Decoders 2025

April issue

www.zimo.at

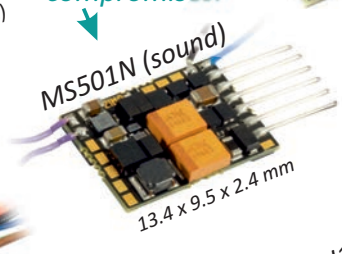
MADE IN AUSTRIA

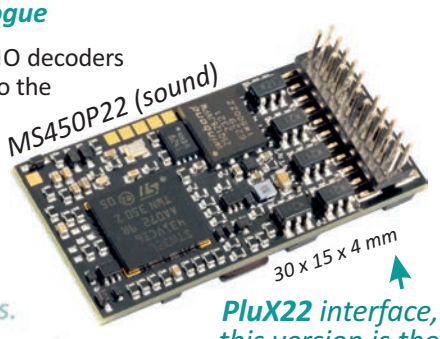
Multiprotocol: DCC, mfx, MM, analogue

With the introduction of the MS generation, ZIMO decoders are able to handle not only DCC and MM but also the mfx rail signal,including **automatic registration** with Märklin digital control devices

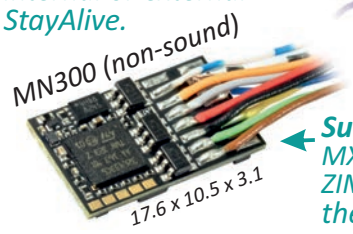
***Next** interface with internal or external StayAlive.*

***Miniature** with sound, but without compromises.*





PluX22** interface, this version is the new bestseller among the sound decoders; Dimensionally identical also with **21MTC.



***Successor** of the MX630 - the classic ZIMO decoder of the 15 years before.*

***Subminiatur** down to 8 x 6 x 2 mm.*

MS & MN

Sound and Non-Sound decoders from a single cast.

The ***most powerful microelectronics*** found in the model railway world are built into these decoders: state-of-the-art 32 bit ARM processors with DSP characteristics (80 MHz, 100 DMIPS), even for decoders without sound, so that they can fully keep up with the sound versions in terms of driving and functional characteristics.

approx. 80 types Always fits!

REAL* 16 bit *audio* - 22 *or* 44 kHz *sample rate* - 16 *channels* - 28 Mbit *memory

The ***REAL 16 bit*** refer to the complete sound project: the sound files stored in the flash, the I²S-bus (=Inter-IC-Sound) for playback in stereo, the fully digital Class "D" amplifier. Even "old"8 bit sound projects do sound better with the new 16 bit hardware.

22 kHz Sample rate by default, but also sound channels of ***11 kHz*** for simpler sounds (e.g. station announcements) and ***44 kHz*** for sounds of maximum hi-fi quality..

128 Mbit sound memory means 360 sec playback time of high quality, more for reduced.

16 sound channels can be played back simultaneously and adjusted individually.

The ***timbres*** of driving sounds (e.g.: chuff sounds, diesel engine, whistles, horns, ...) can be adjusted via high and low pass filters via CV configuration.

For the complete decoder lists (sound and non-sound) see back !

For any scale, MS means the cutting edge of decoder technology,

but nowhere better to be seen (and heard ...) than on large-scale sound decoders.

High performance without overheating
through the use of synchronous rectifiers

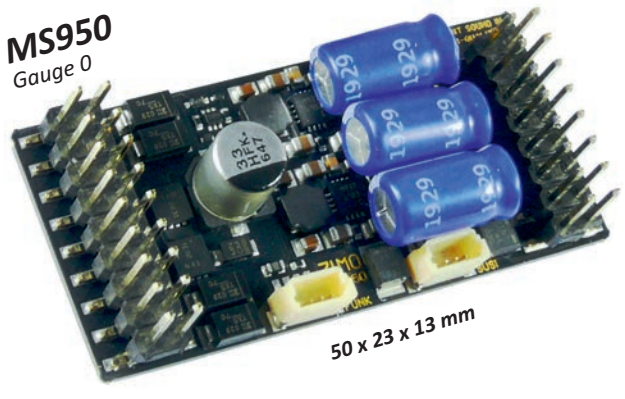
Long-lasting StayAlive onboard
Energy storage consisting of 3 supercaps (more efficient than 2) and boost converter.

