Pocket book of

F R E M O

About this book

This is a short guide written to try to help newcomers, especially those with little or no German language skill, to get to grips with FREMO.

The first section focuses on FREMO and what you need to know about a FREMO meeting.

Subsequent sections look at prototype and model and show how prototype practice is reproduced or modified for the purposes of a FREMO meeting.

Appendices give more about DCC and on German railway terms, and provide a selection of the sources consulted when preparing the book.

To reflect the interests of the UK FREMO group, the books concentrates on standard gauge railway practice in Germany in the period 1965–75. A large proportion of the information is applicable to a wider time period and a greater geographical area.

Acknowledgement

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Version history

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Contents

FREMO: the society

What is FREMO?

There are probably better answers elsewhere, but in short FREMO is a society for European railway modellers who support the idea of its founders to hold meetings (Treffen) where modules and rolling stock belonging to the members are operated in a fairly realistic way, for fun.

By the way, FREMO stands for 'Freundeskreis Europäische Modellbahner', which translates literally as 'Circle of European railway modelling friends' and informally just 'Friends of European model railways'. The name doesn't tell you much about FREMO's activities which have always centred around the meetings.

FREMO meetings are social events where members and invited guests get together to share their enthusiasm not just for railway modelling in general but also for operation. The operating sessions are often quite quiet, but this is deceptive as participants work hard driving, controlling, and shunting to keep the trains running on time, or as close to the timetable as events will allow.

What are the main areas of prototype interest within FREMO?

FREMO started in Germany and with H0 scale, but was inspired by ideas from American model railroaders. The most popular scale to work in is still H0 but there are groups from N to gauge 1 and various narrow gauges are represented.

There are also some groups requiring stricter standards of track and wheel design within a scale, for example H0fine or FREMO:87. Before you decide on a specific scale or prototype check which members live in the area which is geographically accessible to you, since they will the ones you are most likely to be able to get together with.

The most popular country is Germany and the most popular period is around 1965–70, reflecting some of the membership's own life experiences. But there is a large US railroading contingent and other European countries are also well represented.

In this book, where it is relevant, we concentrate on the German prototype.

Meetings

Finding out about meetings

The society publishes *Hp1*, a quarterly magazine sent to all members which includes a calendar of upcoming meetings.

The FREMO web site (some of which is available to non members) also lists upcoming meetings and offers ways to contact organisers and the society's officials.

Before attending a meeting

You must let the meeting organiser know you are coming as a non member, and it is polite to do so if you are. Meetings are private, but visitors are welcome as long as the meeting organiser has been informed.

You do not need to bring any model railway items with you.

It is a good idea to bring a name badge!

The organiser will provide details about the venue and how to get there. Usually, there will be information about local accommodation and where to find food.

Bringing locos to a meeting

Normally only members can take rolling stock to a meeting. The vehicles need to meet the FREMO standards relevant to the meeting. For the prototype this includes:

- Epoch (the time period in railway modelling terms; refer to the MOROP definitions and note that these era definitions differ from those used by UK manufacturers)
- Ownership (railway company or private organisation)
- Geographical applicability
- Route applicability (locomotives with a high axle loading or long fixed wheelbase cannot travel on light or sharply curved track).

Most if not all FREMO groups have adopted DCC control as a standard, so your loco will have to have a working DCC chip. FREMO members developed a portable controller (or 'throttle') called a FRED which is especially suited to running on large modular layouts. It has a fixed loco address, allocated from a central list and your loco and controller will be paired (notionally permanently) on this address. See FREMO and DCC.

Bringing goods wagons or passenger stock to a meeting

Contact the meeting organiser to confirm suitability of the wagons, if in any doubt.

The vehicles need to meet the FREMO standards relevant to the meeting. For the prototype this includes:

- Epoch
- Ownership
- Geographical applicability

As with locomotives, refer to information sources before buying and modifying models if you plan to take them to FREMO meetings,

For the model, this includes:

- Numbering
- Coupling type – there is a standard for the coupling, referred to as a 'loop coupling' in the UK or as a bügel in Geman: the preferred type is the Fleischmann 6511
- Wheel profile – must be either NEM or RP25
- Track power (some meetings use three-conductor Märklin standards, but this currently includes a very small group of members)

Note that lighting features in older stock may cause problems for DCC systems.

