Uhlenbrock Elektronik

Water Crane 80 100

H0 Functional model with Digital Servo

Description

This finished model is constructed in plastic. A quiet digital servo allows the water crane to run between its adjustable end positions. The quiet smooth operation of the servo with integrated digital decoder will satisfy even the most fastidious of model railroaders.

It can be moved to its end positions by key press (analogue operation), solenoid address, locomotive special function or throttle control. The water crane can be controlled with all DCC or Märklin Motorola digital centers.

Characteristics

- For Märklin or DCC Digital systems and Analogue operation
- Integrated Digital decoder
- Controlled by Loco special function, solenoid addresses or proportional to throttle setting
- Configurable turning speed
- Up to four configurable stop positions
- Turning angle up to 180°
- Configurable with DCC CV-Programming or with a Motorola Digital center
- Torque 2 Ncm
- Jib length: 50 mm

Package Contents

Water crane with installed servo drive, mounting materials, instructions

Installation

First determine the distance from the track and cut a hole of 28 x 10 mm into the base board beside the track. A suitable template is at the end of this description.

Now insert the water crane into the base board cutout, feeding the cables through first. To attach the water crane base to the base board you can use a commercial adhesive.

Connection

The digital servo has two leads, which in the analog operation are connected as shown in the diagram below or to the track output of the digital center or boosters in the digital operation.

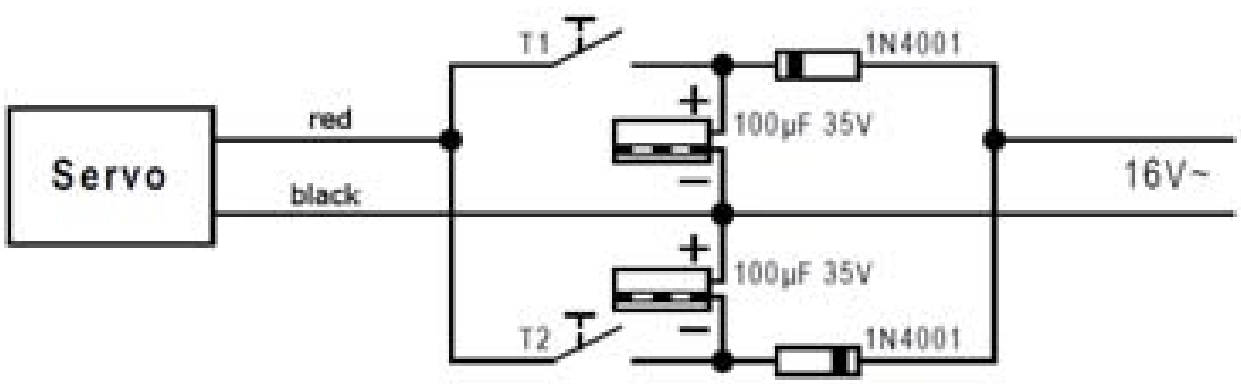
Attention: *Rotating the water crane by hand will damage the servo!*

Connection Example for Analogue operation

The connections are:

Positive to red, Minus to black lead – the Servo travels to Position 1.

Positive to black, Minus to red lead – the Servo travels to Position 2.



The servo proceeds for as long as the key is pressed, up to the maximum stop position.

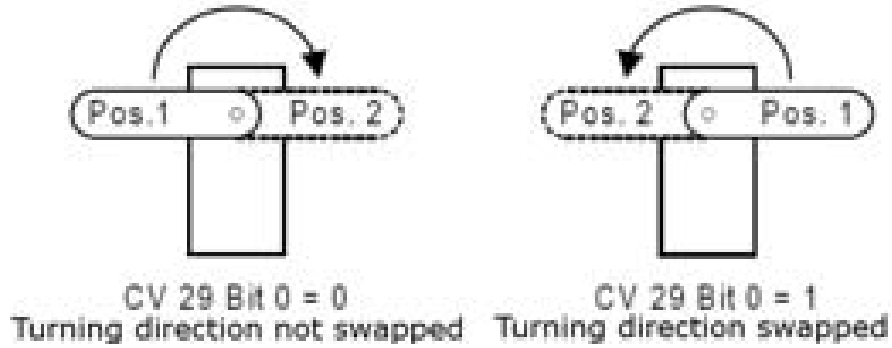
Important: *Only one key can be operated at any one time!*

Note: *We offer suitable components such as "Analog Connection set for Digital Servos" under Part No. 40 140.*

Attention: *The switching pulse of a Märklin Transformer destroys the servo!*

Analogue Operation

The servo can be controlled with a DC or AC voltage between 10 V and 20 V. Depending upon polarity the servo proceeds to two programmable stop positions through maximum angle of 180°.



