

The background image shows a train depot with several tracks. In the background, there is a large white building with the 'SIEMENS' logo on its facade. In the foreground, there are railway tracks with gravel ballast. Overhead, there are green metal structures supporting the retractable overhead conductor rail (Sicat SRD). The sky is clear and blue.

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Ingenuity for life

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Sicat SRD

Retractable overhead conductor rail for depots

[siemens.com/rail-electrification](https://www.siemens.com/rail-electrification)

The Sicat® SRD retractable overhead conductor rail for depots provides electrically powered rail vehicles with the necessary operating current for entering and leaving the depot as well as for electrical testing. During maintenance work, the overhead conductor rail can be pivoted to one side and earthed, thereby ensuring simple and safe access to the vehicles.

This considerably simplifies the procedures for roof-level maintenance work, the lifting of the train with lifting cylinders and any crane work in the clearance of the retractable overhead conductor rail.

Features

- Release for start of maintenance work based on the five safety rules
- Visual and audible signalling of pivoting operation
- Control of the overhead conductor rail functions by means of a local control panel located alongside the maintenance track, as well as from the central control cabinet
- Soft start and stop of pivoting process due to integrated converter on the motor-gear unit

Overview

The control of operating procedures of the retractable overhead conductor rail is carried out via a local operating unit on track side. The pivoting process is visually and audible signalized.

The release at the beginning of maintenance on vehicles is based on the on the five safety rules according to EN 50110-1:2013.

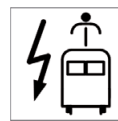
Example for a typical operating procedure: electrical vehicle has to go into the depot for maintenance

- To maintained train will be hand over in the outdoor area to depot train driver
- Train goes slowly with own pantograph into the depot
- Vehicle will be parked on maintenance track, the pantograph will be lowered
- Overhead conductor rail will be deenergized and safely earthed
- If all releases are available the conductor rail will be pivoted to the side of track
- If the conductor rail is located in park position, maintenance work on the roof, for instance with a crane over the vehicle, can be carried out
- Also lifting the train is possible when overhead conductor rail is pivoted in park position

Additionally, during maintenance of the overhead conductor rail operation is possible by means of the touch panel of the central control cabinet. The central control cabinet also serves as a fallback-level for operation of the system.

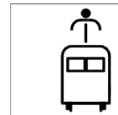
For safety reasons, all pivoting processes may only be performed when the respective section of conductor rail is switched off and earthed. The time required for pivoting the conductor rail in each direction is about 10 seconds.

In the intended use, during the pivoting process the following operating states occur:



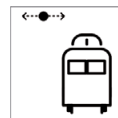
State 1

- Overhead conductor rail is in „operating position“
- Overhead conductor rail is live



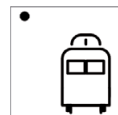
State 2

- Overhead conductor rail is in „operating position“
- Overhead conductor rail is deenergized and safely earthed



State 3

- Vehicle pantograph must be lowered
- Overhead conductor rail moves from „operating position“ to „park position“



State 4

- Overhead conductor rail is in „park position“
- Maintenance work may be carried out from the roof access platforms when keys are released

Regular values

Nominal voltage	[V DC] [kV AC]	750...3,000 15...25
Permanent current load at 50 K over temperature*	[A]	2,900
Short-circuit current	[kA]	45
Ambient temperature	[°C]	≥ -40
Max. temperature of conductor	[°C]	90
Specific mass of conductor rail without contact wire	[kg/m]	approx. 6.2
Distance between supports	[m]	up to 12
Length of support arm from motor base plate to central axis of conductor rail	[m]	1.60...4.00
Conductor rail cross section without contact wire	[mm²]	2,300
Conductor rail material		Aluminium
Clampable contact wire (type AC and BC)		acc. to EN 50149
Max. permissible section length (pivoting range)	[m]	200

* Max. temperature of 90 °C without contact wire

Safety concept

The safety concept of the retractable overhead conductor rail is based on the five safety rules according to EN 50110-1:2013.

The following safety-related components and systems are an integral part of this safety concept:

- Visual and audible signalling of operating state
- Emergency stop pushbutton on each motorized conductor rail support
- AS-i bus system (design in accordance with SIL 1 requirements)
- Limit switches for safe shutdown of the motors at the end of the pivoting process

Possible amplifications for integration into a higher-level safety concept:

- Locking concept for protection against operating errors and for ensuring a safe working environment
- Earthing of overhead conductor rail by means of an earthing switch with entry monitor (design in accordance with SIL 1 requirements)



Release of pivoting operation

- The contact line must be deenergized and safely earthed.
- If releases are missing, the pivoting process can not be started.



