

Purpose of the Standard

This standard is intended to display and convey to the user the important terms of model railroad controls¹⁾ and their system in order to promote understanding and communication about them.

General Note:

Terms not defined in this standard or more detailed explanations correspond to norms defined in matching DIN standards (DIN 19 226, 40 146, 44 300 etc.).

1. Model Railroad Control

A **model railroad control** is a control that is used in the complex process of a model railroad (**model railroad process**) in influencing **one or more typical layout operations (model layout function)**, either as a single task or as multiple tasks in a row. A **model railroad control** can control multiple identical and/or different model railroad functions.

A **model railroad control** is a **program control**, more accurately a **timed sequence control**.

Model railroad controls operate **manually** and/or **automatically**.

Model railroad controls consist of useful combinations of parts between which a **unidirectional and/or bidirectional exchange of information** takes place in the form of control signals.

Control signals are carriers of information in controls and consist of a physical medium (electricity, light, sound, pressure, etc.) with a parameter (amplitude, frequency, duration etc.), whose values can be changed as a function of time according to the information intended for transmission.

Regulation is only applied on model railroads in special cases, for example for speed control.

1.1 Control elements:

Input and output elements, actuators, amplifiers, encoders, timers, storage, processors, etc.

1.2 Model railroad - operating system

This is the systematic summary of model railroad controls with different functions or tasks that work together according to a particular program.

1.3 Control layers

On a control system, these differ according to the type and importance of their intervention. For model railway controls, there is a division into lower, middle and higher levels.

Lower control layers (Control layer 1):

This includes controls that directly affect the operation of the layout. These functions influence, measure or provide feedback.

Middle control layers (Control layer 2):

This includes controls that combine the lower-level controls into groups or arrangements, according to systematic and/or physical aspects.

Higher control layers (Control layer 3):

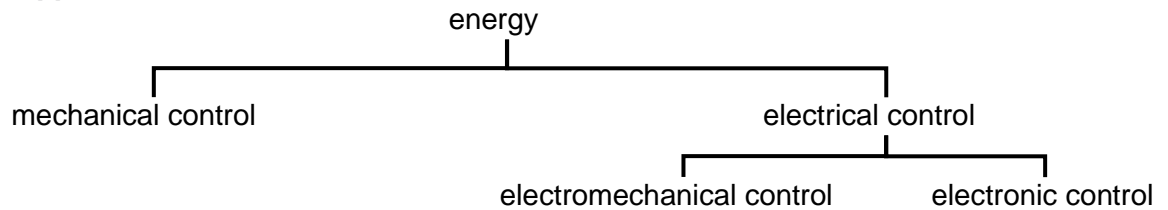
This includes controls that affect all underlying control elements (control layers 1 and 2). These can be centralized (one control panel with a track schedule) or decentralized (several control panels with a track schedule).

¹⁾ The terms used hereafter always have the prefix **Model Railroad-** to distinguish them from other terms with the same wording. This can be omitted if it does not lead to confusion.

1.4 Model Railroad Control Types

The distinction is made on the basis of the different properties:

1.4.1 Support Power



In special cases pneumatic or hydraulic controls can be used.

1.4.2 Control signal type

Important control signals for the model railroad are, for example, the analog and digital light-signals. Accordingly, there are analog and digital controllers.

1.4.3 Operational procedure

The model railway controls are divided into:

1.4.3.1 Vehicle Control

This includes controls that affect all vehicle functions, such as speed, direction of travel, lighting etc.

1.4.3.2 Route operation

This includes controls that serve to influence the roadway, e.g. light-signal controls, rail-switch controls, railway protections, etc.

1.4.4 Other classification functions

These are special features (e.g. **speed control**, **traction current control**) or features that have been combined for practical purposes (combinations of physical assemblies, e.g. **track or block section operation**) or for timing purposes (**timetable**).

2. Model Railway Functions

Each function describes a typical model railway process in the overall process of model railway control and are divided into the following types:

2.1 Main functions

Main functions include functions that are relevant to the model railway operation (mainly train operation).

2.2 Additional functions

Additional functions are functions that complement the model railway.

2.3 Measurement functions

Measurement functions are required functions for monitoring, securing and investigating model railway activities. (Model railway measurement functions are mainly feedback functions.)

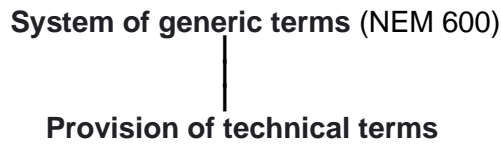
2.4 Power Functions

Power functions are functions that ensure correct operation of the controllers by supplying the required voltages and currents.

3. Graphical overviews

3.1 Overview of the technical basis of model railroad control technology

A) Conceptual system



B) Structure of the model railroad controls and control signals



C) Circuit symbols, symbols, code letters (NEM 602) and code colors (NEM 605).

3.2 Schema of the NEM 600 terminological system