The stop positions for the analog operation can be programmed with a digital center in CV 261 for position 1 and CV 262 for position 2 (see to section “Programming”).

The direction of rotation can be swapped with Bit 0 in CV 29.

Digital Operation

Note: *In factory setting the water crane works in operating mode 3 (see below). It can be directly addressed in DCC and Motorola data formats with locomotive address 72. The speed step 0 moves the crane to the center position, the maximum speed step in forward and reverse direction move to end stops on the right and left respectively.*

In the digital operation the servo can be controlled in five different operating modes. The particular operating mode is specified in CV 257 (see to section “Selection of Digital Format and Operating mode”).

In all operating modes the **speed** (CV 258) between the end positions and the **starting delay** (CV 259) are adjustable. The **brake delay** is hard coded.

Up to four stop positions can be programmed in CVs 261 to 264. The range of values is between 0 and 255 and corresponds to a total angle from 0 to 180°.

With bit 0 of CV 29 the rotation direction can be exchanged in all operating modes (see table “Calculating the value for CV 29”).

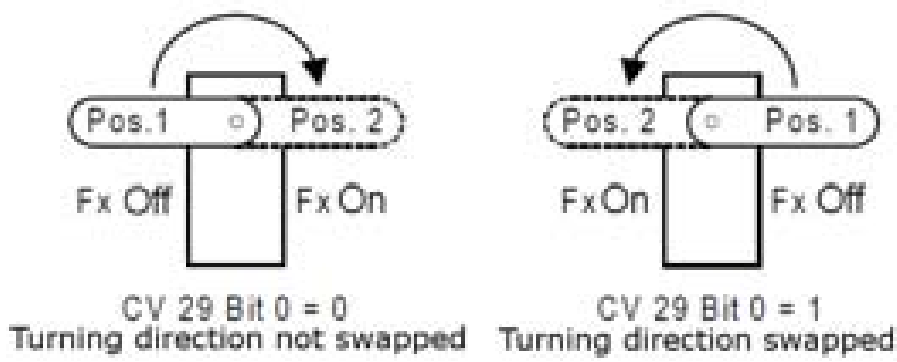
The **locomotive address** is programmed either in CV 1 (short address DCC 1-127, Mot. 1-80) or in CVs 17 and 18 (long address DCC 128-9999). Bit 5 of CV 29 specifies whether the short or the long address is to be used (see table “Calculating the value for CV 29”).

The **Solenoid address** (Operating modes 4 und 5) is always programmed into CVs 17 and 18 (only DCC 1-2000).

Operating Modes

Operating Mode 1 – Control with Locomotive Address and Special Function

With any locomotive special function of a programmable locomotive address the servo can approach two programmable stop positions in a total maximum angle of 180°.



If the locomotive special function is switched off stop position 1 from CV 261 is approached. If the locomotive special function is switched on, then the stop position 2 from CV 262 is approached.

The number of the locomotive special function is entered into CVs 265 (high order byte) and 266 (low order byte). If CV 265 has a value of 128 (factory setting) a value between 0 and 28 can be programmed into CV 266, which corresponds to the desired locomotive special function number f 0 to f 28.