Release for electrical switching on the contact line

- The contact line only may be switched under voltage, when the overhead conductor rail is in operating position.
- The monitoring is done via the limit switches on the first and last motorized support.



Release for maintenance works

- Maintenance facilities may only be put into operation, when the overhead conductor rail is in park position.
- The monitoring is done via the limit switches on the first and last motorized support.



Release for higher-level emergency stop control

- By default, emergency stop buttons are designated for immediate stopping of the pivoting process.
- If planned, a higher-level emergency stop button can be integrated into the existing emergency stop loop.

Tests

The components of the overhead conductor rail, the contact line, disconnectors, earthing switches and drive mechanisms as well as the motor-gear unit are mechanically and electrically type-tested. The central control cabinet is routine tested.

For further information please refer to the corresponding product information.

Design

The retractable overhead conductor rail for depots Sicat SRD comprises:

- the retractable part of the conductor rail consisting of standard contact line components of the conductor rail system Sicat SR as well as support arms and motor-gear units,
- the control with the central control cabinet, the local operating unit and emergency stop buttons,
- the signalling and
- the current connection and the signal and power cables.

Almost all components of the retractable overhead conductor rail Sicat SRD come from Siemens.

Overhead conductor rail

The overhead conductor rail is attached to the beams of the maintenance halls by means of special customer-specific adapted cantilevers. Depending on the distance between the hall structure and the track, additional fixing brackets may be required to attach the cantilevers.

The transition from the conventional catenary system outside the depot to the overhead conductor rail is implemented by means of a transition element. At that point, usually in the depot entrance area, the conductor rail is fix.

In an overlap area the overhead conductor rail can be electrically and mechanically connected or disconnected when the electric rail vehicle enters or leaves the maintenance track. During the maintenance work the overhead conductor rail is electrically isolated by means of disconnect-

tors. An earthing switch with entry monitor ensures safe earthing (design in accordance with SIL 1 requirements). The mechanical disconnection is achieved by moving the overhead conductor rail away from the vehicle.

Depending on the length of the track, the retractable overhead conductor rail can be divided into several sections.

Further information on the Sicat SR overhead conductor rail system can be found in the relevant product information.

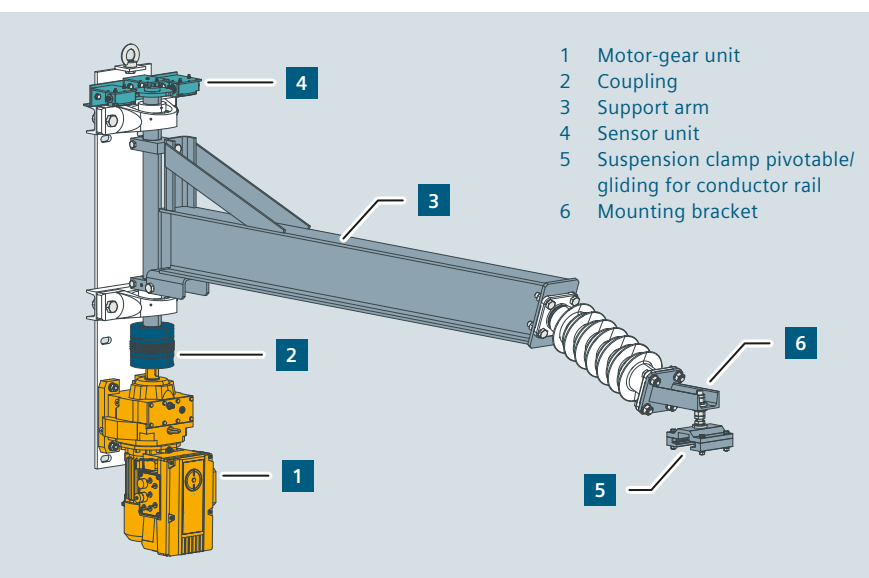
Drive train

By default, every third support point is motor-operated. In order to optimize the forces occurring in the pivoting process and to achieve a long product service life, an integrated converter enables soft start and stop of the pivoting process. An integrated engine brake ensures that the overhead conductor rail remains securely in the respective end position.

