Manual

Multi-Decoder MD-2.BiDiB

Item no. 46-13126 | 46-13127

8- fold servo decoder
and 4-fold turnout decoder

《BiDiB》

tams elektronik

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1. Getting started

Notes on BiDiB®

The BiDiB devices described in this manual comply with the standards of the BiDiB specification (status V0.7). The BiDiB specification has been published on: www.bidib.org.

BiDiB® is a registered trademark. Copyrights and trademarks to BiDiB are held by Wolfgang Kufer, OpenDCC.de.

In order to increase the readability of this text, we have refrained from referring to it whenever the term BiDiB is used.

How to use this manual

This manual gives step-by-step instructions for safe and correct 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 MD-2.BiDiB is designed to be operated according to the instructions in this manual in BiDiB-controlled model railway layouts. Any other use is inappropriate and invalidates any guarantees.

The 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.

Package contents

- one Multi-Decoder MD-2.BiDiB, depending on the model
      ready-built module, item number 46- 13126 or
      ready-built module in a housing, item number 46-13127
- an Ethernet patch cable with RJ-45 connectors (length: 0.5 m)
- two short-circuit jumpers
- a CD (containing the manual and further information)

Required materials

In order to connect the decoder, you need wire. Recommended diameters:

- $\geq$ 0,05 mm² for the connections to LEDs, push buttons and switches;
- $\geq$ 0,25 mm² for all other connections.

When using motor-run turnouts, you need an additional adapter AMW-2 for each turnout (item-no. 72-00086).

2. Safety instructions

> **⚠ Caution:**
>
> The decoder contains integrated circuits. These 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.

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.

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 mount this module.

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

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

3. Operation overview

In terms of the BiDiB specification the Multi-Decoder MD-2.BiDiB is a node operated on an interface. It complies with the requiremets for the class "Accessory Control" defined in the BiDiB-specification.

Note: The MD-2.BiDiB **cannot** be controlled by digital control units sending digital accessory decoder commands to the accessory decoders (e.g. in Motorola or DCC format).

3.1. Controlling servos and other accessories

The MD-2.BiDiB is a stationary decoder used to control a maximum of 8 servos. In addition, coil driven turnouts or semaphore signals, decouplers or other accessories or push-buttons for manual activation of the servos can be connected.

Operating mode 1:
8-fold servo decoder
+ turnout- and/or
switching decoder

Connecting area 1 ("pin headers")	8 servos[*1] (8-fold servo decoder)
Connecting area 2 ("terminal strips")	4 solenoid accessories[*2] (4-fold turnout decoder)
	or 8 other accessories[*3] (8-fold switching decoder)
	or combination of turnouts and other accessories

* see page 9

Operating mode 2:

8-fold servo decoder
with push-buttons
for manual activation

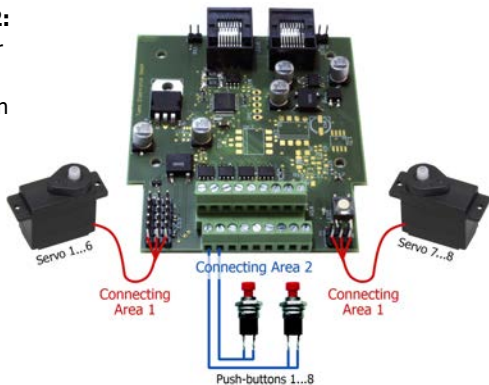| Connecting area 1 ("pin headers")	8 servos[*1] (8-fold servo decoder)
Connecting area 2 ("terminal strips")	8 push-buttons for toggling between the servos´ two end positions (as well suitable for purely analogue operation)

[*1] Servos: to control for example turnouts, semaphore signals or (railroad crossing) gates.

[*2] Solenoid accessories: accessories switched by short switching impulses, for example coil driven turnouts (with or without limit stop), coil driven semaphore signals, decouplers. Hint: In order to control motor-run turnouts, you need an additional adapter AMW-2.
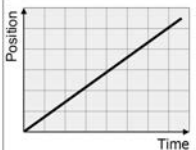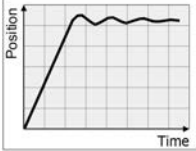
[*3] Other accessories: for example light signals (to switch over between the signals) or other lights (to switch them on and off).

