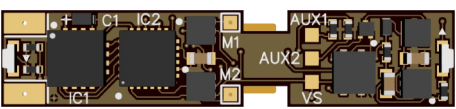
Universal Digital Decoder for AZL and Märklin Diesel Locomotives



User's Manual

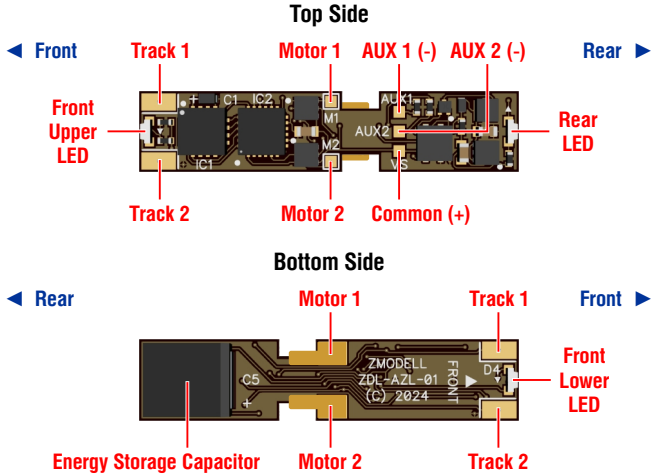
Art. No: ZDL-AZL-01

Suitable for:

AZL 6200 **(GP7)**, 62000 **(GP7/GP9)**,
62100 **(GP30)**, 62500 **(GP38-2)**, 63200 **(SD45)**,
61000 **(SD70, SD70M, SD75M, SD75i)**, 63100 **(SD70ACe)**,
62400 **(ES44AC)**, 62900 **(F3A, F3B)**, 63000 **(F7A, F7B)**,
64600 **(E7A, E7B)**, 62600 **(E8A, E8B, E9A, E9B)**, 63500 **(P42),**
Märklin 88615, 88616 **(GP38-2)**,
88625, 88626, 88627, 88628, 88629 **(E8A, E8B, E9A)**

Ver 1.05

Overview



Package contents

- **1x** ZDL-AZL-01 digital decoder
- **1x** User's Manual

Technical data

Operating mode: DCC, MM, SelecTRIX 1, SelecTRIX 2, DC Analog
Max. voltage: 15 V in digital mode, 12 V in analog mode
Power buffer: Integrated highly efficient 470 µF energy storage module with thermal and overvoltage protection

Functions

F0 – Directionally controlled headlights and tail lights
F1 – Dimming function (brightness of headlights reduced by 50%)
F2 – Shunting mode (maximal speed reduced by 50%, short acceleration and deceleration time)
F3 – AUX 1 output
F4 – AUX 2 output

Default address: 3 (DCC), 01 (SelecTRIX)

Installation

1. Prior to installing the digital decoder, make sure your locomotive runs perfectly in analog mode without jerks and stalls.

2. Separate the locomotive housing and the chassis by pulling the body upwards. Perform this step carefully in order not to damage separately attached parts on the housing like handrails, window hoods etc.

3. Remove the stock analog circuit board by careful pulling its rear end slightly up and then backwards.

IMPORTANT: In case of installing ZDL-AZL-01 digital decoder in any of Märklin E8A, E8B or E9A locomotives (Art. No. 88625, 88626, 88627, 88628, 88629), the small stock circuit board with front LED should be removed from the chassis! It is impossible to use it together with the digital decoder!

4. Carefully install the digital decoder onto the chassis. Prior to this, make sure that the ends of the motor pads on the bottom side of the circuit board are bent down by 60-75 degrees, as shown on the following picture. Do not bend the tabs stronger, otherwise they may break or become crumpled during installation:

ZDL-AZL-01 digital decoder, side view

It is not necessary to additionally isolate the chassis from the motor tabs, since the last ones are positioned far enough from it and normally never come into contact with the chassis.

Important: In some cases, it may be necessary to remove excessive solder from the track pads at the front end of the circuit board to let the digital decoder sit in place correctly. It can be done in two ways: by gentle scratching the solder with a sharp knife or with a soldering iron. Regardless of chosen method, please proceed extremely carefully in order not to damage surrounding components!

5. Use a multimeter to check if the track pads are making good contact with the chassis and also make sure that there is no short circuit between the motor tabs and the chassis.

Information: If the digital decoder is installed correctly and it sits in place completely, but there is still no electric contact between the track pads and the chassis, adding some solder to the track pads on the circuit board may be needed.

Please do it carefully using a soldering iron with thin tip (1-2 mm) and avoid touching surrounding components and making solder bridges!

6. It is recommended to put the locomotive onto the programming track at this step and check if all functions work correctly (reading address, lights and motor).

Tip: In case of incorrect or unreliable reading of the address or adjusting decoder settings, please check if the wheelsets and the track are absolutely clean. It is also recommended to additionally clean the brass springs attached to the chassis and the tabs coming from the trucks. The brass springs can be further bent downwards to put more pressure on the tabs and provide a better electrical connection.

6. If the previous step was successful, the locomotive now needs to be re-assembled completely. For this, carefully install the housing back onto the chassis and gently press on it until it sits on the chassis completely.

