

XNControl

XpressNET adapter for digital control EasyControl

Item no. 40-01305 (kit) / 40-01307 (ready-built device)



Manual

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Subject to technical modification.

The asterisks **

This manual mentions the following companies:

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1. What for is XNControl?

The XNControl is an adapter to connect up to 16 XpressNET control devices to the digital model railway controller EasyControl. Examples for XpressNET control devices are:

Lokmaus 2, Lokmaus 3 (**not** Lokmaus 1) and Multimaus from Roco**

Hand controller from Lenz**

Connecting the XpressNET control devices to the XNControl allows you to use them as hand control devices in the digital controller EasyControl. The XNControl receives the control and switch commands sent from the XpressNET control devices via the data bus XpressNET, translates them into control and switch commands for the databus EasyNet used by the digital system EasyControl and passes them on to the central unit MasterControl. This sends the commands to the various decoders (locomotive, function, points or switching decoders) on your layout.

It is impossible to access from XpressNET control device data in the locomotive database of the MasterControl, to change the data or to program decoders. A PC planned to be integrated into the digital control EasyControl has to be connected directly to the MasterControl as XpressNet PC interfaces are not supported by the XNControl.

2. Getting started

How to use this manual

This manual gives step-by-step instructions for safe and correct assembly of the kit and connecting of the ready-built device, and operation. Before you start, we advise you to read the whole manual, particularly the chapter on safety instructions and the FAQ chapter. 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 device on to another person, please pass on the manual with it.

Intended use

The XNControl has been designed for connection to the digital control EasyControl in concordance with these instructions. The kit and the ready-built device should not be assembled or fitted by children under the age of 14. Any other use is inappropriate and invalidates any guarantees. 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 kit, containing the components listed in the parts and one PCB or one XNControl,
- patch-cable (RJ45) for connecting the XNControl to the MasterControl,
- one jumper for use with software update
- one manual.

Required materials

For assembling the kit you need:

- an electronic soldering iron (max. 30 Watt) with a fine tip,
- a soldering iron stand,
- a tip-cleaning sponge,
- a heat-resistant mat,
- a small side cutter and wire stripper,
- a pair of tweezers and long nose pliers,
- tin solder (0,5 mm. diameter).

For the power supply of the connected XpressNET devices you will need:

- AC or DC power pack with 12 V and min. 1A current, e.g. AC power pack item-no. 79-10026 from Tams Elektronik (not included in delivery).

3. 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,
- connecting the circuit to another voltage than specified,
- impermissibly high humidity,
- 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 device.
- Assembling and mounting the kit should only be done in closed, clean, dry rooms. Beware of humidity.

- Only use low power for this device 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 device.

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 device.

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.

4. 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**. If you have had training in soldering you can skip this chapter.

- Use a small soldering iron with max. 30 Watt. Keep the soldering tip clean so the heat of the soldering iron is applied to the solder point effectively.
- 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.
- Solder quickly: holding the iron on the joints longer than necessary can destroy components and can damage copper tracks or soldering eyes.
- Observe correct polarity orientation of semi-conductors, LEDs electrolytic capacitors and integrated circuits before soldering and ensure that the solder time does not exceed 5 seconds, otherwise components can be damaged.
- 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 PCB solder side 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.

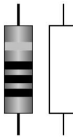
5. Assembling the kit

You can skip this part if you have purchased a ready-built device.

Preparation

Put the sorted components in front of you on your workbench. The separate electronic components have the following special features you should take into account to prevent mistakes in assembling:

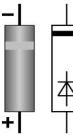
Resistors



Resistors reduce current. Their mounting orientation is of no importance. The value of resistors for smaller power ratings (under 5 W) is indicated through colour rings. Every colour stands for another figure. The colour ring in brackets indicates the tolerance of the resistor which here is of no importance.

Value	Colour rings
120 Ω	brown - red - brown (gold)
4,7 k Ω	yellow - violet - red (gold)

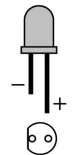
Diodes



Diodes allow the current to pass through in one direction only (forward direction), simultaneously the voltage is reduced by 0,3 to 0,8 V. Exceeding of the limit voltage always will damage the diode, and allow current to flow in the reverse direction.

The diode type is printed on the body.

