

MANUAL FOR DCC TURNTABLE

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Please read the Manual carefully before installation and operation.



DCC / ANALOG TURNTABLE

1. Introduction

Dear Customer!

Thank you for purchasing the "HELJAN DCC / Analog Turntable".

Your new HELJAN Turntable has many features; therefore it is important to carefully read this guide before installing it on your layout. The turntable is like a small computer, working on very small voltage / impulses, therefore it is important always to keep the moving components (gears, optical eye etc.) very clean.

HELJAN has produced a turntable that meets all the requirements needed for a modern DCC layout.

If installed and used correctly, this product will give years of service!



2. Before you get started

- a) Your turntable should be powered from its own transformer (not included).

Check the output of the transformer is correct for this use before making any electrical connections.

The ideal voltage to operate the turntable is 15 Vac, 500 mA.

- b) The opening in the wall of the pit houses the optical sensor and is used as the "zero point". For the indexing to work properly, this area and the small gear teeth and ring rail moulded in the bottom of the pit, must be clean and open at all times. If you wish to paint or weather the pit further, mask off these areas before starting. Please note that it's not possible to make a position directly at the "zero point".

Before installing the pit, cover the centre pivot hole with tape to keep out dust and debris.

Your new turntable **must** be installed on a flat, stable and level surface. Determine the location for your pit and use the enclosed template to cut the mounting hole in your baseboard. Allow at least 2¼" (5.7 cm) of clearance below the pit. The zero reader is mounted directly below a mounting boss; be sure to provide clearance in your baseboard for the reader too.

Pre-drill the positions for the mountings as shown on the template with an 8 mm bit. Secure the pit in place using eight screws and washers (included) - do not over tighten as this could cause the pit to warp.

If you are using foam / polystyrene for the surface of your layout, open the areas for the mounting bosses slightly and push the pit into place.

Make sure the pit is level, secure and properly supported before proceeding.

When you remove the bridge from the pit, it's important that the power is first switched off.

3. Adjustment of tracks

With the pit in place, you can install the approach/exit tracks. The indexing can be programmed for up to 48 different stopping positions, so you can add tracks almost anywhere around the pit – but remember, don't install tracks in the "NO TRACK" areas.

The bridge is equipped with a Code 83 rail-profile; if you are using another profile for your track, use of transition tracks may be necessary. The top of your rails and the bridge rails must be level.

For a smooth transition between the bridge and service tracks, you need to modify your rails by filing the inside at a slight angle for about 3/16" (4 mm) (see Fig. 1).

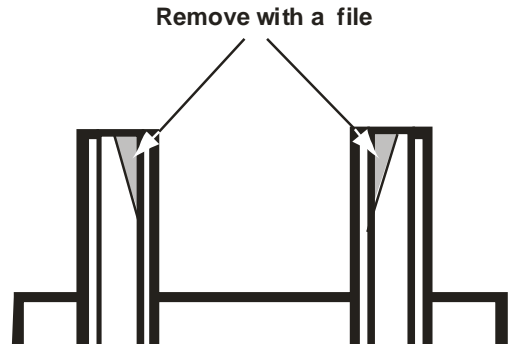
For the rails to sit correctly on the lip of the pit, you must remove a few sleepers from the end of the track.

Important note: Leave a gap of about 1/16" (1.5 mm) between the end of each service track and the bridge.

All service tracks must align with the bridge rails in a straight line. The bridge can be used as a guide.

Wire the service tracks (parts not included) for power as desired.

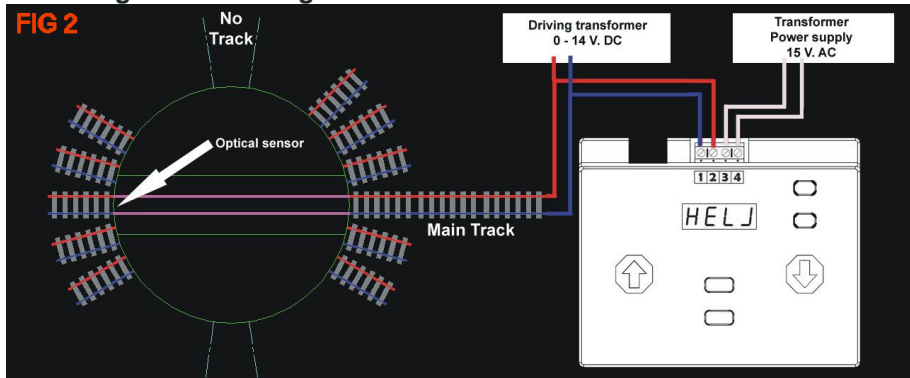
You must fix the position of your service tracks, before you program the positions.