Control system

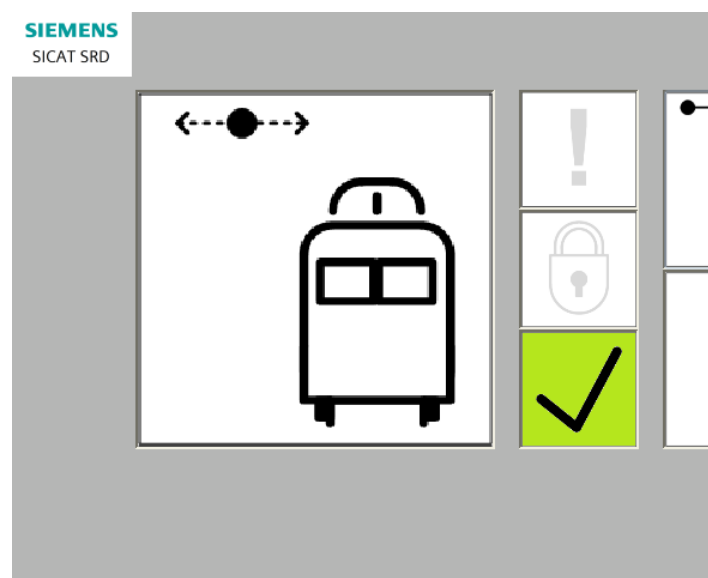
The control system for the retractable overhead conductor rail comprises the following components:

- Central control cabinet with Simatic CPU and Simatic Touch Panel
- Local operating unit
- Emergency stop buttons
- AS-i bus system (design in accordance with SIL 1 requirements) for communication between the components



Motorized support incl. suspension clamp

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SICAT SRD



Main view of diagnostics screen on the Simatic Touch Panel

Central control cabinet

One central control cabinet per conductor rail section is envisaged beside the track. The central control cabinet comprises the main components of the control system and of the power supply. The signals from the local operating unit and of the emergency stop buttons are also here collected.

As an option, the values of the voltage transformers and the light signal control can also be read in.

Touch panel

For diagnostic purposes a touch panel of type SIMATIC HMI is installed in the central control cabinet. It offers amongst others information about:

- the position of the retractable overhead conductor rail
- the position of the switches and disconnectors in the track area
- the emergency stop monitoring for the control system of the retractable overhead conductor rail
- the fault monitoring
- the safety monitoring
- the motor-gear units
- the locking system

Additionally, the overhead conductor rail can be operated by means of the touch panel.

Local operating unit

By default, in operation the retractable overhead conductor rail is controlled by means of a local operating unit, which also displays the most important states for operation. The position of the local operating unit is defined project-specific. The operator must be able to view the track and the respective section of the retractable overhead conductor rail from the local operating unit.

Emergency stop buttons

In addition to the emergency stop button at the local operating unit, the system can be equipped with further emergency stop buttons. If the emergency stop button is pressed, the pivoting process is stopped immediately and no further movement of the overhead conductor rail is possible. The emergency stop buttons mechanically lock themselves in the pressed position.

Signaling system

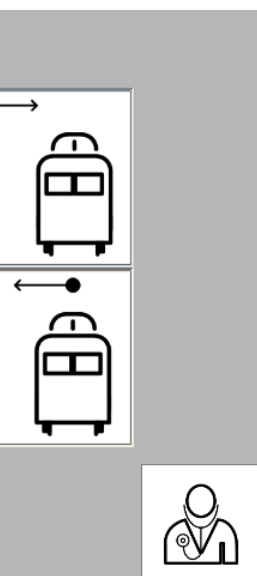
The operating states of the retractable overhead conductor rail are signaled via visual and audible signals. A signaling system with signal horns is fitted at the beginning, in the middle and at the end of the section. A green and a red lamp as well as a flashing light and acoustic signal indicate the states of the pivoting process.

Signaling by means of an LED strip light along the conductor rail is possible as an option.

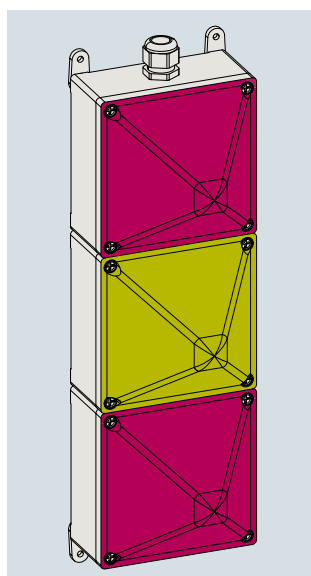
AS-i bus system (Actuator Sensor interface)

The AS-i bus system provides communication between the controller, sensors, actuators and drives with an effective and powerful bus system in accordance with the EN 50295 and IEC 62026-2 standards. It links all sensors and actuators at the lowest field level to the higher-level control. This eliminates the need for expensive parallel cabling.

