S88-1

s88-Rückmelder

s88-Feedback Module

Décodeur s88

s88-Terugmelder

Anleitung

Manual

Mode d´emploi

Handleiding

Art.-Nr. 21-01-070
Art.-Nr. 22-01-070

CE

Table of contents

(Pages I to IV in the centre of this handbook are removeable.)

How to use this manual

If you have no specialist technical training, this manual gives step-by-step instructions for safe and correct assembly of the kit and fitting 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 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 on to another person, please pass on the manual with it.

Intended use

Caution:

Integrated circuits are very sensitive to static electricity. Do not touch components without first discharging yourself. Touching a radiator or other grounded metal part will discharge you.

The kit or the ready-built module can be assembled or fitted using this manual. The ready-built module is designed for use in model railways. It indicates the status of 16 connected contacts via the s88-bus to the connected digital unit (interface, memory or central unit).

The kit and the ready-built module are not suitable for children under the age of 14.

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

Any other use is inappropriate and invalidates any guarantees.

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 designed,
- impermissibly high humidity,
- condensation building 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 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 stations only in approved mains sockets installed by an authorised electrician.
- Observe cable diameter requirements.
- After condensation build up, allow up to 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 life-threatening fire, burns and toxic smoke. Connect your soldering iron or soldering station only when actually needed. Always keep the soldering iron always 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.

Little children can swallow small components with sharp edges. Life threatening! 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.

EMC declaration

This product is developed in accordance with the European standards EN 55014 and EN 50082-1, tested corresponding to the EC - directive 89/336/EWG (EMVG of 09/11/1992, electromagnetic tolerance) and meets legal requirements.

To guarantee the electromagnetic tolerance 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 connections diagrams included with this manual.
- Use only original spare parts if you have to repair the kit or the ready-built module.

Operation overview

The module is compatible to the s88-bus of Märklin*. It detects the status of the contacts connected to the 16 inputs. This information is transferred via the s88-bus to the next module resp. to the connected digital unit (interface, memory or central unit). The data transfer from one feedback module to the next one works on the principle of the bucket brigade device.

To each memory unit of Märklin* can be connected in series up to three and to an interface unit up to 31 feed back modules. If connected directly to the central unit normally 31 feed back modules can be connected.

Technical specifications

Number of contacts	16
Protected to	IP 00
Ambient temperature in use	0 - + 60 °C
Ambient temperature in storage	-10 - + 80 °C
Comparative humidity allowed	max. 85 %
Dimensions	ca. 73 x 83 mm
Weight	ca. 65 g

Checking the package contents

Check the contents of the package for completeness immediately after unpacking it:

- one kit, containing the components listed in the parts list (see page I), eight jumper wires and one PCB or
- one ready-built module,
- one 6-core ribbon cable with plugs,
- one manual.

Required tools and consumables

Make sure you have the following tools, equipment and materials ready for use:

- 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 (not necessary for the ready-built module),
- tin solder (0,5 mm. diameter),
- wire (diameter: > 0,25 mm² for all connections).

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 tin solder SN 60 Pb (i.e. 60 % tin, 40 % lead) with rosin-based flux.
- When soldering electronic circuits never use soldering-water or soldering grease. They contain acids that can corrode components and copper tracks.
- Solder fast: long soldering 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 tin solder finds its way, then remove the soldering iron.
- Do not move the component for about 5 seconds after soldering. A glossy and perfect soldering spot should remain.
- 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.

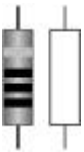
Assembling the kit

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

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.

Value	Colour rings
1 kΩ	brown - black - red (gold)
4,7 kΩ	yellow - violet - red (gold)
100 kΩ	brown - black - yellow (gold)

The colour ring in brackets indicates the tolerance of the resistor which here is of no importance.

Resistance networks

In resistance networks several resistors are integrated. The number of the integrated resistors varies depending on the design. One side of the resistors is commonly taken out of the network, the other side seperately for every resistor. The common connection of the resistors is marked.

