wahlberg
MOTION DESIGN
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Rotator

Item No .281

User Manual

Safety Information

WARNING!
Read the safety precautions in this section before installing, powering, operating or servicing this product.

The following symbols are used to identify important safety information on the product an in this manual:

DANGER! Safety hazard. Risk of severe injury or death.

DANGER! Hazardous voltage. Risk of lethal or severe electric shock.

WARNING! Fire hazard.

WARNING! Refer to user manual.

This product is for professional use only. It is not for household use.
This product presents risks for sever injury or death due to fire hazards, electric shock, and falls.

Read this manual before installing, powering or servicing the rotator; follow the safety precautions listed below and observe all warnings in this manual and printed on the rotator. If you have questions about how to operate the rotator safely, please contact you Wahlberg Motion Design supplier or Wahlberg Motion Design.

PROTECTION FROM ELECTRIC SHOCK

- Disconnect the rotator from AC power before removing or installing any cover or part and not when in use.
- Always ground (earth) the rotator electrically.
- Use only a source of AC power that complies with local building and electrical codes and has both overload and ground-fault (earth-fault) protection.
- Before using the rotator, check that all power distribution equipment and cables are in perfect condition and rated for the current requirements of all connected devices.
- Power input throughput cables must be rated 16 A minimum, have three conductors 1.5 mm^2 (AWG16) minimum conductor size and an outer cable diameter of 5-15 mm (0.2-0.6 inch). Cables must be hard usage type (SJT or equivalent) and heat-resistant to 90°C (194°F) minimum. In the EU the cables must be <HAR> approved or equivalent.
- Use only Neutrik powerCON TRUE1 NAC3FX-W cable connectors to connect to power input sockets. Use only Neutrik powerCON TRUE1 NAC3FX-W cable connectors to connect to power throughput sockets.
- Assembly power supply cables following the instructions in this manual only (see page 12).

- Isolate the rotator from power immediately of the power plug or any seal, cover, cable, or other component is damaged, defective, deformed, wet, or showing signs of overheating. Do not reapply power until repairs have been completed
- Do not expose the rotator to rain or moisture.
- Refer any service operation not described in this manual to a qualified technician.

PROTECTION FROM BURNS AND FIRE

- Do not operate the rotator if the ambient temperature (Ta) exceeds 40° C (104° F).
- Do not modify the rotator in any way not described in this manual.
- Install only genuine Wahlberg parts.

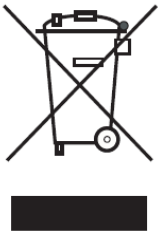
PROTECTION FROM INJURY

- Fasten the rotator securely to a fixed surface, rig, or structure when in use. The rotator is not portable when installed.
- Ensure that any supporting structure and/or hardware can hold at least 10 times the weight of all the devices they support
- If suspending from a rigging structure, fasten the rotator using the supplied Manfrotto slim coupler and M12 bolt, nut, and washers supplied with the rotator according to the manual, see page 10.
- Always install the rotator as described in this manual. If the rotator is installed in a location where it may cause injury or damage if it falls, install as described in page 10.
- If possible, allow enough clearance beneath the rotator so it cannot cause any danger to personnel beneath it. Else, adjust the lower limit accordingly following the instructions in this manual.
- Check that all external cobblers and rigging hardware are securely fastened.
- Block access below the work area and from a stable platform whenever installing, servicing or moving the rotator.
- Do not operate the rotator with missing or damaged covers, shields, or shaft.

Before each use

- Ensure that the rotator is correctly and safely mounted
- Ensure that the attached load is correctly mounted

Warning! Do not use the rotator if any damage or error is found!



Disposing of this product

Wahlberg Motion Design products are supplied in compliance with Directive 2002/96/EC of the European Parliament and of the Council of the European Union on WEEE (Waste Electrical and Electronic Equipment), as amended by Directive 2003/108/EC, where applicable.

Help preserve the environment! Ensure that this product is recycled at the end of its life. Your supplier can give details of local arrangements for the disposal of Wahlberg Motion Design products.

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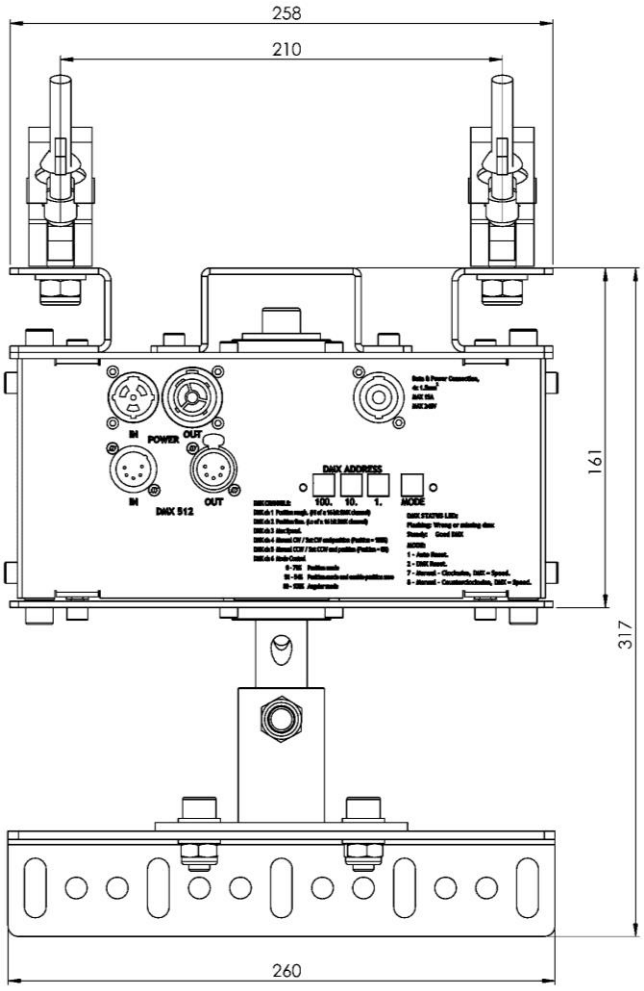
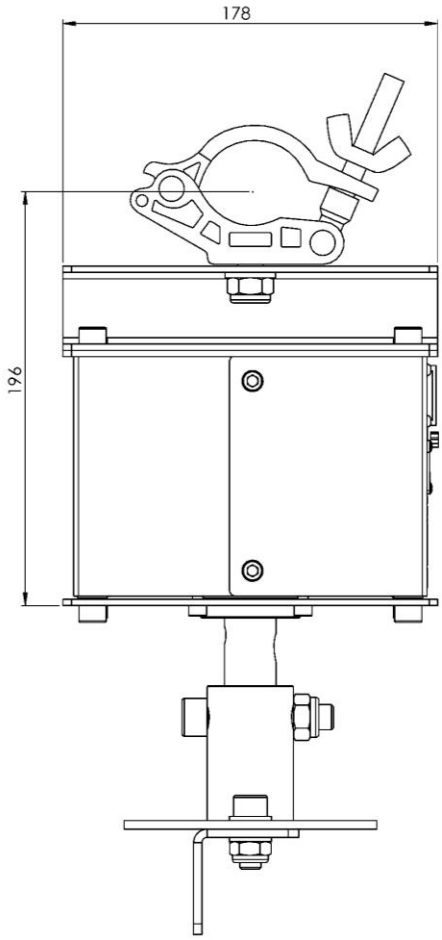
Technical specifications

