



Evolution Center



## ER Series - Motorized E-Rollers

### Product Manual

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# INTRODUCTION

## Contents

This manual contains important product information of the motorized E-rollers (ER series). It provides the intended use, integral safety measures and guides for servicing, transport and storing conditions. Also, technical support for installation, maintenance and troubleshooting is provided.

**This guide is part of the product. Therefore, the product cannot be used without consulting the guide prior to installation or use.**

## General Safety Measures

The motorized E-roller has been designed and configured in order to meet safety standards when in operation. However, risks may still occur. Therefore, it is important to study and follow the manual prior to usage.

- For optimal and safe use of the system it is required to study and follow the manual.
- Keep this manual in a safe and visible location near the system.
- The supplier cannot be held responsible for faults and defects that would have been avoided by following this manual.
- The supplier cannot be held responsible when changes are made and/or added to the system which has not been described and/or allowed in the manual.
- Do not use the system when one or more components are damaged or malfunctioning.
- Questions concerning the manual can be addressed to NDW located in Waalwijk.

## Intended use

The motorized E-roller must only be used for industrial applications in an industrial, dry environment. The E-roller must be integrated in automated conveyor modules or systems with NDW motor controllers installed. Depending on the application, different methods of power transmission to non-driven rollers can be used (i.e. poly-V, round belts, toothed belts or chains). Any other use is prohibited. The integration of the E-roller in automated conveyor modules can create additional hazards. This is not covered in this manual. It is required to validate the safety of the complete system before switching it on.

## Qualified persons

Only qualified personnel are allowed to work with- or integrate the E-rollers. Qualified personnel are expected to understand this manual and have knowledge on national safety regulations regarding industrial appliances. While working with the E-roller, the following points should be taken into account by the qualified personnel:

- Relevant diagrams and user manuals of the E-roller.
- Regulations and requirements that are specific for this product.
- Safety and warning instructions as provided by this document.
- National and/or local safety regulations

## Dangers

While working with the E-roller, certain dangers may occur. This list provides the general dangers that may happen and instructs on how to avoid accidents:

- Maintenance and repair may only be executed by authorized and qualified personnel according to the appropriate national safety regulations. Otherwise serious bodily injury may arise.
- Before initiating or using the E-roller, make sure all unauthorized personnel has cleared the working area of the conveyor.
- Keep hands and fingers away from moving parts.
- Make sure the E-roller is only operated by NDW motor controllers and with control voltages compliant with a SELV environment.
- The power must always be switched off when maintenance or installation work is performed on the E-roller. Ensure the power cannot accidentally be switched on.
- Check for visible damage regularly. Also make sure mounts and screws have correct tension.
- If you notice any faulty behaviour of the motorized roller or the system, immediately cut the power and make sure it cannot accidentally be switched on. Contact qualified personnel in order to perform troubleshooting.
- Do not touch the E-roller during operation or directly after. Metal surfaces can reach high temperatures.
- Make sure no unnecessary tools or equipment is near the system when in operation. Tools or screws falling on the conveyor may cause serious damage to the system.
- When installing or troubleshooting the conveyor system, be aware that sensors or other signals may be triggered unintentionally, leading to hazardous situations.
- Never try to open an E-roller.



# PRODUCT INFORMATION

## Product description

The ER series consist of motorized E-rollers which are brushless DC motors integrated in a conventional NDW roller with the primary purpose to drive non-driven rollers in conveyor systems. Typical industrial applications range from intralogistics systems to manufacturing applications which include product handling. The E-roller can be used in straight, curved and angled conveyor systems but also in specialized modules such as right-angle transfer units. Furthermore, the E-rollers are perfectly suitable for applications where zero-pressure accumulation is required.

## E-roller motor controllers

Each motorized E-roller must be connected to a compatible NDW motor controller such as the BC50 or BP120 controller. All controllers are designed to precisely control the behaviour of the motorized roller.



### BC50 Motor Controller

- Single E-roller connection
- 24Vdc power input
- Basic I/O control
- IP20



### BP120 Motor Controller

- Dual E-roller connection
- 230Vac power input
- Integrated logic and ZPA functionalities
- Two sensor connections
- IP54

## Key functions

### Different gear ratios to suit a wide range of applications

The motorized E-rollers can be ordered with three different gear ratios. In this manual these three motor types are classified as 100RPM (36:1), 200 RPM (24:1) and 400 RPM (17:1). The different gear ratios result in different rated speeds and rated torques. As a result, there will always be a motor suitable for your application. In this manual, some guidelines will be provided to select the appropriate motor type.

### Maintenance free and low noise

The E-rollers are completely maintenance free during their lifetime and therefore it is sufficient to simply check for visible damage on a regular basis. Furthermore, the E-rollers have a low operating noise to minimize impact on the users and their surroundings.

### Seamless integration with non-driven rollers

Since NDW is manufacturer of both the motorized E-rollers as well as non-driven rollers, seamless integration and alignment between the two can be guaranteed. The E-roller can be equipped with different transmission alternatives such as poly-V, round belts, toothed belts and chains to drive the non-driven rollers.

### Energy efficient and low start-up current

The E-rollers have a rated power consumption of 50W during maximum payload. For most applications the typical power usage will be lower. Furthermore, the NDW motor controllers limit the current flowing to the E-rollers at 2A, even during start-up of the controllers.

