Manual

Adapter for PluX22- and 21MTC-Interface

Item no. 70-01045

| PluX22 |
| NEM 658 \| RCN-122 |

| NEM 660 |
| RCN-121 |

tams elektronik

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Subject to technical modification.

1. Getting started

How to use this manual

This manual gives step-by-step instructions for safe and correct assembly of the kit and fitting and connecting of the ready-built module, and operation. Before you start, we advise you to read the whole manual, particularly the chapter on safety instructions and the checklist for trouble shooting. You will then know where to take care and how to prevent mistakes which take a lot of effort to correct.

Keep this manual safely so that you can solve problems in the future. If you pass the kit or the ready-built module on to another person, please pass on the manual with it.

Intended use

The adapter is designed to be operated according to the instructions in this manual in digital model railroad vehicles. Any other use is inappropriate and invalidates any guarantees.

The adapter should not be assembled or mounted by children under the age of 14.

Reading, understanding and following the instructions in this manual are mandatory for the user.

Checking the package contents

Please make sure that your package contains:
- one adapter PCB
- one 22-pole plug connector for use as MTC-interface
- this manual

Required materials

For assembling the kit you need:

- an electronic soldering iron (max. 30 Watt) or a regulated soldering iron with a fine tip and a soldering iron stand
- a tip-cleaning sponge
- a heat-resistant mat
- a small side cutter and wire stripper
- as necessary a pair of tweezers and long nose pliers
- electronic tin solder, recommended diameter: 0,5 mm
- wire, recommended diameters: 0,04 to 0,10 mm² (depending on the load)

2. Safety instructions

Mechanical hazards

Cut wires can have sharp ends and can cause serious injuries. Watch out for sharp edges when you pick up the PCB.

Visibly damaged parts can cause unpredictable danger. Do not use damaged parts: recycle and replace them with new ones.

Electrical hazards

- Touching powered, live components,
- touching conducting components which are live due to malfunction,
- short circuits and connecting the circuit to another voltage than specified,
- impermissibly high humidity and condensation build up

can cause serious injury due to electrical shock. Take the following precautions to prevent this danger:

- Never perform wiring on a powered module.
- Assembling and mounting the kit should only be done in closed, clean, dry rooms. Beware of humidity.
- Only use low power for this module as described in this manual and only use certified transformers.
- Connect transformers and soldering irons only in approved mains sockets installed by an authorised electrician.
- Observe cable diameter requirements.
- After condensation build up, allow a minimum of 2 hours for dispersion.
- Use only original spare parts if you have to repair the kit or the ready-built module.

Fire risk

Touching flammable material with a hot soldering iron can cause fire, which can result in injury or death through burns or suffocation. Connect your soldering iron or soldering station only when actually needed. Always keep the soldering iron away from inflammable materials. Use a suitable soldering iron stand. Never leave a hot soldering iron or station unattended.

Thermal danger

A hot soldering iron or liquid solder accidentally touching your skin can cause skin burns. As a precaution:

- use a heat-resistant mat during soldering,
- always put the hot soldering iron in the soldering iron stand,
- point the soldering iron tip carefully when soldering, and
- remove liquid solder with a thick wet rag or wet sponge from the soldering tip.

Dangerous environments

A working area that is too small or cramped is unsuitable and can cause accidents, fires and injury. Prevent this by working in a clean, dry room with enough freedom of movement.

Other dangers

Children can cause any of the accidents mentioned above because they are inattentive and not responsible enough. Children under the age of 14 should not be allowed to work with this kit or the ready-built module.

> ⚠ **Caution:**
>
> Little children can swallow small components with sharp edges, with fatal results! Do not allow components to reach small children.

In schools, training centres, clubs and workshops, assembly must be supervised by qualified personnel.

In industrial institutions, health and safety regulations applying to electronic work must be adhered to.

3. Safe and correct soldering

⚠ Caution:

Incorrect soldering can cause dangers through fires and heat. Avoid these dangers by reading and following the directions given in the chapter **Safety instructions**.

