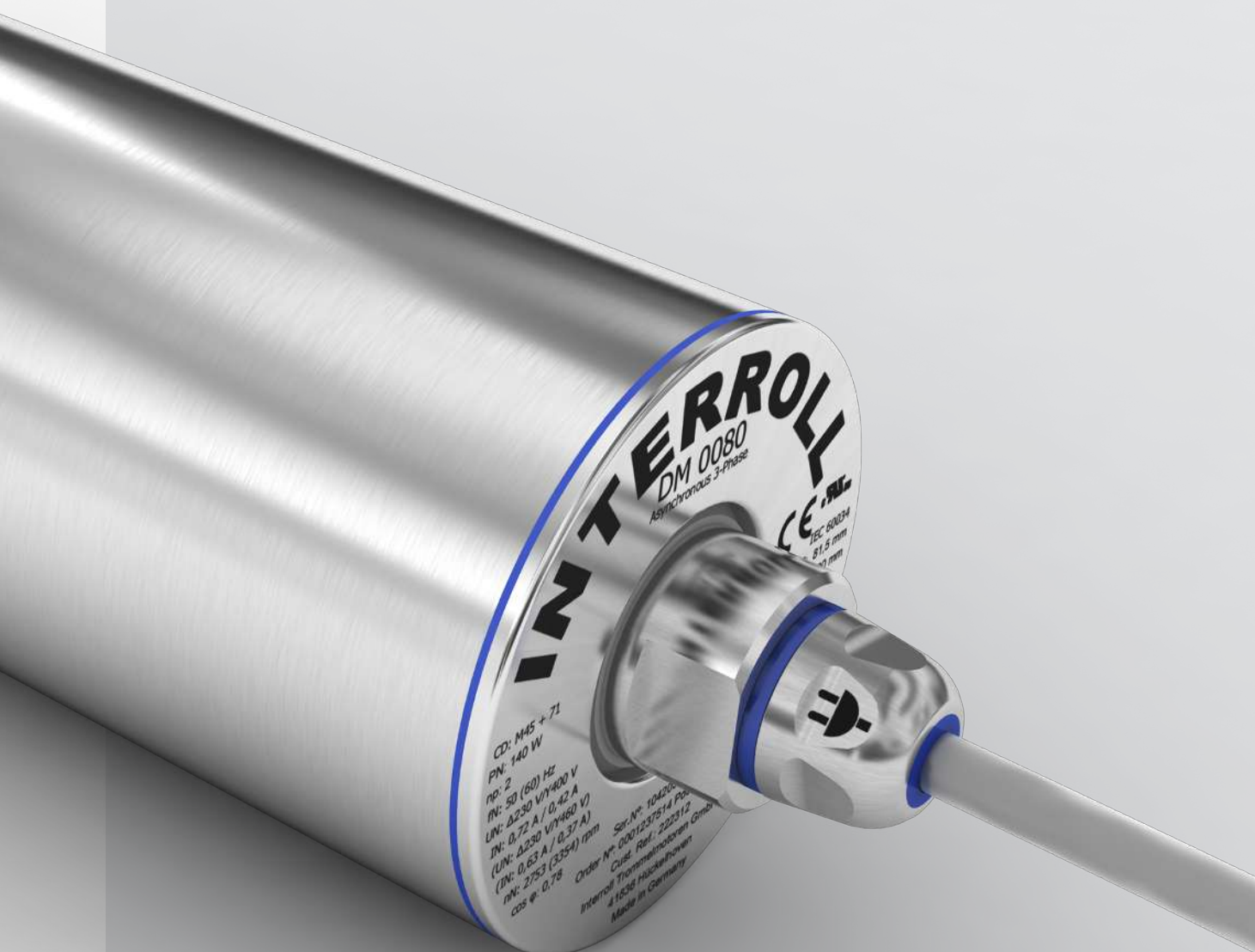


# CATALOG

## DRUM MOTOR

### DM SERIES



PRODUCT OVERVIEW



	DM 0080	DM 0080	DM 0080	DM 0080	DM 0080	DM 0113	DM 0113	DM 0113	DM 0138	DM 0165
Motor technology	Asynchronous	Asynchronous	Asynchronous	Asynchronous	Synchronous	Asynchronous	Asynchronous	Synchronous	Asynchronous	Asynchronous
No. phase	3-phase	3-phase	1-phase	1-phase		3-phase	1-phase		3-phase	3-phase
Diameter	81.5 mm	81.5 mm	81.5 mm	81.5 mm	81.5 mm	113.5 mm	113.5 mm	113.5 mm	138 mm	164 mm
Gear material	Steel	Technopolymer	Steel	Technopolymer	Steel	Steel	Steel	Steel	Steel	Steel
Rated power	40 – 140 W	40 – 75 W	25 – 110 W	25 – 110 W	145 – 425 W	160 – 550 W	250 W	300 – 1100 W	160 – 1000 W	370 - 2200 W
Rated torque	1.2 – 59.8 Nm	3.2 – 20.3 Nm	0.8 – 39.2 Nm	4.5 – 21.4 Nm	2.1 – 65 Nm	6.7 – 157 Nm	19.1 – 71.5 Nm	5.4 – 132.7 Nm	15.7 – 238.3 Nm	32.1 – 365.2 Nm
Max. belt pull	1467 N	498 N	961 N	525 N	1594 N	2767 N	1260 N	2339 N	3454 N	4453 N
Speed of the shell	0.03 – 2.5 m/s	0.07 – 0.87 m/s	0.05 – 2.49 m/s	0.05 – 0.9 m/s	0.08 – 2.72 m/s	0.05 – 1.86 m/s	0.18 – 0.67 m/s	0.16 – 2.97 m/s	0.04 – 2.29 m/s	0.08 – 2.53
Drum width (FW)	200 – 1200 mm	239 – 1200 mm	250 – 1200 mm	287 – 1200 mm	192 – 1200 mm	257 – 1400 mm	307 – 1400 mm	207 – 1400 mm	307 – 1600 mm	407 – 1750
Friction-driven belt	●	●	●	●	●	●	●	●	●	●
Positive driven belt	●	●	●	●	●	●	●	●	●	●
Without belt	●	–	–	–	●	●	–	●	●	●

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## Symbols



Drum motor



Idler pulley



Options



Accessories

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[www.interroll.com](http://www.interroll.com)

The Interroll Group is a globally leading supplier of high-quality key products and services for internal logistics. The company, which is listed on the stock exchange and has its headquarters in Switzerland, employs some 2300 people in 32 companies around the globe.

The solutions for our customers' daily logistical challenges are based on Interroll key products that are built on a worldwide common platform.



## Conveyor Rollers

Interroll is the worldwide leading provider of conveyor rollers that can be found in a multitude of applications in internal logistics. For the roller production, we merge quality, flexibility and speed. More than 13 million rollers in 60,000 variants leave our plants worldwide every year. Our production is always order-driven, even for the smallest order quantities and, if desired, even with a delivery time of 24 hours. Proven.



## Drives and Controls

Interroll is a leading manufacturer in the segment of DC motor rollers and drum motors.

Interroll RollerDrive and their controls are used in automated conveyor technology. Energy-efficient DC drives are installed in decentralized conveyor systems and, as a result, optimize energy demand and material handling. The bus interface enables integrating the zero pressure accumulation conveyor technology into Industry 4.0 systems.

Interroll Drum Motors are designed for use in belt conveyors and conveyor systems. These robust, high-quality belt drives enable the construction of maintenance-free, energy-efficient conveyor belt systems for the majority of industrial applications as well as for food processing, baggage handling and supermarket checkouts.

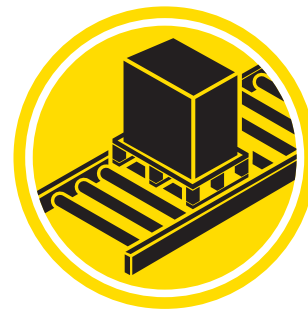


## Conveyors & Sorters

The Modular Conveyor Platform (MCP) from Interroll offers highest flexibility: a broad spectrum of modules, consisting of roller conveyors, belt conveyors as well as key products such as transfer, high-performance diverts or spiral lifts, covers all requirements of the material handling.

The Interroll crossbelt sorters were developed with an eye on precision for fast and precise sorting of goods of all types from 50 g to 35 kg. More than 300 Interroll sorters are used every day by the largest CEP players and E-commerce enterprises worldwide.

The brand-new modular pallet conveyor platform (MPP) offers roller and chain conveyors as well as special conveyors such as transfers and turntables to create a fully integrated, robust, space-saving and energy-saving solution for high throughput handling of pallets.



## Pallet & Carton Flow

Interroll Pallet Flow and Carton Flow are the first choice when it comes to rapid turnarounds and optimizing the storage and commissioning process. Thanks to its efficiency and robustness, Pallet Flow ensures long-term availability and more flexibility for peaks in orders. The compact design reduces space requirements by up to 50 percent compared to conventional solutions. The integrated TimePlus Separator as well as the Magnetic Speed Controller increase the safety of the work environment and significantly reduce the risk of damages to goods.

The Interroll Carton Flow solutions are efficient as well as ergonomic, and were developed to improve the commissioning output.

# THE HIGHLY EFFICIENT BELT DRIVE



## **Compact, robust and absolutely hygienic**

Since the drum motor is installed directly in the frame of the conveyor belt in a space-saving way, the transport capacity is maximized given the same base area. Positive side effect: Elegantly designed conveyor belts with evenly distributed weights. The installation or replacement of a drum motor is generally simple and quick using the plug-and-play principle, because only a few components have to be installed - thus saving time and money. In food processing, perfect hygiene and good cleaning options are especially important: This is where the drum motor scores big with its encapsulated design made of stainless steel.



## **Proven principle, efficient drive**

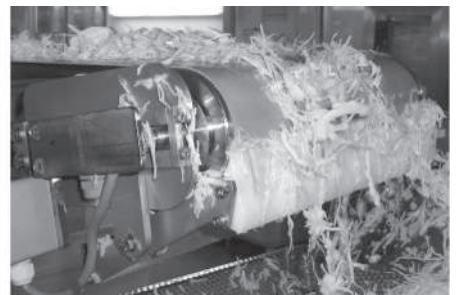
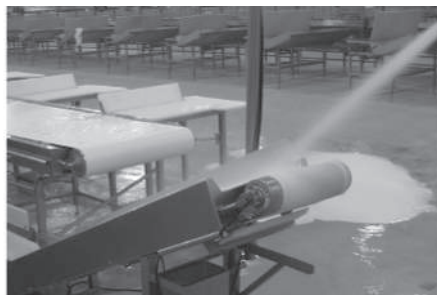
In principle, drum motors are energy-efficient because they directly drive the conveyor belt. In addition, they are practically maintenance-free and extremely wear-resistant, thereby significantly reducing the operating costs of the conveyor system and the risk of standstills or breakdowns. By the way: High-quality sealing systems ensure that a drum motor will also run reliably in aggressive environments.

The Interroll synchronous drum motors have a very low power loss of only 9 %. The planetary gear box made of steel transfers 92 – 95 % of the power directly to the conveyor. They are especially suited to applications where a high-torque, dynamic drive, a wide speed range, or high duty cycles are necessary.



## **All-rounder with a broad application range**

Drum motor applications are varied: When used in friction-driven belts, the motor is cooled directly via the belt tensioned over the drum shell. Modular plastic belts are not tensioned; in this case, the drive is form-fit via sprockets or a profile lagging. Solid homogeneous belts are also positive driven, whereby a profile on the underside of the belt engages in a drum profile made of hygienically certified PU. But it also works entirely without a belt and the drum motor transports the material directly.



## Practice-oriented, scalable, and thought out in detail

The new drum motor platform from Interroll combines the different motor concepts in a single design and makes it easy for customers to build their own and completely individual conveyor system. Since all motors have the same shafts, the number of different parts from the original equipment manufacturer is reduced and conveyor construction is significantly easier. The broad speed spectrum covers all imaginable applications. The clever plug-and-play solution makes installation easier. Each motor is approved, tested, and modularized so that it can be produced and delivered around the world in the shortest amount of time. Also available as oil-free variants!

## Flexibility and robustness make the difference



### More performance, more configurability

The broad range of services for the motors covers all conceivable uses in the food industry, intralogistics and manufacturing. All motors are optimized for their application, giving planning personnel the freedom to choose between synchronous and asynchronous designs.



### More hygienic

All Interroll Drum Motors of the new generation meet the highest standards of hygiene according to IP69k. This gives users the assurance that the cleaning process meets the highest standard.



### Lower costs, more service

The clever plug-and-play wiring solution and simple installation, assembly and maintenance ensure noticeable savings in time and costs, as well as reduced downtimes of the conveyor system. Replacement parts available worldwide through Interroll and service partners make repairs easy and offer a faster, better service.



### RFID Chip

At Interroll we constantly strive to improve our solutions to help you stay on top of your game. Digitalization and connected products are the way forward in material handling. That's why we integrated an RFID chip in our Drum Motors. This will allow you to identify the specific type of drive and its features, making your life a lot easier when it comes to fine-tuning your system, as well as maintenance and spare parts management. No more time wasted in finding serial numbers, digging up documentation and sending emails to ask for specs. You'll have all the info you need at your fingertips with one single scan.



### Tested quality, innovative technology

All motor components are standardized, tested, and approved in elaborate testing. Modularized motor types have been developed for all current applications; they are quickly available and contribute to minimizing costs.



### Fewer breakdowns

A stable planetary gear train is enough for a high torque in all motors, holds up against bending, and resists overloads and impact loads. The result is safer, more reliable operation.



### More stability

The strong 30 mm shaft and the larger ball bearings on Interroll's new drum motors allow significantly higher belt tensions. It provides a safety net even in cases of a defective belt tracking or overtensioned conveyor belts.



# DRUM MOTOR

## DM 0080



Practice-oriented, scalable and thought out in detail: The new drum motor DM 0080 makes it easy to build a completely individual conveyor system and is dimensioned for the higher requirements for permissible belt tension from industry and belt manufacturers.

With a broader speed spectrum, the DM 0080 covers all possible applications. The clever plug-and-play connection significantly simplifies the installation. Each motor is approved, tested, and modularized so that it can be produced and delivered around the world in the shortest amount of time.

The modular design of the DM 0080 allows a free combination of individual module groups, such as shaft, end cover, shell, steel or technopolymer gear, asynchronous or synchronous motor winding, to perfectly meet the requirements of an application. In addition, various options, such as encoder, brake, backstop, rubber laggings, etc., as well as different accessories are available.

With the platform concept of the DM 0080, it is possible to cover all internal logistics applications in the food processing sector, as well as in industry, distribution and airports.

The DM 0080 synchronous drum motor is also offered as oil-free variant. It is ideal for highly dynamic applications, conveyor systems in food processing, SmartBelt conveyors and many belt conveyors with servo driver.





### Technical data

	Asynchronous squirrel cage motor	AC synchronous permanent magnet motor
Insulation class of motor windings	Class F, IEC 34 (VDE 0530)	Class F, IEC 34 (VDE 0530)
Voltage	230/400 V $\pm 5\%$ (IEC 34/38) Most of the common international voltages and frequencies are available upon request	230 or 400 V
Frequency	50 Hz	200 Hz
Shaft seal, internal	NBR	NBR
Protection rate Motor*	IP69K	IP69K
Thermal protection	Bi-metal switch	Bi-metal switch
Operating mode	S1	S1
Ambient temperature, 3-phase motor	+2 to +40 °C Low temperature ranges on request	+2 to +40 °C Low temperature ranges on request
Ambient temperature, 3-phase motor for applications with positive driven belts or no belt	+2 to +25 °C	+2 to +40 °C

\* The protection rate of the cable connector may deviate.

### Design variants and accessories

Lagging	Lagging for friction drive belts Lagging for modular plastic belts Lagging for positive drive solid homogeneous belts
Sprockets	Sprockets only on request
Options	Backstop Electromagnetic holding brake and rectifier* Encoder* Balancing Plug connection
Oils	Food-grade oils (EU, FDA) Synchronous motors also available as oil-free variants
Certificate	cULus safety certificates
Accessories	Idler pulleys; conveyor rollers; mounting brackets; cables; inverters

A combination of encoder and safety holding brake is not possible. In addition, the use of a backstop with a synchronous motor is technically not meaningful.

\* Depending on the output and speed, the motor extends by 50–70 mm.

# DRUM MOTOR

## DM 0080

### Material variants

The following components can be selected for the drum motor and the electrical connection. The combination of components depends on the material used.

Component	Version	Aluminum	Mild steel	Stainless steel	Brass/nickel	Technopolymer
Shell	Crowned		●	●		
	Cylindrical		●	●		
	Cylindrical + key for sprockets		●	●		
End housing	Standard	●		●		
Shaft	Standard			●		
	Cross-drilled thread			●		
Gear boxes	Planetary gear box		●			●
Electrical connector	Straight connector			●	●	●
	Straight hygienic connector			●		
	Elbow connector			●		●
	Terminal box	●		●		●
	Straight plug connection			●		
	90° plug connection			●		
	90° hygienic connector			●		
Motor winding	Asynchronous motor					
	Synchronous motor					
External seal	PTFE					

### Motor variants

#### Mechanical data for synchronous motors with steel gear

$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$M_{MAX}/M_A$	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
145	8	3	164.23	0.078	18.3	65.0	1595	1.4	211	204
145	8	3	119.83	0.11	25.0	47.4	1164	2.1	211	204
145	8	3	103.89	0.12	28.9	41.1	1009	2.5	211	204
145	8	3	85.34	0.15	35.2	33.8	829	3.0	211	204
145	8	2	62.7	0.20	47.8	26.0	637	2.2	192	185
145	8	2	53.63	0.24	55.9	22.2	545	2.5	192	185
145	8	2	42.28	0.30	71.0	17.5	430	3.0	192	185
145	8	2	38.5	0.33	77.9	15.9	392	3.0	192	185
145	8	2	31.35	0.41	95.7	13.0	319	3.0	192	185
145	8	2	26.94	0.48	111.4	11.2	274	3.0	192	185
145	8	2	20.27	0.63	148.0	8.4	206	3.0	192	185
145	8	2	14.44	0.89	207.8	6.0	147	3.0	192	185
145	8	2	11.23	1.14	267.1	4.6	115	3.0	192	185
145	8	1	8.25	1.55	363.6	3.6	89	3.0	192	185
145	8	1	4.71	2.72	636.9	2.1	51	3.0	192	185
298	8	2	53.63	0.24	55.9	45.9	1126	1.2	222	215
298	8	2	42.28	0.30	71.0	36.1	888	1.5	222	215
298	8	2	38.5	0.33	77.9	32.9	808	1.6	222	215
298	8	2	31.35	0.41	95.7	26.8	658	3.0	222	215
298	8	2	26.94	0.48	111.4	23.0	566	3.0	222	215
298	8	2	20.27	0.63	148.0	17.3	426	3.0	222	215
298	8	2	14.44	0.89	207.8	12.3	303	3.0	222	215
298	8	2	11.23	1.14	267.1	9.6	236	3.0	222	215
298	8	1	8.25	1.55	363.6	7.4	183	3.0	222	215
298	8	1	4.71	2.72	636.9	4.3	105	3.0	222	215

