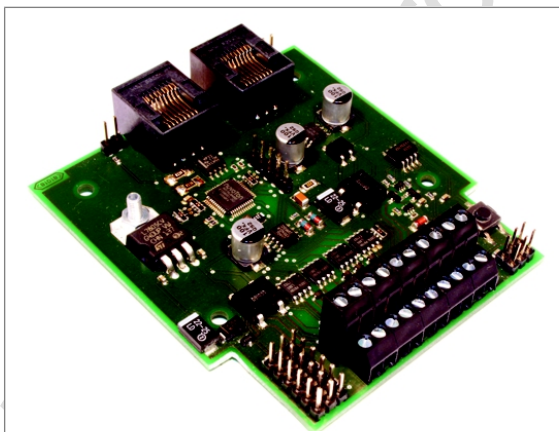


Manual

# Multi-Decoder

Item no. 43-03116 | 43-03117



MM

DCC

RailCom

BiDiB

tams elektronik



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## 1. Getting started

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

This manual gives step-by-step instructions for safe and correct fitting and connecting of the decoder, 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 decoder on to another person, please pass on the manual with it.

### **Intended use**

The Multi-Decoder is designed to be operated according to the instructions in this manual in model building, especially in digital model railroad layouts. Any other use is inappropriate and invalidates any guarantees.

The Multi-Decoder 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**

- one ready-built module or
- one ready-built module in a housing (complete unit),
- a CD (containing the manual and further information).

### **Required materials**

For the connection of the central unit, points, servos and other accessories: wire. Recommended diameters:

- $\geq 0,05 \text{ mm}^2$  for the connection of LEDs, push-buttons or switches ;
- $\geq 0,25 \text{ mm}^2$  for all other connections.

For the connection of the BiDiB interface:

- one or two patch cables with RJ 45 connectors.

For the connection of push-buttons, switches or LEDs to connecting area 2:

- 3-pole socket terminal strip grid dimension 2,54 mm (item no. 85-11203-10)

Depending on the chosen operation mode, you need in addition:

- operation mode 1: up to 8 LEDs (e.g. 4 green and 4 red ones) and series resistors 470 Ohm;
- operation mode 2 and 4: up to 8 push-buttons (z.B. Art.-Nr. 84-5212x, x=1...7);
- operation mode 5: up to 8 relays 1 x  $U_m$  12V (z.B. Art.-Nr. 84-61010).

When using servos with a current consumption of more than 1 A or when operating several servos at the same time and thus exceeding the maximum current of 1 A in connecting area 2:


- an additional voltage supply (e.g. servo PCB item no. 70-05900).

When not programming the decoder with a DCC central unit:

- 2 external programming switches,
- 5 special jumpers to bridge the connections A and C in connecting area 2.

A complete, ready-for-connection programming-set is available (item no. 43-03119-01).

## 2. Safety instructions

 **Caution:** Integrated circuits (ICs) are inserted on the decoder. They are sensitive to static electricity. Do not touch components without first discharging yourself. Touching a radiator or other grounded metal part will discharge you.

### **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.

## 3. Operation overview

### 3.1. Operation modes

The Multi-Decoder is a stationary decoder that can be used optionally as:

- solenoid accessory (points) decoder to control articles activated by a short switching impulse, e.g. coil driven points (with or without limit stop), semaphore signals with twin coil drive, decouplers.
- switching decoder to change over between two accessories (e.g. light signals) or to switch on and off accessories independently from each other (e.g. lighting). The voltage supply for the connected accessories is provided by the Multi-Decoder.
- servo decoder to control servo driven points (with or without frog polarisation) or other servo driven components. You can connect an additional voltage supply for the servo(s), when the maximum current of the decoder is not sufficient.
- combination of the mentioned decoder types.

#### **Mode 1:**

- 4-fold points decoder with LED display for the position of points
- **or** 8-fold switching decoder
- **or** a combination of points and switching decoder.

The LEDs which can be connected when used as a points decoder, display how the points have been switched (branching or straight on). When using points with limit stop, the LEDs show the actual position of points even if the points has been set manually. In case points with limit stop cannot be switched properly, the LEDs flash alternately and thus show the failure.

**Mode 2:**

- 4-fold points decoder
- **or** 8-fold switching decoder
- **or** combination of points and und switching decoder

with connections for push-button to switch points or to switch on and off the connected accessories.

**Mode 3:**

12-fold decoder to control

- 4 points (4-fold points decoder)
- **or** 8 other accessories (8- fold switching decoder)
- **or** a combination of points and other accessories
- **and** 8 servo driven accessories (e.g. points, signals, railway crossing gates, gates).

**Mode 4:**

8-fold servo decoder with connections for 8 push-buttons. The push-button are used to switch between the end positions of the connected servos.

**Mode 5:**

8-fold servo Decoder to control

- 4 points with frog polarisation
- **and** 4 servo driven accessories.

Hint: For the connection of the frog polarisation addition relays are required (not included in the package).

**Mode 6:**

8-fold servo decoder for the connection of

- 4 servo driven points with connections for 8 end position switches (to report the actual position of points)
- and 4 servos.



### 3.2. Connecting areas

Mode	Connecting area 1 "terminal strips"	Connecting area 2 "solder pins"
1	max. 4 points and / or max. 8 other accessories*	LEDs for displaying the position of points
2	max. 4 points and / or max. 8 other accessories*	8 push-button for switching the points / accessories
3	max. 4 points and / or max. 8 other accessories*	max. 8 servos
4	push-buttons for switching the servos	max. 8 servos
5	max. 8 relays for the frog polarisation	max. 4 servo driven points + max. 4 servos
6	max. 8 end position switches	max. 4 servo driven points + max. 4 servos
* possible combination of points and other accessories (e.g. 2 points + 4 other accessories).		

### 3.3. Driving the decoder

#### Driving the decoder in digital operation

The connected points, servos or other accessories are operated via accessory decoder commands in DCC or Motorola format, sent from the central unit to one of the four accessory decoder's addresses. The decoder automatically recognizes the commands' data format. It is possible to switch the outputs via mixed DCC and Motorola commands as well as to operate one output alternately in DCC and Motorola format.

With the operation modes 2 and 4 (with connections for push-buttons)

you can control the accessories optionally via accessory decoder commands or connected push-buttons.

### **Driving the decoder in analogue operation**

In a pure analogue layout you can control points, servos or other accessories in the operation modes 2 and 4 (with connected push-buttons). The necessary settings are made via jumpers and push-buttons then (without using a digital control unit).