Model:	Rotator 281
Item no.:	281
Dimensions(without mounting clamp):	260 × 178 × 317 mm. / 10.2 × 7.0 × 12.5 in. (L×W×H)
Power supply:	100-240 V AC 50-60 Hz.
Power consumption:	Max 150 Watt.
Power plug:	Neutrik powerCON TRUE1 NAC3FX-W
DMX control signal:	DMX 512 1990 + DMX512A / 7 channels used.
DMX connection:	5 pole XLR, In & link
Rotating limit:	No limit / Continuous rotation
Rotating speed:	Variable, 0.15-6.8 rpm
Maximum attachment current:	
1 + (1.5 mm^2):	10A through power connection
1 - (1.5 mm^2):	10A through power connection
2 + (1.5 mm^2):	10A through power connection
2 - (1.5 mm^2):	10A through power connection
Minimum breaking load:	> 1500 kg
Maximum load:	
Shaft - down	150 kg. (330 lbs.)
Shaft - up	100 kg. (220 lbs.)
Shaft - sideways	50 kg. (110 lbs.)
Noise emission:	~50 dB (1m distance)
Weight:	11.8 kg (26 lbs)
Mounting clamp:	3xSlim eye coupler (Max load: 300 kg) 50 mm (2 inch)
Motor:	24 V DC, 28.9 W, IP30

.Rotator 281


258
210
IN
POWER
OUT
IN
DMX 512
OUT
DMX ADDRESS
100.
10.
1.
MODE
161
317
260


178
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Introduction

Before using the Wahlberg Rotator for the first time, please read this manual carefully. Failure in handling can cause injury of persons and/or damage the rotator.

Package content

1× Rotator 281
3× Manfrotte Slim coupler
3× Mounting bolts, nuts, and washers (M12) for slim coupler mounting
1× PowerCON TRUE1 NAC3FX-W Female plug for power cable
1× SpeakON SPX NL4FX Female plug for power/signal-throughput
1× SpeakON SPX NL4FX Male plug for power/signal-throughput
1x Instruction manual
1x Clamp for shaft

Description

Rotator 281 is a rotator for stage use, mainly for use in theatres, shows and concerts.
It is designed for rotating lamps and other electrical devices. The rotator has a positioning system that enables a Rotator to stop at any desired position. The load is up to 150 kg. The rotation speed is between 0.15 rpm and 6.8 rpm.

The rotators are easily connected as a chain, allowing for advanced and creative ways of making dynamic movements. The rotator is controlled by the DMX channels from the lighting desk. It has a built-in positioning system which is utilized in locating the desired position. The positioning system is controlled from a 16 bit DMX channel and is highly accurate; the rotator stops within 1°. The speed of the rotator is likewise controlled from the lighting desk, and it is possible to set the left and right limits of the movement of the rotator, adjusting its span of motion. Six DMX channels controls the wanted position and the speed of the movement, and the rotator finds the position applied on the lighting desk. The movements are programmed as lighting and in interaction with the light.

The control system ensures that the motor only is powered when:

- The control signal is reliable.
- The position and speed control is on.
- The motor position is calculated after witch a PID regulator calculates the motor speed and distance.

Rotator 281 should only be operated by an experienced DMX-controlled-lighting-desk-operator.
The lighting desk has to be programmed according to the manual, so the rotator will stop when the speed is put to 0 %. It is also possible for the user to stop the rotator on the main. After power failure the start and 0° position of the rotator needs to be reset before the rotator can function again.

Manually operation of the rotator is only intended for mounting, service, and tests.

Area of use

The Rotator is intended for indoor use only. It is designed for rotating lamps and other electrical devices at the weight and speed stated in "Technical Data". Any other use of the rotator may result in a risk of injury of persons or equipment damage. Exceeding the load rating may cause failure of the equipment.
Use only approved rigging connectors to secure the load to the rotator and do not modify the shaft as this may damage the rotator and result in a risk of injury of persons or equipment damage.

Do not modify the rotator. For any modification of your rotator, contact Wahlberg.

It is the customers' responsibility that any local restrictions concerning the use of the rotator are complied with.

For indoor use only!
Caution! To reduce the risk of electric shock or injury: use indoors only
Caution! To reduce the risk of electric shock, do not expose to rain: store indoors!

