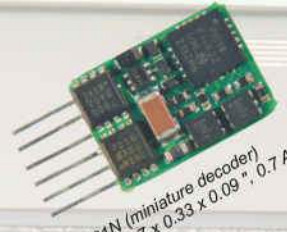
Decoders

Locomotive Decoders
Sound Decoders
Function Decoders
Accessory Decoders
Decoder Update Device



MX621N (miniature decoder)
0.47 x 0.33 x 0.09 ", 0.7 A

Photos enlarged (2:1)

MX699KV (large scale sound decoder): 2.0 x 1.6 x 0.5 ", 6 A, 10 Watt

ZIMO system products

Brief description MX10 & MX32 & StEin last pages of this catalogue (more in the separate System catalogue).

MX600 (flat decoder)
1 x 0.43 x 0.08 ", 0.8 A

The best for money, the smallest, the most powerful, and ca. 100 other types

ZIMO ELEKTRONIK

The ZIMO Decoder Catalogue June 2016

www.zimo.at

ZIMO Decoders . . .

ZIMO Decoders . . .

. . . come from our own production facility in Vienna,

as with all products from ZIMO Digitalsystems. Here is where ZIMO employees make the complete circuit board assembly, do all the soldering and wiring, program the microcontrollers, load the sound data, initialize and test, and perform all repair work.

This 'self-made' flexibility allows ZIMO to offer a complete, consistent range of latest-generation decoders, including "exotic" types, which while perhaps only needed in small quantities, are included to satisfy our claim of "an appropriate decoder for every rail vehicle."

The dimensions of the ZIMO decoders are often smaller than those of the comparable products of other manufacturers, even though most of our decoder types are equipped with more outputs than usual, and although microcontrollers feature large program memory (32K or more, leaving adequate space for software updates), and with sound decoders, much more storage space (at minimum 32 Mbits) for sounds to be played back.

A close-up of an MX645 sound decoder circuit board

ZIMO Decoders . . .

. . . offer a selection where ALL models have ALL features.

The list of COMMON features is extensive (seen on the following pages), while the tables indicating the characteristics of each decoder families are just a few lines, because it's all about those few differences.

ZIMO production machine room: two placement robots, Reflow soldering oven, soldering-paste printer, AOI device.

ZIMO Decoders . . .

. . . are equipped with the latest technology. A look at the details (see picture of sound decoder MX645, above, as an example) shows the integration density of our electronics: the components closely juxtaposed in miniaturized arrangements, no space wasted for conductors because they've been moved to the unseen internal layers of our 4-layer printed circuit board.

ZIMO Decoders . . .

. . . for a product range of currently about 100 types, divided into 25 "Decoder families." One such family corresponds to the general layout of a circuit board for several decoder types, each with different access technology (wiring, direct plug as PluX or MTC), and sometimes several variants based on type and number of outputs.

So, the perfect decoder type for a particular application is easy to find: the dimensions, the number of function outputs where appropriate, the type and number of functional low voltages, the type of energy storage interface connection, and the connection technology are the decisive criteria shown. Rarely does the total current overload capacity need to be considered: ZIMO decoders are spaciously laid out, and so they're almost

ZIMO Decoders . . .

. . . offer innovative solutions. It's always been the ZIMO tradition to introduce new ideas to the market. For example, the combination of high-frequency motor control and load regulation (introduced 10 years ago, and previously generally regarded as not feasible) and the ability to update.

ZIMO Decoders . . .

. . . are not more expensive than similar quality products.. In many cases ZIMO decoders offer a considerable price advantage, especially because properties such as HLU, RailCom, SUSI and servo-control are not reserved for special products, but rather are included in every model.

ZIMO exhbition booth, the decoder-wall

Even today there are a number of unique features of ZIMO decoders, such as: • the "HLU" concept and ZIMO train number recognition • "Swiss mapping," an alternative to NMRA function mapping that links complex lighting conditions to adjust to individual desires (appropriate not only for the Swiss...) • the high level of configurability of ZIMO's sound capabilities • "Input Mapping," which is the combined function mapping upstream of the assignment of function keys.

There are no derated "Basic decoders" in the ZIMO product line. This product policy not only eliminates the waste of our valuable labor to develop inferior products, but it's also advantageous to the user: the use of a decoder which exploits the latest technology options may not always be evident at the time of purchase, but can be relevant when it comes to adapting to new operations later, for example when new feedback options are needed.

ZIMO Decoders . . .

. . . are NOT ONLY locomotive decoders and (locomotive) sound decoders, but also function decoders and accessory decoders:

And these decoder classes have properties that may not be self-evident. For example: function decoders for non-powered vehicles are not simply locomotive decoders with reduced features (for example, removal of the motor output) but rather ZIMO adds a special feature: the second address, which - programmed to the address of the locomotive - allows for consistent activation of all facilities in the train, a step toward a 'train bus' (in this case, a "virtual" bus, i.e. without direct connection or data exchange between cars).

ZIMO Decoders . . .

. . . are supplemented by high-quality accessories: for example, a wide range of speakers for sound decoders. In addition to the usual round speakers, miniature rectangular speakers with specially-made bodies and resonant bass reflex speaker boxes provide very good sound from an extremely small space. Energy storage electrolytic capacitors, tantalum and Gold Caps offered by ZIMO (as components and modules) are particularly useful and recommended.

A range of adapters and locomotive boards facilitate the installation and increase the performance of our

The Important Characteristics of ZIMO (Sound) Decoders

(all decoders are largely functionally identical)

Basic Properties

- DCC-addresses 1 ...10239 Composite addresses 1 ...127, MM-addresses 1 ...80, functions F0 ...F28.
- 14, 28, 128 external speed steps; 256 or 1024 internal.
- Programming in "Service Mode" and "Operational Mode"; CV-readback in “Operational Mode” with RailCom.
- DC-Analog operation, with optional unregulated or load-regulated motor control.
- AC-Analog operation, including direction-reversal using Märklin-standard current-surge impulse.
- SUSI-interface: included on smaller decoders on solder pads; on larger decoders on connector.
- Software update capability: New software versions may be loaded into the decoder with the help of the ZIMO MXULF decoder update device (or its predecessor MXDECUP) or via MX10 base unit (the ZIMO command station). This can be accomplished on the track without opening the locomotive. Sound projects are similarly loaded.

Operational Safety Features

- Overcurrent protection for motor and function outputs with shutdown and automatic reset.
- Over temperature protection by automatic shutdown at about 100° C (212° F).
- Protection elements (suppressor diodes) against voltage spikes from motor inductance and external sources.
- Overvoltage protection min. 35 V, typically 50 V.

Motor Control and Regulation

- Low-noise, high frequency PWM control, selectable 20/40 kHz. Alternatively, low-frequency (adjustable 30 to 150 Hz) - for certain older engine types.
- Suitable for all DC motors including coreless motors (Faulhaber, Maxxon), "difficult cases" such as Fleischmann-round motor, with additional diodes for field coil motors.
- Partial self-optimizing control, and numerous possibilities for manual adjustment.
- Speed steps either relative to a three-point curve or programmable in 28 steps.
- Alternative km/h control (1/2, 1, or 2 km/h per speed step) instead of the conventional speed step control.
- Adjustable balance of the transmission neutral position upon direction reversal for the avoidance of starting jolt.
- Acceleration settings (NMRA standard) and additional "exponential acceleration and braking" for soft start/stop and "adaptive acceleration and braking" to avoid sudden jolts.
- Distance controlled stopping (constant stopping distance) for precise stopping in front of a red signal by HLU or ABC.
- Shunting ("Switcher") functions: half-speed, reduction or disconnection of the starting/braking times.
- Automatic motion continuation during interruption of wheel/rail contact (dirty track, switches, etc.) until reliable supply resumes (Assumes installation of an energy storage device in the locomotive).

Functions and Function Outputs

- Full NMRA Function Mapping, with extensions (direction dependence, asymmetric lighting, etc.).
- ”Swiss Mapping” (not only for the Swiss!), with multiple lighting conditions defined for cases of: locomotive without train, locomotive pulling train and locomotive pushing train, and the key combinations to activate them.
- ZIMO input mapping, ‘forward-connected’ to the desired key-function mappings which permits setting of the key allocations as desired; especially useful for decoders in which a ready-to-use sound project has been loaded.
- Dimming, flashing, American and other lighting effects: Mars ditch, strobe ... Soft start, brake light, flickering...
  Smoke special functions - heating element and fan.
- High beam/low beam headlight switching via function key.
- Time-limiting of coupling control for overload protection of Krois, Roco, or other digital couplers and ‘coupling-waltz’ (automatic push and release).
- Besides the actual 2 (or 4, depending on the decoder) function outputs, additional "logic level" outputs are included, which be used as control lines for standard servo drives for couplers, pantographs and other mechanical elements.
- Servo configuration with special CVs for end and middle

Train Control and Feedback

- Braking distances by DC, ABC (= stopping by asymmetric DCC signal), "Märklin braking distance".
- ZIMO HLU - "signal controlled speed influence" with speed limits in 5 steps and stop. Only in conjunction with ZIMO digital system (MX1, MX31ZL, MX10, MX32ZL as controller) and ZIMO track section modules (MX9, "StEin").
- ZIMO train number message signal via high-current pulse. Only in conjunction with ZIMO digital system (MX1, MX31ZL, MX10, MX32ZL as controller) and ZIMO track section modules (MX9, "StEin").
- RailCom, already deployed applications: "On-the-main" programming and CV with confirmation reading, RailCom address feedback, feedback of the current speed. Many other applications planned in future software releases.

Sound Playback

- Powerful Sound Amplifier: in miniature sound decoders, 1 Watt for 8 Ohm speaker. In H0 sound decoders, 3 Watts for 4 or 8 Ohm speaker (or two 8 Ohm in parallel), in large-scale decoders, 10 Watts for 4 or 8 Ohm speakers (or two 8 Ohm in parallel) at 10 V.
- Playback rate 22 kHz (used by default) and 11 kHz (for long sequences such as announcements), Flash memory 32 Mbit (3-6 min playing time), 6 sound channels can be mixed and played back simultaneously (e.g. steam 'chuffs' on two
- Acceleration and load dependent sound playback; automatic measuring trip for 'training' load-sensitivity, both for steam engines and for diesel and electrical locomotives.
- Synchronization of steam 'chuffs' alternatively by an axle cam detector (mechanical contact, opto-detector, Hall-effect sensor) or by the software-simulated axle detector. Adjustment options for various steam sound effects with overlapping.
- Numerous sound CVs for real-time adaptation of the loaded sound project, in particular for diesel and electric locomotives: the volume and speed (or pitch) curves for turbochargers, thyristor and electrical motor noise, and many others.
- Loading of sound projects (= overwrite the project already loaded in the decoder) using the ZIMO decoder update module MXULFA (or its predecessor MXDECUP) or the base unit MX10 (ZIMO command station), i.e. with the same equipment and similar methods as for a decoder software update. It's possible to load a sound project on the track without opening the loco (which takes about 10 minutes), or alternatively via the SUSI interface (approx. 1 min).
- Sound collection as a special form of sound project: sound samples and parameters for several series are included. For example, "European Steam/Diesel Collection" with 5 steam 'chuff' sets, 10 whistles, 2 bells, ... Real-time selection of the available samples allows you to create an individual sound for each locomotive.

Energy Storage Interface

- With external energy storage (electrolytic, tantalum, Goldcap capacitors) continuous locomotive motion during a break in wheel/rail contact, eliminating flickering lights and sound disruption, also compensating for any loss of energy through RailCom and HLU gaps.
- Energy storage up to 5000 μF may be connected directly (without additional components) to all decoders and sound decoders that have a length of more than 20 mm, offering full effect without disrupting programming or train-number impulses or altering limitations defined by in-rush current.
- Goldcaps with unlimited capacity may be connected directly to some small decoders and to all large-scale decoders.

Special Large-scale Features

- Synchronous rectifier instead of diodes to reduce voltage drop and heat loss, offering continuous current up to 6 A without a heat sink.
- One, two or three function low voltage sources (up to 1 A) depending on decoder type: 5 V (as servo supply, also often used for smoke fan and lights); 10 V; and adjustable low voltage of from 1.2 V to just below track voltage.
- Up to 14 "normal" function outputs (1A total load per group of 4) depending on the decoder type; additionally, a special output for a smoke fan.
- 4 servo outputs, depending on the decoder type, via control lines, or included 3-pin connectors.
- Acceleration sensor to automatically adjust

Comparison Table: Locomotive (Sound) Decoders for smaller scales

Each decoder family includes several types (= Different types of connection)

Decoder Family >	Flat decoder	Miniature			Standard H0		High end H0		High power H0, 0		SOUND	SOUND	SOUND
	MX600	MX618	MX621	MX622	MX623	MX630	MX633	MX634	MX635	MX636	MX644	MX645	MX648
Dimensions mm (in.) circuit board (without heat shrink tubing)	25 x 11 x 2 (1 x .43 x .08)	15 x 9.5 x 2.8 (.6 x .37 x .11)	12 x 8.5 x 2.2 (.47 x .33 x .09)	14 x 9 x 2.5 (.55 x .35 x .1)	20 x 8.5 x 2.5 (.79 x .33 x .1)	20 x 11 x 3.5 (.79 x .43 x .14)	22 x 15 x 3.5 (.87 x .6 x .14)	20.5x15.5x3.5 (.8x.61x.14)	26x15x3.5 (1x.6x.14)	26x15x3.5 (1x.6x.14)	30 x 15 x 4 (1.2 x .6 x .16)	30 x 15 x 4 (1.2 x .6 x .16)	20 x 11 x 4 (.79 x .43 x .16)
Continuous Current Sum of Motor and Function Outputs	0,8 A	0,7 A	0,7 A	0,8 A	0,8 A	1,0 A	1,2 A	1,2 A	1,8 A	1,8 A	1,2 A	1,2 A	0,8 A
Function Outputs including two headlamp outputs	4	4	4	4	4	6	10 (9) *)	6 **)	10 (9) *)	8 **)	8 **)	10 (9) *)	6 (4) *)
Servo/Logic Out optional logic-level outputs on SUSI-Pins	-	2	-	2	2	2	2	2	2	2	2	2	2
Function Low-Voltage	-	-	-	-	-	-	-	-	alternatively 14 V, 5 V, 1,5 V 0,8 total	alternatively 14 V, 5 V, 1,5 V 0,8 A total	only low-current: 5V / 200 mA	only low-current: 5V / 200 mA	-
Audio Power/Imp. (4 Ohm --> 8 Ohm or 2 x 8 Ohm parallel)	-	-	-	-	-	-	-	-	-	-	3 Watt / 4 Ω	3 Watt / 4 Ω	1 Watt / 8 Ω
Wire Connections NEM 652 (R) / NEM 651 (F)		MX618N18	-	-	-	-	-	-	-	-	-	-	-
NEM 651 body connector 6-pole male conn. on decoder (N)	-	-	MX621N	MX622N	-	-	-	-	-	-	-	-	-
PluX-Plug 12, 16, or 22-pole male conn. on decoder	MX600P12	-	-	-	MX623P12	MX630P16	MX633P16, MX633P22	-	MX635P22	-	-	MX645P16, MX645P22	MX648P16
MTC-Plug 21-pole female connector on decoder	-	-	-	-	-	-	-	MX634D, C		MX636D, C	MX644D, C	-	-
Next-Plug	MX600 MX600R	-	MX621 MX621R, -F	MX622 MX622R, -F	MX623 MX623R, -F	MX630 MX630R, -F	MX633 MX633R, -F		MX635 MX635R, -F	-	-	MX645 MX645R, -F	MX648 MX648R, -F
Energy-storage conn. (for 16V or 25V electrolytic to 5000 µF)	-	-	-	-	-	-	yes (16V) also Goldcap	yes (25V)	yes (16V) also Goldcap	yes (16V) also Goldcap	yes (25V)	yes (16V)	

*) The wired decoders have more function outputs than the PluX types because the PluX plug has one pin missing ("Index-pin" used as a safeguard against false insertion: "22-pin" connector actually has only 21 pins)

**) Decoders with MTC interface have depending on type some logic level function outputs: „C" versions (FA3, FA4 logic level, vs „D" FA3, FA4 normal outputs), in case of MX636 there exist also „RailCommunity"-conforming types

Select by type of connection, dimensions, sound or non-sound

Decoder with connectors

SOUND MX649	SOUND MX658
23 x 9 x 4 (.9 x .35 x .16)	25 x 10,5 x 4 (.98 x .41 x .16)
0,7 A	0,8 A
4	4
2	2
-	-
1 Watt / 8 Ω	1 Watt / 8 Ω
-	MX658N18
MX649N/L gerade/gewinkelt	-
-	-
-	-
MX649 MX649R, -F	.
-	-

