



Translation of an excerpt of the investigation report

“Train derailment Nördlingen station on 12/10/2021”

Status as of 12/05/2026, version 1.0.

Note:

In accordance with Article 3 of Implementing Regulation (EU) 2020/572, points 1, 5 and 6 of Annex I of an investigation report shall be written in a second official European language. This translation should be available no later than three months after the delivery of the report.

The following English translation is a corresponding excerpt of the investigation report. The German language version is authoritative.

Excerpt translation:

1 Summary

The first section contains a brief description of the event, as well as information on the consequences, primary causes and safety recommendations provided in the individual case.

1.1 Brief description of the event

On 12/10/2021 at around 2:13 pm the passenger train RB 57223, which was travelling from Aalen main station to Donauwörth, derailed when entering Nördlingen station at points W 208.

1.2 Comparable events

While the analysis of the circumstances was still ongoing, on 24/08/2022 the passenger train RB 57223, which was travelling from Aalen main station to Harburg (Schwaben), derailed when entering Nördlingen station at points W 208. Further investigations showed that almost identical chains of events had occurred in the two events. As a result of this, the main investigations were carried out on the basis of the event that occurred first.

1.3 Consequences

The derailment did not result in any injuries or fatalities. Property damage amounting to approx. EUR 700,000 was caused to the derailed electric multiple unit (EMU) and to the infrastructure facilities.

1.4 Causes

During the investigation of the event, the following actions, failures, incidents or circumstances were identified as safety-critical factors. These are differentiated into causal or contributing and systemic factors according to Implementing Regulation 2020/572. Identified shortcomings in the emergency management are also addressed.

A system with designations in square brackets is used to provide better clarity about the factors and aspects of emergency management.

A detailed assessment of the event with classification as safety-critical factors is provided in the sections below.

<i>What happened: Date/time, and action/failure /circumstance/incident</i>	<i>Causal factor</i>	<i>Contributing factor</i>	<i>Systemic factor</i>
<i>12/10/2021 / 2:13 pm: Premature route release of the entry route, combined with a premature points operation to set up the exit route by the signaller at Nördlingen station.</i>	<i>Premature release of the route by the signaller [F1]</i>		
<i>Part of the initial situation since 1929: The special technical design of the signal boxes at Nördlingen station required switching of points W 208 after entry onto track 5 in order to set the exit route. In addition, there was no train- operated release for the entry routes.</i>	<i>Technical design of the signal box [F2]</i>		<i>Risk control for manual operator actions [S2]</i>
<i>Part of the initial situation since 03/09/2021: Signal box 2 staffed by only one signaller, even though the signal box technology was designed for staffing with a signaller and a points operator. In addition, there were variations from normal operation as part of construction and inspection work.</i>		<i>Increased workload and safety consciousness of the signaller [F3]</i>	<i>Compensation measures of an organisational nature [S3]</i>

Table 1: Summary of influencing factors

1.5 Safety recommendations

The following safety recommendation no. 02/2026 is made in accordance with Section 6 of the EUV [German railway accident investigation regulation] and Article 26(2) of Directive (EU) 2016/798:

It is recommended that the infrastructure manager's procedures in accordance with Delegated Regulation (EU) 2018/762 Annex II point 5.2.1 must be examined for constant consideration of the requirements due to human factors in order to ensure that the safety risk associated with equipment is continuously managed, in particular in the event of an extension of the operating phase.

5 Conclusions

The following section contains a summary of the identified causal, contributing and systemic factors. In addition, two further subsections are provided containing information about measures already taken, and additional comments

5.1 Summary and conclusion

The event was caused by a mistake on the part of the responsible Nördlingen signaller in signal box 2 [F1], combined with the need for manual operations due to the outdated signal box technology [F2]. An intermittent workload with a conflict of objectives relating to the prompt handling of the train movement [F3] was a contributing factor. In addition to factors [F2] and [F3], two systemic factors [S2] and [S3] were identified.

In relation to the causal factors “Premature release of the route by the signaller” [F1] and “Technical design of the signal box” [F2]:

The technical design of the signal box at Nördlingen station did not involve either a train-operated release of the stop signal or a train-operated route release for incoming trains. As a result, the track examination was only carried out by inspecting the entry route after passing the route release point with the rear of the train as per guideline 408.251 section 4. This could easily be inspected visually by the signaller in signal box 2 at the time of the event. In addition, he switched points W 208 without making sure that this was free of vehicles in accordance with the provisions of guideline 408.0131 section 2.

The responsibility for operationally safe handling of operating actions lay solely with the signaller, for whom it was mandatory to comply with the specified procedures in the absence of technical dependencies. As a result, a brief failure to observe the rules in conjunction with the usual operating actions was enough to switch points W 208 under passenger train RB 57223, which was still moving. A greater level of automation using modernised signal box systems would not have allowed this human error to happen in this way. As an electronic signal box has since been put into operation at Nördlingen station, an independent safety recommendation will not be issued in relation to this matter.

In relation to the systemic factor “Risk control for manual operator actions” [S2]:

As can be seen from the non-exhaustive list in section 4.5, there have also been similar events in the past in which there was an ill-timed route release due to manual intervention by the operating personnel. In addition, the fact that two almost identical events could occur at Nördlingen station within ten months highlights the risk when relying solely on operational safety rules without further technical dependencies. As shown in section 4.4.1, the infrastructure manager had carried out various risk assessments even before the events. However, according to information from the infrastructure manager, the lack of a clear track

reporting system as a criterion for route release was not explicitly considered as a risk during this evaluation.