Using for the first time

Important! The Rotator 281 must be protected from environmental factors such as physical shocks and vibration during transportation and storage.

Warning! Read "Safety Information" on page 2 before installing, powering, operating, or servicing the rotator. Before applying power to the rotator:

- Check the Wahlberg Motion Design website at www.wahlberg.dk for the most recent documentation and technical information about the Rotator 281. Wahlberg user manual revisions are identified by the revision number in the bottom of each page.
- Carefully review the "Safety Instructions" on page 2.
- Check that the local AC mains power source is within the rotator power voltage and frequency ranges.
- See "Power cables and power plug" on page 2. Install a Neutrik powerCON TRUE1 NAC3FX-W power input connector on a suitable power cable. If drawing the power from a mains power outlet, install a suitable power plug on the power cable.

Physical installation

Warning! The Rotator 281 must be either fastened to a flat surface such as a floor or roof, or clamped to a truss or similar structure. Do not apply power to the Rotator 281 if it is not securely fastened.

Warning! The supporting surface must be hard and flat. Fasten the rotator securely.

Warning! Use only the supplied rigging clamps and M12 bolts. The clamp must be screwed into the central holes in the rotator's mounting brackets using the supplied M12 washers and M12 locking-nuts.

Fastening the rotator to a flat surface

The Rotator 281 can be fastened to flat surface such as a floor or roof. Check that the surface can support at least 10 times the weight of all rotators and equipment to be installed on it.

Mounting the rotator on a truss

The Rotator 281 can be clamped to a truss or similar rigging structure.
When loading the rotator with full load it is important to use all 3 slim couplers when mounting.

To clamp a Rotator 281 to a truss:

1. Check that the rigging clamp is undamaged and that the rigging structure can support at least 10 times the combined weight of all Rotators and equipment to be installed on it.
2. Use the 3 supplied rigging clamp or contact Wahlberg Motion Design for a replacement.
3. Fasten the clamps to the rotator with the supplied M12 bolts, nuts, and washers in the holes in the mounting brackets of the rotator.
4. Block access under the work area. Working from a stable platform, hang the rotator on the truss. Tighten the rigging clamp.

Mounting the rotator in an angle

The Rotator 281 can be mounted in any angle.

Warning! Always mount the load with the center of mass directly below the center of the axis.

Warning! The maximum load depends on the angle the rotator is mounted in. Refer to table below

Maximum load:

Shaft - down	150 kg.	(330 lbs.)	only with 3 rigging clamps mounted!
Shaft - up	100 kg.	(220 lbs.)	only with 3 rigging clamps mounted!
Shaft – sideways	50 kg	(110 lbs.)	only with 3 rigging clamps mounted!

AC power

Warning! Read "Safety Information" on page 2 before connecting the Rotator 281 to AC mains power.

Warning! For protection from electric shock, the Rotator 281 must be grounded (earthed). The power distribution circuit must be equipped with a fuse or circuit breaker and ground-fault (earth-fault) protection.

Warning! Socket outlets or external power switches used to supply the Rotator 281 with power must be located near the rotator and easily accessible so that the rotator can easily be disconnected from power.

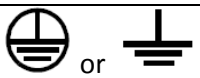
Warning! Check that the voltage range specified on the rotator's serial number label matches the local AC mains power voltage before applying power to the rotator. Do not apply AC mains power to the rotator at any other voltage than that specified on the rotator's serial number label.

Power cables and power plug

The Rotator 281 requires a power input cable with a Neutrik powerCON TRUE1 NAC3FX-W cable connector for AC mains power input. The cable must meet the requirements listed under "Protection from electric shock" on page 2.

If you install a power plug on the power cable, install a grounding-type (earthed) plug that is rated 16 A minimum. Follow the plug manufacturer's instructions. Table 1 shows standard wire color-coding schemes and some possible pin identification schemes; if pins are not clearly identified, or if you have any doubts about proper installation, consult a qualified electrician.

Table 1 - Colour guide

Wire Colour	Conductor	Symbol	Screw (US)
Brown	Live	L	Yellow or brass
Blue	Neutral	N	Silver
Yellow/green	Ground (earth)		Green

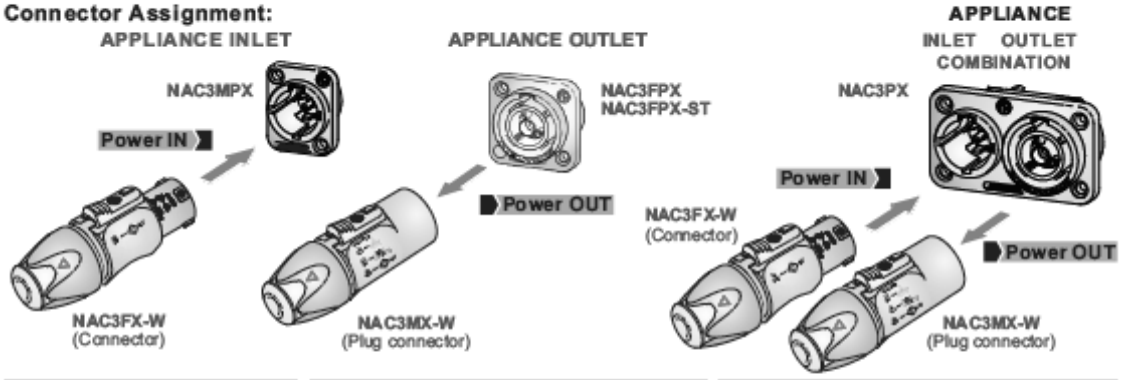
Installing a power input connector on a power cable

To install a Neutrik powerCON TRUE1 NAC3FX-W input connector on a power Cable, follow the original Neutrik instructions below:

A. OPERATING INSTRUCTION

Application:
The powerCON TRUE1 system is certified as connector with breaking capacity according IEC 60320, VDE 0625. It is intended for use as appliance couplers and interconnection couplers. It serves to supply power to an appliance and from an appliance to another equipment. To be installed by qualified person only.