Diodes must be mounted in a given direction. The negative end is marked with a ring. This is shown in the PCB layout.



Light emitting diodes (LEDs)

When operated in the forward direction the LEDs light. They are available in several different versions (differing in colour, size, form, luminosity, maximum current, voltage limits). The longer lead of wired LEDs is always the anode (positive pole).

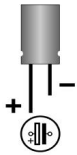
Capacitors



Among other things capacitors are used for filtering interference voltages or as frequency determining parts. Ceramic capacitors are not polarized, for that reason their mounting orientation is of no importance. Normally they are marked with a three-digit number which indicates the value coded.

Value	Number
10 nF	103
100 nF	104

Electrolytic capacitors



Electrolytic capacitors are often used to store energy. In contrast to ceramic capacitors they are polarized. One of the two leads is marked with a minus sign which indicates the mounting orientation. The value is given on the casing.

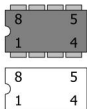
Electrolytic capacitors are available with different voltage sustaining capabilities. Using an electrolytic capacitor with a voltage sustaining capability higher than required is always possible.



Rectifiers

Rectifiers convert alternating into direct voltage, they have hardly no influence on the level of the voltage. They have four pins: two for the input voltage (a.c. voltage) and two for the output voltage (d.c. voltage). The pins for the output voltage are polarized. The pin connections are printed on the housing. As usual with wired components the longer connecting pin is the positive pole.

Integrated circuits (ICs)



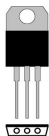
Depending on the type, ICs fulfil various tasks. They are polarized and therefore have to be mounted in a certain direction. The most common housing form is the so-called "DIL"-housing, from which 4, 6, 8, 14, 16, 18 or more "legs" (pins) are arranged along the long sides. The mounting orientation is shown by a semicircular or circular marking at the end of the housing, which is also shown on the PCB layout.

ICs are sensitive to damage during soldering (heat, electrostatic charging). For that reason in the place of the ICs IC sockets are soldered in, in which the ICs are inserted later. The mounting orientation of the sockets is preset as well. The markings on the PCB, the socket and the IC must lie on top of each other after mounting.

Micro-Controller

Micro-controller are ICs, which are individually programmed for the particular application. When leaving the manufacturer's works their memory is empty. The programmed controller normally are only available from the manufacturer of the circuit belonging to it.

Voltage regulators



Voltage regulators are ICs, which convert a variable, non regulated input voltage in a constant output voltage. They are produced in transistor housings with three connecting pins for input, output and earth.

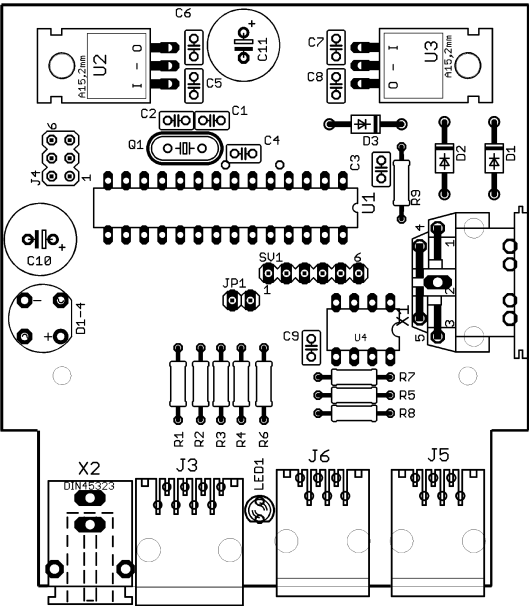
With voltage regulators in a SOT-housing (in form of a half cylinder) the mounting orientation is given by the layout of the connecting pins.

With voltage regulators in a flat TO-housing the unlabelled metallic rear is marked by a thick line on the PCB layout.

