R Uhlenbrock Elektronik

Digital-Motor 81 210

Characteristics

- For Märklin or DCC Digital systems and Analogue operation
- Integrated Digital decoder
- Switchable by Locomotive function, turnout address or proportional to running speed setting
- Configurable rotation speed
- Configurable by DCC CV Programming or by a Motorola Digital center
- With mounting material, cam leaver, string pulley and string
- Torque 2 Ncm
- Dimensions 20.0 x 17.6 x 8.0 mm

Description

The digital motor with the integrated digital decoder is suitable for installation in vehicles, as well as for use in stationary working models. The quiet, smooth running spoils even the most fastidious Model railroader. The motor moves the item with the enclosed string and pulley. For example, ventilators or propellers can be moved in vehicles. In fixed items it can drive conveyors, wind turbines, boom crane and cranes.

With the enclosed mounting material the motor can be installed in many different positions.

Connection

The digital motor has two connecting wires, which, in an analogue operation connect as shown below or in digital operation to the track power from the digital center or a Booster.

Example for connecting in Analogue Operation
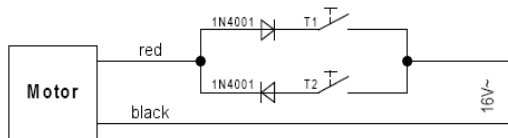
The Motor turns for as long as a Key is being pressed.

Important: Only one key can be pressed at any one time.

Explaining the connection:
Plus to red, Minus to black wire – the Motor moves to Position 1.
Plus to black, Minus to red wire – the Motor moves to Position 2.
Attention: The reversing pulse from a Märklin transformer will destroy the motor!

To operate with the enclosed pulley it must be pushed onto the motor axle. The right and left of the pulley recesses are slightly different diameters. Push the pulley with the tighter fit onto the motor axle. The pulley is fixed to the motor axel with the enclosed screw.

A string end is attached to string pulley with a tiny amount of super glue, after which the motor is connected and the string slowly wound up.

Analogue Operation

The Motor can be operated with DC or AC voltage between 10V und 20V. The motor turns in either direction depending on the polarity.

The rotating speed is programmed (CV51) with a Digital center (see chapter "Programming").

Bit 0 in CV29 can be used to swap the rotation direction.

Digital Operation

In digital operation the motor may be controlled in three different operating modes. The appropriate operating mode is determined by the value in CV50 (see section "Selection of Operating Mode").

The maximum rotation speed is configurable (CV5) in all operating modes. Besides that, a start delay (CV 3) and also a brake delay (CV 4) can be programmed.

In all operating modes Bit 0 in CV29 can **swap the rotation direction** (see Table "Calculating the value for CV29").

The **Locomotive address** is programmed into either CV1 (short address DCC 1-127, Mot. 1-80) or in CV17 and CV18 (long address DCC 128-9999). Bit 5 in CV29 determines if the short or the long address is to be used (see Table "Calculating the value for CV29").

The **Solenoid address** (Operating mode 3) is always programmed in CV17 and CV18 (only DCC 1-2000).

Operating Modes

Operating Mode 1 – Control by Locomotive address and Special functions

Using two selected Locomotive special functions of unused locomotive addresses the motor can be controlled in both of its rotation directions.

If only the first locomotive special function is switched on the motor turns clockwise. If only the second locomotive special function is switched on the motor turns anticlockwise. If both locomotive special functions are on or off the motor is stationary.

The numbers of the locomotive special functions are set in CVs 35/36 and 37/38. If CV35 is set to 128 (factory setting) for the first locomotive special function, then CV36 can be programmed to a value between 0 and 28, where this value is for the first locomotive function number corresponding to f0 to f28.

If CV37 is set to 128 (factory setting) for the second locomotive special function, then CV38 can be programmed to a value between 0 and 28, where this value for the second locomotive function number corresponds to f0 to f28.

If a locomotive special function between f29 and f32767 is to used value to program into CVs 35/36 for the first locomotive special function and CVs 37/38 for the second locomotive special function is calculated by the following formula:

locomotive function number = high order byte * 256 + low order byte

CV35 = 1. Locomotive special function, high order byte
CV36 = 1. Locomotive special function, low order byte
CV37 = 2. Locomotive special function, high order byte
CV38 = 2. Locomotive special function, low order byte

Example

The motor is controlled with locomotive special functions f300 und f301 of locomotive address 10.

Divide the first special function number by 256 (300/256 = 1, remainder 44)
Enter the result (1) as the value in CV35.
Enter the remainder (44) as the value in CV36.