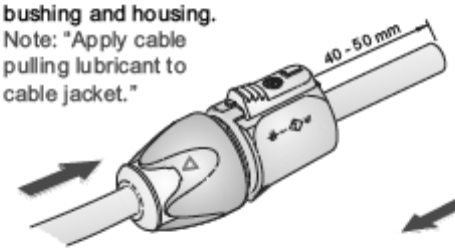
Connector Assignment:



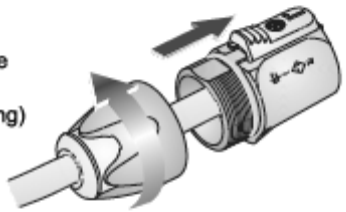
Approval based:	VDE EN 60320-1/EN60320-2-2 ✓	UL UL 498 / CSA C22.2 No. 182.3 ✓
Rating:	250 V ac / 16 A	250 V ac / 20 A
Cable Type:	H05VV-F3G 1.0 mm², Length max. 2 m	SJTOW, SJOOW 3 x 12 AWG
	H05VV-F3G 1.5 - 2.5 mm²	
	H07RN-F3G 1.5 mm²	
Strain Relief:	White chuck	White chuck
Cable O.D.:	6.0 - 12.0 mm	6.0 - 12.0 mm

B. ASSEMBLY INSTRUCTION

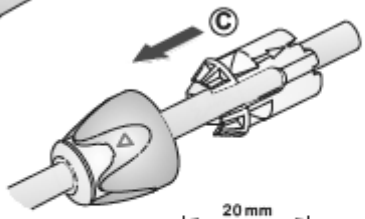
Ⓐ Insert cable into the bushing and housing. Note: "Apply cable pulling lubricant to cable jacket."



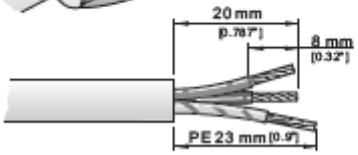
Ⓑ Separate the housing from the bushing (cable remain in bushing)

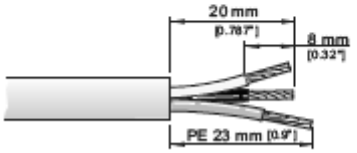


Ⓒ Place chuck over the cable.



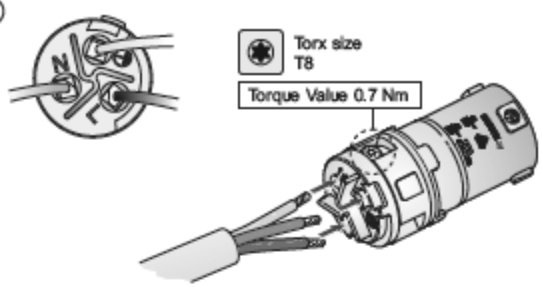
Ⓓ Prepare cable as shown.





VDE (EN 60320-1/EN60320-2-2) | **UL** (UL 498 / CSA C22.2 No. 182.3)

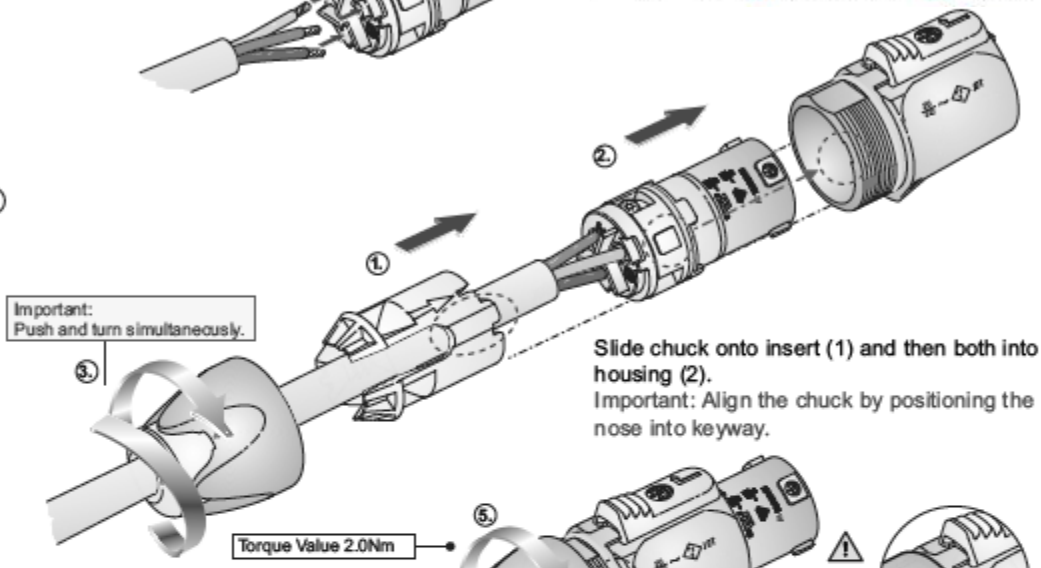
Ⓔ



Slide the cable into the contacts and clamp with the screw with Torx size T8.