If locomotive special functions between f29 and f32767 are to be used programming of the CVs 265 and 266 is calculated according to the following equation:

Locomotive special function number = high order Byte * 256 + low order Byte

Example

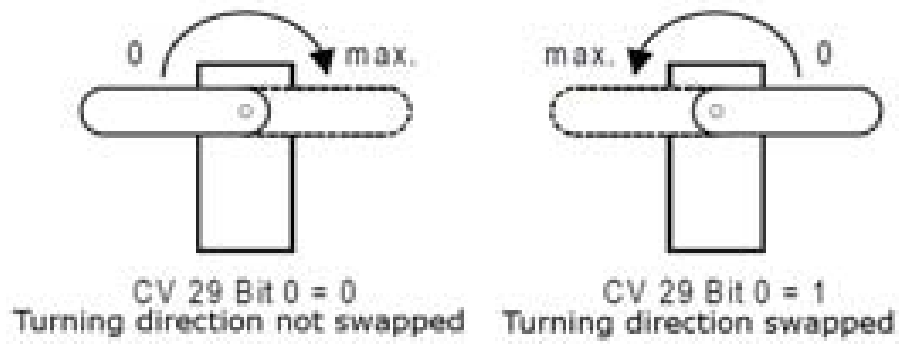
The Servo is to be controlled by locomotive special function f300 of locomotive address 10.

- Divide the special function number by 256 (300/256 = 1, remainder 44)
- Enter the integer result (1) as the value in CV 265.
- Enter the remainder (44) as the value in CV 266.

The following CVs are to be programmed: CV 1 (short address) = 10, CV 265 = 1, CV 266 = 44

Operating Mode 2 - Control with Locomotive Address and Speed Step

Using any locomotive address the servo can be moved, proportional to the position of the speed control. The servo speed step 0 approaches the left most stop and the maximum speed step (14 or 28 depending on value in CV 29) the Servo approaches the right most position.



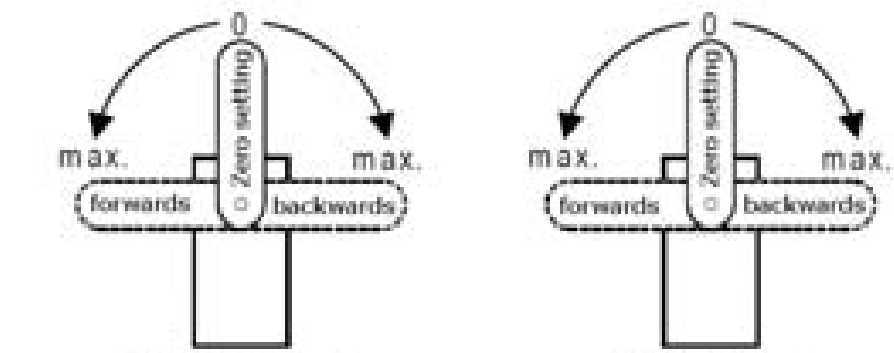
CV 29 Bit 0 = 0
Turning direction not swapped

CV 29 Bit 0 = 1
Turning direction swapped

Arbitrary stop positions are therefore attainable by the speed control position through a maximum angle of 180°.

Operating Mode 3 - Control with Locomotive Address, Speed Step and Driving Direction

The servo can be controlled proportional to the position of the speed control with any locomotive address where speed step 0 brings the servo to the central position. With the maximum speed step in the forward direction the servo goes to its right most stop and with the maximum



CV 29 Bit 0 = 0
Tuning direction not swapped

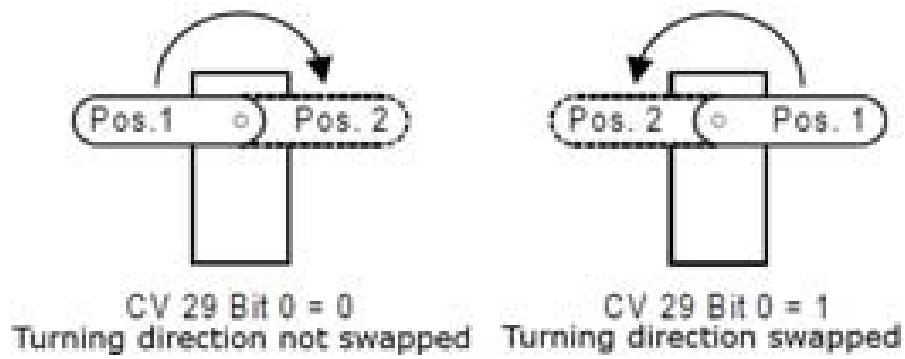
CV 29 Bit 0 = 1
Tuning direction swapped

speed step in the reverse direction the servo goes its left most stop. Arbitrary stops are attainable with the speed control position through a maximum angle of 180°.