The voltage supply for the connected accessories is provided by the Multi-Decoder MD-2.

Motion sequences

You can set separately for each of the 8 servos:

- Starting and end position
- Rotational speed
- Simple linear motion curve or linear motion curve with teetering when reaching the end position (to be adjusted separately for the two directions of motion)

	Simple linear motion curve with constant velocity. It is not possible to break the motion sequence before the end position has been reached. When reaching an end position the motion sequence is stopped automatically.
	Linear motion with teetering at the end positions (typical motion sequence of semaphore signals and railroad crossing gates). The teetering motion has to be set separately for each direction of motion.

3.2. Features according to the BiDiB-specification

The BiDiB-specification provides characteristics for the class "Accessory Control" which all nodes of this class have to comply with ("obligatory features"). They mainly refer to the transmission of commands and sending of confirmations.

According to the BiDiB specification the Multi-Decoder MD-2.BiDiB confirms the reception of an operation command by reporting the approximate operation time to the PC, and sends a status signal after having finished the operation. In case problems occur during the operation (e.g. short circuit) the decoder automatically sends an error message.

In addition to the obligatory features the Multi-Decoder MD-2.BiDiB has the following optional features:

Monitoring and spontaneous message

In operating mode 2 ("servos + push-buttons") the Multi-Decoder MD-2.BiDiB sends a spontaneous message to the PC, as soon as a servo has been set by pushing the button.

User configuration

In operating mode 1 ("servos + turnouts") the on-time can be set to a time between 100 msec and 127 sec individually for each of the 4 pairs of outputs. In state of delivery the time is set to 300 msec.

When setting the value "0", the switching time for the pair of outputs is unlimited. This allows to use the outputs as change-over switches (e.g. to switch light signals or lights).

Firmware update

It is possible to update the firmware of the Multi-Decoder MD-2.BiDiB.

3.3. Use in BiDiBus

In terms of the BiDiB specification the decoder WD-34.(M.)BiDiB is a node to be operated together with up to 31 other nodes on one level. Depending on the structure of the system the nodes of one level are connected to

- an interface providing the connection to the PC
- a hub allowing to extend the structure by an additional level

Example for a BiDiB controlled layout part

The interface (ZEUS) provides the connection between PC control and the nodes on the different levels of the system. The example shows different turnout decoders in the highest level switching for example coil driven points (WD-34.BiDiB) and motor-driven points (WD-34.M.BiDiB).

The hub (ARTEMIS) provides an additional level with a maximum of 32 nodes. The example shows a servo decoder (MD-2.BiDiB) and a switching decoder (SD-34.BiDiB) in this level.

The operation commands for the accessory decoders and the reporting messages of the accessory decoders are transmitted via the BiDiBus line.

Compared to conventional digital control systems there is no need for a digital control unit including boosters for this BiDiB controlled layout part.
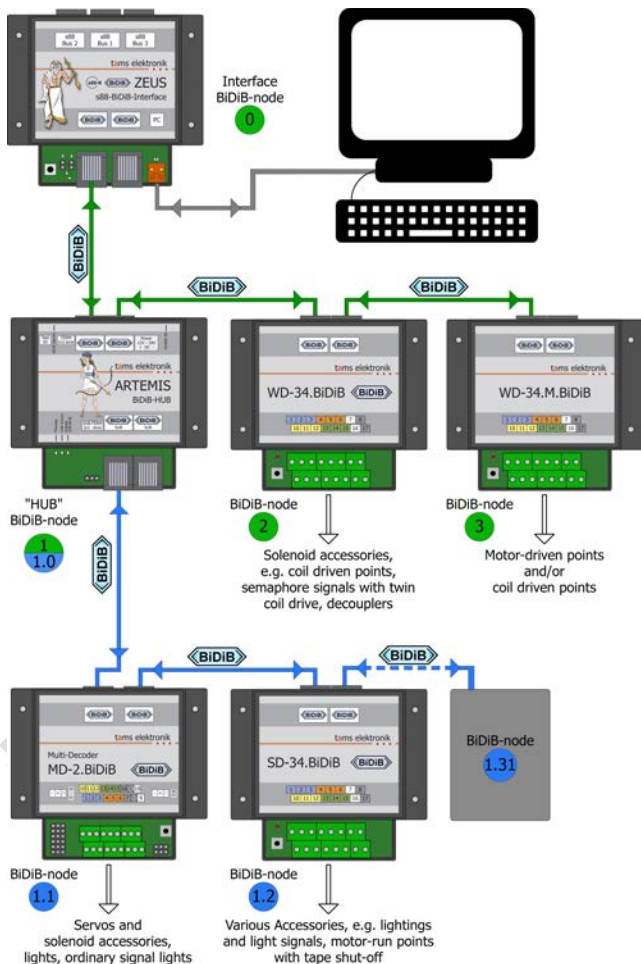
3.4. Wiring

