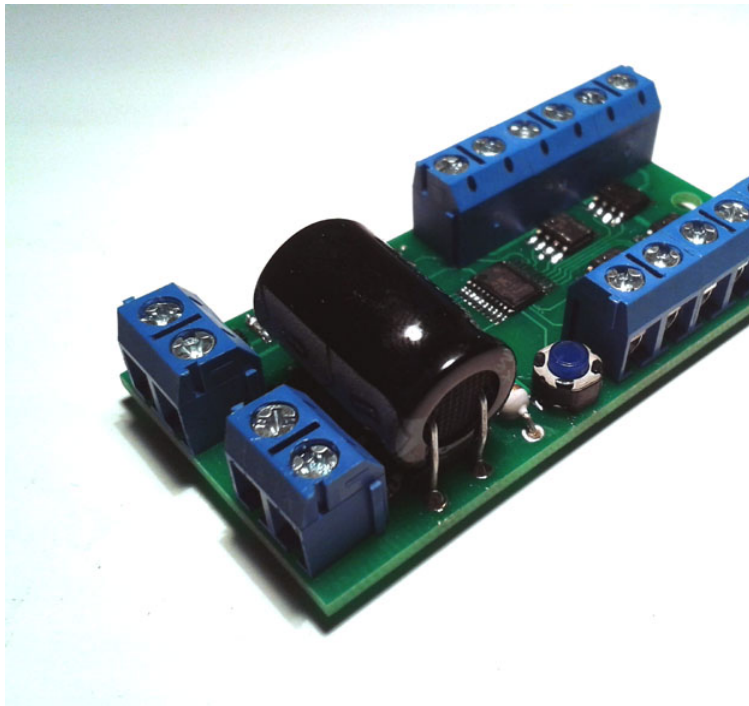




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RLT1410v3

**MÄRKLIN CRAN DECODER
MOTOROLA PROTOCOL**

Document History

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Index

DOCUMENT HISTORY	I
INDEX	II
FIGURES	III
HOW TO USE THIS MANUAL	1
INTENDED USE	1
SECURITY INSTRUCTIONS	2
MECHANICAL RISKS	2
ELECTRICAL RISKS	2
FIRE RISKS	2
BURNS RISKS.....	2
OPERATING DETAILS	3
INSTALATION	4
CONTENT.....	4
TOOLS AND HENDED MATERIALS	4
THE RIGTH WELDING.....	4
BEFORE INSTALLING THE DECODER.....	5
CONNECTING THE POWER SUPPLY.....	5
<i>Connecting the decoder without external power supply</i>	5
<i>Connecting the decoder with external power supply</i>	5
CONECTION TO A MÄRKLIN 7051 CRANE	5
DIAGRAMS FOR USING THE OTHER DECODER OUTPUTS	6
PROGRAMMING	7
SETTING THE ADDRESS WITH CONTROL UNIT (6021)	7
SETTING THE ADDRESS WITH CENTRAL STATION 1	7
SETTING THE CONFIGURATION VALUES (CV) WITH CENTRAL STATION 2	7
SETTING THE CONFIGURATION VALUES (CV) WITH MOBILE STATION 1.....	7
SETTING THE CONFIGURATION VALUES (CV) WITH MOBILE STATION 2.....	7
CRANE CONTROL	8
FREQUENTLY ASKED QUESTIONS	9
WARRANTY CONDITIONS	9
TECHNICAL SPECIFICATION	10

Decoder RLT1410v3



Figures

FIGURE 1 – DECODER CONNECTION DIAGRAM	6
FIGURE 2 – CABLE COLOR EXPLANATION.....	6

Images

How to use this manual

Even if you have no technical training, this manual provides step by step instructions to ensure proper installation and operation of this decoder. Before you begin, please read the entire manual, including on the safety chapter and frequently asked questions. Keep this manual if you want to give this decoder to another person.

Intended use

This decoder is designed to be installed in Märklin 7051 crane, motorized with two altern current motors and his electromagnet. Only recognizes the Motorola digital data format . These data is normally sent by Digital Central Device and will control the motor of the turnout. Any other use or misuse voids the warranty.