# DRUM MOTOR

## DM 0080



$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$M_{MAX}/M_A$	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
425	8	2	38.5	0.33	77.9	46.8	1148	1.2	252	245
425	8	2	31.35	0.41	95.7	38.1	935	2.6	252	245
425	8	2	26.94	0.48	111.4	32.7	804	3.0	252	245
425	8	2	20.27	0.63	148.0	24.6	605	3.0	252	245
425	8	2	14.44	0.89	207.8	17.5	431	3.0	252	245
425	8	2	11.23	1.14	267.1	13.6	335	3.0	252	245
425	8	1	8.25	1.55	363.6	10.6	260	2.5	252	245
425	8	1	4.71	2.72	636.9	6.0	149	3.0	252	245
700	8	2	38.5	0.5	116.9	51.6	1267	1.1	252	245
700	8	2	31.35	0.62	143.5	42.0	1032	2.3	252	245
700	8	2	26.94	0.72	167.0	36.1	887	2.7	252	245
700	8	2	20.27	0.95	222.0	27.2	667	3.0	252	245
700	8	2	14.44	1.33	311.6	19.4	475	3.0	252	245
700	8	2	11.23	1.71	400.7	15.1	370	3.0	252	245
700	8	1	8.25	2.33	545.5	11.7	287	2.3	252	245

$P_N$  = Rated power  
 np = Number of poles  
 gs = Gear stages  
 i = Speed ratio  
 v = Speed  
 $n_A$  = Shell rated speed

$M_A$  = Drum motor rated torque  
 $F_N$  = Drum motor rated belt pull  
 $M_{MAX}/M_A$  = Ratio of max. acceleration torque to rated torque  
 $FW_{MIN}$  = Minimum drum width  
 $SL_{MIN}$  = Minimum shell length

### Mechanical data for synchronous motors with oil-free steel gear

P <sub>N</sub> [W]	np	gs	i	v [m/s]	n <sub>A</sub> [min <sup>-1</sup> ]	M <sub>A</sub> [Nm]	F <sub>N</sub> [N]	M <sub>MAX</sub> /M <sub>A</sub>	FW <sub>MIN</sub> [mm]	SL <sub>MIN</sub> [mm]
80	8	2	62.7	0.204	47.8	14.1	346.2	3.0	192	185
80	8	2	53.63	0.239	55.9	12.1	296.1	3.0	192	185
80	8	2	42.28	0.303	71.0	9.5	233.4	3.0	192	185
80	8	2	38.5	0.333	77.9	8.7	212.6	3.0	192	185
80	8	2	31.35	0.408	95.7	7.1	173.1	3.0	192	185
80	8	2	26.94	0.475	111.4	6.1	148.7	3.0	192	185
80	8	2	20.97	0.632	148.0	4.6	111.9	3.0	192	185
80	8	2	14.44	0.887	207.8	3.2	79.7	3.0	192	185
80	8	2	11.23	1.140	267.1	2.5	62.0	3.0	192	185
80	8	1	8.25	1.552	363.6	2.0	48.1	3.0	192	185
80	8	1	4.71	2.718	636.9	1.1	27.5	3.0	192	185
110	8	2	53.63	0.239	55.9	16.9	414.6	3.0	222	215
110	8	2	42.28	0.303	71.0	13.3	326.8	3.0	222	215
110	8	2	38.5	0.333	77.9	12.1	297.6	3.0	222	215
110	8	2	31.35	0.408	95.7	9.9	242.3	3.0	222	215
110	8	2	26.94	0.475	111.4	8.5	208.2	3.0	222	215
110	8	2	20.27	0.632	148.0	6.4	156.7	3.0	222	215
110	8	2	14.44	0.887	207.8	4.5	111.6	3.0	222	215
110	8	2	11.23	1.140	267.1	3.5	86.8	3.0	222	215
110	8	1	8.25	1.552	363.6	2.7	67.3	3.0	222	215
110	8	1	4.71	2.718	636.9	1.6	38.4	3.0	222	215
180	8	2	38.5	0.333	77.9	19.8	484.7	2.7	252	245
180	8	2	31.35	0.408	95.7	16.1	394.7	3.0	252	245
180	8	2	26.94	0.475	111.4	13.8	339.1	3.0	252	245
180	8	2	20.27	0.632	148.0	10.4	255.2	3.0	252	245
180	8	2	14.44	0.887	207.8	7.4	181.8	3.0	252	245
180	8	2	11.23	1.140	267.1	5.8	141.4	3.0	252	245
180	8	1	8.25	1.552	363.6	4.5	109.6	3.0	252	245
180	8	1	4.71	2.718	636.9	2.6	62.6	3.0	252	245

# DRUM MOTOR

## DM 0080



$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$M_{MAX}/M_A$	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
450	8	2	38.5	0.499	116.9	32.9	807.8	1.6	252	245
450	8	2	31.35	0.613	143.5	26.8	657.8	3.0	252	245
450	8	2	26.94	0.713	167.0	23.0	565.2	3.0	252	245
450	8	2	20.27	0.947	222.0	17.3	425.3	3.0	252	245
450	8	2	14.44	1.330	311.6	12.3	303.0	3.0	252	245
450	8	2	11.23	1.710	400.7	9.6	235.6	3.0	252	245
450	8	1	8.25	2.328	545.5	7.4	182.7	3.0	252	245

$P_N$	= Rated power	$M_A$	= Drum motor rated torque
np	= Number of poles	$F_N$	= Drum motor rated belt pull
gs	= Gear stages	$M_{MAX}/M_A$	= Ratio of max. acceleration torque to rated torque
i	= Speed ratio	$FW_{MIN}$	= Minimum drum width
v	= Speed	$SL_{MIN}$	= Minimum shell length
$n_A$	= Shell rated speed		

### Electrical data for synchronous motors

$P_N$ [W]	np	$U_N$ [V]	$I_N$ [A]	$I_0$ [A]	$I_{MAX}$ [A]	$f_N$ [Hz]	$\eta$	$n_N$ [1/min]	$J_R$ [kgcm <sup>2</sup> ]	$M_N$ [Nm]	$M_0$ [Nm]	$M_{MAX}$ [Nm]	$R_M$ [Ω]	$L_{SD}$ [mH]	$L_{SQ}$ [mH]	$k_e$ [V/krpm]	$T_e$ [ms]	$k_{TN}$ [Nm/A]	$U_{SH}$ [V]
145	8	230	0.81	0.81	2.43	200	0.85	3000	0.14	0.46	0.46	1.38	21.6	45.60	53.70	41.57	4.97	0.57	25
145	8	400	0.47	0.47	1.41	200	0.83	3000	0.14	0.46	0.46	1.38	62.5	130.7	138.0	72.23	4.41	0.98	36
298	8	230	1.30	1.30	3.90	200	0.86	3000	0.28	0.95	0.95	2.85	10.2	27.80	29.30	47.46	5.75	0.73	19
298	8	400	0.78	0.78	2.34	200	0.87	3000	0.28	0.95	0.95	2.85	29.1	81.90	94.10	83.09	6.48	1.22	32
425	8	230	2.30	2.30	6.90	200	0.87	3000	0.42	1.35	1.35	4.05	5.66	16.26	19.42	45.81	6.86	0.59	19
425	8	400	1.32	1.32	3.96	200	0.86	3000	0.42	1.35	1.35	4.05	17.6	49.80	59.00	80.80	6.70	1.02	33
700	8	400	2.52	2.52	6.78	300	0.87	4500	0.42	1.49	1.49	4.0	5.66	16.26	19.42	45.81	6.86	0.59	21.4

$P_N$	= Rated power	$M_N$	= Rated torque of rotor
np	= Number of poles	$M_0$	= Standstill torque
$U_N$	= Rated voltage	$M_{MAX}$	= Maximum torque
$I_N$	= Rated current	$R_M$	= Phase to phase resistance
$I_0$	= Standstill current	$L_{SD}$	= d-axis inductance
$I_{MAX}$	= Maximum current	$L_{SQ}$	= q-axis inductance
$f_N$	= Rated frequency	$k_e$	= EMF (mutual induction voltage constant)
$\eta$	= Efficiency	$T_e$	= Electrical time constant
$n_N$	= Rated torque of rotor	$k_{TN}$	= Torque constant
$J_R$	= Rotor moment of inertia	$U_{SH}$	= Heating voltage

### Electrical data for oil-free synchronous motors

P <sub>N</sub> [W]	np	U <sub>N</sub> [V]	I <sub>N</sub> [A]	I <sub>0</sub> [A]	I <sub>MAX</sub> [A]	f <sub>N</sub> [Hz]	η	n <sub>N</sub> [1/min]	J <sub>R</sub> [kgcm <sup>2</sup> ]	M <sub>N</sub> [Nm]	M <sub>0</sub> [Nm]	M <sub>MAX</sub> [Nm]	R <sub>M20</sub> [Ω]	R <sub>M75</sub> [Ω]	L <sub>SD</sub> [mH]	L <sub>SQ</sub> [mH]	k <sub>e</sub> [V/krpm]	T <sub>e</sub> [ms]	k <sub>TN</sub> [Nm/A]	U <sub>L</sub> [V DC]
80	8	230	0.45	0.45	1.34	200	0.85	3000	0.14	0.25	0.25	0.76	21.62	26.26	45.60	53.70	41.57	4.97	0.57	325
80	8	400	0.26	0.26	0.78	200	0.83	3000	0.14	0.25	0.25	0.76	62.54	75.95	130.70	138.0	72.23	4.41	0.98	560
110	8	230	0.48	0.48	1.44	200	0.86	3000	0.28	0.35	0.35	1.05	10.20	12.39	27.80	29.30	47.46	5.75	0.73	325
110	8	400	0.29	0.29	0.86	200	0.87	3000	0.28	0.35	0.35	1.05	29.06	35.29	81.90	94.10	83.09	6.48	1.22	560
180	8	230	1.97	0.97	2.91	200	0.87	3000	0.42	0.57	0.57	1.72	5.66	6.87	16.26	19.42	45.81	6.86	0.59	325
180	8	400	0.56	0.56	1.69	200	0.86	3000	0.42	0.57	0.57	1.72	17.60	21.38	49.80	59.0	80.80	6.70	1.02	560
450	8	400	1.62	1.62	4.86	300	0.87	4500	0.42	0.95	0.95	2.86	5.66	6.87	16.26	19.42	45.81	6.86	0.59	560

P <sub>N</sub>	= Rated power	M <sub>0</sub>	= Standstill torque
np	= Number of poles	M <sub>MAX</sub>	= Maximum torque
U <sub>N</sub>	= Rated voltage	R <sub>M20</sub>	= Phase-to-phase resistance at 20 °C
I <sub>N</sub>	= Rated current	R <sub>M75</sub>	= Phase-to-phase resistance at 75 °C
I <sub>0</sub>	= Standstill current	L <sub>SD</sub>	= d-axis inductance
I <sub>MAX</sub>	= Maximum current	L <sub>SQ</sub>	= q-axis inductance
f <sub>N</sub>	= Rated frequency	k <sub>e</sub>	= EMF (mutual induction voltage constant)
η	= Efficiency	T <sub>e</sub>	= Electrical time constant
n <sub>N</sub>	= Rated torque of rotor	k <sub>TN</sub>	= Torque constant
J <sub>R</sub>	= Rotor moment of inertia	U <sub>L</sub>	= Intermediate circuit voltage
M <sub>N</sub>	= Rated torque of rotor		

# DRUM MOTOR

## DM 0080



### Mechanical data for 3-phase asynchronous motor with steel gear

$P_N$ [W]	$n_p$	$g_s$	$i$	$v$ [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
40	4	3	164.23	0.03	7.8	42.4	1040	219	212
40	4	3	119.83	0.05	10.7	30.9	759	219	212
40	4	3	103.89	0.05	12.3	26.8	658	219	212
40	4	3	85.34	0.06	15.0	22.0	541	219	212
40	4	2	62.70	0.09	20.4	16.9	416	200	193
40	4	2	53.63	0.10	23.8	14.5	356	200	193
40	4	2	42.28	0.13	30.2	11.4	281	200	193
40	4	2	38.50	0.14	33.2	10.4	256	200	193
40	4	2	31.35	0.17	40.8	8.5	208	200	193
40	4	2	26.94	0.20	47.4	7.3	179	200	193
40	4	2	20.27	0.27	63.0	5.5	135	200	193
75	2	3	164.23	0.07	16.2	38.1	936	219	212
75	2	3	119.83	0.10	22.2	27.8	683	219	212
75	2	3	103.89	0.11	25.6	24.1	592	219	212
75	2	3	85.34	0.13	31.2	19.8	486	219	212
75	2	2	62.70	0.18	42.4	15.2	374	200	193
75	2	2	53.63	0.21	49.6	13.0	320	200	193
75	2	2	42.28	0.27	62.9	10.3	252	200	193
75	2	2	38.50	0.30	69.1	9.4	230	200	193
75	2	2	31.35	0.36	84.8	7.6	187	200	193
75	2	2	26.94	0.42	98.7	6.5	161	200	193
75	2	2	20.27	0.56	131.2	4.9	121	200	193
75	2	2	14.44	0.79	184.1	3.5	86	200	193
75	2	2	11.23	1.01	236.8	2.7	67	200	193
80	4	3	119.83	0.05	10.9	59.8	1467	269	262
80	4	3	103.89	0.05	12.6	51.8	1272	269	262
80	4	3	85.34	0.07	15.3	42.6	1045	269	262
80	4	2	62.70	0.09	20.9	32.7	804	250	243
80	4	2	53.63	0.10	24.4	28.0	687	250	243
80	4	2	42.28	0.13	30.9	22.1	542	250	243
80	4	2	38.50	0.15	34.0	20.1	494	250	243
80	4	2	31.35	0.18	41.7	16.4	402	250	243



# DRUM MOTOR DM 0080

$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
80	4	2	26.94	0.21	48.6	14.1	345	250	243
80	4	2	20.27	0.28	64.5	10.6	260	250	243
80	4	2	14.44	0.39	90.6	7.5	185	250	243
80	4	2	11.23	0.50	116.5	5.9	144	250	243
80	4	1	8.25	0.68	158.5	4.5	112	250	243
80	4	1	4.71	1.18	277.7	2.6	64	250	243
140	2	3	119.83	0.10	23.0	50.5	1239	269	262
140	2	3	103.89	0.11	26.5	43.8	1074	269	262
140	2	3	85.34	0.14	32.3	36.0	883	269	262
140	2	2	62.70	0.19	43.9	27.7	679	250	243
140	2	2	53.63	0.22	51.3	23.7	580	250	243
140	2	2	42.28	0.28	65.1	18.6	458	250	243
140	2	2	38.50	0.31	71.5	17.0	417	250	243
140	2	2	31.35	0.38	87.8	13.8	339	250	243
140	2	2	26.94	0.44	102.2	11.9	292	250	243
140	2	2	20.27	0.58	135.8	8.9	219	250	243
140	2	2	14.44	0.81	190.7	6.4	156	250	243
140	2	2	11.23	1.05	245.1	5.0	122	250	243
140	2	1	8.25	1.42	333.7	3.8	94	250	243
140	2	1	4.71	2.49	584.5	2.2	54	250	243

$P_N$	= Rated power	$n_A$	= Shell rated speed
np	= Number of poles	$M_A$	= Drum motor rated torque
gs	= Gear stages	$F_N$	= Drum motor rated belt pull
i	= Speed ratio	$FW_{MIN}$	= Minimum drum width
v	= Speed	$SL_{MIN}$	= Minimum shell length

# DRUM MOTOR

## DM 0080

Mechanical data for 3-phase asynchronous motor with technopolymer gear

$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
40	4	3	78.55	0.07	16.3	20.3	498	239	232
40	4	3	71.56	0.08	17.9	18.5	454	239	232
40	4	3	63.51	0.09	20.1	16.4	403	239	232
40	4	3	52.92	0.10	24.1	13.7	336	239	232
40	4	3	48.79	0.11	26.2	12.6	309	239	232
40	4	3	43.3	0.13	29.5	11.2	275	239	232
40	4	2	19.2	0.28	66.6	5.2	128	239	232
40	4	2	16	0.34	79.9	4.3	106	239	232
40	4	2	13.09	0.42	97.6	3.5	87	239	232
75	2	3	78.55	0.14	33.9	18.2	448	239	232
75	2	3	71.56	0.16	37.2	16.6	408	239	232
75	2	3	63.51	0.18	41.9	14.7	362	239	232
75	2	3	52.92	0.21	50.2	12.3	302	239	232
75	2	3	48.79	0.23	54.5	11.3	278	239	232
75	2	3	43.3	0.26	61.4	10.1	247	239	232
75	2	2	19.2	0.59	138.5	4.7	114	239	232
75	2	2	16	0.71	166.2	3.9	95	239	232
75	2	2	13.09	0.87	203.1	3.2	78	239	232

$P_N$	= Rated power	$n_A$	= Shell rated speed
np	= Number of poles	$M_A$	= Drum motor rated torque
gs	= Gear stages	$F_N$	= Drum motor rated belt pull
i	= Speed ratio	$FW_{MIN}$	= Minimum drum width
v	= Speed	$SL_{MIN}$	= Minimum shell length

### Electrical data for 3-phase asynchronous motor

$P_N$ [W]	$n_p$	$n_N$ [min <sup>-1</sup> ]	$f_N$ [Hz]	$U_N$ [V]	$I_N$ [A]	$\cos\varphi$	$\eta$	$J_R$ [kgcm <sup>2</sup> ]	$I_s/I_N$	$M_s/M_N$	$M_p/M_N$	$M_B/M_N$	$M_N$ [Nm]	$R_M$ [Ω]	$U_{SH\Delta}$ [V]	$U_{SHY}$ [V]
40	4	1319	50	230	0.34	0.71	0.42	0.67	1.93	1.31	1.31	1.51	0.29	294.5	35.4	–
40	4	1319	50	400	0.20	0.71	0.42	0.67	1.93	1.31	1.31	1.51	0.29	294.5	–	61.4
75	2	2730	50	230	0.39	0.83	0.58	0.67	3.04	1.48	1.48	1.70	0.26	164.4	26.4	–
75	2	2730	50	400	0.22	0.83	0.58	0.67	3.04	1.48	1.48	1.70	0.26	164.4	–	45.8
80	4	1331	50	230	0.58	0.67	0.51	1.25	2.20	1.46	1.46	1.65	0.57	132.5	25.9	–
80	4	1331	50	400	0.34	0.67	0.51	1.25	2.20	1.46	1.46	1.65	0.57	132.5	–	44.8
140	2	2796	50	230	0.65	0.79	0.67	1.25	3.86	1.88	1.88	2.03	0.48	72.7	19.0	–
140	2	2796	50	400	0.38	0.79	0.67	1.25	3.86	1.88	1.88	2.03	0.48	72.7	–	32.9

$P_N$	= Rated power	$I_s/I_N$	= Ratio of startup current - rated current
$n_p$	= Number of poles	$M_s/M_N$	= Ratio of startup torque - rated torque
$n_N$	= Rated speed of rotor	$M_B/M_N$	= Ratio of pull-out torque - rated torque
$f_N$	= Rated frequency	$M_p/M_N$	= Ratio of pull-up torque - rated torque
$U_N$	= Rated voltage	$M_N$	= Rated torque of rotor
$I_N$	= Rated current	$R_M$	= Branch resistance
$\cos\varphi$	= Power factor	$U_{SH\Delta}$	= Heater voltage in delta connection
$\eta$	= Efficiency	$U_{SHY}$	= Heater voltage in star connection
$J_R$	= Rotor moment of inertia		