Operating Mode 4 – Control with 1 Solenoid address and 2 Stop positions (DCC Format only)

Using a solenoid address the servo can travel between two programmable stops through a maximum angle of 180°.

If the solenoid address is switched to “branch/red”, stop position 1 in the CV 261 is approached. If the solenoid address is switched to “straight/green” stop position 2 in the CV 262 approached.



The solenoid address is programmed into the CVs 17 (high order byte) and 18 (low order byte) as follows:

Solenoid address = high order Byte * 256 + low order Byte

Example

Solenoid address 300 is to control the Servo.

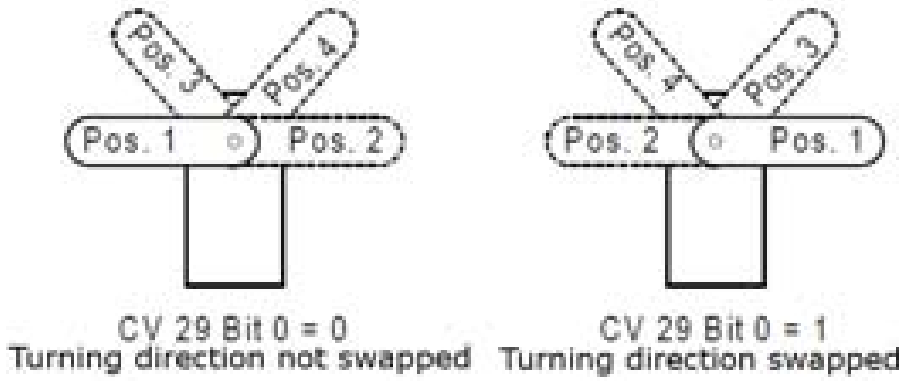
- Divide the solenoid address by 256 (300/256 = 1, remainder 44)
- Enter the integer result (1) as the value in CV 17.
- Enter the remainder (44) as the value in CV 18.

The following CVs must be programmed: CV 17 = 1, CV 18 = 44

Operating Mode 5 – Control with 2 Solenoid addresses and 4 Stops (DCC Format only)

The servo can be controlled with two sequential solenoid addresses with up to four programmable stops through a maximum angle of 180°.

If the first solenoid address switched to “branch/red”, the servo moves to ‘Stop 1’ in CV 261. If it is switched to “straight/ green” the servo moves to ‘Stop 2’ in CV 262. If the second solenoid address is switched to “branch/red” the servo moves to ‘Stop 3 in CV 263 and if it is switched to “straight/green” the servo moves to ‘Stop 4 in CV 264.



The **first solenoid address** is programmed into CVs 17 (high order byte) and 18 (low order byte) as follows:

Solenoid address = high order Byte * 256 + low order Byte

The **second solenoid address** is the first address plus 1.

Example

The servo is to be controlled by solenoid address 300 and 301.

- Divide the special function number by 256 (300/256 = 1, remainder 44)
- Enter the integer result (1) as the value in CV 265.
- Enter the remainder (44) as the value in CV 266.

The following CVs are programmed: CV 17 = 1, CV 18 = 44

Since CV 257 specifies Operating mode 5 (Control with 2 Solenoid addresses and 4 Stops) the subsequent address (here 301) controls Servo for stops 3 and 4.

Selection of Digital Format and Operating mode

Different configuration for the servo can be specified in CV 257, e.g. the data format to be used and the operating mode in which the digital servo is to work.

Note: *Only one of the five operating modes can be selected in each case*

Calculating the value for CV 257

The value to be entered is calculated from the CV-table by adding the values of the desired functions.

Example

The servo is to be controlled by solenoid address and only decoded in DCC format.

A solenoid address Value = 4
Only DCC operation Value = 64

The Sum of the values is 68.
The value of 68 is programmed into CV 257.

