

ROLLERDRIVE SERIES EC5000

ø 50 mm, crowned, IP54, for 0 to 40 °C



- 24V
- 48V
- 20W
- 35W
- 50W
- AI
- BI

Application area

The EC5000 with crowned tube is ideal for driving belts for conveying goods systems. Examples include: conveying cardboard cartons, containers, platens or tires at normal ambient temperature. Such belt conveyors are especially suited for small conveying goods. The belt conveyors can be designed as straight conveyors or zero pressure accumulation – horizontally as well as with slight slope.

Compact design

The motor integrated in the tube allows a very compact design of the belt conveyor. The RollerDrive is based on a diameter of 50 mm. However, the tube has diameters in the range of 51.5 to 52 mm.

Very energy-efficient

The brushless drive features energy recovery when braking. The conveyor system can operate without pneumatics or conventional drives, which must be operated continually.

Flexible possible applications

RollerDrive is available in many variations, allowing it to be used in all types of different conveyor systems. For the user, this translates into a single interface instead of many. The seven gear ratios allow selecting the perfect pairing between speed and torque. The electronic holding brake (Zero-Motion-Hold) holds conveying goods in position, even on gravity conveyors.

Low-noise

The use of decoupling elements achieves particularly low-noise running.

Maintenance-free and installation-friendly

The drive with internal commutation electronics does not require any maintenance. It features an overload protection that prevents damages due to overtemperature or blockage. It is connected securely without complex screw connection by using a motor cable with 5-pin snap-in plug.



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Technical data

EC5000

Rated voltage	24 V	24 V	48 V	48 V
Power	35 W	50 W	35 W	50 W
Rated current	2.4 A	3.4 A	1.2 A	1.7 A
Starting current	5.5 A	7.5 A	2.8 A	3.8 A
Max. noise emission (installed)	55 dB (A), application-dependent			
Length of motor cable	500 mm			
Min. reference length	411 mm			
Max. reference length	711 mm			
Ambient temperature in operation	0 to 40 °C			
Motor shaft	Stainless steel, 11 mm HEX, thread M12 x 1			
Anti-static version	Yes (< 10 ⁶ Ω)			
Tube wall thickness	2.25 to 2.5 mm			
Tube material	Uncoated steel			
Tube sleeving	-			

Belt

Max. permissible belt elongation	8 %
Max. belt pull for 1 % elongation	175 mN/mm
Permissible temperature range	0 to 40 °C

Belt conveyor

Max. length	2000 mm
Ratio of length to width	A random length-width ration can be selected; the width of the belt conveyor must not exceed the length.
Belt divert	Exclusively rolling, not gliding

In addition to the calculations for belt tension and application performance requirements given below, the bending of the RollerDrive must also be considered. The correct belt tracking depends on the crowning and the resulting bending of the tube.

The max. permissible belt tension (TE) for your application can be calculated using the following formula:

$$TE = BW \cdot \varepsilon \cdot K1\% \cdot 2^* \cdot \text{safety factor}$$

A safety factor of 20 % is recommended.

$$TE \text{ in N} = \text{Max. belt tension}$$

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- BW in mm = Belt width
- ε = Factor by which the actual belt elongation lies above 1 % (maximum 8, since the maximum belt elongation is at 8 %)
- K1% in N/mm = Belt pull for 1 % elongation
- * = Factor since carrying and return section have to be taken into account

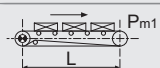
The calculated belt tension must not exceed the following maximum permissible belt tension for the EC5000:

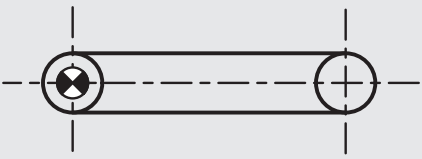
Gear ratio	Max. permissible belt tension
18:1	2120 N
21:1	2230 N
30:1	2510 N
42:1	2810 N
49:1	2950 N

The belt pull (F) can be calculated using the following formula. It is used for selecting the suitable power stage, gear ratio, and possible conveying goods weight.