If any problems in operation are traced to a vehicle, then the vehicle will be removed from the arrangement for the duration of the meeting unless it can be fixed. This reflects practical need, and is not an expression of disapproval.

Contributing modules to a meeting

The meeting organisers need to have details of your modules within the application time.

Modules are what make the arrangement. Plain-track modules whether straight or curved give running time for trains and visual separation between stations.

All modules need to be physically and electrically compatible, and this is achieved with standard positions for tracks at the module ends, standard electrical connections for track power, and a standard height from floor to railhead. The width of a module is governed by the module ends and the convention that modules will line up neatly. This keeps gangways clear and simple and also means that train drivers can walk along beside their train without having to watch out for unexpected projections.

There is complete freedom in choosing the length of a module and (within the FREMO recommendations) the form and radius of any curves. When designing a module of any kind the first consideration needs to

be what can be transported to a meeting. Design modules to be short enough to fit in a vehicle.

A CAD diagram (in AutoCAD DWG format) of the module is essential for meeting planners. These CAD drawings are held on a central database which is accessed by meeting organisers. All UK modules should be registered on the UK section of the database. Fine details such as accurate radii are not necessary, but the diagram should include:

- all tracks
- connections between tracks
- relevant buildings and structures such as goods sheds and loading areas.

The FREMO standards offer all necessary practical guidance on module building. These are published on the FREMO web site. The H0 standard has been translated into English.

Contributing a station to a meeting

The meeting organisers need to have details of your station module within the application time for the meeting. These will include a CAD diagram similar to other module diagrams. They will also generally include information about any goods that can be received or dispatched from the station and information about the train lengths that can be accommodated in each loop and platform.

There should be an entry for the station in the FREMO 'Yellow Pages' including this information. The 'Yellow Pages' is an online resource and further details are beyond the scope of this book. See: https://g-zi.de/FYP/Main.php

A station module is much more than straight track with turnouts.

Refer to the following sections to get an idea of the things that happen at a typical station:

- Regulation of services – the tasks and responsibilities of the station operator.
- Routing of trains in stations and yards – the possibilities of a station layout
- Shunting – the way freight trains are handled in station

Before starting to design a station it is a good idea to grasp what is possible for a given size of station and which kind of goods and quantities are to be sent or received. A complex layout with limited possibilities would be a disappointing result. There are many sources of information on the prototype and it is a good idea to start from a real track plan. This is especially the case given that, in general, stations were laid out following conventions and the relative location of the passenger station building (Empfangsgebäude), goods shed (Güterschuppen) and loco shed (Lokschuppen) were predictable.

You are free to choose suitable module dimensions

to suit the design of the station, and only the outer ends of the station need to conform to the FREMO profile and electrical connections. See the English translation of the FREMO standard for the H0 requirements.

A station owner is expected but not required to bring the following for use in the arrangement:

Telephone compatible with analogue tone-dialling private phone exchanges

For DCC powered meetings:

- LocoNet compatible booster
- LocoNet throttle connection (often built into the station module boards; if these are detachable they are often referred to as ‘LocoNet’ or ‘LN boxes’)
- LocoNet cables sufficient to span the length of the station
- 25-way computer cables, if these are being used at the meeting

It is normally considered good practice to have a few spare cables and LN boxes.

Turnouts can be operated using motors or by hand.

Setting up a meeting

After attending a few FREMO meetings you may decide to offer to start your own. This task should

ideally be shared between several experienced members. Approval and support will be given by the FREMO managing committee and it is beyond the scope of this handbook to cover the tasks involved in more detail. It is likely that it will be over a year before your meeting can take place.

Train operation on an arrangement

Timetables

The timetable for a railway line sets out which services run between the stopping points on the line. Timetables for individual lines are brought together into regional and national timetables.