# DRUM MOTOR

## DM 0080

### Mechanical data for 1-phase asynchronous motor with steel gear

P <sub>N</sub> [W]	np	gs	i	v [m/s]	n <sub>A</sub> [1/min]	M <sub>A</sub> [Nm]	F <sub>N</sub> [N]	FW <sub>MIN</sub> [mm]	SL <sub>MIN</sub> [mm]
25	4	3	119.83	0.05	11.0	18.5	455	269	262
25	4	3	103.89	0.05	12.7	16.1	395	269	262
25	4	3	85.34	0.07	15.5	13.2	324	269	262
25	4	2	62.7	0.09	21.1	10.2	249	250	243
25	4	2	53.63	0.11	24.6	8.7	213	250	243
25	4	2	42.28	0.13	31.2	6.8	168	250	243
25	4	2	38.5	0.15	34.3	6.2	153	250	243
25	4	2	31.35	0.18	42.1	5.1	125	250	243
25	4	2	26.94	0.21	49.0	4.4	107	250	243
25	4	2	20.27	0.28	65.1	3.3	81	250	243
75	2	3	119.83	0.10	22.9	26.8	658	269	262
75	2	3	103.89	0.11	26.5	23.2	570	269	262
75	2	3	85.34	0.14	32.2	19.1	468	269	262
75	2	2	62.7	0.19	43.9	14.7	360	250	243
75	2	2	53.63	0.22	51.3	12.5	308	250	243
75	2	2	42.28	0.28	65.0	9.9	243	250	243
75	2	2	38.5	0.31	71.4	9.0	221	250	243
75	2	2	31.35	0.37	87.7	7.3	180	250	243
75	2	2	26.94	0.44	102.1	6.3	155	250	243
75	2	2	20.27	0.58	135.7	4.7	116	250	243
75	2	2	14.44	0.81	190.4	3.4	83	250	243
75	2	2	11.23	1.04	244.9	2.6	64	250	243

# DRUM MOTOR DM 0080

$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [1/min]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
85	2	3	119.83	0.10	22.9	30.9	759	269	262
85	2	3	103.89	0.11	26.5	26.8	658	269	262
85	2	3	85.34	0.14	32.2	22.0	540	269	262
85	2	2	62.7	0.19	43.9	16.9	415	250	243
85	2	2	53.63	0.22	51.3	14.5	355	250	243
85	2	2	42.28	0.28	65.0	11.4	280	250	243
85	2	2	38.5	0.31	71.4	10.4	255	250	243
85	2	2	31.35	0.37	87.7	8.5	208	250	243
85	2	2	26.94	0.44	102.1	7.3	178	250	243
85	2	2	20.27	0.58	135.7	5.5	134	250	243
85	2	2	14.44	0.81	190.4	3.9	96	250	243
85	2	2	11.23	1.04	244.9	3.0	74	250	243
110	2	3	119.83	0.10	23.0	39.2	961	269	262
110	2	3	103.89	0.11	26.5	34.0	833	269	262
110	2	3	85.34	0.14	32.2	27.9	684	269	262
110	2	2	62.7	0.19	43.9	21.4	526	250	243
110	2	2	53.63	0.22	51.3	18.3	450	250	243
110	2	2	42.28	0.28	65.0	14.5	355	250	243
110	2	2	38.5	0.31	71.4	13.2	323	250	243
110	2	2	31.35	0.37	87.7	10.7	263	250	243
110	2	2	26.94	0.44	102.1	9.2	226	250	243
110	2	2	20.27	0.58	135.7	6.9	170	250	243
110	2	2	14.44	0.81	190.5	4.9	121	250	243
110	2	2	11.23	1.05	244.9	3.8	94	250	243

$P_N$  = Rated power  
 np = Number of poles  
 gs = Gear stages  
 i = Speed ratio  
 v = Speed  
 $n_A$  = Shell rated speed

$M_A$  = Drum motor rated torque  
 $F_N$  = Drum motor rated belt pull  
 $M_{MAX}/M_A$  = Ratio of max. acceleration torque to rated torque  
 $FW_{MIN}$  = Minimum drum width  
 $SL_{MIN}$  = Minimum shell length

# DRUM MOTOR

## DM 0080

Mechanical data for 1-phase asynchronous motor with technopolymer gear

$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [1/min]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
25	4	3	115.2	0.05	11.5	17.8	436	287	280
25	4	3	96	0.06	13.8	14.8	364	287	280
25	4	3	78.55	0.07	16.8	12.1	297	287	280
25	4	3	71.56	0.08	18.4	11	271	287	280
75	2	3	96	0.12	28.6	21.4	525	287	280
75	2	3	78.55	0.15	35	17.5	430	287	280
75	2	3	71.56	0.16	38.4	16	391	287	280
75	2	3	63.51	0.19	43.3	14.2	347	287	280
85	2	3	78.55	0.15	35	20.2	496	287	280
85	2	3	71.56	0.16	38.4	18.4	452	287	280
85	2	3	63.51	0.19	43.3	16.3	401	287	280
110	2	3	63.51	0.19	43.3	20.7	508	287	280
110	2	3	52.92	0.22	52	17.2	423	287	280
110	2	3	48.79	0.24	56.4	15.9	390	287	280
110	2	3	43.3	0.27	63.5	14.1	346	287	280
110	2	2	19.2	0.61	143.2	6.6	162	287	280
110	2	2	16	0.73	171.9	5.5	135	287	280
110	2	2	13.09	0.90	210.1	4.5	110	287	280

$P_N$  = Rated power  
 np = Number of poles  
 gs = Gear stages  
 i = Speed ratio  
 v = Speed  
 $n_A$  = Shell rated speed

$M_A$  = Drum motor rated torque  
 $F_N$  = Drum motor rated belt pull  
 $M_{MAX}/M_A$  = Ratio of max. acceleration torque to rated torque  
 $FW_{MIN}$  = Minimum drum width  
 $SL_{MIN}$  = Minimum shell length

### Electrical data for 1-phase asynchronous motor

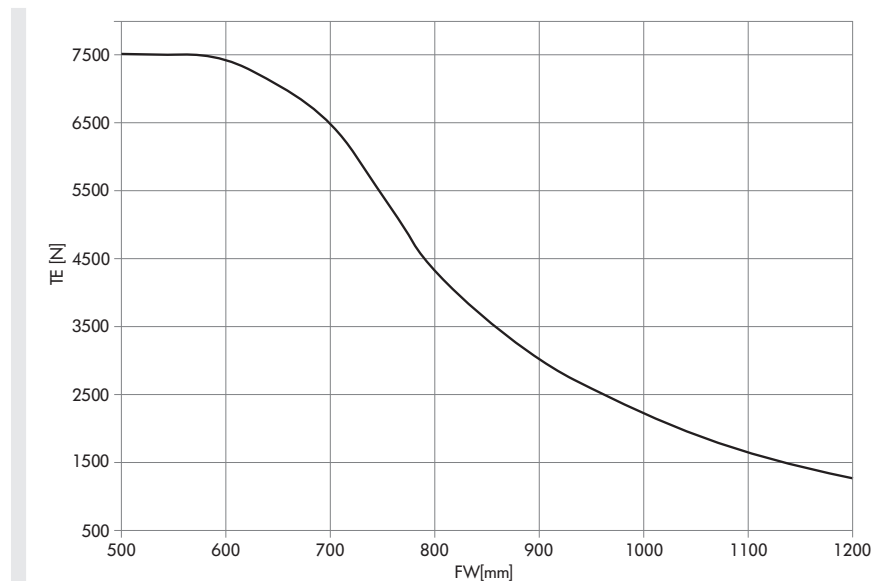
$P_N$ [W]	np	$U_N$ [V]	$I_N$ [A]	$\cos\varphi$	$\eta$	$J_R$ [kgcm <sup>2</sup> ]	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_P/M_N$	$R_M$ [Ω]	$U_{SH \sim}$ [V DC]	$C_R$ [μF]
25	4	230	0.39	1.00	0.28	1.2	2.2	1.11	1.37	1.11	150.0	44	3
50	2	230	0.54	1.00	0.4	0.9	3.1	0.94	1.71	0.94	82.0	33	3
75	2	230	0.68	1.00	0.48	1.0	3.2	0.74	1.37	0.74	66.0	34	4
85	2	230	0.73	0.98	0.53	1.3	5.2	0.93	1.6	0.93	52.0	28	6
110	2	230	0.94	1.00	0.51	1.2	2.0	0.73	1.15	0.73	51.0	36	8

$P_N$	= Rated power	$I_s/I_N$	= Ratio of startup current - rated current
np	= Number of poles	$M_s/M_N$	= Ratio of startup torque - rated torque
$U_N$	= Rated voltage	$M_B/M_N$	= Ratio of pull-out torque - rated torque
$I_N$	= Rated current	$M_P/M_N$	= Ratio of pull-up torque - rated torque
$\cos\varphi$	= Power factor	$R_M$	= Branch resistance
$\eta$	= Efficiency	$U_{SH \sim}$	= Heater voltage for DC units
$J_R$	= Rotor moment of inertia	$C_R$	= Capacitor size

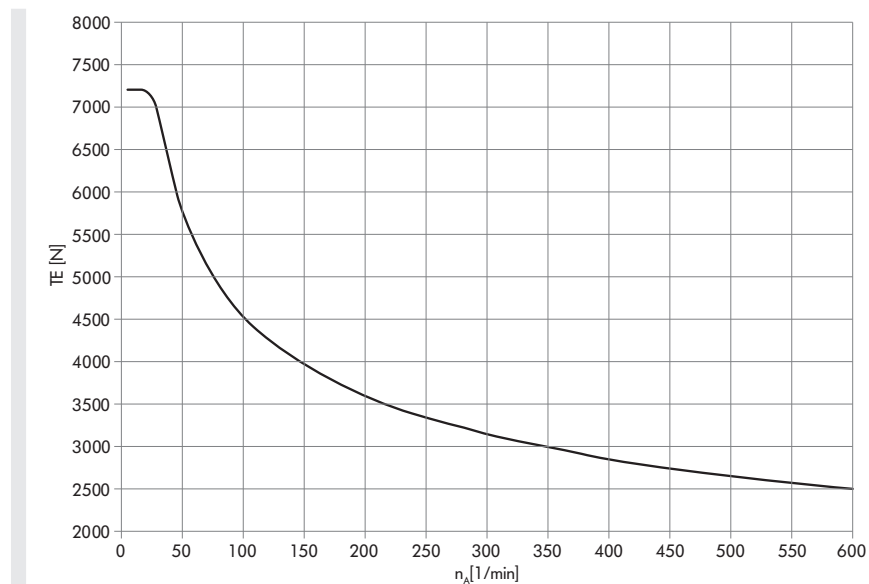
# DRUM MOTOR DM 0080

## Belt tension diagrams

### Belt tension depending on drum width



### Belt tension depending on rated speed of shell



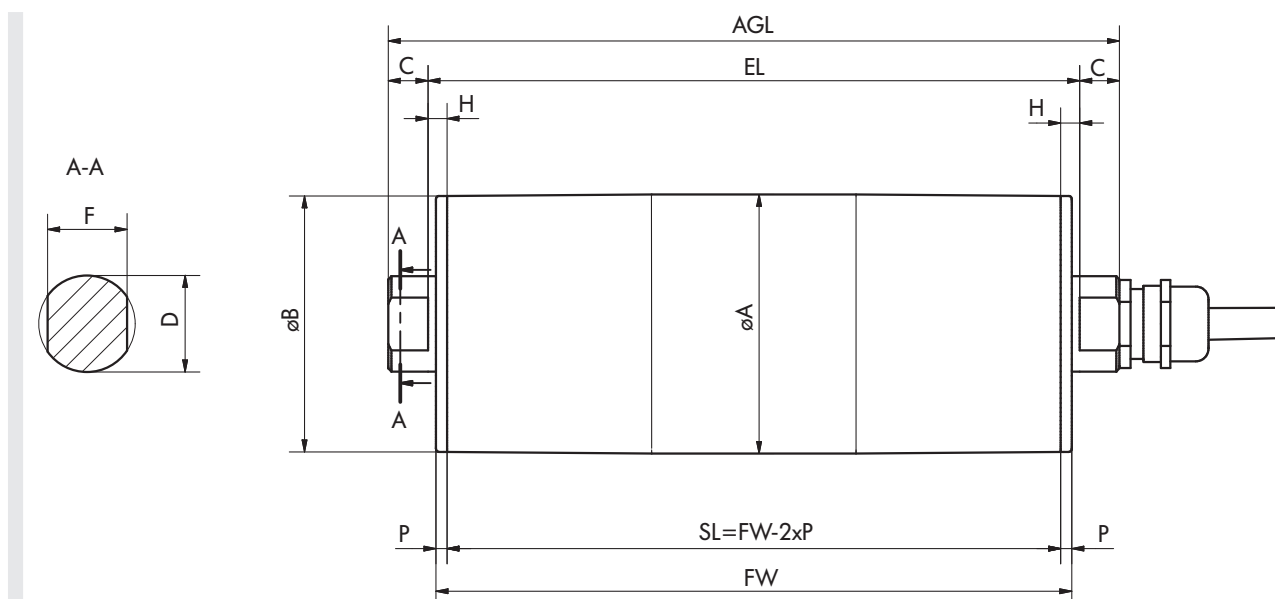
**Note:** The correct value for the maximum permissible belt tension is determined from the speed of the drum motor. When selecting the motor, also check whether the maximum permissible TE value fits the desired drum width (FW). The belt tension diagrams apply only to standard shafts.

TE = Belt tension  
 $n_A$  = Shell rated speed  
 FW = Drum width



## Dimensions

### Drum motor



Type	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	H [mm]	P [mm]	SL [mm]	EL [mm]	AGL [mm]
DM 0080 crowned	81.5	80.5	12.5	30	25	6	3.5	FW - 7	FW + 5	FW + 30
	81.5	80.5	12.5	25	20	6	3.5	FW - 7	FW + 5	FW + 30
	81.5	80.5	12.5	17	13.5	6	3.5	FW - 7	FW + 5	FW + 30
DM 0080 cylindrical	81	81	12.5	30	25	6	3.5	FW - 7	FW + 5	FW + 30
	81	81	12.5	25	20	6	3.5	FW - 7	FW + 5	FW + 30
	81	81	12.5	17	13.5	6	3.5	FW - 7	FW + 5	FW + 30
DM 0080 cylindrical + key	81.7	81.7	12.5	30	25	6	3.5	FW - 7	FW + 5	FW + 30
	81.7	81.7	12.5	25	20	6	3.5	FW - 7	FW + 5	FW + 30
	81.7	81.7	12.5	17	13.5	6	3.5	FW - 7	FW + 5	FW + 30

# DRUM MOTOR

## DM 0113



Practice-oriented, scalable and thought out in detail: The new drum motor DM 0113 makes it easy to build a completely individual conveyor system and is dimensioned for the higher requirements for permissible belt tension from industry and belt manufacturers.

With a broader speed spectrum, the DM 0113 covers all possible applications. The clever plug-and-play connection significantly simplifies the installation. Each motor is approved, tested, and modularized so that it can be produced and delivered around the world in the shortest amount of time.

The modular design of the DM 0113 allows a free combination of individual module groups, such as shaft, end cover, shell or steel gear, asynchronous or synchronous motor winding, to perfectly meet the requirements of an application. In addition, various options, such as encoder, brake, backstop, rubber laggings, etc., as well as different accessories are available.

With the platform concept of the DM 0113, it is possible to cover all internal logistics applications in the food processing sector, as well as in industry, distribution and airports.



### Technical data

	Asynchronous squirrel cage motor	AC synchronous permanent magnet motor
Insulation class of motor windings	Class F, IEC 34 (VDE 0530)	Class F, IEC 34 (VDE 0530)
Voltage	230/400 V $\pm 5\%$ (IEC 34/38) Most of the common international voltages and frequencies are available upon request	230 or 400 V
Frequency	50 Hz	150 Hz
Shaft seal, internal	NBR	NBR
Protection rate Motor*	IP69K	IP69K
Thermal protection	Bi-metal switch	Bi-metal switch
Operating mode	S1	S1
Ambient temperature, 3-phase motor	+2 to +40 °C Low temperature ranges on request	+2 to +40 °C Low temperature ranges on request
Ambient temperature, 3-phase motor for applications with positive driven belts or no belt	+2 to +25 °C	+2 to +40 °C

\* The protection rate of the cable connector may deviate.

### Design variants and accessories

Lagging	Lagging for friction drive belts Lagging for modular plastic belts Lagging for positive drive solid homogeneous belts
Sprockets	Sprockets only on request
Options	Backstop Electromagnetic holding brake and rectifier* Encoder* Balancing Plug connection
Oils	Food-grade oils (EU, FDA)
Certificate	cULus safety certificates
Accessories	Idler pulleys; conveyor rollers; mounting brackets; cables; inverters

A combination of encoder and safety holding brake is not possible. In addition, the use of a backstop with a synchronous motor is technically not meaningful.

\* Depending on the output and speed, the motor extends by 50–70 mm.

# DRUM MOTOR

## DM 0113



### Material variants

The following components can be selected for the drum motor and the electrical connection. The combination of components depends on the material used.

Component	Version	Aluminum	Mild steel	Stainless steel	Brass/nickel	Technopolymer
Shell	Crowned		●	●		
	Cylindrical		●	●		
	Cylindrical + key for sprockets		●	●		
End housing	Standard	●		●		
Shaft	Standard			●		
	Cross-drilled thread			●		
Gear boxes	Planetary gear box		●			
Electrical connector	Straight connector			●	●	●
	Straight hygienic connector			●		
	Elbow connector			●		●
	Terminal box	●		●		●
	Straight plug connection			●		
	90° plug connection			●		
	90° hygienic connector			●		
Motor winding	Asynchronous motor					
	Synchronous motor					
External seal	PTFE					

### Motor variants

#### Mechanical data for synchronous motors with steel gear

$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$M_{MAX}/M_A$	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
300	4	3	168	0.16	26.8	91.7	1616	1.5	227	220
300	4	3	120	0.22	37.5	65.5	1154	2.1	227	220
300	4	3	100	0.27	45.0	54.6	962	2.5	227	220
300	4	3	80	0.33	56.3	43.7	769	3	227	220
300	4	2	63	0.42	71.4	36.2	638	3	207	200
300	4	2	45	0.59	100	25.9	456	3	207	200
300	4	2	36	0.74	125	20.7	364	3	207	200
300	4	2	30	0.89	150	17.2	304	3	207	200
300	4	2	24	1.11	187.5	13.8	243	3	207	200
300	4	2	20	1.34	225	11.5	202	3	207	200
300	4	2	16	1.67	281.3	9.2	162	3	207	200
300	4	2	12	2.23	375	6.9	121	3	207	200
300	4	1	9	2.97	500	5.4	96	3	207	200
700	4	3	80	0.33	56.3	101.9	1795	1.3	257	250
700	4	2	63	0.42	71.4	84.5	1488	1.7	237	230
700	4	2	45	0.59	100	60.3	1063	2.4	237	230
700	4	2	36	0.74	125	48.3	850	3	237	230
700	4	2	30	0.89	150	40.2	709	3	237	230
700	4	2	24	1.11	187.5	32.2	567	3	237	230
700	4	2	20	1.34	225	26.8	472	3	237	230
700	4	2	16	1.67	281.3	21.4	378	3	237	230
700	4	2	12	2.23	375	16.1	283	3	237	230
700	4	1	9	2.97	500	12.7	224	3	237	230

# DRUM MOTOR

## DM 0113



$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$M_{MAX}/M_A$	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
1100	4	2	63	0.42	71.4	132.7	2339	1.1	267	260
1100	4	2	45	0.59	100	94.8	1670	1.5	267	260
1100	4	2	36	0.74	125	75.8	1336	1.9	267	260
1100	4	2	30	0.89	150	63.2	1114	2.3	267	260
1100	4	2	24	1.11	187.5	50.6	891	2.8	267	260
1100	4	2	20	1.34	225	42.1	742	3	267	260
1100	4	2	16	1.67	281.3	33.7	594	3	267	260
1100	4	2	12	2.23	375	25.3	445	3	267	260
1100	4	1	9	2.97	500	20.0	352	3	267	260