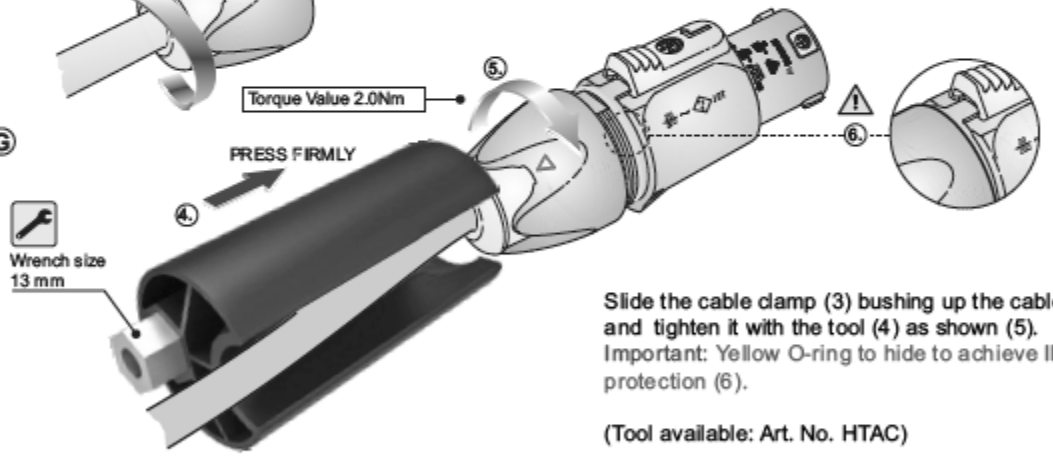
Wiring		VDE	UL
L	⇒	brown	black
N	⇒	blue	white
⏚	⇒	green/yellow	green

Ⓕ



Slide chuck onto insert (1) and then both into housing (2).
Important: Align the chuck by positioning the nose into keyway.

Ⓖ



Slide the cable clamp (3) bushing up the cable and tighten it with the tool (4) as shown (5).
Important: Yellow O-ring to hide to achieve IP protection (6).

(Tool available: Art. No. HTAC)

FOR DISASSEMBLY - OPEN TWIST LOCK!

1. Press with screw driver to unlock
2. Turn bushing 360°.
3. Repat step①+②until bushing is unscrewed.

CAUTION

To ensure protection category, do not expose the connection to bending forces (e.g. do not attach loads to the cable, no free-dangling cable windings etc.).

SAFETY WARNING
For safety and certification reasons the connector must be replaced in case of any broken parts or serious damage.

Data link

A DMX 512 data link is required in order to control the rotator via DMX. The Rotator 281 has 5-pin XLR connectors for DMX data input and output. The pin-out on all connectors is pin 1 = shield, pin 2 = (data -), and pin 3 = (data +). Pins 4 and 5 in the 5-pin XLR connectors are not used in the Rotator 281, and there is no connection between the 5-pin XLR in and out connectors.
The Rotator 281 is subject to the common limit of 32 devices per daisy-chained link. Note that if independent control of a rotator is required, it must have its own DMX channels. To add more rotators or groups of rotators when the above limit is reached, add a DMX-splitter and another daisy-chained link.

Tips for reliable data transmission

- Use shielded twisted-pair cable designed for RS-485 devices: standard microphone cable cannot transmit control data reliably over long runs. 24 AWG cable is suitable for runs up to 100 meters (328 ft.).
- Never use a rotator's outputs to split a DMX link. To split the link into branches, use an opto-isolated RS-485 splitter/amplifier.
- Terminate the link by installing a termination plug in the output socket of the last rotator. The termination plug, which is a male XLR plug with a 120 Ohm, 0.25 Watt resistor soldered between pins 2 and 3, "soaks up" the control signal so it does not reflect and cause interference. If a splitter is used, terminate each branch of the link.

Connecting the data link

To connect the Rotator 281 to data:

1. Connect the DMX data output from the DMX controller to the Rotator 281's male 5-pin XLR DMX input connector (DMX 512 IN).
2. Connect the DMX output of the rotator to the DMX input of the next rotator and continue connecting rotators output to input (DMX 512 OUT).
3. Terminate the last rotator on the link with a 120 Ohm resistor.

The DMX lamp is the green led, next to the DMX-selectors.

- Glows constant, when the DMX connection is correct.
- Flash if the DMX signal is missing or wrongly connected.

Attachment power and data link

Warning! Read “Safety Information” on page 2 before connecting AC mains power to the attachment power inlet.

Warning! Socket outlets or external power switches used to supply the attachment with power must be located near the rotator and easily accessible so that the attachment can easily be disconnected from power.

Power voltage

Warning! Check that the voltage range specified on the rotators serial number label for attachment power voltage matches the local AC mains power voltage before applying power to the rotators attachment power inlet. Do not apply AC mains power to the rotators attachment power inlet at any other voltage than that specified on the rotators serial number label.

Attachment connection plug

The Rotator 281 requires a power and data input a Neutrik speakON NL4FX cable connector. The cable for connecting the speakON plug on the rotator for the attachment power and data, must meet the requirements listed under “Protection from electric shock” on page 2.

The attachment connection has four conductors; two for power and two for data or power.

Connecting the power cable

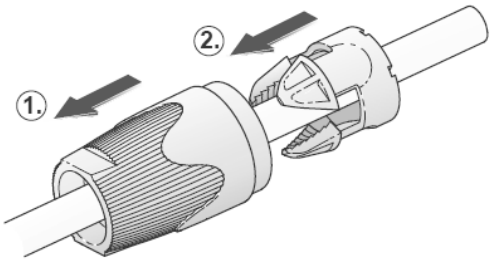
Refer to the section “AC power” on page 11 for installation of the power connection.

Connecting the data link

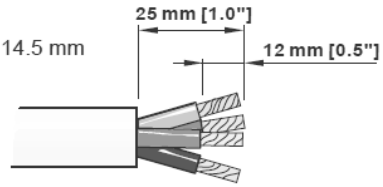
Refer to the section “Data link” on page 14 for installation of the data connection.