Function CV 257	Value
Operating Mode 1 Locomotive Address and Special Function	1
Operating Mode 2 Locomotive Address and Speed Step	2
Operating Mode 3 Loco Address, Speed Step and Driving Direction	3
Operating Mode 4 1 Solenoid address and 2 Stop positions	4*
Operating Mode 5 2 Solenoid addresses and 4 Stops positions	5
Only DCC Operation	64*
Only Motorola Operation	128

Note: *If functions "Only DCC operation" and "Only Motorola operation" are programmed simultaneously the digital servo has no function and can only be programmed.*

Programming

The Configurations variables or CVs form the basis of all configuration possibilities of the digital servos. The digital servo can be programmed with the Intellibox, DCC and Motorola centers.

Note: *While programming the servo moves into the central position. With each read and write instruction it moves slightly around this position.*

Programming with the Intellibox

The Intellibox supports DCC programming with a simple input menu. Long addresses do not have to be laboriously calculated and can be entered directly. The Intellibox automatically calculates the values for CV 17 and CV 18 and sets bit 5 in CV 29, so that the long address is used. For the exact approach please read the appropriate chapter in the Intellibox Manual.

Programming with DCC Devices

Use the programming menu of your DCC center, in order to select and program the servo CVs by register, CV direct or Page programming. For the exact approach please read the manual of the center used.

Help Register for “small” DCC Centers with max. 99 CVs

In order to program CVs above 256 with DCC centers that are able to only program a max. 99 CVs, an auxiliary register is needed. If CV 32 is programmed to 1, 2, 3 or 4, the CVs above 256 can be programmed via the CVs 96, 97, 98 and 99 as follows:

CV 32 = 0 – Help register deactivate
CV 32 = 1 – CVs 96-99 program CVs 257-260
CV 32 = 2 – CVs 96-99 program CVs 261-264
CV 32 = 3 – CVs 96-99 program CVs 265-268
CV 32 = 4 – CVs 96-99 program CVs 269-272

Programming of long Addresses without Programming menu

If programming is done with centers which do not have a programming menu, the values for CV 17 and CV 18 must be calculated. Here is a guide for the programming of address 2000.

Divide the address value by 256 (2000/256 = 7 remainder 208).
Add the integer result (7) to 192.
Enter the result (199) as the value in CV 17.

Enter the remainder (208) as the value in CV 18.

Important: *Set Bit 5 in CV 29 to 1 so the decoder uses the long address.*

Mainline programming

The decoder can be programmed with mainline programming (POM) in all operating modes, as with locomotive decoders. If the decoder is in operating mode 4 or 5 (control by solenoid addresses) the solenoid address from the CVs 17 and 18 must be used as “locomotive address” of the POM instruction. The two CVs can then not be changed.

Attention: *In mainline programming, programming of CVs smaller than 257, an existing locomotive with the same address will be unintentionally changed as well. For this reason use mainline programming only to change the stop positions (CV 261-264) of the Servos. Locomotive decoders usually do not use these CVs.*

Calculating the value for CV 29 (DCC Configuration)

Example

The servo is to be controlled by a locomotive address in DCC format with 28 speed steps. The address used is a long address from CV 17/18.

DCC 28 speed steps Value = 2
Use long address Value = 32

The sum of the values is 34.
This value is factory set in CV 29.

Bit	Function of CV 257	Value
0	Don’t swap turning direction Swap turning direction	1
1	DCC 14 speed steps DCC 28 speed steps	2
2	Only digital operation Automatic digital/analogue operation	3
5	Use short address in CV 1 Use long address in CV 17/18	4*

Programming with a Märklin Center

All CVs can be programmed with a Märklin center, but not read.

Only operating modes 1 to 3 are programmable.

1. Switch the center off and on.
2. Select the locomotive address of the Digital servo.
3. Operate the direction change 5 times.
4. Set the throttle to “Zero”. The Servo moves slightly.
5. Enter the number of the CV that is to be programmed.
6. Operate the reversing control quickly. The Servo moves slightly.
7. Enter the desired value the CV such as a locomotive address.
8. Operate the reversing control quickly. The Servo moves slightly.

If further CVs are to be programmed repeat steps 5 to 8.

When programming is complete switch the center to “STOP” or select address “80” and operate the reversing control for a short time.