- Use a small soldering iron with max. 30 Watt or a regulated soldering iron.
- Only use electronic tin solder with flux.
- When soldering electronic circuits never use soldering-water or soldering grease. They contain acids that can corrode components and copper tracks.
- Insert the component connecting pins into the PCB´s holes as far as possible without force. The components should be close to the PCB`s surface.
- Observe correct polarity orientation of the parts before soldering.
- Solder quickly: holding the iron on the joints longer than necessary can destroy components and can damage copper tracks or soldering eyes.
- Apply the soldering tip to the soldering spot in such a way that the part and the soldering eye are heated at the same time. Simultaneously add solder (not too much). As soon as the solder becomes liquid take it away. Hold the soldering tip at the spot for a few seconds so that the solder flows into the joint, then remove the soldering iron.

- Do not move the component for about 5 seconds after soldering.
- To make a good soldering joint you must use a clean and unoxidised soldering tip. Clean the soldering tip with a damp piece of cloth, a damp sponge or a piece of silicon cloth.
- Cut the wires after soldering directly above the soldering joint with a side cutter.
- After placing the parts, please double check for correct polarity. Check the PCB tracks for solder bridges and short circuits created by accident. This would cause faulty operation or, in the worst case, damage. You can remove excess solder by putting a clean soldering tip on the spot. The solder will become liquid again and flow from the soldering spot to the soldering tip.

4. Operation overview

The adapter is used to upgrade vehicles with a PluX or MTC interface interface. There is a 22-pole socket soldered on to the adapter PCB which is used to insert the plug connector of the decoder-sided PluX interface. In order to connect the adapter to the the decoder-sided MTC interface, the extra 22-pole plug connector has to be inserted into the adapter PCB.

Info	PluX interfaces	MTC interfaces
Standard	NEM 658 (or RCN-122)	NEM 660 (or RCN-121)
Number of pins	12, 16 or 22	22
Plug connector	on the decoder	in the vehicle
Socket	in the vehicle	on the decoder

PluX interfaces for different gauges

PluX-interfaces have 12, 16 or 22 connector pins and that way are suitable to be mounted in vehicles of different gauges (or with varying space requirements). The assignment of the different versions allows to insert a plug connector with 12 or 16 connector pins into a socket with a larger number of connections.

Index-pin

For both types of interfaces the position of an index-pin which should not be used has been defined. By means of the index-pin you can distinguish the direction for inserting the plug connector into the socket. At the position of the plug connector in question the pin should be removed.

5. Technical specifications

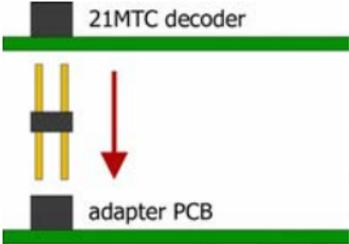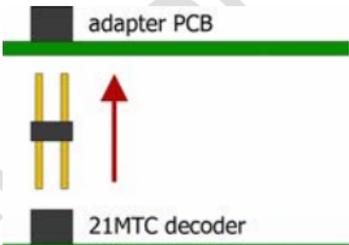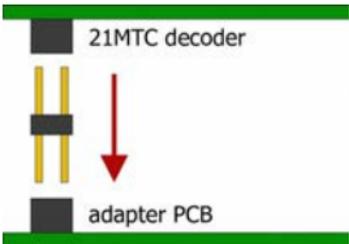|	
Max. current per connecting pin	1.000 mA
Protected to	IP 00
Ambient temperature in use	0 ... +60 °C
Ambient temperature in storage	-10 ... +80 °C
Comparative humidity allowed	max. 85 %
Dimensions of the PCB (approx.)	15 x 24 mm
Weight of the assembled board (approx.)	1.3 g

6. Mounting versions

The (PluX- or MTC-) vehicle decoder can be inserted as well from the top as from the bottom into the adapter PCB. The assignment of the PCB´s contacts depends on the direction of inserting the decoder.

