



**Tie-FenLock 200 Depot Control System**

**FS-DES-STD-02  
Version 2.0**



1	<b>ABBREVIATIONS &amp; ACRONYMS</b>
2	<b>INTRODUCTION</b> 2.1 Executive Summary 2.2 Overview of Benefits
3	<b>OPERATIONAL OVERVIEW</b> 3.1 General Operational Overview 3.2 Example of Operation
4	<b>SYSTEM OVERVIEW</b> 4.1 System Characteristics 4.2 System Architecture 4.2.1 Equipment Housing 4.2.2 Point Machine 4.2.3 Points Position Indicator 4.2.4 Point Setting Panel (PSP) 4.2.5 Signals 4.2.6 Train detection 4.2.7 Movement Authority 4.2.8 Cable Routing 4.2.9 Power Supply 4.2.10 Points Heating
5	<b>FURTHER INFORMATION AND READING</b>

# 1. Abbreviations & Acronyms

Term	Definition
CCU	Central Control Unit
DCS	Depot Control System
DPPS	Depot Personnel Protection System
EMC	Electromagnetic Compatibility
EU	European Union
IP	Ingress Protection
LOPS	Locally Operated Point System
NR	Network Rail
PCB	Plastic Circuit Board
REB	Relocatable Equipment Building
RSP	Route Setting Panel
SIL	Safety Integrity Level
TD	Train Describer
UPS	Uninterruptible Power Supply
Vac	Voltage, alternating current
Vdc	Voltage, direct current

# 2. Introduction

## 2.1 Executive Summary

This document provides the system description for the Tie-FenLock 200 Depot Control System (DCS) for use in depots, yards and other non-mainline applications. The Tie-FenLock 200 DCS is a basic method for controlling all depot point ends from a single location.

Tie-FenLock	Description
100	Tie-FenLock Point Machines operated by individual plungers located by each set of points, combined with a Points Position Indicator (optional).
200	Tie-FenLock Point Machines operated from a Point Setting Panel, one switch per point. Position of points indicated on panel. Points Position Indicators provided with optional plunger to operate points locally.
300	Tie-FenLock Point Machines operated centrally from a Route Setting Panel (RSP) or VDU. Points in a route operated by a single button. Optional PPIs, axle counters for train detection plus limited interlocking e.g. for an interface to a mainline system, provision of a slot or Shunters Acceptance.
400	Tie-FenLock Point Machines, standard NR GPL signals controlled from a Route Setting VDU. Axle counter train detection provided to give a full but simplified interlocking, e.g. signals won't clear unless points in correct position and axle counter sections clear. Able to relay interface with NR signalling functions, other Depot Protection Systems, CCTV systems etc. Suitable for remote operation. Additional features.



Fenix Signalling is the sole provider for all Tie-FenLock DCS in the UK, working in partnership with Fenix Rail Systems to deliver a range of services and solutions for UK depots. Some existing UK installations:

- British Steel, Scunthorpe. Tie-FenLock 100 installation with 350 point ends (1989-90)
- Bombardier Central Rivers Depot, near Derby. Tie-FenLock 400 installation incorporating 29 point ends, point position indicators throughout and axle counters (2001)
- Siemens Southampton Depot. Tie-FenLock 400 installation incorporating 10 points indicators and approximately 25 axle counters (2002)
- ABP Immingham Depot. Tie-FenLock 400 installation incorporating 10 points and 1 Route Setting Panel (2002)
- Alstom Morden Depot, London. Tie-FenLock 400 installation .A London Underground application with 32 point ends (2004)
- Chilterns Wembley Depot. Tie-FenLock 400 installation incorporating 8 point ends (2004)
- Alstom Golders Green Depot, London. A London Underground application (2006)
- Chilterns Banbury Depot, Banbury. Tie-FenLock 400 installation with 7 point ends, fully interlocked with signals and interfaced to the mainline (2016-17)
- Bombardier Central Rivers extension. Modification to an existing Tie-FenLock 400 installation (2001) to provide an additional stabling road (2018)



Fenix Signalling recommend the Tie-FenLock 200 DCS for large, but simple, depot layouts.

## 2.2 Overview of Benefits

The main benefits of the Tie-FenLock 100 system are:

 <p>Known to be a reliable and cost-effective solution;</p>	 <p>Developed &amp; compliant with EN standards; including safety integrity levels (SIL);</p>	 <p>Reduced capital cost vs mainline systems</p>
 <p>Over 1,000 systems worldwide since 1984;</p>	 <p>Operates in harsh environments including coal yards, harsh winters (e.g. in Finland &amp; Poland)</p>	 <p>Minimal maintenance - low life cycle cost</p>
 <p>Lifetime 2nd line support - UK installations since 1989 are still fully supported for spares, technical support &amp; O&amp;M training;</p>	 <p>Reduced need for hand shunters – eliminates/reduces risk of staff slips, trips, falls, being struck by a train etc. as well as providing labour cost savings</p>	 <p>Systems have been installed in all types of electric traction areas &amp; are fully compliant with EN50121-4 for immunity and emission</p>
 <p>Trailable, low-maintenance point machines;</p>		 <p>All system actions/events are recorded and saved for future access (remotely if required)</p>

## 3. Operational overview

### 3.1 General Operational Overview

The Tie-FenLock 200 system is presented on a point setting panel to the user. Indications of the current position of the point machine, normal or reverse, are shown with LEDs. Points are operated by pressing a single button corresponding to a single point end.