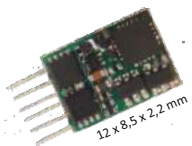
Next18

MX618N18

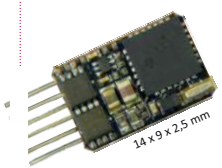
MX658N18

NEM 651 direct

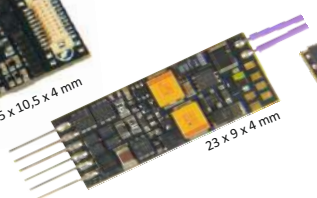
MX621N



MX622N



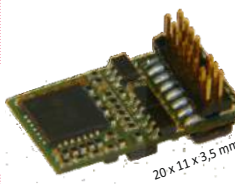
MX649N



PluX12, PluX16

MX623P12

MX630P16



MX648P16

PluX22

MX633P22

MX635P22

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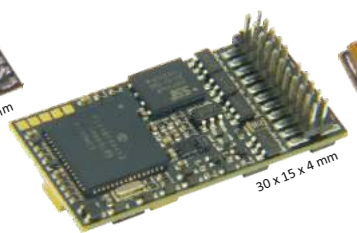
MX645P22



21MTC

MX634D, -C

MX636D, -C

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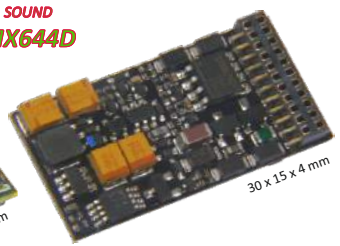
MX644D



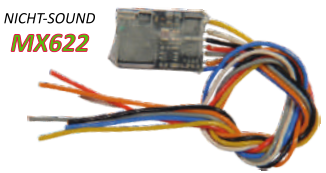
Wired decoders

Within almost all decoder families a through-hole version is available with free wires (.) or with plug on wires per NEM 652 (R) NEM 651 (F)

for example:

MX600 MX600R
MX621 MX621R MX621F
MX622 MX622R MX622F
MX623 MX623R MX623F
MX630 MX630R MX630F
MX633 MX633R MX633F
MX635 MX635R MX635F

NICHT-SOUND **MX622**



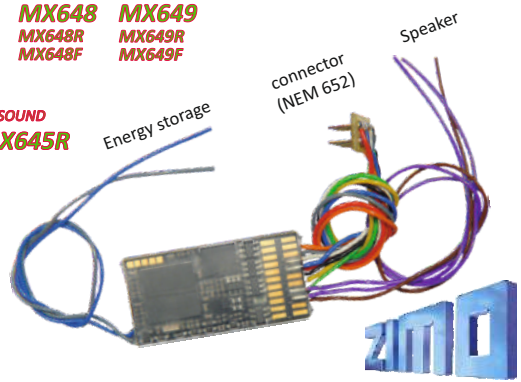
NICHT-SOUND **MX623F**

SOUND **MX645** MX645R MX645F

SOUND **MX648** MX648R MX648F

SOUND **MX649** MX649R MX649F

SOUND **MX645R**



Comparison Table: Large Scale (Sound) Decoders

Each decoder family includes several types (= Different types of connection)	MX699				MX696			MX697	
Decoder Family >	MX695KN	MX699LS SOUND	MX699LV SOUND	MX699KS SOUND	MX699KV SOUND	MX696N	MX696S SOUND	MX696V SOUND	MX696KS SOUND	MX696KV SOUND	MX697S SOUND	MX697V SOUND
Dimensions mm (in.) (Length without 2 x 6 mm breakoff)	50 x 40 x 13 (2.0 x 1.6 x .5)	50 x 40 x 13 (2.0 x 1.6 x .5)		50 x 40 x 13 (2.0 x 1.6 x .5)		55 x 29 x 16 (2.2 x 1.2 x .63)	55 x 29 x 16 (2.2 x 1.2 x .63)		68 x 29 x 20 (2.5 x 1.2 x .7)		60 x 32 x 21 (2.2 x 1.3 x .83)	
Continuous Current Sum of Motor and Function Outputs	6 A	6 A		6 A		4 A	4 A		4 A		4 A	
Function Outputs including two headlamp outputs	14	8	15	8	15	4	8	14	8	14	10	
Servos: control lines (complete with 5V supply)	- 4	4 -	- 4	4 -	- 4	- 4	4 -		- 4		4 -	- 4
Function low-voltage 5V fixed (MX696N: 6V)	5 V	5 V	5 V	5 V	5 V	6 V	-		-	5 V	-	5 V
Function low-voltage 10V fixed	10 V	10 V		10 V		-	10 V		-		10 V	
Function low-voltage adjustable (Pot.) ≥ 1.2V	Potentiometer	- -	Code switch for: 1,5 - 6,5 - 14 -19 V	- -	Code switch for: 1,5 - 6,5 - 14 -19 V	-	-	Pot.	-	Pot.	-	Pot.
Audio Power/Imp. (4 Ohm --> 8 Ohm or 2 x 8 Ohm parallel)	-	10 Watt / 4 Ω		10 Watt / 4 Ω		-	10 Watt / 4 Ω		10 Watt / 4 Ω		10 Watt / 4 Ω	
Connector type (main connector)	32 Srew terminals	28 Pins	42 Pins	28 Srew terminals	42 Srew terminals	20 (2 x 10) Srew terminals	20 + 10 Pins	20 + 20 Pins	20 Srew terminals		12 + 12 Pins	
Connector type (Servo-connector)	4 x 3- pins	Solder pads	4 x 3 pins	Solder pads	4 x 3 pins	Solder pads	Solder pads	Pins	4 x 3 pins		Solder pads	4 x 3 pins
Internal supercaps as energy storage	-	1 Farad (8 V) *)		1 Farad (8 V) *)		-	-		-		-	
Energy Storage conn. (for 16V capacitors, all types and capacities)	yes (17 V), for elc. capacitors or 7-cell Goldcap moduls	yes (17 V), for elc. capacitors or 7-cell Goldcap moduls		yes (17 V), for elc. capacitors or 7-cell Goldcap moduls		yes (17 V), for elc. capacitors or 7-cell Goldcap moduls	yes (17 V), for elc. capacitors or 7-cell Goldcap moduls		yes (17 V), for elc. capacitors or 7-cell Goldcap moduls		yes (17 V), for elc. capacitors or 7-cell Goldcap moduls	

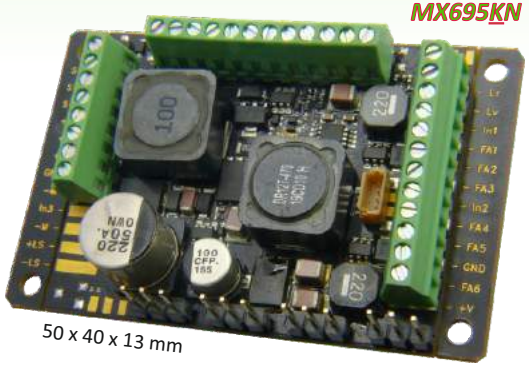
*) the internal energy storage of the MX699 makes the MX699 run continuously for 1 ... 5 sec, reduced speed, but sound with full volume.

Select by type of connection, dimensions, sound or non-sound

Decoder with various connectors

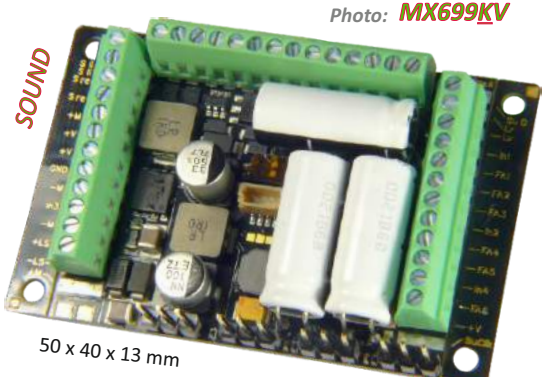
Screw terminals

Non-sound decoder
MX695KN



50 x 40 x 13 mm

Types MX699KS, MX699KV
Photo: **MX699KV**

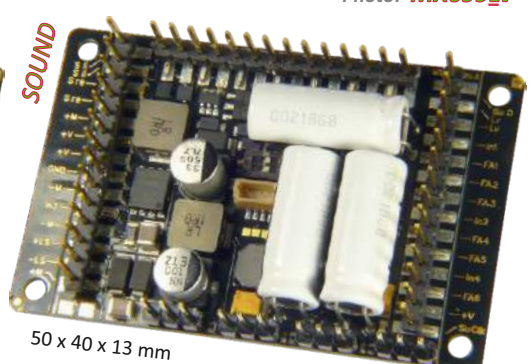


50 x 40 x 13 mm

single-row pin connector

NO
non-sound decoders
with single-row

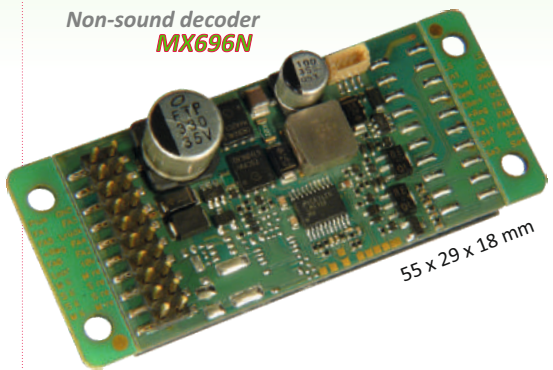
Types MX699LS, MX699LV
Photo: **MX699LV**



50 x 40 x 13 mm

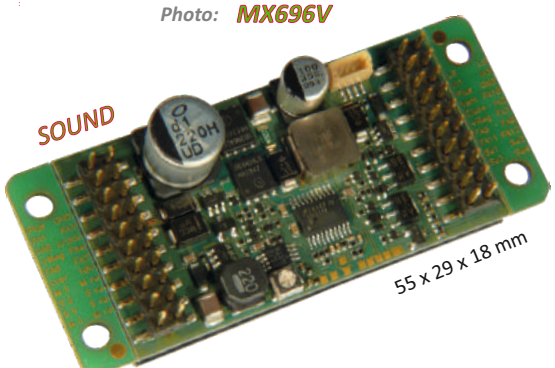
double-row pin connector

Non-sound decoder
MX696N



55 x 29 x 18 mm

Types MX696S, MX696V
Photo: **MX696V**



55 x 29 x 18 mm

„american" connectors

(Bachmann, Aristo, ...)

NO
non-sound decoders
with „american" connectors

Types MX697S, MX697V
Photo: **MX697V**

60 x 32 x 21 mm

Comparison Table: Function decoders

Select by type of connection

Each decoder family includes several types (= Different types of connection)

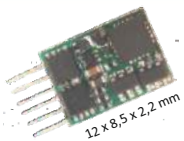
Function decoders derived from loco decoders:

Decoder Family >	MX621 **MX681**	MX630 **MX685**	MX634 **MX686**	MX632 **MX687**	MX645 SOUND **MX689**
Dimensions mm (in.) circuit board (without heat shrink tubing)	12 x 8.5 x 2.2 (.47 x .33 x .09)	20 x 11 x 3.5 (.79 x .43 x .14)	20.5x15.5x3.5 (.8 x .61 x .14)	26x15x3.5 (1.0 x .6 x .14)	30 x 15 x 4 (1.2 x .6 x .16)
Continuous Current Sum of Motor and Function Outputs	0,7 A	1,0 A	1,2 A	1,2 A	1,2 A
Function Outputs including two headlamp outputs	6	8	8	8	10
Servo/Logic Out optional logic-level outputs on SUSI-Pins	-	2	2	2	2
Function Low-Voltage	-	-	-	yes (0,8 A) opt. 1,5 or 5 V	-
Audio Power/Imp. (4 Ohm --> 8 Ohm or 2 x 8 Ohm parallel)	-	-	-	-	3 Watt / 4 Ω
Wire Connections NEM 652 (R) / NEM 651 (F)	**MX681R**	**MX685R**	-	-	-
NEM 651 body connector 6-pole male conn. on decoder (N)	**MX681N**	-	-	-	-
PluX-Plug 12, 16, or 22-pole male conn. on decoder	-	**MX685P16**	-	-	**MX689P22**
MTC-Plug 21-pole female connector on decoder	-	-	**MX686D**	**MX687WD**	-
Free wires	**MX681**	**MX685**	**MX686**	**MX687V MX687W**	**MX689**
Energy-storage conn. (for 16V or 25V electrolytic to 5000 µF)	-	-	yes (25V)	yes (25V)	yes (16V)

Function decoder with connectors

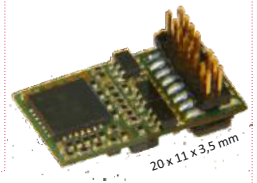
NEM 651 direct

MX681N



PluX-16, -22

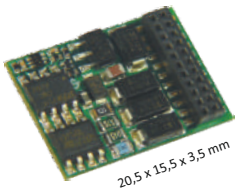
MX685P16



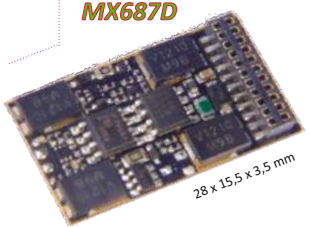
SOUND **MX689P22**

21MTC

MX686D



MX687D



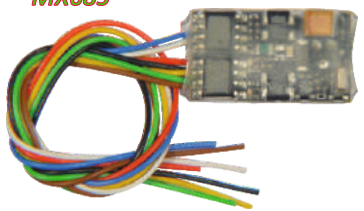
Wired ...

Within almost all decoder families a through-hole version is available with or with plug on wires per

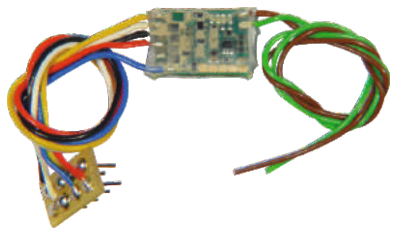
free wires (.) *NEM 652 (R)*

examples:

MX685



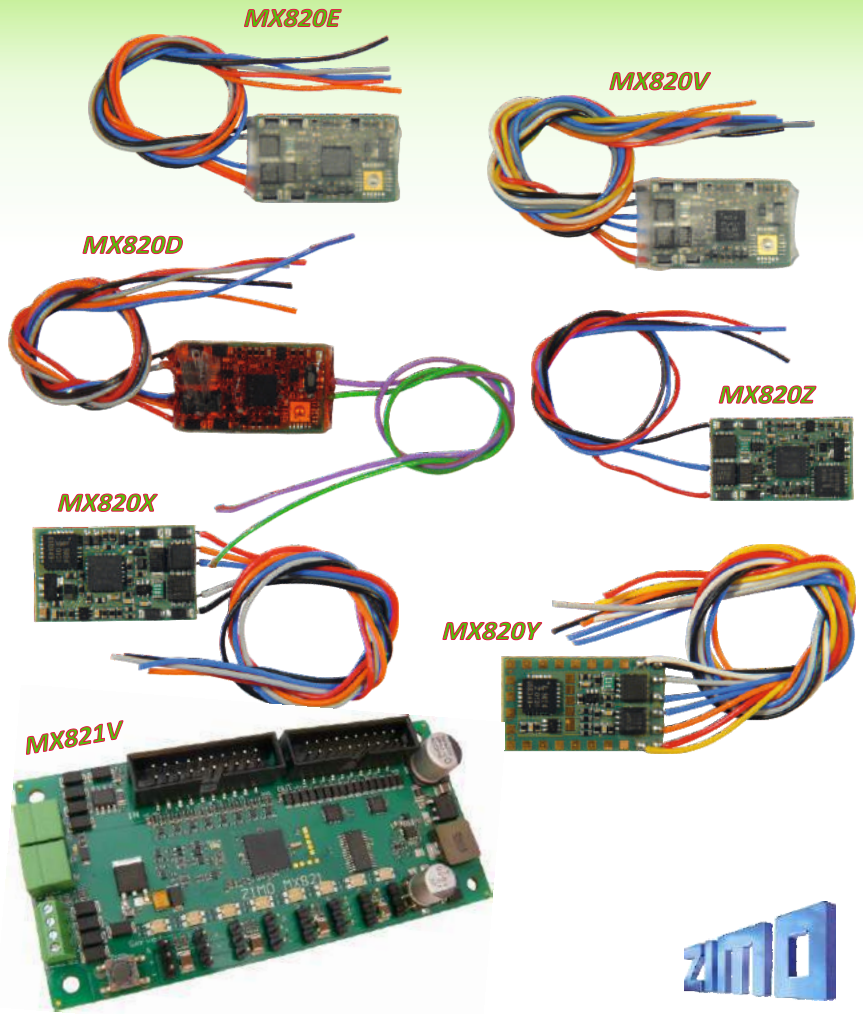
MX681R



Comparison Table: Accrssory decoders

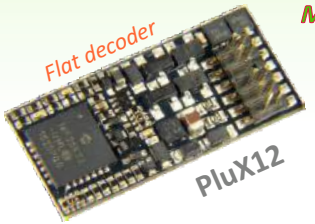
Decoder Families >	MX820						MX821
7 decoder models in all, in 2 decoder families **Decoder Models>**	**MX820E**	**MX820D**	**MX820V**	**MX820X**	**MX820Y**	**MX820Z**	**MX821V**
Dimensions mm (in.) circuit board (without heat shrink tubing)	19 x 11 x 2 (.75 x .45 x .08)	19 x 11 x 3 (.75 x .45 x .1)	19 x 11 x 2 (.75 x .45 x .08)	19 x 11 x 2 (.75 x .45 x .08)	19 x 11 x 2 (.75 x .45 x .08)	19 x 11 x 2 (.75 x .45 x .08)	19 x 11 x 2 (.75 x .45 x .08)
Continuous Current Sum of all outputs	1.0 A	1.0 A	1.0 A	1.0 A	1.0 A	1.0 A	-
Switch Outputs also usable for two lamps	1	1	2	1	2	-	-
Inputs control circuits or location signals	2	2	4	2	4	-	16
Light Output each will drive one LED/ lamp @100 mA	-	-	-	8	16	16	16
Servo/Logic level output also for Multiplex Signal	-	-	-	-	-	-	8
Servo Low-Voltage 5 V	-	-	-	-	-	-	yes
Audio Power/Imp. (4 Ohm --> 8 Ohm or 2 x 8 Ohm parallel)	-	-	-	-	-	-	-
Wiring loose wires with no connector	5 wires	7 wires	7 wires	5 wires	7 wires	3 wires	screw term., pin conn.
Energy storage conn.	-	-	-	-	-	-	-
	*Single-switch (**E**)*	*Sealed version (**D**)*	*Two switches (**V**)*	*8 or 16 Light outputs (LEDs) + 1 switch*	*+ 2 switches*	*no*	

