

Decoders 2024

October issue



Multiprotocol: DCC, mfx, MM, analogue

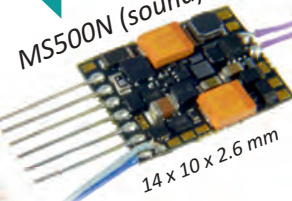
With the introduction of the MS generation, ZIMO decoders are able to handle not only DCC and MM but also the mfx rail signal, including automatic registration with Märklin digital control devices



Next interface with internal or external StayAlive.



Miniature with sound, but without compromises.



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



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

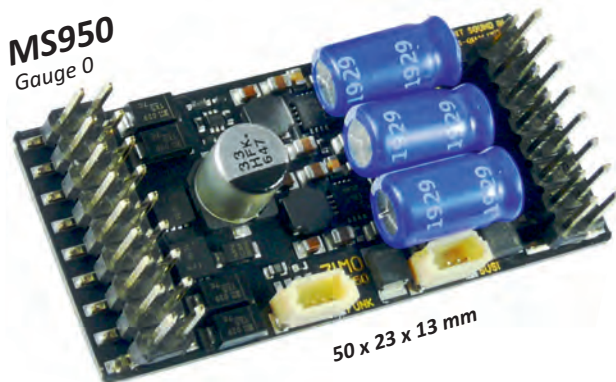
Long-lasting StayAlive onboard Energy storage consisting of 3 supercaps (more efficient than 2) and boost converter.

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 <

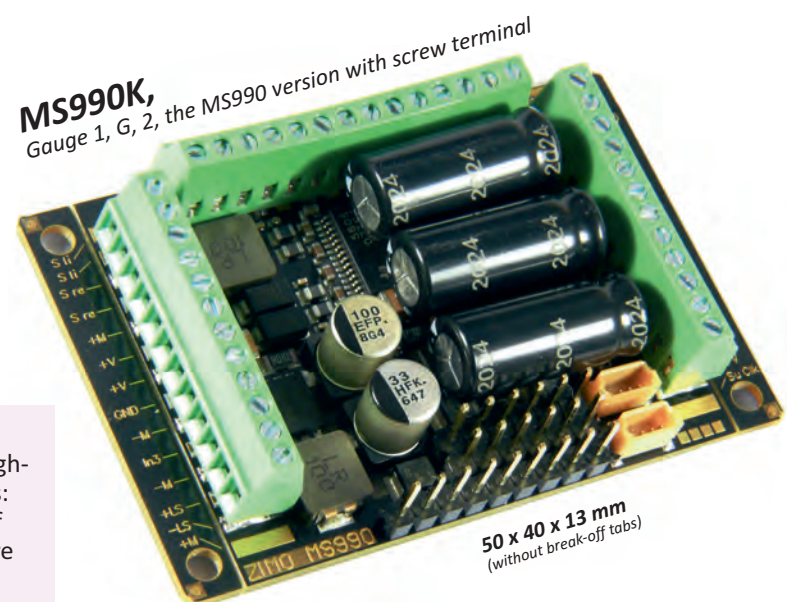
Smoke generators (single, dual) can be operated cost-effectively without external control electronics, via two outputs each for heating elements and fan motors. > ZIMO decoders do it themselves <

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

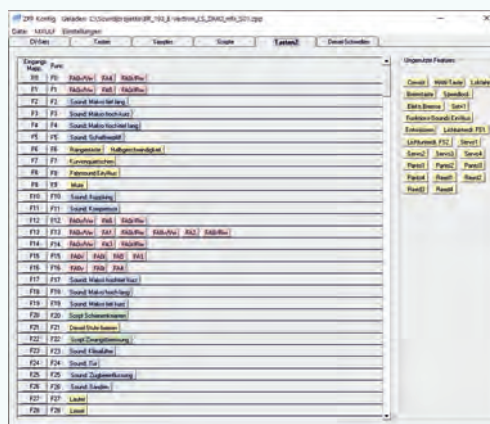
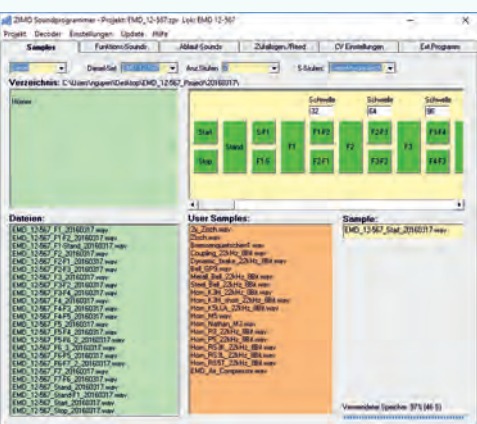
CVs and observing the changes live is only possible in this way. Its omission would be an anachronism (and is still the case elsewhere in the garden railroad sector...).

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.