According to the BiDiBus specification patch cables with RJ 45 connectors (Cat5 cables) are used as bus lines for the the Multi-Decoder MD-2.BiDiB. These cables allow simple and quick handling and provide safe connections to the interface and other nodes.

Plugging in and out the cables during operation is permitted (hotplug).

3.5. Assignment in the BiDiBus system (addressing)

According to the BiDiB-specification the assignment of the Multi-Decoder MD-2.BiDiB in the BiDiBus system is made automatically. As a basis for the automatic assignment, the decoder has a unique number (unique ID) programmed by the manufacturer. When switching on the BiDiB system, the interface scans the present nodes within its structure, and makes a list with the available nodes, their unique IDs and a local address valid for this session only.

With a new node connected to the bus, the list of the present nodes is upgraded automatically, and the interface sends a corresponding message to the PC. By means of the control software the decoder is assigned to the accessories and configured.

The Multi-Decoder MD-2.BiDiB has a so-called "identify button" according to the BiDiB specification. After pushing the button on the PCB the decoder is highlighted in the screen display and the LED on the decoder flashes.

3.6. Overload protection

In case the maximum current at one of the outputs or the total maximum current of one ot the two connecting areas has been exceeded, the decoder automatically switches off. Then, you have to switch the decoder currentless, to eliminate the overload and to switch on the decoder again.

⚠ Caution:

When connecting an in- or output to a live wire (e.g. to the power supply), a very high current occurs suddenly. In this case, the overload protection is ineffective, the decoder can be damaged irreparably.

4. Technical specifications

Features according to the BiDiB-specification	Node, class "Accessory Control" Optional Features: ■ adjustable on-time: 100 msec - 127 sec. or 0 (= ∞) ■ Firmware update
Additional optional features	Spontaneous message when triggering the servo movement by push buttons (operating mode 2)
Status of the BiDiB specification	V0.7
Supply voltage	12 – 18 V a.c. voltage or 14 – 24 V d.c. voltage
Current consumption (without connected devices)	approx. 60 mA
Connecting area 1 ("pin headers")	8 servos max. current / output: 1,000 mA
Connecting area 2 ("terminal strips")	4 pairs of outputs, depending on the operating mode for use as ■ 8 switching outputs or ■ 4 turnout outputs max. current / output: ■ up to 2 seconds: 1,500 mA ■ continuous: 1,000 mA
Max. total current	Connecting area 1: 1,000 mA (continuous)
	Connecting area 2: 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 / including housing	approx. 72 x 82 mm / approx.100 x 90 x 35 mm
Weight of the assembled board / including housing	approx. 43 g / approx. 91 g

5. Connecting the decoder

Make the connections one after the other to:

- servos (connecting area 1)
- push-buttons (connecting area 2, operating mode 2) **or**
- turnouts, other solenoid accessories and/or other accessories (connecting area 2, operating mode 1)
- the interface and/or other nodes on the same level
- power supply

	Operating mode 1	**Operating mode 2**
Connecting area 1 ("pin headers")	8 servos[*1] (8-fold servo decoder)	8 servos [*1] (8-fold servo decoder)
Connecting area 2 ("terminal strips")	4 solenoid accessories[*2] (4-fold turnout decoder) **or** 8 other accessories[*3] (8-fold switching decoder) **or** combination of turnouts and other accessories	8 push-buttons for toggling between the servos´ two end positions (suitable for purely analogue operation)