$P_N$	= Rated power	$M_A$	= Drum motor rated torque
np	= Number of poles	$F_N$	= Drum motor rated belt pull
gs	= Gear stages	$M_{MAX}/M_A$	= Ratio of max. acceleration torque to rated torque
i	= Speed ratio	$FW_{MIN}$	= Minimum drum width
v	= Speed	$SL_{MIN}$	= Minimum shell length
$n_A$	= Shell rated speed		

### Electrical data for synchronous motors

$P_N$ [W]	np	$U_N$ [V]	$I_N$ [A]	$I_0$ [A]	$I_{MAX}$ [A]	$f_N$ [Hz]	$\eta$	$n_N$ [1/min]	$J_R$ [kgcm <sup>2</sup> ]	$M_N$ [Nm]	$M_0$ [Nm]	$M_{MAX}$ [Nm]	$R_M$ [Ω]	$L_{SD}$ [mH]	$L_{SQ}$ [mH]	$k_e$ [V/krpm]	$T_e$ [ms]	$k_{TN}$ [Nm/A]	$U_{SH}$ [V]
300	4	230	1.3	1.3	3.9	150	0.88	4500	0.90	0.64	0.64	1.91	16.1	68.67	101.33	40.41	12.59	0.49	31
300	4	400	0.75	0.75	2.25	150	0.88	4500	0.90	0.64	0.64	1.91	48.3	206	304	69.99	12.59	0.85	54
700	4	230	2.91	2.91	8.73	150	0.91	4500	2.25	1.49	1.49	4.46	3.8	26.47	38.93	39.57	20.49	0.51	17
700	4	400	1.68	1.68	5.04	150	0.91	4500	2.25	1.49	1.49	4.46	11.4	79.40	116.8	68.54	20.49	0.88	29
1100	4	230	3.62	3.62	10.86	150	0.92	4500	3.60	2.33	2.33	7.0	2.37	19.27	28.40	42.77	24.00	0.64	13
1100	4	400	2.09	2.09	6.27	150	0.92	4500	3.60	2.33	2.33	7.0	7.1	57.80	85.20	74.08	24.00	1.12	22

$P_N$	= Rated power	$M_N$	= Rated torque of rotor
np	= Number of poles	$M_0$	= Standstill torque
$U_N$	= Rated voltage	$M_{MAX}$	= Maximum torque
$I_N$	= Rated current	$R_M$	= Phase to phase resistance
$I_0$	= Standstill current	$L_{SD}$	= d-axis inductance
$I_{MAX}$	= Maximum current	$L_{SQ}$	= q-axis inductance
$f_N$	= Rated frequency	$k_e$	= EMF (mutual induction voltage constant)
$\eta$	= Efficiency	$T_e$	= Electrical time constant
$n_N$	= Rated torque of rotor	$k_{TN}$	= Torque constant
$J_R$	= Rotor moment of inertia	$U_{SH}$	= Heating voltage

### Mechanical data for 3-phase asynchronous motor with steel gear

P <sub>N</sub> [W]	np	gs	i	v [m/s]	n <sub>A</sub> [min <sup>-1</sup> ]	M <sub>A</sub> [Nm]	F <sub>N</sub> [N]	FW <sub>MIN</sub> [mm]	SL <sub>MIN</sub> [mm]
160	4	3	168	0.05	8.3	157	2767	307	300
160	4	3	150	0.06	9.3	140.2	2470	307	300
160	4	3	120	0.07	11.6	112.1	1976	307	300
160	4	2	73.8	0.11	18.9	72.6	1279	257	250
160	4	2	63	0.13	22.2	62	1092	257	250
160	4	2	45	0.18	31	44.3	780	257	250
160	4	2	36	0.23	38.8	35.4	624	257	250
160	4	2	30	0.28	46.6	29.5	520	257	250
160	4	2	27	0.31	51.7	26.6	468	257	250
160	4	2	24	0.34	58.2	23.6	416	257	250
160	4	2	20	0.41	69.9	19.7	347	257	250
160	4	2	16	0.52	87.3	15.7	277	257	250
160	4	2	12	0.69	116.4	11.8	208	257	250
160	4	1	9	0.92	155.2	9.3	164	257	250
225	2	2	73.8	0.22	37.4	52	915	257	250
225	2	2	63	0.26	43.8	44.3	781	257	250
225	2	2	45	0.36	61.3	31.7	558	257	250
225	2	2	36	0.45	76.6	25.3	447	257	250
225	2	2	30	0.54	91.9	21.1	372	257	250
225	2	2	27	0.6	102.1	19	335	257	250
225	2	2	24	0.68	114.9	16.9	298	257	250
225	2	2	20	0.82	137.9	14.1	248	257	250
225	2	1	16	1.02	172.4	11.3	198	257	250
225	2	2	12	1.37	229.8	8.4	149	257	250
225	2	1	9	1.82	306.4	6.7	118	257	250

# DRUM MOTOR

## DM 0113



$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
370	4	2	63	0.13	22	145	2555	307	300
370	4	2	45	0.18	30.8	103.6	1825	307	300
370	4	2	36	0.23	38.6	82.8	1460	307	300
370	4	2	30	0.27	46.3	69	1217	307	300
370	4	2	27	0.3	51.4	62.1	1095	307	300
370	4	2	24	0.34	57.8	55.2	973	307	300
370	4	2	20	0.41	69.4	46	811	307	300
370	4	2	16	0.51	86.8	36.8	649	307	300
370	4	2	12	0.68	115.7	27.6	487	307	300
370	4	1	9	0.91	154.2	21.8	384	307	300
370	2	2	73.8	0.22	37.7	84.6	1491	307	300
370	2	2	63	0.26	44.1	72.2	1272	307	300
370	2	2	45	0.37	61.8	51.6	909	307	300
370	2	2	36	0.46	77.2	41.3	727	307	300
370	2	2	30	0.55	92.6	34.4	606	307	300
370	2	2	27	0.61	102.9	30.9	545	307	300
370	2	2	20	0.82	139	22.9	404	307	300
370	2	2	16	1.03	173.7	18.3	323	307	300
370	2	1	9	1.83	308.8	10.9	191	307	300
550	2	2	36	0.46	78.1	60.8	1071	317	310
550	2	2	30	0.55	93.8	50.6	892	317	310
550	2	2	27	0.62	104.2	45.6	803	317	310
550	2	2	24	0.69	117.2	40.5	714	317	310
550	2	2	20	0.83	140.7	33.8	595	317	310
550	2	2	16	1.04	175.8	27	476	317	310
550	2	2	12	1.39	234.4	20.3	357	317	310
550	2	1	9	1.86	312.6	16	282	317	310

$P_N$	= Rated power	$n_A$	= Shell rated speed
np	= Number of poles	$M_A$	= Drum motor rated torque
gs	= Gear stages	$F_N$	= Drum motor rated belt pull
i	= Speed ratio	$FW_{MIN}$	= Minimum drum width
v	= Speed	$SL_{MIN}$	= Minimum shell length



### Electrical data for 3-phase asynchronous motor

$P_N$ [W]	$n_p$	$n_N$ [min <sup>-1</sup> ]	$f_N$ [Hz]	$U_N$ [V]	$I_N$ [A]	$\cos\varphi$	$\eta$ [%]	$J_R$ [kgcm <sup>2</sup> ]	$I_s/I_N$	$M_s/M_N$	$M_p/M_N$	$M_B/M_N$	$M_N$ [Nm]	$R_M$ [Ω]	$U_{SH\Delta}$ [V]	$U_{SHY}$ [V]
160	4	1397	50	400	0.54	0.7	60.5	3.8	3.05	1.92	1.92	2.13	1.09	63.7		36.4
160	4	1397	50	230	0.94	0.7	60.5	3.8	3.05	1.92	1.92	2.13	1.09	63.7	20.9	
225	2	2758	50	400	0.56	0.86	67.8	2.5	4.32	2.57	2.57	2.62	0.78	39.3		28.1
225	2	2758	50	230	0.96	0.86	67.8	2.5	4.32	2.57	2.57	2.62	0.78	39.3	16.2	
370	4	1388	50	400	1.1	0.71	68.0	6.8	3.67	2.35	2.29	2.43	2.55	22.1		25.8
370	4	1388	50	230	1.9	0.71	68.0	6.8	3.67	2.35	2.29	2.43	2.55	22.1	14.9	
370	2	2779	50	400	0.82	0.87	74.2	4.4	5.47	2.91	2.88	2.91	1.27	19.9		21.3
370	2	2779	50	230	1.42	0.87	74.2	4.4	5.47	2.91	2.88	2.91	1.27	19.9	12.3	
550	2	2813	50	400	1.23	0.85	76.5	5.4	5.77	3.27	3.15	3.27	1.87	11.6		18.1
550	2	2813	50	230	2.13	0.85	76.5	5.4	5.77	3.27	3.15	3.27	1.87	11.6	10.5	

$P_N$	= Rated power	$I_s/I_N$	= Ratio of startup current - rated current
$n_p$	= Number of poles	$M_s/M_N$	= Ratio of startup torque - rated torque
$n_N$	= Rated speed of rotor	$M_B/M_N$	= Ratio of pull-out torque - rated torque
$f_N$	= Rated frequency	$M_p/M_N$	= Ratio of pull-up torque - rated torque
$U_N$	= Rated voltage	$M_N$	= Rated torque of rotor
$I_N$	= Rated current	$R_M$	= Branch resistance
$\cos\varphi$	= Power factor	$U_{SH\Delta}$	= Heater voltage in delta connection
$\eta$	= Efficiency	$U_{SHY}$	= Heater voltage in star connection
$J_R$	= Rotor moment of inertia		

# DRUM MOTOR

## DM 0113

### Mechanical data for 1-phase asynchronous motor with steel gear

$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [1/min]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
250	4	2	45	0.18	30.2	71.5	1265	307	300
250	4	2	36	0.22	37.8	57.2	1012	307	300
250	4	2	30	0.27	45.3	47.7	843	307	300
250	4	2	27	0.3	50.4	42.9	759	307	300
250	4	2	24	0.34	56.7	38.1	675	307	300
250	4	2	20	0.4	68	31.8	562	307	300
250	4	2	16	0.5	85	25.4	450	307	300
250	4	2	12	0.67	113.3	19.1	337	307	300

$P_N$	= Rated power	$M_A$	= Drum motor rated torque
np	= Number of poles	$F_N$	= Drum motor rated belt pull
gs	= Gear stages	$M_{MAX}/M_A$	= Ratio of max. acceleration torque to rated torque
i	= Speed ratio	$FW_{MIN}$	= Minimum drum width
v	= Speed	$SL_{MIN}$	= Minimum shell length
$n_A$	= Shell rated speed		

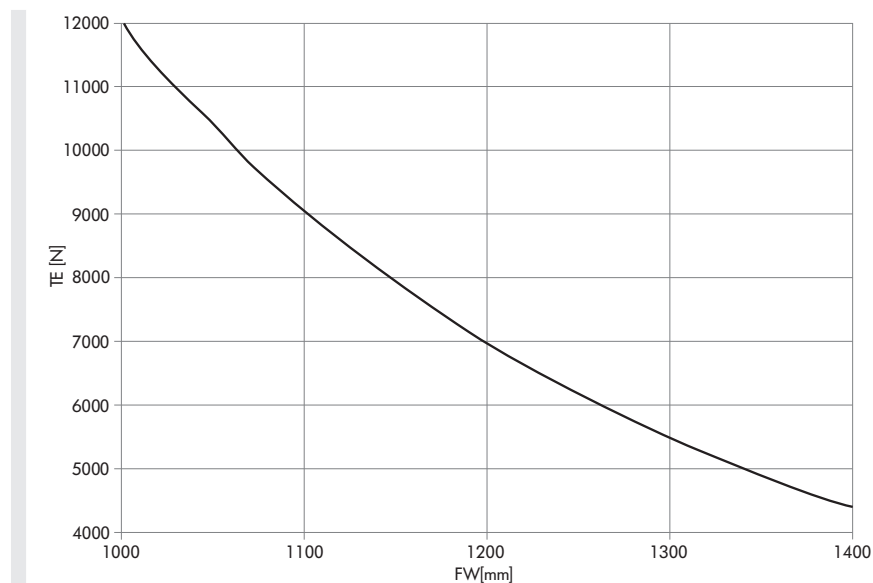
### Electrical data for 1-phase asynchronous motor

$P_N$ [W]	np	$U_N$ [V]	$I_N$ [A]	$\cos\varphi$	$\eta$ [%]	$J_R$ [kgcm <sup>2</sup> ]	$I_S/I_N$	$M_S/M_N$	$M_B/M_N$	$M_P/M_N$	$R_M$ [Ω]	$U_{SH \sim}$ [V DC]	$C_R$ [μF]
250	4	1360	2.4	0.97	0.5	7.2	1.25	1.1	1.1	1.1	12.7	44.3	12

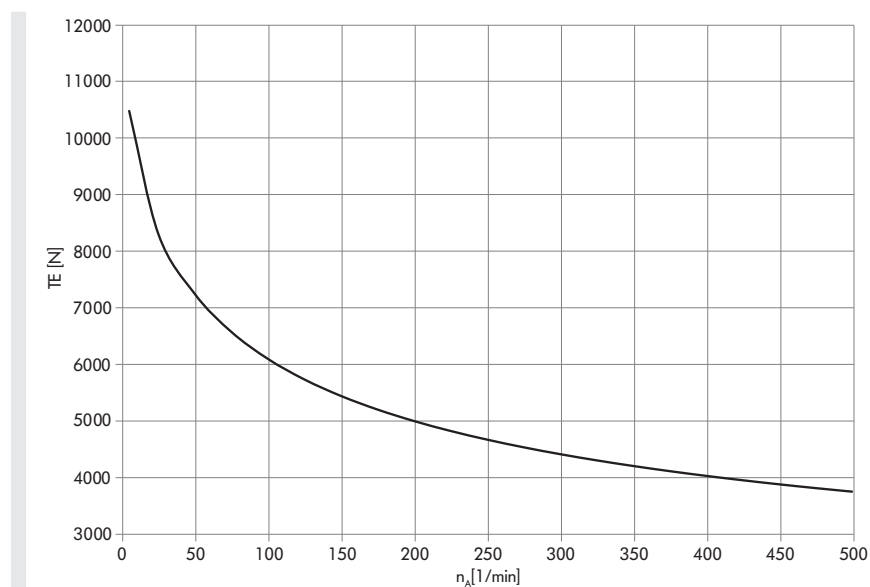
$P_N$	= Rated power	$I_S/I_N$	= Ratio of startup current - rated current
np	= Number of poles	$M_S/M_N$	= Ratio of startup torque - rated torque
$U_N$	= Rated voltage	$M_B/M_N$	= Ratio of pull-out torque - rated torque
$I_N$	= Rated current	$M_P/M_N$	= Ratio of pull-up torque - rated torque
$\cos\varphi$	= Power factor	$R_M$	= Branch resistance
$\eta$	= Efficiency	$U_{SH \sim}$	= Heater voltage for DC units
$J_R$	= Rotor moment of inertia	$C_R$	= Capacitor size

## Belt tension diagrams

### Belt tension depending on drum width



### Belt tension depending on rated speed of shell



**Note:** The correct value for the maximum permissible belt tension is determined from the speed of the drum motor. When selecting the motor, also check whether the maximum permissible TE value fits the desired drum width (FW). The belt tension diagrams apply only to standard shafts.

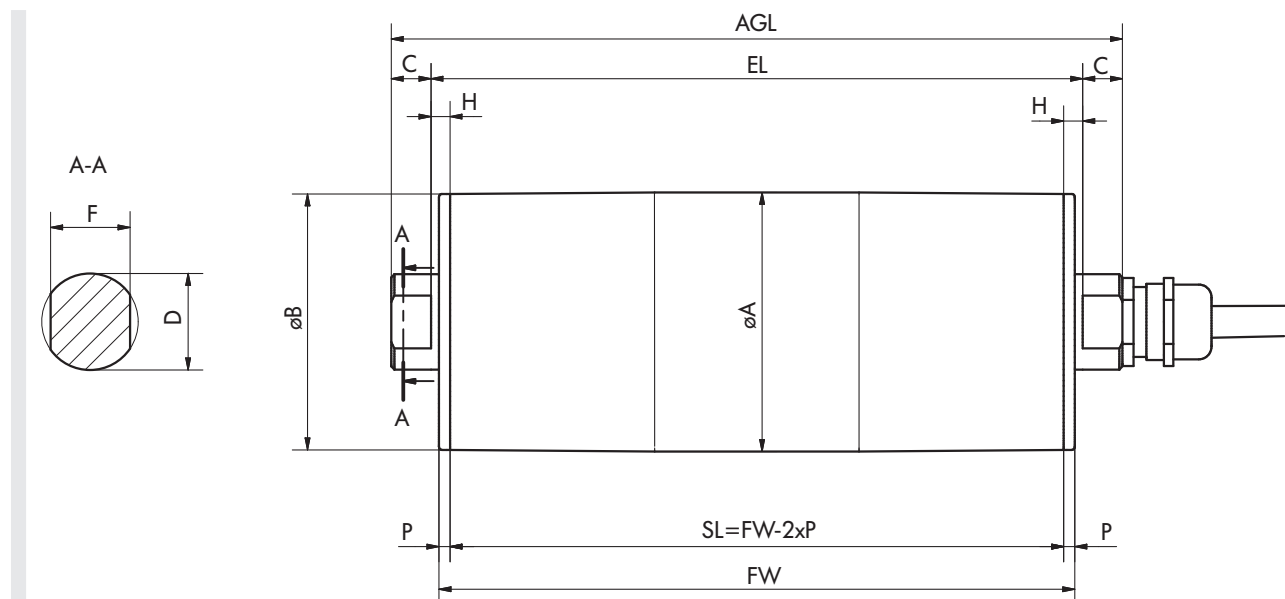
TE = Belt tension  
n<sub>A</sub> = Shell rated speed  
FW = Drum width

# DRUM MOTOR

## DM 0113

### Dimensions

#### Drum motor



Type	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	H [mm]	P [mm]	SL [mm]	EL [mm]	AGL [mm]
DM 0113 crowned	113.5	112	25	30	25	10	3.5	FW - 7	FW + 13	FW + 63
	113.5	112	25	25	20	10	3.5	FW - 7	FW + 13	FW + 63
DM 0113 cylindrical	112	112	25	30	25	10	3.5	FW - 7	FW + 13	FW + 63
	112	112	25	25	20	10	3.5	FW - 7	FW + 13	FW + 63
DM 0113 cylindrical + key	113	113	25	30	25	10	3.5	FW - 7	FW + 13	FW + 63
	113	113	25	25	20	10	3.5	FW - 7	FW + 13	FW + 63



# DRUM MOTOR DM 0138



Practice-oriented, scalable and thought out in detail: The new drum motor DM 0138 makes it easy to build a completely individual conveyor system and is dimensioned for the higher requirements for permissible belt tension from industry and belt manufacturers.

With a broader speed spectrum, the DM 0138 covers all possible applications. The clever plug-and-play connection significantly simplifies the installation. Each motor is approved, tested, and modularized so that it can be produced and delivered around the world in the shortest amount of time.

The modular design of the DM 0138 allows a free combination of individual module groups, such as shaft, end cover, shell or steel gear, to perfectly meet the requirements of an application. In addition, various options, such as encoder, brake, backstop, rubber laggings, etc., as well as different accessories are available.

With the platform concept of the DM 0138, it is possible to cover all internal logistics applications in the food processing sector, as well as in industry, distribution and airports.