Select by type of connection



MX600

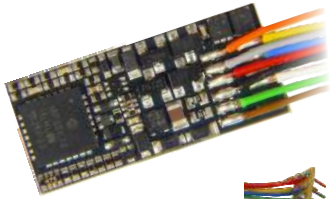
H0, ... (Nicht-Sound)



MX600P12
NEM 658 directly on decoder

DCC + RailCom, DC-analog
25 x 11 x 2 mm
0,8 A motor, total (peak 1,5 A)
4 function outputs

The new budget-priced decoder, with full feature set



MX600
wires only

MX600R
NEM 652 on wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX618

N, H0e, TT, ... (NO SOUND)

MX618N18
RCN-118 directly on decoder

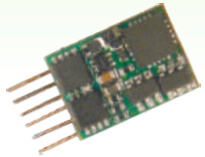
DCC + RailCom, DC-analog, MM
15 x 9,5 x 2,8 mm
0,7 A motor, total (peak 1,5 A)
4 function outputs
4 logic level outputs for more functions, servo control line or SUSI

No version with wires available

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX621

N, H0e, TT, ... (NO SOUND)



MX621N
NEM 651 directly on decoder

DCC + RailCom, DC-analog
12 x 8,5 x 2,2 mm
0,7 A motor, total (peak 1,5 A)
4 function outputs

MX621
wires only

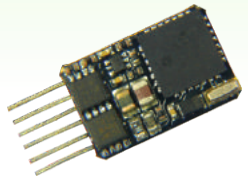
MX621R
NEM 652 on wires

MX621F
NEM 651 on wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

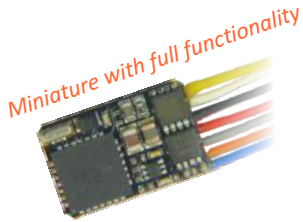
MX622

N, H0e, TT, ... (NO SOUND)



MX622N
NEM 651 directly on decoder

DCC + RailCom, DC-analog, MM, AC-analog
14 x 9 x 2,5 mm
0,7 A motor, total (peak 1,5 A)
4 function outputs
2 logic level outputs for more functions, servo control line or SUSI



MX622
wires only

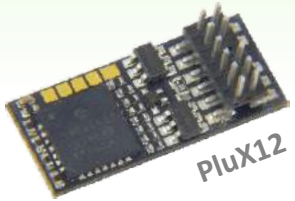
MX622R
NEM 652 on wires

MX622F
NEM 651 on wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX623

TT, H0, ... (NO SOUND)



MX623P12
NEM 658
directly
on decoder

DCC + RailCom, DC-analog, MM, AC-analog

20 x 8,5 x 2,5 mm

0,8 A motor, total (peak 2,5 A)

4 function outputs

2 logic level outputs for more functions, servo control line or SUSI

MX623
wires only

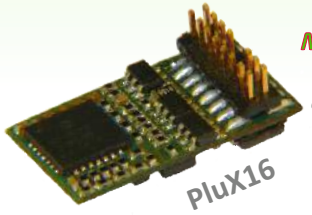
MX623R
NEM 652
on wires

MX623F
NEM 651
on wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX630

H0, 0m, ... (NO SOUND)



MX630P16
NEM 658
directly
on decoder

DCC + RailCom, DC-analog, MM, AC-analog

20 x 11 x 3,5 mm

1,0 A motor, total (peak 2,5 A)

6 function outputs

2 logic level outputs for more functions, servo control line or SUSI

MX630
wires only

MX630R
NEM 652
on wires

MX630F
NEM 651
on wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX633

H0, 0m, ... (NO SOUND)

MX633P22
NEM 658
directly
on decoder

DCC + RailCom, DC-analog, MM, AC-analog

22 x 15 x 3,5 mm

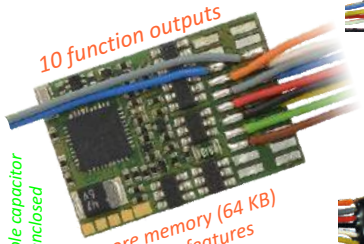
1,2 A motor, total (peak 2,5 A)

10 function outputs

(„only" 9 function outputs on PluX-22 available)

2 logic level outputs for more functions, servo control line or SUSI

direct connection for external energy storage



MX623
wires only

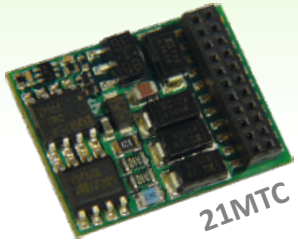
MX623R
NEM 652
on wires

MX623F
NEM 651
on wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX634

H0, 0m, ... (NO SOUND)



MX634D
MTC directly
on decoder

DCC + RailCom, DC-analog, MM, AC-analog

20,5 x 15,5 x 3,5 mm

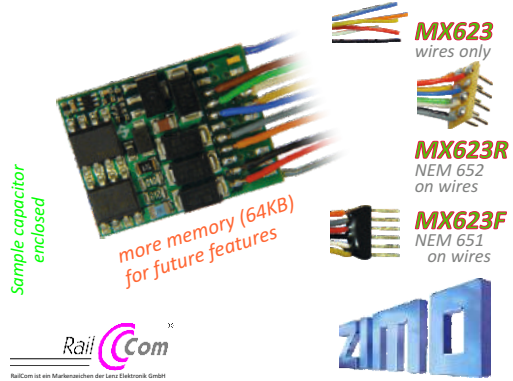
1,2 A motor, total (peak 2,5 A)

6 function outputs

(2 of them - **FA3, FA4** - switchable to l**ogic level)**

2 logic level outputs for more functions, servo control line or SUSI

direct connection for external energy storage



MX623
wires only

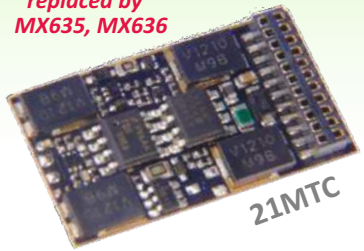
MX623R
NEM 652
on wires

MX623F
NEM 651
on wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX632

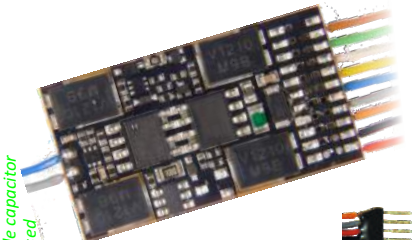
phased-out type, replaced by MX635, MX636



MX632D
MTC directly on decoder

MX632C
MTC directly on decoder

DCC + RailCom, DC-analog, MM, AC-analog
28 x 15,5 x 3,5 mm
1,6 A motor, total (peak 2,5 A)
8 function outputs
(2 of them - **FA3, FA4** - at **C-type** as l**ogic levels)**
2 logic level outputs for more functions, servo control line or SUSI
direct connection for external energy storage



Sample capacitor enclosed

MX623
wires only

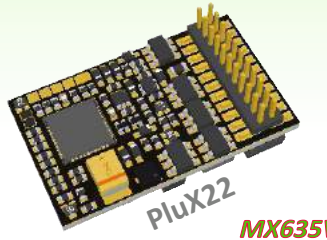
MX623R
NEM 652 on wires

MX623F
NEM 651 on wires

MX632V, MX632W
variantions with low voltage 1,5 V resp. 5 V

MX635

H0, 0m, 0, ... *(NO SOUND)*



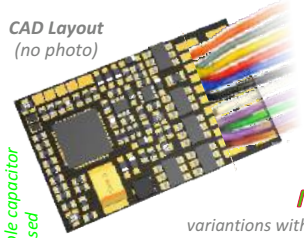
MX635P22
NEM 658 directly on decoder

CAD Layout (no photo)

MX635VP, MX632WP
variantions with low voltage 1,5 V resp. 5 V

DCC + RailCom, DC-analog, MM, AC-analog
26 x 15 x 3,5 mm
1,8 A motor, total (peak 2,5 A)
10 function outputs
2 logic level outputs for more functions, servo control line or SUSI
direct connection for external energy storage
(also allowed goldcap modules with more than 5000 µF)

CAD Layout (no photo)



Sample capacitor enclosed

MX635
wires only

MX635R
NEM 652

MX635V, MX632W
variantions with low voltage 1,5 V resp. 5 V

MX636

H0, 0m, 0, ... *(NO SOUND*

still no photo

MX636D
MX636C
MTC directly on decoder

21MTC

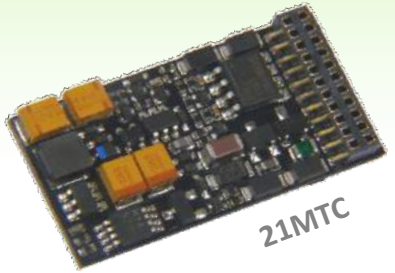
MX636VD, MX636WD
mit Niederspannung 1,5 V bzw. 5 V

DCC + RailCom, DC-analog, MM, AC-analog
26 x 15 x 3,5 mm
1,8 A motor, total (peak 2,5 A)
8 function outputs
2 logic level outputs for more functions, servo control line or SUSI
direct connection for external energy storage
(also allowed goldcap modules with more than 5000 µF)

No version with wires available

MX644

H0, (0) ... ***(SOUND)***



MX644D
MTC directly on decoder

MX644C
MTC directly on decoder

DCC + RailCom, DC-analog, MM, AC-analog
30 x 15 x 4 mm
1,2 A motor, total (peak 2,5 A)
8 function outputs
(2 of them - **FA3, FA4** - at **C-type** as l**ogic level)**
2 logic level outputs for more functions, servo control line or SUSI
function low voltage 5 V (200 mA)
direct connection for external energy storage
3 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

No version with wires available

MX645

H0, (0) ... ***(SOUND)***

MX645P16
NEM 658 directly on decoder

MX645P22
NEM 658 directly on decoder

DCC + RailCom, DC-analog, MM, AC-analog
30 x 15 x 4 mm
1,2 A Motor, total (Peak 2,5 A)
10 funktion outputs
2 logic level outputs for more functions, servo control line or SUSI
function low voltage 5 V (200 mA)
direct connection for external energy storage
3 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

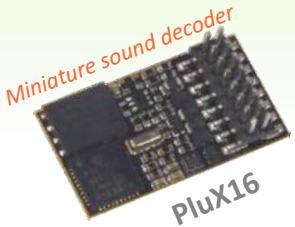
MX645
wires only

MX645R
NEM 652 on wires

MX645F
NEM 651 on wires

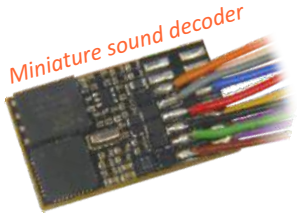
MX648

N, TT, H0e, H0, ... ***(SOUND)***



MX648P16
NEM 658 directly on decoder

DCC + RailCom, DC-analog, MM, AC-analog
20 x 11 x 4 mm
0,8 A motor, total (peak 1,5 A)
6 function outputs
(„only" 4 function outputs on PluX-16 available)
2 logic level outputs for more functions, servo control line or SUSI
1 Watt audio, 8 Ohm, 32 Mbit, 6 channels



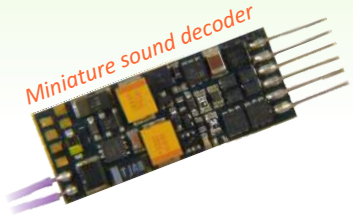
MX648
wires only

MX648R
NEM 652

MX648F
NEM 651 on wires

MX649

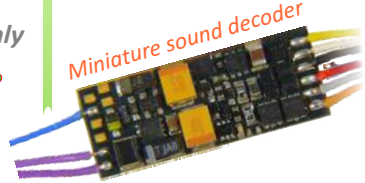
N, TT, H0e, H0, ... ***(SOUND)***



MX649N
NEM 651 directly on decoder

MX649L
NEM 651, - curved - directly on decodere

DCC + RailCom, DC-analog, MM, AC-analog
23 x 9 x 4 mm
0,7 A motor, total (peak 1,5 A)
4 function outputs
2 logic level outputs for more functions, servo control line or SUSI
1 Watt audio, 8 Ohm, 32 Mbit, 6 channels



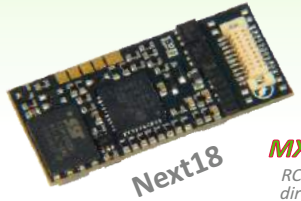
MX649
wires only

MX649R
NEM 652

MX649F
NEM 651 an Litzen

MX658

N, H0e, TT, ... ***(SOUND)***



MX658N18
RCN-118 (NEM 662) directly on decoder

DCC + RailCom, DC-analog, MM, AC-analog
25 x 10,5 x 4 mm
0,8 A motor, total (peak 1,5 A)
4 function outputs
2 logic level outputs for more functions, servo control line or SUSI
1 Watt audio, 8 Ohm, 32 Mbit, 6 channels

No version with wires available

Adapter Boards . . . for decoders with PluX-22 interface

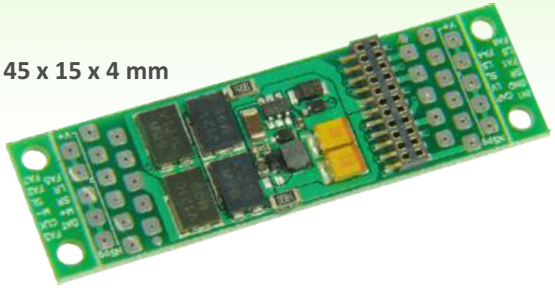
with PluX-22 connector and 30 solder pads
for the locomotive wiring

with ZIMO Sound decoder plugged-in
(ADAPLU + MX645P22):

1,5 A motor (peak 2,5 A)
9 function outputs
2 logic level outputs (Servo, SUSI)
direct connection for external energy storage
(also allowed goldcap modules with more than 5000 µF)
3 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

with ZIMO Non-sound decoder plugged-in
(ADAPLU + MX633P22 or MX635P22):
as above, but without sound

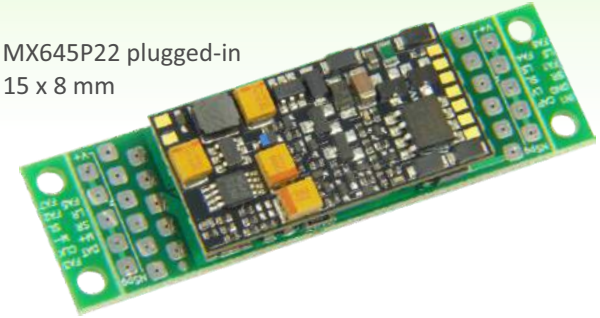
ADAPLU **45 x 15 x 4 mm**



Separate rectifier for increase of power

Types ▶ **ADAPLU** *normal version* **ADAPLU15** *1,5 V low voltage* **ADAPLU50** *5 V low voltage for functions*

with MX645P22 plugged-in
45 x 15 x 8 mm



A Sound decoder for „small" Large scale locos !