FREMO meetings where a timetable is used can ignore the situation beyond the limits of the arrangement, but it is common to include real destinations, represented by a fiddleyard (Schattenbahnhof), to fit the arrangement into its notional location. For example, northerly locations might all be accessed via fiddleyard A, easterly ones by fiddleyard B, and others by fiddleyard C. As the fiddleyards have no handling facilities themselves, the game-play of the FREMO meeting is increased because passenger trains can run to different notional destinations along the same route and freight services can be made up with groups of wagons for different remote depots ordered sequentially

The FREMO timetable usually covers a day of operation. If operated at five times the real clock, it is often possible to go through it twice in a single day.

This depends on a fairly early start and an end well into the evening, though as the timetable reaches the night time hours trains are usually a little sparser and those who need to leave the meeting can do so.

There are three types of FREMO timetable according to purpose.

Overall working timetable

This provides timings of all services that will run in a session and gives an overview for the organisers.

Station timetable

Every place where trains are stopped and started has a timetable providing the arrival and departure times of each train. The number and the type of train is given.

The station timetables are not confined to yards and passenger stations. even a small standalone junction will need them.

Train timetable

Each train has a timetable showing arrival and departure times at each yard and station along the route. In reality these timetables have extensive information about line speeds, gradients, curves and any special features of the route that are significant to drivers. The FREMO timetable may have remarks inserted by the timetable author.

Freight services will include details of wagon

exchanges that take place in each station.

If the direction of travel changes and the loco must run round the train (kopfmachen) this is shown.

Driving

The job of a driver is to take a train between the stopping points on the timetable in a timely manner but without excessive speed. The driver needs to ensure that the train is safe to run, and to use driving practices that will not damage the train or its load.

Whenever in charge of a train, the driver must obey the instructions given to him by control staff either verbally or through signals, and must also obey the instructions of fixed signals at the trackside.

On FREMO arrangements, each meeting member can act as driver simply by taking a timetable and reporting for duty. This means going to the station where the train starts at the service start time shown on the timetable (Dienstbeginn). The meeting organiser may hand out timetables to stop people from picking their 'favourite' service.

When the train arrives at its final destination the driver places the timetable on the pile of completed timetables, ready for the next session.

There are no conductors or guards (Zugbegleiter) on FREMO services, except those firmly glued inside the vehicles.

Running direction

In most of Austria, in Germany, Poland, Czechoslovakia and in the Netherlands, trains run on the right. In Belgium, most of France, Italy and Switzerland, they run on the left. Signal positioning reflects this fact, with the arm of a mechanical signal usually pointing away from the running line it controls.

Mechanical signals on running lines: the essentials

Like many others, the current German signalling system provides indications of speed rather than route as the British system does. Nonetheless the most important signal is very recognisable even to those familiar with British practice. This is the main signal (Hauptsignal) and the prototype has an 8 or 10m high mast with a red and white arm at the top. The arm is usually horizontal and at this aspect the signal may not be passed unless there are special circumstances. The signal can be passed when the arm is raised at 45 degrees.

A second arm on a Hauptsignal is used to indicate a speed restriction. In the normal position this arm, which looks like the main arm, is vertical and the restriction is not in force. When the arm is lowered to the same angle as the main arm the speed restriction is in force. This is usually the case when the following turnout is set to the diverging route.

Further indications are given by the turnout signals

(Weichensignale) indicating the route through turnouts and slips.

The approach signal (Vorsignal) is a yellow disc with a black border at the top of a shorter mast (usually the prototype is 3.3m to 5.3m high). This signal is used to indicate the aspect of the next Hauptsignal and is conventionally spaced 1km ahead of it. When the Hauptsignal arm is horizontal (and must not be passed) the Vorsignal is displayed vertically facing oncoming traffic. When the Hauptsignal arm is raised the Vorsignal hinges back so that the disc is horizontal facing the sky.

The aspects of signals are all coded. The code names generally apply equally to the mechanical signal seen by day (and the lights shown by a mechanical signal at night which are not exactly equivalent) and the lights displayed in colour-light signalling. A comprehensive guide in English is available from the German Railway Society along with several even more detailed German publications from MIBA. See Sources.