Several low-voltage sources available
5 V supply for servos etc., 10 V, adjustable output (1.5 V low voltage to driving voltage).

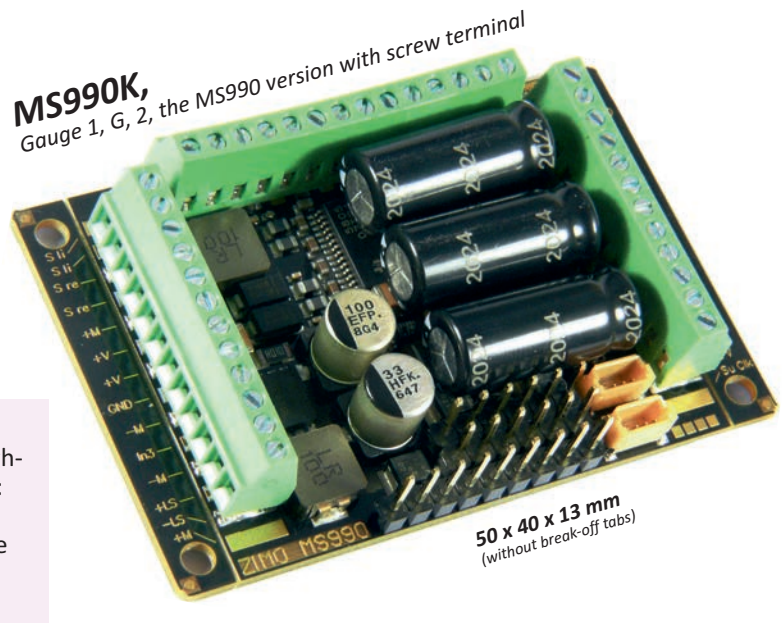
Up to 6 servos can be connected directly
for couplers, pantographs, steam locomotive control, etc. without complex external SUSI modules or similar.
> ZIMO decoders do it themselves <

Smoke generators (single, dual) can be operated cost-effectively
without external control electronics, via two outputs each for heating elements and fan motors.
> ZIMO decoders do it themselves <

Gradients, slopes and curves can be recognised and reported back
measured by gyro and acceleration sensor integrated in the decoder, supports the sound image, informs the "locomotive driver" on the cab (controller) or app, and in the future will also influence the driving operation.
> ZIMO decoders do it themselves <



Sound filters for All and for large scales also "stereo"
The application of up to 6 filter algorithms (starting with high-pass and low-pass) opens up previously unknown options: Adaptation to (especially small) speakers with "repair" of irregularities in their frequency response, change of timbre according to model, installation, or "taste", position-dependent reaction to ground or environment.



"Huge" database for sound projects in highest quality
In the ZIMO sound database (at www.zimo.at), more than 800 sound projects are available for download, of which more than 300 are already available in a 16-bit version only for MS sound decoders, but on which the remaining 8-bit projects can also be played - even with a quality advantage over 8-bit decoders. Of all the projects, approx. 60% are free and 40% are fee-based (external "sound providers").

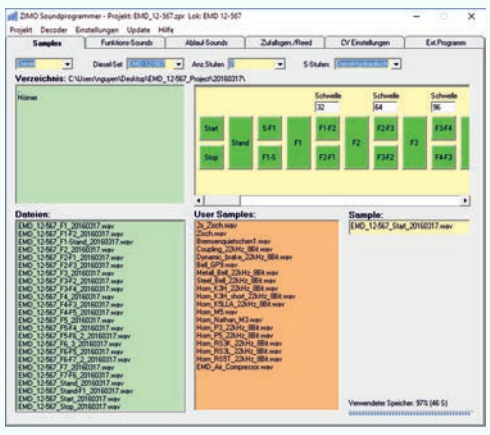
*The **ZIMO product philosophy** – future-oriented and consistently implemented*

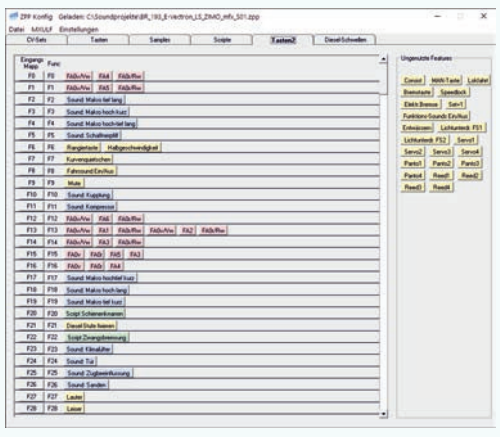
Integrated train control technology
or the combination of addressed vehicle control (the basic task of a digital system) and influence by track and current operating conditions, is taken into account by all ZIMO products. ABC (basic but limited) and HLU (powerful, and almost infinitely expandable) is implemented in all decoders, which is also a step towards ETCS (European Train Control System) that - following the prototype - will probably find its way into the world of model railroads.