* see page 9

5.1. Connecting servos

The connecting area 1 is equipped with pin headers, where you can insert the servos´ connecting sockets directly. If yo have to extend the servos´ connecting cables, you should use 3-pole pin and socket strips, grid dimension 2,54 mm (e.g. item no. 85-11103-10 and 85-11203-10).
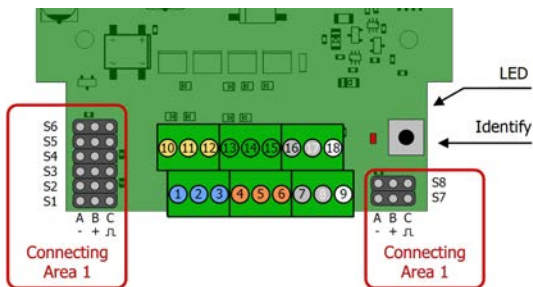
		A	**B**	**C**
S1	servo 1	GND (-)	VCC (+)	signal ⊓_
S2	servo 2	GND (-)	VCC (+)	signal ⊓_
...	...	...	...	...
S8	servo 8	GND (-)	VCC (+)	signal ⊓_

⚠ **Caution:** The maximum current for connecting area 1 as well as the maximum current per servo connection is 1,000 mA (see section 4. "Technical specifications"). With a too high current consumption of the connected accessories the decoder switches off automatically.

INFO: servo connections

Connection	**Short term**	**Identification symbol**	**Colour of connecting wire** (deviations possible)
Voltage supply	"GND"	-	black or brown
	"VCC"	+	red
Impulse (signal)	"PW"	⊓_	white or orange

5.2. Connecting push-buttons ($\rightarrow$ Operating mode 2)

The connecting area 2 is equipped with terminal strips to plug in and screw on the connecting wires for the push-buttons.
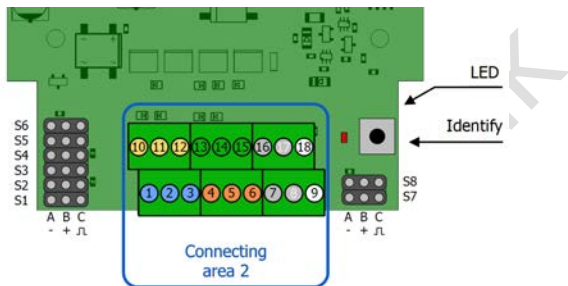
1 | 2	Push-button for servo 5
3 | 2	Push-button for servo 6
4 | 5	Push-button for servo 7
6 | 5	Push-button for servo 8
10 | 11	Push-button for servo 1
12 | 11	Push-button for servo 2
13 | 14	Push-button for servo 3
15 | 14	Push-button for servo 4

⚠ **Caution:** The push-buttons should be connected to the decoder only. A push-button connected to other components of the layout possibly causes a short-circuit and, as a consequence, irreparable damages at the connected items.

5.3. Connecting accessories (→ Operating mode 1)

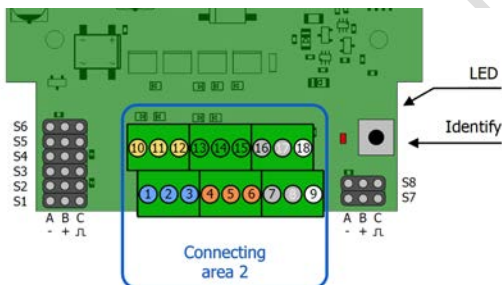The connecting area 2 is equipped with terminal strips to plug in and screw on the connecting wires for turnouts and other (solenoid) accessories. You can connect to each of the four output pairs either one solenoid accessory or two other accessories. A mixed use as turnout and switching decoder is possible.

1	Output pair 1 (T1)	Solenoid accessory / turnout 1 or switching contact 1	Turnout 1 "diverging" (1r)
2		Return conductor for T(urnout)1	
3		Solenoid accessory / turnout 1 or switching contact 2	Turnout 1 "straight" (1g)
4	Output pair 3 (T3)	Solenoid accessory / turnout 3 or switching contact 5	Turnout 3 "diverging" (3r)
5		Return conductor for T(urnout)3	
6		Solenoid accessory / turnout 3 or switching contact 6	Turnout 3 "straight" (3g)

10	Output pair 2 (T2)	Solenoid accessory / turnout 2 or switching contact 3	Turnout 2 "diverging" (2r)
11		Return conductor for T(urnout)2	
12		Solenoid accessory / turnout 2 or switching contact 4	Turnout 2 "straight" (2g)
13	Output pair 4 (T4)	Solenoid accessory / turnout 4 or switching contact 7	Turnout 4 "diverging" (4r)
14		Return conductor for T(urnout)4	
15		Solenoid accessory / turnout 4 or switching contact 8	Turnout 4 "straight" (4g)

**⚠ Caution:** The maximum current for connecting area 2 as well as the maximum continuous current per output is 1,000 mA (see section 4. "Technical specifications"). With a too high current consumption of the connected accessories the decoder switches off automatically.