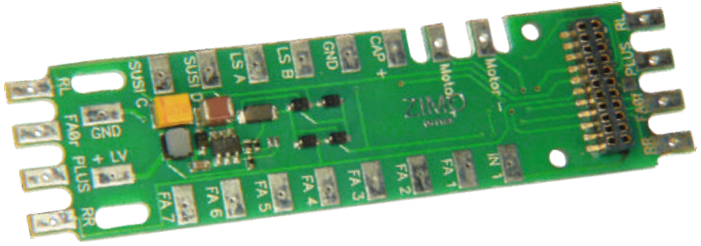
with PluX-22 connector and **24** solder pads
for the locomotive wiring

with ZIMO Sound decoder plugged-in
(*ADAPUS + MX645P22):*

1,5 A motor (peak 2,5 A)
8 Funktions-Ausgänge,
2 function outputs
2 logic level outputs (Servo, SUSI)
direct connection for external energy storage

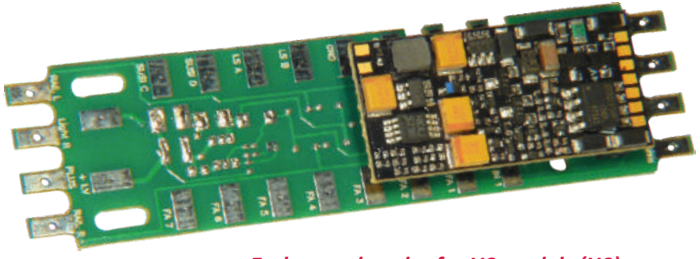
3 Watt Audio, 4 - 8 Ohm, 32 Mbit, 6 Kanäle

ADAPUS **71 x 18 x 4 mm**



Types ▶ **ADAPUS** *normal version* **ADAPUS15** *1,5 V low voltage* **ADAPUS50** *5 V low voltage for functions*

mit MX645P22 plugged-in
71 x 18 x 8 mm



Exchange decoder for US models (H0)

. . . for decoders with 21MTC interface

ADAMTC

44 x 26,5 x 4 mm

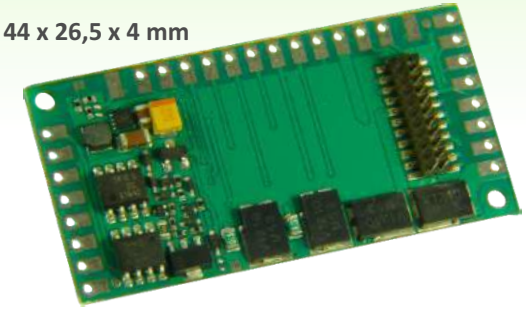
with 21MTC connector and **28** solder pads
for the locomotive wiring

with ZIMO Sound decoder plugged-in
(ADAMTC + MX645P22):

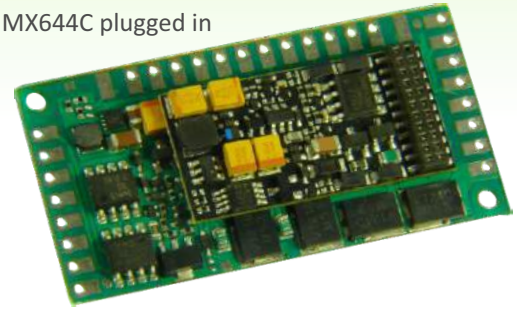
1,8 A motor (peak 2,5 A)
8 function outputs
2 logic level outputs (Servo, SUSI)
direct connection for external energy storage
(also allowed goldcap modules with more than 5000 µF)
3 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

with ZIMO Non-sound decoder plugged-in
(ADAMTC + MX634D or MX636D):
as above, but without sound

Separate rectifier for increase of power



with MX634C oder MX644C plugged in
44 x 26,5 x 6 mm



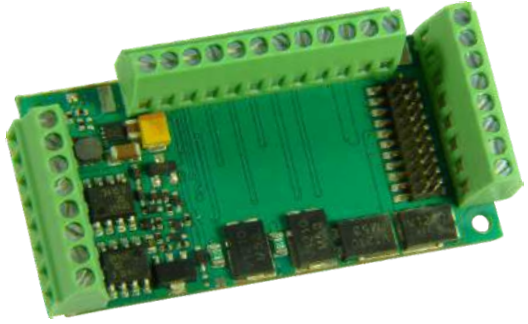
Typen ▶ **ADAMTC** *Normal version* **ADAMTC15** *1,5 V low voltage* **ADAMTC50** *5 V low voltage for functions*

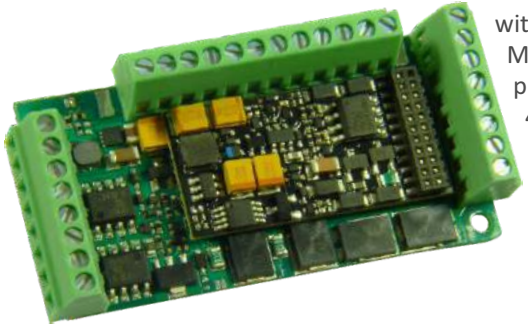
ADAMKL mit Schraubklemmen

44 x 26,5 x 12 mm

as above,
but with 28 screw terminals
(instead of solder pads)

Eigener Gleichrichter zur Leistungssteigerung des Decoders (1.8 A)





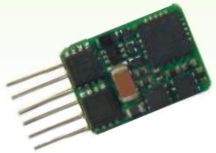
with
MX634C oder MX644C
plugged-in
44 x 26,5 x 12 mm

A Sound decoder for „small" Large scale locos !

Typen ▶ **ADAMKL** *Normal version* **ADAMKL15** *1,55 V low voltage* **ADAMKL50** *5 V low voltage for functions*

MX681

function decoder (NO SOUND)
a variation of the loco decoder MX621



MX681N
NEM 651
directly
on decoder

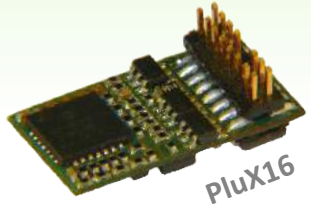
DCC + RailCom, DC-analog, MM
12 x 8,5 x 2,2 mm
0,7 A total current
6 function outputs

MX681
only wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

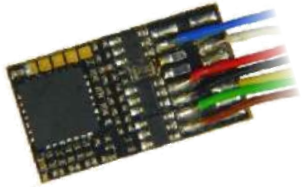
MX685

function decoder (NO SOUND)
a variation of the loco decoder MX630



MX685P16
NEM 658
directly
on decoder

DCC + RailCom, DC-analog, MM, AC-analog
20 x 11 x 3,5 mm
1,0 A total current
8 function outputs
2 logic level outputs for more
functions, servo control line or SUSI

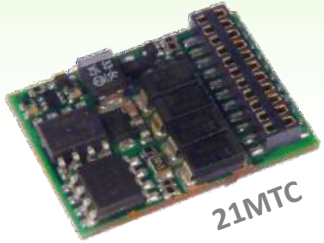


MX685
only wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX686

function decoder (NO SOUND)
a variation of the loco decoder MX631 or MX634



MX686D
MTC directly
on decoder

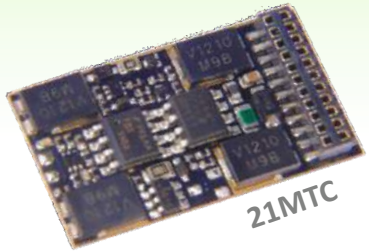
DCC + RailCom, DC-analog, MM, AC-analog
20,5 x 15,5 x 3,5 mm
1,2 A total current
8 function outputs
2 logic level outputs for more
functions, servo control line or SUSI
direct connection for external energy storage

MX686
only wires

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

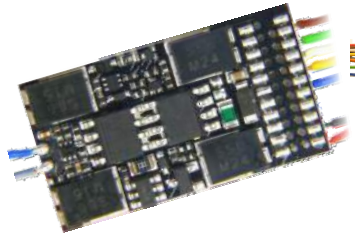
MX687

function decoder (NO SOUND)
a variation of the loco decoder MX632 (later MX636)



MX687WD
MTC directly
on decoder
low voltage 5 V

DCC + RailCom, DC-analog, MM, AC-analog
28 x 15,5 x 3,5 mm
1,2 A total current
8 function outputs
2 logic level outputs for more
functions, servo control line or SUSI
direct connection for external energy storage



MX687V
only wires

MX687W
only wires

MX687V, MX687W
variations with low voltage 1,5 V respectively 5 V

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX688

function decoder (NO SOUND)
a variation of the loco decoder MX618

MX688N18
RCN-118 (NEM 662) directly on decoder

DCC + RailCom, DC-analog, MM

15 x 9,5 x 2,8 mm

0,7 A total current

6 function outputs

2 logic level outputs for more functions, servo control line or SUSI

No version with wires available

MX689

function decoder (SOUND)
a variation of the loco decoder MX645

MX689P22
NEM 658(22 pin) directly on decoder

DCC + RailCom, DC-analog, MM, AC-Analog

30 x 15 x 4 mm

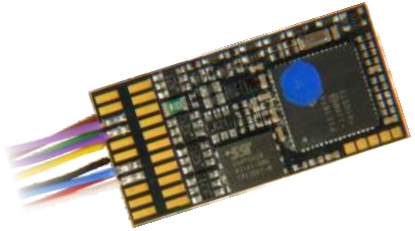
1,2 A total current

8 function outputs

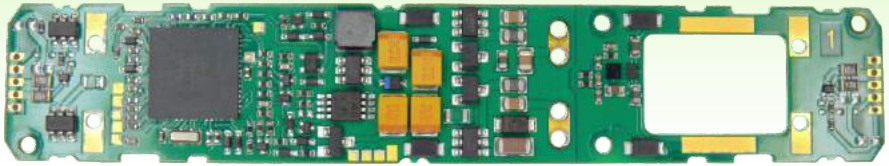
2 logic level outputs for more functions, servo control line or SUSI

direct connection for external energy storage

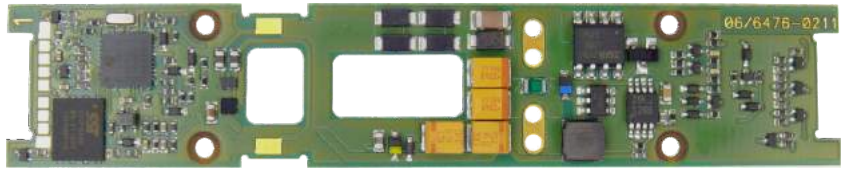
Low voltage for functions 5 V (200 mA)



ZIMO Sound decoder und adapter boards *individual*



Customized loco decoder for Roco N-Spur Taurus



Customized loco decoder for Fleischmann N cscale Re 460

Besides the standard produts there are many special solutions, developed for loco manufacturers.

In many cases ZIMO makes customized decoders (frequently used in N scale because lack of space), in other situations ZIMO makes adapter boards, which contain lightning, energy storage, micro motors for pantos, etc.

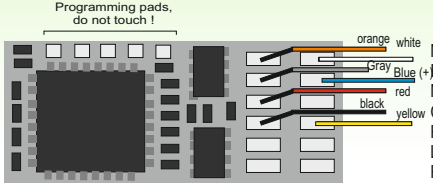
Loco adapter board for a swedisch „Class Du" with sound decoder MX644 (MTC interface) plugged-in. The board includes energy storage containing 6 Tantalium capacitors.

The loco board with MX648P16 plugged-in for Roco „Berg" Loco (BR 98)

Connecting decoders

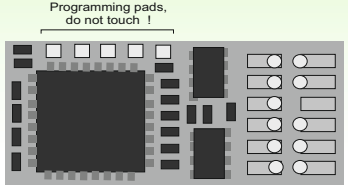
MX623

MX623 Top View, wired side



Motor right (orange)
Front headlight (= Lfor) white
Motor left (gray)
Common positive (blue)
Right rail (red)
Left rail (black)
Rear headlight (= Lrev) yellow

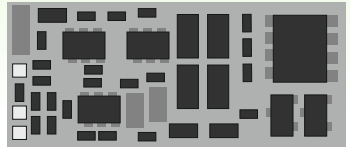
MX623 Top View, pin-out (PluX-12)



Motor right Lfor
Motor left Gem. Pluspol (+)
Right rail --- (Index)
Left rial Lrev
Function outputs FO1 FO3
Function outputs FO2 FO4

FO3, Fo4 are logic level outputs !

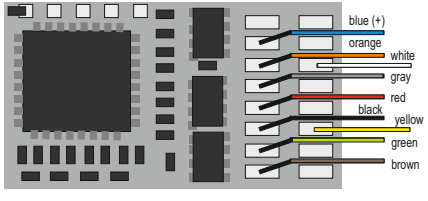
MX623 Bottom View



GROUND
SUSI Clock or Servo 2, FO6
SUSI Data or Servo 1, FO5

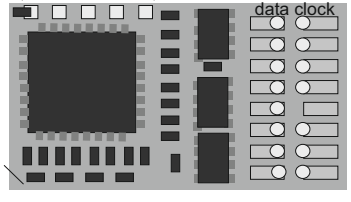
MX630

MX630 Top View, wired side



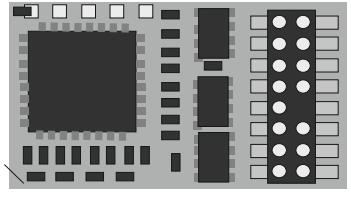
Common positive (blue)
Motor right (orange)
Front headlight (= Lfor) white
Motor left (gray)
Right rail (red)
Left rail (black)
Rear headlight (= Lrev) yellow
Function output FO1 (green)
Function output FO2 (brown)

MX630 Top View, pin-out



SUSI, Servo‘s (2, 1) or FA6, FA5
Common pos. (+) GROUND
Motor right Lfor
Motor left Common pos. (+)
Right rail --- (Index)
Left rail Lrev
Function output FO1 FO3
Function output FO2 Fo4

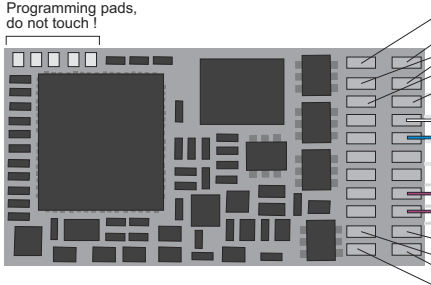
MX630P (with PluX16)



SUSI, Servo‘s (2, 1) or FO6, FO5
Common pos. (+) GROUND
Motor right Front light (= Lfor)
Motor left Common pos. (+)
Right rail --- (Index)
Left rail Rear light (= Lrev)
Function output FO1 FO3
Function output FO2 Fo4

MX645

MX645 wires only Top Side



The SUSI outputs can alternatively be used as servo outputs:

+ >220 uF 20 V -

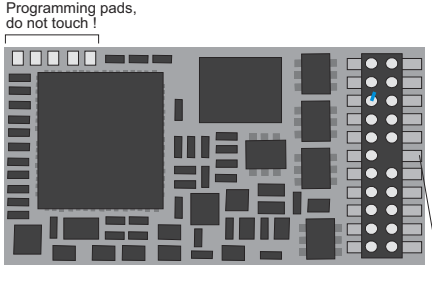
Function output FO3
Switch input
SUSI Data (Servo 2) SUSI Clock (Servo 1)
Cap. pos.
Ground

Cap. neg.
Cap. pos.

orange Motor right
gray Motor left
White
blue Front headlight
Common power (+) red Right rail
black Left rail
yellow Rear headlight
purple Speaker
purple Speaker
green Function output FO1
brown Function output FO2

Function output FO 4
Function output FO 5
Function output FO 6
Function output FO 7

MX645P22 Top Side (with PluX22)



The SUSI outputs can alternatively be used as servo outputs:

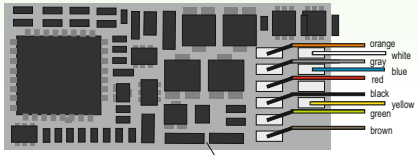
Function output FO3
SUSI Data (Servo 2)
Capacitor positive
Motor right
Motor left
Right rail
Left rail
Function output FO1
Function output FO2
Function output FO5
Function output FO7
Function output FO8

Switch input
SUSI Clock (Servo 1)
Ground
Front headlight
Common positive (+)
--- (Index)
Rear headlight
Speaker
Speaker
FO4
FO6

MX600
MX621

MX600, MX600R Wire side, top
(single-layer board)

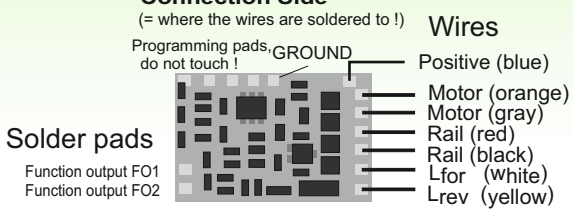
FO3 and FO4 on the backside are not implemented / usable



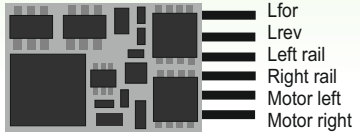
Motor right (orange)
Front headlight (= Lfor) white
Motor left (gray)
Common positive (blue)
Right rail (red)
Left rail (black)
Front headlight (= Lrev) yellow
Function output FO1 (green)
Function output FO2 (brown)

Makeshift ground terminal if required
between the diodes and the capacitor

MX621, MX621R, MX621F
Connection Side
(= where the wires are soldered to !)