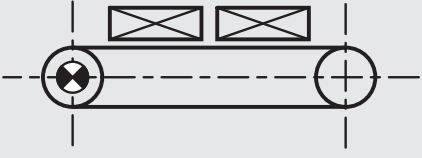
$F = F_0 + F_1 + F_2 + \text{safety factor}$

A safety factor of 20 % is recommended.


$$F_0 = 0.04 \cdot g \cdot L \cdot (2 P_n + P_{pr})$$

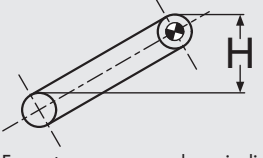


Force without load



Force to convey goods horizontally

$$F_1 = 0.04 \cdot g \cdot L \cdot P_{m1}$$



Force to convey goods on incline

$$F_2 = g \cdot H \cdot P_{m1}^*$$

- P_n in kg/m = Belt weight per meter
- P_{pr} in kg/m = Weight of rotating parts of the belt conveyor per meter length
- P_{m1} in kg/m = Weight of conveying good

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L in m	= Center-to-center length
H in m	= Height difference in conveyor
F ₀ to F ₂ in N	= Belt pull components for operating conditions shown
g in m/s ²	= 9.81

* The value F2 is negative with declined conveyors. However, to prevent over-run acceleration due to gravity, F2 should be positively calculated as for inclined conveyors.

With the help of the belt pull (F), the following formula can be used to calculate the required rated torque (M).

$$M \text{ [Nm]} = 0.026 \cdot F$$

Design versions

35 W

Gear ratio	Max. conveying speed [m/s]	Min. conveying speed [m/s]	Rated torque [Nm]	Acceleration torque [Nm]	Zero motion hold [Nm]
18:1	1.00	0.04	0.89	2.22	2.22
21:1	0.86	0.04	1.04	2.59	2.59
30:1	0.60	0.03	1.49	3.74	3.74
42:1	0.43	0.02	2.07	5.18	5.18
49:1	0.37	0.02	2.42	6.04	6.04
78:1	0.23	0.01	3.55	9.54	9.54
108:1	0.17	0.01	4.95	13.00	13.00

50 W

Gear ratio	Max. conveying speed [m/s]	Min. conveying speed [m/s]	Rated torque [Nm]	Acceleration torque [Nm]	Zero motion hold [Nm]
18:1	1.00	0.04	1.27	3.17	3.17
21:1	0.86	0.04	1.48	3.70	3.70
30:1	0.60	0.03	2.13	5.34	5.34
42:1	0.43	0.02	2.96	7.40	7.40
49:1	0.37	0.02	3.45	8.63	8.63
78:1	0.23	0.01	5.07	13.00	13.00
108:1	0.17	0.01	7.07	13.00	13.00

Before the run-in, the values may differ up to ±20 %. After a run-in phase, the values vary only in the range of ±10 % for 95 % of all RollerDrive used.

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Permissible applications

Extensive tests have been conducted with the EC5000 as belt drive. The following information represents the results of these tests and refer to an ambient temperature of 20 °C and a belt tension of 4 %. Despite the test results, it is recommended to test your application since every application case has its individual properties.

A roller of Series 1700 Heavy with a diameter of 51 mm and a wall thickness of 2 mm should be used for the belt deflection.

Horizontal belt conveyors

Tested mechanical power stages	50 W
Max. permissible weight per conveyor	50 kg (for all available gear ratios)
Max. number of conveying goods per minute (start-stop operation)	40 (18:1 gear ratio, depending on the pause time and the zone length)
Higher gear ratios	Reduced number due to lower speed

Belt conveyor tilted 10°

Tested mechanical power stages	50 W
Max. permissible weight per conveyor	10 kg (18:1 gear ratio) 15 kg (21:1 gear ratio) 25 kg (30:1 gear ratio) 35 kg (42:1 gear ratio) 40 kg (49:1 gear ratio)

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Dimensions

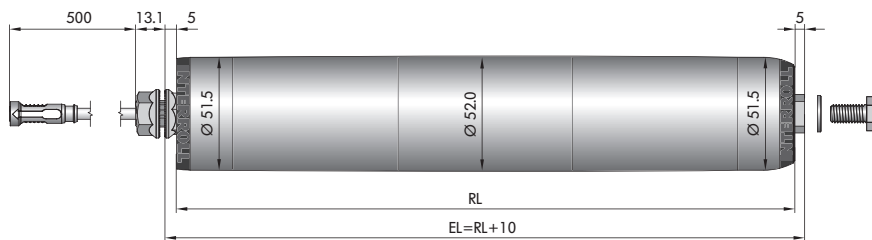
A sufficient axial play is already taken into account, so that the actual clear width between side profiles is required.

A hexagon hole with a size of at least 11.2 mm is recommended. If the RollerDrive is inserted obliquely, the fastening hole must be designed larger accordingly. A drilled hole with a diameter of 8.5 mm should be planned for the opposite side.

RL = Reference length/ordering length

EL = Installation length, clear width between side profiles

Crowned tube with M8 female thread



Form and diameter progression of the tube