### **3.4. BiDiB**

BiDiB is a manufacturer comprehensive log regulating the complete controlling of a model railway layout (vehicles, points, other accessories) as well as the feedback data transfer. The BiDi-bus allows the different components of the model railway layout (e.g. digital control units, boosters, accessory decoders and feedback modules) to communicate bidirectionally with each other. For further information on BiDiB: [www.bidib.org](http://www.bidib.org)

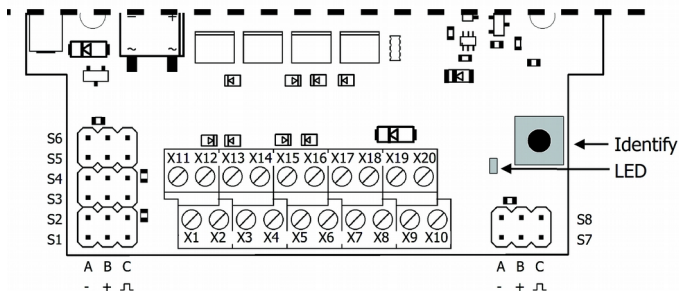
The Multi-Decoder can be used as a data link module at an interface according to the BiDiB specification. It conforms to the standards to accessories defined in the BiDiB specification (state V0.5)

According to the BiDiB-specification the Multi-Decoder is assigned automatically in a BiDi-bus-system. As soon as the Multi-Decoder has been logged on in a BiDi-bus-system, data sent from the control unit via the rails to the decoder will be blocked.

The push-button on the module used for programming the decoder, also serves as identify-push-button.

### **Firmware update**

It is possible to update the firmware of the Multi-Decoder according to the BiDiB-specification.



### 3.5. Feedback with RailCom

The points decoder WD-34 is RailCom compatible, i.e. the decoder is able to pass the RailCom messages via the rails to special RailCom detectors. After an accessory decoder command to its address it sends:

- status report, e.g. "have worked the points" or "points have to be worked" and / or
- time report ("need still 2 seconds to perform the accessory decoder command") and / or
- fault report, e.g.. "points cannot be worked"

and thus also acknowledges receipt of the accessory decoder command.

When using points with limit stop or servo driven points with limit contact (in operation modes 1 to 3 and 6), the Multi-Decoder reports the actual position of points (even after altering manually) and of servos.

### 3.6. Power supply

The Mult decoder can either be supplied by the central unit or a booster. In order to release the digital electric circuit it is also possible to supply the decoder by a transformer of it's own.

### 3.7. Overload protection

When exceeding the maximum current at one of the outputs or the maximum total current of one of the two connecting areas due to a too high current consumption of the connected accessories, the decoder switches off automatically. Switch off the decoder's power supply then, eliminate the overload and switch on the decoder again.

**Attention:**

When connection an in- or output to a live wire (e.g. with a faulty connection of an in- or output to the voltage supply), very high currents occur suddenly. In this case the overlaod protection is without effect, the decoder can be damaged irreparably.

## 4. Technical specifications

Data format	DCC, Motorola
Adress range	MM: 1020 DCC: 2040 Hint: The adress range to be used also depends from the control unit.
Bus system	BiDiB
Feedback log	RailCom
Supply voltage	Digital voltage of the central unit or 14 – 20 V a.c. voltage
Current consumption (without connected devices) approx.	40 mA
Outputs connecting area 1 "terminal strips" max. current / output: - up to 2 seconds - steady	8 switching outputs or 4 points outputs  1.500 mA 1.000 mA
Outputs connecting area 2 "solder pins" max. current / output	8  1.000 mA
Max. total current: - connecting area 1 - connecting area 2	1.000 mA (steady) 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.) Dimensions including housing (approx.)	72 x 82 mm  100 x 90 x 35 mm
Weight of the assembled board (approx.) Weight including housing (approx. )	44 g  92 g

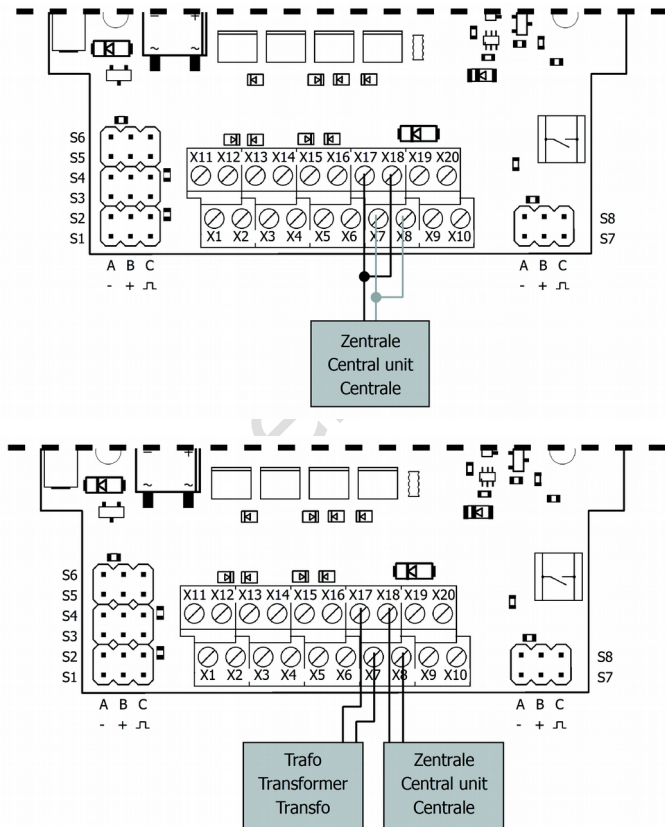
## 5. Connections

The decoder is equipped with terminal strips and solder pins you can use to connect points and other accessories, servos, LEDs and push-buttons (depending on the chosen operation mode) as well as the central unit and the power supply. Connections to: -

- terminal strips: Insert the connecting wires into the terminal strips and screw them tightly.
- solder pins: You can insert the servos' connecting sockets directly. For the connection of push-buttons or LEDs or when extending the connection wires of servos, it is recommended to use 3-pole socket terminal strips with grid dimension 2.54 mm (e.g. item no. 85-11203-10).

## 5.1. Connecting the power supply and the central unit

You can supply the decoder either via the central unit or a separate transformer according to the two following connection diagrams.



Terminal strip	Connection to:
X7	power supply / transformer ( $\sim$ )
X8	input DCC signal
X17	power supply / transformer ( $\sim$ )
X18	input DCC signal / central unit

**⚠ Attention:** Switch off the digital central unit while connecting the decoder.

**⚠ Attention:** When connecting several devices to the same voltage supply, generally all connections have to be polarised identically. Otherwise a short circuit will occur, possibly damaging connected devices.

**⚠ Attention:** When a component is getting too hot, disconnect the decoder immediately from the power supply. Risk of short circuit! Check the assembly.