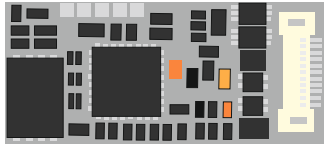


MX621N (= Mx621 with 6-pin plug on board)
Controller Side
(this is also the correct installation position)



MX658
MX622

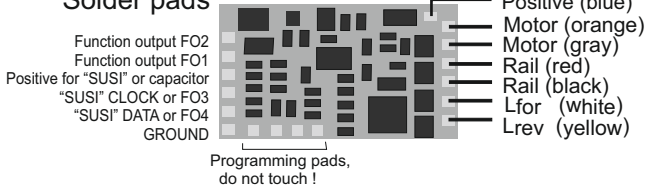
MX658N18
Plug Side (Next 18)



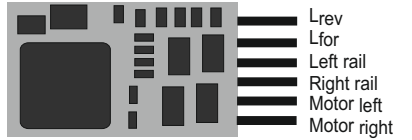
Left track	Left rail
Motor left	Front headlight Lf
Fu-Output FO2	Speaker
SUSI (Data) or FO4	+ Positive
GROUND	GROUND
+ Positive	SUSI (Clock) or FO3
Speaker	Fu-Output FO1
Rear headlight Lr	Motor right
Right rail	Right rail

Note FO3, FO4:
are logic level Fu-Outputs
on the SUSI pins, when
CV #124, Bit 7 = 1

MX622, MX622R, MX622F
Connection Side
(= where the wires are soldered to !)

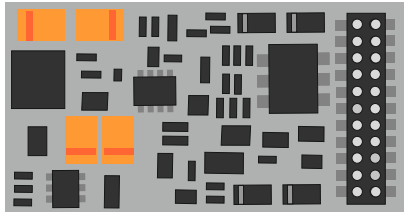


MX620N or MX622N (with 6-pin plug on board)
Controller Side
(this is also the correct installation position !)



MX644

MX644D, C Top View (with 21-pin „MTC" connector)



+ 5 V (200 mA)	GROUND
Function output FO3	Speaker
Function output FO2	Speaker
Function output FO1	Front headlight (= Lfor)
Common positive	Rear headlight (= Lrev)
Capacitor negative	SUSI Data (FO8, Servo 2)
Motor 1	SUSI Clock (FO7, Servo 1)
Motor 2	Function output FO4
GROUND	Function output FO5
Left rail	Function output FO6
Right rail	Switch input

FO3 and FO4 on the MX644C are logic level outputs, but "normal" outputs on the MX644D.

Capacitor as back-up power.
(If not mounted on loco board and connected via plug)

(Is the same as common positive)

CAP. Pos.

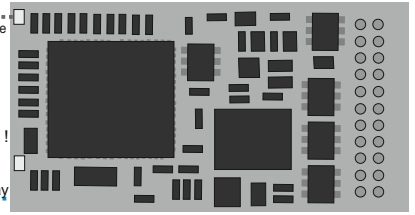
Blue

Attention:
CAP. neg. Is not the same as GROUND !

CAP. Neg.

Gray

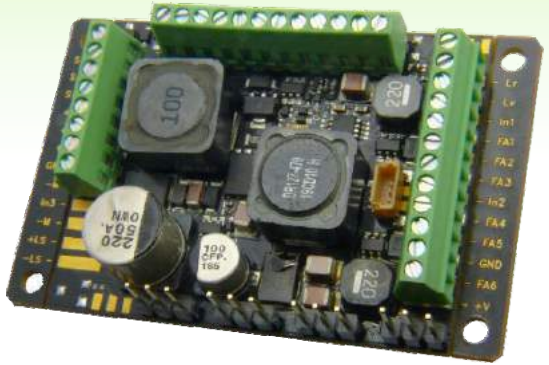
MX644D, C Bottom View



Attention:
There are engines where the decoder must be plugged in normal (with the side top up) while on others it must be inserted upside down.

MX695KN

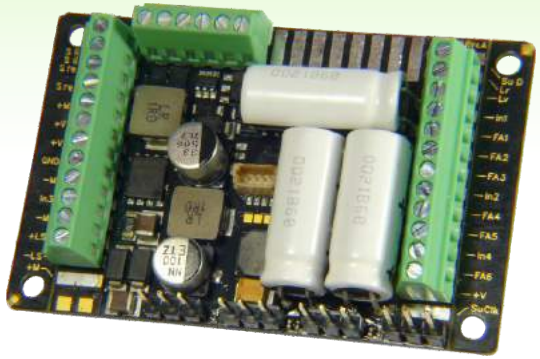
Large scale decoder (NO SOUND) with screw terminals



DCC + RailCom, DC-analog, MM, AC-analog
50 x 40 x 13 mm (without break-off plates)
6 A motor, total (peak 10 A)
14 function outputs
1 smoke fan connector
3 gate inputs
4 complete servo outputs (control line, minus, 5 V)
3 function low voltages
(5 V, 10 V, variable: 1,5 V to track voltage)
SUSI (with 4 pin plug)
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)

MX699KS

Large scale decoder (SOUND) with screw terminals



DCC + RailCom, DC-analog, MM, AC-analog
50 x 40 x 13 mm (without break-off plates)
6 A motor, total (peak 10 A)
8 function outputs
2 smoke fan outputs
4 gate Inputs
4 complete servo control outputs (control line, minus, 5 V)
2 function low voltages (5 V, 10 V)
SUSI (with 4 pin plug)
3 supercaps (3F each) as internal energy storage
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX699KV

Large scale decoder (SOUND) with screw terminals

DCC + RailCom, DC-analog, MM, AC-analog
50 x 40 x 13 mm (without break-off plates)
6 A motor, total (peak 10 A)
15 function outputs
2 smoke fan outputs
4 gate Inputs
4 complete servo control outputs (control line, minus, 5 V)
3 function low voltages
(5 V, 10 V, code switch adjustable 1,5 - 6,5 - 14 - 19 V)
SUSI (with 4 pin plug)
3 supercaps (3F each) as internal energy storage
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX699LS, -LLS

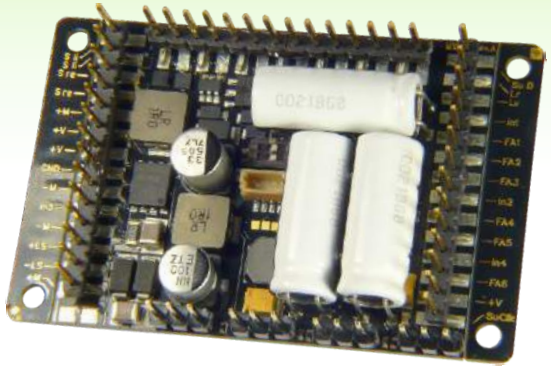
Large scale decoder (SOUND) with pin connectors

Pin connectors standard version (MX699LS and MX699LV) length 6 mm above socket (= 10 mm above board)
special version: MX699LLS und MX699LLV length 12 mm above socket (= 16 mm above board)

DCC + RailCom, DC-analog, MM, AC-analog
50 x 40 x 13 mm (without break-off plates)
6 A motor, total (peak 10 A)
8 function outputs
2 smoke fan outputs
4 gate Inputs
4 complete servo control outputs (control line, minus, 5 V)
2 function low voltages (5 V, 10 V)
SUSI (with 4 pin plug)
3 supercaps (3F each) as internal energy storage
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX699LV, -LLV

Large scale decoder (SOUND) with pin connectors



DCC + RailCom, DC-analog, MM, AC-analog
50 x 40 x 13 mm (without break-off plates)
6 A motor, total (peak 10 A)
15 function outputs
2 smoke fan outputs
4 gate Inputs
4 complete servo control outputs (control line, minus, 5 V)
3 function low voltages
(5 V, 10 V, code switch adjustable 1,5 - 6,5 - 14 - 19 V)
SUSI (with 4 pin plug)
3 supercaps (3F each) as internal energy storage
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX699LM

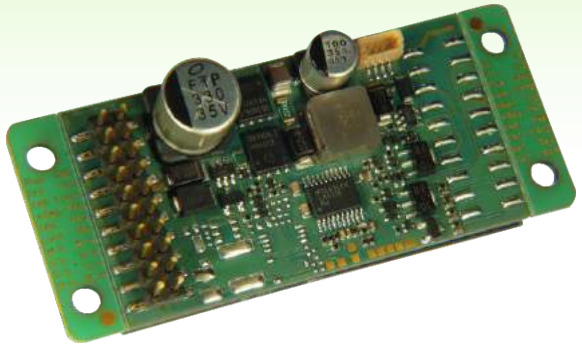
Large scale decoder (SOUND) for Märklin interface

as MX699LV, with pin connector (long side) bended down in order to keep it accessible when decoder is inserted in Märklin connector.

DCC + RailCom, DC-analog, MM, AC-analog
50 x 40 x 13 mm (without break-off plates)
6 A motor, total (peak 10 A)
15 function outputs
2 smoke fan outputs
4 gate Inputs
4 complete servo control outputs (control line, minus, 5 V)
3 function low voltages
(5 V, 10 V, code switch adjustable 1,5 - 6,5 - 14 - 19 V)
SUSI (with 4 pin plug)
3 supercaps (3F each) as internal energy storage
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX696N

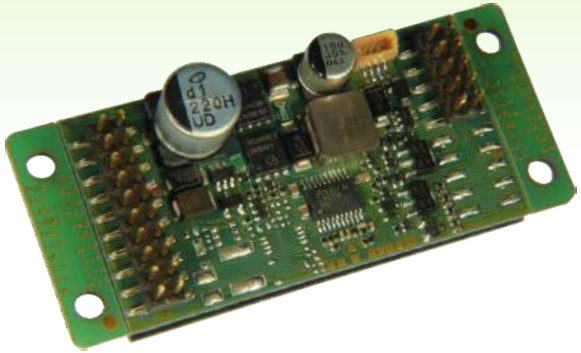
Large scale decoder (NO SOUND)



DCC + RailCom, DC-analog, MM, AC-analog
55 x 29 x 16 mm (without break-off plates)
4 A motor, total (peak 10 A)
8 function outputs
1 smoke fan connector
3 gate inputs
4 servo outputs (+ 6 V low voltage total)
2 funktion low voltages
(6 V, 10 V)
SUSI (with 4 pin plug)
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)

MX696S

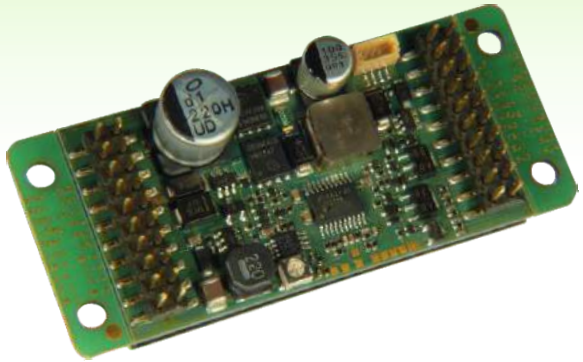
Large scale decoder (SOUND) slim design



DCC + RailCom, DC-analog, MM, AC-Analog
55 x 29 x 13 mm (without break-off plates)
4 A motor, total (peak 10 A)
8 function outputs
1 smoke fan connector
3 gate inputs
4 servo control outputs (5 V external needs to be provided)
1 funktion low voltage (10 V)
SUSI (with 4 pin plug)
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX696V

Large scale decoder (SOUND) slim design



DCC + RailCom, DC-analog, MM, AC-Analog
55 x 29 x 16 mm (without break-off plates)
4 A motor, total (peak 10 A)
14 function outputs
1 smoke fan connector
3 gate inputs
4 servo outputs (4 control lines, 5 V from variable low-voltage)
2 funktion low voltage
(10 V, variabel 1,5 V to track voltage)
SUSI (with 4 pin plug)
direct connection for external energy storage
(capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX697N

large scale decoder (NO SOUND) for „american interfaces"

No picture available;
MX697N (Large Scale Decoder for american locos WITHOUT SOUND) produced only on request.

DCC + RailCom, DC-analog, MM, AC-analog
56 x 32 x 21 mm
4 A motor, total (peak 10 A)
10 function outputs
1 smoke fan connector
3 gate inputs
4 servo control outputs (control line, minus, 5 V)
3 funktion low voltage
(5 V, 10 V, variable 1,5 V to track voltage)
SUSI (with 4 pin plug)
direct connection for external energy storage
(17V: capacitors, Goldcaps or battery-switch)

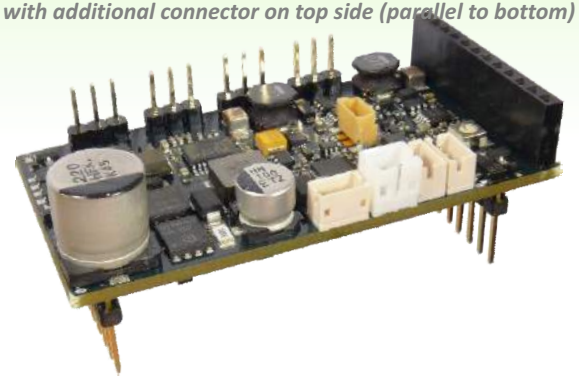
MX697S

large scale decoder (SOUND) for„american interfaces, usually directly to insert in Bachmann locos

DCC + RailCom, DC-analog, MM, AC-analog
56 x 32 x 21 mm
4 A motor, total (peak 10 A)
10 function outputs
1 smoke fan connector
3 gate inputs
4 servo control outputs (5 V power needs to be provided externally)
1 funktion low voltage (10 V)
SUSI (with 4 pin plug)
direct connection for external energy storage
(17V: capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX697V

large scale decoder (SOUND) for„american interfaces, usually directly to insert in Bachmann locos; with additional connector on top side (parallel to bottom)

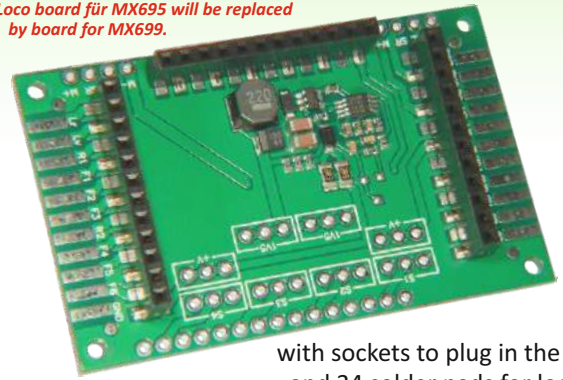


DCC + RailCom, DC-analog, MM, AC-analog
56 x 32 x 21 mm
4 A motor, total (peak 10 A)
10 function outputs
1 smoke fan connector
3 gate inputs
4 servo control outputs (control line, minus, 5 V)
3 funktion low voltage
(5 V, 10 V, variable 1,5 V to track voltage)
SUSI (with 4 pin plug)
direct connection for external energy storage
(17V: capacitors, Goldcaps or battery-switch)
10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

Loco Board

designed for use with large scale sound decoder MX695LS

Loco board für MX695 will be replaced by board for MX699.