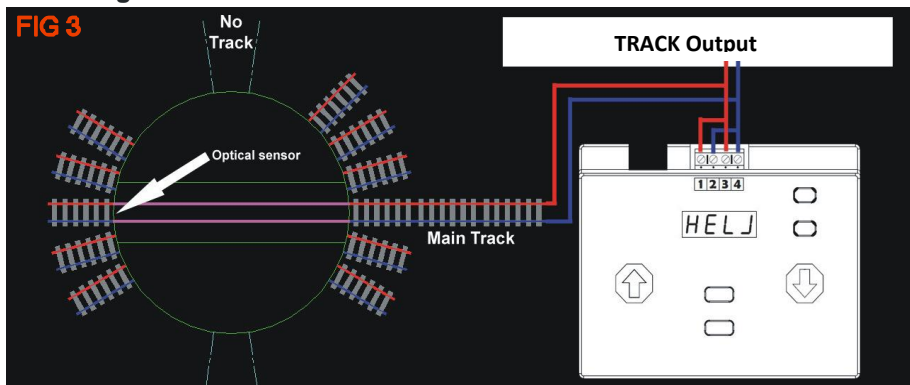
4. Connection – Wiring-diagram

- a) Please note that your DCC Turntable automatically reverses the track polarity in the “ No Track” area. It is therefore important that you are aware of the polarity over and under the “No Track” area.

Wire diagram for Analog:



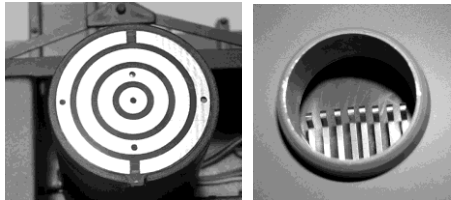
Wire diagram for DCC:



- b) All red wires should be connected.
All blue wires should be connected.
If a short circuit occurs when the loco is running onto the bridge, the wires in screw terminal 1 and 2 should be reversed.
-

- c) Finish by vacuuming and cleaning your Turntable.
Clean the contacts in the pit and on under the bridge. See Fig. 4

FIG 4



Contacts under bridge

Contacts in Pit

Contact under bridge: Clean in Propyl Alcohol or similar and finish by wiping with a dry cloth.

Contacts in Pit: Clean in Propyl Alcohol or similar. Use a cotton bud and be careful, not to bend the contacts, because this may affect the contact to the bridge.

It is important that the power is switched off when you clean the contacts

5. Functions and overview of the Control Box

a) **Operational overview**

The electronic control integrated into the Control Box for the turntable has the following characteristics:

Analogue and digital operation

The turntable can be used on analogue model railway layouts as well as digital model railway layouts run in DCC format. In analogue operation the turntable is run via the control box. In digital operation it is possible to remote-control the turntable from a digital control unit via the Control Box.

The electronic control automatically recognizes the operational mode (analogue or digital) and the digital format DCC that is run. Please note, that it is only possible to set track positions via the Control box.

Settings

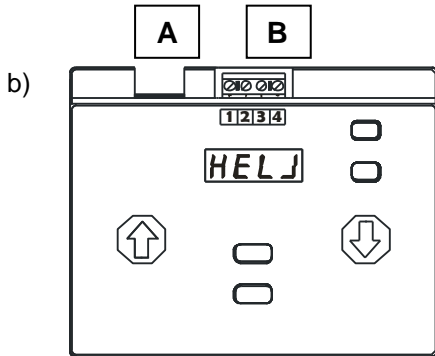
The electronic control allows you to define up to 48 individual stops of the bridge.

Please note: Stops can be added or deleted separately at any time. Also please note, that when a position/stop is set, a 180 degree position/stop, from current position, is automatically set.

Running

The motor running the bridge is driven with a starting and braking delay that replicates the operational characteristics of the prototype.