It is possible to fit multiple point setting panels. However, as there is no interlocking it is important that procedures are in place that do not allow two users to operate the points concurrently.

### 3.2 Example of Operation

The operation of the point setting panel is as follows:

**START**

**FINISH**

The user approaches the panel and presses the buttons until the point ends intended for use are in their correct position.

The user checks that the end position LED indication of each point end is in the correct lie and that the indication is steady, not flashing.

After this, the user may direct the driver to the intended destination using hand signalling and verbal communication.



## 4. System overview

### 4.1 System Characteristics

The 200 consists of the same equipment as the 100 but the points are controlled from a Point Setting Panel rather than individually.

The system also boasts a modular design philosophy which is created from high grade industrial components, thus increasing the availability of spare parts and reducing maintenance costs. The system is constantly performing self-checks on the circuits and reporting faults, which means that malfunctioning units can be swapped very quickly and easily. The metal plates on the front (see figure 3) can be taken off, exposing the logic controller hardware board, known as a card, beneath. This card has a part number and pin-code, meaning only a card of that type can replace the original.

All systems are compatible with relevant EU EMC standards to all traction types. All outdoor equipment has a temperature operating window of at least -25°C to +45°C or harsher.



Figure 1 - Tie-FenLock 200 basic layout

## 4.2 System Architecture

### 4.2.1 Equipment Housing

Typically the Tie-FenLock 200 system is installed in location cabinets. Unlike typical NR location cabinets, these are mounted on a swinging frame and therefore necessitate access from one side. The frame is made up of 2 columns of 8 19" racks (although typically only a maximum of 7 are used to allow cable bending and access in the base of the location).



Figure 2 - Location cabinet (frame closed)



Figure 3 - Location cabinet (frame open)

The racks are also compatible with indoor application, where a glass fronted cabinet can be mounted within a designated building or within a relocatable equipment building (REB). This is beneficial in areas where signalling equipment is densely populated.

### 4.2.2 Point Machine

The Tie-FenLock 200 system uses trailable point machines which are robust and mounted in the four foot. The machine is normally installed in approximately 80 minutes, which is much faster than current mainline equipment.

A six-foot moving version is mounted on two cross members which clamp to the outside foot of the rail. The overall height of the machine is below the standard BS113 rail running height.



Figure 4 - Point machine installation



The detection and power is supplied by a single cable, with a minimum of 5 cores. The power supply is currently a three phase neutral 400Vac supply, although a 110Vac variant is in development. It is recommended that the tail cable to the point machine is armoured to prevent damage.

The points machine features an internal mechanism allowing the machine to be safely used in a trailing direction without damaging the components. The machine can be installed with a plate which allows the intergration of a standard six-foot mounted back drive. In the event of a power failure, the machine can be operated manually by inserting a key to engage manual operation and then turning a crank handle.

The machine requires minimal maintenance at an interval of every 6 months, which is limited to the exterior of the machine. This is normally to account for vibration and wear in the turnout. It includes adjustment of the detection rods and maintenance of the screw thread to prevent rusting, in addition to re-torquing the bolts.

When an over-running and/or a trailing move is detected, if safe and in combination with the axle counter system, the points automatically throw the points to the non-trailing position to prevent damage to the infrastructure/train.



#### 4.2.3 Points Position Indicator

The Tie-FenLock 200 DCS typically uses unique points position indicators to illustrate the lie of the points to the driver and a positive confirmation to the shunter that the points are correctly set.

These are typically mounted on posts near to the turnout which it is indicating. There are six lamps in total, three on each side. Only two are lit at one time, either horizontal or vertical depending on the lie of the points.



Figure 5 - Points Position Indicator

#### 4.2.4 Point Setting Panel (PSP)

The PSP is a stainless steel push button panel mounted on posts, sited in a convenient location within the depot. Each point end can be moved by pressing the green buttons on the panel. The end position is then shown as a yellow LED indication.