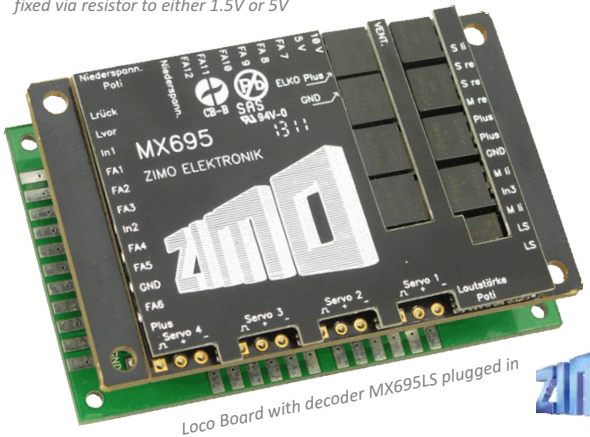
LOKPL95BV

with sockets to plug in the decoder and 34 solder pads for loco wiring

62 x 40 x 10 mm

LOKPL95BS/LOKPL95BV15/LOKPL95BV50

set with/without low voltage fixed via resistor to either 1.5V or 5V



Loco Board with decoder MX695LS plugged in

Loco Boards

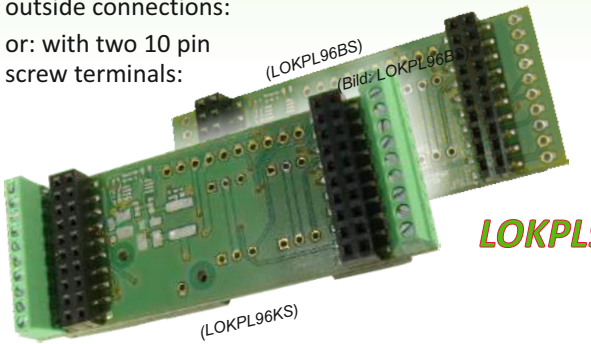
designed for use with large scale decoder MX696 (all types)

two 20 pin sockets for plugging in a decoder MX696 and solder pads for all outside connections:

64 x 26 x 6 mm

LOKPL96BS

or: with two 10 pin screw terminals:



or:

LOKPL96KS

like LOKPL96BS and -KS but additionally:

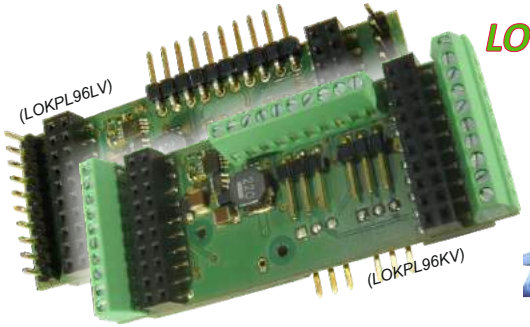
LOKPL96LV

4 complete servo outputs
(control, minus, 5 V from own voltage regulator on the LOKPL96)

9 more pin connections for function outputs etc.

or:

LOKPL96KV



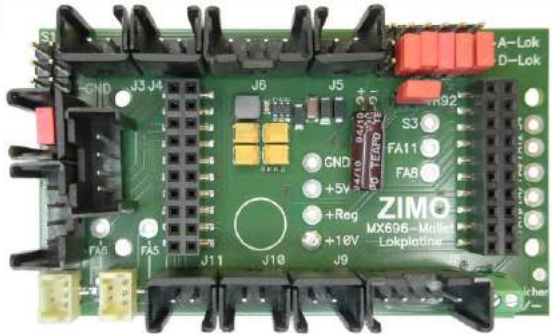
Loco Boards

passend für Großbahn-Decoder MX696S

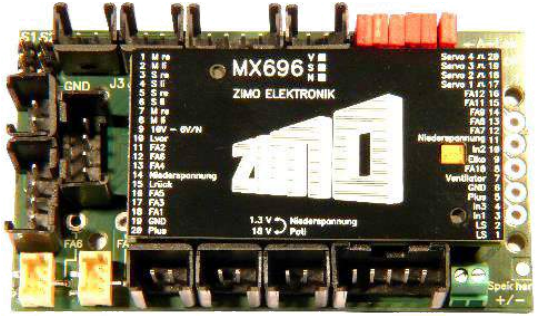
20 pin sockets fpor plugging in a decoder MX696.

75 x 42 x 10 mm

LOKPLSHMAL



Connectors compatible with cabling of the HSB Mallet, „Pfiffi" of Trainline Gartenbahnen.

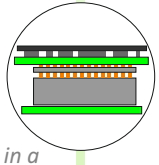


Loco board with decoder MX696S

Originanal equipment for TrainLine.

MX696KS

nearly a MX695KS, but slim



placement in a 32 mm boiler

DCC + RailCom, DC-analog, MM, AC-Analog

64 x 29 x 18 mm

4 A motor, total (peak 10 A)

8 function outputs

1 smoke fan connector

1 gate input on clamp (+ 2 as solder pads)

4 Servo control outputs on solder pads (5 V power needs to be provided externally)

SUSI (with 4 pin plug)

direct connection for external energy storage (capacitors, Goldcaps or battery-switch)

10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

MX696KV

Large scale decoder (with SOUND) combination of

LOKPL96KV *and* ***MX696V***

nearly a MX695KV, but slim

DCC + RailCom, DC-analog, MM, AC-Analog

64 x 29 x 18 mm

4 A motor, total (peak 10 A)

14 function outputs (8 on clamps, 6 as pins)

1 smoke fan connector

3 gate inputs (1 on clamp, 2 as pins)

4 complete servo outputs (control line, minus, 5 V)

2 function low voltages

(5 V, adjustable 1,5 V to track voltage)

SUSI (with 4 pin plug)

direct connection for external energy storage (capacitors, Goldcaps or battery-switch)

10 Watts audio, 4 - 8 Ohm, 32 Mbit, 6 channels

Large scale *individual*

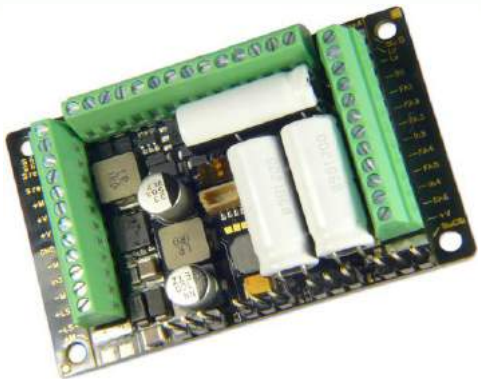
Some demands can be fulfilled most easily by little modifications of serial products, e.g. for special energy storage solutions or a train bus which is not fully conformant to the standard.

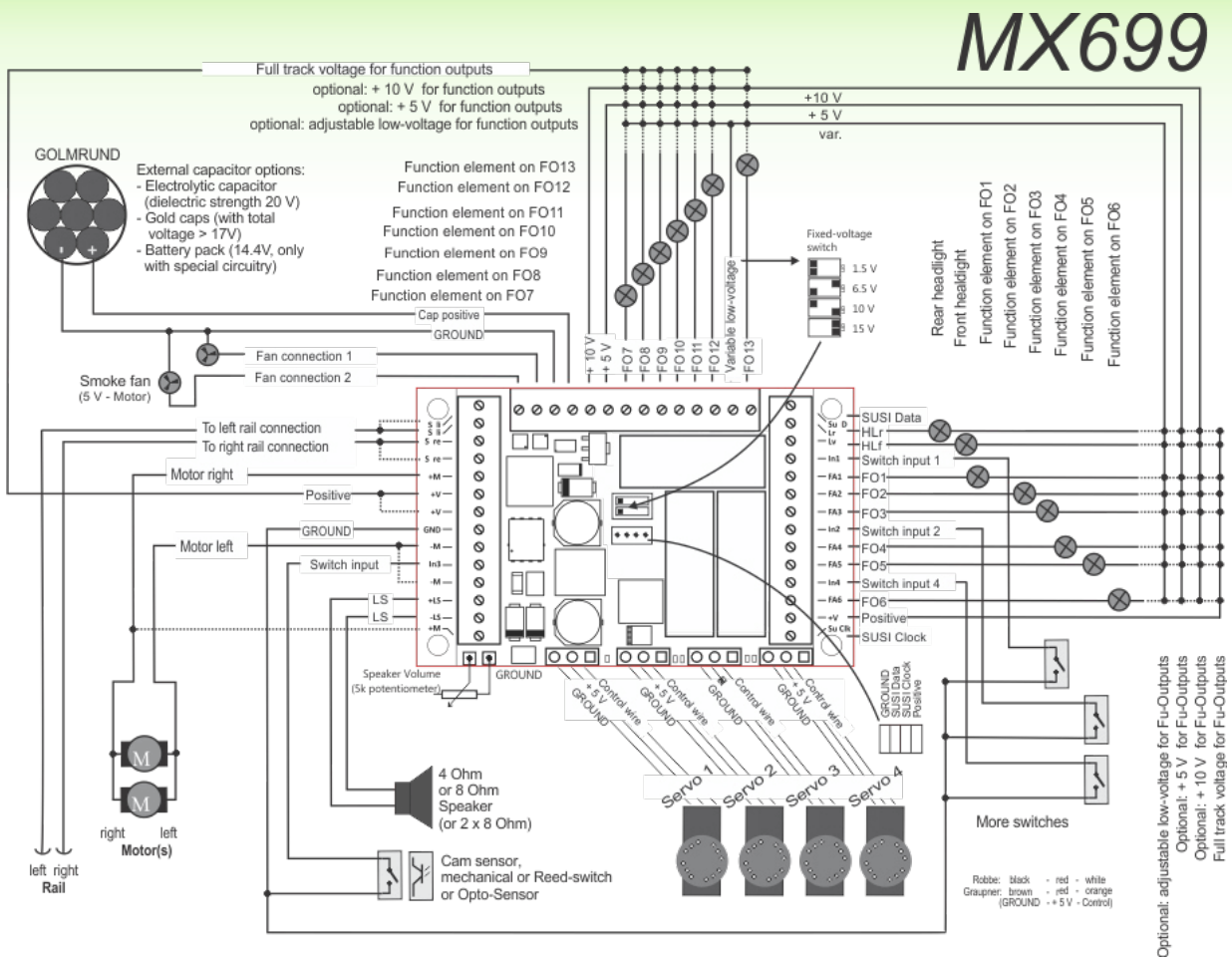
Märklin-LGB G scale „Allegra" (RhB ABe) after installing supercap energy storage, speaker, and decoder MX695LS.

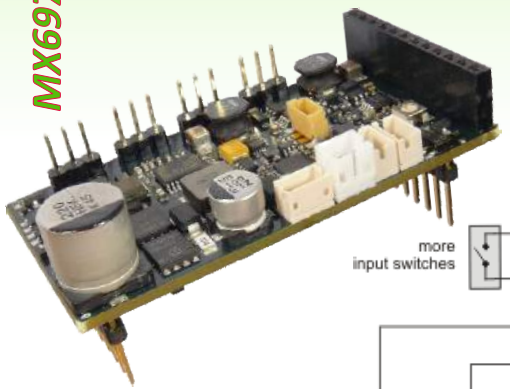
Trainline HSB Mallet, installation of loco board LOKPLSHMAL and inserted Large scale Sound decoder MX696S

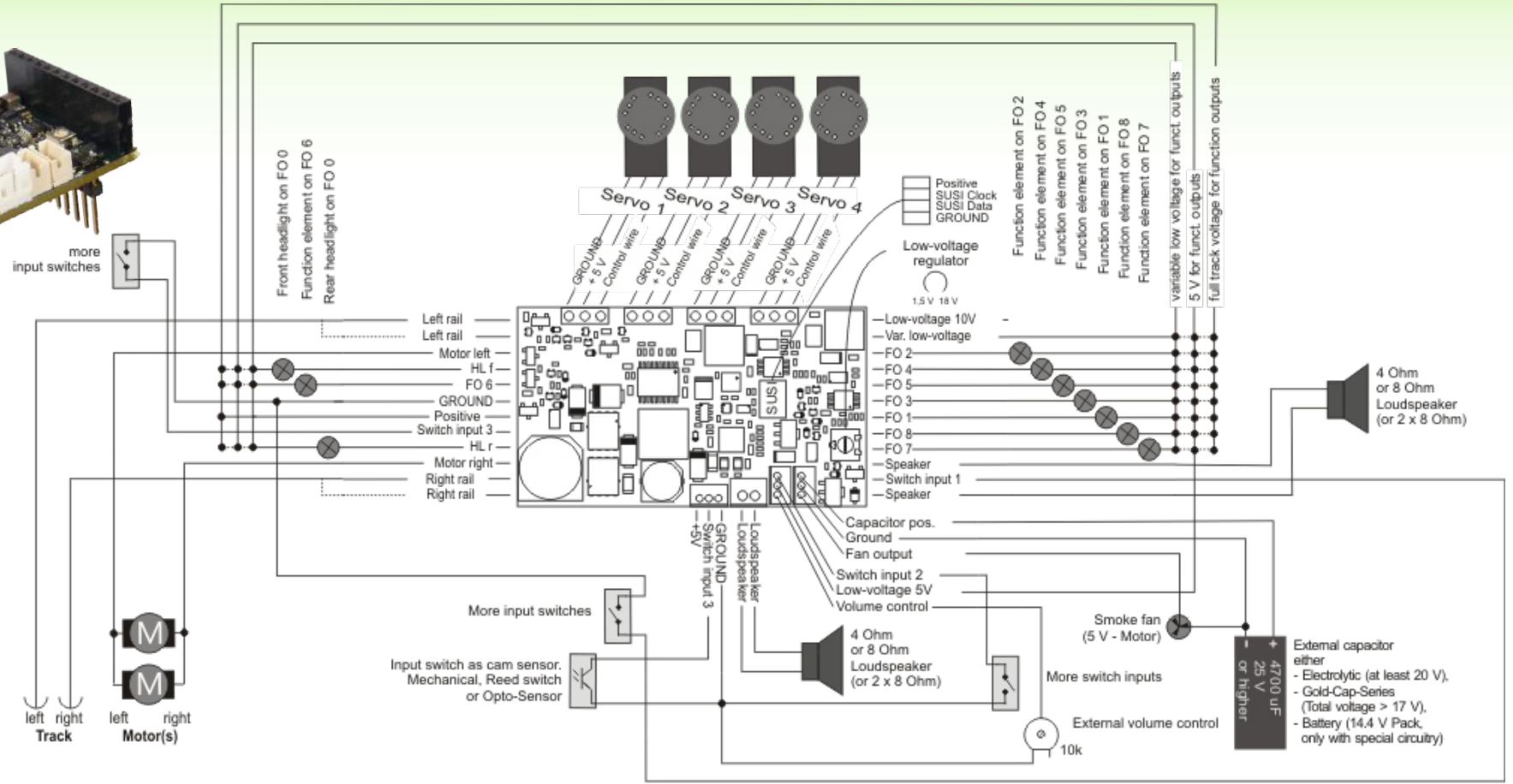
Connecting decoders

MX699






MX697


more
input switches
Front headlight on FO 0
Function element on FO 6
Rear headlight on FO 0
Servo 1
Servo 2
Servo 3
Servo 4
GROUND
+ 5 V
Control wire
Positive
SUSI Clock
SUSI Data
GROUND
Low-voltage
regulator
1.5 V 18 V
Function element on FO 2
Function element on FO 4
Function element on FO 5
Function element on FO 3
Function element on FO 1
Function element on FO 8
Function element on FO 7
variable low voltage for funct. outputs
5 V for funct. outputs
full track voltage for function outputs
Left rail
Left rail
Motor left
HL f
FO 6
GROUND
Positive
Switch input 3
HL r
Motor right
Right rail
Right rail
Low-voltage 10V
Var. low-voltage
FO 2
FO 4
FO 5
FO 3
FO 1
FO 8
FO 7
Speaker
Switch input 1
Speaker
4 Ohm
or 8 Ohm
Loudspeaker
(or 2 x 8 Ohm)
Capacitor pos.
Ground
Fan output
Switch input 2
Low-voltage 5V
Volume control
+5V
Switch input 3
GROUND
Loudspeaker
Loudspeaker
More input switches
Input switch as cam sensor.
Mechanical, Reed switch
or Opto-Sensor
4 Ohm
or 8 Ohm
Loudspeaker
(or 2 x 8 Ohm)
Smoke fan
(5 V - Motor)
More switch inputs
External volume control
10k
4700 µF
25 V
or higher
External capacitor
either
- Electrolytic (at least 20 V),
- Gold-Cap-Series
(Total voltage > 17 V),
- Battery (14.4 V Pack,
only with special circuitry)
left right
Track
left right
Motor(s)

MX820E, D

accessory decoder for 1 switch

MX820E
standard layout, one-sided board assembly

DCC + RailCom

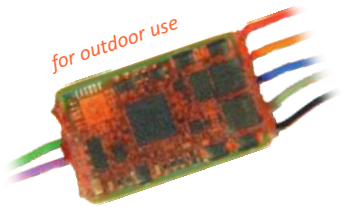
19 x 11 x 2 mm

MX820D with waterproof shrink tube: 24 x 12 x 3 mm

1,0 A total current

1 output for a switch with double coil drive, motor drive, EPL drive or a signal with 2 lights

2 inputs for forced switching or stance contacts

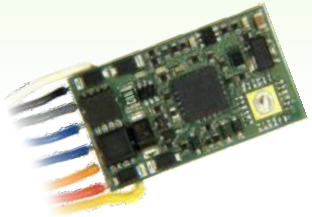


MX820D
wie MX820E, aber mit Abdichtung gegen Spritzwasser

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX820V

accessory decoder for 2 switches



MX820V
as MX820E, but two-sided board assembly for 2 output pairs

DCC + RailCom

19 x 11 x 3 mm

1,0 A total current

2 outputs for switches with double coil drive, motor drive, EPL drive or signals with 2 lights each

