	Standards for European Model Railroads Electrical Interfaces Next18 / Next18S	NEM 662 Page 1 of 4
Recommendation	Dimensions in mm	Edition 2025 (replaces Edition 2016)

1. Purpose of the Standard

This standard establishes 18-pin interfaces¹⁾ to enable the secure and fast installation or exchanging of electronic modules for electronic components (loco and function decoder) in areas of limited space. The interfaces are thus suitable for vehicles of scale N and TT as well as small vehicles of scale H0.

2. Interface Description

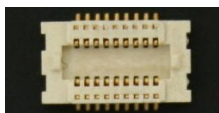
This interface is deployable with cored DC motors and coreless DC motors. There are variants Next18 without sound, and Next18S with sound function. It is not intended, and should it should be avoided, that one installs a Next18 decoder into vehicles designed for a Next18S decoder.

The interface provides up to 8 function outputs. It is not required that all functions of the interface be supported. Connections for functions that are not supported must remain unconnected. This applies to both vehicles and other equipment in which the socket portion is installed, as well as for decoders or other equipment where the plug portion is installed. The installation volume as well as the size of the decoder are a part of the interface.

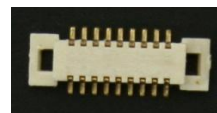
Vehicles with factory installed interfaces in accordance with this standard must clearly indicate on their packaging whether the interface is of version Next18 or Next18S.

2.1 Mechanical Characteristics

The interface is composed of an encapsulated 18-pin socket strip on the motherboard of the vehicle and an also encapsulated 18-pin plug strip on the circuit board of the decoder.



Socket Strip (in the vehicle)



Plug Strip (at the decoder)

The security against incorrect connection orientation and protection against erroneous installation is guaranteed through the symmetric assignment of the electrical connections and via the corresponding installation volume limitations in vehicles.

¹⁾ This recommendation is based on the RailCommunity standard RCN-118, Edition December 2024.

2.1.1 Decoder

For the decoder, the variants Next18 without sound function and Next18S with sound function are differentiated:

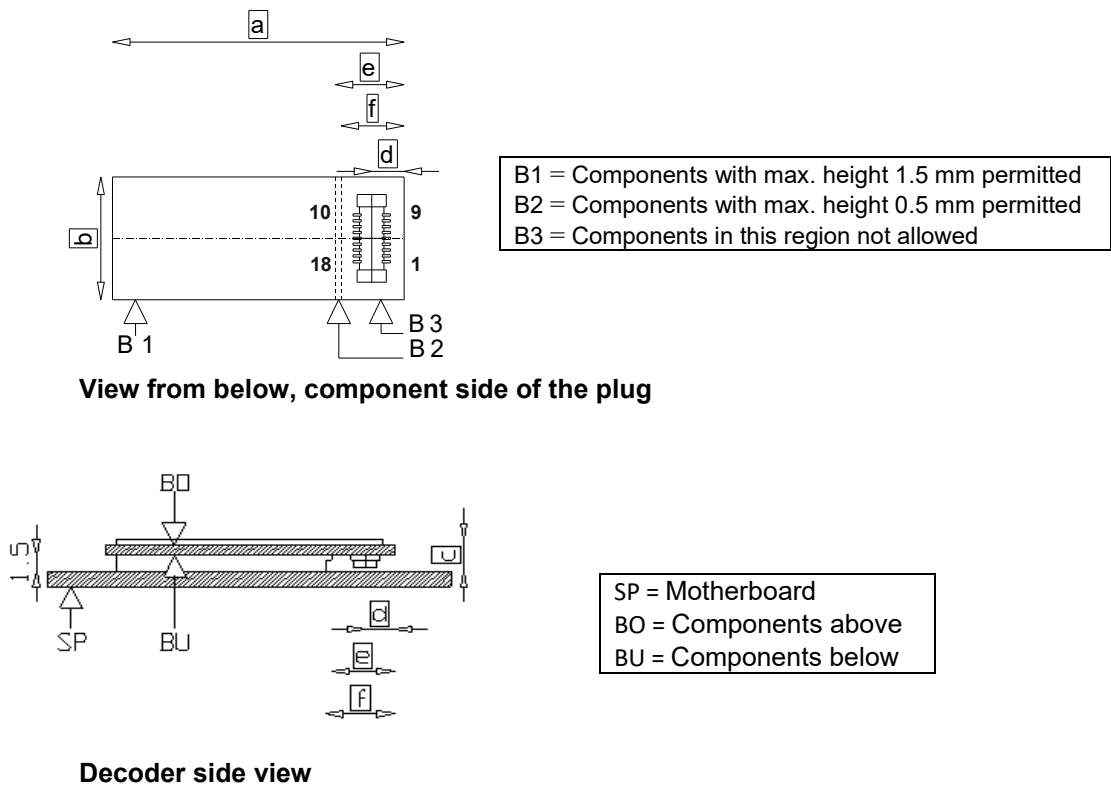
Table 1:

Dimension	Description	Next18	Next18-S ¹⁾
a	Decoder-Length	15.0 mm	25.0 mm
b	Decoder-Width	9.5 mm	9.5 mm ²⁾
c	Decoder-Height	2.9 mm	4.1 mm
d	Distance from board edge to plug center line	2.5 mm	2.5 mm
e	Distance from board edge to components with max. height of 0.5mm	5.4 mm	5.4 mm
f	Distance from board edge to components with max. height of 1.5mm	5.9 mm	5.9 mm

- 1) Decoders with these dimensions must have functional loudspeaker outputs.
- 2) As the width for Next18-S was defined as 10.5 mm until 2020, the installation space should continue to be dimensioned for their continued usability.

2.1.2 Decoder Installation

The installation space in the locomotive must be designed such that components of the decoder cannot touch bare metal or conductive paths. The installation space (dimensions per Table 1) should be dimensioned such that the decoder fits without restriction.



The maximum component height on the bottom of the electronic components is 1.5mm. The maximum component height on the top side of electronic components is computed out of the maximum height of the decoder minus the component height below (1.5mm) and the thickness of the utilized circuit board.

2.2 Electrical Characteristics

Contacts may be driven with a maximum of 0.5 A. The connections for power delivery as well as U+ and GND (decoder plus and minus after rectifier) are each implemented with two contacts each. The maximum load on these connections is thus 1.0 A.

Connections that are not used on the vehicle side should be routed to soldering points on the vehicle mainboard.

2.3 Pin Assignments

Table 2a: Next18

Description	Pin #	Pin #	Description
Power pickup right	1	18	Power pickup right
Motor + / AUXA	2	17	F0_r
AUX1	3	16	AUX5
ZBCLK / AUX3 / GPIO_A	4	15	U+
GND	5	14	GND
U+	6	13	ZBDAT / AUX4 / GPIO_B
AUX6	7	12	AUX2
F0_f	8	11	Motor - / AUXB
Power pickup left	9	10	Power pickup left

Table 2b: Next18S

Description	Pin #	Pin #	Description
Power pickup right	1	18	Power pickup right
Motor +	2	17	F0_r
AUX1	3	16	LS_A ²⁾
ZBCLK / AUX3 / GPIO_A	4	15	U+
GND	5	14	GND
U+	6	13	ZBDAT / AUX4 / GPIO_B
LS_B	7	12	AUX2
F0_f	8	11	Motor -
Power pickup left	9	10	Power pickup left

The circuit boards of the vehicles as well as the decoders must be constructed such that the varied uses of connections LS_A / AUX5 and LS_B / AUX6 doesn't lead to damage on the vehicle nor the decoder.

2.4. Signal Descriptions

Table 3:

Name	Description
Power pickup right	Power pickup right (in direction of forward travel), 2 contacts are utilized to increase the current load capacity
Power pickup left	Power pickup left (in direction of forward travel), 2 contacts are utilized to increase the current load capacity
Motor + / AUXA	Motor connection positive (in analog mode connected to power pickup right), alternatively amplified output for function decoders
Motor - / AUXB	Motor connection negative (in analog mode connected to power pickup left), alternatively amplified output for function decoders
F0_f	Head signal in direction forward, amplified output
F0_r	Head signal in direction rear, amplified output
AUX1	Function output 1 (amplified output), train rear signal for reverse direction of travel, if separated from the head signal
AUX2	Function output 2 (amplified output), train rear signal for forward direction of travel, if separated from the head signal
ZBCLK / AUX3 / GPIO_A	Trains Bus Clock, input or output A (logic signal, no power output) ¹⁾
ZBDAT / AUX4 / GPIO_B	Train Bus Data, input or output B (logic signal, no power output) ¹⁾
LS_A / AUX5	Speaker connection A for Next18S ²⁾ or Function output 5 for Next18 (logic signal, no power output)
LS_B / AUX6	Speaker connection B for Next18S ²⁾ or Function output 6 for Next18 (logic signal, no power output)
GND	Decoder negative after rectifier
U+	Decoder positive after rectifier, 2 contacts are utilized to increase the current load capacity. This output is used to supply the functions and/or for connection external buffer capacitors. The limiting of power up current for external buffer capacitors must be done on the vehicle side of the interface.