Feedback capability via RailCom
has been indispensable for ZIMO decoders (all types from Z and N to large-scale) for 15 years, because reading & writing CVs and observing the changes live is only possible in this way. Its omission would be an anachronism (and is still the case elsewhere in the garden railroad sector...).

No external sound modules
Such modules from a bygone era of underperforming DCC systems are NOT supported by the current decoder generations - they are by now obsolete. Integrating all vehicle functions in a single component (i.e. the sound decoder) has long been the only sensible solution, because the interaction of motor, sound, light and mechanical effects (which all influence each other) is much better than with "SUSI" interfaces between separated electronic units.

No "stripped-down" large-scale decoder
Non-sound large scale decoders or decoders with reduced function outputs are NO LONGER available from ZIMO. However, this is NOT a pure question of product philosophy but also an economic measure: the costs of a larger variety of decoder types eat up a good part of the achievable component savings. Of course, customer specific designs (i.e. for manufacturers or user groups) are available within the framework of "ZIMO INDIVIDUAL" - provided they don't contradict the described product philosophy.



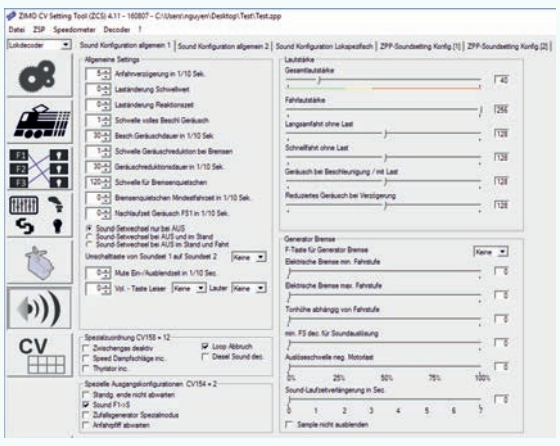


The tools for good sound

***ZSP** Sound Programmer* is a software to create sound projects by the "sound provider", usually for professional use, but also publicly available for the "amateur".

***ZPP** Konfig* allows the user to customise finished sound projects (.zpp files): adding sound samples (e.g. whistles), creating scripts, applying equaliser and filter functions with testing of the effect in real time.

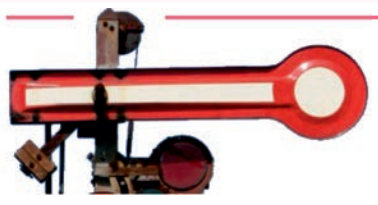
***ZCS** CV Setting* offers a graphical user interface for setting the CVs, but also for the GUI on operating devices.



SPECIALS

That's only with ZIMO:
Features that are unique, or ahead of their time, make a difference to "normal" products. Much is based on sophisticated software. The hardware contributes its share: not geared to lowest costs, but to high quality and future viability.

HLU *unmatched for 20+ years*



5 Limits	**H**	**Halt**	7 steps
	UH	Intermediate	
	U	**Ultra slow**	
	LU	Intermediate	
	L	**sLow**	
	FL	Intermediate	
	F	**Full speed**	
	(A	voltage OFF)	

The HLU speed limits (including „Halt“ und „Full speed“)

From the beginning (1980), "HLU", initially under the designation "signal controlled speed influence", has been a fixed component of ZIMO digital systems and decoders.

While **DCC**, according to the standard, sends **addressed commands** to each individual vehicle, individual **separate track sections** can be given **HLU information** at the same time. These are not addressed, but are locationdependent for decoders located there.

In this way, trains receive HLU instructions to **stop before red signals or speed limits**.

HLU information is generated by the track section outputs of a "**StEin module**", usually under the control of a computer controller (interlocking software).

EW *right direction*

Since model railways have gone digital, the direction selected on the driving device is not track-related but locomotive-related (forward = "cab 1 ahead"). This is often, but not always, advantageous. ZIMO offers the possibility to drive specifically in a **given layout-related direction**, called **"East" (Ost) and "West"**, if required. Technically, this is the phase position of the DCC rail signal.