## 5.2. Connecting servos

You can connect up to 8 servos to the solder pins in connecting area 2.

### Connector pin assignment of servos

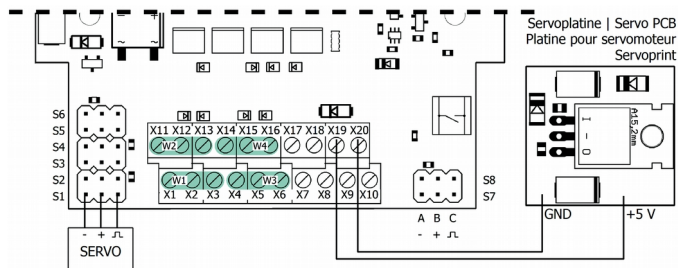
The assignment of servos' electric connectors is not standardised. Observe the manufacturer information.

Connector	Short term	Code	Wire colour (deviation possible)
Voltage supply	"GND"	-	black or brown
	"VCC"	+	red
Impulse (signal)	"PW"	$\square$	white or orange



## Connecting an additional voltage supply

When using one or several servos with a power consumption of more than 1 A, you have to connect an additional voltage supply (e.g. servo PCB item no. 70-05900-01).



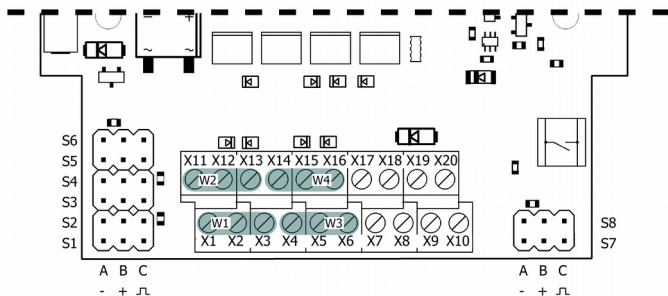
Terminal strip	Connection to:
X19	external voltage supply for servos (+5 V)
X20	external voltage supply for servos (GND)



### Attention:

When connecting an external voltage supply, you have to make sure to switch it on at the same time as the voltage supply for the decoder or afterwards. Otherwise the decoder can possibly be damaged.

### 5.3. Connector pin assignment for operation modes 1 to 3



#### Connecting area 1 "terminal strips"

The terminal strips are provided for the connection of solenoid articles (for use as a points decoder) and / or other accessories (for use as a switching decoder). You can connect to each of the four pairs of outputs optionally one solenoid article or two other accessories. A mixed use as points and switching decoder is possible.


You can connect points with or without limit stop. You can define the type of points individually for each pair of outputs (with CV programming) or in common for all pair of outputs (with programming with push-buttons and jumpers).


You can connect to one pair of outputs accessories to be switched (e.g. light signals) as well as accessories you want to switch on and off independently from each other. You can define the switching mode individually for each pair of outputs (with each programming mode).

## Connecting area 2 "solder pins"

Depending of the chosen operation mode you can connect to the solder pins:

- Operation mode 1: max. 8 LEDs to display the points' position (connection via a series resistor of minimum 470 Ohm). Usually, green LEDs are used to display the position "straight on" and red ones to display the position "branching".
- Operation mode 2: max. 8 push-buttons to switch the points or to switch on and off other accessories.
- Operation mode 3: max. 8 servos.

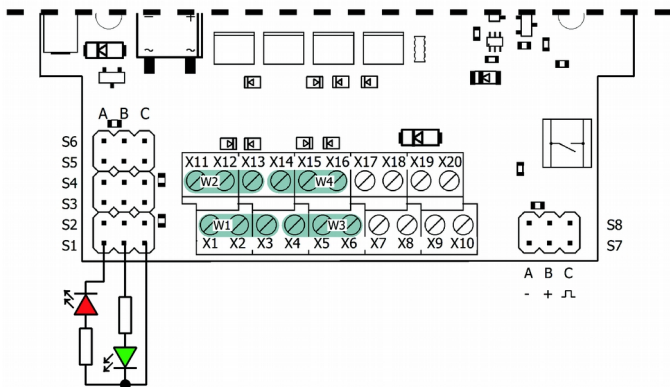
 Observe the maximum current of the outputs as well as of the two connecting areas (see section 5. "Technical specifications"). With a too high current consumption of the connected accessories the decoder switches off automatically.

 Pay attention to not connection the in- and outputs by accident to a live wire. The extreme overlad suddenly occuring can damage the decoder irreparably.

### Connections to connecting area 1 "terminal strips" for modes 1 - 3

	Connection to:		Accessory decoder command
X1	Pair of outputs 1 (W1)	Solenoid article / points 1 or switching contact 1	points 1 "branching" (1r)
X2		Return conductor for W1	
X3		Solenoid article / points 1 or switching contact 2	points 1 "straight on" (1g)
X4	Pair of outputs 3 (W3)	Solenoid article / points 3 or switching contact 5	points 3 "branching" (3r)
X5		Return conductor for W3	
X6		Solenoid article / points 3 or switching contact 6	points 3 "straight on" (3g)
X11	Pair of outputs 2 (W2)	Solenoid article / points 2 or switching contact 3	points 2 "branching" (2r)
X12		Return conductor for W2	
X13		Solenoid article / points 2 or switching contact 4	points 2 "straight on" (2g)
X14	Pair of outputs 4 (W4)	Solenoid article / points 4 or switching contact 7	points 4 "branching" (4r)
X15		Return conductor for W4	
X16		Solenoid article / points 4 or switching contact 8	points 4 "straight on" (4g)

## Connections to connecting area 2 "solder pins" for mode 1



	LEDs	A	B	C
S1	LEDs for W1	LED 1r (-) (red / branching)	LED 1g (+) (green / straight on)	LED 1r (+) LED 1g (-)
S2	LEDs for W2	LED 2r (-) (red / branching)	LED 2g (+) (green / straight on)	LED 2r (+) LED 2g (-)
S3	LEDs for W3	LED 3r (-) (red / branching)	LED 3g (+) (green / straight on)	LED 3r (+) LED 3g (-)
S4	LEDs for W4	LED 4r (-) (red / branching)	LED 4g (+) (green / straight on)	LED 4r (+) LED 4g (-)
S5 to S8		not in use		

### Connections to connecting area 2 "solder pins" for mode 2

	Push-buttons	A	B	C
S1	push-button for W1r	push-button 1 (connector 1)	--	push-button 1 (connector 2)
S2	push-button for W1g	push-button 2 (connector 1)	--	push-button 2 (connector 2)
S3	push-button for W2r	push-button 3 (connector 1)	--	push-button 3 (connector 2)
...	...	...	--	...
S8	push-button for W4g	push-button 8 (connector 1)	--	push-button 8 (connector 2)



**Attention:** The push-buttons should be connected to the decoder only. Any connection between a push-button and the remaining layout will lead to a short circuit possibly damaging the connected components.

