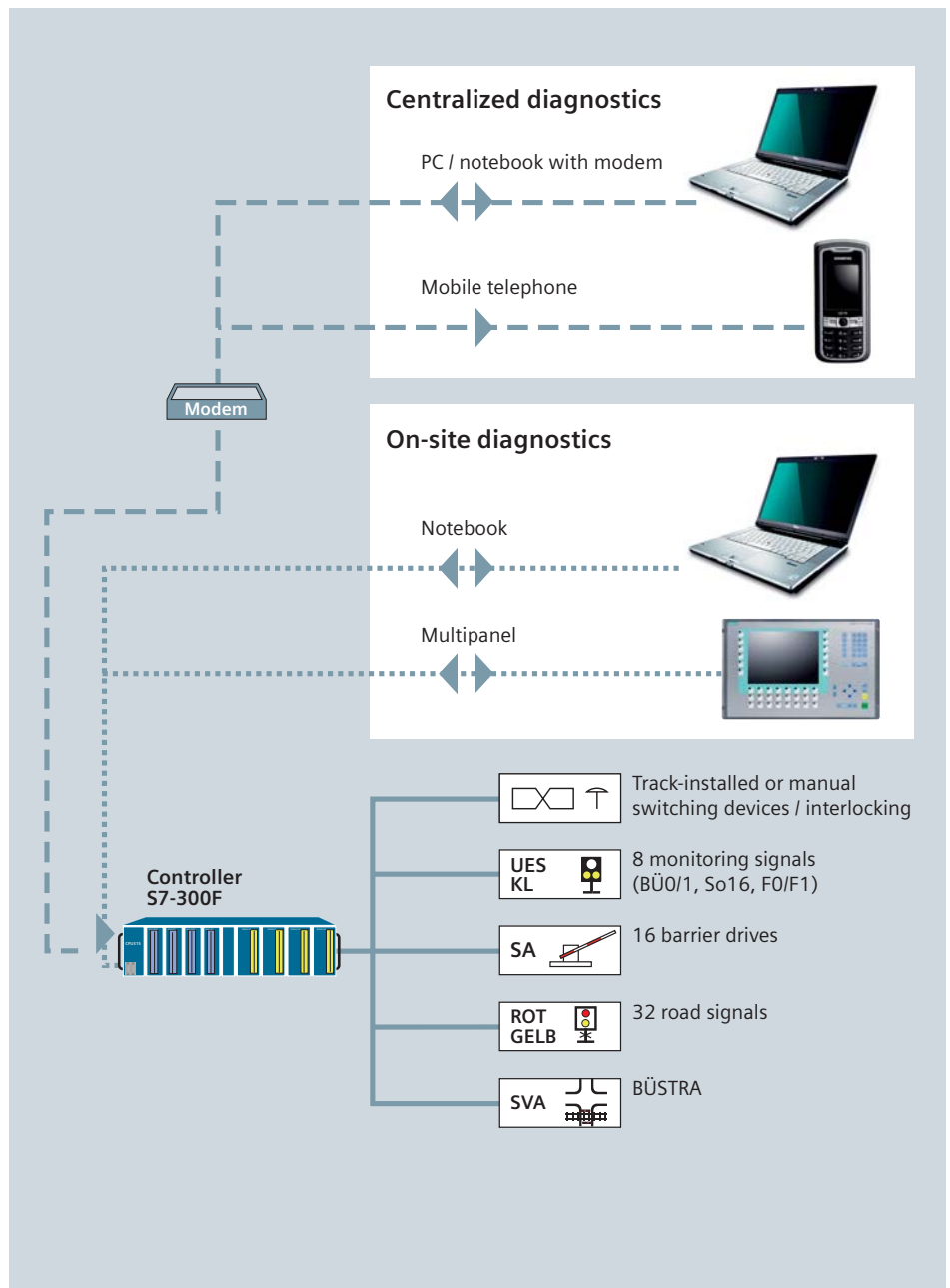
**Diagnostic notebook**

There is an integrated circulating memory for more exhaustive diagnostics. All system activities (triggering of the initiating treadles, switch-on and switch-off of road and monitoring signals, barrier movements, etc.) and any system malfunction are logged in this memory along with the time and date, with assignment to the affected elements.

The circulating memory can be connected via an interface to the service PC for evaluation. The aforementioned events are recorded in a table, and the faulty element (outlined in red and flashing) can immediately be pinpointed in a topographical diagram.