### Overvoltage- and stall protection

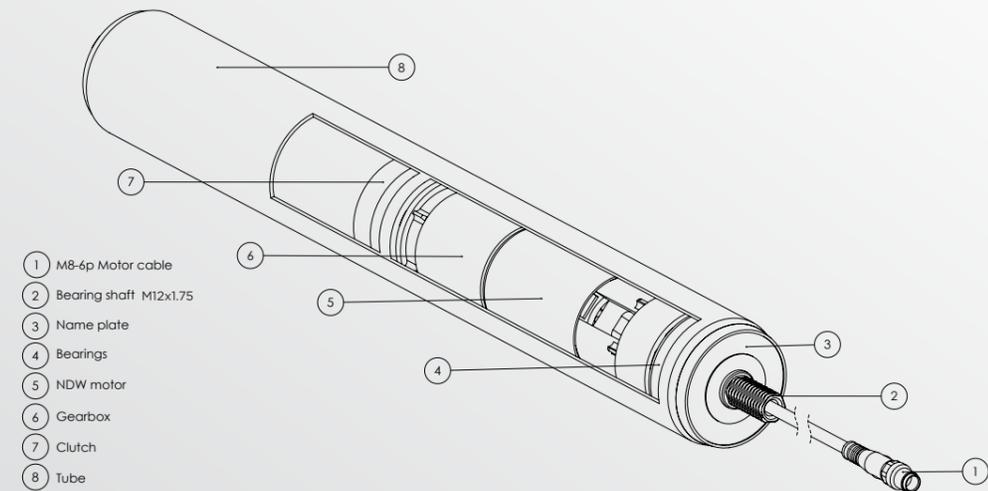
All NDW motor controllers are equipped with a protection against induced overvoltage of the motorized E-roller when it acts as a generator. For example, this could occur when heavy packages are stopped or when a conveyor system has a slope. Besides protection against overvoltage, all NDW motor controllers have a build-in motor stall protection. When the rotation of the E-roller is blocked, the controller will initiate a stall protection to protect the E-roller. The controller will try to resolve the stalled motor several times. When the motor remains stalled, the controller will send an error signal.

### PWM speed control

Depending on the application, the amount of power the E-roller must deliver is monitored and controlled. For example, heavy packages and long roller sections typically require more power compared to light packages and short roller sections. To ensure a constant speed and stable acceleration, the E-roller continuously provides speed and power feedback to the connected controller. In turn, the controller monitors these values and corrects whenever necessary.

# PRODUCT INFORMATION

## Components



## Scope of delivery

The delivery of the E-roller contains the following parts:

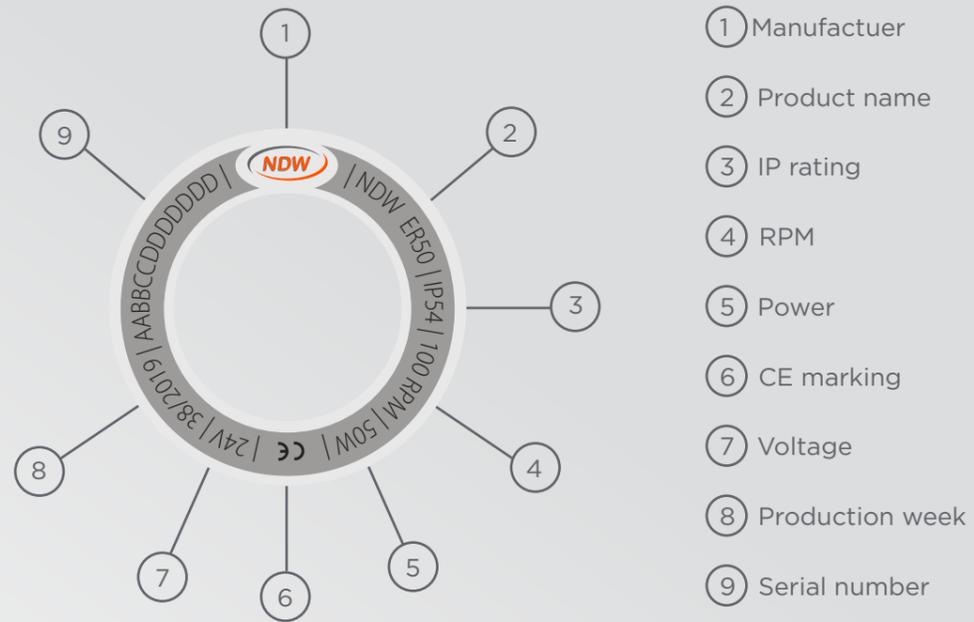
- E-roller  
(Mounting materials not included.)
- Optional\*:
  - E-roller extension cable  
(order code: 901-CABMOT-L)
  - E-roller mounting lock plate  
(order code: 901-ERLOCK-1A)

*\*Can be ordered separately.*

Available in different standard lengths. A full overview of accessories is shown on page 29.

# ASSEMBLY

## Label



- ① Manufacturer
- ② Product name
- ③ IP rating
- ④ RPM
- ⑤ Power
- ⑥ CE marking
- ⑦ Voltage
- ⑧ Production week
- ⑨ Serial number

## E-roller configuration

The E-roller can be configured in many ways. In the table below, possible configurations can be found.

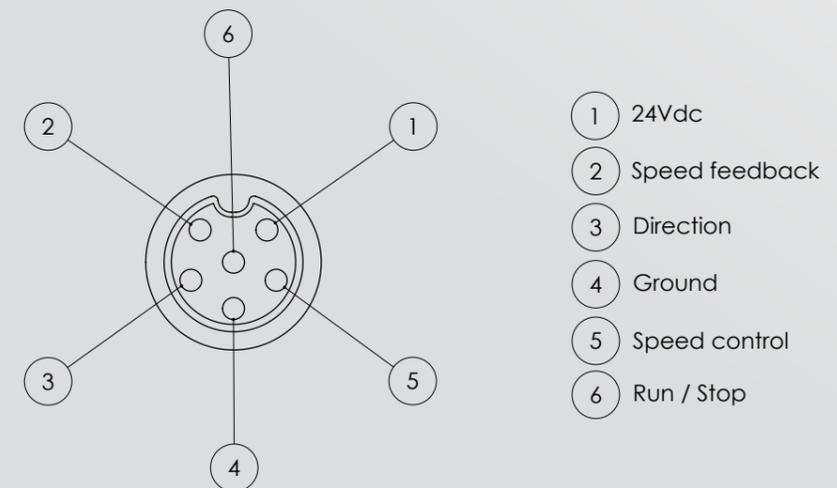
E-roller configuration	
General	<ul style="list-style-type: none"> <li>• Motor Type: 100RPM, 200RPM, 400RPM.</li> <li>• Serial number</li> <li>• Protection Rate</li> <li>• Date of production</li> </ul>
Tube	<ul style="list-style-type: none"> <li>• Diameter: 50, 60, 70, 80, 89 mm</li> <li>• Material: Stainless steel, Zinc-plated steel, Chromium-plated steel</li> <li>• Sleeve: PVC hose (2mm), Tapered elements (for curves/turns)</li> </ul>
Length	<ul style="list-style-type: none"> <li>• Installation length (IL = inbetween frame length)</li> </ul>
Transmission element	<ul style="list-style-type: none"> <li>• Poly-V head</li> <li>• Grooves (round belt)</li> <li>• Round belt head</li> <li>• Toothed belt head</li> <li>• Chains</li> </ul>
Mounting (non-cable side)	<ul style="list-style-type: none"> <li>• Hexagonal spring shaft</li> <li>• Internal thread: M8, M10, M12</li> </ul>