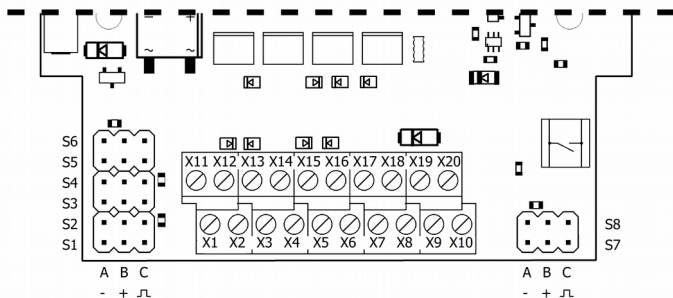
### Connections to connecting area 2 "solder pins" for mode 3

	Servos	A   "GND" (-)	B   "VCC" (+)	C   "PW" (⌋)
S1	servo 1	GND (-)	VCC (+)	signal ⌋
S2	servo 2	GND (-)	VCC (+)	signal ⌋
S3	servo 3	GND (-)	VCC (+)	signal ⌋
...	...	...	...	...
S8	servo 8	GND (-)	VCC (+)	signal ⌋



**Attention:** When using servos with a current consumption of more than 1 A or when operating several servos at the same time and thus exceeding the maximum current of 1 A in connecting area 2, you have to connect an external voltage supply. Also see section 5.2.

## 5.4. Connector pin assignment for operation modes 4 to 6



### Connecting area 2 "solder pins"

You can connect a maximum of 8 servos to the solder pins.

### Connecting area 1 "terminal strips"





Depending on the chosen mode of operation you can connect to the terminal strips:

- Operation mode 4: max. 8 push-buttons to toggle between the servos' end positions.
- Operation mode 5: 8 relays for the frog polarisation of four points.
- Operation mode 6: 8 switches as end position switches of 4 servo driven points for the feedback of the actual position of the points.

**⚠** Observe the maximum current of the outputs as well as of the two connecting areas (see section 5. "Technical specifications"). With a too high current consumption of the connected accessories the decoder switches off automatically.

**⚠** Pay attention to not connection the in- and outputs by accident to a live wire. The extreme overlad suddenly occuring can damage the decoder irreparably.

**Connections to connecting area 2 "solder pins" for modes 4 - 6**

	Connection to	A	B	C
S1	servo 1	GND (-)	VCC (+)	signal 
S2	servo 2	GND (-)	VCC (+)	signal 
S3	servo 3	GND (-)	VCC (+)	signal 
...	...	...	...	...
S8	servo 8	GND (-)	VCC (+)	signal 

**Connections to connecting area 1 "terminal strips" for mode 4**

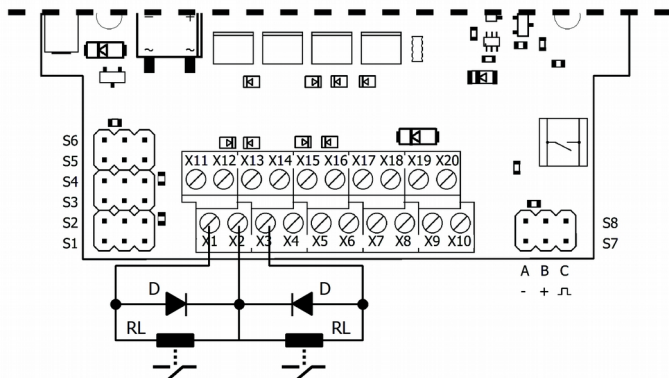
	Connection to:
X1   X2	push-button for servo 1
X3   X2	push-button for servo 2
X4   X5	push-button for servo 3
X6   X5	push-button for servo 4
X11   X12	push-button for servo 5
X13   X12	push-button for servo 6
X14   X15	push-button for servo 7
X16   X15	push-button for servo 8



**Attention:** The push-buttons should be connected to the decoder only. Any connection between a push-button and the remaining layout will lead to a short circuit possibly damaging the connected components.



## Connections to connecting area 1 "terminal strips" for mode 5



	Connection to:
X1   X2	relay 1 for servo 1
X3   X2	relay 2 for servo 1
X4   X5	relay 1 for servo 3
X6   X5	relay 2 for servo 3
X11   X12	relay 1 for servo 2
X13   X12	relay 2 for servo 2
X14   X15	relay 1 for servo 4
X16   X15	relay 2 for servo 4
It is not possible to connect a relay for servos 5 to 8.	

### Connections to connecting area 1 "terminal strips" for mode 6

	Connection to:
X1   X2	end position switch 1 for servo 1
X3   X2	end position switch 2 for servo 1
X4   X5	end position switch 1 for servo 2
X6   X5	end position switch 2 for servo 2
X11   X12	end position switch 1 for servo 3
X13   X12	end position switch 2 for servo 3
X14   X15	end position switch 1 for servo 4
X16   X15	end position switch 2 for servo 4
It is not possible to connect a position switch for servos 5 to 8.	

**⚠ Attention:** The end position switches should be connected to the decoder only. Any connection between a switch and the remaining layout will lead to a short circuit possibly damaging the connected components.

## 5.5. Connection to the BiDi-bus

The Multi-Decoder has two RJ 45-ports for connecting the decoder to the BiDi-bus. They are switched in parallel and thus can be used optionally for the connection to the BiDiB-interface and / or the next data link module.

## 6. Programming the Multi-Decoder

### **Programming with a DCC-central unit**

You can program the configuration variables (CV) using a DCC digital central unit. See the chapter in the manual of your central unit where the byte wise programming of configuration variables (CVs) is explained.

The address range that can be programmed with a DCC-central unit is limited to the decoder addresses 1 to 63 (corresponding to the accessory decoder addresses 1 to 252). If you want to use higher addresses (DCC up to 2040 and MM up to 1020), you can assign them to the decoder by using the integrated programming push-button.

### **Programming with a MM-central unit**

When using a Motorola-central unit, you can program the decoder by using external push-buttons and jumpers only. It is impossible to program the decoder with a MM-central unit.

### **Programming without digital central unit**

When using the Multi-Decoder in a pure analogue layout, you can make all essential settings without a digital central unit by using external push-buttons and jumpers only.