Parts list

Resistors	R1, R2, R3, R4, R5	120 Ω
	R6, R7, R8, R9	4,7 k Ω
Diodes	D1, D2, D3	1N4004
LEDs	LED1	3 mm
Capacitors	C1, C2	not inserted
	C3	10 nF
	C4, C5, C6, C7, C8, C9	100 nF
Electrolytic capacitors	C10, C11	470 μ F
Rectifiers	D1-4	B80C800
Micro-Controller	U1	MEGA 168
ICs	U4	SN75176
IC-sockets	for U1	28-pin
	for U4	8- pin
Voltage regulators	U2	7812
	U3	7805
Quartz	Q1	not inserted
Connecting socket	J3	RJ 45 connecting socket
	J4	not inserted
	J5, J6	RJ 12 connecting socket
	X1	5- pin DIN-socket
	X2	power-socket
Pin-type strip	JP1	2-pin
	SV1	not inserted

PCB print



Assembling the kit

Start the assembly with the the resistors and the diodes. First solder the components on the solder side of the PCB and then cut the excess wires with the side cutter, as short as possible.

Next solder the pin-type strip, the IC-socket, the rectifier and the voltage regulator. If you intend to mount the circuit into the housing supposed for the enclosure of the XNControl please follow the instructions in the section "Enclosure of the XNControl".

Continue the assembly with the capacitors and the electrolytic capacitors. Last solder the connecting socket and the LED.



Caution:

Diodes, IC-sockets, rectifiers, electrolytic capacitors, and LEDs must be placed in the right direction! If you solder them the wrong way round the affected parts can be damaged when you connect the power. In the worst case the whole circuit can be damaged. In any case, a wrongly connected part will not function.

Finally, insert the ICs into the soldered IC-sockets.



Caution:

Do not touch the ICs without first discharging yourself by touching a radiator or other grounded metal parts. Do not bend the "legs" of the ICs when inserting them into the sockets. Check that the markings on the PCB, the socket and the IC show to the same direction.

Performing a visual check

Perform a visual check after the assembly of the device and remove faults if necessary:

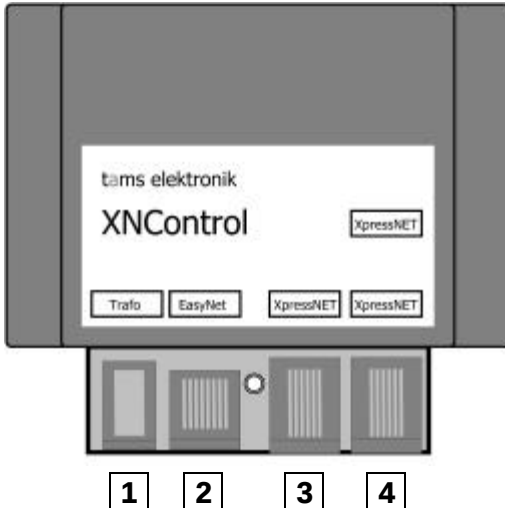
- Remove all loose parts, wire ends or drops of solder from the PCB. Remove all sharp wire ends.
- Check that solder contacts which are close to each other are not unintentionally connected to each other. Risk of short circuit!
- Check that all components are polarised correctly.

When you have remedied all faults, go on to the next part.

Enclosure of the XNControl

There is a housing available for the XNControl (item no. 40-01308). If you intend to use this housing the electrolytic voltage regulators U2 and U3 have to be bent by 90 degrees. Bend the connecting wires **before soldering** in the regulators, as you otherwise might solder them in too close to the PCB.

6. Connecting the XNControl



Caution:

If a component gets hot or the LED does not light disconnect the power pack immediately from the power supply and check the assembly. Risk of short circuit!

5

Connections of the XNControl

1	Power supply for up to 16 XpressNET devices	Use an AC or DC powerpack with 12 to 16 Volt and min. 1 A current.
2	MasterControl or BusControl connected in series (RJ-45 connecting socket)	Any Ethernet patch cable (used in Computer networks) will work for connection.
3 / 4	RJ-12 connecting socket	e.g. for Lokmaus 2 and 3 or Multimaus from Roco**
5	5- pin DIN-socket	e.g. for hand controller from Lenz**

Connecting several XpressNET control devices

You can connect two devices simultaneously with RJ12-connectors and one device with a 5-pin DIN connector directly. Using a special distributor (additional accessory) allows to connect up to 16 XpressNET control devices.

Connecting several decentralised control devices or adapters

You may connect up to 64 decentralised control devices or adapters to one EasyNet. If you intend to connect more than one control device you will also need:

- up two control devices: a distributor BusControl (optional extra). The BusControl is sufficient to control max. nine control devices. If you intend to connect further devices you need additional BusControls.
- up five control devices: an additional AC power pack (optional extra). An additional AC Power Pack is sufficient to supply eight further control devices. If you intend to connect further devices you need additional power packs.