**Diagnostic panel (multipanel)**

A permanently installed diagnostic panel can be used as an alternative or in addition to the diagnostic notebook. Its functions are similar to those of the diagnostic notebook.



Diagnostics

Public telephone network or GSM network (dedicated line or trunked radio network)





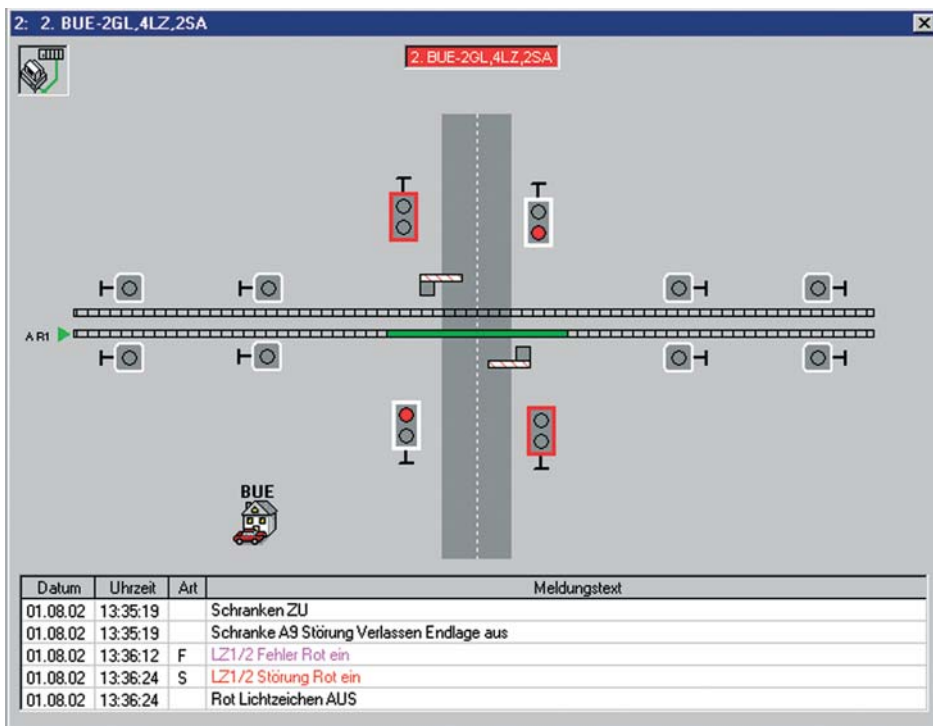
### On-line diagnostics

The BUE S7 system also permits remote diagnostics. Data is transmitted via a remote modem to a control center which can handle up to 15 level-crossing systems.

The control center has the same visualization options for each level crossing as with a service PC on site. Maintenance staff can use remote diagnostics to connect to individual level crossings and query their status.

Another convenient option is remote diagnostics via GSM indication transmission to a mobile telephone with parallel recording of indications in the control center using a fax.

Thus, both brief inquiries in the event of a fault, no matter where the maintenance staff happen to be, and parallel recording of the fault indications are possible.



Visualization of a level-crossing fault in the diagnostic tool, levels 2 and 3 (faulty element outlined in red, fault indication text in red)

### Safety cases

#### Standards

Standards relating to the demonstration of technical safety as per CENELEC	EN 50126 EN 50128 EN 50129
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Quality systems	ISO 9001
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Electric signaling systems for railways	DIN VDE 0831
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Principles for computers in safety-related systems	DIN VDE 0801
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German Railway Building and Operation Regulations	EBO
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Standard relating to level-crossing protection systems	VDV 341
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Requirement categories as per BOStrab (Tram Construction and Operation Ordinance)	VDV 331
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Regulations for the protection of level crossings of non-DB railways	BÜV NE
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#### Approval

The BUE S7 level-crossing protection system has been approved by the Federal Railways Office in Germany (EBA) in line with CENELEC.

**Siemens AG**  
Industry Sector  
Mobility Division  
P.O. Box 3327  
D-38023 Braunschweig, Germany

Phone: (+49) (5 31) 2 26-28 88  
Fax: (+49) (5 31) 2 26-48 88

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The information in this document contains general descriptions of the technical options available, which do not always have to be present in individual cases. The required features should therefore be specified in each individual case at the time of closing the contract.