## 6.1. Setting the addresses

### Addresses of the Multi-Decoder

Depending on the chosen operation mode, one, two or three succeeding quads of accessory decoder addresses are assigned to each decoder address. The accessory decoder addresses used to send the switching commands, arise as follows:

decoder address  $\times 4$  = highest address of a quad of points addresses

		Examples			
Mode	Number of quads	Decoder address	Accessory decoder addresses	Decoder address	Accessory decoder addresses
1	$1 \times 4 = 4$	1	1 - 4	4	13 - 16
2	$1 \times 4 = 4$	1	1 - 4	4	13 - 16
3	$3 \times 4 = 12$	1	1 - 12	4	13 - 24
4	$2 \times 4 = 8$	1	1 - 8	4	13 - 20
5	$2 \times 4 = 8$	1	1 - 8	4	13 - 20
6	$2 \times 4 = 8$	1	1 - 8	4	13 - 20

With the operation modes using more than one quad, you have to program the address of the first quad. The succeeding addresses are set automatically for the other quads.

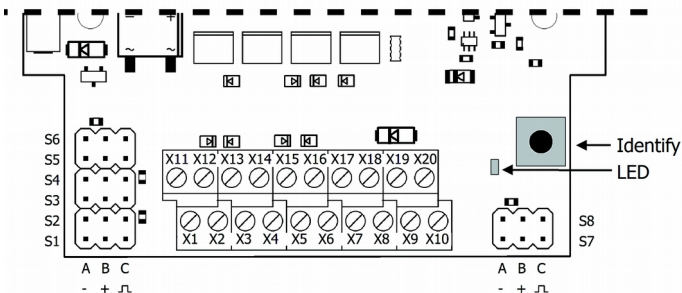
## Programming the addresses with a DCC-central unit

Name of CVs	CV-no.	Input value (Default)	Remarks and tips
Decoder addresses 1 to 63	1	1, 2, 3, ... 63 (1)	corresponds to accessory decoder addresses 1 to 252

Hint: If you want to use higher addresses or do not use a DCC-central unit, you can set the addresses by using the integrated programming push-button.

Please not: In order to take over the settings finally, you have to switch off the decoder for a short time (approx. 5 seconds).

## Setting the address by the integrated programming push-button



1. Push the integrated programming push-button. The LED flashes and thus displays the change-over into the address programming mode.
2. Enter at your control unit any address from the (first) quad of accessory decoder addresses you want to use to switch the connected accessories (e.g. accessory decoder address "10" from the quad 9 – 12). Enter a switching command for the chosen address.
3. As soon as the LED goes out, the decoder has taken over its new address.

## 6.2. Possible settings and default values

	DCC-programming (CV#)	Programming by push-buttons and jumpers	Default
Operation mode	1...6 (CV#38)	1...6 (progr. step 2)	1
RailCom	Channel 1 and / or 2 on / off RailCom on / off (CV#28 / CV#29)	---	RailCom on (Channel 1 and 2)

### Settings for connecting area 1 (operation modes 1 to 3)

	DCC-programming (CV#)	Programming by push-buttons and jumpers	Default
On-Time	0 ... 25,5 s (to be set individually for each pair of outputs) (CV##3...6, CV##33...36)	0 ... 25,5 s (to be set individually for each pair of outputs) (progr. step 3a, progr. step 3b)	for alle 4 pairs of outputs: 0,5 s
Switching mode for pairs of outputs	switching on and off or changing over (to be set individually for each pair of outputs) (CV#37)	switching on and off or changing over (to be set individually for each pair of outputs) (progr. step 4)	for alle 4 pairs of outputs: changing over (→ points decoder, switching decoder with change over function)
Type of points drive	without or with limit stop (to be set individually for each pair of outputs) (CV#66)	without or with limit stop (to be set in common for all pairs of outputs) (progr. step 5)	for alle 4 pairs of outputs: with limit stop

**Settings for connecting area 2 (operation modes 3 to 6)**

	DCC-programming (CV#)	Programming by push-buttons and jumpers	Default
Servo control in rest	servo signals are switched off or sent further (to be set individually for each servo) (CV#255)	servo signals are switched off or sent further (to be set in common for all servos) (progr. step 6)	servo signals are switched off for all 8 servos as soon as the servo has reached its rest position
Servo settings	left / right stop / servo velocity (to be set individually for each servo) (CV##40 ff , CV##140 ff)	left / right stop / servo velocity (to be set individually for each servo) (progr. step 7)	
Follow-up time of servos	(to be set in common for all servos) (CV#67)	---	200 ms

### 6.3. Programming with a DCC-central unit

Please not: In order to take over the settings finally, you have to switch off the decoder for a short time (approx. 5 seconds).

#### Basic settings

Name of CVs	CV-no.	Input value (Default)	Remarks and tips
Version	7	---	Read only!
Manufacturer	8	(62)	Read only!
Reset	8	0 ... 255	By entering any value the settings in state of delivery are restored.

#### Choosing the operation mode

Name of CVs	CV-no.	Input value (Default)	Operation mode no.	Value of the CV
Operation mode	38	0, 1, 2, 3, 4, 5 (0)	1	0
			2	1
			...	...
			6	5

#### Settings for RailCom

Name of CVs	CV-no.	Input value (Default)	Remarks and tips
RailCom channel	28	0, 1, 2, 3 (3)	RailCom in channel 1 off   on 0   1
			RailCom in channel 2 off   on 0   2
RailCom on / off	29	128, 136 (136)	RailCom off 128
			RailCom on 136

Hint: When not using RailCom with a DCC-central unit, it is recommended to switch it off in CV#29.



**Settings for connecting area 1 (operation modes 1 to 3)**

Name of CVs	CV-no.	Input value (Default)	Remarks and tips				
On-time of the outputs			Defines how long the switching impulse is applied / the output is switched on.				
points 1r	3	0, 1, 2 ... 255 (5)	Switched on till the next switching impulse to the same accessory decoder address				
points 1g	4						
points 2r	5						
points 2g	6					100 milliseconds (msec)	1
points 3r	33					200 milliseconds (msec)	2
points 3g	34					300 milliseconds (msec)	3
points 4r	35					...	
points 4g	36					25,5 seconds (sec)	255
Switching mode for the pairs of outputs	37	0, 1, 2, 3, 4, 5, 6, ... 15 (15)	The outputs are switched on and off independently from each other (e.g. for switching decoder, decoupler).				
			The outputs are changed over (e.g. for points decoder, switching decoder with change over function)				
			pair of outputs 1	1			
			pair of outputs 2	2			
			pair of outputs 3	4			
			pair of outputs 4	8			
Points drive	66	0, 1, 2, 3, 4, 5, 6, ... 15 (15)	limit stop	without	with		
			points 1	0	1		
			points 2	0	2		
			points 3	0	4		
			points 4	0	8		

**Settings for connecting area 2 (operation modes 3 to 6)**

Name of CVs	CV-no.	Input value (Default)	Signal for	is sent further *	is switched off **
Servo control in rest	65	0, 1, 2, 3, 4, 5, 6, ... 255 (255)	servo 1	0	1
			servo 2	0	2
			servo 3	0	4
			servo 4	0	8
			servo 5	0	16
			servo 6	0	32
			servo 7	0	64
			servo 8	0	128

\* The servo control signals are sent continuously, the decoder controls the servo in rest. Please note: With this setting snarling noises can occur.