Due to the influence of human action in normal operation without additional technically-operated dependencies, it was possible for the mistakes by the Nördlingen signaller to result directly in the train derailments that occurred. The human performance was also dependent on external influences. Even an isolated change, such as the additional deployment of the crossing keeper, resulted in a higher workload and a related increase in the likelihood of human error. Due to the lack of technically-operated dependencies, this resulted directly in an increase in the probability that dangerous events would occur.

In the case of the train derailment on 23/02/2022 in Rüsselsheim station, the Federal Authority for Railway Accident Investigation has already issued safety recommendation no. 01/2024 for a similar context. This recommended “to reduce the risks from human error mentioned in Regulation (EU) 2018/762 Annex II point 4.6.1 b), in electromechanical signal boxes it is recommended that, as a minimum, the points in main tracks should be equipped with a points lever locking device.” It is true that this safety recommendation relates specifically to a different kind of signal box, but in terms of its objective it can also be transferred to the mechanical signal box without a clear track reporting system that is being considered here.

The infrastructure manager was aware of the low level of safety at Nördlingen station and this should have been largely resolved with the long-planned conversion of the signal box to more modern signal box technology. However, the replacement with a modern system was repeatedly delayed and as a result the continued use was extended. The Federal Authority for Railway Accident Investigation was not able to conclusively identify any resulting traceable, continuous risk control throughout the extended operating phase of the system at the infrastructure manager. Against this background, and building on safety recommendation no. 1/2024, the Federal Authority for Railway Accident Investigation is issuing safety recommendation no. 02/2026 that the infrastructure manager’s procedures in accordance with Delegated Regulation (EU) 2018/762 Annex II point 5.2.1 must be examined for constant consideration of the requirements due to human factors in order to ensure that the safety risk associated with equipment is continuously managed, in particular in the event of an extension of the operating phase.

In relation to the contributing factor “Increased workload and safety consciousness of the signaller [F3] and systemic factor “Compensation measures of an organisational nature” [S3]

The investigation showed that, purely according to the calculation carried out by South-east Bavaria Railway, there was not an increased workload for the signaller at Nördlingen station and there were sufficient breaks when looked at over an extended period. However, the workload was concentrated at the times when a train movement was actually carried out. In conjunction with the requirements of the signal box technology, the situation could arise when for a short period the allotted time for all required operating actions was no longer sufficient for prompt execution of operations. This meant that there was a conflict of objectives for the

signaller who was working. It is possible that this circumstance resulted in incorrect sequences of actions becoming established, which were not safety-critical in normal operation over track 4, without the knowledge or with the acceptance of people with more authority at Nördlingen station. The best way to counteract these circumstances is by using sufficient staffing levels even during peak periods and by establishing a positive safety culture that promotes risk awareness.

The second event on 24/08/2022 showed that this had not fully happened by that time at least. It is not possible to conclusively assess whether the compensatory measures taken after this were effective as organisational measures and would have a positive effect in other circumstances. It must at least be noted that the Federal Authority for Railway Accident Investigation is not aware of any comparable cases for the south region of DB InfraGO AG since the event on 24/08/2022. There will therefore be no safety recommendation.

5.2 Measures taken since the event

After the event, the signaller involved was given retraining by the infrastructure manager and for the time being was no longer used as a signaller in signal box 2 at Nördlingen station. In addition, interactive teaching on the subject “Checking and securing a track” was carried out for all signallers used.

After the second similar event on 24/08/2022, the following measures were also taken:

- *The route release point for trains entering Nördlingen station was moved to the location where trains usually stop.*
- *The acknowledgement button for the route release in signal box 2 was equipped with an automatically closing flap. The objective of this measure was that the signaller would have to consciously lift the flap in order to operate the acknowledgement button.*
- *In addition, information signs were displayed within the field of vision at the acknowledgement button for the route release.*
- *Interactive teaching was conducted with all signallers working at Nördlingen station about the altered route release points and the technical adjustment to the acknowledgement button.*
- *Special instruction was carried out on “Checking and securing a track” with all signallers for Nördlingen station.*

In the meantime, an electronic signal box was put into operation at Nördlingen station on 31/03/2025. The two mechanical signal boxes have not been used since then. As a result, the technical error sources described, in particular the special features resulting from the design of the mechanical signal box, are no longer present at the time of writing the report.

5.3 Additional observations

Not applicable.

6 Safety recommendations

The following safety recommendations are made in accordance with Section 6 of the EUV and Article 26(2) of Directive (EU) 2016/798:

<i>No</i>	<i>Addressee and safety recommendation</i>	<i>Relates to company</i>
<i>02/2026</i>	<i>Safety authority: It is recommended that the infrastructure manager's procedures in accordance with Delegated Regulation (EU) 2018/762 Annex II point 5.2.1 must be examined for constant consideration of the requirements due to human factors in order to ensure that the safety risk associated with equipment is continuously managed, in particular in the event of an extension of the operating phase.</i>	<i>Infrastructure manager</i>