### Technical data

	Asynchronous squirrel cage motor
Insulation class of motor windings	Class F, IEC 34 (VDE 0530)
Voltage	230/400 V $\pm 5\%$ (IEC 34/38) Most of the common international voltages and frequencies are available upon request
Frequency	50 Hz
Shaft seal, internal	NBR
Protection rate Motor*	IP69K
Thermal protection	Bi-metal switch
Operating mode	S1
Ambient temperature, 3-phase motor	+2 to +40 °C Low temperature ranges on request
Ambient temperature, 3-phase motor for applications with form-fit belts or no belt	+2 to +25 °C

\* The protection rate of the cable connector may deviate.

### Design variants and accessories

Laggings	Lagging for friction drive belts Lagging for modular plastic belts Lagging for positive drive solid homogeneous belts
Sprockets	Sprockets only on request
Options	Backstop Electromagnetic holding brake and rectifier* Encoder* Balancing Plug connection
Oils	Food-grade oils (EU, FDA)
Certificate	cULus safety certificates
Accessories	Idler pulleys; conveyor rollers; mounting brackets; cables; inverters

\* Depending on the output and speed, the motor extends by 50–70 mm.

# DRUM MOTOR

## DM 0138

### Material variants

The following components can be selected for the drum motor and the electrical connection. The combination of components depends on the material used.

Component	Version	Aluminum	Mild steel	Stainless steel	Brass/nickel	Technopolymer
Tube	Crowned		●	●		
	Cylindrical		●	●		
	Cylindrical + key for sprockets		●	●		
End housing	Standard	●		●		
Shaft	Standard			●		
	Cross-drilled thread			●		
Gear boxes	Planetary gear box		●			
Electrical connector	Straight connector			●	●	●
	Straight hygienic connector			●		
	Elbow connector			●		●
	Terminal box	●		●		●
	Straight plug connection			●		
	90° plug connection			●		
	90° hygienic connector			●		
Motor winding	Asynchronous motor					
External seal	PTFE					



### Motor variants

#### Mechanical data for 3-phase asynchronous motor with steel gear

P <sub>N</sub> [W]	np	gs	i	v [m/s]	n <sub>A</sub> [min <sup>-1</sup> ]	M <sub>A</sub> [Nm]	F <sub>N</sub> [N]	FW <sub>MIN</sub> [mm]	SL <sub>MIN</sub> [mm]
160	4	3	252	0.04	5.5	238	3454	307	300
160	4	3	150	0.07	9.2	142	2056	307	300
160	4	3	120	0.08	11.5	113	1645	307	300
160	4	3	100	0.1	13.9	95	1371	307	300
370	4	2	73.8	0.14	18.8	169	2452	307	300
370	4	2	63	0.16	22.0	144	2093	307	300
370	4	2	49.2	0.2	28.2	113	1635	307	300
370	4	2	42	0.24	33.1	96	1395	307	300
370	4	2	36	0.28	38.6	83	1196	307	300
370	4	2	30	0.33	46.3	69	997	307	300
370	4	2	27	0.37	51.4	62	897	307	300
370	4	2	24	0.42	57.9	55	797	307	300
370	4	2	20	0.5	69.5	46	664	307	300
370	4	2	16	0.63	86.8	37	532	307	300
370	4	2	12	0.84	115.8	28	399	307	300
370	4	1	9	1.11	154.3	22	315	307	300
550	2	2	73.8	0.28	38.7	123	1776	307	300
550	2	2	63	0.33	45.3	105	1516	307	300
550	2	2	49.2	0.42	58.0	82	1184	307	300
550	2	2	42	0.49	68.0	70	1011	307	300
550	2	2	36	0.57	79.3	60	866	307	300
550	2	2	30	0.69	95.2	50	722	307	300
550	2	2	27	0.76	105.7	45	650	307	300
550	2	2	24	0.86	119.0	40	578	307	300
550	2	2	20	1.03	142.8	33	481	307	300
550	2	2	16	1.29	178.4	27	385	307	300
550	2	2	12	1.72	237.9	20	289	307	300
550	2	1	9	2.29	317.2	16	228	307	300

# DRUM MOTOR

## DM 0138



$P_N$ [W]	np	gs	i	v [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
750	4	2	42	0.24	33.3	194	2807	357	350
750	4	2	36	0.28	38.9	166	2406	357	350
750	4	2	30	0.34	46.7	138	2005	357	350
750	4	2	27	0.37	51.9	125	1805	357	350
750	4	2	20	0.51	70.0	92	1337	357	350
750	4	2	16	0.63	87.5	74	1069	357	350
750	4	2	12	0.84	116.7	55	802	357	350
750	4	1	9	1.12	155.6	44	633	357	350
1000	2	2	49.2	0.42	57.9	150	2169	357	350
1000	2	2	42	0.49	67.9	128	1851	357	350
1000	2	2	36	0.57	79.2	109	1587	357	350
1000	2	2	30	0.69	95.0	91	1322	357	350
1000	2	2	27	0.76	105.6	82	1190	357	350
1000	2	2	24	0.86	118.8	73	1058	357	350
1000	2	2	20	1.03	142.6	61	882	357	350
1000	2	2	16	1.29	178.2	49	705	357	350
1000	2	2	12	1.72	237.6	36	529	357	350
1000	2	1	9	2.29	316.8	29	418	357	350

$P_N$  = Rated power  
 np = Number of poles  
 gs = Gear stages  
 i = Speed ratio  
 v = Speed

$n_A$  = Shell rated speed  
 $M_A$  = Drum motor rated torque  
 $F_N$  = Drum motor rated belt pull  
 $FW_{MIN}$  = Minimum drum width  
 $SL_{MIN}$  = Minimum shell length

### Electrical data for 3-phase asynchronous motor

$P_N$ [W]	$n_p$	$n_N$ [min <sup>-1</sup> ]	$f_N$ [Hz]	$U_N$ [V]	$I_N$ [A]	$\cos\varphi$	$\eta$ [%]	$J_R$ [kgcm <sup>2</sup> ]	$I_s/I_N$	$M_s/M_N$	$M_p/M_N$	$M_B/M_N$	$M_N$ [Nm]	$R_M$ [Ω]	$U_{SH\Delta}$ [V]	$U_{SHY}$ [V]
160	4	1390	50	400	0.46	0.76	0.67	3.98	3.5	1.86	1.86	2.13	1.1	60.2		30.7
160	4	1390	50	230	0.79	0.76	0.67	3.98	3.5	1.86	1.86	2.13	1.1	60.2	18.2	
370	4	1389	50	400	1.01	0.75	0.71	6.48	4.07	2.24	2.00	2.28	2.5	21.1		23.7
370	4	1389	50	230	1.74	0.75	0.71	6.48	4.07	2.24	2.00	2.28	2.5	21.1	13.7	
550	2	2855	50	400	1.28	0.77	0.80	4.21	5.49	2.82	2.82	3.26	1.8	11.8		17.4
550	2	2855	50	230	2.21	0.77	0.80	4.21	5.49	2.82	2.82	3.26	1.8	11.8	10.1	
750	4	1400	50	400	1.86	0.77	0.77	11.45	4.47	2.29	2.07	2.41	5.1	9.1		19.4
750	4	1400	50	230	3.22	0.77	0.77	11.45	4.47	2.29	2.07	2.41	5.1	9.1	11.2	
1000	2	2851	50	400	2.03	0.84	0.84	7.45	6.25	2.91	2.91	3.12	3.4	5.7		14.7
1000	2	2851	50	230	3.52	0.84	0.84	7.45	6.25	2.91	2.91	3.12	3.4	5.7	8.5	

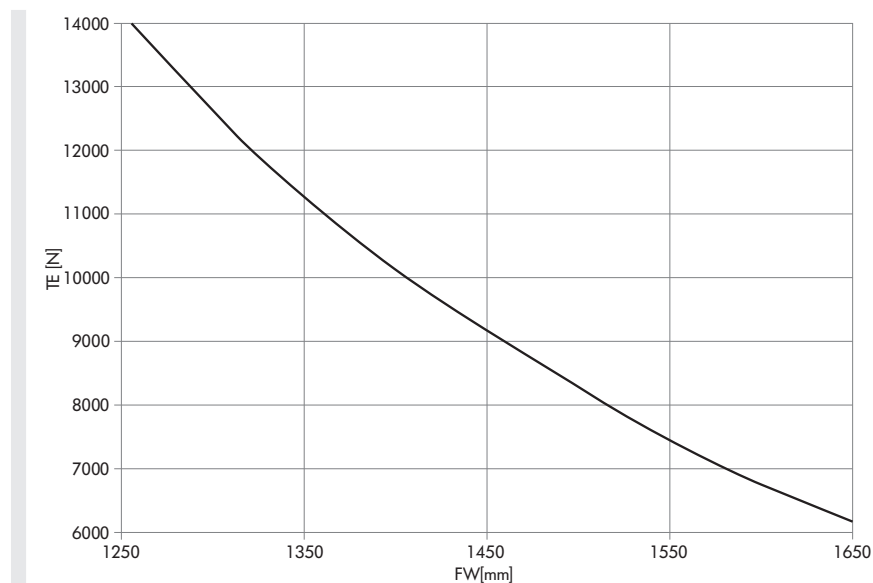
$P_N$	= Rated power	$I_s/I_N$	= Ratio of startup current - rated current
$n_p$	= Number of poles	$M_s/M_N$	= Ratio of startup torque - rated torque
$n_N$	= Rated speed of rotor	$M_B/M_N$	= Ratio of pull-out torque - rated torque
$f_N$	= Rated frequency	$M_p/M_N$	= Ratio of pull-up torque - rated torque
$U_N$	= Rated voltage	$M_N$	= Rated torque of rotor
$I_N$	= Rated current	$R_M$	= Branch resistance
$\cos\varphi$	= Power factor	$U_{SH\Delta}$	= Heater voltage in delta connection
$\eta$	= Efficiency	$U_{SHY}$	= Heater voltage in star connection
$J_R$	= Rotor moment of inertia		

# DRUM MOTOR DM 0138

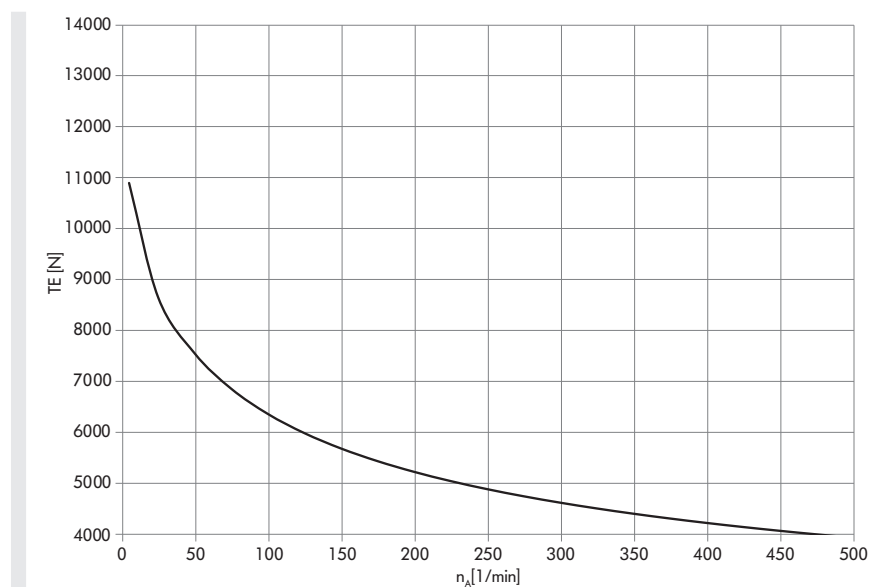


## Belt tension diagrams

### Belt tension depending on drum width



### Belt tension depending on rated speed of shell

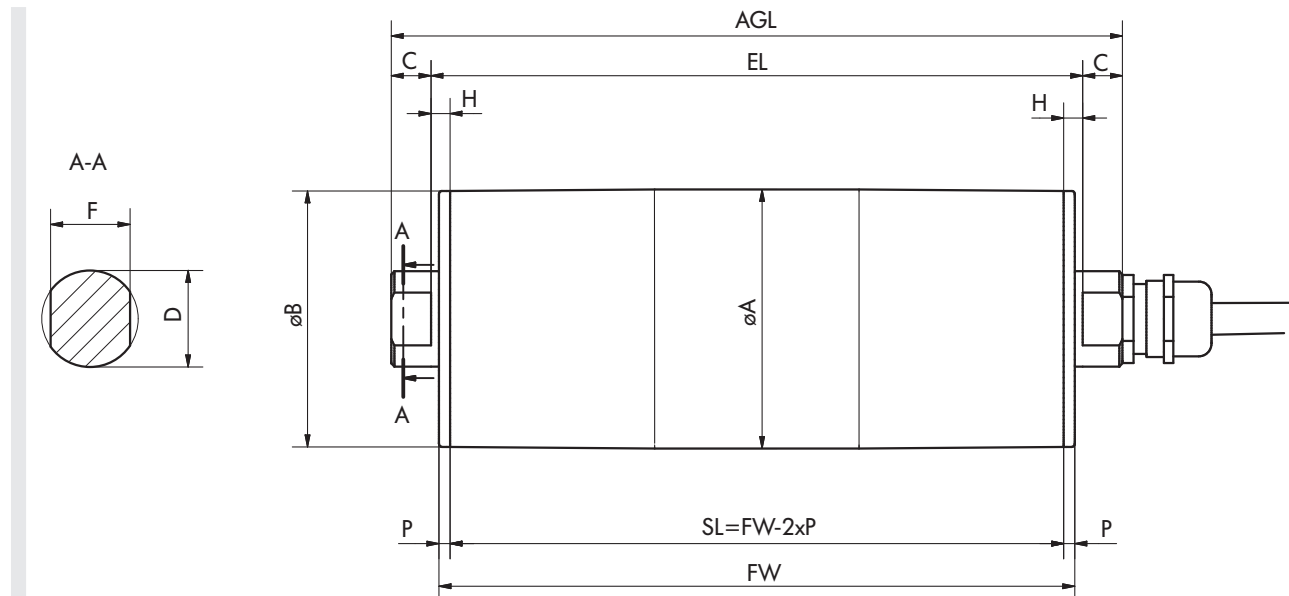


**Note:** The correct value for the maximum permissible belt tension is determined from the speed of the drum motor. When selecting the motor, also check whether the maximum permissible TE value fits the desired drum width (FW). The belt tension diagrams apply only to standard shafts.

TE = Belt tension  
 $n_A$  = Shell rated speed  
 FW = Drum width

## Dimensions

### Drum motor



Type	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	H [mm]	P [mm]	SL [mm]	EL [mm]	AGL [mm]
DM 0138 crowned	138	136	25	30	25	15	3.5	FW - 7	FW + 23	FW + 73
	138	136	25	30	20	15	3.5	FW - 7	FW + 23	FW + 73
DM 0138 cylindrical	136	136	25	30	25	15	3.5	FW - 7	FW + 23	FW + 73
	136	136	25	30	20	15	3.5	FW - 7	FW + 23	FW + 73
DM 0138 cylindrical + key	137	137	25	30	25	15	3.5	FW - 7	FW + 23	FW + 73
	137	137	25	30	20	15	3.5	FW - 7	FW + 23	FW + 73

# DRUM MOTOR

## DM 0165



Practice-oriented, scalable and thought out in detail: The new drum motor DM 0165 makes it easy to build a completely individual conveyor system and is dimensioned for the higher requirements for permissible belt tension from industry and belt manufacturers.

With a broader speed spectrum, the DM 0165 covers all possible applications. The clever plug-and-play connection significantly simplifies the installation. Each motor is approved, tested, and modularized so that it can be produced and delivered around the world in the shortest amount of time.

The modular design of the DM 0165 allows a free combination of individual module groups, such as shaft, end cover, shell or steel gear, to perfectly meet the requirements of an application. In addition, various options, such as encoder, brake, backstop, rubber laggings, etc., as well as different accessories are available.

With the platform concept of the DM 0165, it is possible to cover all internal logistics applications in the food processing sector, as well as in industry, distribution and airports.



### Technical data

	Asynchronous squirrel cage motor
Insulation class of motor windings	Class F, IEC 34 (VDE 0530)
Voltage	230/400 V 3-phase $\pm 5\%$ (IEC 34/38) Most of the common international voltages and frequencies are available upon request
Frequency	50/60 Hz
Shaft seal, internal	NBR
Protection rate Motor*	IP69K
Thermal protection	Bi-metal switch
Operating mode	S1
Ambient temperature, 3-phase motor	+2 to +40 °C
Ambient temperature, 3-phase motor for applications with form-fit belts or no belt	+2 to +25 °C

\* The protection rate of the cable connector may deviate.

### Design variants and accessories

<b>Laggings</b>	Lagging for friction drive belts Lagging for modular plastic belts Lagging for positive drive solid homogeneous belts
<b>Sprockets</b>	Sprockets only on request
<b>Options</b>	Backstop Electromagnetic holding brake and rectifier* Encoder* Balancing Plug connection
<b>Oils</b>	Food-grade oils (EU, FDA)
<b>Certificate</b>	cULus safety certificates (starting Q1/2020)
<b>Accessories</b>	Idler pulleys; conveyor rollers; mounting brackets; cables; inverters

\* Depending on the output and speed, the motor extends by 50–70 mm.

# DRUM MOTOR

## DM 0165

### Material variants

The following components can be selected for the drum motor and the electrical connection. The combination of components depends on the material used.