Advice for new drivers

There is much to learn. Although many aspects of driving are probably quite obvious, there will be points of detail that you are not aware of. Others in the meeting are likely to put you right if you make a mistake, and as this a model no lives are at risk. Here are some things to remember.

- Respect all signals and look out for small fixed ones that may not be obvious.
- No train accelerates rapidly, especially when any part of it is crossing pointwork or sharp curves.
- For British readers: as a rule, goods trains do not travel as fast as passenger trains, but the universal use of air brakes and vehicles with a reasonably long wheelbase means that even pick-up trip freights can travel almost twice as fast on the main line as they would in Britain at the same time period. With perishable goods travelling many hundreds of miles this is an important capability.

Regulation of services

This is the job of the station operators at each station and fiddleyard, and roughly corresponds to the local train controller (Fahrdienstleiter, literally driving service leader). The local controller is in reality usually located in a signal box (Stellwerk) but relies on a signalman of a lower grade (Wärter) to carry out the physical tasks of route setting and operation of each signal (Signal) and turnout (Weiche).

In FREMO the distinction is removed. This is especially appropriate for passenger stations where the station master (Bahnhofsvorsteher) often had overall responsibility for train control and for

operating the signals, turnouts and level crossing barriers within the station limits .

Communication between train controllers

Trains can only enter and leave each section of track under the direction of the local train controller supervising the relevant sections. The train controller with a train to dispatch must seek permission from the train controller of the next section before he can give permission for the train to move beyond his signals. This is done by telephone.

Sending and receiving a train

The receiving controller waits until the whole train has entered the section of track they control and then telephones the sending controller to confirm that the train has arrived in their section.

The section Train reporting gives more details of the sequence of offering and accepting trains

Speeding up and slowing down

To regulate the speed of traffic according to operational condition, drivers may be shown hand-held signals. These are boards as follows:

- White triangle with a red border and a black K: speed up to maximum shown in timetable, until the next reporting point (Fahrzeit kürzen)
- White rectangle with a red border and a

black L: slow down by 1/3 until the next reporting point (Langsamer fahren)

Routing of trains in stations and yards

Although a station may appear to have numerous loops available as 'through routes', in fact the signalling provision usually restricts the number that trains are allowed to run through. The remaining loops are only available for shunting moves (eg running round) or for making up trains. Furthermore a train made up in a loop track cannot leave from that loop if it is not protected by a main signal. There is no permissible route out of the station from the loop even though the track exists.

Turnout signals (Weichensignale)

In the prototype, German turnouts have an indicator showing whether they are set for the main or diverging route. These are essential because the speed at which the train can run through the junction is governed by which way the points are set and this is indicated only by the turnout signal.

On FREMO layouts it is common for these to be operable, but this is not always the case.

Shunting

FREMO arrangements are more challenging and fun when there is plenty of shunting to be done.

Collecting and delivering freight: waybills

Ideally the timetable will allow the exchange of significant amounts of goods between the various locations included in the timetable. By concentrating on a time period somewhere in the twentieth century it is possible to reproduce the single-wagon traffic (Einzelwagenverkehr) that made it necessary to break up and rearrange many goods services en route.

Wagon waybills identify the goods carried and the destination. Wagons may need to be detatched in station A for forwarding to station B, or for loading or unloading, and the driver needs to review the waybills carefully on arrival at each station.

Coupling and uncoupling model wagons can be tricky if they are standing on a track that is obstructed by another train. This is one reason why FREMO standards require good couplings that operate without resistance and are to the correct height above rail. It also explains the height of the modules.

A small station might be shunted only by the train locomotive under the control of the train driver. A larger station will usually offer a dedicated shunting loco (often a Kleinlok). The station's owner is likely to provide a suitable loco that is tried and tested and may feature automatic uncoupling features accessible through DCC functions.

Shunting must be completed in a timely matter to respect the timetable. Conversely, time must be allowed for shunting when the timetable is compiled. Through services almost always obstruct shunting and will always be prioritised by the station controller.