\*\* The servo control signals are switched off as soon as the servo is in rest. The servo keeps its position internally.

Name of CVs	CV-no.	Input value (Default)	Remarks and tips
Settings for servo 1	140	4...30 (14)	LS = left stop each step = 100 $\mu$ s (0,1 msec)
	40	0...99 (0)	LS-f = left stop / fine tuning each step = 1 microsekunde ( $\mu$ sec)
	141	4...30 (16)	RS = right stop each step = 100 $\mu$ s (0,1 msec)
	41	0...99 (0)	RS-f = right stop / fine tuning each step = 1 microsekunde ( $\mu$ sec)
	142	0...255 (0)	V = velocity
	42	0...99 (16)	V-f = velocity / fine tuning

Name of CVs	CV-no.	Input value (Default)	Remarks and tips
Settings for servo 2	143	4...30 (14)	LS
	43	0...99 (0)	LS-f
	144	4...30 (16)	RS
	44	0...99 (0)	RS-f
	145	0...255 (0)	V
	45	0...99 (16)	V-f
Settings for servo 3	146	4...30 (14)	LS
	46	0...99 (0)	LS-f
	147	4...30 (16)	RS
	47	0...99 (0)	RS-f
	148	0...255 (0)	V
	48	0...99 (16)	V-f
Settings for servo 4	149	4...30 (14)	LS
	49	0...99 (0)	LS-f
	150	4...30 (16)	RS
	50	0...99 (0)	RS-f
	151	0...255 (0)	V
	51	0...99 (16)	V-f
Settings for servo 5	152	4...30 (14)	LS
	52	0...99 (0)	LS-f
	153	4...30 (16)	RS
	53	0...99 (0)	RS-f
	154	0...255 (0)	V
	54	0...99 (16)	V-f
Settings for servo 6	155	4...30 (14)	LS
	55	0...99 (0)	LS-f
	156	4...30 (16)	RS
	56	0...99 (0)	RS-f
	157	0...255 (0)	V
	57	0...99 (16)	V-f

Name of CVs	CV-no.	Input value (Default)	Remarks and tips
Settings for servo 7	158	4...30 (14)	LS
	58	0...99 (0)	LS-f
	159	4...30 (16)	RS
	59	0...99 (0)	RS-f
	160	0...255 (0)	V
	60	0...99 (16)	V-f
Settings for servo 8	161	4...30 (14)	LS
	61	0...99 (0)	LS-f
	162	4...30 (16)	RS
	62	0...99 (0)	RS-f
	163	0...255 (0)	V
	63	0...99 (16)	V-f

CV-Name	CV-Nr.	Eingabewert (Defaultwert)	Erläuterungen und Hinweise
Servo follow-up time	67	0...255 (2)	each step = 100 msec (0,1 sec)

By setting a servo follow-up time you can avoid that the servo signal is switched off immediately after the regulating time calculated by the decoder has elapsed und thus the servo movement is interrupted before reaching the stop e.g. after a unscheduled slow run.

## 6.4. Programming with push-buttons and jumpers

In order to program the Multi-Decoder without digital control unit you need the following optional accessories:

- two external programming push-buttons for the connection at the solder pins in connecting area 2 and
- six programming jumpers (or similar) to bridge the connectors A and C of the solder pins in connecting area 2.

The integrated programming push-button is used to confirm a setting or to save a data entry.

### **Possible settings**

You can make all essential settings of the decoder by use of the programming push-buttons and jumpers:

- programming step 1: reset (the settings in the state of delivery are restored, see section 6.2.);
- programming step 2: choosing the operation mode.

Für connecting area 1 (operation modes 1 to 3):

- programming step 3: on-time of the outputs;
- programming step 4: switching mode for the pairs of outputs;
- programming step 5: type of the points drive (with or without limit stop).

Für connecting area 2 ( operation modes 3 to 6):

- programming step 6: servo control in rest;
- programming step 7: servo settings (left and right stop, velocity).

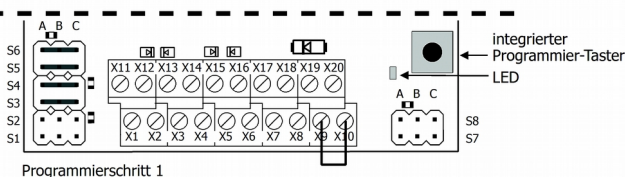
## Hints

You can perform the programming with push-buttons and jumpers in any order; it is possible to perform only single steps as well.

At the beginning of programming you always have to bridge the terminal strips X9 and X10 in connecting area 1 first (with a wire).

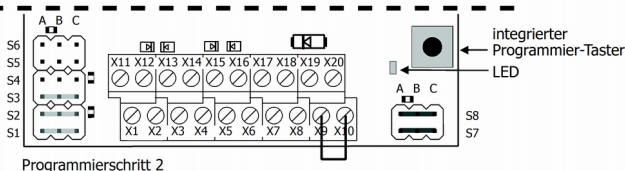
When bridging the solder pins in connecting area 2 you always have to bridge the connectors A and C, at the same time the connector B stays open.

## Programming step 1: Reset



Proceeding	Effect
<b>Before</b> switching on: bridge the connectors A and C at S3 to S6.	
Switch on the decoder.	The LED flashes.
Switch off the decoder.	The decoder performs a reset. When switched on for the next time the settings in state of delivery are restored.