## Technical Data

<b>Rated voltage</b>	24Vdc
<b>Rated current</b>	2A (1)
<b>Starting current</b>	2A (1)
<b>Power consumption (Max)</b>	50W
<b>Ambient temperature in operation</b>	0 °C to +40 °C, non-condensing
<b>Compatible NDW controllers</b>	BC50 and BP120
<b>Motor connector type and cable length</b>	M8-6pin, length 900mm
<b>Motor shaft</b>	Stainless steel, 11 mm hexagon, thread M12 x 1.75
<b>Tube</b>	50 x 1.5mm, stainless steel or zinc-plated steel
<b>Stall protection</b>	Yes
<b>Overvoltage protection</b>	Yes
<b>Protection rate</b>	IP54 (IP65 on request)
<b>Maximum noise level</b>	55 dB (2)
<b>Max installation height</b>	1000 m

1. Actual current is dependent on the conditions of the application, such as actual load, section length, slope etc. A very short current peak of <40ms will occur during startup of the E-roller.
2. Measured at 1 meter. Also dependent on the conditions of the application, such as conveyor frame, mounting type, load and resonance behavior of the system.

## Motor cable



Type	Connector	Cable specification	Remarks
E-Roller cable	M8-6pin screw	6x0.25 mm <sup>2</sup>	-

**Note: only connect E-roller cable with compatible NDW motor controller. Furthermore, only use original NDW motor extension cables since they guaranteed the required ratings.**

## Performance data

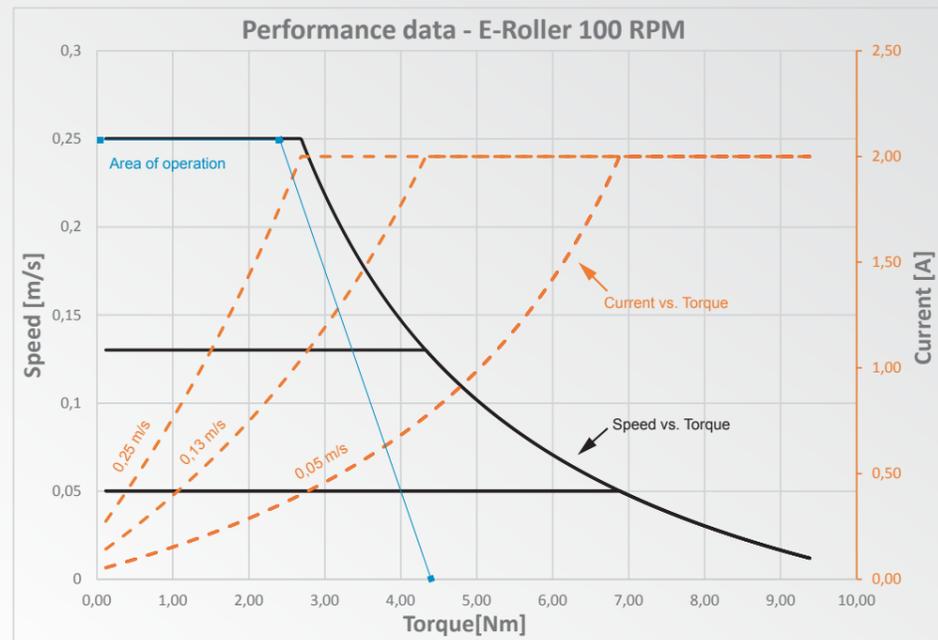
The performance of an E-roller is expressed in torque vs. speed and torque vs. current consumption. The data for the three motor types (100RPM, 200RPM and 400RPM) are listed below. Note that for the speed values, a 50mm roller is used as reference. All motors must be controlled by NDW controller (BC50 or BP120). These controllers limit the maximum current to the motor to 2A.

### Performance data - 100 RPM (36:1 gear ratio)

Nominal speed (m/s) (50 mm E-roller)	Nominal torque (Nm)	Starting torque (Nm)	Starting Current (A)
0.25	2.57	6.88	2
0.13	3.21	6.88	2
0.05	4.07	6.88	2

### Available speed setpoints: 0.05 - 0.26 m/s, stepsize 0.01 m/s

Above values are given as guideline. Actual transfer capacity depends on the application parameters such as nature of transported load, quality of the bearings, duty-cycle, type of transmission to non-driven rollers etc.