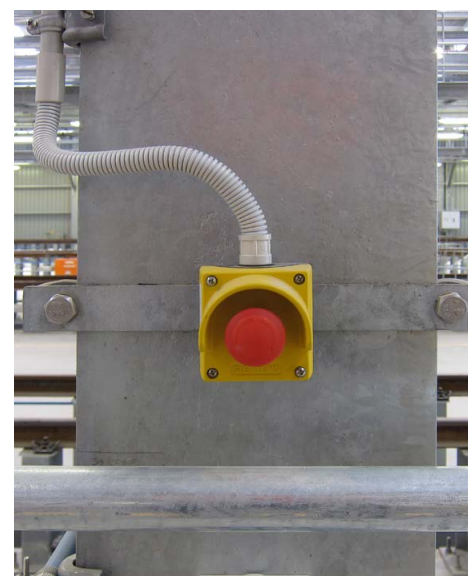
The AS-i bus system is designed for the overhead conductor rail application in accordance with the SIL 1 requirements.



Local operating unit



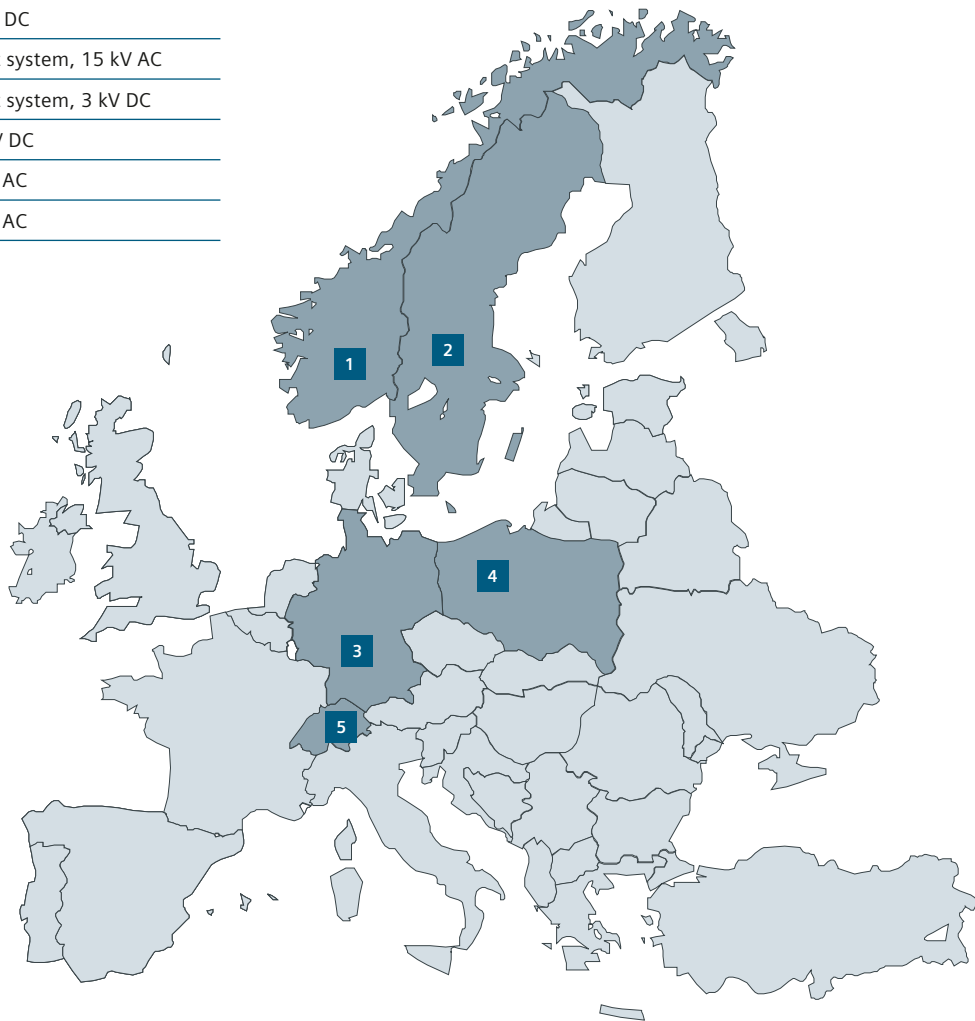
Signaling system



Emergency stop button

Referenzen

	Project	System type
1	Bergen, Norway	Depot, Lightrail DC, 750 V DC
2	Stockholm, Sweden	Depot solutions
3	Germany <ul style="list-style-type: none"> • Test center Wegberg-Wildenrath • Dortmund • Munich-Pasing 	Pivotal overhead conductor rail in outdoor area Depot, 15 kV AC Depot, 15 kV AC
4	Olszty, Poland	Depot, 750 V DC
5	Villeneuve, Switzerland	Electrical test system, 15 kV AC
6	Jekaterinburg, Russia	Electrical test system, 3 kV DC
7	Mekka, Saudi-Arabia	Depot, 1.5 kV DC
8	Delhi, India	Depot, 25 kV AC
9	Brisbane, Australia	Depot, 25 kV AC