Please note that the integrated components and circuits used in this decoder are sensitive to static electricity. Before handling the decoder please discharge yourself touching any metal object (radiator, etc).

Security Instructions

Mechanical Risks

Be careful to cut the wires, the cutting tools may have sharp edges and can cause serious injury. Visibly damaged tools can cause unpredictable damage.

Electrical Risks

When you connect the decoder must take special care to avoid :

- Short circuit.
- Connect the decoder to a different voltage than that specified.
- High humidity. Condensation can cause serious injury from electrical shock. You must installing the decoder only in dry clean rooms.
- Connect high current devices to the decoder outputs.
- Only use transformers and welders in approved outlets installed by a licensed electrician.
- Respect the needs of cable diameter.

Fire Risks

Touching flammable materials with a hot soldering station can cause fire, which may result in injury or death from burns or suffocation. Connect the welding or soldering station only when needed. Never leave a hot soldering without paying enough attention.

Burns Risks

A hot welder accidentally touching your skin can cause burns:

- *Always place the soldering station on a suitable support.*
- *Remove the tin from the soldering tip with a wet cloth or a thick sponge.*

Operating Details

The device was designed to work with the Motorola protocol. The decoder receives the data from the central station and selects the packets that have the right address. This information will be used to control the turnouts. The maximum current controlled to protect the output transistors .

The decoder is programmed with the "One-Touch" technology, this simple method simplify the programming procedure. The digital input is optically isolated and let the decoder to be connected to an external transformer.

Instalation

Content

Verify the content and check that you have the following elements:

1 Decoder

Tools and hended materials

Before start be, sure that you have the following tools and materials ready to use:

- An electronic soldering (30 W max.) With a fine tip.
- One foot for soldering
- A sponge tip for cleaning
- A small wire cutter
- A pair of tweezers
- Tin (preferably 0.5 mm in diameter)

The righth Welding



ATTENTION: Welding incorrectly can cause fires and burns. Avoid these dangers by following the instructions contained in this section.

Use a small soldering iron of maximum of 30 watts. Keep clean soldering iron tip so that heat is transferred in proper form to the tin and perform an effective welding. Use specific electronic tin SN / preferably PB 63/37 with flux, this type of tin due to its characteristics of solidification prevents the "cold welding". To make a good welding the soldering iron must be clean and free of rust, preferably using a ceramic tip. Clean the soldering tip with a damp cloth or a piece of cloth. Weld quickly, mantaining the soldering iron the board longer than necessary can damage components and / or copper tracks. Apply the soldering tip to heat the cable and the track simultaneously, just in that momment add tin (not too much). As soon as the tin becomes liquid over the track and cable, remove it slowly. Keep the soldering iron in place for a few seconds, to let the tin flow around the cable / contact, then remove the soldering iron. The cable / contact must remain together approximately 5 seconds after removing the tin.

Welds should be shiny, this indicates that the procedure was successful. After checking the welding (preferably with a magnifying glass), check that there are no unwanted shorts circuits. Inadequate or faulty welding may cause damage to the decoder or cause faulty operation. You can remove the excess of tin in the contacts putting the soldering in place you want to correct, let the tin will become liquid again and can remove excess.

Before installing the decoder

Before installing the decoder verify that the total consumption of the accessories / coils you are going to connect is lower than the maximum total consumption defined in the technical specification (1500mA)

The decoder can be damaged if it's exposed for a long time to high currents that exceed the specified value.

Connecting the power Supply

Connecting the decoder without external power supply

If you DON'T want to use an external transformer and use the Central Station power, you can connect the AC/DC to the Digital Input , and connect all together to the Central Station digital output.

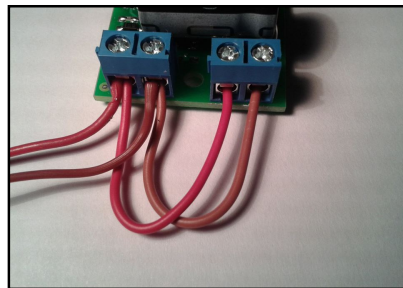


Image 1 – Connection without External Transformer



NEVER LET THE CENTRAL STATION DIGITAL OUTPUT TO BE CONNECTED TO THE EXTERNAL TRANSFORMER. IF THE CENTRAL STATION DIGITAL OUTPUT IS ACCIDENTALLY CONNECTED TO AN EXTERNAL TRANSFORMER THE CENTRAL WILL BE DAMAGED.