Note: *Since programming with a Motorola Digital center from Märklin only entries from 01 to 80 are possible, the value “0” must be entered as address “80”.*

Page Register for entering CV Numbers larger than 256

If CVs higher the 256 are to be programmed a 4 must be programmed into CV 66 (Page Register). Then CVs 257 to 272 can be programmed via CVs 1.

CV 66 = 0, program CVs 1 to 29 directly.
CV 66 = 4, program CVs 257 to 272 using CVs 1 to 16.

The value for CVs 261 to 264 for the four possible stop positions, whose value can be larger than 80, is internally automatically multiplied by 4, so that the input value here is 0 - 63.

Example

Stop position 1 is to be set to 200 in CV:

CV 66 = 4 (CVs 1 to 16 are used to program CVs 257 to 272)
CV 5 = 50 (CV 5 now corresponds to CV 261 and 50 * 4 = 200 is the desired value of 200)

Offset Register for input of CV Values greater than 79 (only for CVs 257 and CV 265)

If CV values larger 79 are to be programmed into CVs 257 or 265 then a value larger than 0 must be programmed into CV 65 (offset register). With all following programming processes the value from the CV 65 is automatically multiplied by 4 and added to every one of the following CV values to be programmed. The result is then programmed in the appropriate CV.

When leaving Motorola programming the offset register (CV 65) is automatically set back to zero.

Example

CV 257 is to be programmed with the function "Only Motorola operation" (value 128).

CV 66 = 4 (use CVs 1-16 to program CVs 257-272)
CV 65 = 25 (the following values are added with 25 * 4 = 100)
CV 1 = 28 (CV 1 corresponds to CV 257 and 28+100 = 128 corresponds to the desired Value of 128)

Note: *If the digital servo is in the operating mode 4 or 5 (Control by solenoid addresses) Motorola programming is not possible. The operating mode of the Servos must be changed with a DCC center before it can be programmed with a Motorola center.*

Programming Guard (DCC and Motorola)

If several Digital servos in the same model (e.g. multi station locomotive shed) are to be controlled with the same locomotive address, but with different locomotive functions, the “Decoder Lock” function can be used (programming guard) during programming. Before the installation of the Digital servo into the model, connect the servo to the programming track, program the locomotive address (CV 1) and also program CV 16 with an index number, which is different for each digital servo.

If the CVs of a Servo to be changed after installation, then CV 15 is programmed with the index number of the Servo to be programmed.

Note: *The CVs of a Servo can be programmed only if the value in CV 15 corresponds with the value in CV 16. However CV 15 can always be programmed.*

After this, CV-programming (POM) only changes the CVs of this Servos and not the CVs of the other Servos.

Table of CVs (Configuration Variables) for the Digital servos

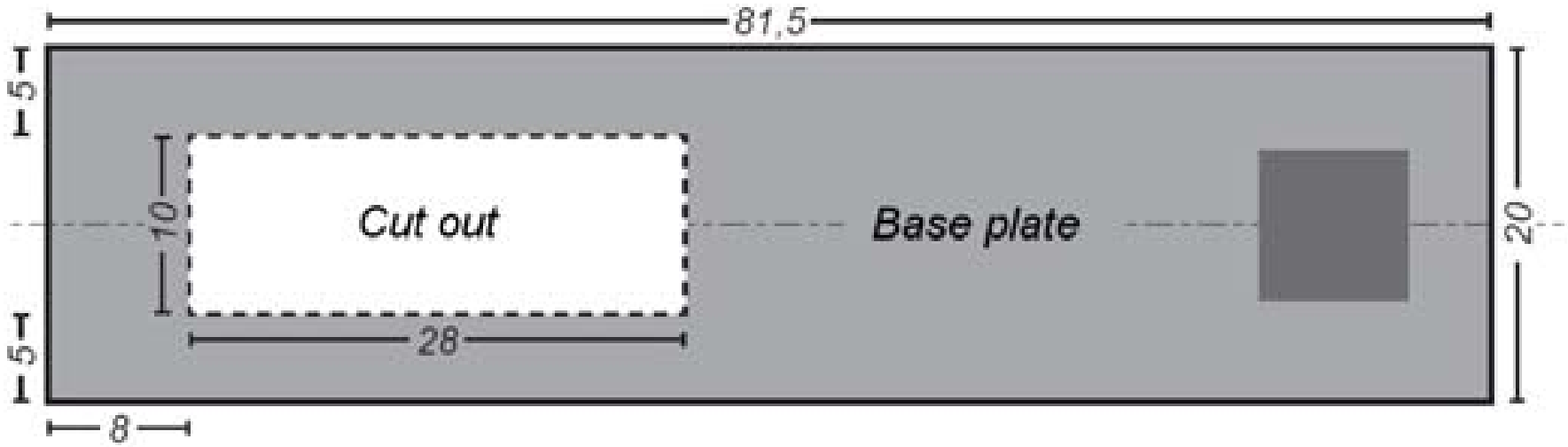
CV	Description	Range	default
1	Short Address (Factory setting) Is only used if CV 29 Bit 5= 0	DCC 1-127 Mot 1-80	72
7	**Software Version** *(The processor can be updated)*	-	varies
8	**Manufacturer ID**	-	85
15	**Decoder Lock** *(programming guard)*	0-255	0
16	**Decoder Lock Index Number**	0-255	0
  17 18	**Long Locomotive address (128-9999) or** **Solenoid address (1-2000)** 17 = high order byte 18 = low order byte *The long locomotive address is only used when CV 29, Bit 5 = 1*	 192-231 0-255	 0 1

