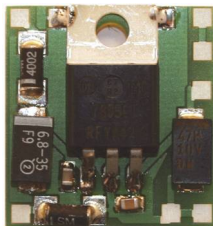


Manual

# Servo board

Item number 70-05900



Voltage / Power supply  
for Servos

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### **Version 2.0 10/2021**

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#### **Printing the manual**

The formatting is optimised for double-sided printing. The standard page size is DIN A6. If you prefer a larger display, printing on DIN A5 is recommended.

## 1. Getting started

### **How to use this manual**

This manual will help you step by step to connect and use the board safely and properly. Before you start connecting, read these instructions completely, especially the safety instructions and the section on possible errors and how to rectify them. You will then know what you have to observe and thus avoid errors that can sometimes only be rectified with a great deal of effort.

Keep this manual safely so that you can solve problems in the future. If you pass the board on to another person, please pass on the manual with it.

### **Intended use**

The servo board is designed to be operated according to the instructions in this manual in model building, especially with model railways. Any other use is inappropriate and invalidates any guarantees. The servo board should not be 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 servo board

A servo is not included in the scope of delivery. The board is optimised for combination with 9 g servos whose dimensions correspond to the board (e.g. Tower Pro SG 90, art. no. 70-05113).

## Required materials

To connect the board you will need:

- a soldering iron with temperature control and a thin tip and a deposit stand or a controlled soldering station
- a scraper, rag or sponge
- a heat-resistant pad
- a small pair of side cutters and wire strippers
- electronic solder (preferably 0.5 to 0.8 mm diameter)
- wire, recommended diameters:  $\geq 0,10 \text{ mm}^2$  for all connections

## 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 soldering iron with temperature control, which you set to approx. 300 °C.
- Only use electronic solder with a flux.
- Never use soldering fluid or soldering grease when soldering electronic circuits. These contain an acid that destroys components and conductor paths.
- Solder quickly: Soldering for too long can detach solder pads or tracks or even destroy components.
- Hold the soldering tip on the soldering point so that it touches the wire and the pad at the same time. Add (not too much) solder simultaneously. As soon as the solder begins to flow, remove it from the soldering point. Then wait a moment for the solder to flow well before removing the soldering iron from the soldering joint.
- Do not move the created solder joint for about 5 seconds.
- A clean, non-oxidized soldering tip is essential for a perfect soldering joint and good soldering. Therefore, before each soldering, wipe off excess solder and dirt with a damp sponge, a thick damp cloth or a silicone wiper.
- After soldering, check (preferably with a magnifying glass) whether connections or tracks have been bridged with solder by mistake. This can lead to malfunction or destruction of components or, in the worst case, the complete circuit. You can re-liquefy excess solder with the clean hot soldering tip. The solder then flows from the board onto the soldering tip.

## 4. Operation overview

Typical model making servos require a voltage of 5 V and a current of up to 1 A. The servo board is used when a circuit sends a servo signal but cannot provide the required voltage and / or current for the servo.

### **Examples of use:**

- Vehicle decoders (locomotive and function decoders) that provide a servo signal at an output. Both the maximum total current and the voltage at the servo output are usually too low to supply a servo.
- Other circuits that provide a servo signal at an output, but where both the maximum total current and the voltage at the servo output are too low to supply a servo (e.g. some versions of the Light Computer "Next Generation").
- Circuits for controlling servos (e.g. servo decoders, analogue servo controls). These are usually designed for the direct connection of one servo per output. If more servos are to be connected to the same output, the maximum current is often not sufficient.



## 5. Technical specifications

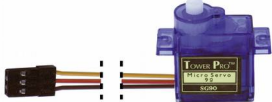
Supply voltage	DC or digital voltage: max. 30 V AC voltage: max. 20 V
Max. current for servo output	Peak (up to 10 sec.): 1.000 mA Permanent: 500 mA
Protected to	IP 00
Ambient temperature in use	0 ... +60 °C
Ambient temperature in storage	-10 ... +80 °C
Comparative humidity allowed	max. 85 %
Dimensions of the PCB (approx.)	23 x 23 mm
Weight of the circuit (approx.)	5 g

## 6. Connecting the Servo board

### Info servos

The pin assignment of servos of different manufacturers and/or types may differ with regard to both the sequence and the colour of the connecting cables. The red connection cable is usually intended for connection to the power supply (+ 5 V). Therefore, be sure to observe the specifications for the respective servo.

**Example:** Terminal assignment Tower Pro SG 90

	yellow	Signal
	red	+ 5 V
	brown	GND



### Note:

If you interchange the connections for earth and power supply, the servo may be damaged.

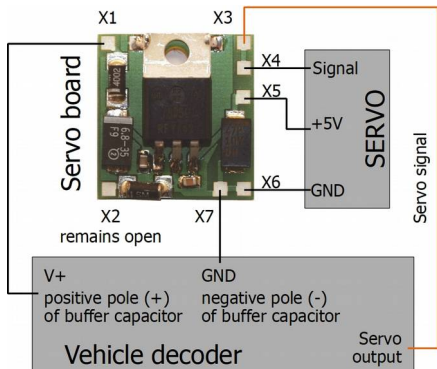
### Attaching the servo board

The servo board is optimised for combination with 9 g servos whose dimensions correspond to those of the board. You can attach the servo board to the side surface of the servo with double-sided adhesive tape, for example.