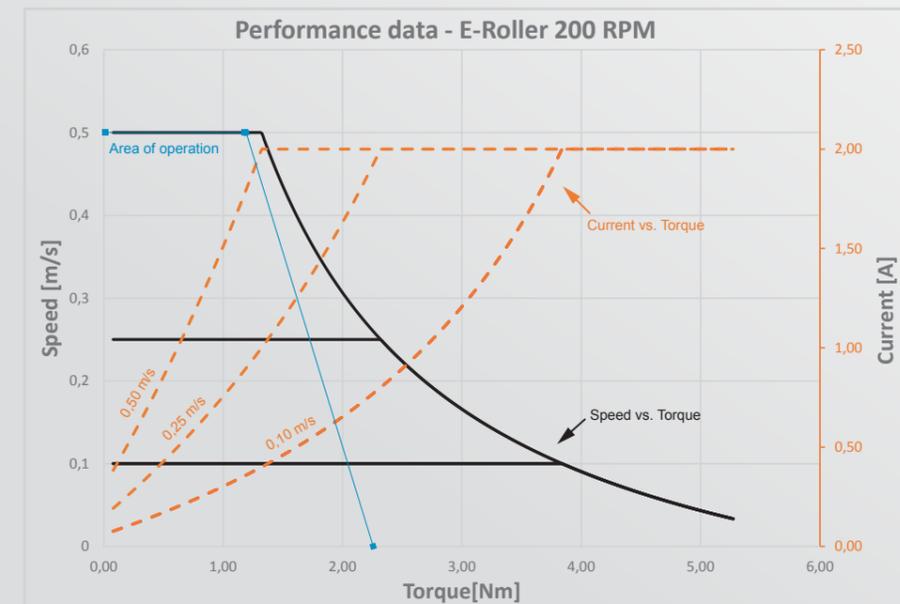


### Performance data - 200 RPM (24:1 gear ratio)

Nominal speed (m/s) (50 mm E-roller)	Nominal torque (Nm)	Starting torque (Nm)	Starting Current (A)
0.50	1.26	3.84	2
0.25	1.67	3.84	2
0.10	2.11	3.84	2

### Available speed setpoints: 0.10 - 0.52 m/s, stepsize 0.01 m/s

Above values are given as guideline. Actual transfer capacity depends on the application parameters such as nature of transported load, quality of the bearings, duty-cycle, type of transmission to non-driven rollers etc.

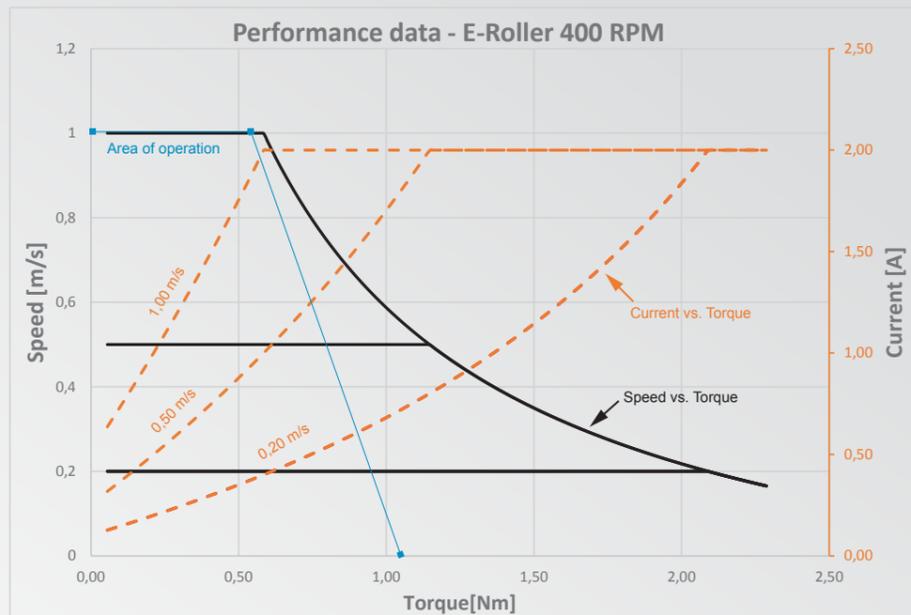


**Performance data - 400 RPM (17:1 gear ratio)**

Nominal speed (m/s) (50 mm E-roller)	Nominal torque (Nm)	Starting torque (Nm)	Starting Current (A)
1.00	0.55	2.09	2
0.50	0.77	2.09	2
0.20	1.03	2.09	2

**Available speed setpoints: 0.20 - 1.04 m/s, stepsize 0.01 m/s**

Above values are given as guideline. Actual transfer capacity depends on the application parameters such as nature of transported load, quality of the bearings, duty-cycle, type of transmission to non-driven rollers etc.



**E-roller dimensions**

The configuration of the E-roller determines the overall dimensions of the roller. When ordering an E-roller the IL-value (installation length or inbetween frame length width) should be used. Since NDW also manufactures the non-driven rollers, alignment between E-rollers and other rollers can be guaranteed.

An overview of the most common E-roller configurations is presented in the table below.

Tube diameter	Zinc-plated	Stainless steel	Without grooves	With grooves	Poly-V (2)	Round belt (2)	Toothed Belt	Chain
50x1.5	Yes	Yes	HEX, M8	HEX, M8	HEX, M8	HEX, M8	HEX, M8	HEX, M8
60x1.5	Yes	-	HEX, M8	HEX, M8	HEX, M8	HEX, M8	HEX, M8	HEX, M8
60x2	Yes	Yes	HEX, M8	HEX, M8	HEX, M8	HEX, M8	HEX, M8	HEX, M8
60x3	Yes	Yes (1)	HEX, M8	HEX, M8	HEX, M8	HEX, M8	HEX, M10	HEX, M10
63,5 x 2.9	Yes	-	M8, M10, M12	-	M8, M10, M12	M8, M10, M12	M8, M10, M12	M8, M10, M12
70x2	Yes	Yes	M8, M10, M12	-	M8, M10, M12	M8, M10, M12	M8, M10, M12	M8, M10, M12
80x2	Yes	Yes	M8, M10, M12	-	M8, M10, M12	M8, M10, M12	M8, M10, M12	M8, M10, M12
80x3	Yes	Yes	M8, M10, M12	-	M8, M10, M12	M8, M10, M12	M8, M10, M12	M8, M10, M12
89x3.2	Yes	Yes	M8, M10, M12	-	M8, M10, M12	M8, M10, M12	M8, M10, M12	M8, M10, M12