CV	Description		Range	default
29	**Configuration according to DCC Specification**	Value	0-255	6
	Bit 0=0 Don't change Rotation direction	0*		
	Bit 0=1 Change Rotation direction	1		
	Bit 1=0 DCC 14 speed steps	0		
	Bit 1=1 DCC 28 speed steps	2*		
	Bit 2=0 Only Digital operation	0		
	Bit 2=1 Automatic Analogue/Digital detection	4*		
	Bit 5=0 Use short address (from CV 1)	0*		
	Bit 5=1 Use long address (from CV 17/18)	32		
32	**Index Register for "small" DC Centers**		0-4	0
	0 = Help register deactivate			
	1 = CVs 96-99 programs CVs 257-260			
	2 = CVs 96-99 programs CVs 261-264			
	3 = CVs 96-99 programs CVs 265-268			
	4 = CVs 96-99 programs CVs 269-272			
65	**Offset Register** for CV programming with a Motorola center			
66	**Page Register** for CV programming with a Motorola center			
96-99	**Help register for "small" DCC Centers**		-	-
	96 for CVs 257, 261,265, 269			
	97 for CVs 258, 262,266, 270			
	98 for CVs 259, 263,267, 271			
	99 for CVs 260, 264,268, 272			
	For this CV 32 must be set to appropriate Index			
257	**Selection of Operating mode and data format**	Value	0-255	3
	Control by locomotive address and special function	1		
	Control by locomotive address and speed step	2		
	Control by locomotive address, speed step and direction	3*		
	Control by 1 solenoid address (2 stop positions)	4		
	Control by 2 solenoid address (4 stop positions)	5		
	Only DCC Operation	64		
	Only Motorola Operation	128		

CV	Description	Range	default
258	**Rotation speed**	1-63	10
259	**Start Delay**	1-63	2
260	**Decoder Reset**	0, 1	0
261	**Stop Positon 1**	0-255	122
262	**Stop Positon 2**	0-255	75
263	**Stop Positon 3**	0-255	122
264	**Stop Positon 4**	0-255	169
	Locomotive function Number		
265	265 = High order byte	0-128	128
266	266 = Low order byte	0-255	1

*The factory default values are marked with an *.*

Template for mounting the Water Crane (Shown 1:1)



02045 If you have any questions call us. Hotline times are:
8583-27 Mon - Tue - Thu - Fri, 14:00-16:00 and Wednesdays 16:00-18:00

Our products are covered by a two year warranty. If it is defective send decoder along with the receipt of purchase to the following address:

Uhlenbrock Elektronik GmbH * Mercatorstr. 6 * 46244 Bottrop
Tel: 02045-8583-0 * Fax: 02045-8684-0 * www.uhlenbrock.de