Divide the second special function number by 256 (301/256 = 1, remainder 45)
Enter the result (1) as the value in CV37.
Enter the remainder (45) as the value in CV38.

The following CVs need to be programmed:
CV1 (short address) = 10, CV35 = 1, CV36 = 44, CV37 = 1, CV38 = 45

Operating Mode 2 – Control by Locomotive address, Speed Step and Direction

The motor speed and direction is controlled with the throttle like the motor in a locomotive.

In this operating mode the minimum motor speed (CV2) and the speed for a middle speed (CV6) can be programmed.

Operating Mode 3 – Control by 2 Solenoid addresses (only DCC-Format)

The motor is controlled in both directions with tow solenoid addresses.

If only the first solenoid address is switched to "straight/green" the motor rotates clockwise. If only the second solenoid address is switched to "straight/green", the motor rotates anticlockwise. If both solenoid addresses are "round/red" or "straight/green" together the motor is stationary.

The **first solenoid address** is programmed into CV17 (high order byte) and CV18 (low order byte):

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

The **second solenoid address** corresponds to the first address plus 1.

Example

Solenoid addresses 300 and 301 are to control the motor.

Divide the solenoid address by 256 (300/256 = 1, remainder 44)
Enter the result (1) as the value in CV17.
Enter the remainder (44) as the value in CV18.

The following CVs need to be programmed:
CV17 = 1, CV18 = 44

Since CV50 is set to operating mode 3 (Control by 2 Solenoid addresses) the immediately following (here 301) controls the motor in the opposite direction.

Selection of Operating Mode

Use CV50 to select the operating mode in which the digital motor will run.

1 = Operating mode 1 - Control by Locomotive address and Special functions
2 = Operating mode 2 - Control by Locomotive address, Speed Step and Direction (factory setting)
3 = Operating mode 3 - Control by 2 Solenoid addresses

Note: Only one of the three operating modes can be selected.

Programming

The basis for setting up all the digital motor's options is the Configuration Variables, CVs for short. The Digital Motor can be programmed with Intellibox, DCC und Motorola Center.

Note: During programming the motor move slightly during every read and write operation.

Programming with the Intellibox

The Intellibox supports DCC programming with a user friendly embedded menu. Long addresses do not need to be laboriously calculated. They can be entered directly. The Intellibox automatically calculates the values for CV17aund CV18 and sets Bit 5 in CV29 so that the long address is actually used. The precise procedure is found in the Manual for your Center.

Programming with DCC devices

Use the programming menu of your DCC Center to program the motor CVs by Register, direct or Page programming for reading and programming. The precise procedure is found in the Manual for your Center.

Programming of long Addresses without Programming Menu

If the programming is done with a center which does not have an embedded programming menu the values for CV17 and CV18 must be calculated. The following shows how to program address 2000.

Divide the address value by 256 (2000/256 = 7 remainder 208).
Take the result and (7) and add 192 to it.
Enter this result (199) as the value for CV17.
Enter the remainder (208) as the value for CV18.

Important: Set Bit 5 of CV29 to 1 so that the decoder actually uses the long address

Main Line Programming

The decoder can be programmed using locomotive main line programming (POM) in all its operating modes. If the decoder is in operating mode 4 or 5 (controlled by solenoid address) the solenoid address must be used as the "locomotive address" of the POM-command. The two CVs then cannot be altered.

***Attention:** When main line programming, please note that if a locomotive with the same address exists on the track, its CVs will also be changed.*

Calculating the value for CV29 (DCC Configuration)

Example

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

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

The Sum of the Values is 34.
This value is factory preset to CV29.

Bit	Function CV29	Value
0	Rotation direction not swapped Rotation direction swapped	0 1
1	DCC 14 Speed steps DCC 28 Speed steps	0 2*
2	Only digital operation Digital/Analogue automatic	0 4
5	Use short address from CV1 Use long address from CV 17/18	0 32*

Programming with a Märklin Center

With a Märklin center all CVs can be programmed, but not read.

1. Switch Center off and on.
2. Select the address of the digital motor.
3. Operate the direction change-over 5 times in quick succession.
4. Set the speed controller to "zero". The motor moves slightly.
5. Enter the number of the CV that is to be programmed.
6. Briefly operate the direction change-over. The motor moves slightly.
7. Enter the desired value for CV e.g. a locomotive address.
8. Briefly operate the direction change-over. The motor moves slightly.

If further CVs are to be programmed repeat points 5-8.

If programming is to be terminated switch the center to "STOP" or set the address to "80" and briefly operate the direction change-over.