Capacitors

Among other things capacitors are used for filtering interference voltages or for setting frequencies. 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.

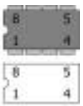
Value	Number
100 nF	104

Transistors

Transistors are current amplifiers which convert low signals into stronger ones. They have three contacts. As they are polarized, they have to be mounted in a certain direction.

BC-Types have a housing in form of a half cylinder (SOT-housing). The cross section is shown in the PCB Layout which determines the mounting orientation.

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 damages 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 on. 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.

Terminal strips

Terminal strips are solder-in screw-type terminals. They provide a solder-free and safe connection of the cables to the circuit, which can still be seperated any time. When several terminal strips have to be mounted side by side, they have to be put together before mounting.

Assembling the kit

Start the assembly with the lateral resistors. 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. Insert the eleven wire bridges. Jumper wires are included for the longer wire bridges. For the short wire bridges you should use the off cut wires from the resistors.

Next solder in the IC-sockets. They have to be mounted according to the marking on the PCB.

Continue the assembly with the vertical resistors, the resistance networks, the capacitors and the transistor.

Caution:

Resistance networks, transistors and ICs must be placed in the right direction! If you solder them the wrong way 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.

Next solder in the solder pins and the terminal strips. Put together the terminal strips before mounting them.

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

Due to material defects and / or improper assembly there may be risks of injury. Transport damage to ready-built modules is also possible. So you must perform a visual check after the assembly or after unpacking the module.

Check all nuts, pins and connections as well as the mechanical connections for correct assembly.

The following points are inapplicable if you have purchased a ready-built module.

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.

Performing a functional test and connecting the s88-feedback module

Even if you have purchased a ready-built module, check all functions. Transport damage can never be excluded.

Follow the connections diagram fig. 3a to 3c.

Connect the s88-feedback module with the enclosed ribbon cable to the central unit / the memory unit / the interface unit. Careful to connect the plug to the solder pin JP2 (OUT) as shown in fig. 3a. Connect the

ribbon cable plug onto the input of the central unit / the memory unit / the interface unit with the cables underneath.

Afterwards connect all inputs of the feedback module one after the other to the earth cable of the digital system (i.e. brown cable to the rail), by inserting the connecting cable into the terminal strips and screw it down. Check if the correct status message is shown for all inputs.

After performing a successful functional test install the s88-feedback module at the desired place on your model railway. Connect the inputs 1 to 16 to the contacts and connect the module to the central unit / the memory unit / the interface unit or to another feedback module.

FAQ

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

   **Switch off the digital system immediately !**

  Possible cause: one or more components are soldered incorrectly.
  → Perform a visual check.

- The central unit / the memory unit / the interface unit do not show the proper status.
  Possible cause: The connection between the feedback module and the central unit is interrupted.
  → Check the connections. Check as well, if the connecting socket of the ribbon cable are put on in the right direction.
  Possible cause: The connection between the input and the contact is interrupted.
  → Check the connections.

If you cannot find the problem, please return the module for repair (address on the cover page).

Manufacturer's note

According to DIN VDE 0869, 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 conforms with the EC- directive 89/336/EWG on electromagnetic radiation and is therefore CE certified.

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 or the connection diagram(s)

- if the ready-built module has been altered and repair attempts have failed,
- if arbitrary changes in the circuit are made,
- if parts are stored incorrectly and if the wires to the parts are made incorrectly,
- if parts other then the original ones 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 module,
- 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.

* **Märklin** is a registered and protected trade mark of Gebr. Märklin & Co, Stuttgarter Straße, Göppingen , Germany.