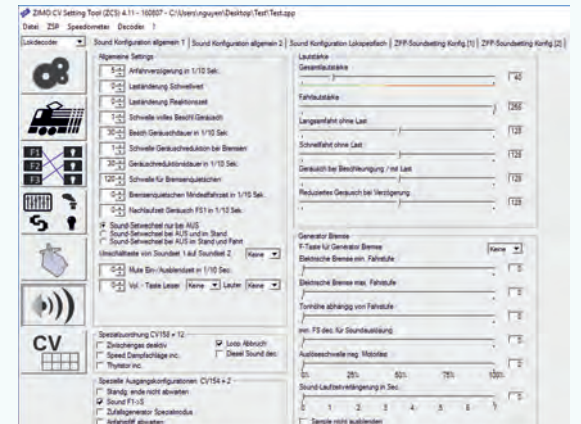


The tools for good sound

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

HLU unmatched for 20+ years

H	Halt	7
S	UH Intermediate	steps
U	Ultra slow	steps
LU	Intermediate	steps
L	slow	steps
FL	Intermediate	steps
F	Full speed	steps
(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 location-dependent 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).

on-track search

All POM

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).

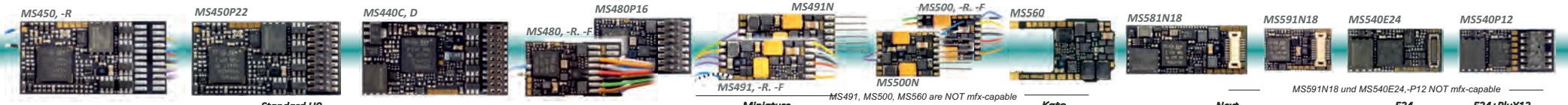


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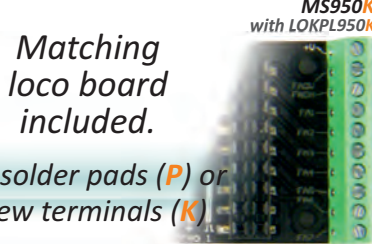
MS SOUND DECODERS

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



	Standard H0				Miniature				Next		E24		E24+PluX12	
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	Next (like EM13)	Next	Next	E24	E24 12				
Continuous Current (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)	0,8 A (1,5 A)				
Function Output incl. 2 headlamps (+ logic)	10 4 with wires, 9 / 4 on plug, 6 on s. pads, 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, 4 on plug, 2 on s. pads (+ 2 logic levels)	5 4 with wires, 1 on s. pads, 2 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, ext. 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necessary)	2 alternative use of logic levels (NO, ext. 5V necessary)	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 solder pads	yes alternative use of logic levels on E24-plug + on s. pads		yes alternative use of logic levels on PluX12 + on solder pads		
Switching Inputs for axis 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 alternative use of logic levels	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		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 tantal. on solder pads)	no	no (max. 1000 µF) on E24 + on s. pads	no (max. 1000 µF) on solder pads				
Loudspeaker - Outputs depend. on Dec. 8Ω or 4Ω (2x8Ω parallel)	1 3 Watt, 4 - 8 Ω on wires / PluX	1 3 Watt, 4 - 8 Ω on MTC-plug	1 1 Watt, 8 Ω on wires / PluX	1 1 Watt, 8 Ω on wires	1 1 Watt, 8 Ω on wires	1 1 Watt, 8 Ω on wires	1 3 Watt / 4 - 8 Ω on Next18-plug	1 1 Watt / 8 Ω on Next18-plug	1 1 Watt / 8 Ω on E24-plug	1 1 Watt / 8 Ω on PluX12 + on solder pads				

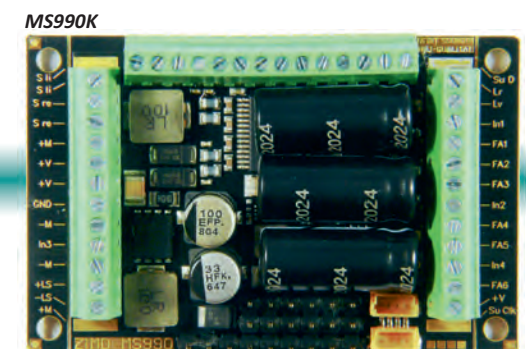
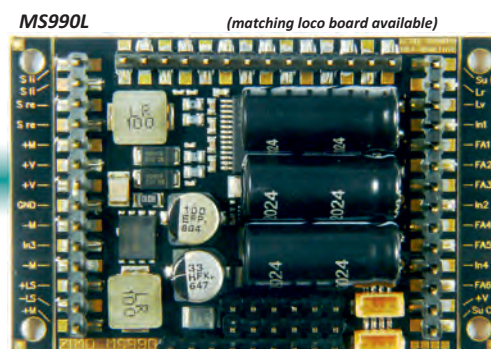
Legend of connection techniques: **12**: free quantity (12) quantity; **22**: PluX-plug (22) PluX22...; **651** | **652**: wires + NEM-plug (651) Nem-651...; **651** | **651**: NEM-651 direct flat (N) / 90° angled (L); **MTC**: ZIMTC-Stecker (C std.) / D (ZIMO); **Next**: Next18-plug; **KATO**: KATO-compatible like [EM13]; **E24**: E24-plug; **E24 12**: E24 with PluX12-plug on adapter board



Matching loco board included.