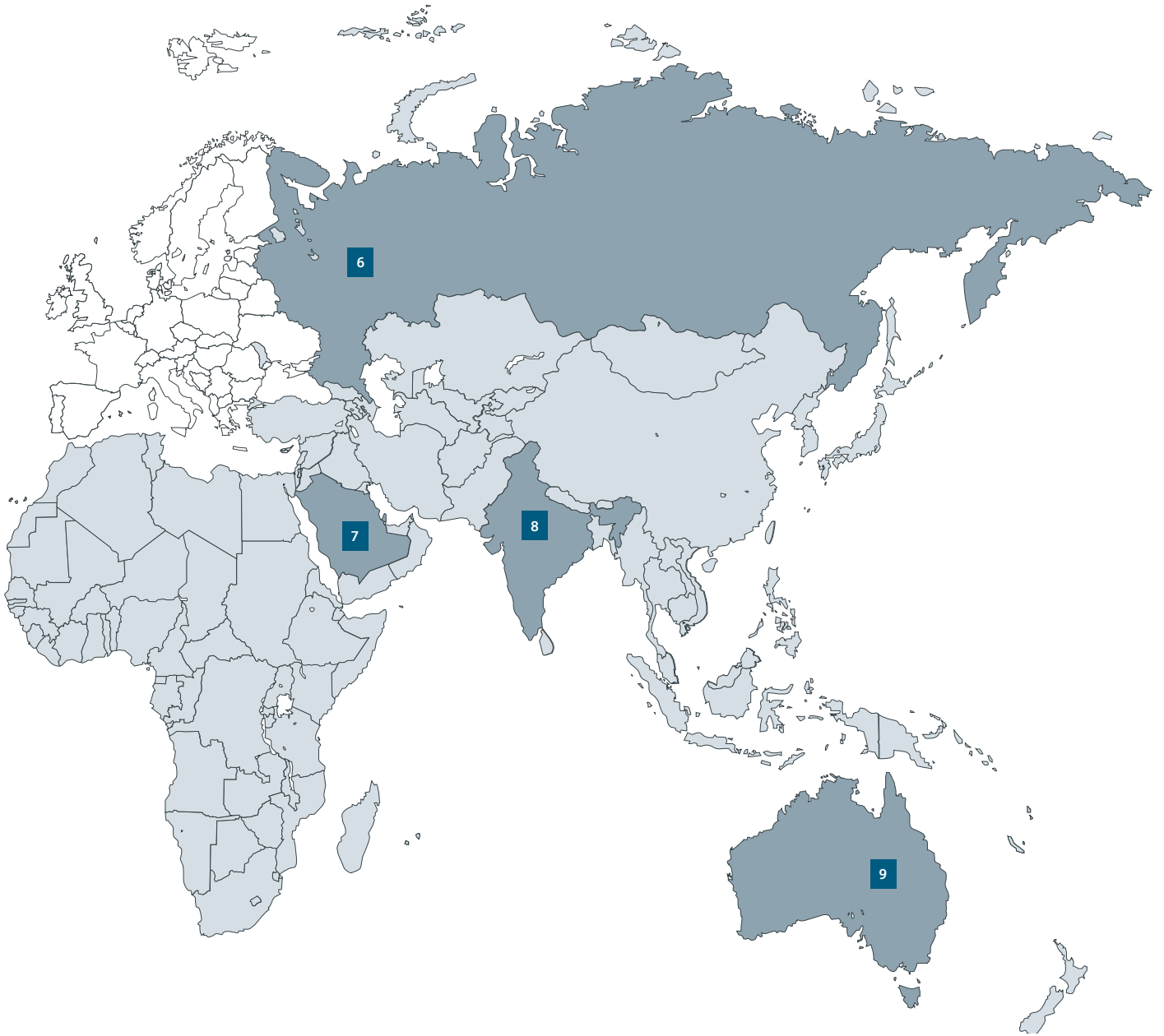
Olszty, Poland



Wegberg-Wildenrath, Germany



Munich-Pasing, Germany



Metro Mekka, Saudi-Arabia



Depot entrance, Ipswich / Brisbane, Australia

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Sicat SRD / Product information
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