(1) Stainless steel available in 60.3x3 mm tube

(2) Available in plastic and steel header

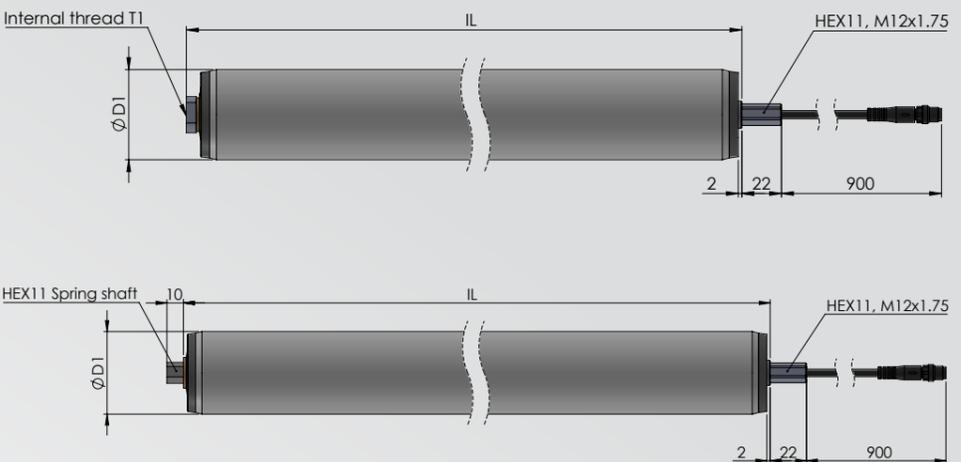
For other configurations, minimal installation length IL and availability, please contact NDW.

Note: for some configurations a minimum order quantity applies.

**Without grooves**

Available diameters D1	50, 60, 63.5, 70, 80, 89 mm
Available internal thread T1	M8, M10, M12, HEX (1)

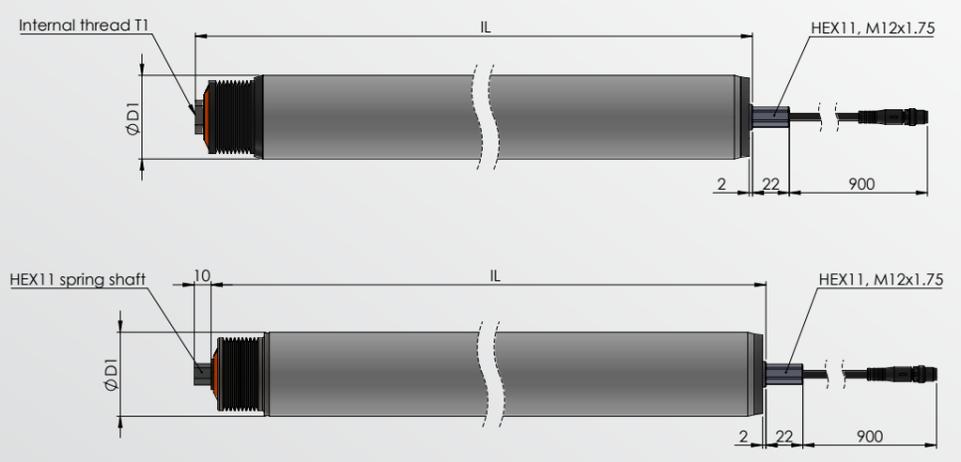
(1) Spring loaded HEX only for 50, 60 mm diameter



**Poly-V** Available in plastic and steel header

Available diameters D1	50, 60, 63.5, 70, 80, 89 mm
Available internal thread T1	M8, M10, M12, HEX (1)

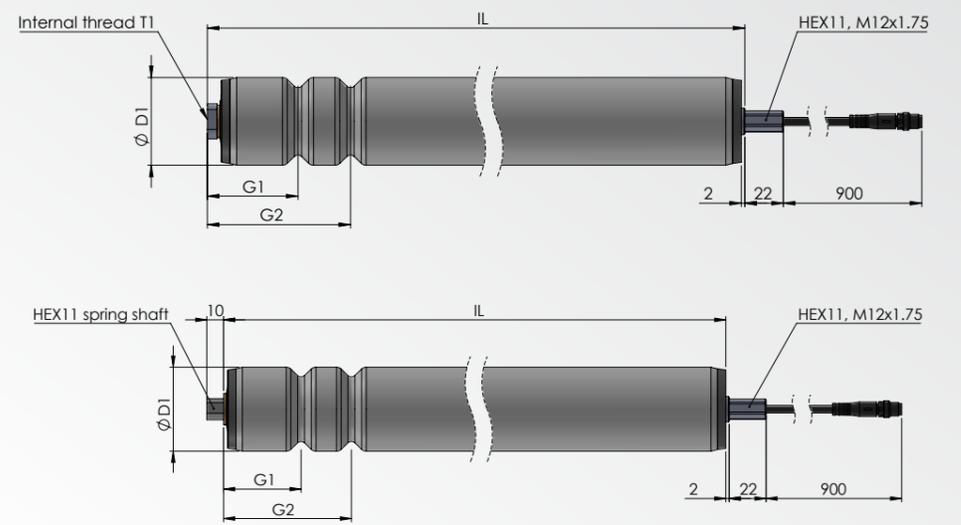
(1) Spring loaded HEX only for 50, 60 mm diameter