To install a Neutrik speakON NL4FX cable connector, follow the original Neutrik instructions below:

Ⓐ



Ⓑ **Cable O.D.** 7.0 - 14.5 mm
[0.24 - 0.39"]
Wire size 4 mm²
(AWG 12)



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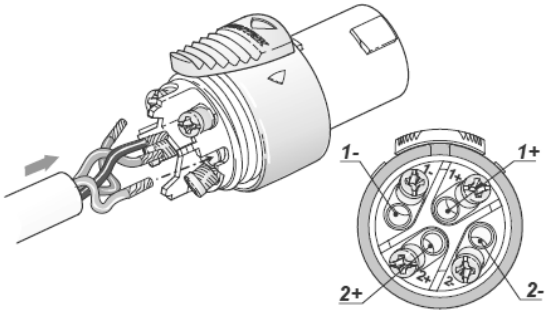

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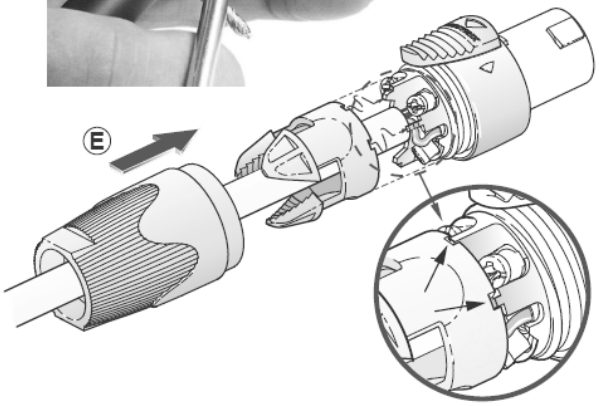


Assembly of the Connector:

Ⓐ **Place the bushing and chuck over cable.**

Ⓑ **Prepare the cable as shown.**

Important is the stripping length of 25 mm and 12 mm.

Ⓒ **Insert wires into terminals and secure clamp terminals with screw driver (POZIDRIV® #1) at max. torque 0.8 Nm.**
For 6 mm² (AWG 10) remove screws, clamping sheet and solder.

Ⓓ **For easy wiring especially on big cables, first screw on the inner conntacts 1+ and 2+ and afterwards the outer contacts 1- and 2- !**

Ⓔ **Push chuck up to housing .**

Important: Align the chuck by positioning the nose into the recess.

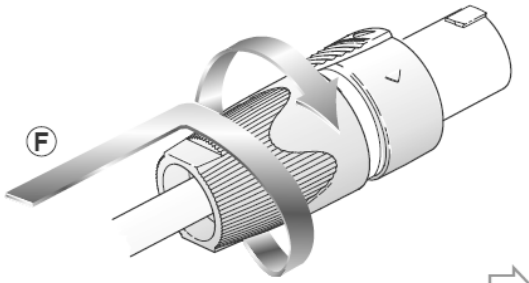
Ⓕ **Tighten the bushing**

INFO to the screw driver:

DO NOT USE!

POZIDRIV® #1	**Philips**

Ⓕ



Setup

Warning! Read “Safety Information” on page 2 before installing, powering, operating, or servicing the Rotator 281.

Warning! Only experienced DMX users should operate the rotator. Contact Wahlberg for further information and education on DMX protocol.

E setting

The MODE setting allows you to operate the rotator in different ways. Each MODE setting has a given function. Each mode gives an opportunity for different run settings of the rotator. The MODE is selected using the MODE selector on the rotator.
The rotator needs to be reset, before the positioning MODE is possible. The rotator must be reset each time its power supply has been disconnected.

Read the passage about controlling the clockwise (CW)-end- and counter clockwise (CCW)-end positions, to explore and setup the rotator best for your own particular need.

Warning! Only operate the rotator when there is a clear view to the rotator and area beneath/above or besides it, depending on the method used for mounting.

Warning! Before running the rotator, ensure that the ‘danger zone’ next to the rotator is cleared so no people can be harmed.

Warning! MODE 7 and MODE 8 is only for service and tests!

Warning! Before running the rotator in MODE 7 or MODE 8, ensure that the area beneath the rotator is cleared so no people can be harmed.

MODE 0 – Not used, Motor stops

MODE 1 – Slow Speed Change (Ramp)
Positioning mode with slow ramp

MODE 2 – Normal Speed Change (Ramp)
Positioning mode with medium ramp

MODE 3 – Fast Speed Change (Ramp)
Positioning mode with fast ramp

MODE 4 – Not used, Motor stops

MODE 5 – Not used, Motor stops

MODE 6 – Not used, Motor stops

MODE 7 – Manual run up (no DMX needed) – Only for service and tests!
The rotator rotates clockwise (CW) with the speed set on the DMX-selectors. This function can be used as a test-function.
E.g. Set the rotator to MODE 7 and the DMX address to 100, for a slow movement, or set the DMX address to 500 for fast movement.

MODE 8 – Manual run up (no DMX needed) – Only for service and tests!
The rotator rotates counter clockwise (CCW) with the speed set on the DMX-selectors. This function can be used as a test-function.
E.g. Set the rotator to MODE 8 and the DMX address to 100, for a slow movement, or set the DMX address to 500 for fast movement.

MODE 9 – Not used, Motor stops

Table 2 - Overview of MODE functions

MODE	Function	Note
0	Not used, Motor stops	
1	Slow speed change (Ramp)	
2	Normal speed change (Ramp)	
3	Fast speed change (Ramp)	
4, 5, 6	Not used, Motor stops	
7	Manual clockwise (CW) (no DMX needed)	Warning! Only for service and tests!
8	Manual counter clockwise (CCW) (no DMX needed)	Warning! Only for service and tests!
9	Not used, Motor stops	

DMX ADDRESS setting

The DMX address, also known as the start channel, is the first channel used to receive instructions from the controller. For independent control, each rotator must be assigned its own control channels.
The DMX address is configured using the three DMX ADDRESS selectors on the rotator. The selected DMX address states from which channels, on the lighting desk, the rotator is controlled. The DMX address can be selected from 1 – 505. The Rotator 281 uses six DMX channels.