4 inputs for forced switching or stance contacts

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX820X, Y

accessory decoder with light outputs

MX820X
as MX820E, but with additional 8 outputs for signal lights etc. on solder pads

DCC + RailCom

19 x 11 x 3 mm

1,0 A total current

1 resp. **2** outputs for switch-drives

8 resp. **16** outputs for signal lights (LEDs or light bulbs up to 100 mA)

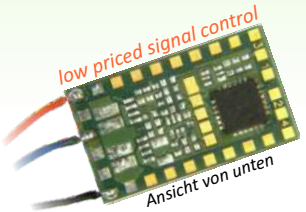
4 inputs for forced switching or stance contacts

MX820Y
as MX820V, but with additional 16 outputs for signal lights etc. on solder pads

RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

MX820Z

accessory decoder with light outputs



MX820Z
NO „normal" outputs for track-switches, but 16 outputs for signal lights etc. on solder pads

DCC + RailCom

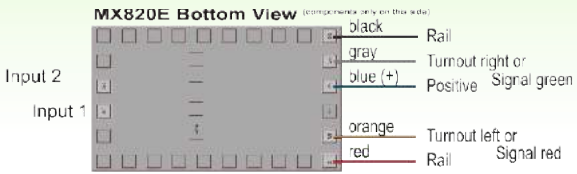
19 x 11 x 3 mm

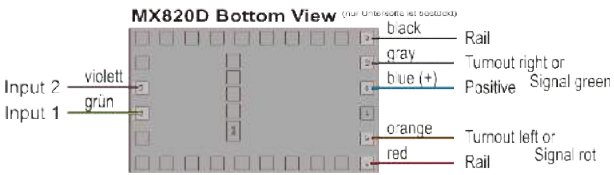
1,0 A total current

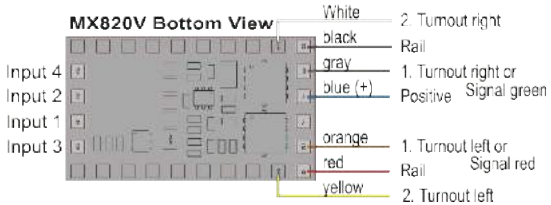
16 outputs for signal lights (LEDs or light bulbs up to 100 mA)

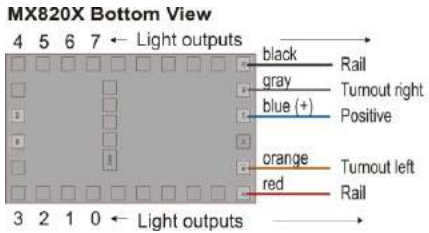
RailCom ist ein Markenzeichen der Lenz Elektronik GmbH

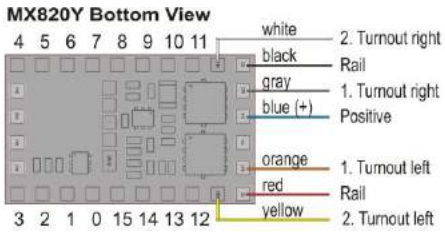
Connecing accessory decoders

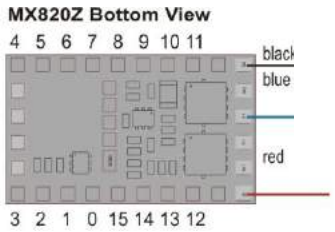


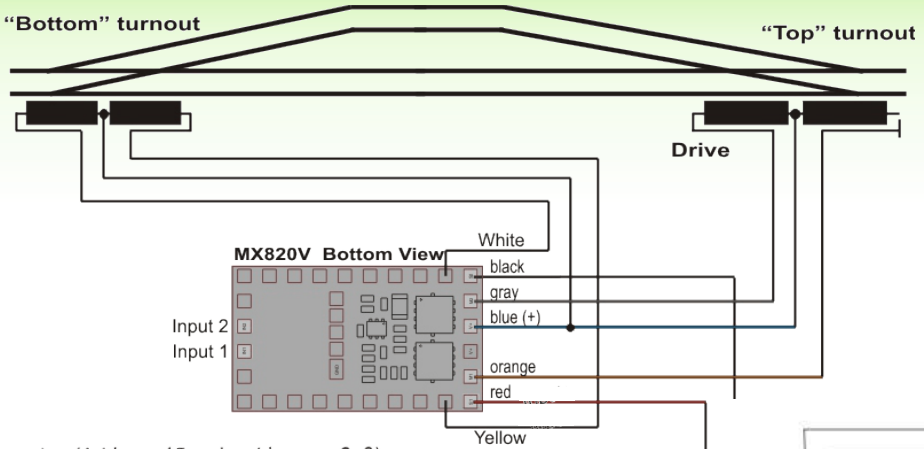










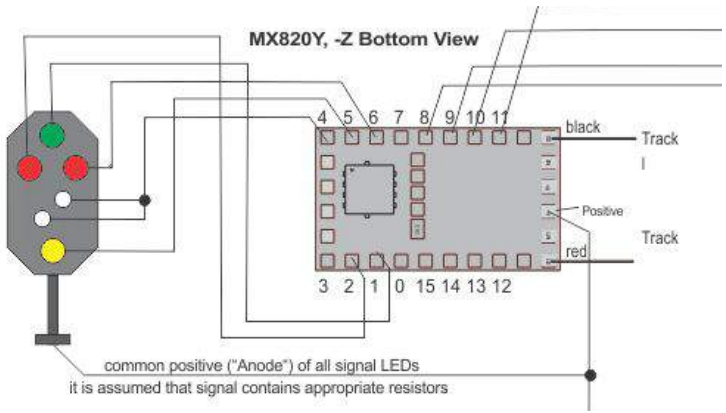


i.e. (Address 15, sub-addresses 2 ,3):
Address: CV's #513, 521 = 15 (Address 15)
Sub-address: CV #545 = 32 (Turnout on F2, F3)
Switch time of sub-address 2: CV #517 = 2 (0.2 sec, default)
Switch time of sub-address 3: CV #518 = 2 (0.2 sec, default)

Example: Connecting a main signal
(matching the default signal aspect in CV #150...153 with control mode = 0):

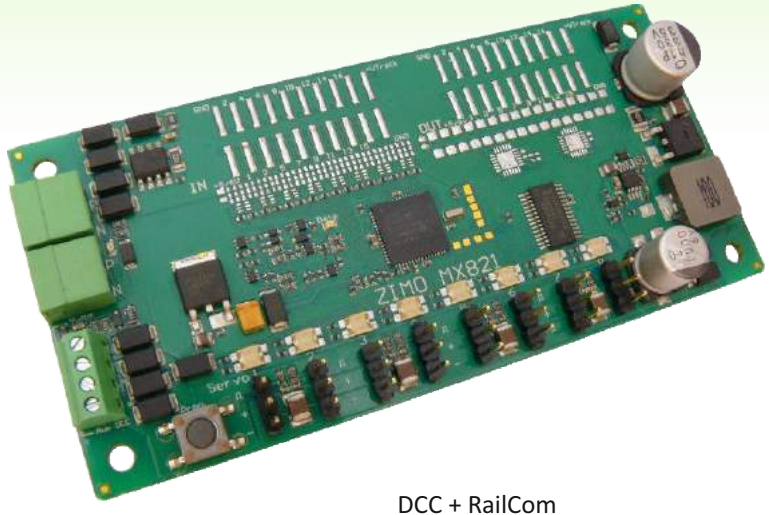
Light output 0 is not used
Light output 1 to green LED
Light output 2 to (first) red LED
Light output 3 not used
Light output 4 to white LEDs (Shunting signal)
Light output 5 to yellow LED
Light output 6 to (second) red LED

Signal aspects in the CVs #150 ... 157:
Hp00 = 01000100 = 68 (= both red LEDs ON)
Hp1 = 00000010 = 2 (= green LED)
Hp2 = 00100010 = 34 (= green and yellow LEDs)
SH1 = 01010000 = 80 (= one red and white LED)



MX821S

accessory decoder for 8 servos



DCC + RailCom

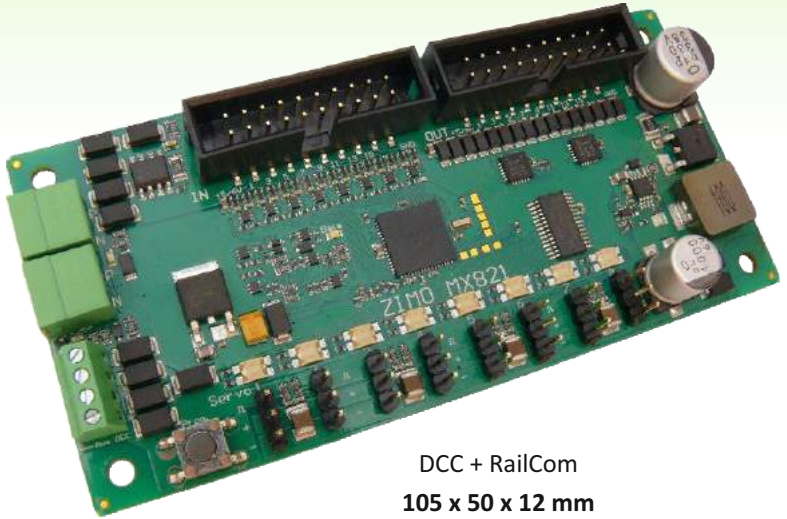
105 x 50 x 12 mm

8 complete servo outputs
(control, minus, 5 V from own voltage regulator)

Low voltage for servo supply
(5 oder 6 V, 3 A)

MX821V

accessory decoder for 8 servos, 16 inputs and 16 outputs



DCC + RailCom

105 x 50 x 12 mm

8 complete servo outputs
(control, minus, 5 V from own voltage regulator)

Low voltage for servo supply and
16 loads at the outputs
(5 oder 6 V, 3 A)

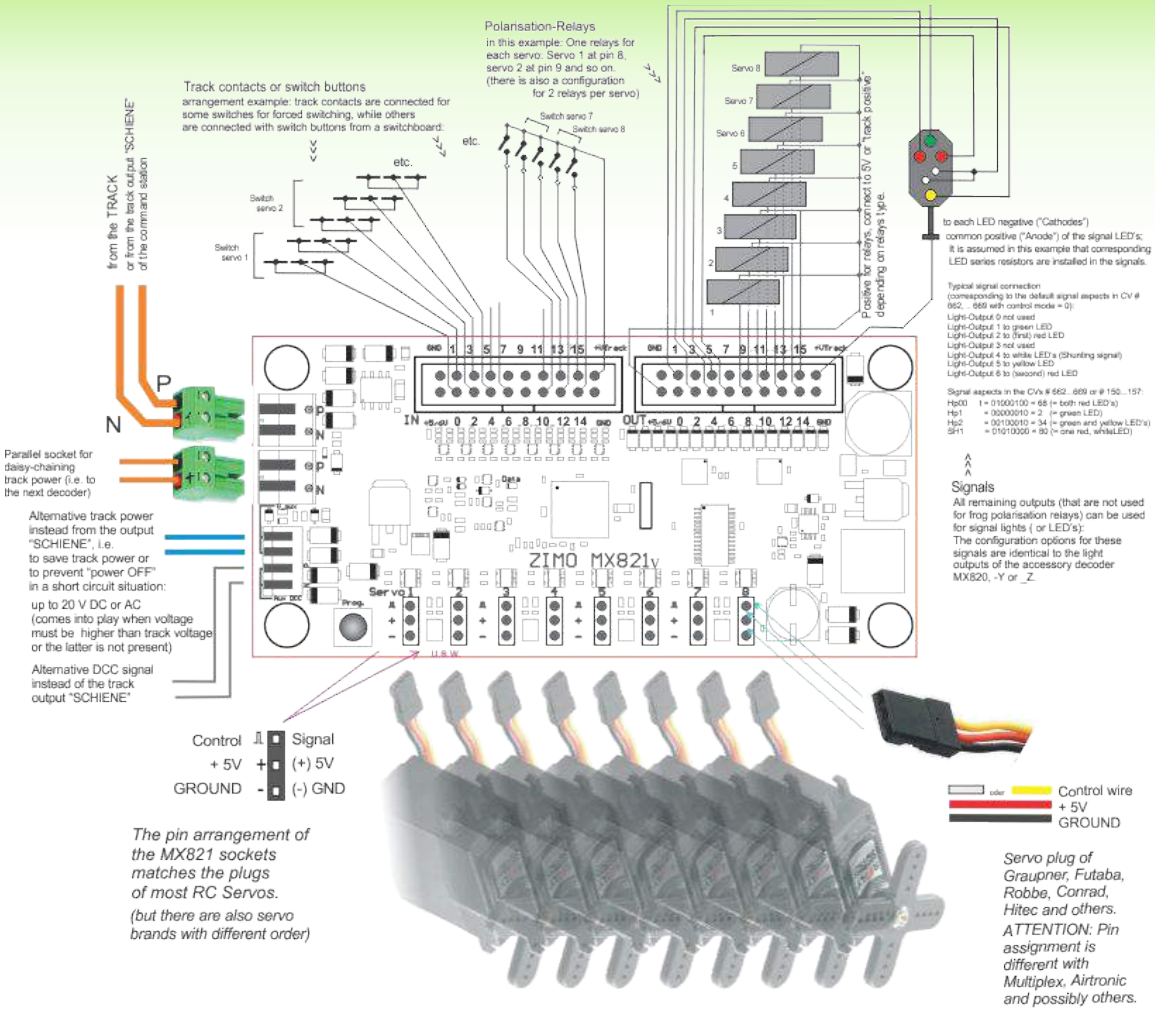
16 inputs for forced switching or
stance contacts

16 outputs for relais or
or signal lights

Connecting accessory decoders MX821

MX821V

MX821S as MX821V, but without in- and outputs.



ZIMO accessory decoders MX820 und MX821

. Three methods for addressing:

1) The address programming (= allocating the desired accessory address 1…511) is normally done with “service mode” programming at the command station's programming track output, which allows only one decoder to be connected at the time.

2) If the decoder is not yet installed in the layout, or is at least easily accessible, it can also be programmed with a new address using the button on the MX821.After the decoder is connected and powered up, press the button until the servo LED's change from red (or green) to orange. The decoder is now in the “address learn” mode waiting on the next switch command.

3) This is a new feature of ZIMO accessory decoders introduced in 2013 (which includes the MX820, MX821…with software versions from September 2013). It is typically used when decoders get installed without first changing the delivery address 3 to a unique address, which happens quite frequently.

. The „synchronuous software update”:

A distinctive feature of the ZIMO accessory decoders is the „synchronous update”, which takes into account that accessory decoders are usually installed permanently in the layout and should preferably remain there during the update.

For the synchronous (simultaneous) update of all accessory decoders, connect the decoder update module MXULFA to the track (power bus) in place of the DCC command station and start the special synchronous software update procedure. The MXULF searches for any accessory decoders (suitable for the synchronous update) and then updae ist started.

Energy storage for ZIMO decoders

Capacitor-Assortments and ready-to-use-modules

H0 decoder with Elko

Large scale decoder with Goldcap modul

Energy storage can be connected to the decoder . . .

+ to enable driving over un-energized tracks and turnout frogs,
+ to enable interference-free sound reproduction (often in practice the most important point),
+ to reduce decoder heat specially produced from low restistance motors,
+ to compensate for energy losses due to HLU and RailCom gaps.

Many ZIMO decoders (see decoder summary and descriptions) are equipped with a „direct connection for external energy storage", in which case electrolytic, tantalum or Goldcap capacitors can be connected without further action by the appropriate pins or wires. For other decoders (especially miniature types) additional components are needed. The following ranges of capacitors are available at ZIMO (alternatively, such components can be purchased on the electronics market).

Small decoders do not have a „direct connect", but with some addirionel components a energy storage (at almost no cost) is possible.

The following assortments and modules are available from ZIMO:

SPEIKOMP

Assortment of capacitors, inductors, diodes, resistors
for a ZIMO decoder
WITHOUT direct energy storage connection,
i.e. for MX621, MX622, MX623, MX630, MX646, MX648

ELKSODR

. . .

Assortment of capacitors, inductors, diodes, resistors
for 10 ZIMO decoders
WITHOUT direct energy storage connection,
i.e. for MX621, MX622, MX623, MX630, MX646, MX64

ELKSOMT
ELKSOGR
ELKSOGR

Elko assortment for 10 - 20 ZIMO decoders with 25 V connection
Elko assortment for 20 - 30 ZIMO decoders mit 16 V connection
Elko assortment for 5 - 10 ZIMO large scale decoders wit 16 V
Capacities varying with availablity

TANTSOPL

. . .

Tantal-assortment (30 x 220 µF)
for 2 to 4 ZIMO decoders (10 to 20 per decoder)
with direct energy storage connection „16 V"
i.e. for MX633, MX645 and large scale decoders MX695, MX696, ...