Significant signals for shunt moves

The shunting signal (Gleisperrsignal) is used to give permission for shunting moves within a station area, inside the blocks controlled by main signals. They show that a move is possible but do not provide the authority to make the move. It is (usually) mast-mounted signal with a black bar on a white circular disc. The bar is normally horizontal. Movement past the signal is possible when the bar is angled at 45 degrees up to the right. However, a specific order is still needed before the signal can be passed.

The limit of shunt board (Rangiertafel) is a fixed board on a short pole showing how far onto a running line block a shunting move may go. It is marked 'Halt für Rangierfahrten'. Do not pass this board during a shunt move.

The await instructions sign (Wartezeichen) is a W on a mast. It marks signals that can be passed for some shunting operations, on track which is still protected from entry to the main line. Instruction to pass is given by authorised personnel including the train guard verbally, aurally or with a light signal. In

FREMO expect to receive an instruction from the station operator.

There are many more signals associated with shunting, and depending on the complexity of the station these may be found on FREMO arrangements.

Uncoupling

Each station should provide an uncoupling tool of some kind; drivers are not required to have their own.

Makeup of trains

Depending on the period and motive power, pick-up freights need accommodation for the guard (Zugbegleiter and in earlier times also for the train crew). This is either in the cab of a diesel or electric, the passenger luggage van (Personenzuggepäck-wagen, Pwg) of a mixed goods and passenger service (Güterzug mit Personenförderung, GmP), or in a goods luggage van (Güterzuggepäckwagen, Pwg). The Pwg is marshalled immediately behind the train locomotive.

A tender engine (Schlepptenderlok) is run forwards if at all possible when it is the train locomotive, and has to be turned when it needs to reverse direction. Most German tender engines were only permitted to travel at reduced speed when running tender-first.

FREMO and DCC

There are typically dozens of locos or other powered vehicles on the track during a FREMO meeting, so DCC is the ideal control system because the complexity of isolating locos from each other by switching track sections on and off is removed.

FREMO members took to DCC in the 1990s – very early – and developed a number of devices more or less specific to their needs. Today it is possible to buy almost everything needed off the shelf, but there are one or two exceptions.

A recent article in Hp1 gives lots of insight into how the DCC setup for an arrangement should be done and gives more detail about some of the components listed below and how they are connected and used. See Sources.

FRED: the FREMO throttle

These throttles have gone through several design revisions. The significant features are:

LocoNet communication using a 6-pin RJ12 connector

Programmed to a single loco address

Loco and owner clearly identified on the back

Slim, ergonomic design with buttons reduced to

minimum necessary. More recent DCC features such as sound and complex lighting have increased the number.

Buying a FRED

FREDs are built new from kits, and every few years FREMO members pool time and money to buy the parts for another batch and make up the kits. With the arrival of new FREDs older ones become available. For each locomotive you plan to take to a FREMO meeting, you need to provide a FRED to match. If necessary you can easily reprogram it yourself to match other locomotives.

Command station

This is responsible for taking the DCC control signals from the FREDs and converting them into DCC track signals. It often provides power to a single power district but this is not a requirement.

Often only one command station is required on an arrangement. Larger arrangements might need two or three.

Several commercial units are suitable. They must support LocoNet. The units designed by FREMO members are now regarded as outdated and are not recommended. It is best to check within FREMO as others are likely to cause problems.

Booster

A booster delivers track power to a section of the arrangement. Power from the booster must never be connected to track powered from a different booster. The output from all the boosters is effectively synchronised by the central unit, enabling locos to run across the isolation gaps where two booster areas meet without electrical damage or a short circuit.

Almost every station has its own booster. The localisation helps to prevent a short circuit in a station from affecting all locos running on the entire arrangement. Short circuits are common in stations where drivers accidentally overrun the isolation gaps around turnouts during shunting moves.

As with the central unit, several commercial boosters are suitable for use. Again, it is good to check within FREMO for advice.

LocoNet box/junction

This holds several RJ11 sockets to allow FREDs to be connected to the DCC control bus.