6.1. Mounting versions for PluX decoders
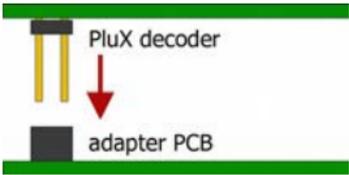
Version 1: Inserting direction from top	
Version 2: Inserting direction from bottom	
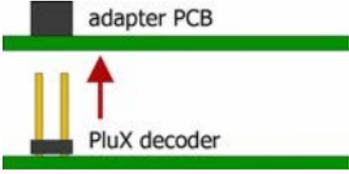
6.2. Mounting versions for MTC decoders

Version 1 a: Inserting direction from top **+** socket terminal strip of the decoder on top	21MTC decoder adapter PCB
Version 1 b: Inserting direction from bottom **+** socket terminal strip of the decoder on top	adapter PCB 21MTC decoder
Version 2 a: Inserting direction from top **+** socket terminal strip of the decoder at the bottom	21MTC decoder adapter PCB
Version 2 b: Inserting direction from bottom **+** socket terminal strip of the decoder at the bottom	adapter PCB 21MTC decoder
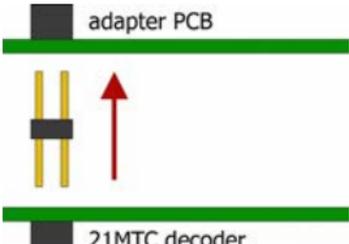
7. Assembling the kit

Solder the connecting cables on the top side of the adapter PCB. Observe the different assignments for PluX and MTC interfaces and the different mounting versions.

It is recommended to use cables of different colours according to NEM 658 or NEM 660 in order to avoid mistakes when connecting the adapter PCB.

> **⚠ Caution:**
>
> Confusing the connections can cause damages at the deocder and/or at the vehicle. For that reason you should be very attentive when assigning the connections.

7.1. Assignment for PluX adapters (NEM 658/RCN-122)

	Mounting version 1 inserting direction from top	Mounting version 2 inserting direction from bottom
PluX adapter		
	Figure: Top side of the adapter PCB Assignment for use according to PluX (NEM 658 / RCN-122) 11 = Index-Pin	

Pin	Name	Description Plux adapter	Cable colour
1	GPIO/C	universal input/output	
2	AUX3	output 3	
3	GPIO/B	universal input/output, train-bus pulse	
4	GPIO/A	universal input/output, train-bus data	
5	GND	decoder ground, pick-off after rectifier	
6	V+ Cap.	decoder plus, pick-off after rectifier, connection storage capacitor	blue
7	F0f	lighting forward direction	white
8	Motor 1	motor connection 1 (+) / forwards	orange
9	V+	decoder plus, pick-off after rectifier	blue
10	Motor 2	motor connection 2 (-) / backwards	grey
11	Index	not in use, coding	
12	Rails 1	current collector right in forward direction of motion	red
13	F0r	lighting backward direction	yellow
14	Rails 2	current collector left in forward direction of motion	black
15	LS/A	loudspeaker connection A	
16	AUX1	output 1	green
17	LS/B	loudspeaker connection B	
18	AUX2	output 2	violet
19	AUX4	output 4	
20	AUX5	output 5	
21	AUX6	output 6	
22	AUX7	output 7	

7.2. Assignment for 21MTC adapters (NEM 660/RCN-121)

In order to avoid damage due to a connection of the decoder with reversed polarity, you sould remove the index pin (pin 11) at the 22-pole plug connector. You can withdraw the pin with small pliers.

MTC adapter	Mounting version 1 (a and b) Socket terminal strip of the decoder on top	Mounting version 2 (a and b) Socket terminal strip of the decoder at the bottom
	Figure: Top side of the adapter PCB Assignment for use according to 21MTC (NEM 660 / RCN-121) 11 = Index-Pin	

Pin	Name	Description MTC adapter	Cable colour
1	Input1	sensor input 1	
2	Input2	sensor input 2	
3	AUX6	output 6	
4	AUX4	output 4	
5	ZBCLK	pulse generator train bus	
6	ZBDTA	data train bus (TxD, RxD)	
7	F0r	lighting forward direction	yellow

Pin	Name	Description MTC adapter	Cable colour
8	F0f	lighting backward direction	white
9	LS/A	loudspeaker connection A	brown
10	LS/B	loudspeaker connection B	brown
11	Index	not in use, coding	
12	Vcc	internal decoder voltage 1,8 – 5,7 volts	
13	AUX3	output 3	
14	AUX2	output 2	violet
15	AUX1	output 1	green
16	V+	decoder plus, pick-off after rectifier, connection storage capacitor	blue
17	AUX5	output 5	
18	Motor2	motor connection 2 minus / backwards	grey
19	Motor1	motor connection 1 plus / forwards	orange
20	GND	decoder ground, pick-off after rectifier	
21	rails left	rails left in forward direction of motion	black
22	rails right	rails right in forward direction of motion	red

7.3. Performing a visual check

After having soldered the cables you should perform a visual check and remedy defects.