⚠ Caution: Be sure not to connect the in- and outputs by accident to a live wire. The extreme overload suddenly occurring can damage the decoder irreparably.

5.4. Power supply

As a power supply for the decoder and the connected accessories (servos, turnouts, etc.) you need an AC voltage transformer (12–18 V ~) or a DC voltage power pack (14–24 V =).

⚠ Caution: You can use one transformer or powerpack to supply several BiDiB nodes. But, do **not** connect digital devices integrated in a conventional digital control system (with digital control unit) to the power supply used to supply BiDiB nodes.
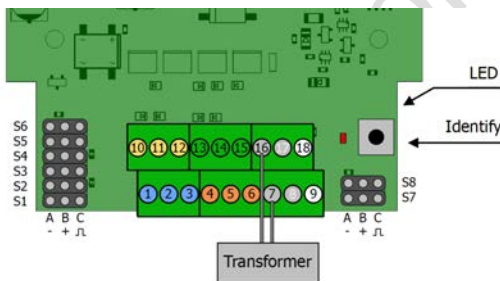
When connecting a node to the power supply the polarity is of no importance. In case several similarly designed decoders (e.g. WD-34. (M.)BiDiB, SD-34.BiDiB or MD-2.BiDiB) are connected to the same power supply, the assignment of ground / plus of the transformer or plus / minus of the power pack should be the same with all decoders.

⚠ Caution: Switch off the power supply when connecting the decoder.

⚠ Caution: If a component gets too hot, disconnect the decoder and the power supply from the mains **immediately**. Possible short circuit! Check the assembly!

5.5. Connection examples

Connecting turnouts
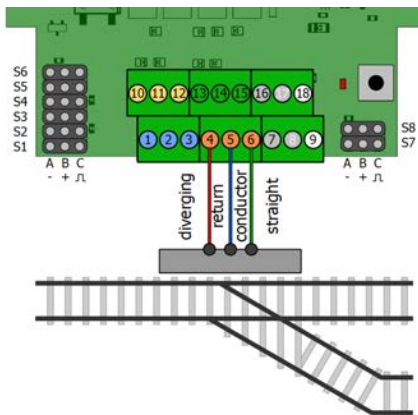
Connection of points to terminals 4 to 6 ("turnout 4")

Connecting decouplers
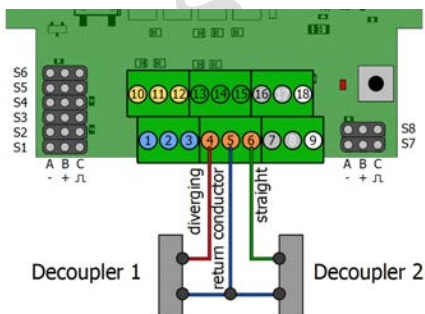
Connection of two decouplers to terminals 4 to 6

5.6. Connection to the BiDiBus

The two RJ 45 connection sockets are connected in parallel and thus can be used optionally for the connection of the decoder to the BiDiB interface and/or other BiDiB nodes on the same level.
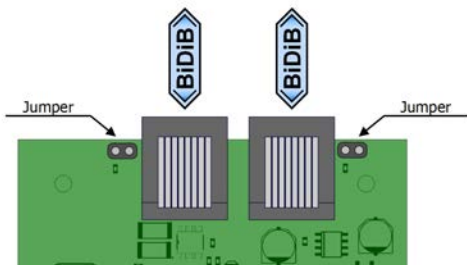
In case the Multi-Decoder MD-2.BiDiB is the last node in a level, you have to bypass the two 2-pole socket pins beside the RJ 45 connection sockets. The easiest way is to insert the jumpers included in the scope of supply.