The box can be attached to any module where it will fit; usually it is clamped to one side. The classic FREMO LN box has a slot to take a suitable steel clamp and both items can be bought from H0fine at the time of writing (the LN box is supplied as a kit

containing four sockets and a printed circuit board which the purchaser must solder up).

What you need

The items you may wish to buy and bring to meetings depend on whether you intend to bring powered vehicles or modules with you. The details are given in the Meetings section.

The prototype

Designation of routes

Railway routes can be classified according the frequency and speed of service they can support. The German ones fall broadly into the following groups, which would also apply in most of the rest of Europe.

Main line (Hauptbahn)

This category includes multi-track lines between major population centres. High service speeds and dense frequency. Generally, such lines are beyond the capacity of a FREMO arrangement though some large meets do support them.

Also included are less significant routes, often single-track. Line speeds can be quite high but very large or powerful locomotives are unlikely unless the terrain is particularly hilly.

Many FREMO H0 meetings essentially depict a single-track main line. Many stations are simple enough to be represented by the kinds of module most members are able to contemplate building, but complex enough to make operation challenging with full signalling and a variety of services to lots of different destinations.

Secondary or branch line (Nebenbahn, Lokalbahn, Privatbahn, Sekundärbahn)

These are subject to simplified operational rules. In exchange for lower line speeds the signalling requirement is reduced. The official designation of a Nebenbahn in several European countries includes all narrow-gauge and private railways.

Some FREMO H0 arrangements have explicitly designated themselves as Nebenbahnen. In addition, FREMO narrow-gauge arrangements often work to these standards.

Since before 1900 and almost without interruption there have been private railways in Germany which offer potential for modellers to choose unusual prototype rolling stock.

Industrial feeder or internal network (Industriebahn, Werksbahn)

Short connections (or long sidings) to service industrial facilities, these can become quite elaborate. They may run through an entire estate or industrial district and are generally owned by civic authorities. They are generally operated using verbal signals over telephone and radio and may include facilities to control road traffic lights. Track often runs inset into road surfaces so that trains must integrate with road traffic.

They offer lots of operational potential for single-wagon traffic and short trains.

An Industriebahn could be represented in its entirety with a set of FREMO modules serving two or three facilities, and similar agricultural lines and sidings are also possible.

Designation of trains

Passenger

D: Passenger express train .Designation from Durchgangszug (gangwayed train)

E: Passenger express (Eilzug)

Et: multiple unit (Triebwagen)

P: Passenger local train (Personenzug)

Pb: commuter train (Berufsverkehr)

Pt: multiple unit

Pto: railbus (Triebwagen, Omnibus)

Ptb, Ptob: commuter services formed from multiple unit or railbus

Goods

Dg: Through freight (Durchgangsgüterzug)

Gag: Block freight (Ganzzug)

Lg: Empty return working of a Gag (Leerganzzug)

Ng: Local goods (Nahgüterzug)

Pick-up goods (Sammelzug)

Üg: Transfer freight (Übergabezug)

Internal service moves

Dstg: Service train (Dienstgüterzug) .Typically civil engineering supplies and equipment

Lf: Light engine (Leerfahrt)

Lz: locomotive/s only (Lokzug)

Train reporting

Some FREMO meetings are particularly enthusiastic about following the real railway rulebook when communicating between signallers, and using the designated form of words exclusively. This is not absolutely essential. To ensure trains can travel through the arrangement really requires always stating the names of the offering and receiving stations and always identifying the train concerned using its train number as printed in the timetable.

Stating the names of the offering and receiving stations helps prevent accidental contacts between the wrong stations. Stating the train number allows the receiving area to check that the service is following the timetable and establish which route needs to be available (for example, a passenger service must use the right line if stopping in a passenger station). The offering station offers the train to the receiving station and the receiving station accepts it if the route is clear or rejects it if not. If they reject it, then they must inform the originating station as soon as the route is clear. Finally, the receiving station must report back to the offering station once the train has arrived.

To give an insight into the exact form of communication laid down in the German rulebook, the section below is a simplified extract from Horst J

Obermayer: *Taschenbuch der Eisenbahn* (vol. 2) pp 98–103. It reproduces the rules of the Deutsche Bundesbahn in the 1970s.