Poly-V, Not available in Germany

**With grooves**

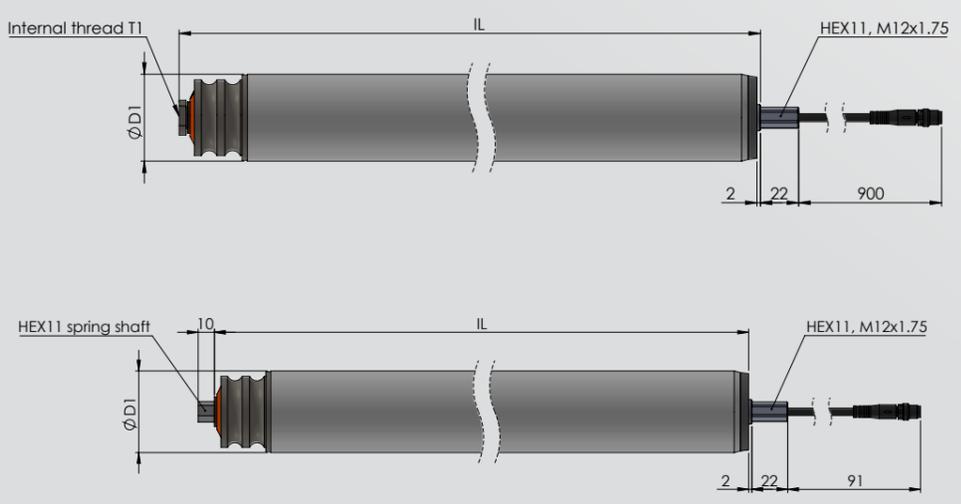
Available diameters D1	50, 60 mm
Available internal thread T1	M8, HEX



**With round belt head** Available in plastic and steel header

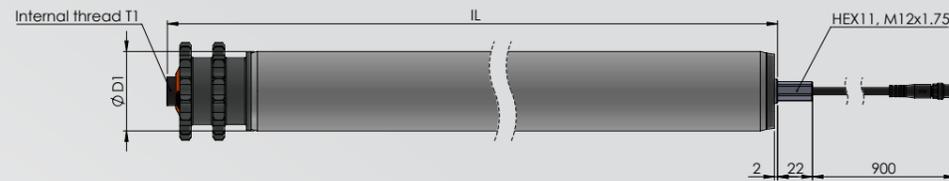
Available diameters D1	50, 60, 63.5, 70, 80, 89 mm
Available internal thread T1	M8, M10, M12, HEX (1)

(1) Spring loaded HEX only for 50, 60 mm diameter



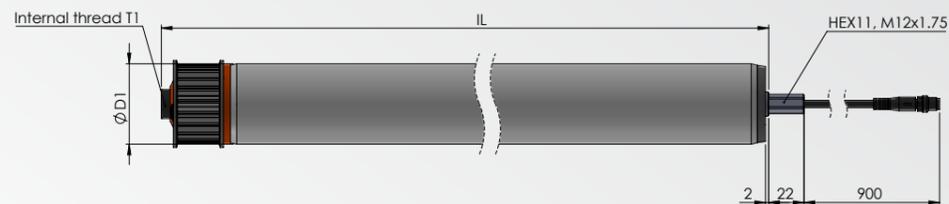
### With chain head

Available diameters D1	50, 60, 63.5, 70, 80, 89 mm
Available internal thread T1	M8, M10, M12



### With toothed belt

Available diameters D1	50, 60, 63.5, 70, 80, 89 mm
Available internal thread T1	M8, M10, M12



# TRANSPORT AND STORAGE

## Ambient conditions for transport

Permissible ambient temperature	-20 °C to 60 °C
Permissible relative humidity	5% to 95%, non-condensing

The transport of the E-rollers must be executed by qualified personnel only. A risk of injury persists when transporting the product incorrectly. The instructions below must be followed during transport at all times:

- Before transportation, make sure that each box or E-roller is properly fixed.
- Every package should be checked for damage and completeness according to the "Scope of Delivery" page 9.
- Impacts to the product must be avoided at all times.
- If any damage occurred during transportation, you are advised to take photos that will serve as evidence. Immediately report the damage to the transport company and NDW otherwise compensation cannot be guaranteed.
- Prevent significant temperature fluctuations while transporting the E-roller, since this may lead to condensation, causing serious damage to the product.

## Ambient conditions for Storage

Permissible ambient temperature	-20 °C to 60 °C
Permissible relative humidity	5% to 95%, non-condensing

- While storing, make sure that each box or E-roller is properly fixed.
- When a controller is taken out of storage, please inspect for damage prior to usage.

# ASSEMBLY

## Warning notice concerning assembly and electrical installation

Not following the safety instructions might lead to hazardous situations and failure or shortened lifetime of the motorized E-roller.

## Safety instructions

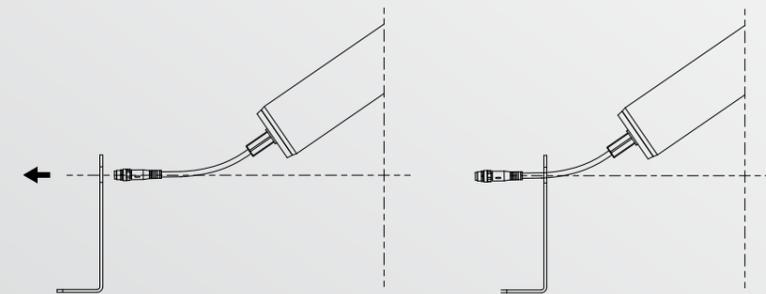
- Do not drop or otherwise physically mishandle the E-roller to avoid internal damage.
- Do not force the E-roller in the conveyor frame. It must be carefully inserted.
- Before assembly, check each E-roller visually for damage.
- Only qualified and authorized personnel should perform electrical work.
- Make sure that the connections and the housing never come in contact with any hazardous voltages, not even during the malfunction of the E-roller.
- The motor plug should be handled with care, applying too much tension or load could potentially damage the cable which could lead to failure of the E-roller.
- Do not twist the E-roller cable.
- Make sure that there is no interference between any existing electrical installation and the controller or E-roller.
- Both the E-roller, the controller and the voltage source should be connected to a conveyor frame or supporting structure in such a way that they are properly earthed. Earthing incorrectly could potentially result in the build-up of static charge, causing both the E-roller and the controller to malfunction.
- Do not carry or secure the E-roller by the motor cable.
- Keep hands and fingers away from moving parts.
- Do not turn the E-roller by hand or by sliding an object over the roller. This might damage the E-roller through induction.