6. Settings

When switching on the BiDiB system all nodes are identified automatically by the interface. As far as supported by the control software, all new nodes that have not been configured, are displayed when switching on and can be configurated immediately afterwards.

6.1. Identify button

In order to identify a MD-2.BiDiB in the screen display of the control software, you have to push the identify button on the PCB. Then, the assigned BiDiB node is highlighted in the screen display, and the LED on the decoder flashes.
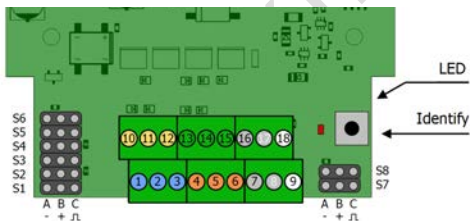
6.2. Firmware update and configuration

By means of the applicactions BiDiB-Wizard and BiDiB-Monitor (both available as free downloads), you can perform a firmware update and configurate the decoder. Please check the description to determine whether a particular program provides these possibilities as well.

Firmware update

The current firmware is available as a free download under:

http://tams-online.de/download/firmware

6.3. Possible settings and default values

CV	Meaning	Default value
Operation mode (CV 39)	Operation mode 1 ("servos + turnouts")	Operation mode 1
	Operation mode 2 (" servos + push-buttons")	

Settings for connecting area 1

CV	Meaning	Default value
Servo control in rest (CV 65)	Servo control commands are switched off or sent further. (to be set individually for each servo)	For all 8 servos: servo signals are switched off as soon as the servo has reached its rest position.
Servo settings (CV 40...63)	left / right stop, servo velocity (to be set individually for each servo)	
Follow-up time of servos (CV 67)	0 ... 25,2 s (to be set in common for all servos)	500 ms
Teetering (CV 68/CV 69)	especially for semaphore signals or railroad crossing gates: yes/no (to be set individually for each servo and each direction of motion)	no
Velocity of teetering (CV 70...77)	(to be set individually for each servo and in common for both directions of motion)	

Settings for connecting area 2 (operating mode 1)

CV	Meaning	Default value
On-Time (CV 31...38)	0 ... 25,5 s (to be set individually for each pair of outputs)	for alle 4 pairs of outputs: 0,3 s
Hint: Setting the value "0" for the on-time allows to use the output as a changeover switch (switching decoder).		

6.4. Configuration variables

Choosing the operation mode

CV	No.	Input value (Default)	Operation mode no.	Value of the CV
Operation mode	39	0, 1 (0)	1 ("servos + turnouts")	0
			2 ("servos + push-buttons")	1

Settings for connecting area 1 (servos)

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
* The servo control signals are sent continuously, the decoder controls the servo in rest. Please note: With this setting snarling noises can occur.			servo 4	0	8
			servo 5	0	16
** The servo control signals are switched off as soon as the servo is in rest. The servo keeps its position internally.			servo 6	0	32
			servo 7	0	64
			servo 8	0	128

CV	No.	Input value (Default)	Remarks and tips
Settings for servo 1	40	0...255 (100)	LS = left stop each step = 100 μs (0,1 msec)
	41	0...255 (150)	RS = right stop each step = 100 μs (0,1 msec)
	42	0...255 (10)	V = velocity
	68*	0,1,2,3 (0)	Teetering / direction 0 = no teetering 1 = teetering left 2 = teetering right 3 = teetering on both sides
	70	0...255 (40)	Teetering / velocity (for both directions of motion) Each step changes the velocity of teetering by 100 μs (0.1 msec).
Settings for servo 2	43	0...255 (100)	LS = left stop
	44	0...255 (150)	RS = right stop
	45	0...255 (10)	V = velocity
	68*	0,4,8,12 (0)	Teetering / direction 0 = no teetering 4 = teetering left 8 = teetering right 12 = teetering on both sides
	71	0...255 (40)	Teetering / velocity