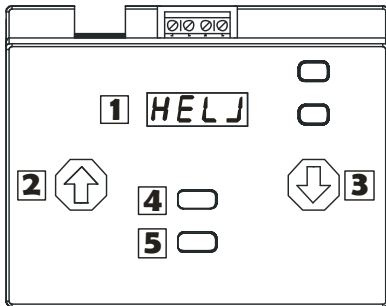
Connecting power supply and turntable



A Turntable
Connect the turntable to the Control Box the cable which is supplied.

B Power supply
Connect the control box either to the Track output of your digital layout or to the AC power supply of your analogue layout (not exceeding 18 Vac). Do not mix up the connections!
See Fig. 2+3 on page 3

c) Display and function keys of the Control Box



1 Display
The digital display has 4 digits. During operation and while making settings, all relevant information is shown here. A flashing display indicates that you can make settings or that the bridge is moving.

2 Function key "UP" (CW)* and 3 Function key "DOWN" (CCW)*
The function keys "UP" and "DOWN" are used for:

- to scroll in the menu or
- to alter values to be set

Where a wide choice of values is available the keys have a repeating function:

When pushing them for a longer time the values are not altered one by one but very quickly.

4 Function key "ESCAPE"
The function key "ESCAPE" is used to quit a menu point. If settings have been made, they are not saved.

5 Function key "GO/SET"
The function key "GO/SET" is used to

- to enter into a menu point or
- to save settings
- to initiate bridge movement
- If you are positioned at a stop and you press "GO/SET" again, the bridge turns 180 degrees from your current position.

d) **Menu of the Control Box**

The control commands for the Control Box are organized in a menu:

Menu point	Remark
<i>Tr</i>	→ Driving the bridge to set a stop The displays shows after ``Tr`` the digit number (1 to 48) of the stop where the bridge currently is
<i>Cal</i>	→ Calibrating the ``0``-position of the bridge This should be done always - after putting the bridge into the turntable pit - after altering the bridge position by hand - after the power supply has been interrupted while the bridge was moving or a programme has just been set. - after programming is done
<i>Prog</i>	→ Setting a stop for the bridge and numerating the stopping position
<i>Del</i>	→ Deleting a stop of the bridge
<i>Adr</i>	→ Setting the turntable's digital address
<i>bl</i>	_____
<i>Res</i>	→ Performing a reset / restoring the factory settings

e) **Navigating through the menu**

1. **Choosing a menu point:**

Press the function keys ``UP`` or ``DOWN`` for scrolling from one menu entry to another.

2. **Entering into a menu entry:**

Press the function key ``GO/SET``. The name of the menu entry, shown in the display, starts to flash. In case of error, press the function key ``ESCAPE``.

3. **Choosing a value:**

Press the function keys ``UP`` or ``DOWN`` to alter the value in the display. The keys have a repeating function:

When pushing them for a longer time the values are not altered one by one but very quickly.

4. **Saving a chosen value:**

Press the function key ``GO/SET`` or turning the bridge 180 degrees.

5. **Leaving a menu entry without saving the settings:**

Press the function key ``ESCAPE``.

6. **How to program your Turntable**

Put the bridge onto the turntable pit, plug the grey cable into the control box and switch on the power supply. The display shows in a moving screen **Heljan**.

Note: The circular contact ring and wipers must be ultra-clean with digital operation.

Clean both parts in Propyl Alcohol or a similar cleaner any time the bridge is removed and installed.

Please note that the end to set your positions from, is the end where the sensor in the bridge/Cabin is placed.

Before you start using your Turntable, please perform a Reset as follows:

a) Performing a reset / Menu point

By performing a reset you will restore the factory settings.

Please note: All settings you have made will be deleted!

In order to perform a reset follow these steps:

1. Scroll to the menu point
 2. Press the function key **GO/SET**. **Res** in the display starts to flash. If you want to cancel, press **ESCAPE**.
 3. Press the function key **GO/SET** again. The display shows a **y** to the left and a **n** to the right.
 4. Confirm your choice by pressing the function key **UP** for **yes, performing a reset** or **DOWN** for **no / escape**.
 5. After having pressed the function key **UP** for **performing a reset** the display will return to the *Res*.
 6. Finish by calibrating. See Section 6B.
-

b) Calibrating the bridge / menu point

The bridge will automatically calibrate itself, when travelling past the zero position during normal operation. The zero position is where the sensor is located in the side of the pit. However, there are times when you have to calibrate the bridge (See section 5D `Menu of the control box´ for more information).