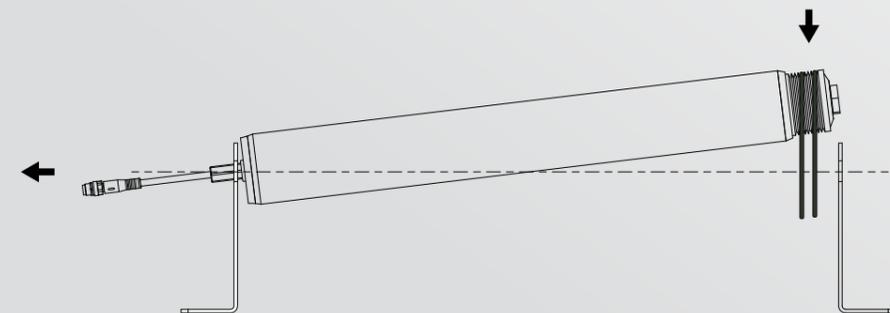
## Mounting the E-roller

- Insert the motor cable and motor shaft into the conveyor frame. The hole in the frame can be either hexagonal (min. inner diameter of 11.2 mm) or round hole (min. diameter 12.2 mm).
- Be aware to not damage the motor cable or motor shaft while inserting it through the slot in the frame.
- Make sure the motor cable does not make a sharp corner when exiting the motor shaft. This may cause damage to the cable.

### 1. Inserting the motor side of the E-roller



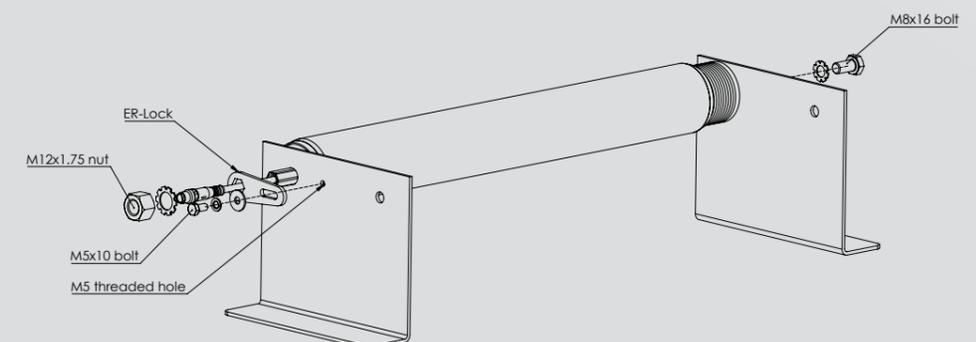
### 2. Align the other side of the motor with the opening in the frame on the opposite side.



### 3. Mount the non-motor side of the E-roller with a suitable bolt and toothed washer.

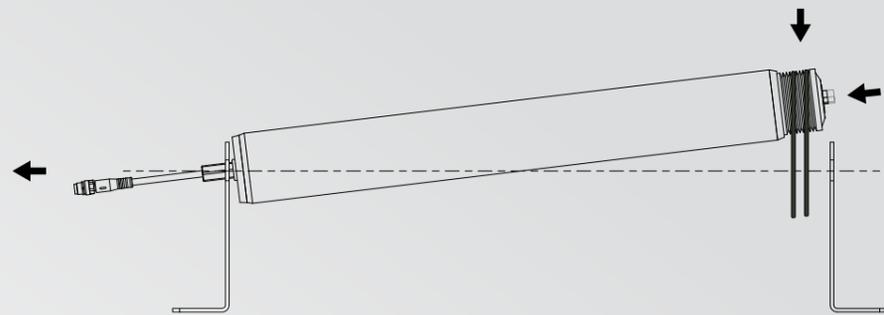
### 4. Place the ER-lock over the motor shaft and mount the slotted lib with an M5 bolt to the frame to prevent the E-roller from twisting.

### 5. Place a toothed washer and M12 nut over the motor shaft and tighten the nut with a wrench.



For E-rollers with a HEX spring mounting on the non-motor side, the mounting of the E-roller is similar.

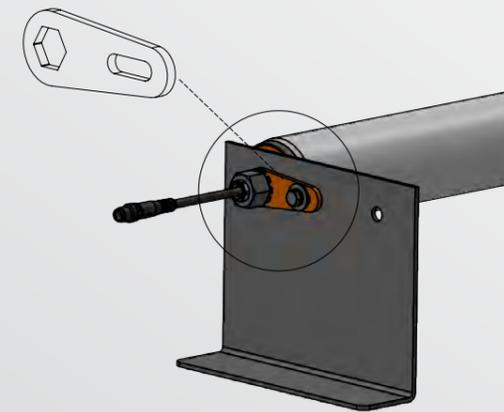
1. Press the HEX shaft inwards and place the E-roller between the two frames.  
When correctly aligned, the HEX shaft will lock itself inside the frame.



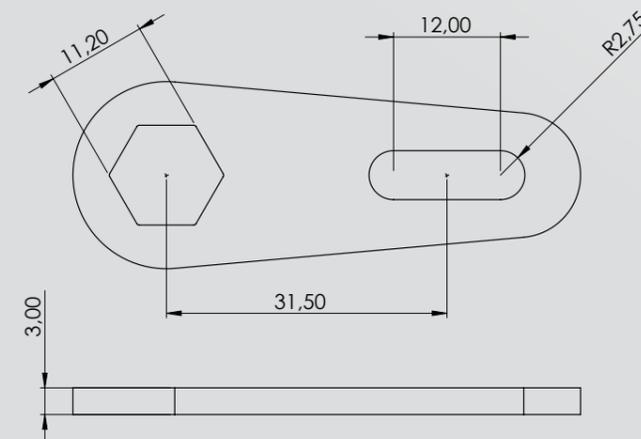
**Note:** when installing an E-roller with tapered elements (i.e. in a curved section), the attachment shaft will be positioned under a small angle. To prevent damaging the motor, a suitable angle compensator must be used for mounting the E-roller. This is not included in the default scope of delivery.