With solder pads (P) or screw terminals (K)

Gauge 0 and „small large scale“



gauge 1, G, 2, ...

	MS950	MS955	MS990L / MS990K
Dimensions (mm)	50 x 23 x 13	50 x 26 x 13	50 x 40 x 13 (without breakout tabs)
Connections Wires and/or standardized interfaces	34 Pin headers	38 Pin headers	63 Pin headers 38 Screw terminals + Pin headers
Continuous Current (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 5V for Servos a.o. Consumers 5V resp. 10V Audio voltage variable low voltage from 1.5V	1.5 A 0.5 A (5V do not overload!) not available	1.5 A 0.5 A (5V do not overload!) not available	1.5 A 0.5 A (10V - 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 for axis sensors, reed contacts, etc.	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 cam 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 internal storage) external Elkos/Supercap-Block (15 V) on s.pads	internal energy stor. from 3 Supercaps YES (add. to internal storage) external Elkos/Supercap-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 (2x8Ω paral.)	2 3 Watt / 4 Ω on pins	2 5 Watt / 4 Ω on pins	2 10 Watt / 4 Ω on pins

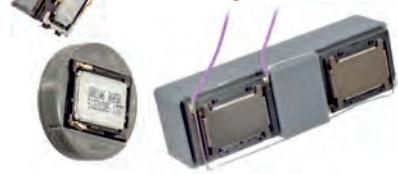
Single and dual smoke generators for large scale

ZIMO smoke generators were specially developed for use together with ZIMO large scale decoders. This minimises the effort for own electronics (only sensor and temperature control on-board) and optimises the function.

Through SLA production (Stereo Lithography), several (also customer-specific) variants with different shapes and dimensions can be manufactured.



Loudspeakers for all scales

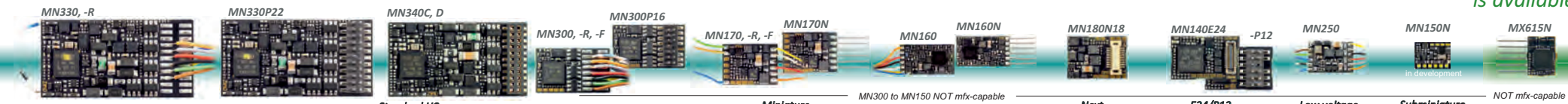


From the small "Sugar Cubes" (rectangular loudspeakers with resonance body) in many variations to large VISATON loudspeakers ...

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.

MX replacement types, until MN subminiature is available.



	Standard H0			Miniature		Next		E24/P12		Low voltage		Subminiature	
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	MN180N18	MN140E24 / MN140P12	MN250	MN150 MN150, -N	MX615 -R, -F, -N			
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	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	8,2 x 5,9 x 2	8,2 x 5,7 x 2			
Connections	9 652 1	FA3-FA6: Logik./amplif.	9 652 1	9 652 1	9 652 1	Next	E24 E24 12	Next	E24 12	7 651			
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)	0,7 A (1,5 A)	0,7 A (1,5 A)	0,5 A (0,8 A)	0,5 A (1,5 A)	0,5 A (1 A)	0,5 A (1 A)		
of which: continuous motor output (peak) (of which: ONLY function outputs)	1,2 A (0,8 A)	1,2 A (0,8 A)	1,0 A (0,8 A)	0,7 A (0,5 A)	0,5 A (0,5 A)	0,7 A (0,5 A)	0,7 A (0,5 A)	0,2 A / 5V (0,3 A/5V)	0,5 A (0,5 A)	0,5 A (0,5 A)	0,5 A (0,5 A)		
Function Outputs incl. 2 x headlights (+ logic levels outputs)	10 4 with wires, 6 on s. pads, 1 on s. pads (+ 2 logic levels + 1 alt. use of IN1)	4/8 all 4 / 8 on plug (+ 5/2 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 s. pads (+ 2 logic levels)	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	4 2 wires/pins 2 solder pads	4 2 wires/pins 2 solder pads	4 2 wires/pins 2 solder pads		
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 alternatively 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	-	-	-	* „no“ for energy storage connection means that, nevertheless, energy storage can be connected to the decoder via the STACO StayAlive-Controller.		
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 on E24-plug / no	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 *	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 *	no *	no *		



	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. 15V - capacitors DIRECTLY on the decoder	yes (25 V)	yes (16 V)	no	no

„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.

MXULF and test board MSTAP



The decoder update and sound loading device MXULF loads the 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.