To calibrate, follow these instructions:

1. Scroll to the menu point .
2. Press the function key **GO/SET**. **Cal** in the display starts to flash. In case you want to cancel, press **ESCAPE**.
3. Press the function key **GO/SET** again **Cal** in the display flashes half as quick as before. The bridge will start to turn first slow, then fast until it reaches **0**-position and then stop at the pre-installed position 1.

Please note, If the bridge does not stop at position **1** after calibration a counting error has occurred and the bridge needs to be calibrated again.

c) Setting a programmed stop of the bridge / Menu point

1. Scroll to the menu point **Prog**.
2. Press the function key **GO/SET**. **Prog** in the display starts to flash. In case you want to cancel, press **ESCAPE**.

3. Start the bridge moving by pressing the function keys ``UP`` or ``DOWN`` for a short time.
To stop the bridge at the selected position press the function keys ``UP`` or ``DOWN`` again.
The fine tuning of the position can be done with the ``UP`` and ``DOWN``.
Attention: Always finish positioning the bridge in the same direction you started programming in.
4. Save the chosen position by pressing the function key ``GO/SET`` again.
5. ``P`` in the display is shown and the highest available number for a position is suggested in the display. If necessary choose a lower number by pressing the function key ``UP`` or ``DOWN``.
Selecting a lower number is equal to inserting a position between already programmed positions. This implies That all programmed positions above the point of insertion is incremented by one position number.
6. Save the chosen number by pressing the function key ``GO/SET`` again.
7. Finish by calibrating the bridge. See section 6B.

Special feature: Please note, that when a position/stop is set, a 180 degree position/stop, from current position, is automatically set. You can go to the automatically 180 degree set position, by pressing the function key Go/set again, when positioned at the desired track.

NOTE: It is not possible to make a position directly at the ``zero point``.

Also please note that it is only possible to set track positions via the Control box.

Note: If you accidentally push the ``GO/SET`` when you wish to stop at a desired position, the display flashes with a suggested position number. Press ``ESCAPE``. The bridge stops and the display shows ``Prog``. Push ``GO/SET`` and then the ``UP`` or ``DOWN`` function keys twice and find the correct position. Always stop with ``UP`` function key.

Please note: The program does not allow to leave out a number for a stop. Example:

You have already four stops (which have been assigned the numbers 1 to 4)

You want to set a new stop (the fifth)

Either → no. 5 (which is suggested automatically)

Or → a lower no. (1, 2, 3, 4)

In case you choose a lower number (e.g. no. 2) the program automatically renumbers the stops

As shown below:

	Old stops				New stop
Stop numbers before setting the fifth stop	1	2	3	4	---
Stop numbers when setting the suggested number for the new fifth stop	1	2	3	4	5
Stop numbers when choosing the no. 2 for the new (fifth) stop	1	3	4	5	2

NOTE: Positions 1 and 2 (are related to the zero point) are not programmable positions; start with track 3 when you program tracks. When you have made minimum 2 new stops, you are able to remove the pre-installed position 2. Also please note that it's not possible to make a position directly at the ``zero point``.

d) **Deleting a programmed stop of the bridge / Menu point**

In order to delete a position of the bridge follow these steps:

1. Scroll to the menu point ``del``
2. Press the function key ``GO/SET``
3. Press the function key ``GO/SET`` again. The display shows a ``d`` and the number of your current stop. If you want to delete another stop than the chosen one, simply choose another by pressing the "UP" or "DOWN" buttons. Please note that deleting a position causes all positions above the deletion point to be decremented by one position number.
4. Delete the chosen stop by pressing the function key ``GO/SET`` again.
All positions with a number higher than the deleted one are renumbered automatically.

Please note: After completion of deleting desired positions, the display always returns to show Tr 1.

7. Driving the bridge to a programmed stop / Menu point

In order to change the bridge's position, follow these steps:

1. Scroll to the menu point ``tr``. The digit no. shows the current position of the bridge.
2. Press the function key ``GO/SET``. ``tr`` in the display starts to flash.
In case you want to cancel, press ``ESCAPE``.