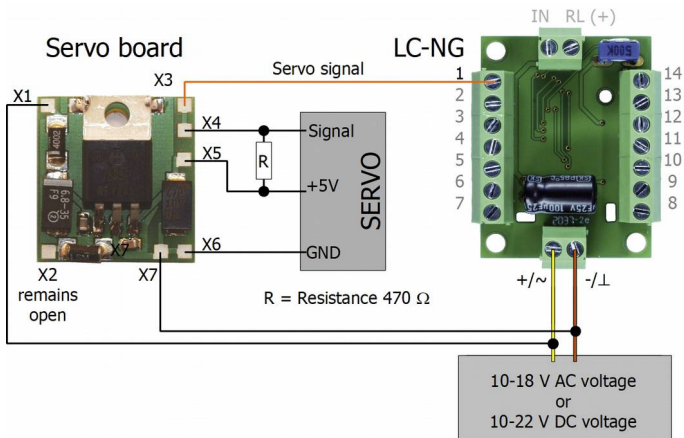
Application example: 9 g servo, with the side surface attached to the underside of the servo board

## 6.1. Connection to a vehicle decoder



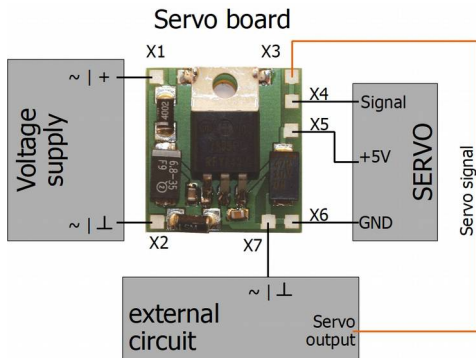
X1	Vehicle decoder	V+ / positive pole (+) of buffer capacitor
		GND / negative pole (-) of buffer capacitor
X7	Vehicle decoder	<p><b>⚠ Note:</b> Do not connect X7 to the return conductor for all functions of the decoder. Danger of short circuit! Components on the servo board and the decoder may be damaged.</p>
X2	remains open	
X3	Vehicle decoder	Servo output
X4	Servo	Signal (PWM)
X5	Servo	Power supply (+5V)
X6	Servo	Ground (GND)

## 6.2. Connection to an LC-NG module



X1	Power supply of the LC-NG module	+   ~	Beachten Sie beim Anschluss an Gleichspannung die Polung. Beim Anschluss an Digital- oder Wechselspannung ist die Polung nicht von Bedeutung.
X7		-   ⊥	
X2	Remains open		
X3	LC-NG		Servo output. Please refer to the instructions for the LC-NG module to find out which output(s) has/have a servo signal.
X4	Servo		Signal (PWM)
X5	Servo		Power supply (+5V)
X6	Servo		Ground (GND)

## 6.3. Connection to other external circuits



X1	Voltage supply	+   ~	Note the polarity when connecting to DC voltage. When connecting to digital or AC voltage, the polarity is not important.
X2		-   ⊥	
X3	External circuit	<b>Servo output</b> Note: Alternatively, you can connect the output to which the servo signal is applied on the external circuit directly to the servo. It usually makes handling easier if all the connections of the servo are connected to the servo board and the servo output of the external circuit is connected to the servo board.	
X4	Servo	Signal (PWM)	
X5	Servo	Power supply (+5V)	
X6	Servo	Ground (GND)	
X7	External circuit	Ground connection	

## 7. Check list for troubleshooting

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



Disconnect the system from the mains immediately!

Possible cause: the module is defective. → Send in the module for repair.

- The servo does not react to control signals.

Possible cause: The servo is connected incorrectly. → Check the connection, especially the pin assignment of the servo.

Possible cause: You have connected the signal line to an output of the external circuit / decoder where no servo signal is present. → Check the pin assignment of the external circuit / decoder.

Possible cause: The servo output of the external circuit / decoder is defective. → Check the output.

Possible cause: The power supply is not connected correctly. → Check the connections.

## **Technical Hotline**

If you have any questions about the use of the circuit, our technical hotline will help you (telephone number and e-mail address on the last page).

## **Repairs**

You can send us a defective circuit for repair (address on the last page). In the event of a warranty or guarantee claim, the repair is free of charge for you. As proof of any warranty or guarantee claim, please enclose the proof of purchase with your return.

If there is no warranty or guarantee claim, we are entitled to charge you the costs of the repair and the costs of the return shipment. We charge a maximum of 50% of the new price for the repair according to our valid price list. We reserve the right to refuse the repair if it is technically impossible or uneconomical.

Please do not send us repair shipments freight collect. In the event of a warranty or guarantee claim, we will reimburse you for the regular shipping costs.

## 8. 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.



## 9. EU Declaration of Conformity

 This product fulfils the requirements of the following EU directives and therefore bears the CE marking.

2001/95/EU Product Safety Directive

2015/863/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)

2014/30/EU on electromagnetic compatibility (EMC Directive).  
Underlying standards:

DIN-EN 55014-1 and 55014-2: Electromagnetic compatibility - Requirements for household appliances, electric tools and similar electrical appliances. Part 1: Emitted interference, Part 2: Immunity to interference

To maintain electromagnetic compatibility during operation, observe the following measures:

Only connect the supply transformer to a professionally installed and fused earthed socket.

Do not make any changes to the original components and follow the instructions, connection and assembly diagrams in this manual exactly.

Only use original spare parts for repair work.

## 10. Declarations concerning the WEEE directive



This product complies with the requirements of the EU Directive 2012/19/EC on Waste Electrical and Electronic Equipment (WEEE).

Do not dispose of this product in (unsorted) municipal waste, but recycle it.





Information and tips:

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