Also see the BusControl's manual.

7. Operation with the XNcontrol

Before you can send control and switching commands from a XpressNET device you have to make the following connections:

- XNControl – MasterControl
- XNControl – power supply
- XpressNET device – XNControl

Enter the control and switching commands according to the instructions for the XpressNET device. The LED on the XNControl flashes irregularly while receiving data, translating and sending it to the MasterControl.

Please note: Neither is it possible to enter the MasterControl database from a connected XpressNET device or to alter data nor to program a decoder from a connected XpressNET device.

8. Software Update

Your XNControl is a state-of-the-art product, which is constantly improved and adapted to occurring changes. To benefit from this development, you can update the MasterControl to the newest software version.

Disconnect **all** external control devices from the EasyNet – including the XNControl you want to update.

Unscrew the cover from the housing. Then bypass the two pins of the pin-type strip JP1 at the XNControl (e.g. with the added jumper) and restore the connection from XNControl to the EasyNet. The LED on the XNControl starts to flash quickly.

Next select the menu point "Software Update" at your MasterControl and confirm your input with / ok. Now the LED on the XNControl flashes slower and regularly. The MasterControl will then display in the second line "...Download..."

Now please connect the MasterControl to your PC and execute the update application.

Please note: Always connect the MasterControl to your PC before executing the update application. Otherwise your PC might have difficulties detecting the interface.

Follow the instructions of the update application.

9. Technical Specifications

Power supply for XpressNET devices:	AC or DC power pack 12-16 V / min. 1 A
Power supply for XNControl:	AC or DC power pack 12-16 V / min. 1 A or via EasyNet (for software update only)
Power consumption (without consumer):	approx. 100 mA
Interfaces:	EasyNet (RJ-45) XpressNET (RJ-12 und DIN 5-polig)
Protection:	IP 00
Ambient temperature while operating:	0 - + 60 °C
Ambient temperature while not operating:	-10 bis + 80 °C
Maximum humidity:	max. 85 %
Dimensions (including housing)	approx. 100 x 90 x 35 mm
Weight of the circuit	approx 42,1 g
Weight including housing	approx 96,1 g

10. Manufacturer's note, CE and Warranty

Manufacturer's note

The person who builds this kit or brings the circuit into operation is the manufacturer of the product. If he sells the product to another person he is responsible for passing on all the relevant papers. Domestic appliances assembled from a kit are deemed industrial products and must comply with health and safety regulations.

Certification

This product is developed and tested in accordance with the European standards EN 55014-1 and EN 61000-6-3. This product conforms with the EC- directive 2004/108/EG on electromagnetic radiation and is therefore CE certified.

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, circuit diagram and PCB layout included with this manual.
- Use only original spare parts if you have to repair the kit or the ready-built device.

Conditions of warranty

This product is guaranteed for two years. The warranty includes the correction of faults which can be proved to be due to material failure or factory flaw. As we have no control over the correct and proper assembly and mounting we can only guarantee the quality of the components and the completeness of kits. We guarantee the function of the parts according to the parameters in not mounted state as well as the adherence to the technical specifications of the circuit when assembled and connected according to the manual.

Other claims are excluded. By law, we are not responsible for damages or secondary damages in connection with this product. We retain the right to repair, make improvements, supply spare parts or return the purchase price.

The following invalidate the warranty:

- using an unsuitable soldering iron, solder containing liquid acids or similar,
- if the kit is assembled and soldered poorly, or if damage is caused by not following the instructions in this manual,
- if the ready-built device has been altered and repair attempts have failed,
- if arbitrary changes in the circuit are made,
- if components are removed or swapped, or wiring is added or removed in any other way as layed down in the original design,
- if parts other than the originals delivered with this kit are used,
- if the copper tracks or soldering eyes are damaged,
- when components are mounted incorrectly, or if the components or the circuit are poled incorrectly, also subsequent damage resulting from these faults,
- if damage occurs due to an overload of the device,
- if connected to a incorrect voltage or current,
- if damaged by other persons,
- if damaged by faulty operation or if damaged by careless use or abuse,
- if damaged by touching components before electrostatic discharging of the hands.