Connecting the decoder with external power supply

The RLT1410 decoder has the digital input optically isolated from the rest of the circuit, this feature lets you connect an external transformer without risk of damage the digital central. The digital output from the central station must be connected to the digital input of the decoder. The external transformer must be connected to the AC/DC input. We recommend an 16v AC transformer or a 18V DC power supply.

Connection to a Märklin 7051 crane

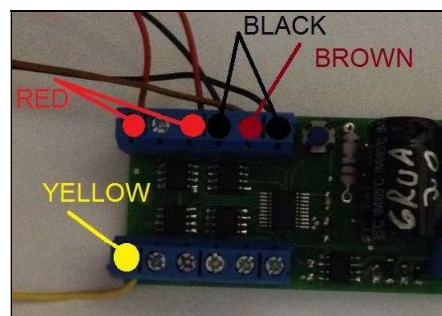
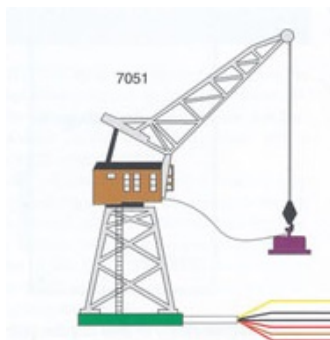


Image 2 - Connection to a Märklin 7051 crane

Diagrams for using the other decoder outputs

Look carefully the follow color diagram of Figure 1 and Figure 2, paying attention to the colors of the cables and the positions where they are placed.

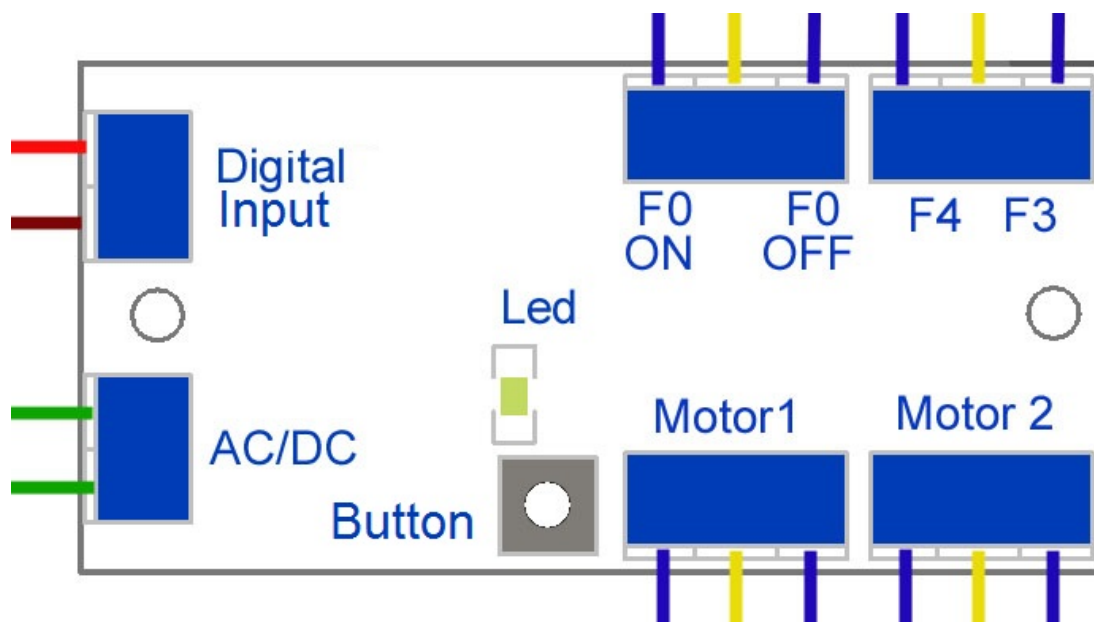


Figure 1 – Decoder connection diagram

RED	Connection to central track (Digital)
BROWN	Connection to outer track (Digital)
GREEN	Connection to the external transformer
GREEN	Connection to the external transformer
BLUE	Conection to the Coil / Accesory for Motor/Function
YELLOW	Connection to the Coil / Accesory (Common Point)
BLUE	Conection to the Coil / Accesory for Motor/Function