Characteristic is: the entire directional logic is NOT simply switched over, but "Vor-Rück" (forward-backward) and "Ost-West" (east-west) work together:

- always correct start-up without knowing the rerail direction
- display the complete directional information via RailCom on the control unit ("Vor-Rück", „Ost-West" on the cab), without loss of the usual handling.

All PoM *on-track search*

For a long time it has been the general standard to read and program CVs on the main track; however, the classic programming track output is still used for addressing decoders.

ZIMO has introduced **re-addressing at the main track** (i.e. in "Operational Mode", PoM).

The "on-track search" is used to **find the unknown address(es)** of one or a few vehicles. The currently searched vehicle is de-energised for a short time:

its address and name (if already available) appear after a few seconds.

innovative RailCom applications !

Registration and GUI *transmission*

The current version of the **ZIMO stock search**, realised with the means of the **RCN-218** standardised by the RailCommunity, is started on the ZIMO controller MX33; (new) decoders then register; a comparison with the existing "object database" (the "stock") takes place.

In practice, the **ZIMO "GUI transmission"** is even more important than the registration. The "GUI" (Graphical User Interface) consists of an individual collection of images, symbols and control elements for each vehicle, whereby a distinction is also made between different operating devices (ZIMO cab (controller), ZIMO App, Roco App).

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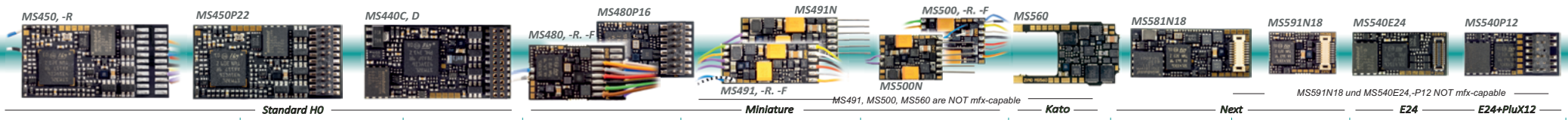
MS SOUND DECODERS

ZIMO is constantly developing new decoder types,
You can find the latest range at www.zimo.at