Component	Version	Aluminum	Mild steel	Stainless steel	Brass/nickel	Technopolymer
Tube	Crowned		●	●		
	Cylindrical		●	●		
	Cylindrical + key for sprockets		●	●		
End housing	Standard	●		●		
Shaft	Standard			●		
	Cross-drilled thread			●		
Gear boxes	Spur gear box		●			
Electrical connector	Straight connector			●	●	●
	Straight hygienic connector			●		
	Elbow connector			●		●
	Terminal box	●		●		●
	90° hygienic connector			●		
External seal	PTFE					



### Motor variants

#### Mechanical data for 3-phase asynchronous motor

P <sub>N</sub> [W]	np	gs	i	v [m/s]	n <sub>A</sub> [min <sup>-1</sup> ]	M <sub>A</sub> [Nm]	F <sub>N</sub> [N]	FW <sub>MIN</sub> [mm]	SL <sub>MIN</sub> [mm]
370	12	3	46.56	0.084	9.8	339.6	41.42	457	450
370	8	3	62.37	0.100	11.1	300.6	3666	407	400
370	8	3	46.56	0.127	14.8	224.4	2736	407	400
370	4	3	62.37	0.189	22.0	158.5	1933	407	400
370	4	3	46.56	0.254	29.5	118.3	1443	407	400
370	4	3	39.31	0.300	35.0	99.9	1218	407	400
370	4	3	31.56	0.374	43.6	80.2	978	407	400
370	4	3	24.60	0.480	55.9	62.5	762	407	400
370	4	2	19.64	0.601	70.0	50.9	621	407	400
370	4	2	14.66	0.806	93.8	38.0	464	407	400
370	4	2	12.38	0.954	111.1	32.1	391	407	400
550	6	3	62.37	0.116	13.5	365.2	4453	407	400
550	6	3	46.56	0.156	18.1	272.6	3324	407	400
750	6	3	46.56	0.156	18.1	371.6	4532	457	450
750	4	3	62.37	0.187	21.7	310.6	3787	407	400
750	4	3	46.56	0.250	29.1	231.8	2827	407	400
750	4	3	39.31	0.296	34.5	195.7	2387	407	400
750	4	3	31.56	0.369	42.9	157.1	1916	407	400
750	4	3	24.60	0.473	55.1	122.5	1494	407	400
750	4	2	19.64	0.593	69.0	99.8	1217	407	400
750	4	2	14.66	0.794	92.40	74.5	908	407	400
750	4	2	12.38	0.940	109.5	62.9	767	407	400

# DRUM MOTOR

## DM 0165



$P_N$ [W]	$n_p$	$g_s$	$i$	$v$ [m/s]	$n_A$ [min <sup>-1</sup> ]	$M_A$ [Nm]	$F_N$ [N]	$FW_{MIN}$ [mm]	$SL_{MIN}$ [mm]
1100	4	3	46.56	0.243	28.4	348.8	4254	407	400
1100	4	3	39.31	0.288	33.6	294.5	3591	407	400
1100	4	3	31.56	0.359	41.8	236.4	2883	407	400
1100	4	3	24.60	0.461	53.7	184.3	2248	407	400
1100	4	2	19.64	0.577	67.2	150.1	1831	407	400
1100	4	2	14.66	0.773	90.1	112.1	1366	407	400
1100	4	2	12.38	0.916	106.7	94.6	1154	407	400
1100	2	3	46.56	0.525	61.1	161.7	1972	407	400
1100	2	3	39.31	0.621	72.4	136.5	1665	407	400
1100	2	3	24.60	0.993	115.7	85.4	1042	407	400
1100	2	2	19.64	1.244	144.9	69.6	849	407	400
1100	2	2	14.66	1.667	194.1	51.9	633	407	400
1100	2	2	12.38	1.974	229.9	43.9	535	407	400
1100	2	2	9.65	2.532	294.8	34.2	417	407	400
1500	4	3	31.56	0.379	44.1	305.3	3723	457	450
1500	4	3	24.60	0.486	56.6	238.0	2903	457	450
1500	4	2	19.64	0.609	70.9	193.9	2364	457	450
1500	4	2	14.66	0.816	95.0	144.7	1765	457	450
1500	4	2	12.38	0.967	112.6	122.20	1490	457	450
2200	2	3	46.56	0.524	61.0	324.3	3954	457	450
2200	2	3	39.31	0.620	72.2	273.8	3339	457	450
2200	2	3	31.56	0.773	90.0	219.8	2680	457	450
2200	2	3	24.60	0.991	115.4	171.3	2089	457	450
2200	2	2	19.64	1.242	144.6	139.6	1702	457	450
2200	2	2	14.66	1.664	193.8	104.2	1270	457	450
2200	2	2	12.38	1.971	229.5	87.9	1073	457	450
2200	2	2	9.65	2.527	294.3	68.6	836	457	450

$P_N$	= Rated power	$n_A$	= Shell rated speed
$n_p$	= Number of poles	$M_A$	= Drum motor rated torque
$g_s$	= Gear stages	$F_N$	= Drum motor rated belt pull
$i$	= Speed ratio	$FW_{MIN}$	= Minimum drum width
$v$	= Speed	$SL_{MIN}$	= Minimum shell length

### Electrical data for 3-phase asynchronous motor

$P_N$ [W]	$n_p$	$U_N$ [V]	$I_N$ [A]	$\cos\varphi$	$\eta$ [%]	$J_R$ [kgcm <sup>2</sup> ]	$I_s/I_N$	$M_s/M_N$	$M_p/M_N$	$M_B/M_N$	$R_M$ [Ω]	$U_{SH\Delta}$ [V]	$U_{SHY}$ [V]
370	12	230	2.77	0.63	0.53	35.1	2.0	1.20	1.20	1.50	19.4	17	
370	12	400	1.60	0.63	0.53	35.1	2.0	1.20	1.20	1.50	19.4		29
370	8	230	2.42	0.62	0.57	22.6	2.9	1.90	1.90	2.35	22.0	17	
370	8	400	1.50	0.62	0.57	22.6	2.9	1.90	1.90	2.35	22.0		31
370	4	230	1.90	0.77	0.66	11.3	3.2	1.60	1.60	1.80	29.2	21	
370	4	400	1.10	0.77	0.66	11.3	3.2	1.60	1.60	1.80	29.2		37
550	6	230	2.77	0.69	0.72	22.6	3.4	1.40	1.40	1.65	19.5	19	
550	6	400	1.60	0.69	0.72	22.6	3.4	1.40	1.40	1.65	19.5		32
750	6	230	3.64	0.81	0.64	22.6	3.5	1.75	1.75	2.00	6.2	9	
750	6	400	2.10	0.81	0.64	22.6	3.5	1.75	1.75	2.00	6.2		16
750	4	230	3.12	0.80	0.75	11.3	3.5	1.53	1.30	1.80	23.9	30	
750	4	400	1.80	0.80	0.75	11.3	3.5	1.53	1.30	1.80	23.9		52
1100	4	230	4.85	0.82	0.69	11.3	3.5	1.50	1.30	1.70	7.2	14	
1100	4	400	2.80	0.82	0.69	11.3	3.5	1.50	1.30	1.70	7.2		25
1100	2	230	4.16	0.86	0.77	7.6	5.2	3.15	2.10	3.42	2.9	5	
1100	2	400	2.40	0.86	0.77	7.6	5.2	3.15	2.10	3.42	2.9		9
1500	4	230	6.06	0.87	0.71	19.8	3.8	1.55	1.55	2.10	5.2	14	
1500	2	400	3.50	0.87	0.71	19.8	3.8	1.55	1.55	2.10	5.2		24
2200	2	230	7.88	0.86	0.81	7.6	5.3	2.60	2.60	3.20	6.2	21	
2200	2	400	4.55	0.86	0.81	7.6	5.3	2.60	2.60	3.20	6.2		36

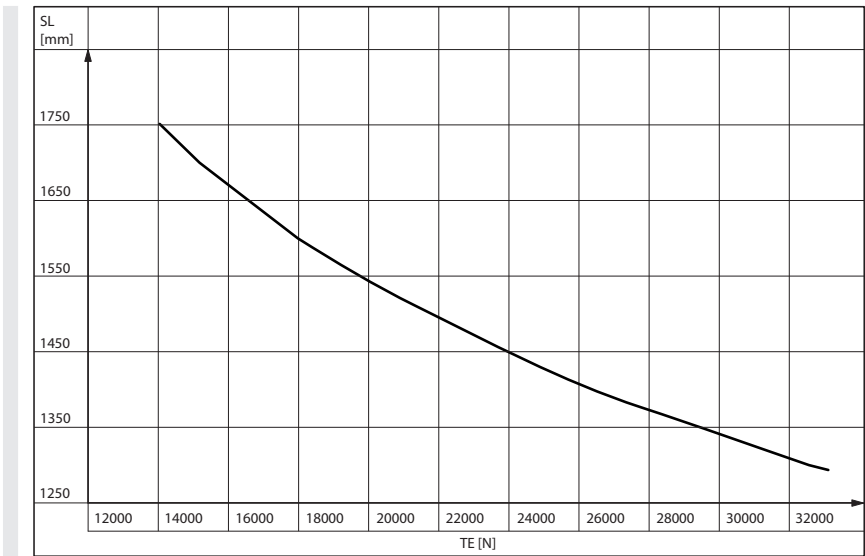
$P_N$	= Rated power	$I_s/I_N$	= Ratio of startup current - rated current
$n_p$	= Number of poles	$M_s/M_N$	= Ratio of startup torque - rated torque
$U_N$	= Rated voltage	$M_p/M_N$	= Ratio of pull-up torque - rated torque
$I_N$	= Rated current	$M_B/M_N$	= Ratio of pull-out torque - rated torque
$\cos\varphi$	= Power factor	$R_M$	= Branch resistance
$\eta$	= Efficiency	$U_{SH\Delta}$	= Heater voltage in delta connection
$J_R$	= Rotor moment of inertia	$U_{SHY}$	= Heater voltage in star connection

# DRUM MOTOR

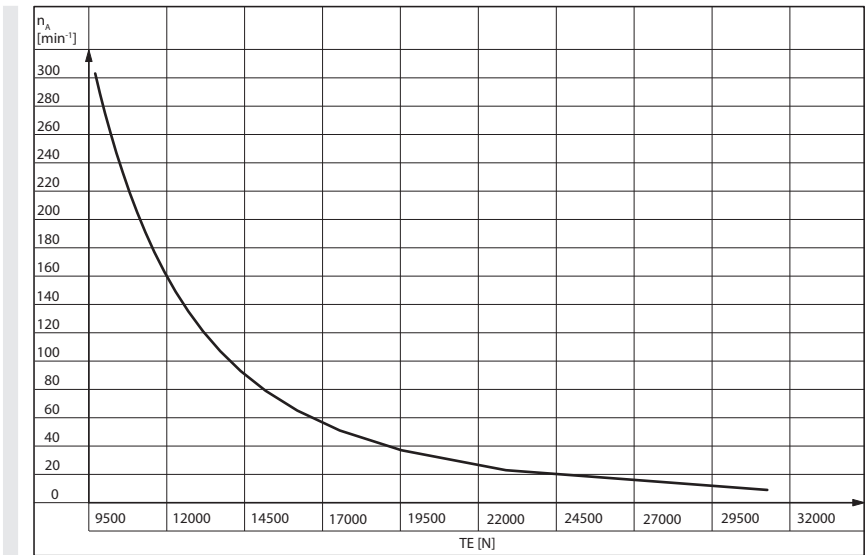
## DM 0165

### Belt tension diagrams

#### Belt tension depending on shell length



#### Belt tension depending on rated speed of shell

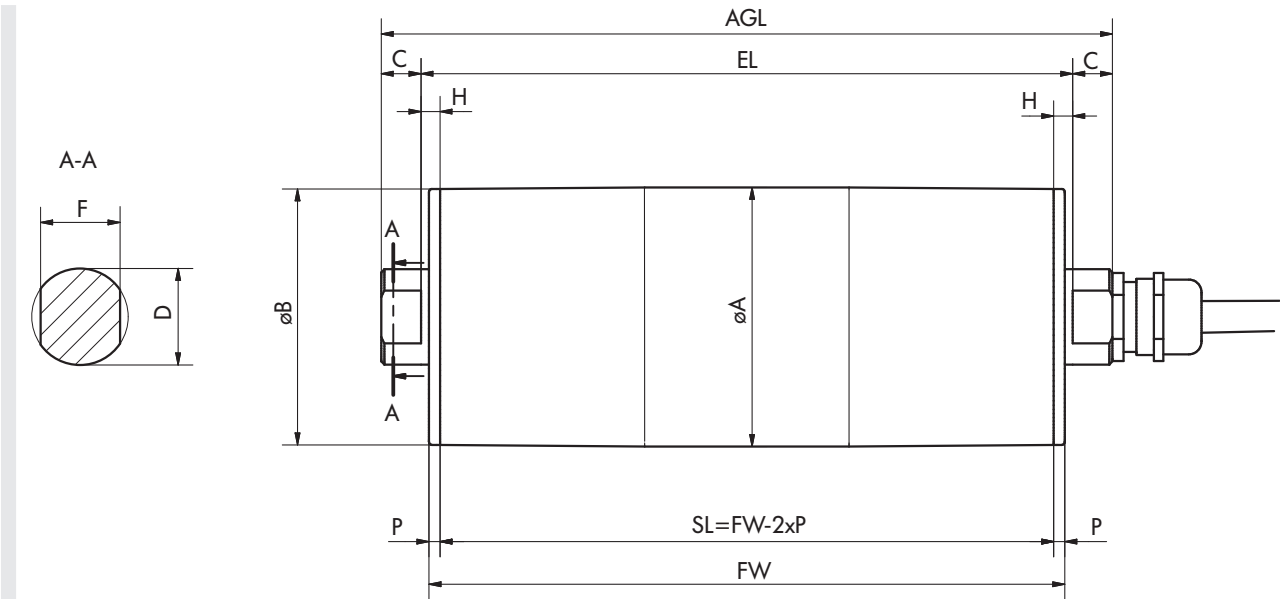


**Note:** The correct value for the maximum permissible belt tension is determined from the maximum permissible TE value for the speed of the drum motor. For motors with shell length SL > 1300 mm, check whether the maximum permissible TE value for the jacket length is lower. In this case, use the lower value as maximum permissible TE value. The belt tension diagrams apply only to standard shafts.

- TE = Belt tension
- n<sub>A</sub> = Shell rated speed
- SL = Shell length

Dimensions

Drum motor



Type	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	H [mm]	P [mm]	SL [mm]	EL [mm]	AGL [mm]
DM 0165 crowned	164	162	45	40	30	20	3.5	FW – 7	FW + 33	FW + 123
	164	162	25	30	25	20	3.5	FW – 7	FW + 33	FW – 83
DM 0165 cylindrical	162	162	45	40	30	20	3.5	FW – 7	FW + 33	FW + 123
	162	162	25	30	25	20	3.5	FW – 7	FW + 33	FW + 83
DM 0165 cylindrical + key	162	162	45	40	30	20	3.5	FW – 7	FW + 33	FW + 123
	162	162	25	30	25	20	3.5	FW – 7	FW + 33	FW + 83

# DRUM MOTOR CABLE OVERVIEW

Of the DM series

## Cable overview

### Cable connections

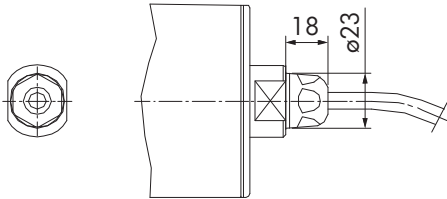


Fig.: Straight hygienic connector, IP69k stainless steel

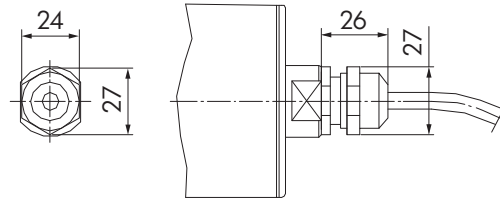


Fig.: Straight connector, brass or stainless steel

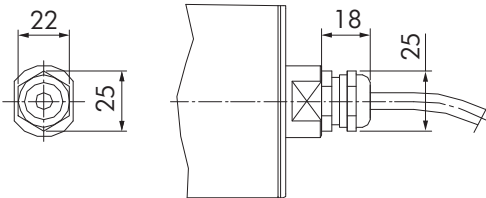


Fig.: Straight EMC connector, brass or stainless steel

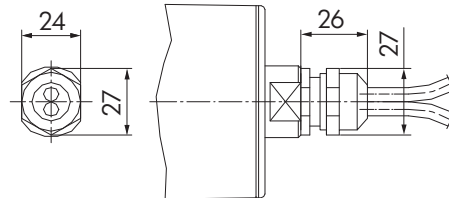


Fig.: Straight connector for encoder, brass or stainless steel

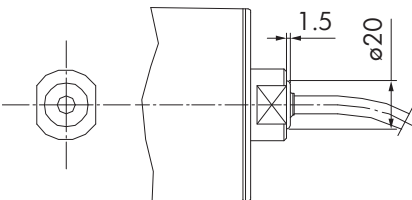


Fig.: Protective cap made of PU

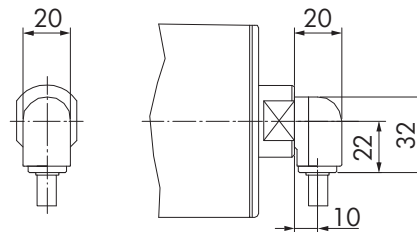


Fig.: Elbow connector, technopolymer

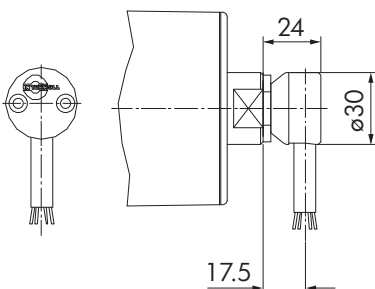


Fig.: Elbow connector, stainless steel, also for encoders

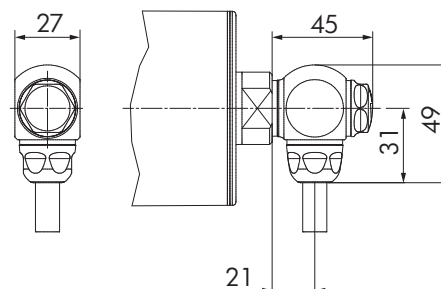


Fig.: 90° hygienic connector

# DRUM MOTOR CABLE OVERVIEW

Of the DM series

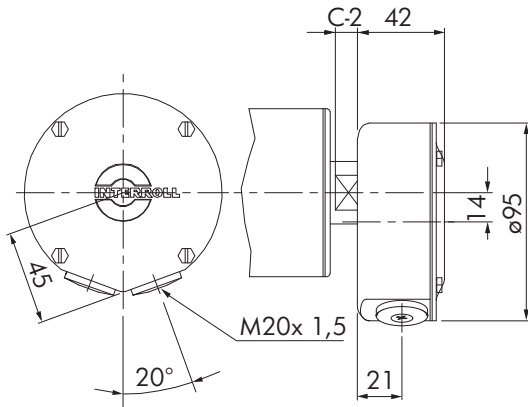


Fig.: Terminal box, stainless steel

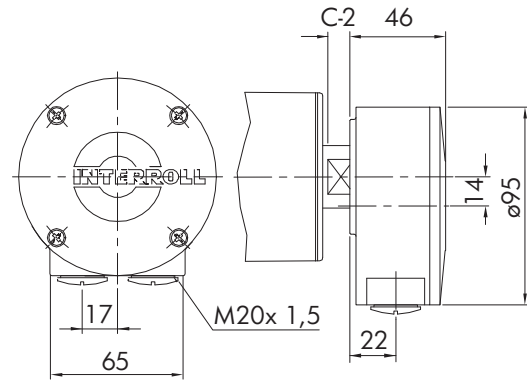


Fig.: Terminal box, aluminum

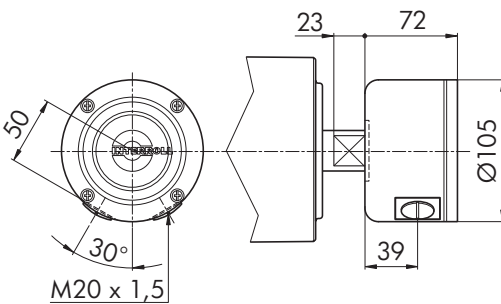


Fig.: Terminal box, techno-polymer

Cable specification: Cable types  
Available cable lengths: 1 m, 3 m, 5 m, 10 m

All cable connection dimensions are approximate.

# DRUM MOTOR CABLE OVERVIEW

Of the DM series

## Straight plug connection (hygienic design)

The new plug connection is the ideal solution for a quick initial installation and significantly less maintenance effort. Connecting and disconnecting the cables to the motor is simple and can be performed safely and very quickly in just a few steps. Complete disassembly is not needed for motor maintenance or the replacement of a damaged cable. Only the pressing screw and the shell nipple must be loosened and completely unscrewed from the shaft end. Then the connector can easily be pulled out. The assembly is just as simple, in reverse order: The connector engages in the intended position. Then the shell nipple and pressing screw are screwed in and firmly tightened to the block.

## Technical data

<b>Shaft design</b>	Only for 30 mm shaft diameter and 25 mm WAF
<b>Materials</b>	Stainless steel, TPU seals
<b>Connection</b>	Star/delta configuration with thermal controller contact (shield optional)
<b>Cable lengths</b>	1 m, 3 m, 5 m, 10 m
<b>Delivery</b>	Cable not installed, screw components installed on cable
<b>Electrical data</b>	According to DIN EN 61984
<b>Voltage</b>	230/400 V
<b>Amperage</b>	Max. 5 A
<b>Temperature range</b>	+2 to +40 °C Lower temperatures on request
<b>Protection rate</b>	IP69k after complete assembly
<b>Hygiene requirement</b>	Suitable for cleaning with high-pressure cleaner
<b>Directives</b>	CE certified, EHEDG certified, use of chemicals permissible according to ECOLAB
<b>Mounting tool</b>	Open-end wrench 14 mm and 20 mm

The minimum length of the drum motor with plug connection increases by 59 mm.