7. Put the locomotive onto the track. It is recommended to perform a break-in run at full speed during 5-10 minutes in both directions.

Important: To achieve best driving performance, please always keep the wheelsets of the locomotive and tracks clean from dust, fibers and grease.

Additional Functions

ZDL-AZL-01 digital decoder features two auxiliary outputs with maximum load capability of 300 mA each (total load capacity of the digital decoder including all consumers like motor and lights should not exceed 0.5 A). Auxiliary outputs are shunted with 4.7 kΩ resistors and allow direct connection of LEDs and other consumers. They can be connected to the corresponding pads on the circuit board marked with VS (+) and AUX 1 (-), AUX 2 (-).

It is recommended to use thin stranded flexible wire for this. Single-core enameled cables (magnet wire) are not recommended. The brightness of auxiliary outputs is adjustable (see §10 of the "Programming" section). In case of connecting consumers other than standard LEDs (for example, blinking LEDs), the brightness should be always set to the maximum level. Otherwise, such consumers may show malfunction.

ZDL-AZL-01 digital decoder is equipped with dual warm white front light LEDs on both sides of the circuit board which together provide approximately 4 times higher brightness than the front LED on the stock analog board at full throttle. This feature significantly improves the illumination of headlights on many compatible locomotive models that have weak headlights and/or ditch lights from the factory due to the long and winding lightguides.

Programming

This digital decoder is based on Doehler & Haass® hardware and software technology. For detailed information about all available features and programming in all available modes (DCC, MM, SelecTRIX 1 and 2), please refer to the complete programming manual available on Doehler & Haass® official website: https://doehler-haass.de

1. DCC Address: Default DCC address is 3. To change default address, desired value (1-127) should be written to CV1. Long addresses (0001-9999) available; they are defined by CV17 and CV18; also, CV29 bit 5 should be enabled. Please refer to the complete programming manual available on Doehler & Haass® official website.

2. Starting speed: It is recommended to increase this value if the locomotive does not start at the first speed step. The range is 0-15. Default value is 0.

3. Maximal speed: To adjust maximal speed, change CV5 to desired value (range 0-127). Default value is 92.

4. Shunting speed: To adjust shunting speed, change CV61 to desired value (range 0-127). Default value is 63.

5. Acceleration time: The value of CV3 corresponds to the time in seconds from start to maximum speed (available range 0-255). Default value is 3.

6. Deceleration time: The value of CV4 corresponds to the time in seconds from the maximum speed to stop (available range 0-255). Default value is 3.

7. Acceleration and deceleration time in shunting mode: The value of CV62 corresponds to the time in seconds between stop and maximum speed in shunting mode (available range 0-255). Default value is 1.

8. Driving direction: In certain scenarios, normal driving direction must be inverted (for example, in multiple F/E-units configurations like A-A or similar, when noses of different locomotives in consist point in opposite directions). To invert normal driving direction, write 0 to CV51. The driving direction will also change for analog mode, and the front and tail lights will be inverted correctly, too. Default value is 7.

Note: Please do not use CV29 bit 0 for changing normal driving direction.

9. Deactivation of light functions: Certain locomotive models are equipped with front lights only (F/E A units) either have no lights at all (F/E B units). To use the digital decoder with these models, light functions can be deactivated so that they remain OFF regardless of the status of the F0 function. This setting applies to analog mode, too:

Lights Configuration	CV33	CV34
Front and rear lights (default)	1	2
Front lights only	1	0
Tail lights only	0	2
No lights	0	0

10. LED Brightness: The brightness of the lights can be adjusted. To change it, see the following settings table:

CV	Function	Range	Default
52	Brightness of the front and rear LEDs	0-31	31
53	Brightness of the front and rear LEDs in dimming mode	0-31	15
54	Brightness of the AUX 1 output	0-31	31
55	Brightness of the AUX 2 output	0-31	31

Information: If the LEDs connected to the auxiliary outputs have capacitors connected in parallel, then adjusting the brightness of the auxiliary outputs may have no effect.

11. Auxiliary outputs in analog mode: It is possible to configure which auxiliary outputs should be activated in analog mode:

Auxiliary Outputs Configuration	CV13
AUX 1 and AUX 2 OFF (default)	0
AUX 1 only	4
AUX 2 only	8
AUX 1 and AUX 2 ON	12

Information: Please note that the digital decoder requires at least 6.5-7 Volts in analog mode to start.

12. Decoder reset: To reset decoder to the factory defaults, write 8 to CV8.

ATTENTION: This product is intended only to experienced users! Please perform all operations with all precautions that apply to work with ESD sensitive devices. This product is not suitable for children under 15 years. The functioning of every decoder is fully tested before delivery. Should nevertheless a failure occur, please contact the supplier where you purchased the decoder or directly the manufacturer. The warranty period is one year from the date of purchase. The manufacturer is not responsible for any damage to the train model and/or digital decoder caused by improper installation, assembly or disassembly of the model, as well as by exceeding the maximum allowed operating parameters.

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Art. No: ZDL-AZL-01

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