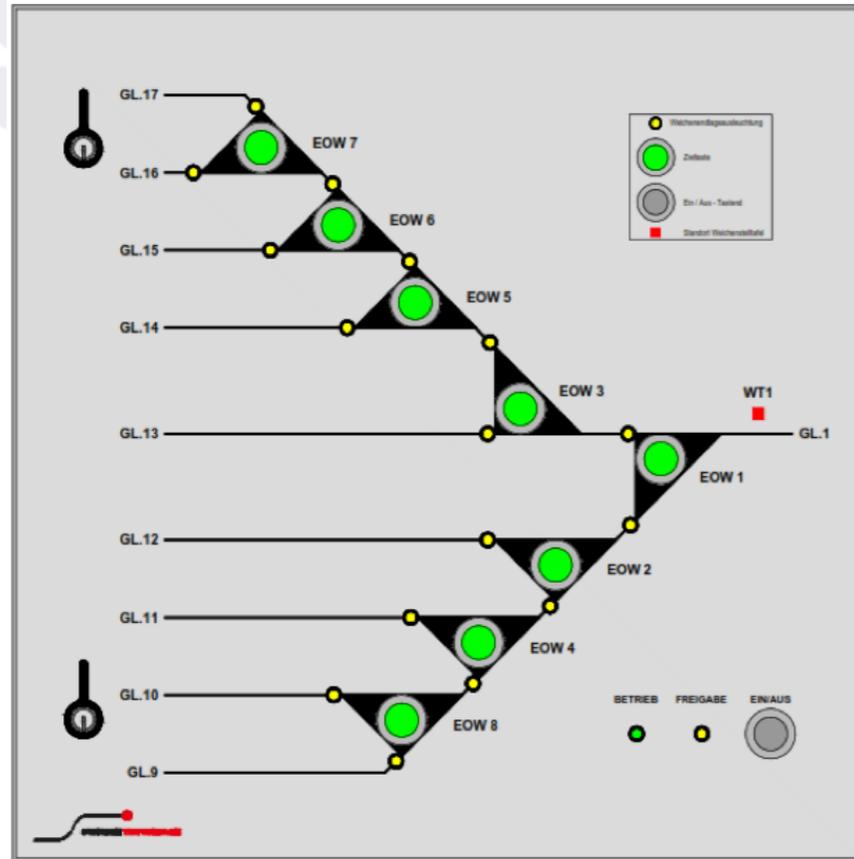


Figure 6 - Design drawing of a PSP

#### 4.2.5 Signals

Not provided for Tie-FenLock 100.

#### 4.2.6 Train detection

Not required for Tie-FenLock 100.

#### 4.2.7 Movement Authority

The shunter will need to speak to the driver to tell the driver where and when to proceed.

#### 4.2.8 Cable Routing

Separation between the cable for the plunger and other cables is required. This can be achieved by running the cables in separate troughs, providing 50mm separation between the cables within the trough, or providing a non-conductive barrier between the cables.

#### 4.2.9 Power Supply

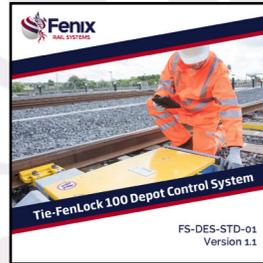
The Tie-FenLock 200 requires a three phase neutral 400Vac supply to the equipment housing, location or REB where it is transformed down and/or distributed as required. The electronic components predominantly run off 12Vdc and 24Vdc.

#### 4.2.10 Points Heating

The Tie-FenLock 200 system is compatible with most points heating systems. However, should control of the points heating system be required by the depot operator, a more advanced version is required i.e. Tie-Fenlock 300 or 400.

## 5. Further information and reading

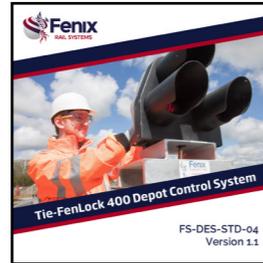
The Tie-FenLock 200 is the third most advanced of the four Tie-FenLock DCS options and therefore may not be suitable for all depot applications. Further information can be found in the following documents:



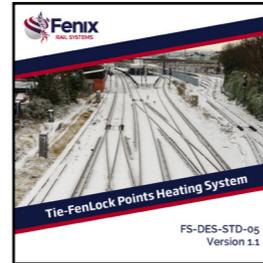
FS-DES-STD-001  
– Tie-FenLock  
100 Depot Control  
System – System  
Overview



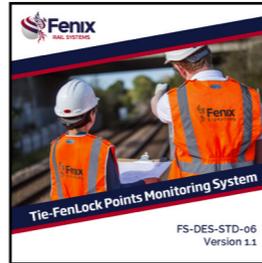
FS-DES-STD-003  
– Tie-FenLock  
300 Depot Control  
System – System  
Overview



FS-DES-STD-004  
– Tie-FenLock  
400 Depot Control  
System – System  
Overview



FS-DES-STD-005  
– Tie-FenLock  
Points Heating  
System – System  
Overview



FS-DES-STD-006  
– Tie-FenLock  
Points Monitoring  
System – System  
Overview

Fenix Rail Systems provide signalling system consultancy and turnkey delivery (design, procurement, installation, testing, commissioning, handover and O&M) in the UK and worldwide for both greenfield projects and brownfield projects requiring complicated stageworks. Project delivery in the UK is aligned with Network Rail GRIP stages 2-8.

Our offices are open from 08.30 to 17.30 each day. Key management can be contacted via the office landline 03300 580180 and mobile numbers are provided for convenience outside office hours. Your main contact with Fenix Rail Systems are as follows:

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