- Check if soldering joints closely adjoining are connected to each other by accident. Risk of short circuit!
- Check if you have assigned the connecting cables on the adapter PCB properly to the connections of the decoder.

⚠ **Caution:**

Confusing the connections can cause damages at the deocder and/or at the vehicle. For that reason you should be very attentive when assigning the connections.

8. Check list for troubleshooting

- Parts are getting too hot and/or start to smoke.

⚠ **Disconnect the system from the mains immediately!**

Possible cause: The connecting cables on the PCB are badly assigned to the connections of the decoder or the vehicle. → Perform a visual check (→ chapter 7) and remedy defects. Damage on the decoder or the vehicle cannot be excluded.

Possible cause: The plug connector or the socket have been inserted the wrong way. → Check the connections and remove the index pin to avoid mistakes like these.

- You cannot switch function outputs of the decoder.

Possible cause: The connecting cables have not been soldered properly. → Check the soldering joints.

Possible cause: The cables on the PCB have not been assigned properly to the decoder / the connections in the vehicle. → Check the connections.

Possible cause: The plug connector or the socket have been inserted the wrong way. → Check the connections and remove the index pin to avoid mistakes like these.

Hotline: If problems with your module occur, our hotline is pleased to help you (mail address on the last page).

Repairs: You can send in a defective module for repair (address on the last page). In case of guarantee the repair is free of charge for you. With damages not covered by guarantee, the maximum fee for the repair is the difference between the price for the ready-built module and the kit according to our valid price list. We reserve the right to reject the repairing of a module when the repair is impossible for technical or economic reasons.

Please do not send in modules for repair charged to us. In case of warranty we will reimburse the forwarding expenses up to the flat rate we charge according to our valid price list for the delivery of the product. With repairs not covered by guarantee you have to bear the expenses for sending back and forth.

9. Guarantee bond

For this product we issue voluntarily a guarantee of 2 years from the date of purchase by the first customer, but in maximum 3 years after the end of series production. The first customer is the consumer first purchasing the product from us, a dealer or another natural or juristic person reselling or mounting the product on the basis of self-employment. The guarantee exists supplementary to the legal warranty of merchantability due to the consumer by the seller.

The warranty includes the free correction of faults which can be proved to be due to material failure or factory flaw. With kits we guarantee the completeness and quality of the components as well as the function of the parts according to the parameters in not mounted state. We guarantee the adherence to the technical specifications when the kit has been assembled and the ready-built circuit connected according to the manual and when start and mode of operation follow the instructions.

We retain the right to repair, make improvements, to deliver spares or to return the purchase price. Other claims are excluded. Claims for secondary damages or product liability consist only according to legal requirements.

Condition for this guarantee to be valid, is the adherence to the manual. In addition, the guarantee claim is excluded in the following cases:

- if arbitrary changes in the circuit are made,
- if repair attempts have failed with a ready-built module or device,
- if damaged by other persons,
- if damaged by faulty operation or by careless use or abuse.

10. EU declaration of conformity

$C\epsilon$ This product conforms with the EC-directives mentioned below and is therefore CE certified.

2004/108/EG on electromagnetic. Underlying standards: EN 55014-1 and EN 61000-6-3. To guarantee the electromagnetic tolerance in operation you must take the following precautions:

- Connect the transformer only to an approved mains socket installed by an authorised electrician.
- Make no changes to the original parts and accurately follow the instructions, connection diagrams and PCB layout included with this manual.
- Use only original spare parts for repairs.

2011/65/EG on the restriction of the use of certain hazardous substances in electrical and electronic equipment (ROHS). Underlying standard: EN 50581.

11. Declarations conforming to the WEEE directive

This product conforms with the EC-directive 2012/19/EG on waste electrical and electronic equipment (WEEE).

Don´t dispose of this product in the house refuse, bring it to the next recycling bay.

Information and tips:

http://www.tams-online.de

Warranty and service:

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