GOLDSORG

Goldcap-assortment (15 x 1 F, 8 x 12 mm)
for ZIMO large scale decoders and
certain H0-decoders (series of 7 Goldcaps)
i.e. for MX695, MX696, ..., MX633, possibly further enhanced types

GOLMRUND
25 x 14 mm

Goldcap - ready-to-use-module (board with 7 pieces, 140000 µF)
for ZIMO large scale decoders and certain H0-decoders
i.e. for MX695, MX696, ..., MX633, possibly further enhanced types

GOLMLANG
60 x 8 x 14 mm

Goldcap - ready-to-use-module (board with 7 pieces, 140000 µF)
for ZIMO large scale decoder and certain H0-decoders
i.e. for MX695, MX696, ..., MX633, possibly further enhanced types

SUPERCAP68
27 x 15 x 5,5 mm

Goldcap - ready-to-use-module with 6800 µF
for **all** ZIMO decoders with 16 V energy connection
i.e. for MX633, MX645, ...

Speakers for ZIMO decoders

a lot of sound on little space

LS8X12	8 x 12 x 8 mm	miniature rectangular speaker
LS10X15	10 x 15 x 8 mm	8 ohm / 1 W
LS10X15H11	10 x 15 x 11 mm	8 ohm / 1 W
LS13X18	13 x 18 x 13 mm *„Dumbo"*	8 ohm / 1 W

ZIMO special types with integrated sound box;

the sound outputs of the decoders MX644,MX645 are able to operate two 8 ohm speakers parallel (volume effect such as one 4 Ohm / 2 W); with MX646, MX648 only 1 speaker
NOT suitable for a large scale decoder (because of their 10 V output)

LS20R	20 mm round speaker	8 ohm / 1 W
LS23R	23 mm round speaker	8 ohm / 0,5 W
LS28R	28 mm round speaker	8 ohm / 0,5 W

LS26X20X08	26 x 20 x 8 mm	200 Hz - 20 kHz	8 ohm / 1 W
LS40X20X09	40 x 20 x 9 mm	more low frequency	8 ohm / 1 W
LS40X22X09	40 x 22 x 9 mm	high volume	4 ohm / 2 W
LS50X15X14	50 x 15 x 14 mm	both types for more	4 ohm / 2 W
LS55X22X09	55 x 22 x 9 mm	low frequencies and high volume	

ZIMO special types with integrated sound box,
the larger types consisting of 2 „Dumbos".

LSG50X15X14	50 x 15 x 14 mm	if shortage of space	16 ohm / 2 W
LSK50WP	5 cm, low install. depth	170 Hz - 17 kHz	8 ohm / 3 W
LSK64WP	6 cm, low install. depth	170 Hz - 15 kHz	8 ohm / 3 W
LSFRS5	5 cm, with mounting plate	150 Hz - 20 kHz	8 ohm / 5 W
LSFRWS5	5 cm, low install. depth	150 Hz - 20 kHz	8 ohm / 4 W
LSFRWS5R	5 cm, w/o mounting plate	150 Hz - 20 kHz	8 ohm / 4 W
LSFRS7	7 cm	150 Hz - 20 kHz	8 ohm / 5 W
LSFRS8	8 cm	100 Hz - 20 kHz	4 ohm / 30 W

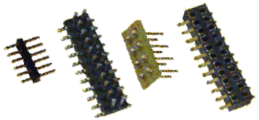
This is the ZIMO selection of VISATON for large scale decoders.

ZIMO large scale decoders such as MX696, MX697, MX699 supply the sound

Material for ZIMO decoders

plugs, connection material, smoke generator

FLEXL10xx	10 m highly flexible stranded wire *colors: black, red, blue, grey, yellow, orange, green, white, brown, violet*
FLEXL1000xx	1000 m highly flexible stranded wire, reel



STIFT6	NEM651 plug for refitting (= 6 pin plug connector)
RSTECK	NEM652 plug for refitting (2 x 4 = 8 pin)
BUCHS6	counterpart of 6 pin plug connector (NEM651: N, F -decoders)
STIFT22	counterpart of 21 pin socket board (MTC: D, C -decoders)
BUCHS22	counterpart of 22 pin plug connector (PluX: P16, P22 -decoders)

BUCHS8KAB	8 pin female connector forNEM 652 with cable
M4000Z	amplifier module for logic level output
LITZAWG22xx	7 m wire for large scale applications colors: black, red, white grey, blue, orange, yellow, green, brown

CRIBUCHS12	12 pin Crimp-socket for large scale decoder MX695
CRIBUCHS14	14 pin Crimp-socket for large scale decoder MX699
CRIMPTOOL	Crimping-tool for socket CRIBUCHS12
CRIBUSET	assortment: 12 x CRIBUCHS12 + Crimp-tool

BAKASTE2X5	ribbon cable plug (cutting terminal) 10 pin (2 x 5)
BAKASTE2X10	ribbon cable plug (cutting terminal) 20 pin (2 x 10)
BAKAB20POL	30 m ribbon cable 20 pin **for large scale decoder MX696**
SCHRAUB10	screw adapter for 10 pin plug connector for MX696S
SCHRAUB16	screw adapter for 16 pin plug connector for MX690
SCHRAUB20	screw adapter for 20 pin plug connector for MX696

SUSIKAB	4 pin connection cable for SUSI interface
TR92-101	smoke generator with fan for large scale 49 x 29 x 33 mm (without flange), tank volume 4 ml

Sound providers

These pages show ZIMO partners who make sound projects for ZIMO sound decoders. They are not employed at ZIMO, selling their projects directly, but are a part of ZIMO's human resources.

Heinz Däppen (CH) (Sound Design)

... has started in the year 2009 to design sound projects commercially. He together with ZIMO invented the „coded" project, where a load code has to be written to the CVs # 260 - 263 before loading the sound project itself. This is the basis for all sound providers to get money from the customers using their projects.

Heinz Däppen also works for famous model railway manufactures which pre-install his sound projects in their locos. Heinz Däppen together with Matthias Henning defined the „ZIMO Advanced Standard" for assigning functions to lighting and sound effects. Now there exists also a „ZIMO US Standard".

Switzerland (RhB) ...)

... and USA (Mogul)

the sound portfolio of Heinz Däppen contains Swiss and USA vehicles, mostly narrow-gauge prototypes.

www.sound-design.white-stone.ch

Gabriel Meszároš (SK) (Artol s.r.o., Slovakia)

(Self introduction) My first attempt with sound projects is dated to 2008, when I was asked to prepare a sound project for steam locomotive Class 556.0 "Stoker". Then I started working on some other sound projects. It required study of decoder features and orienting in th options. I like the large variability of sounds matching options and work with them via settings in the decoder. It is not always easy, but hope that my aim to achieve realistic sound is fulfilled.

I prefer working on diesel locomotive projects, whose sound can be quite different depending on the operating mode. It is always a challenge, as the best record sounds, process them, snip and assemble them into a final sound project. Continue to update older sound projects as new decoders brings new possibilities or I have the opportunity to record new sound to achieve better experience for model railroaders enthusiasts.

www.artol.sk

Matthias Henning (D) (Modellbahnwelt Henning)

(Self introduction) Born in the DDR (GDR - German democratic republic) I got my first PIKO model railway in the year 1961. In the eighties I started to make sound and substandard film recordings from locomotivs. From this early activities I could use something much later for my sound projects.

My special field are the locomotives from the former „Deutsche Reichsbahn", epoch III and iV. In the year 2000 I started to make sound projects for other decoder manufacturers, from the year 2010 for ZIMO sound decoders.

Currently (when this text is written, in the year 2015) i am working on sound projects for the „sächsische VIIK", the „996102" and the „VT2.09"

www.henning-modellbahn.de

Die BR118 DR, PIKO Modell in TT

Keith Pearson - Mr Soundguy (UK)

Keith Pearson has brought together a lifetime interest in model railways, a career in computer software development and testing, and significant experience in professional sound engineering, to launch a range of model railway sound projects under the brand of ŒMr Soundguy[1]. The sound projects use authentic sounds from recordings, and these are further tailored using spectrum analysis in order to obtain the best results from the specific speaker/enclosure.

UK distributor: www.railexclusive.com

Modelleisenbahn GmbH (A)

From the year 2010 (as ZIMO started to deliver decoders to Roco and Fleischmann) many sound projects were created, in many cases as results of cooperation between ZIMO and Roco sound specialists, sometimes also with the help of external sound providers. Most of theses sound projects are now available on the ZIMO sound database for frei download.

Besides of standard locomotives there exist special cases, which demonstrate what ZIMO technology is able to do: e.g. turning and lowering/lifting the vehicle body, snow blowing, of course everything with original sound.

Beilhack rotary snow plow (a Roco model)

Two of many locos with sound projects from Paul Chetter: SLW 00 gauge Class 24 , Minerva Pecket

ZIMO ELEKTRONIK GmbH (A)

Also ZIMO itself acts as an sound provider: two employees working on design of sound projects (besides of other tasks).

Sound projects are made as own products (for free download from the sound data-base) or on order of loco manufacturers.

Oswald Holub

Quang Nguyen

Paul Chetter (UK)

... is the regular DCC Sound contributor to Hornby Magazine and has been a 'Champion' of ZIMO since 2009. Paul has created many British steam and diesel locomotive sound projects which are available from a number of UK ZIMO retailers. He has created custom projects for a number of model manufacturers across a range of gauges.

Many new features have resulted from suggestions, developments and field testing originating from Paul, the most recent being the Brake Key and Manual Notching for decoders and the numbering of sound samples in ZSP. He continues to be at the forefront of project enhancements, helping to bring the ZIMO brand to more users.

Paul's most recent projects are for the Sutton's Locomotive Works Class 24 Diesel-Electric in 00 gauge and Minerva Models' Peckett E Steam loco in 0 gauge; both were released in December 2015.

Although standard gauge mainline locomotives and multiple units form a large part of his portfolio Paul continues to support the needs of Industrial and Narrow Gauge modellers with a range of custom projects.

Chetter sound projects are „preloaded" only in ZIMO decoders or in ZIMO equipped UK locos, availabe from UK dealers. See Sound database on ZIMO Website and contact directly the dealers or ZIMO's distributor for UK: office@philipsutton.com

MXULF , MXULFA

Decoder update and sound loading device

- **MXULF and MXULFA:** MXULFA = MXULF with display!

„ULF" are the initials of „**U**pdate", „**L**aden", „**F**ahren" (German for loading and driving).

starting screen on the MXULFA, with display of the track voltage for updating

```
MXULF,E SW:0.32
11.6 Vout
```

- **self-update from USB-stick**

```
Selbst-Update
erfol9reich
```

display after self-update on MXULFA; in addition „LED 3" green (also visible on the MXULF)

- **decoder update and sound loading with the USB-Stick**

MXULFA tries to find out, which decoder type it is (from the UID)

```
MXULF,E SW:0.32
  suche Decoder
```

```
  Update OK
Update:   100%
```

success message

display of the loading progress, both in case of loading via track and via „SUSI loading"

```
Sound Flash: 60%
```

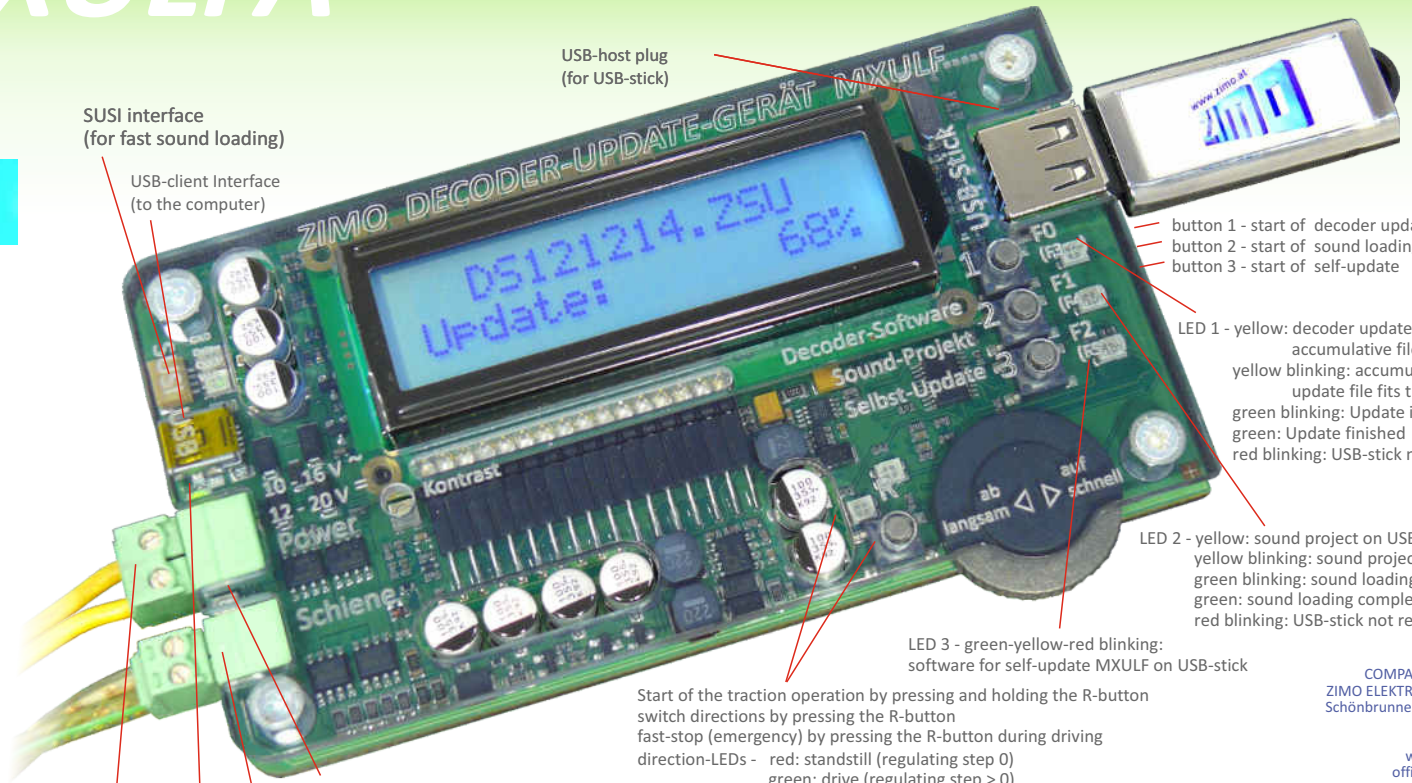
- **Driving locos and programming CVs with MXULFA**

```
Rü  56  Adr 1016
F0,F1,F2 = 1,1,0
```

„DRIVE" screen with directions, regulating step, address, status of a selection of functions

```
STOPP
F0,F1,F2 = 1,1,0
```

emergency stop!



USB-host plug (for USB-stick)

SUSI interface (for fast sound loading)

USB-client Interface (to the computer)

button 1 - start of decoder update
button 2 - start of sound loading
button 3 - start of self-update

LED 1 - yellow: decoder update accumulative file on USB-stick
yellow blinking: accumulative update file fits the decoder
green blinking: Update in progress
green: Update finished
red blinking: USB-stick not readable

LED 2 - yellow: sound project on USB-stick
yellow blinking: sound project matches
green blinking: sound loading in progress
green: sound loading completed
red blinking: USB-stick not readable

LED 3 - green-yellow-red blinking:
software for self-update MXULF on USB-stick

Start of the traction operation by pressing and holding the R-button
switch directions by pressing the R-button
fast-stop (emergency) by pressing the R-button during driving

direction-LEDs - red: standstill (regulating step 0)
green: drive (regulating step > 0)
green or red blinking: response is missing (although expected)
both LEDs red blinking: short circuit, voltage OFF

fuction switching F0, F1, F2 by pressing the 1, 2, 3 buttons
changing over to „second line" by pressing and holding button 2
turning on/off of F3, F4, F5 by pressing the 1, 2, 3 buttons
changing over to „third line" by pressing and holding the button 3
turning on/off of F6, F7, F8 by pressing the 1, 2, 3 buttons

power supply (10 - 20 V AC or DC)

LED (track) -
yellow: decoder found at track output
yellow blinking: decoder matches the file on the USB-stick
green blinking: decoder update or sound loading in progress
green: decoder update successfully completed

LED (supply) -
green: OK
yellow: voltage to low

track: update-, loading- respectively drive-track (track output to decoder or vehicle)

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Peter W. Ziegler

The ZIMO System

More information in the system catalogue

MX32 The handheld cab

- with real slide controller, real keyboard AND touch screen.
- for train control, switching, programming, ...

MX10 The command station

- 2 track outputs with 12 A + 8 A.
- voltage from 10 to 24 V, max. current from 1 to 12 (8) A adjustable by fine steps.
- communication via CAN Bus, MiWi radio, XnetPress, USB, LAN/WiFi, et. al.
- RailCom high precision detectors.

RailCom®

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