Remark: In order to avoid involuntary changes of the bridge's position by pressing the function keys ``UP`` or ``DOWN`` by accident you need to press the function key ``GO/SET`` first before choosing a new position for the bridge. When just pressing the function keys ``UP`` or ``DOWN`` you will scroll from one menu point to another.

3. Press the function keys ``UP`` or ``DOWN`` to choose the number of the track position to go to. Only the numbers of stops that have been programmed are shown.
4. Press the function key ``GO/SET`` again. ``tr`` in the display flashes half as fast as before and the bridge will move to the next track position.

Please note: If the bridge is already at the selected position number and you've gone all the way to step 4, then The bridge will do a 180 degree turn from its current position.

8. Maintenance

As operation can be affected by dust, it is recommended to cover your Turntable between operating sessions. Zero Point: Make sure this area and the pit edge is **always** clean and free of dust.

Use Propyl Alcohol or a similar cleaner to clean the contacts on the bottom of the bridge and in the pit, should they get dirty.

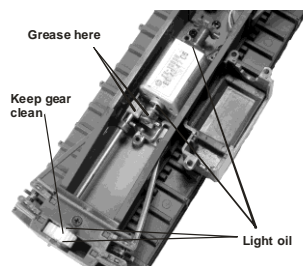
Important note: Any time the bridge is removed from the pit, you must calibrate (see 6B) before resuming operation in order for the bridge to find the positions correctly.

Lubrication: In normal use, the drive mechanism should only require servicing about once a year. Use plastic compatible lubricants made especially for hobby products – **NEVER use household oils or lubricants!**

Remove the screws from the cover. Apply a drop of light oil to both motor bearings and the drive gear train. (See Fig. 5)

Reverse these steps to reassemble – make sure the motor leads are positioned as shown.

FIG. 5



9. FAQ

If the bridge doesn't stop at programmed position and won't move again or the control box reads ``C``:

Proper contact is not being made between the wipers and the bridge centre post. See 4C for cleaning contacts and finish by Calibrating, see 6B.

If the bridge, in "Prog. Mode", is running much slower CCW than CW:

It is recommended to let it run at least 1 turn CCW in "Prog. Mode". Then the mechanical parts will be more flexible.

When driving the bridge to another stop the bridge does not stop exactly at the set position:

1. **Possible cause:** The bridge has been removed from the pit or its position has been altered by hand or the power supply has been interrupted while the bridge was moving or a position has just been programmed. Calibrate the bridge again (see section 6B).

2. **Possible cause:** When setting a new stop the positioning of the bridge was not finished in the same direction it was started. Due to technical reasons this does not allow an exact re-finding of the position. Delete the position and set it again (see chapter 6D).

The display in the Control box reads *Err1*:

There is no contact to the bridge. Please try to clean the contacts as described in the Installation Instructions, section: Troubleshooting. Also please check the wire-connection.

In DCC Mode: If the DCC Command station does not respond. Make sure the Control Box is set to Tr mode.

10. DCC Uhlenbrock / Lenz / ESU

- a) The Turntable is compatible with the official NMRA Digital Command and Control (DCC) standard. The turntable is connected to your layout by connecting the control box terminals directly to the Track output of your main control station. The connection details are depicted in figure 3, page 3. In case of a short-circuit, when driving a loco onto the bridge, the wires connected to the turntable control box (1 and 2) need to be swapped.

The control box comes with a default accessory value of 057 (see section 10b for changing the default set digital value) and it occupies the next 25 sub-addresses. Please mind that no other accessory decoder should be located in the range covered by the control box. Please note that the accessory decoder address has no influence on the loco address.

Please note: The set value is not identical with the digital address (as this is an accessory decoder's address).

From the factory there are two preprogrammed positions on the turntable (1 and 2):

This means that track 1 will be assigned address 225 Red/curve, track 2 will be assigned address 225 Green/straight.

Track 3 will be assigned address 226 Red/curve, track 4 will be assigned address 226 Green/straight.

Now you'll be able to control the turntable like any other accessory decoder on your layout.. While controlling the turntable from your digital control unit, the control box will depict which track position the turntable is turning toward, (this requires that the control box menu is set in "tr" mode.