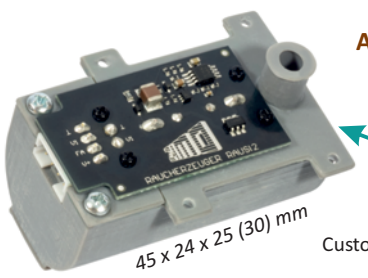
MS-Decoder (Mono) for small scales (N, TT, H0, ..)	MS450 MS450, -R / -P22 / -P16	MS440 -C (std.) / -D (ZIMO)	MS480, MS480, -R , -F / -P16	MS491 MS491, -R, -F / -N, -L	MS500 MS500, -R, -F / -N	MS560	MS581N18 /-G with external mini-Goldcaps	MS591N18	MS540E24 / MS540P12 on adapter
Dimensions (mm)	30 x 15 x 4	30 x 15 x 4	19 x 11 x 3,1	19 x 7,8 x 2,8	14 x 10 x 2,6	27 x 14 x 2,6	24,9 x 10 x 4	15 x 9,3 x 3,1	19 x 8,7 x 2,8 / 3,3 total height
Connections	13 652 / 22 / 16	MTC FA3-FA6: Logikp./verstärkt	13 652 651 / 16	12 652 651 / 651 651	12 652 651 / 651	KATO (like EM13)	Next	Next	E24 / E24 12
Continious Current Motor+Sound+FOs (peak)	1,2 A (2,5 A)	1,2 A (2,5 A)	0,8 A (1,5 A)	0,7 A (1,5 A)	0,7 A (1,5 A)	0,7 A (1,5 A)	0,8 A (1,5 A)	0,7 A (1,5 A)	0,8 A (1,5 A)
Function Output incl. 2 headlamps (+ logic)	10 4 with wires, 6 on s. pads / 9 / 4 on plug 1 / 6 on s. pads (+ 2 logic levels + 1 alternative use IN1)	4/8 all 4 / 8 on plug (+ 6/2 logic levels)	6 4 with wires, 2 on s. pads / 4 on plug, 2 on s. pads (+ 2 logic levels)	5 4 with wires, 1 on s. pads / 2 on plug, 3 on s. pads (+ 2 logic levels)	4 all 4 with wires / 2 on plug, 2 on s. pads (+ 2 logic levels)	2 all 2 on s. pads (+ 2 logic levels)	6 4 on plug 2 on solder pad (+ 3 logic levels)	6 4 on plug 2 on solder pad (+ 2 logic levels)	8 all 8 on plug, 2 also on s. pads (+ 4 logic levels + 1 alt. use. IN1) / 8 4 on plug 4 on s. pads (+ 2 logic levels)
Servo - control lines (complete connection with 5V-supply)	2 alternative use of logic levels (NO, external 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necess.)	2 alternative use of logic levels (NO, ext. 5V necess.)	2 alternative use of logic levels (NO, ext. 5V necess.)	2 alternative use of logic levels (NO, ext. 5V necess.)	2 alternative use of logic levels (NO, ext. 5V necess.)	2 alternative use of logic levels (NO, ext. 5V necess.)	2 alternative use of logic levels (NO, ext. 5V necess.)	2 alternative use of logic levels (NO, external 5V necessary)
SUSI - Connection opt. SUSI, I2C, sound loading protocol	no alternative use of logic levels on s. pads / PluX	no alternative use of logic levels on MTC-plug	no alternative use of logic levels on s. pads / PluX	yes alternative use of logic levels on solder pads	yes alternative use of logic levels on solder pads	yes alternative use of logic levels on solder pads	yes alternative use of logic levels on Next18-plug	yes alternative use of logic levels on solder pads	yes alternative use of logic levels on E24-plug + on s. pads / on s. pads
Switching Inputs for axix sensors, reed-contacts, etc.	1 on s. pads / PluX + 2 alternative use of logic levels	2 on MTC-plug + 2 alternative use of logic levels	2 alternative use of logic levels	2 alternative use of logic levels	2 alternative use of logic levels	2 alternative use of logic levels	2 alternative use of logic levels	2 alternative use of logic levels	2 on E24-plug + 2 alternative use of logic levels / 2 alternative use of logic levels
stabilised low voltage detachable at	5V possible (see connection diagram)	5 V max. 200mA on MTC-plug	5 V max. 50mA on solder pads	5 V max. 50mA on solder pads	5 V max. 50mA on solder pads	5 V max. 50mA on solder pads	5 V max. 200mA on solder pads	no	5 V max. 50mA on E24-plug / no
Energy Storage - connect. 15V - Elkos/Supercaps directly on the Decoder	yes with wires / PluX	yes on solder pads	yes (max 1000µF) on solder pads / PluX	yes (max 1000µF) on solder pads	yes (max 1000µF) on solder pads	no	yes internal buffering (in addit. to internal) external 5V-tantals on solder pads	no	no (max. 1000 µF) on E24 + on s. pads / on solder pads
Loudspeaker - Outputs depend. on Dec. 8Ω or 4Ω (2 x 8Ω parallel)	1 3 Watt, 4 - 8Ω on wires / PluX	1 3 Watt, 4 - 8Ω on MTC-plug	1 1 Watt, 8Ω on wires / PluX	1 1 Watt, 8Ω on wires	1 1 Watt, 8Ω on wires	1 1 Watt, 8Ω on wires	1 3 Watt / 4 - 8Ω on Next18-plug	1 1 Watt / 8Ω on Next18-plug	1 1 Watt / 8Ω on E24-plug / on PluX12 + on solder pads

Legend of connection techniques: 12 free wire [12] quantity; 22 PluX-plug [22] PluX22...; 651 652 wires + NEM-plug [651] Nem-651...; 651 651 NEM-651 direct flat (N) / 90° angled (L); MTC 21MTC-Stecker (C std./D ZIMO); Next Next18-plug; KATO KATO-compatible like [EM13]; E24 E24-plug; E24 12 E24 with PluX[12]-plug on adapter board