## ER-Lock

To ensure the motor shaft is properly fixed in the conveyor frame it is advised to use the ER-lock to mount the E-roller. The ER-lock has a tight hexagonal inner dimension preventing the shaft from rotating and preventing potential damage to the motor cable. The ER-Lock is a stainless-steel plate with a slotted M5 lib. Use a M5 tapped hole in the frame to lock the rotation. For roller diameters >60 mm be aware to carefully select the M5 bolt length otherwise this may cause damage to the E-roller.

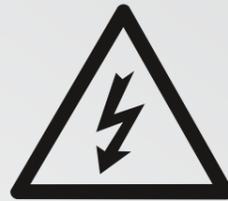


The dimensions of the ER-lock are given below:



## Electrical installation

- Before installing or connecting the E-roller to an NDW controller, disable the power supply of that controller.
- Make sure that all cables used are the right dimensions for the application.
- Only use the specified connectors.
- Make sure the motor cable does not make a sharp corner when exiting the motor shaft (min. radius 25mm). This may cause damage to the cable.
- The E-roller can directly be plugged in the NDW controller. Use the screw connection to fixate the cable.
- Do not apply an AC voltage directly to the E-roller. This will cause irreparable damage.
- Only use compatible NDW controllers to operate the E-roller
- only use original NDW motor extension cables since they guaranteed the required ratings.
- The total length of the E-roller cable may need not exceed 6 meters.



# INITIAL STARTUP AND OPERATION

## Checks before initial start up

- Make sure that the E-roller is mounted correctly and that all the screws have been tightened.
- Check the area around the controller and the motorized roller to make sure there are no other components creating dangerous situations.
- Make sure that the wiring is in accordance with the specification and legal directives.
- Check all protective measurements.
- Check if the motorized roller is properly mounted to prevent damage to the motor cable due to rotation.
- Check the conveyor system and make sure no personnel stands in hazardous areas.
- Keep hands and fingers away from moving parts.

## Checks before operation

- Check the E-roller controller for visible damage.
- Check all protective measurements.
- Make sure there is no blockage of the E-roller.
- Check the conveyor system and make sure no personnel stands in hazardous areas.
- Keep hands and fingers away from moving parts.

## WARNING!

### Accidental start-up of the E-roller

Hazardous situation for both personnel and goods. Make sure no unauthorized persons are near the conveyor before switching on the power supply.

# CLEANING AND MAINTENANCE

Beware of the risk of injuries while cleaning or performing maintenance on the E-roller. Only authorized and qualified personnel is allowed to perform these kinds of tasks. Make sure that the power is switched off and cannot be accidentally switched on again during cleaning or maintenance. Also make sure to indicate cleaning or maintenance work is in progress on-site to inform co-workers.

## Cleaning

In order to avoid potential damage, the E-roller surface should be periodically cleaned with a vacuum cleaner or damp cloth. Wet cleaning methods are not allowed. This could cause unrepairable damage to the E-roller.

## Maintenance

The E-roller itself does not require maintenance. It is however advised to periodically (monthly) check whether screws, mounts and cables are still correctly and tightly positioned. Specifically check if the motor shaft is still tightly fixed to the conveyor frame and is not rotating or twisting.

In case an E-roller is damaged and does not function properly it has to be replaced. Consult the “Removal” section and “Disposal” section page 27 to properly discard the broken product, and the “Assembly” section page 20 for re-installing a new E-roller. Never try to open an E-roller.

# REMOVAL AND DISPOSAL

## Removal

Beware of the risk of injuries while removing the E-roller from the conveyor system. Only authorized and qualified personnel is allowed to perform these kinds of tasks. Make sure that the power is switched off and cannot be accidentally switched on again during removal. When removing the motorized roller from the conveyor system, make sure the following tasks are being executed in this specific order:

- Cut all power from the system or, if applicable, the specific segment.
- If necessary, label the cables in order to ensure they are put back in the right place.
- Disconnect the motor cables from the connected controller.
- Remove the mounting screws that secure the E-roller to the conveyor system.
- Gently remove the E-roller. Make sure not to drop or bump the E-roller, this might result in irreversible damage.
- Make sure any loose cables are off the floor and cannot be damaged by accident.

## Disposal

The disposal of the E-roller must be compliant to industry-specific national or local provisions. The responsibility for right disposal of the E-roller and the accompanying packaging and accessories lies completely with the industrial operator which should consider the proper regulations surrounding disposal of electronic devices.

# TROUBLESHOOTING

Problem	Possible cause	Solution
E-roller does not run	<ul style="list-style-type: none"><li>• No or incorrect power supply.</li><li>• Wrong settings</li><li>• Motor is blocked or obstructed</li><li>• Motor defect</li></ul>	<ul style="list-style-type: none"><li>• Ensure the specified voltages are correct for the connected controller.</li><li>• Ensure the motor cable is correctly attached to the controller</li><li>• Check settings or I/O input on controller</li><li>• Check UI of controller and remove blockage</li><li>• Replace E-roller</li></ul>
E-roller is running in the wrong speed or direction	<ul style="list-style-type: none"><li>• Wrong settings in the controller</li></ul>	<ul style="list-style-type: none"><li>• Change settings or I/O input signals.</li><li>• Change motor type and diameter to the correct setting</li></ul>
Unexpected noises from E-roller	<ul style="list-style-type: none"><li>• Motor or gears are damaged</li></ul>	<ul style="list-style-type: none"><li>• Replace E-roller</li></ul>
E-roller operation is interrupted	<ul style="list-style-type: none"><li>• Motor is blocked or obstructed</li><li>• Motor cable is damaged</li></ul>	<ul style="list-style-type: none"><li>• Check UI of controller and remove blockage</li><li>• Replace E-roller</li></ul>

# ACCESSOIRES

## Cable accessories

### E-roller extension cable

1500mm, two-sided connector, male/female, order code: 901-CABMOT-1500  
3000mm, two-sided connector, male/female, order code: 901-CABMOT-3000

### E-roller mounting lock

ER-lock, stainless steel, order code: 901-ERLOCK-1A