## Programming step 2: Choosing the operation mode



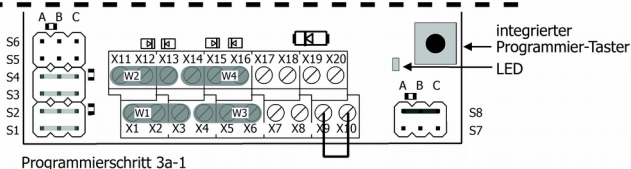
Proceeding	Effect																												
<p><b>Before</b> switching on:</p> <p>bridge the connectors A and C at S7 to S8 <b>and</b></p> <p>bridge the connectors A and C at S1, S2 and / or S3 according to the adjoining list.</p>	<p>Choosing the operation mode:</p> <table border="1"> <thead> <tr> <th></th> <th>S1</th> <th>S2</th> <th>S3</th> </tr> </thead> <tbody> <tr> <td>mode 1</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>mode 2</td> <td>+</td> <td>-</td> <td>-</td> </tr> <tr> <td>mode 3</td> <td>-</td> <td>+</td> <td>-</td> </tr> <tr> <td>mode 4</td> <td>+</td> <td>+</td> <td>-</td> </tr> <tr> <td>mode 5</td> <td>-</td> <td>-</td> <td>+</td> </tr> <tr> <td>Mode 6</td> <td>+</td> <td>-</td> <td>+</td> </tr> </tbody> </table>		S1	S2	S3	mode 1	-	-	-	mode 2	+	-	-	mode 3	-	+	-	mode 4	+	+	-	mode 5	-	-	+	Mode 6	+	-	+
		S1	S2	S3																									
	mode 1	-	-	-																									
	mode 2	+	-	-																									
	mode 3	-	+	-																									
	mode 4	+	+	-																									
	mode 5	-	-	+																									
Mode 6	+	-	+																										
Switch on the decoder.	The LED flashes as a confirmation.																												
Switch off the decoder.	<p>The programming mode is brought to an end.</p> <p>Hint: In order to change the operation mode anew, you first have to switch off the decoder.</p>																												

### Programming step 3 a:

#### Settings for connecting area 1 (operation modes 1 to 3) / setting a limited on-time

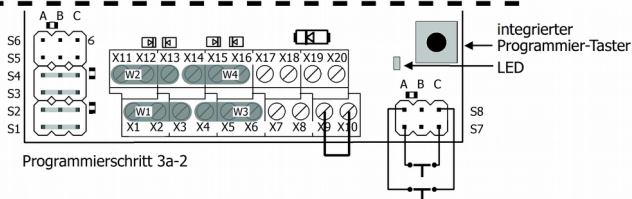
You can set individually for each of the four pairs of outputs a limited on-time between 100 msec and 25.5 sec. The on-time defines how long a connected accessory will be switched on or how long the switching impulse is applied (when connecting points).

Before setting the length of the on-time, you first have to define the pairs of outputs to which a limited on-time has to be applied. Hint: In state of delivery a limited on-time is set for all pairs of outputs.



Proceeding	Effect
<b>Before</b> switching on: bridge the connectors A and C at S8	
<b>Before</b> switching on: bridge the connectors A and C at S1, S2, S3 or S4 .	Limited on-time for S1 = pair of outputs 1 or S2 = pair of outputs 2 or S3 = pair of outputs 3 or S4 = pair of outputs 4
Switch on the decoder.	The LED flashes.
Switch off the decoder.	A limited on-time is set for the chosen pair of outputs . Now you can define the length of the on-time.



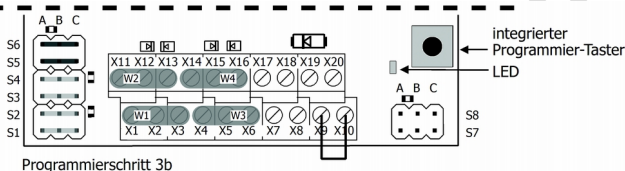


Proceeding	Effect
<b>Before</b> switching on: connect an external programming push-button to S7 and S8	The external programming push-buttons are required to reduce the on-time (button at S7) or to increase the on-time (button at S8).
<b>Before</b> switching on: bridge the connectors A and C at S1, S2, S3 or S4.	Choosing the pair of outputs: S1 = pair of outputs 1 or S2 = pair of outputs 2 or S3 = pair of outputs 3 or S4 = pair of outputs 4 Hint: While programming you can choose another pair of outputs at any time.
Switch on the decoder.	The LED lights. Now you can set the length of on-time for the pair of outputs chose at S1 to S4.
Push the external programming push-button. S7 → reduce the on-time S8 → increase the on-time	The LED goes off. After each modification the output will be switched on and off once or the points will be switched twice.
Push the integrated programming push-button.	Save the set value. The LED lights. When pushing the external programming push-button again, the LED goes off. You can make settings for another pair of outputs then.
Switch off the decoder.	The programmiing mode is brought to an end.

### Programming step 3 b:

#### Settings for connecting area 1 (operation modes 1 to 3) / setting an unlimited on-time

If you want the outputs to be switched on or off till the next switching impulse (for use as switching decoder with changeover function), you have to set an unlimited on-time individually for each pair of outputs.



Proceeding	Effect
<b>Before</b> switching on: bridge the connectors A and C at S5 and S6	Please note: You should not bridge S8 when performing this programming step!
<b>Before</b> switching on: bridge the connectors A and C at S1, S2, S3 or S4	Choosing the pair of outputs: S1 = pair of outputs 1 or S2 = pair of outputs 2 or S3 = pair of outputs 3 or S4 = pair of outputs 4
Switch on the decoder.	The LED lights.
Switch off the decoder.	The settings are saved. The programming mode is brought o an end.

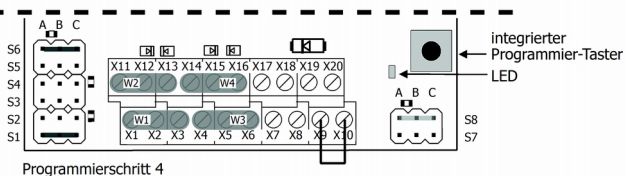
## Programming step 4

### Settings for connecting area 1 (operation modes 1 to 3) / Switching mode for the pairs of outputs

Defines, if the outputs of a pair of outputs are

- switched alternately / changed over (e.g. for points decoders) or
- switched on and off independently from each other (e.g. for switching decoders).

Hint: The settings are valid for all pairs of outputs. The CV programming allows you to set the switching mode individually for each pair of outputs.



Proceeding	Effect
<b>Before</b> switching on: bridge the connectors A and C at S1, S6 and S8	The outputs of all pairs are switched alternately / changed over (e.g. for use as points decoder).

**or:**

<b>Before</b> switching on: bridge the connectors A and C at S1 and S6 (not S8)	All outputs are switched on and off independently from each other (e.g. for use as switching decoders).
Switch on the decoder.	The LED flashes.
Switch off the decoder.	The settings are saved. The programming mode is brought to the end.

## Programming step 5:

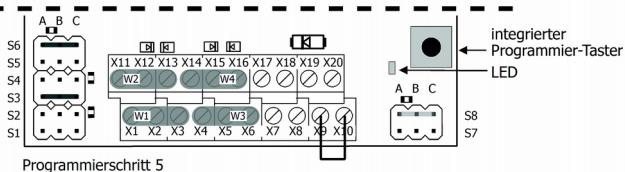
### Settings for connecting area 1 (operation modes 1 to 3) /

#### Type of points drive

Defines, which type of points is connected:

- with or
- without limit stop.