MS large scale decoders	MS950	MS955	MS990L / MS990K
Dimensions (mm)	50 x 23 x 13	50 x 26 x 13	50 x 40 x 13 (without breakaway tabs)
Connections Wires and/or standardized interfaces	34 Pin headers	38 Pin headers	63 Pin headers / 38 Screw terminals + Pin headers
Continuous Current Motor+Sound+FOs (peak)	4 A (10 A)	4 A (10 A)	6 A (10 A)
of which: Function Outputs ONLY Function Outputs combined	2 A	2 A	2 A
Function Outputs incl. 2 x Headlights (+ logic level outputs	11 all 11 on plug (+ 3 logic level)	11 all 11 on plug (+ 2 special lines) (+ 4 logic level)	15 all 15 on plug
Low Voltage 5 V for Servos a.o. Consumers 5 V resp. 10 V Audio voltage variable low voltage from 1.5 V	1.5 A 0.5 A (5 V do not overload!) not available	1.5 A 0.5 A (5 V do not overload!) not available	1.5 A 0.5 A (10 V - do not overload!) 2 A
Servo - Control Lines (complete connection with 5V supply)	2 Servo control line + 2 alternative use of logic level	2 Servo control line + 2 alternative use of logic level	6 complete 3-pole servo connections + 2 alternative use of logic level
SUSI - Connection option. SUSI, I2C, Sound loading protocol	yes own 4-pin SUSI plug	yes own 4-pin SUSI plug	yes own 4-pin SUSI plug and second SUSI-interface pin headers
Switching inputs for axis sensors, reed contacts, etc.	4 on plug + 2 alt. use of logic level	4 on plug + 2 alt. use of logic level	4 on plug + 2 alt. use of logic level
Energy Storage- Connect. 15V - Elkos/Supercaps DIRECTLY on Decoder	internal energy stor. from 3 Supercaps yes (add. to inernal storage) external Elkos/Super-cap-Block (15 V) on s.pads	internal energy stor. from 3 Supercaps yes (add. to inernal storage) external Elkos/Super-cap-Block (15 V) on s.pads	internal energy storage from 3 Supercaps yes (additional to internal storage:) external Elkos/Supercap-Block (15 V) on pins
Loudspeaker - Outputs dep. on Decoder 8Ω or 4Ω (2 x 8Ω paral.)	2 3 Watt / 4Ω on pins	2 5 Watt / 4Ω on pins	2 10 Watt / 4Ω on pins

Single and dual smoke generators for large scale

ZIMO smoke generators are specially developed for ZIMO large-scale railroad decoders, whereby their function could be optimized and own electronics could be minimized - only sensor and temperature control included.



Already 3 models available:

RAUSI1 (single) and **RAUDU1** (dual) for gauge 0, 1, G

RAUSI2, downsized for gauge 0 with almost the same performance.

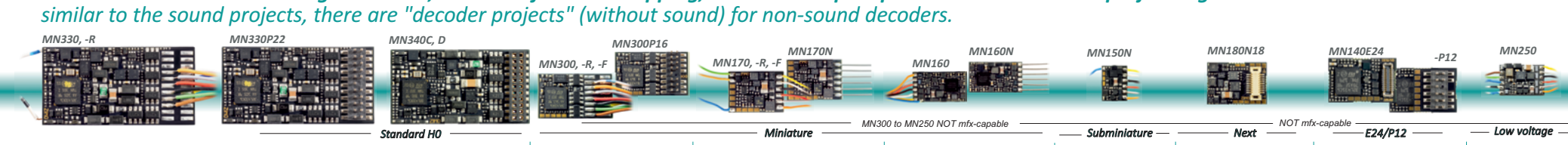
Customized variants are also possible thanks to SLA production.

Loudspeakers for all scales

From the small **"Sugar Cubes"** (rectangular loudspeakers with resonance body) in many variations to large VISATON loudspeakers ...

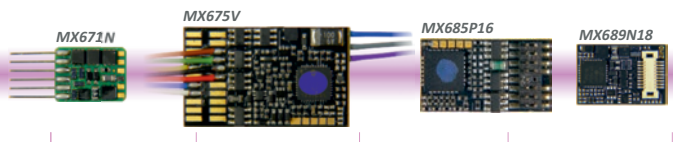
ZIMO MN non-sound decoders use the same microcontrollers and other hardware as MS sound decoders. Of course, the software is also largely the same and is developed further together.
*This results in **the same driving behaviour, the same function mapping, the same script capabilities and the same project organisation**: similar to the sound projects, there are "decoder projects" (without sound) for non-sound decoders.*