Figure 2 – Cable color explanation

Programming

The decoder has the possibility to program the CV parameters "on track" without use dip-switches. The decoder has been tested with all the Märklin centrals and also with the ESU centrals. Before starting the programming remove all the other locomotives from the track. The default decoder address is number 40.

Setting the address with Control Unit (6021)

To enter in program mode you must remove the digital power from the track pressing the "STOP" button, then press "START", and as fast as you can, change the direction with the red knob several times until the front and rear light begin to blink. This procedure must be done during the first 5 seconds since the locomotive gets power . You can repeat this procedure as many times as you want until enter in programing mode. The decoder will show the entering into the programming mode blinking the lights five times.

When you were sure that the locomotive is into the program mode, follow the steps below to program the CV:

- 1) *Write the 01 to modify the CV1 that corresponds to the address .*
- 2) *Invert the direction with the red knob. The lights will blink one time during one second, indicating that the CV number was correctly received by the decoder.*
- 3) *Write the new value of the address you want to store in the decoder.*
- 4) *Invert the direction with the red knob. The lights will blink several times during one second, indicating that the CV value number was correctly received by the decoder.*
- 5) *Press "STOP".*
- 6) *Press "START". The decoder will startup with the new modified CV value.*

Setting the address with Central Station 1

Refer to the manual of the Central Station to find the address programming procedure and program the decoder like a Marklin 60760

Setting the Configuration values (CV) with Central Station 2

Refer to the manual of the Central Station 2 to find the address programming procedure and program the decoder like a Marklin 60760

Setting the Configuration values (CV) with Mobile Station 1

Refer to the manual of the Mobile Station 1 to find the address programming procedure and program the decoder like a Marklin 60760

Setting the Configuration values (CV) with Mobile Station 2

Refer to the manual of the Mobile Station 2 to find the address programming procedure and program the decoder like a Marklin 60760

Crane control

To program the crane address, consider the device a Motorola Programable Locomotive, using the programing method described in your digital central.

Pressing F1 you select the motor 1 , and using the locomotive knob you can control de direction and the speed of the motor.

Pressing F2 you select the motor 2 , and using the locomotive knob you can control de direction and the speed of the motor.

Pressing F3 you contol the F3 Output

Pressing F4 you contol the F4 Output

Presing F0 (light Function) you control the F0 output , this output is commonly used to control the electromagnet and the light of the crane.

Frequently asked questions

The decoder is really hot or is smoking.

Remove the power from the decoder immediately!

Possible cause : One or more connections are wrong ,please recheck the connections.

Possible cause: Short circuit . Remove the cover and take a look to find if some cable or the decoder are touching the frame or the chassis .

Warranty Conditions

All products are tested during production. This product is guaranteed for one year months. The warranty includes the correction of faults that are due to a defect in material or manufacturing. We guarantee the compliance of the technical specifications if the decoder was installed and connected according to the manual. We are not responsible for damages or consequential damages during the connection of this product. We reserve the right to make improvements, supply spare parts or return the purchase price.

The following invalidate the warranty:

- Misuse of soldering or tin.
- If the damage is caused by failure due to not following the instructions in this manual.
- If the module has been altered.
- If copper or copper tracks are lifted.
- If damage occurs due to an overload of the module.
- If you connected the decoder to a wrong voltage or over current.
- If it is damaged by negligent use or abuse.
- If it is damaged by electrostatic discharge on components.

Decoder RLT1410v3



Technical Specification

Data Format: Motorola

Power Supply : 12-24 V

Consumption w/o Load: 6mA

Total Consumption: 1500 mA

Max. Output Consumption: 1500mA

Usage Temperature: 0 a 45 C

Humidity: 85 %

Dimensions: 64 x 32 x 15 mm

Weight : 12,1 g