Stückliste - Parts list
Nomenclature - Stuklijst

Widerstände – Resistors Résistances – Weerstanden	R1, R3	100 kΩ
	R2	4,7 kΩ
	R4 – R19	1 kΩ
Widerstandsnetzwerke Resistance networks Réseaux de résistances Weerstandsnetwerken	RN1, RN2	47 kΩ
Kondensatoren - Condensers Condensateurs - Condensatoren	C1 – C18	100 nF
ICs – ICs – CI – ICs	IC1, IC2	4014 N
	IC3 – IC-6	4044 N
IC-Sockel – IC-sockets Supports de CI – IC-voetjes	IC1 – IC-6	16-pol.
Transistoren – Transistors Transistors – Transistors	Q1	BC547B *
Doppel-Anreihklemmen Double terminal strips – Borniers double – Dubbele printkroonsteen	X1	8-pol.
Stiftleisten – Solder pins Barettes – Contactpennen	JP1, JP2	6-pol.
Drahtbrücken – Wire bridges Ponts – Soldeerbruggen	B1-B8	

* oder ähnlich – or similar – ou équivalent – of gelijkwaardig

Fig. 1: Bestückungsplan - PCB layout
Plan d´implantation - Printplan

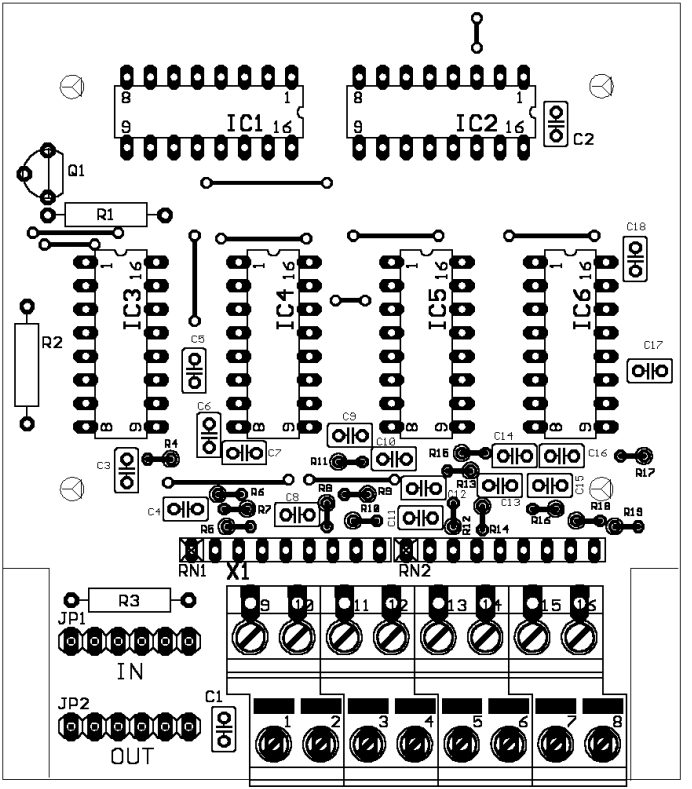


Fig. 2:

Schaltplan

Circuit Diagram

Schéma de principe

Schakelschema

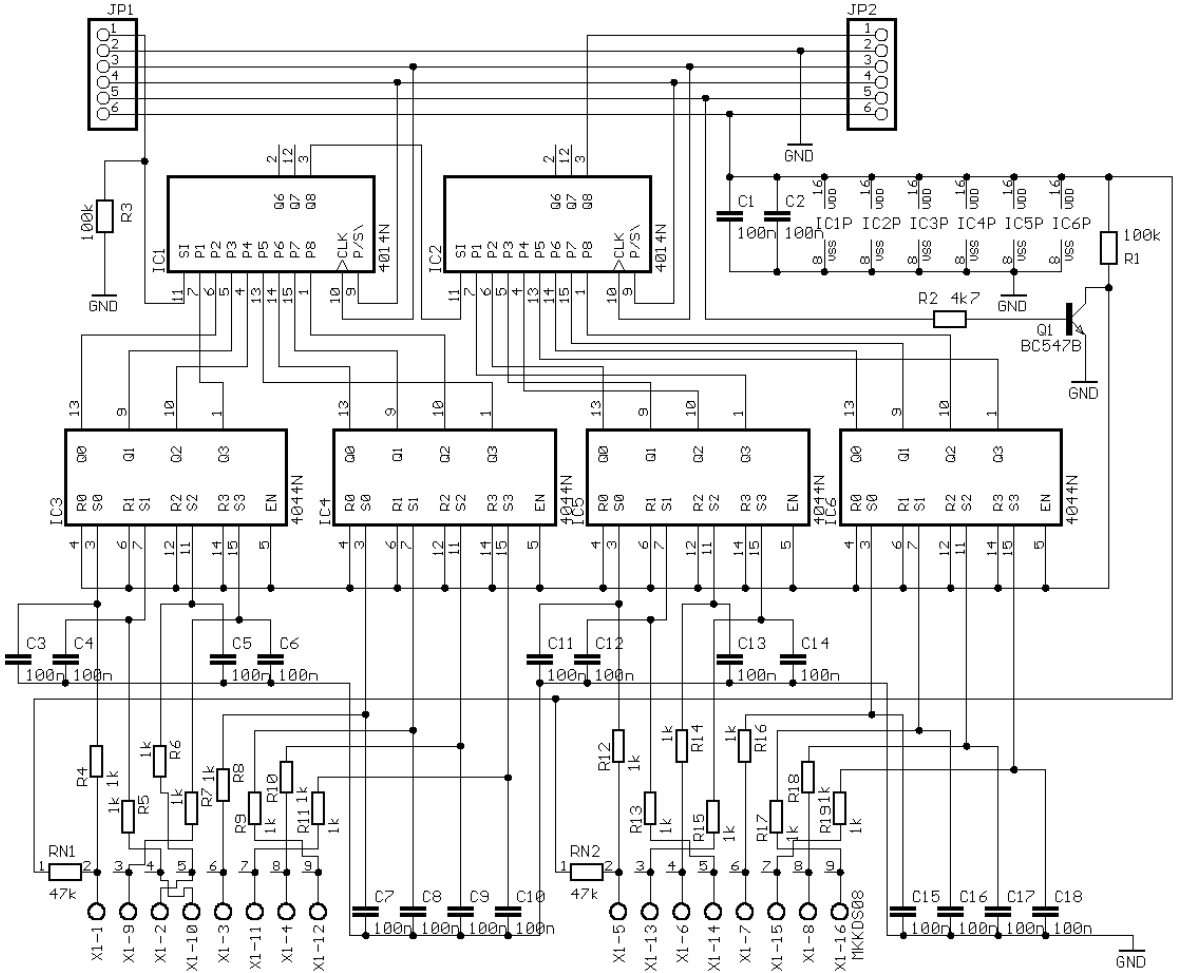


Fig. 3a / 3b: Anschlußpläne - Connection Diagrams – Plans de connexion – Aansluitplannen

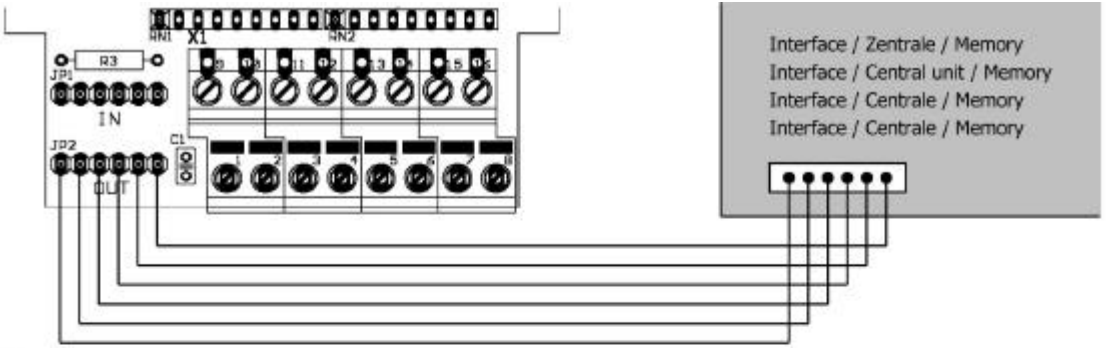


Fig. 3a:
Anschluß s88-Rückmelder an Digitalgerät - Connection of the s88 feedback module to a digital device
Connexion du s88 à un appareil numérique - Aansluiting s88 terugmelder op digitale apparaten