MN NON-SOUND DECODERS



MN - Decoder for small gauges (N, TT, H0, ..)	MN330 MN330, -R / P22	MN340C/D -C (std.) / -D (ZIMO)	MN300 MN300, -R, -F / P16	MN170 MN170, -R, -F / -N	MN160 MN160, / -N, -L	MN150 MN150 / -N	MN180N18	MN140E24 / MN140P12	MN250
Dimensions (mm) wired types: without shrink tubing	30 x 15.3 x 2.2 single-sided assembly	28.6 x 15.3 x 2.5 single-sided assembly	17.6 x 10.5 x 3.1	12 x 8.6 x 2.3	13 x 7.5 x 1.6 single-sided assembly	8.2 x 5.9 x 2	13.3 x 9.5 x 2.6	13. x 8.7 x 2.3 /on adapter, x 2.8	9.9 x 7.5 x 2.1
Connections	/	FA3-FA6: Logicl./amplif.	/	/	/	/		E24 / E24 12	
Total current (contin.) motor + function outputs (peak)	1.2 A (2.5 A)	1.2 A (2.5 A)	1.0 A (1.5 A)	0.7 A (1.5 A)	0.5 A (1 A)	0.5 A (1,5 A)	0.7 A (1.5 A)	0.7 A (1.5 A)	0.5 A (0,8 A)
of which: continuous motor output (peak) (of which: ONLY funcion outputs)	1.2 A (2.5 A) (0.8 A)	1.2 A (2.5 A) (0.8 A)	1.0 A (1.5 A) (0.8 A)	0.7 A (1.5 A) (0.5 A)	0.5 A (1 A) (0.5 A)	0.5 A (1 A) (0.5 A)	0.7 A (1,5 A) (0,5 A)	0.7 A (1.5 A) (0.5 A)	0.2 A / 5V (0.3 A/5V) (0.5 A)
Function Outputs incl. 2 x headlights (+ logic levels outputs)	10 4 with wires, 6 on s. pads / 9 on PluX22 1 on s. pads (+ 2 logic levels + 1 alt. use of IN1)	4/8 all 4 / 8 on plug (+ 6/2 logic levels + 2 alt. use of IN1/4)	6 4 on wires, 2 on s. pads / 4 on plug, 2 on s. pads (+ 2 logic levels)	6 4 on wires resp. 2 on plugs, 2 resp. 4 on s. pads (+ 2 logic levels)	4 2 on wires, 2 on s. pads / 2 on pins, 4 on s. pads (+ 2 logic levels)	4 2 wires/pins 2 solder pads	4 all 4 on plug (+ 4 logic levels)	8/8 8/4 on plug, 2/4 on s. pads (+ 4/2 logic levels)	4 all 4 on wires
Servo - control lines (complete with 5 V supply)	2 alternative use of logic levels (no, ext. 5V needed)	2 alternative use of logic levels (no, ext. 5V needed)	2 alternative use of logic levels (no, ext. 5V needed)	2 alternative use of logic levels (no, ext. 5V needed)	-	-	2 alternative use of logic levels (no, ext. 5V needed)	2 alternative use of logic levels (no, ext. 5V needed)	-
SUSI - connection alternativly SUSI, I2C, Sound loading	yes alternative use of logic levels on solder pads / PluX	yes altern. use of logic levels on MTC-plug	yes alternative use of logic levels on solder pads/ PluX	yes alternative use of logic levels on solder pads			yes alternative use of logic levels on Next18-plug	yes alternative use of logic levels on E24-plug + on solder pads / on solder pads	-
Switching Inputs for cam sensors, Reed-switches, a.o.	1 on s. pads/ PluX + 2 alternative use of logic levels	2 on MTC-plug + 2 alternative use of logic levels	2 alternative use of logic levels	2 alternative use of logic levels	-	-	2 alternative use of logic levels	2 alternative use of logic levels	-
stabilised low voltage detachable at	-	5 V max. 20mA on solder pad	-	-	-	-	-	5 V max. 10mA /no on E24-plug	5 V max. 50mA on wire
Energy Storage - connect. 15V - capacitors DIRECTLY on the decoder.	yes with wires PluX	yes on solder pads	yes on solder pads / PluX max. 15.000µF	no *	no *	no *	yes on solder pads max 15.000µF	yes on E24-plug & on solder pads max. 15.000µF / on solder pads	yes on wires 2 mini-goldcaps

* „**no**“ for energy storage connection means that, nevertheless,energy storage can be connected to the decoder via the **STACO StayAlive-Controller**.