Offering a train

A train can be offered at the earliest, 5 minutes before its timetabled departure or passing time.

The train is offered with the words:

- *Wird Zug (Nummer) angenommen?*
- Can train (number) be accepted?

Accepting a train

A train is accepted with the following words:

- *Zug Nummer (Nummer des Zuges) ja*
- Train number (number of train) yes

Rejecting a train

If there is an obstacle to the train's journey then the offer is rejected with the words:

- *Nein warten*
- No wait

Once the obstacle has been removed the train is accepted with the words:

- *Jetzt Zug (Nummer des Zuges) ja*
- Train (number of train) now yes

Reporting arrival

A train must be reported back once its end has passed the train end signal point and the main signal is set to halt.

When a ‘spitze Kreuzung’ takes place then the report is made after the accepted train has left.

The form of words used to report back is:

- *Zug (Nummer) in (Name der Zugfolgestelle)*
- Train (number) in (name of train reporting point)

Glossary of relevant German terms

Bahnhof Literally, rail yard. The word has a broader meaning than the English ‘railway station’

Dienstbeginn Start of service for train crew

Einzelwagenverkehr Single-wagon traffic

Empfangsgebäude station building

Fahrdienstleiter Train controller, an official usually working in a signal box

Gepäckwagen Vehicle provided for luggage and train guard, usually including a work desk and a toilet.

Gleisperrsignal A protecting signal used to regulate shunting moves in a yard

Güterschuppen goods shed

Hauptsignal Stop signal for through lines. Red arm horizontal indicates stop (‘Hp0’). Raised at 45 degrees (‘Hp1’) indicates go. Variants can show different aspects to indicate speed restrictions (‘Hp2’).

Kleinlok Small low-power and low-speed loco that can be operated by station staff unqualified as drivers for shunting. Also seen on short transfer services

Köf a Kleinlok with a diesel engine and a hydraulic

transmission

kopfmachen Of a train, to reverse direction at a calling point

Kreuzung, spitze Crossing of two trains on a single track line where the waiting train is scheduled to leave as soon as the train occupying the track ahead of it has passed into the loop

Lokschuppen loco shed

Rangieren Shunting

Rangiertafel Limit of shunt board

Schattenbahnhof Fiddleyard

Stellwerk Signal box – applied to the building but also more literally to the mechanism used to actuate moving signals and turnouts

Vorsignal Approach signal on through lines. Yellow circle displayed vertically indicates the next Hauptsignal on the route is not showing go. Variants correspond to the variants of the Hauptsignal

Wärter Signalman/pointsman acting under authority of a train control officer
(→ **Schrankenwärter** level crossing attendant)

Weiche Turnout

Zugbegleiter Guard

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Prototype

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Modelling

NEM standards. These are published by MOROP at e.g. https://www.morop.org/index.php/de/nem-normen.html [German]. Help is sought to translate them into English

The list of eras (Epoche) adopted by modellers in Germany may be helpful when identifying suitable vehicles or liveries. There is an English language discussion on the *Railways of Germany* forum https://www.tapatalk.com/groups/germanrailfr/ under the heading 'How are the German railway eras (Epochs) defined ?'

FREMO

‘Everything you ever wanted to know about the FREMO’. Rainer Keil, Mathias König, Paul Hartman. Explanatory leaflet

‘FREMO H0 – Modular Standard. Standard Gauge 1435mm in 1:87’. Klaus Weibezahn, tr Johannes Neuer, ed Huw Morgan. English language version of the current H0 standard.

‘FREMO module design standard’ Bernt Gerlach. Describes how to prepare a CAD drawing of a module for inclusion in the FREMO database

‘On the basics – explained simply’. Heiko Herholz. HP1, 3/2020. Article about DCC setup for an arrangement.

‘Modular building, or: how our model is divided’. Paul Hartman, trans. Huw Morgan and Rob Cottrell

‘Programming FREDs’. Huw Morgan

Web site https://www.fremo-net.eu