DMX channel 1 – Position rough (16 bit DMX channel):
This channel controls the position of the rotator, with the speed (DMX channel 3). This rough position works together with the fine position (DMX channel 2). The rough position and the fine position are multiplied in to a 16 bit channel. The rough position is the *MSB*.

DMX channel 2 – Position fine (16 bit DMX channel):
This channel controls the position of the rotator, with the speed set on DMX channel 3. This fine position works together with the rough position (DMX channel 1). The fine position and the rough position are multiplied in to a 16 bit channel. The fine position is the *LSB*.

DMX channel 3 – Speed:
This channel controls the speed of the rotator.
This channel defines the maximum speed. The rotator runs with the set max speed, but slows down as closing in on the wanted position. This channel also works as a main brake; the motor does not run unless the channel is set above 0%. The speed-channel can also be used to make soft and slow movements or fast and sudden movements.

DMX channel 4 – Manual CW / Set CW end position:
This channel makes the rotator, rotate clockwise (CW). The channel value determines the speed.
If DMX channel 6 is set between 51-54%, the end position for *position mode* is saved.

DMX channel 5 – Manual CCW / Set CCW end position:
This channel makes the rotator, rotate counter clockwise (CCW). The channel value determines the speed.
If DMX channel 6 is set between 51-54%, the end position for *position mode* is saved.

DMX channel 6 – Mode Control:

Channel value	Function
0-79%	Position mode
51-54%	Position mode and enable ‘end position’ save
80-100%	Angular mode

Attention! The positioning run in positioning mode works only, when the rotator has been reset.

Table 3 - Overview of DMX addresses

DMX Channel	Function	Note
1	Position rough (Hi of a 16 bit DMX channel)	MSB
2	Position fine (Lo of a 16 bit DMX channel)	LSB
3	Set the maximum speed	
4	Manual CW / Set CW end position	
5	Manual CCW / Set CCW end position	
6	Mode control	

Manual reset

When the rotator is ready, the first thing to do is to reset it. The CW-position needs to be set manually, before the rotator is able to use for positioning run. To get the most precise run, fit for your own needs, it is possible to regulate the CW- and CCW- end positions. This is done manually on DMX channel 4 and DMX channel 5

Reset example:

- The DMX channel 4 is set to 30% → the rotator starts to rotate clockwise.
- Let it run until it reaches a desired position.
- Set DMX channel 5 is set to 30% → the rotator starts to rotate counter clockwise.
- Let it run until it reaches a desired position.

The rotator is now reset and the CW-end position and the CCW-end position define the total travel length of the rotation.
If you want to change the rotating length, simply just use DMX channel 4 and 5 to set new end positions.

Positioning

When the rotator has been reset and the CW-end position is set, it is possible to use it for positioning run. The green LED next to the MODE selector indicates, by fast flashing, that the rotator needs to be reset, before it can be used.

The position is set on the DMX channel 1 and 2, which controls the rough-and fine-position. Where 100 % is the CW- end position and 0 % is the CCW-end position.
The positions lamp indicates, by slow flashing, that the rotator has been reset and that it is going towards the wanted position. The position lamp indicates, by stable light, that the rotator has found the wanted position and the motor has stopped.

The speed is set on the DMX channel 3, where 100 % is the fastest and 0 % is the slowest.
The rotator does not run unless the DMX channel 3 is set above zero, and therefore also works as a main brake.

There are 2 modes the rotator position in. These are selected by the value on DMX channel 6.

Positioning Mode

If DMX channel 6 is 0-79%, the 0% position and 100% position is set by the user using DMX channel 4 and 5. When saving positions DMX channel 6 must be set between 50% and 55%. DMX channel 4 moves the rotator in the CW direction and sets the 100% position. Channel 5 moves the rotator in the CCW direction and sets the 0% position. When setting the end positions the 100% position set by channel 4 should always be set first.
When the 0% and 100% position has been set, DMX channel 1 and 2 can be used to position the rotator between 0-100% with the max speed determined by channel 3.

Angular Positioning Mode

When DMX channel 6 is 80-100% the rotator is in *angular positioning mode* and DMX channel 1 and 2 determines the angel the rotator moves to 0% is 0° and 100% is 360°. The rotator will always move the shortest way to the wanted position unless it was doing a continuous rotation set by channel 4 or 5 that was ended.
Example:

- The current position is 5° and the next set position is 350°.
  - → The rotator will move 15° back to the new position.
- The rotator is moving continuously (by having channel 4 or 5 set) and the next set position is 350°
  - → The rotator will continue in the same direction until it reaches the new position, when the continuous move is stopped.
  - → If the continuous move is stopped when the Rotator has moved 10° pass its wanted position it will not move back but do almost a full rotation to reach its position.

Synchronized movements of multiple rotators

If several rotators are installed to perform synchronized movements the best result is achieved by using a fading 16 bit position. By nature there is a slight deviation in performance of the motors so some motors have a slightly higher maximum speed than others.

Like when fading light, the positions of the different rotators should be faded, and the rotators will tend to follow that fade. When fading the positions:

1. The speed channel should be a set to 100 to gain the highest possible speed.
2. The position channel should be added as a 16 bit channel and not just the MSB on channel 1.
3. The speed of the fade needs to be slower than the maximum speed, so the motors have speed enough to perform the movement.

If the fade of the positions is too fast, the rotators will move at the maximum speed, and you will see the difference in the motor speed.
If the fade is to slow the rotators will move – stop – move – stop, when the position changes, thus giving a discontinuous movement.

Service and Maintenance

Warning! Read "Safety Information" on page 2 before servicing the Rotator 281.

Warning! Disconnect the Rotator from AC mains power and allow cooling down for at least 10 minutes before handling.

Warning! Disconnect the attachment connection from AC mains power before handling.

Warning! Refer any service operation not described in this user manual to a qualified service technician.

Attention! Interval of inspections should be determined according to the frequency of use and the working scenario of the rotator.