Furthermore can computer software you may wish to use to control your main layout, also control the turntable.

b) **Setting the turntable's digital address / Menu point**

In order to set the turntable's digital address, follow these steps:

1. Scroll to the menu point "Adr".
2. Press the function key "GO/SET". "Adr" in the display starts to flash. If you want to cancel, press "ESCAPE".
3. Press the function key "GO/SET" again. The display shows a flashing "A" and the 3-digit number of the current address.
4. Choose a new value by pressing the function keys "UP" or "DOWN".
Advice: The keys have a repeating function: When pushing them for a longer time the values are not altered one by one but very quickly.
5. Save the chosen value by pressing the function key "GO/SET" again.

Please note: The set value is not identical with the digital address (as this is an accessory decoder's address).

c)

Further information regarding changing the control box's accessory address:

The DCC address you assign to control box determines the accessory address too. To each Dcc address there are 4 accessory addresses. The formula below calculates the first accessory address in the block of 4 accessory addresses belonging to each DCC address.

First accessory address = ((DCC Address - 1) * 4) + 1

for example if DCC Address = 57 then

First accessory Address = ((57-1) * 4) + 1 = 225.

for example if DCC Address = 58 then

First accessory Address = ((58-1) * 4) + 1 = 229. Please note that the first accessory address has move to the next block of 4 accessory addresses.

If you wish a specific accessory address block rather than the DCC address you can use the reverse formula below.

DCC Address = ((accessory Address - 1) / 4)+1

Please mind if you don't use the first address in the block of 4 the number will be a decimal number and only the integer part will represent the DCC address. Please note, the decimal rather than an integer number could also be an indication of overlapping accessory addresses on your layout.

Please note that the bridge already has the DCC address set to 57 as a factory setting.

Please note: The Control box must be in the "Track mode" (Tr must be displayed on the Control Box) in order to be able to drive the bridge from track to track via the digital command station (DCC).

Please note: The Turn table Control box supports both state-full and state-less, also referred to a permanent and momentary – accessory control from you DCC master box, configurable on for example ECOS from ESU.



DCC / ANALOG TURNTABLE

The table below depicts the relations between DCC addresses and Accessory Addresses

d)

DCC address	Accessory addresses			
1	1	2	3	4
2	5	6	7	8
3	9	10	11	12
4	13	14	15	16
5	17	18	19	20
6	21	22	23	24
7	25	26	27	28
8	29	30	31	32
9	33	34	35	36
10	37	38	39	40
11	41	42	43	44
12	45	46	47	48
13	49	50	51	52
14	53	54	55	56
15	57	58	59	60
16	61	62	63	64
17	65	66	67	68
18	69	70	71	72
19	73	74	75	76
20	77	78	79	80
21	81	82	83	84
22	85	86	87	88
23	89	90	91	92
24	93	94	95	96
25	97	98	99	100
26	101	102	103	104
27	105	106	107	108
28	109	110	111	112
29	113	114	115	116
30	117	118	119	120
31	121	122	123	124
32	125	126	127	128
33	129	130	131	132
34	133	134	135	136
35	137	138	139	140
36	141	142	143	144
37	145	146	147	148
38	149	150	151	152
39	153	154	155	156
40	157	158	159	160
41	161	162	163	164
42	165	166	167	168



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DCC address	Accessory addresses			
43	169	170	171	172
44	173	174	175	176
45	177	178	179	180
46	181	182	183	184
47	185	186	187	188
48	189	190	191	192
49	193	194	195	196
50	197	198	199	200
51	201	202	203	204
52	205	206	207	208
53	209	210	211	212
54	213	214	215	216
55	217	218	219	220
56	221	222	223	224
57	225	226	227	228
58	229	230	231	232
59	233	234	235	236
60	237	238	239	240

If the booster shuts down (eg. short circuit on the track), while the Turntable bridge is running, you may need to calibrate the Turntable (see section 6b, page 7) to restore accuracy.

11. Technical specifications

Data formats:	DCC (NMRA standard)
Power supply:	15-18 Volt AC
Power consumption:	approx. 110 mA
Maximum amount of accessory decoder's addresses:	1020
Protection:	IP 00
Ambient temperature while working:	0 to +60 Degrees Celcius
Ambient temperature while not operating:	-10 to +80 Degrees Celcius
Maximum Humidity:	max. 85%

The Turntables consumption is approx. 110 mA when the bridge turns and approx. 50 mA in standby.