# DRUM MOTOR CABLE OVERVIEW

Of the DM series

## Dimensions

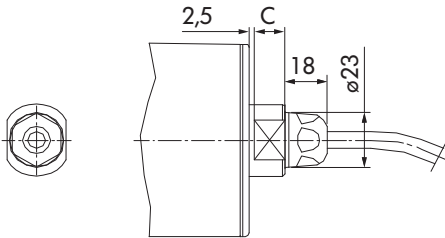


Fig.: Straight plug connection, qualified for hygienic cleaning, IP69k, stainless steel

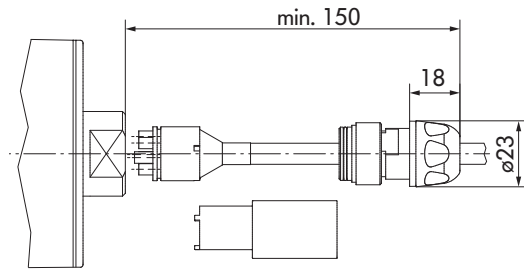


Fig.: Mounting dimensions with a mounting tool

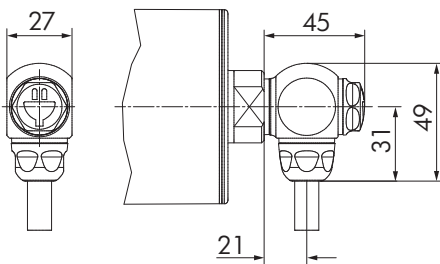


Fig.: 90° plug connection

# DRUM MOTOR CABLE OVERVIEW

Of the DM series

## Cable types of DM series

To reduce EMC emissions, please use a shielded cable for operating the motor via a frequency inverter .

### Cable with 7 main cores

Article number	1107481	1107478	1107477	1107479	1000569	1118469
Cross section	0.5 mm <sup>2</sup>	0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>	1.3 mm <sup>2</sup>
Numeric code and color code	Numeric code + color code	Numeric code + color code	Numeric code + color code	Numeric code + color code	Numeric code + color code	Numeric code + color code
Insulation conductors (main cores)	ETFE	ETFE	ETFE	PP	PVC	ETFE
Data cores (number)	2	2	2	2	—	2
Cross section	0.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>	—	0.5 mm <sup>2</sup>
Numeric code and color code	Color code	Color code	Color code	Color code	—	Color code
Insulation conductors (data cores)	ETFE	ETFE	ETFE	PP	—	ETFE
Insulation of outer sheath	PVC	PVC	PVC	TPU	PVC	PVC
Halogen-free	No	No	No	Yes	No	No
Color of outer sheath	Gray	Gray	Gray	Gray	Black	Gray
Shielded	Copper-tinned	Copper-tinned	—	Copper-tinned	—	Copper-tinned
Outer diameter	7.7 ± 0.2 mm	8.4 ± 0.2 mm	7.3 ± 0.2 mm	8.4 ± 0.2 mm	7.15 ± 0.2 mm	11 ± 0.2 mm
Operating voltage	600 V	600 V	600 V	600 V	300/500 V	600 V
Temperature range	–30 to +105 °C according to UL	–30 to +105 °C according to UL	–30 to +105 °C according to UL	–30 to +105 °C	–30 to +105 °C –40 to +80 °C according to UL	–30 to +105 °C according to UL
Approval	cULus	cULus	cULus	None	cULus	cULus

# DRUM MOTOR CABLE OVERVIEW

Of the DM series

## Cable with 4 main cores

Article number	1107480	1107482	1118470
Cross section	0.75 mm <sup>2</sup>	0.75 mm <sup>2</sup>	1.3 mm <sup>2</sup>
Numeric code and color code	Numeric code + color code	Numeric code + color code	Numeric code + color code
Insulation conductors (main cores)	ETFE	PP	ETFE
Data cores (number)	2	2	2
Cross section	0.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>	0.5 mm <sup>2</sup>
Numeric code and color code	Color code	Color code	Color code
Insulation conductors (data cores)	ETFE	PP	ETFE
Insulation of outer sheath	PVC	TPU	PVC
Halogen-free	No	Yes	No
Color of outer sheath	Gray	Gray	Gray
Shielded	Copper-tinned	Copper-tinned	Copper-tinned
Outer diameter	7.6 ± 0.2 mm	7.6 ± 0.2 mm	8.0 ± 0.2 mm
Operating voltage	600 V	600 V	600 V
Temperature range	-30 to +105 °C according to UL	-30 to +105 °C	-30 to +105 °C according to UL
Approval	cULus	None	cULus

# DRUM MOTOR CABLE OVERVIEW

Of the DM series

## External plug connection cable types

Article number		Cable length	Plain cable article number	Voltage selection	
Straight design	90° design			Asynchronous motor 230 or 400 V Synchronous motor	Asynchronous motor 230/400 V
61114712	61116487	1 m	1107480	●	
61114713	61116488	3 m	1107480	●	
61114715	61116489	5 m	1107480	●	
61114716	61116490	10 m	1107480	●	
61114280	61116483	1 m	1107482	●	
61114281	61116484	3 m	1107482	●	
61114282	61116485	5 m	1107482	●	
61114283	61116486	10 m	1107482	●	
61114272	61116479	1 m	1107481		●
61114273	61116480	3 m	1107481		●
61114274	61116481	5 m	1107481		●
61114275	61116482	10 m	1107481		●
61114255	61116471	1 m	1107477		●
61114256	61116472	3 m	1107477		●
61114257	61116473	5 m	1107477		●
61114258	61116474	10 m	1107477		●
61114265	61116475	1 m	1107479		●
61114266	61116476	3 m	1107479		●
61114267	61116477	5 m	1107479		●
61114268	61116478	10 m	1107479		●

# DRUM MOTOR CONNECTION DIAGRAMS

Of the DM series

## Connection diagrams

### Abbreviations

ye/gn	= yellow/green	or	= orange
bn	= brown	vi	= violet
bk	= black	rd	= red
gy	= gray	wh	= white
bu	= blue	FI	= Frequency inverter
TC	= Thermal controller (thermal motor protection switch)	NC	= Not connected
BR	= Electromagnetic brakes		

### Rotation

**Note:** The rotational direction of the drum motor is shown on the connection diagrams. The rotation indicated is correct when looking at the motor from the connection side.

### Cable connections synchronous motor

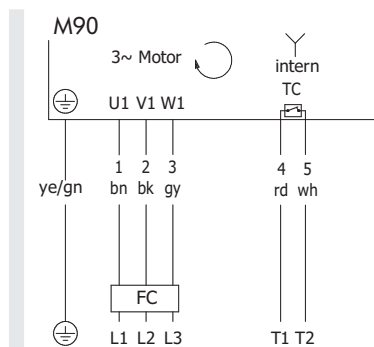


Fig.: 3-phase, 4+2-core cable, winding for 1 voltage, star connection

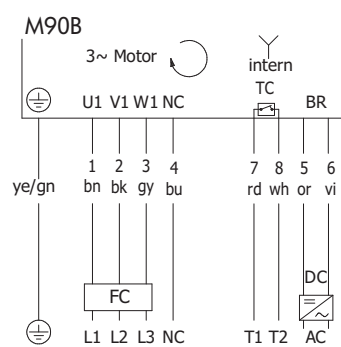


Fig.: 3-phase, 7+2-core cable, winding for 1 voltage, star connection

### Terminal box for synchronous motor

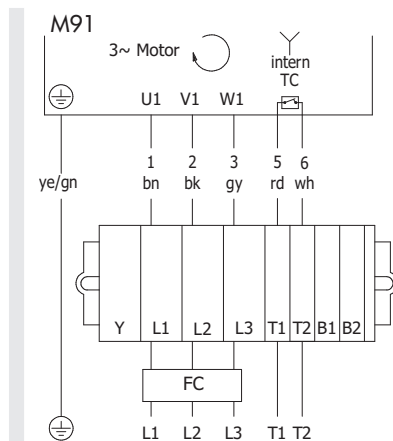


Fig.: 3-phase, 4+2-core cable, winding for 1 voltage, star connection

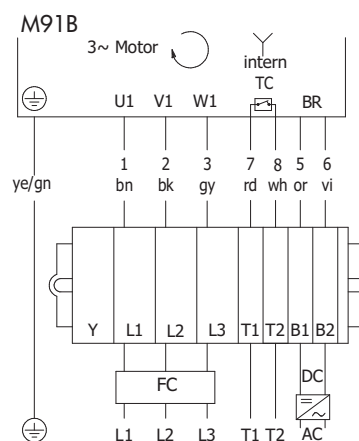


Fig.: With brake, 3-phase, 7+2 core cable, winding for 1 voltage, star connection

# DRUM MOTOR CONNECTION DIAGRAMS

Of the DM series

## Cable connections 3-phase asynchronous motor

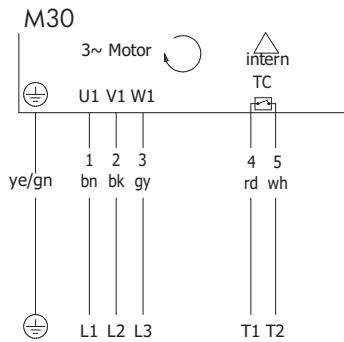


Fig.: 3-phase, 4+2 core cable, winding for 1 voltage, delta connection

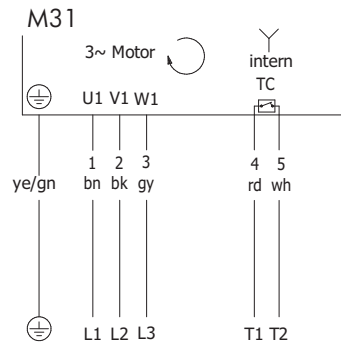


Fig.: 3-phase, 4+2-core cable, winding for 1 voltage, star connection

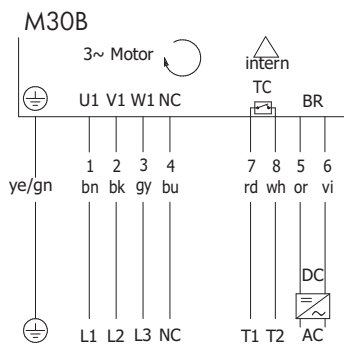


Fig.: With brake, 3-phase, 7+2 core cable, winding for 1 voltage, delta connection

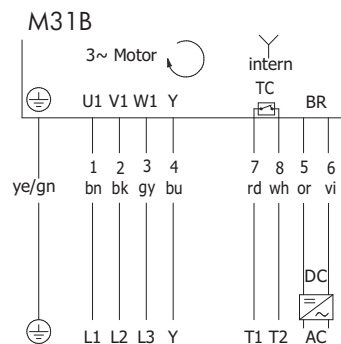


Fig.: With brake, 3-phase, 7+2 core cable, winding for 1 voltage, star connection

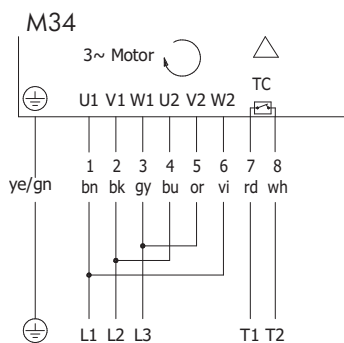


Fig.: 3-phase, 7+2 core cable, winding for 2 voltages, delta connection

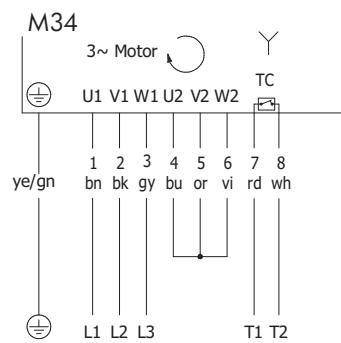


Fig.: 3-phase, 7+2-core cable, winding for 2 voltages, star connection

# DRUM MOTOR CONNECTION DIAGRAMS

Of the DM series

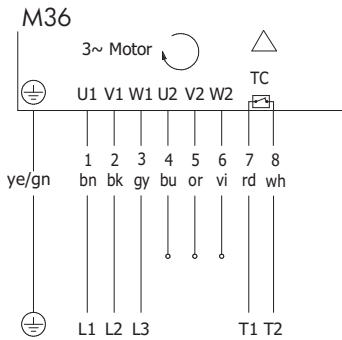


Fig.: 3-phase, 7+2 core cable, 2 speeds, delta connection

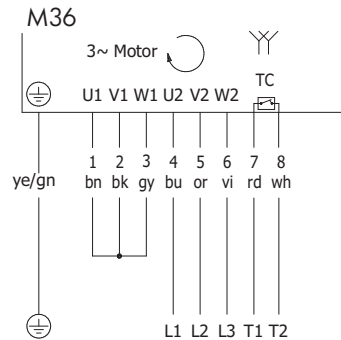


Fig.: 3-phase, 7+2 core cable, 2 speeds, double-star connection

## Terminal box 3-phase asynchronous motor

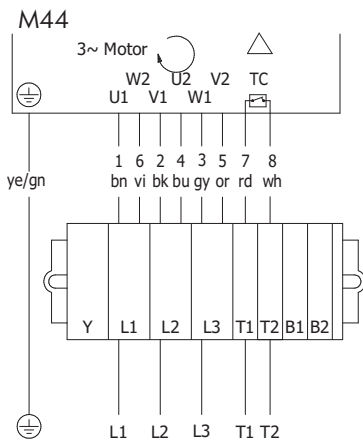


Fig.: 3-phase, winding for 2 voltages, delta connection

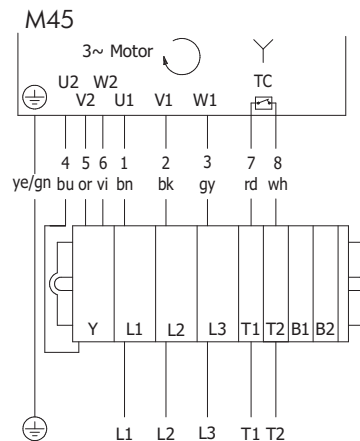


Fig.: 3-phase, winding for 2 voltages, star connection

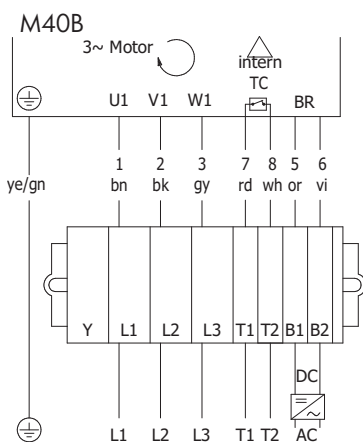


Fig.: With brake, 3-phase, winding for 1 voltage, delta connection

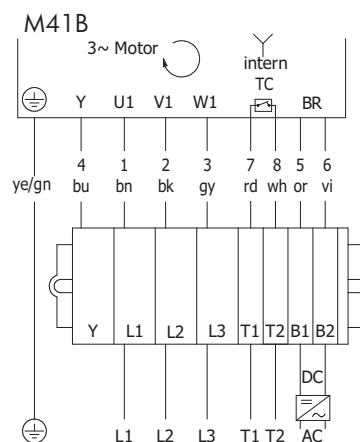
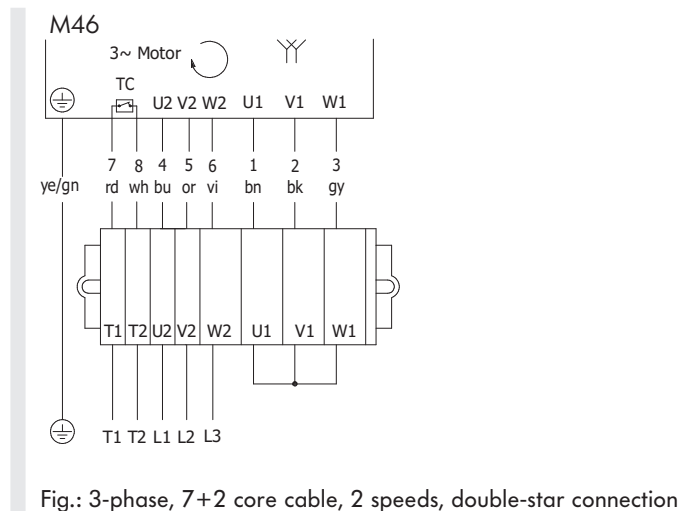
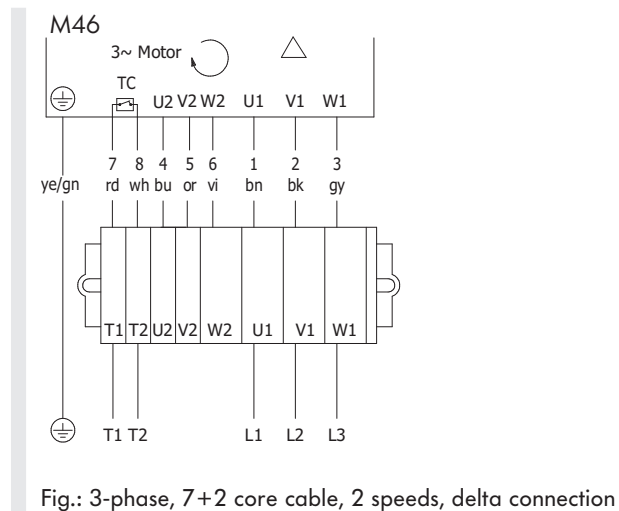


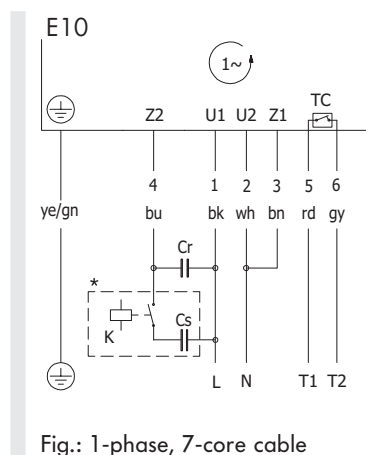
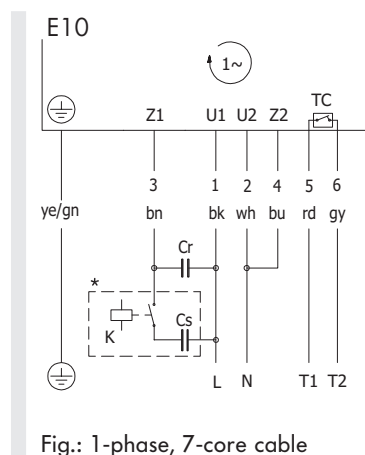
Fig.: With brake, 3-phase, winding for 1 voltage, star connection

# DRUM MOTOR CONNECTION DIAGRAMS

Of the DM series



## Cable connections 1-phase asynchronous motor





## Drum motor

For more information about the starting relay, see page 123.