***Note:** Since a Motorola digital center from Märklin only accepts inputs of 01 to 80, the value "0" must be entered by entering the address as "80".*

Page-Register inputting of CV-Numbers greater than 79

CV values that are larger than 79 can only be programmed with the help of the offset register. The offset register is CV65. If CV65 contains a value > 0, then all following programmed values are calculated by multiplying the contents of CV65 by 4 and adding the result to the entered value.

When leaving the Motorola programming mode the offset register (CV65) is automatically reset to zero.

Example

The value for function "Only Motorola Mode" (Value 128) is to be programmed into CV49.

CV65 = 25 (the following values are added to 25*4 = 100)
CV49 = 28 (and 28+100 = 128 is the new value 128)

***Note:** If the digital motor is in Operating Mode 3 (Control by 2 Solenoid addresses) Motorola programming is blocked. The motor's operating mode must be changed with a DCC center before it can be programmed with a Motorola Center.*

Programming Protection (DCC and Motorola)

If several Digital motors in a model (e.g. conveyor in an industrial area) are to be controlled with the same locomotive address, but via different locomotive functions, the "decoder lock" function (programming protection) can be used for programming. Before installation of the Digital motor connect it to the programming track and program the locomotive address (CV1) and program CV16 with an index number which is different for each installed motor.

If the CVs of an installed motor are to be changed, then program CV15 with the index number of the motor that is to be programmed.

Afterwards only the CVs of this motor are changed by CV programming (POM) and not the CVs of the other motor.

Note: *The CVs of a motor can only be programmed if the value in CV15 is the same as that in CV16. The CV15 however can always be programmed. Afterwards only the CVs of this motor are changed by CV programming (POM) and not the CVs of the other motor.*

Table of CVs (Configuration Variables) of the Digital motors

CV	Description		Value range	Factory default
1	**Short Locomotive address** *is only used when CV29 Bit 5=0 (factory setting)*		DCC 1-127 Mot 1-80	3
2	**Minimum Speed**		-	1
3	**Acceleration Delay**		-	2
4	**Brake Delay**		-	2
5	**Maximum Speed**		-	48
6	**Medium Speed**		-	24
7	**Software version** *(The processor used can be updated)*		-	varies
8	**Manufacturer ID**		-	85
15	**Decoder Lock (Programming protection)**		0-255	0
16	**Decoder Lock Index Number**		0-255	0
17 18	**Long address (1-9999) or Solenoid address (1-2000)** 17 = Long address high byte 18 = Long address low byte *The long address is only used when CV29 Bit 5=1*		192-231 0-255	0 1
29	**Configuration DCC Standard** Bit 0=0 Normal driving direction Bit 0=1 Reversed driving direction Bit 1=0 14 speed steps Bit 1=1 28 speed steps Bit 2=0 only digital operation Bit 2=1 auto digital/analog detection Bit 5=0 Short Address (CV1) Bit 5=1 Long Address (CV17/18)	Value 0 * 1 0 2 * 0 4 * 0 * 32	0-255	6
35 36	**1st locomotive special function number** 35 = high order byte 36 = low order byte		0-128 0-255	128 1
37 38	**2nd locomotive special function number** 37 = high order byte 38 = low order byte		0-128 0-255	128 2
49	**Configuration DCC Standard** Bit 6=0 Data format DCC and Motorola Bit 6=1 Data format only DCC Bit 7=0 Data format DCC and Motorola Bit 7=1 Data format only Motorola *If "Data format only DCC" and "Data format only Motorola" are programmed simultaneously the Digital motor will not operate and can only be programmed.*	Value 0 * 64 0 * 128	0, 64, 128	0
50	**Selection of Operating Mode and Digital Format** 1 = Control by Locomotive address and Special functions 2 = Control by Locomotive address, Speed Step and Direction 3 = Control by 2 Solenoid addresses		1-3	2
51	**Speed in analogue operation**		0-63	10
59	**Decoder Reset**		0, 1	0
65	**Offset Register** *for CV programming with a Motorola Center*		0-63	0

*The factory default values are marked with *.*

Guarantee declaration

Each component is tested for its complete functionality before distribution. If a fault should arise within the guarantee period of 2 years, we will repair the component free of charge upon production of proof of purchase. The warranty claim is void if the damage was caused by inappropriate treatment.

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Our contact Details:
Service

In the event of a defect or failure send the unit together with the invoice and a short description of the fault back to us for repair.

Hotline
We are available if you have any questions!
Your direct line to a technician: **0 20 45 - 85 83 27**
Mon - Tue - Thu – Fri, 14:00~16:00 and Wed 16:00~18:00

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