Hint: The settings are valid for all pairs of outputs. The CV programming allows you to set the type of points drive individually for each pair of outputs.



Proceeding	Effect
<b>Before</b> switching on: bridge the connectors A and C at S3, S6 and S8	Connection of points with limit stop.

or:

<b>Before</b> switching on: bridge the connectors A and C at S3 and S6 (not S8)	Connection of points without limit stop..
Switch on the decoder.	The LED flashes.
Switch off the decoder.	The settings are saved. The programming mode is brought to the end.

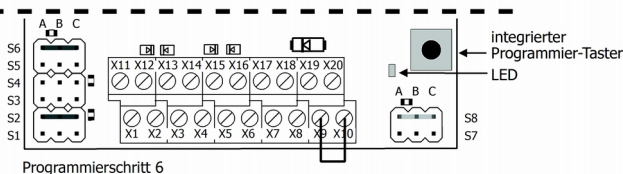
## Programming step 6:

### Settings for connecting area 2 (operation modes 3 bis 6) / Servo control in rest

Defines, if the servo control commands are

- switched off as the servo is in rest. The servo keeps its position internally.
- or sent continuously. The decoder controls the servo in rest. Please note: With this setting snarling noises can occur.

Hint: The settings are valid for all servos. The CV programming allows you to set the servo control in rest individually for each servo.



Programmierschritt 6

Proceeding	Effect
<b>Before</b> switching on: bridge the connectors A and C at S2, S6, and S8	The servo control commands are sent continuously.

or:

<b>Before</b> switching on: bridge the connectors A and C at S2 and S6 (not S8)	The servo control commands are switched off as soon as the servo is in rest.
Switch on the decoder.	The LED flashes.
Switch off the decoder.	The settings are saved. The programming mode is brought to the end.

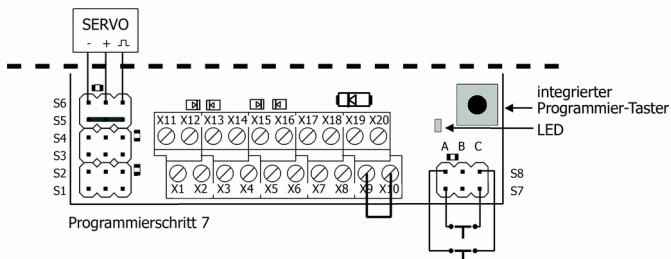
### Programming step 7:

#### Settings for connecting area 2 (operation modes 3 to 6) / Setting the servo end positions and the servo velocity

When setting the servo end positions and velocity, the following programming sub-steps are run through one after the other for the servo connected to S6:

- 1: left stop
- 2: right stop
- 3: velocity

The decoder proceeds automatically to the next programming sub-step after pushing the integrated programming push-button.



Proceeding	Effect			
<b>Before</b> switching on: connect an external programming push-button at S7 and S8	The external programming push-buttons are used to alter the end positions and the velocity: "up" using push-button at S7 or "down" using push-button at S8.			
<p><b>Before</b> switching on: bridge the connectors A and C at S5 <b>and</b></p> <p>in order to choose the servo connection to be programmed bridge the connectors A and C at S1, S2 and / or S3 according to the adjoining list <b>and</b></p> <p>connect the servo to be programmed to S6.</p>	Choosing the servo connector to be programmed:			
		S1	S2	S3
	servo 1	-	-	-
	servo 2	+	-	-
	servo 3	-	+	-
	servo 4	+	+	-
	servo 5	-	-	+
	servo 6	+	-	+
	servo 7	-	+	+
servo 8	+	+	+	
Switch on the decoder.	The LED lights. Programming sub-step 1: left stop			
Push the external programming push-buttons.	Alter the settings. The servo takes over the modification immediately.			
Push the integrated programming push-buttons.	The set value is saved and the decoder proceeds to the next sub-step. .			
Switch off the decoder.	The programming mode is brought to an end.			


 **Attention:**

Before connecting or disconnecting a servo to S6 you always should switch off the decoder. Otherwise you run the risk to damage the servo or connected components due to uncontrolled servo movements.



## 7. Check list for troubleshooting

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

▪  Disconnect the system from the mains immediately!

Possible cause: One or several connectors are connected faulty.  
→ Check the connections. In- or outputs of the decoder connected to a live wire are probably damaged irreparably.

- Connected accessories do not react to switching commands.

Possible cause: The connection of the decoder to the central unit and / or the power supply is interrupted. → Check the connections.

Possible cause: The connection of the decoder to the accessory is interrupted. → Check the connections.

Possible cause: The central unit is not operating. → Check if the central unit is ready for operation.

Possible cause: The connected accessory is defective. → Check the accessory or the points.

- Connected accessories do not react to switching commands as expected / do not react to switching the push-buttons.

Possible cause: Another operation mode is set than expected.  
→ Check the operation mode.

- After programming the decoder it does not react as intended.

Possible cause: The set values for the CV variables are inconsistent.  
→ Perform a decoder reset and test the decoder with the default values first. Then program the decoder anew.

Possible cause: The programming mode has not been finished properly. → Finish the programming mode always by switching off the decoder.

- After programming the address the decoder does not react to switching commands.

Possible cause: When programming the decoder address via CV you set the decoder address. To switch the decoder accessory decoder addresses are used. → Input the accessory decoder address to switch. (Advice: The decoder address multiplied with 4 tallies to the highest address from the quadruple accessory decoder address block. Example: decoder address = 10 → corresponding accessory decoder addresses: 37 to 40.)

- The decoder switches off when sending switching commands to a connected accessory.

Possible cause: The accessory's current consumption exceeds the maximum values. → Check the accessory's current consumption. If necessary, use an external voltage supply for servos or a relay to switch accessories.

## Hotline

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

## Repairs

You can send in a defective decoder 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 50 % of the sales price according to our valid price list. We reserve the right to reject the repairing of a decoder when the repair is impossible for technical or economic reasons.

Please do not send in decoders 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.

## 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

**CE** 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.

## 10. Declarations conforming to the WEEE directive

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



DE 37847206

The Tams Elektronik GmbH is registered with the WEEE-no. DE 37847206, according to. § 6 sect. 2 of the German electro regulations from the responsible authority for the disposal of used electro equipment.

Don't dispose of this product in the house refuse, bring it to the next recycling bay.

tams elektronik

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Information and tips:

<http://www.tams-online.de>

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DE 37847206