¹⁾ The processor pins of the train bus are made available with 470 Ohm series impedance. The levels correspond to those of the function outputs with logic level.

²⁾ The speaker impedance is in the range of 4 to 8 Ohms and is to be documented by the manufacturer.

2.4.1 Description of Function Outputs

The function outputs F0_f, F0_r, AUX1 and AUX2 are intended to switch loads (power outputs). The loads are switched on by the decoder connecting the respective function outputs to ground via an electronic switch. The maximum load current on the function outputs is 100 mA.

A vehicle motherboard produced voltage U+ may not be connected to the pin 6 (U+) of the decoder.

2.4.2 Description of Logic Signals

The logic signals of the connections GPIO_A, GPIO_B, AUX5 and AUX6 are suited to activate external load switches (such as on the motherboard of the vehicle). The maximum load current of logic outputs is 0.5 mA.

It should be noted that when the decoder processor is being started, uncontrolled states including a high-resistance state at the outputs with logic level can occur for a short time. Critical hardware on the mainboard must be secured accordingly.

Table 4:

	Voltage level at output of the decoder	Voltage level for the load switch (on the motherboard of the vehicle)
Function switched off	≤ 0.4 Volt	≤ 0.8 Volt
Function switched on	≥ 2.4 Volt	≥ 2.0 Volt

GPIO_A and GPIO_B may be used as digital inputs, they are switched to GND. The decoder must then have a pull-up in the range 10 to 50 kΩ. If these connections are not used for a train bus, GPIO_A should preferably be used for wheel synchronization in steam locomotives.

Servos should preferably be controlled via GPIO_A and GPIO_B. Serial buses should always use GPIO_A and GPIO_B.

2.4.3 Usage of the Interface on Function Decoders

This interface can be deployed in vehicles without motors (e.g. control cab cars). Since the motor connections would remain disconnected in this case, the decoder should ensure the appropriate feedback signaling in service mode via internal circuitry.

The motor connections can alternatively be used as amplified outputs.

3. Operation without Decoder

For the operation of a vehicle without the installation of a decoder in the interface, a plug strip as bridge is to be used. This bridge plug connects the following contacts to each other:

Power pickup right	–	Motor+	–	F0_r	–	(AUX1, when connected to rear signal in forward direction of travel)
Power pickup left	–	Motor-	–	F0_f	–	(AUX2, when connected to rear signal in reverse direction of travel)

Table 5:

Name	Pin #	Pin #	Name
Power pickup right	1	18	Power pickup right
Motor +	2	17	F0_r
AUX1	3	16	LS_A / AUX5
AUX3 / train bus clock	4	15	U+
GND	5	14	GND
U+	6	13	AUX4 / train bus data
LS_B / AUX6	7	12	AUX2
F0_f	8	11	Motor -
Power pickup left	9	10	Power pickup left

4. Specification of Components for Plug Strip and Socket Strip

Producer: **MoreThanAll**

Plug strip NP0519-P05X-018

Socket strip NP0519-S10X-018

Dealer: **Coratec**

Plug strip CT0519P-05-2x09P

Socket strip CT0519S-10-2x09P

Source:

CORATEC GmbH & Co. KG

Am Naugarten 8

DE - 35116 Hatzfeld

Germany

Phone: +49 (0) 6452 93 27 30

Fax: +49 (0) 6452 93 27 29

info@coratec.de <http://www.coratec.de>

The plugs of the P5KF series from Panasonic are not compatible despite having the same external dimensions.