Attention! Signs of malfunction or poor operation should always lead to an inspection of the rotator, and the rotator should be taken out of operation until the error is eliminated.

Maintenance plan

The results of all the regular inspections are to be documented and kept available at the company. The written result of the last inspection must be kept available at the site of operation, e.g. by an inspection sticker on the rotator showing the date of the inspection, the basis of the inspection and the name of the inspector.

Before every use and weekly

Every time when rigging the rotator, before running the rotator – and at least every week when the rotator is in use:

- Ensure that the rotator is correctly and safely mounted
- Ensure that the attached load is correctly mounted

Monthly

At regular intervals – but at least every month when the rotator is in use:

- Check the mounting clamp and snap hook for damages and proper fastening.
- Check the secure fastening of the attached lamp or electronic equipment
- Check the electric fastening of the lamp.
- Change damaged parts according to this manual.

Yearly

The rotator has to be inspected by a specialist every 12 months.

Every 48 months

The rotator should be inspected by an authorised expert every 48 months.

On-site service

On-site service and maintenance CAN be provided by the Wahlberg Motion Design, giving owners access to Wahlberg Motion Design's expertise and product knowledge in a partnership that will ensure the highest level of performance throughout the product's lifetime. Please contact Wahlberg Motion Design for details.

Life time of the rotator

It is Wahlberg policy to apply the strictest possible calibration procedures and use the best quality materials available to ensure optimum performance and the longest possible component lifetimes. The extent of wear and tear depends heavily on operating conditions and environment, so it is impossible to specify precisely whether and to what extent the performance will be affected. The expected lifetime of the rotator depends on the load, travel length, mounted angle, as well as duty cycle.

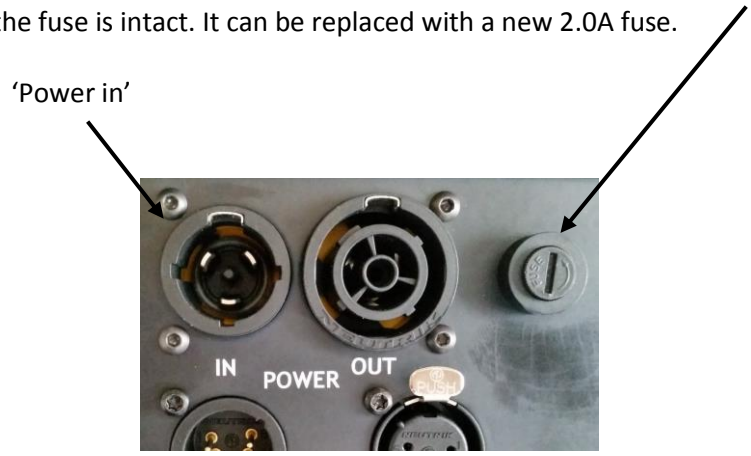
Spare parts

Only parts ordered at or approved by Wahlberg should be used in the rotator to ensure product function and stability. Contact Wahlberg to inquire about spare parts.

Power defect

If the rotator does not react when the power is connected check the following:

- Check that the power plug is properly connected, both to the POWER IN plug on the rotator and to the main power plug.
- Check that the fuse is tightly screwed on in the fuse cap, also if it has just been changed.
- Check that the fuse is intact. It can be replaced with a new 2.0A fuse.



Rotator 281 - Cheat Sheet

wahlberg MOTION DESIGN

MODE	Functions	DMX channels	Function
0	Neutral function – motor stops	1	Position rough (Hi of a 16 bit DMX channel)
1	Slow speed change (Ramp)	2	Position fine (Lo of a 16 bit DMX channel)
2	Normal sleep change	3	Set the maximum speed
3	Fast speed change	4	Manual CCW / Set CW end position
4, 5, 6	Stops the motor unless specified otherwise	5	Manual CCW / Set CCW end position
7	Manual clockwise (CW) (no DMX needed)	6	Mode control
8	Manual counter clockwise (CCW) (no DMX needed)		
9	Stops the motor unless specified otherwise		

How to get started

1. Mount the rotator according to the instructions on page 10.
2. Set the DMX address using the 100, 10, and 1 switches. Set MODE 1
3. Apply DMX from a Lighting desk, best is a desk with manual faders. Pull all channels on to 0%
4. Apply power to the rotator.
   DMX lamp should be lit, and the mode lamp should be flashing.

Position mode

5. Set channel 6 to 52 % and channel 4 to 30 %
   Now the rotator will slowly turn clockwise.
6. When the wanted CW end position is found - set channel 4 to 0% and channel 5 to 30 %
   Now the rotator will slowly turn counter clockwise.
7. When the wanted CCW end position is found - set channel 5 to 0%.
8. Set channel 3 to 50% and channel 1 to 25%
   Now the rotator starts to move down, with 50% speed, to the position 25% from CW end.

Angular positioning mode

9. Set all channels (1 – 6) to 0%
10. Set channel 6 to 100% (Angular mode)
11. Set channel 3 to 50% (Max speed) and channel 4 to 30% (Manual CW).
    Now the rotator will slowly turn clockwise. Let the rotator run minimum one rotation
    (must be done each time power is connected, so the rotator identifies its angular zero position)
12. Set channel 4 to 0% and channel 1 to 25% (Position).
    Now the rotator will rotate until it reaches 90 degrees with 50% speed
13. Set channel 1 to 75%.
    Now the rotator will rotate CW until it reaches 270 degrees with 50% speed

Note: It is possible to change between constant CW or CCW rotation and angular positioning mode while the rotator is running. During change from constant CW/CCW rotation the rotator will always continue in the same direction until the wanted angular position is found. When the rotator is in angular positioning mode it will select the rotation direction that will give the shortest direction.

Before each use

- Ensure that the rotator is correctly and safely mounted
- Ensure that the attached load is correctly mounted

Warning! Do not use the rotator if any damage or error is found!