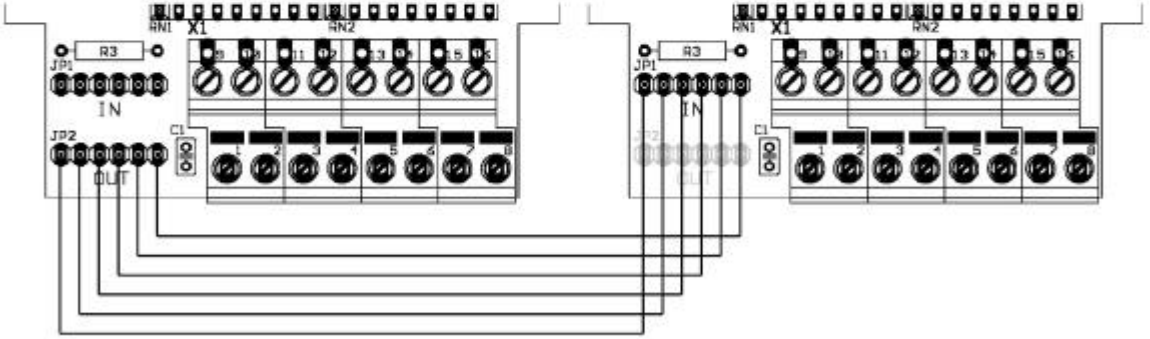
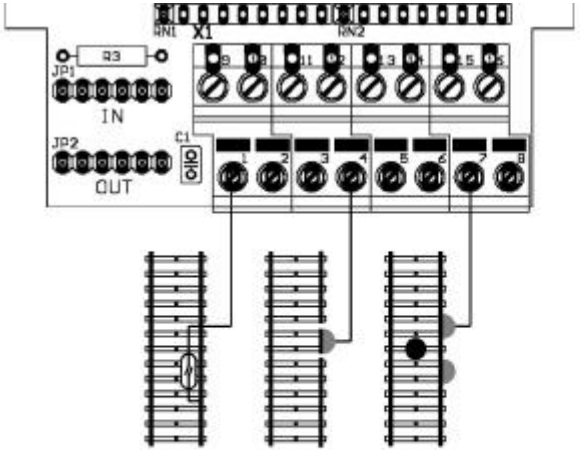


Fig. 3b:
Anschluß s88-Rückmelder an s88-Rückmelder - Connection of the s88 feedback module to another s88 feedback module
Connexion du s88 à un autre s88 - Aansluiting s88 terugmelder op s88 terugmelders

Fig. 3c: Anschlußplan - Connection Diagram – Plan de connexion – Aansluitplan



1 Anschluß an Reedkontakt
Connection to a reed contact
Connexion à un ILS (interrupteur à lame souple)
Aansluiting op het reedcontact

4 Anschluß an Kontaktgleis
Connection to a contact rail
Connexion à un rail de contact
Aansluiting op de contactrails

7 Anschluß an Schaltgleis
Connection to a switching rail
Connexion à un rail de télécommandes
Aansluiting op de schakelrails

Fig. 3c:
Beispiele für den Anschluß von Kontakten
Examples for the connection of contacts
Exemples de connexions de contacts
Voorbeelden voor het aansluiten van contacten

Aktuelle Informationen und Tipps:
Information and tips:
Informations et conseils:
Actuele informatie en tips:

http://www.tams-online.de

Garantie und Service:
Warranty and service:
Garantie et service:
Garantie en service:

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