CV	No.	Input value (Default)	Remarks and tips
Settings for servo 3	46	0.255 (100)	LS = left stop
	47	0...255 (150)	RS = right stop
	48	0...255 (10)	V = velocity
	68*	0,16,32,48 (0)	Teetering / direction 0 = no teetering 16 = teetering left 32 = teetering right 48 = teetering on both sides
	72	0...255 (40)	Teetering / velocity
Settings for servo 4	49	0...255 (100)	LS = left stop
	50	0...255 (150)	RS = right stop
	51	0...255 (10)	V = velocity
	68*	0,64,128,192 (0)	Teetering / direction 0 = no teetering 64 = teetering left 128 = teetering right 192 = teetering on both sides
	73	0...255 (40)	Teetering / velocity
Settings for servo 5	52	0...255 (100)	LS = left stop
	53	0...255 (150)	RS = right stop
	54	0...255 (10)	V = velocity
	69*	0,1,2,3 (0)	Teetering / direction 0 = no teetering 1 = teetering left 2 = teetering right 3 = teetering on both sides
	74	0...255 (40)	Teetering / velocity

CV	No.	Input value (Default)	Remarks and tips
Settings for servo 6	55	0.255 (100)	LS = left stop
	56	0...255 (150)	RS = right stop
	57	0...255 (10)	V = velocity
	69*	0,4,8,12 (0)	Teetering / direction 0 = no teetering 4 = teetering left 8 = teetering right 12 = teetering on both sides
	75	0...255 (40)	Teetering / velocity
Settings for servo 7	58	0.255 (100)	LS = left stop
	59	0...255 (150)	RS = right stop
	60	0...255 (10)	V = velocity
	69*	0,16,32,48 (0)	Teetering / direction 0 = no teetering 16 = teetering left 32 = teetering right 48 = teetering on both sides
	76	0...255 (40)	SW-V = Velocity of teetering
Settings for servo 8	61	0.255 (100)	LS = left stop
	62	0...255 (150)	RS = right stop
	63	0...255 (10)	V = velocity
	69*	0,64,128,192 (0)	Teetering / direction 0 = no teetering 64 = teetering left 128 = teetering right 192 = teetering on both sides
	77	0...255 (40)	Teetering / velocity

* Note on CV 68 and 69: You have to add up the setting values for servos 1 to 4 and 5 to 8 in CV 68 and 69.

CV	No.	Input value (Default)	Remarks and tips
Servo follow-up time	67	0...255 (5)	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 deocder has elapsed und thus the servo movement is interrupted before reaching the stop e.g. after a unscheduled slow run.

Settings for connecting area 2 (operation mode 1)

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.
Turnout 1r	31	For use as a switching decoder: 0	Switched on till the next switching impulse to the same accessory decoder address 0
Turnout 1g	32		
Turnout 2r	33		
Turnout 2g	34	For use as a turnout decoder:: 1, 2 ... 255 (3)	100 milliseconds (msec) 1
Turnout 3r	35		200 milliseconds (msec) 2
Turnout 3g	36		300 milliseconds (msec) 3
Turnout 4r	37		...
Turnout 4g	38		25,5 seconds (sec) 255

⚠ **Caution:** When connecting turnouts, the set on-time has to be greater than 0! Otherwise the turnouts possibly burn through.

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 more connections have been made incorrectly. → Check the connections. In case in- or outputs of the decoder have been connected to a live wire (e.g. to the power supply), the decoder probably is damaged irreparably.

▪ The decoder is not displayed by the control software (the node has not been identified).

Possible cause: The patch cable(s) is/are incorrectly inserted into the connection sockets or is/are defective. → Check the cable(s) and the connection(s).

Possible cause: The interface´s connection is faulty or the interface is defective. → Check the interface and the connections. Check whether other nodes connected to this interface are also not displayed.

▪ Connected accessories do not react to switching commands.

Possible cause: The connection of the decoder to the BiDiBus 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 connected accessory is defective. → Check the accessory.

▪ 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.

- 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.

- The decoder switches off connected accessories some time after having sent switching commands to the accessory.

  Possible cause: For the output the on-time is set to a value greater than "0" (CV 31-38). → Check the settings and alter them.

- The decoder does not switch off a connected turnout.

  Possible cause: For the output the on-time is set to the value "0" (CV 31-38). → Check the settings and alter them. Please note: Possibly the coil of the turnout is burnt through.

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 current sales price according to our valid price list. We reserve the right to reject the repairing of a module when the repair is impossible for technical or economic reasons.

Please do not send in 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).

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

Information and tips:

http://www.tams-online.de

Warranty and service:

Tams Elektronik GmbH $C\epsilon$

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