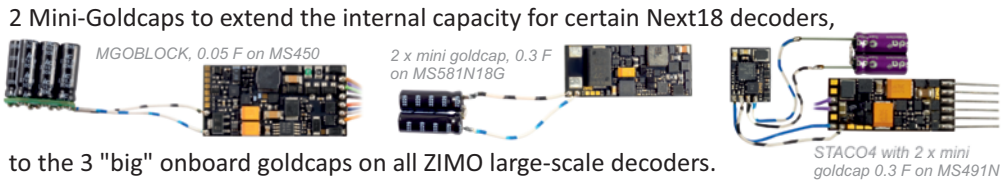


Function decoders	MX671	MX675V	MX685P16	MX689N18
Dimensions (mm) wired types: without shrink tubing	10.5 x 8 x 2.2	25 x 15 x 4	20 x 11 x 3.5	14 x 9.5 x 2.1
Connections wires and/or standard interfaces	9 wires NEM-652 /1	10 wires	PluX-16 / 7 wires	Next18
Function Outputs incl. 2 x headlights (+ logic level outputs)	6	12 (2)	8 (2)	4 (4)
Servo - control lines (complete with 5 V supply)	-	2, alt. zu SUSI	2, alt. zu SUSI	2, alt. zu SUSI
Energy Storage - connect. 15 V - capacitors DIRECTLY on the decoder .	yes (25 V)	yes (16 V)	no	no

StayAlive!

„StayAlive“ - a ZIMO focus: NO voluminous and expensive power packs, but depending on the size ***space-saving, cost-efficient and effective solutions:***

6 modules made of Mini-Goldcaps for direct connection for e.g. H0 decoders,
2 or 3 Mini-Goldcaps in series via StayAlive Controller for miniature decoders,
2 Mini-Goldcaps to extend the internal capacity for certain Next18 decoders,



to the 3 "big" onboard goldcaps on all ZIMO large-scale decoders.

For a **„low-threshold entry“** into StayAlive technology, an Elko with approx. 1000 µF (subject to availability) is included free of charge with every wired decoder. This already achieves a certain effect; however, Goldcap modules for sale achieve many times more.

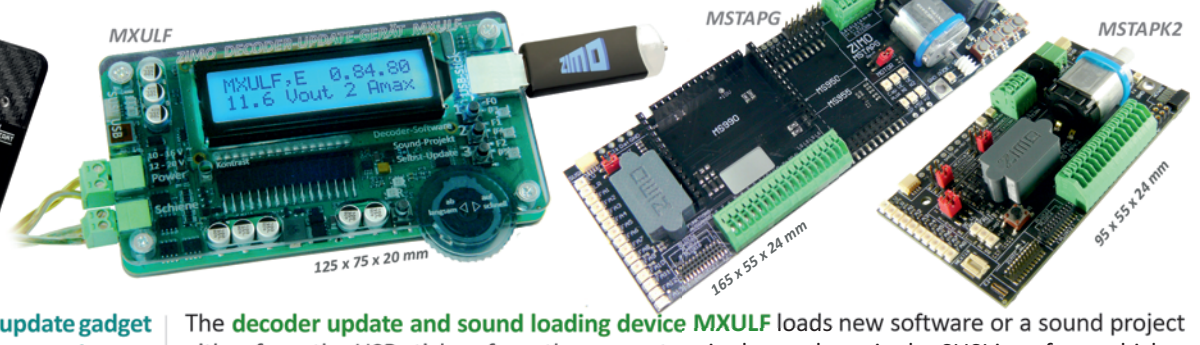
ZIMO Lighting boards

Using the ZIMO special SECOND ADDRESS, which has been adopted from the function decoders and is typically set to the address of the traction unit, all interior lighting and exterior lights can be switched via the functions (function keys) of a single address.

ZIMO KLUG

Compact loading & update gadget
SW & sound loading for **MS/MN** decoders from the computer/ZSP. With all common interfaces!
Coming approx. in the 2nd half of the year.

MXULF and test board MSTAP



The **decoder update and sound loading device MXULF** loads new software or a sound project either from the USB stick or from the computer via the track or via the SUSI interface, which allows very fast loading of sound projects into the decoder: approx. 2 min instead of 30 min.

On the test and connection boards MSTAPK2 (for "small" tracks) and MSTAPG (for ZIMO large scale decoders) there is a direct slot for all ZIMO decoder types with interfaces.