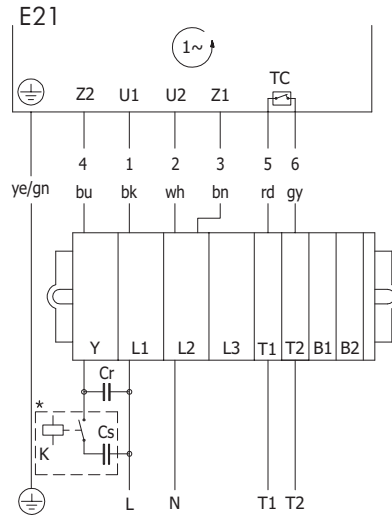


Fig.: 1-phase, 7-core cable

## OPTIONS LAGGING

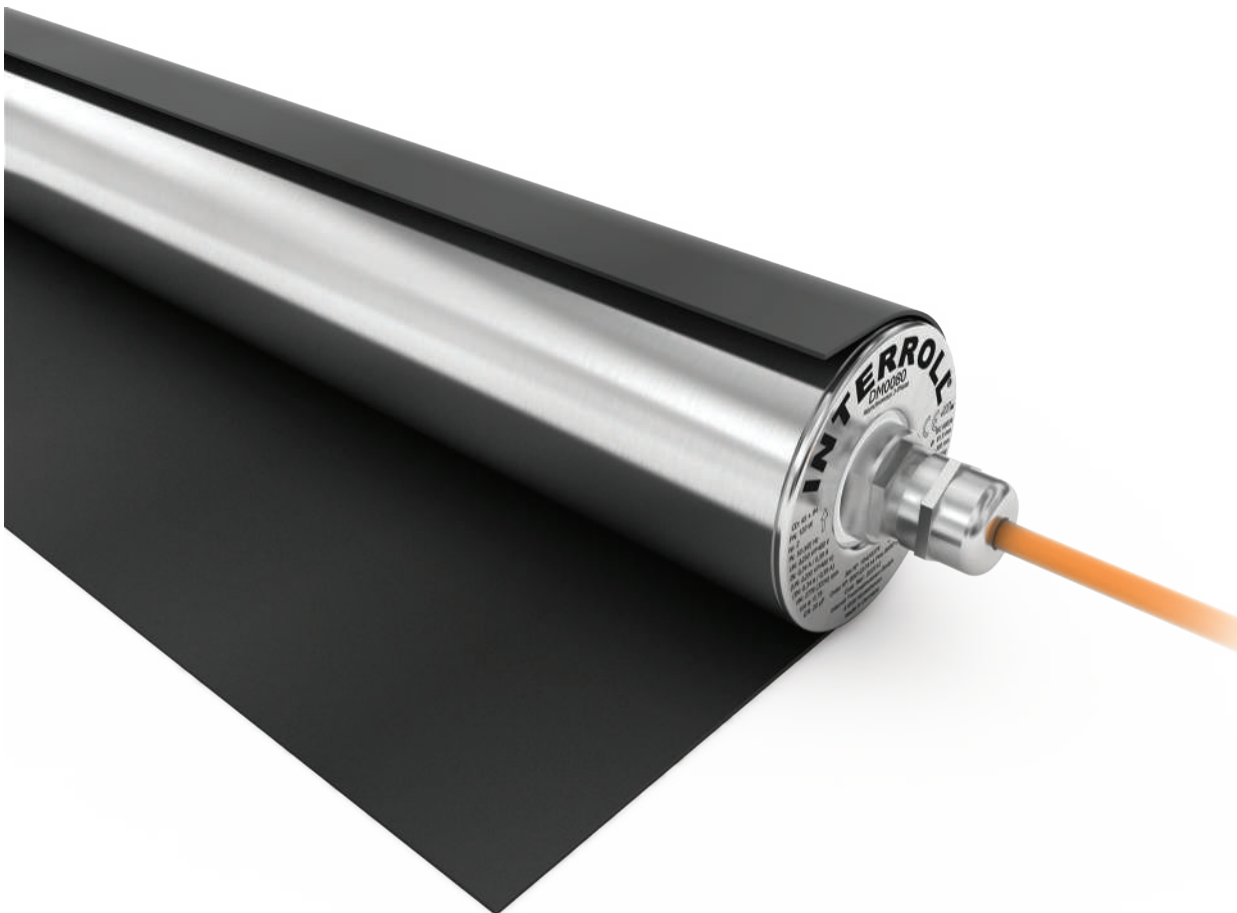
For friction drive belt applications



### Hygienic and loadable

A lagging provides an advantage for drum motors, particularly for wet applications and in food processing, with its typical hygienic requirements. A lagging increases the friction between drum motor and conveyor belt, thereby preventing slippage. On top of that, it is resistant to external influences such as oil, fuels, and other chemicals that may be used for cleaning. Depending on the application, different profiles are available: For high volumes of liquid, a longitudinal grooved lagging redirects moisture between belt and motor, a center V-groove ensures precise belt tracking. Laggings are available in cold and hot vulcanization, whereby the latter meets particularly strict hygiene requirements.

**Note:** It is important to incorporate a calculation of belt pull and speed that is adjusted to the greater outer diameter of the drum motor.



### Technical data

<b>Material</b>	Hot or cold-vulcanized NBR, other materials upon request.
<b>Temperature range</b>	-40 to +120 °C
<b>Shore hardness</b>	65 and 70 ± 5 Shore A

### Versions

#### Cold vulcanization

Lagging profile	Color	Features	Shore hardness	Thickness [mm]
Smooth	Black	Oil- and grease-resistant	65 ± 5 Shore A	3; 4
	White	FDA food approved	70 ± 5 Shore A	
Longitudinal grooves	White	FDA food approved	70 ± 5 Shore A	8
Diamond patterned	Black	Oil- and grease-resistant	70 ± 5 Shore A	8

#### Hot vulcanization

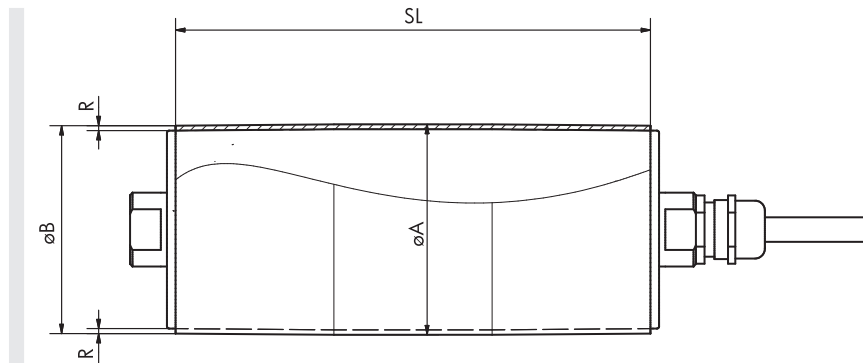
Lagging profile	Color	Features	Shore hardness	Thickness [mm]
Smooth	Black	Oil- and grease-resistant	65 ± 5 Shore A	2; 3; 4; 5; 6; 8; 10; 12; 14; 16
	White/blue	FDA food approved EC1935/2004 approved	70 ± 5 Shore A	
Longitudinal grooves	Black	Oil- and grease-resistant	65 ± 5 Shore A	6; 8; 10; 12; 14; 16
	White/blue	FDA food approved EC1935/2004 approved	70 ± 5 Shore A	
Diamond patterned	Black	Oil- and grease-resistant	65 ± 5 Shore A	6; 8; 10; 12; 14; 16
	White/blue	FDA food approved EC1935/2004 approved	70 ± 5 Shore A	
V-groove	Black	Oil- and grease-resistant	65 ± 5 Shore A	6; 8; 10; 12; 14; 16
	White/blue	FDA food approved EC1935/2004 approved	70 ± 5 Shore A	

# OPTIONS LAGGING

For friction drive belt applications

## Dimensions

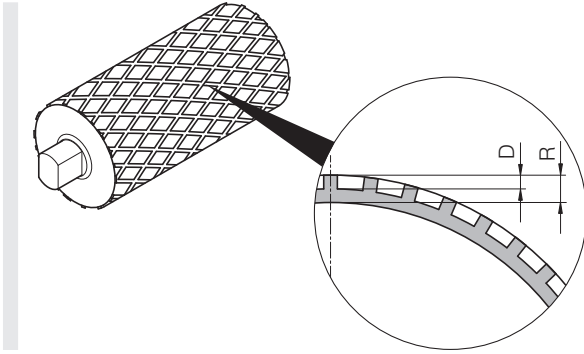
### Smooth



The standard cambers of the lagging are available in the following table.

Drum motor	Ø Tube [mm]	Cold vulcanization			Hot vulcanization		
		Min./max. R [mm]	Ø A [mm]	Ø B [mm]	Min./max. R [mm]	Ø A [mm]	Ø B [mm]
DM 0080	81.5	3	87.5	86.5	2	85.5	84.0
		4	89.5	88.5	6	93.5	92.0
DM 0080 oil-free	81.5				2	85.5	84.5
					16	113.5	112.5
DM 0113	113.5	3	119.5	118	2	117.5	116
		4	121.5	120	16	145.5	144
DM 0113 oil-free	113.5				2	117.5	116
					16	145.5	144
DM 0138	138	3	144	142	2	142	140
		4	146	144	16	170	168
DM 0165	164	3	170	168	2	168	166
		4	172	170	16	196	194

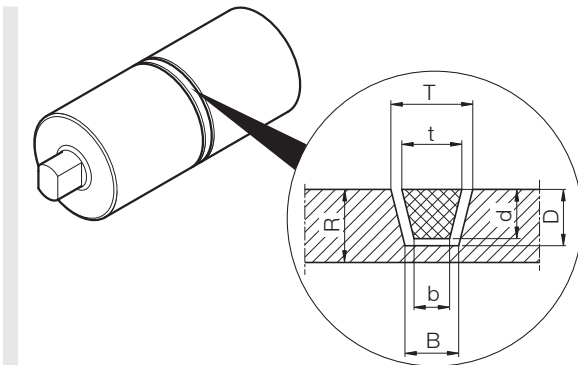
## Diamond patterned



D [mm]	R, cold vulcanization [mm]	R, hot vulcanization [mm]
4	8	6, 8, 10, 12, 14, 16

**Note:** Only possible for motors of DM series.

## V-groove hot vulcanization



Groove	R Standard [mm]	R Option [mm]	Groove			Belt		
			T [mm]	B [mm]	D [mm]	t [mm]	b [mm]	d [mm]
K6	8	6	10	8	5	6	4	4
K8	8	6	12	8	6	8	5	5
K10	10	8	14	10	7	10	6	6
K13	12	10	17	11	9	13	7.5	8
K15	12	10	19	13	9	15	9.5	8
K17	14	12	21	13	12	17	9.5	11

**Note:** Only possible for motors of DM series.

## OPTIONS LAGGING

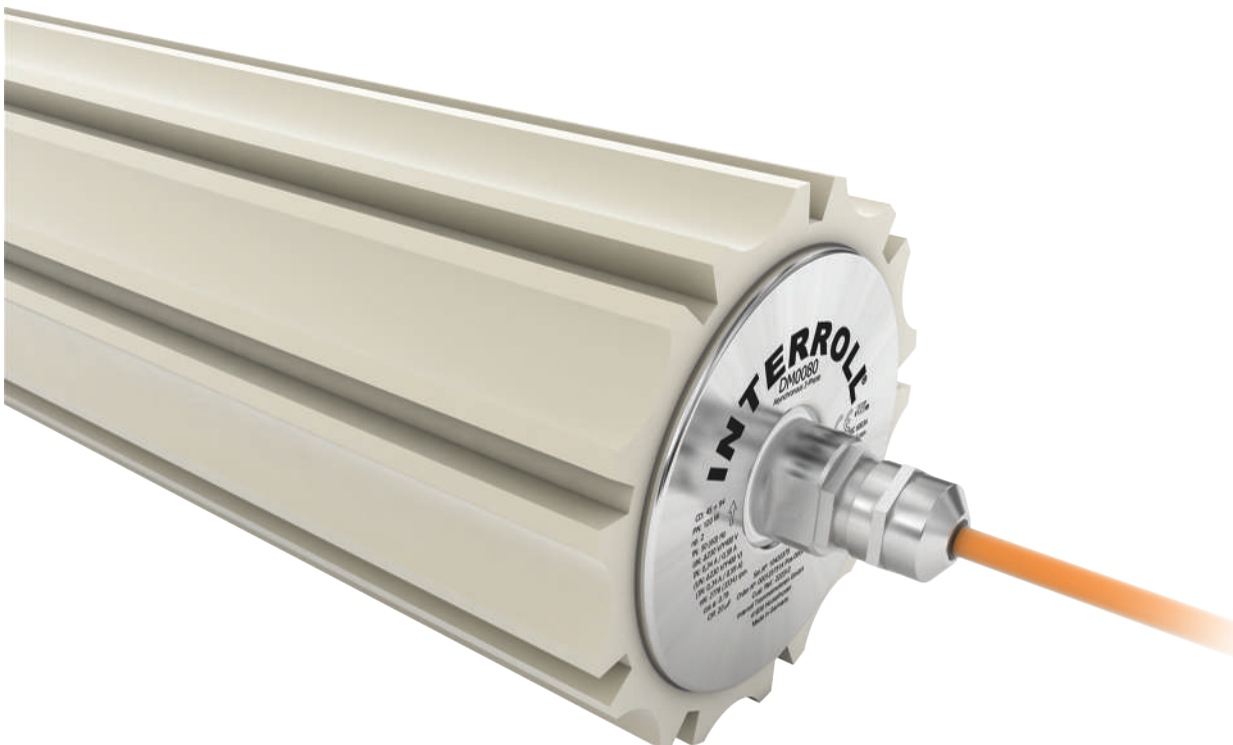
For modular plastic belt applications



### Hygienic, quiet and long lifespan

Based on the specifications of the specific belt manufacturer, up to 38 teeth mesh with the profile of the most common modular plastic belts. The lagging made of hot-vulcanized NBR is suitable for applications in food processing with high hygienic requirements: Easy to clean and extremely resistant to oil, grease and chemicals. Furthermore, it ensures smooth running and provides a long lifespan of the belt due to its low abrasion.

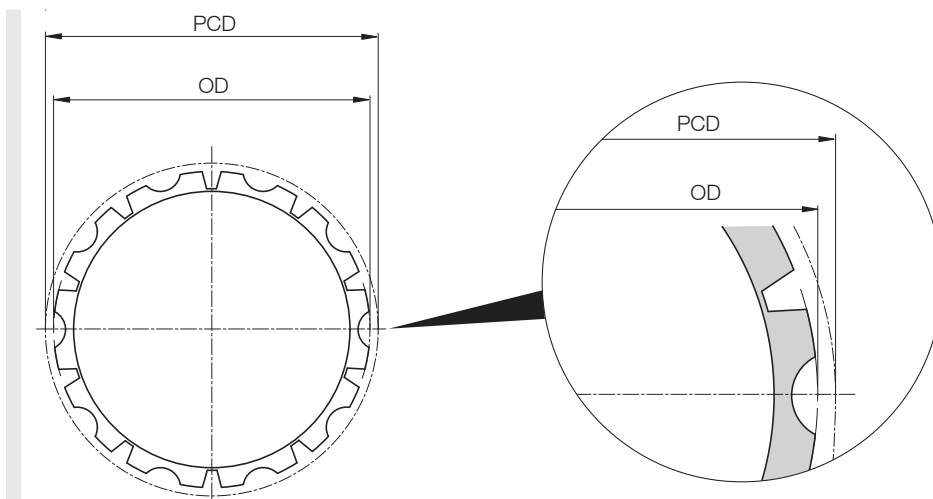
**Note:** It is important to incorporate a calculation of belt pull and speed that is adjusted to the greater outer diameter of the drum motor. Please refer to the velocity factor (VF) in the table page 72.



## Technical data

<b>Material</b>	Hot vulcanized NBR
<b>Temperature range</b>	-40 to +120 °C
<b>Shore hardness</b>	70 ± 5 Shore A
<b>Colors</b>	White/blue
<b>Approvals</b>	FDA/EC 1935/2004

## Versions



OD = Outer diameter in mm      PCD = Pitch diameter in mm

# OPTIONS LAGGING

For modular plastic belt applications

## DM 0080 and DM 0113 lagging product selection

Belt manufacturer	Series	Lagging DM 0080				Lagging DM 0113			
		Z	OD [mm]	PCD [mm]	VF	Z	OD [mm]	PCD [mm]	VF
Ammeraal Beltech/ Uni-Chains	HDS60500	24	98.5	97.3	1.21	32	131.0	129.6	1.14
	HDS61000	12	99.0	98.1	1.22	16	132.0	130.2	1.15
	HDS62000	7	110.8	114.1	1.42	9	144.2	146.2	1.29
	CNB	12	98.0	98.5	1.22	16	131.0	130.7	1.15
	MPB	7	105.5	117.1	1.45	9	140.0	148.5	1.31
	OPB-4					9	144.0	146.2	1.29
	OPB-8					9	139.5	146.2	1.29
	S-MPB	12	97.9	100.1	1.24	16	132.0	132.3	1.17
	UNI QNB					16	131.2	130.7	1.15
	X-MPB					8	152.0	165.9	1.46
Eurobelt	B50								
Habasit	M1200 PE/AC	24	92.5	97.3	1.21	32	125.0	129.6	1.14
	M1200 PP	24	96.0	101.0	1.25	32	128.0	132.6	1.17
	M2500	12	99.4	99.0	1.23	16	132.8	131.6	1.16
	M5000					9	140.0	149.0	1.31
Intralox	800	7	105.5	116.5	1.45	9	140.1	148.5	1.31
	850					9	143.6	148.5	1.31
	1600	13	105.8	105.8	1.31	16	130.5	130.2	1.15
	1650	13	104.9	105.8	1.31	16	129.3	130.2	1.15
	1800					8	152.0	165.9	1.46
	1100 FG PE/AC	20	91.0	98.9	1.23	26	120.6	128.4	1.13
	1100 FG PP	20	91.5	99.5	1.24	26	121.4	129.1	1.14
	1100 FT PE/AC	20	93.5	97.3	1.21	27	128.0	131.0	1.15
	1100 FT PP	20	94.0	98.3	1.22	26	124.0	127.6	1.12
Rexnord	1010	12	97.5	98.1	1.22	16	130.0	130.2	1.15
	2010					9	138.8	147.9	1.30
Scanbelt	S.25-100 & 600	12	92.2	98.7	1.23	16	123.0	128.2	1.13
	S.25-800	12	93.6	96.8	1.20	16	125.8	128.3	1.13
	S.50-100 & 600					9	131.2	146.8	1.29
	S.50-800					9	136.0	146.2	1.29
	S.50-801					9	138.0	139.0	1.22



# OPTIONS LAGGING

For modular plastic belt applications

Belt manufacturer	Series	Lagging DM 0080				Lagging DM 0113			
		Z	OD [mm]	PCD [mm]	VF	Z	OD [mm]	PCD [mm]	VF
Forbo-Siegling	LM14 Series 4	21	93.0	95.3	1.18				
	LM14 Series 2	13	107.0	107.0	1.33	16	131.5	131.5	1.16
	LM50 Series 3					9	140.0	146.2	1.29
	LM50 Series 6	7	107.5	116.2	1.44	9	137.5	146.2	1.29

## DM 0138 and DM 0165 lagging product selection

Belt manufacturer	Series	Lagging DM 0138				Lagging DM 0165			
		Z	OD [mm]	PCD [mm]	VF	Z	OD [mm]	PCD [mm]	VF
Ammeraal Beltech/ Uni-Chains	HDS60500	38	155.2	153.8	1.11				
	HDS61000	19	156.6	154.3	1.12				
	HDS62000	10	160.5	161.8	1.17	12	193.0	193.3	1.18
	CNB	19	155.5	154.9	1.12				
	MPB	10	156.6	164.4	1.19	12	190.0	196.3	1.20
	OPB-4	10	160.0	161.8	1.17				
	OPB-8	10	155.5	161.8	1.17				
	S-MPB	20	165.0	164.9	1.19	24	198.0	199.0	1.21
	UNI QNB								
	X-MPB								
Eurobelt	B50	10	154.0	161.8	1.17	12	187.0	193.2	1.18
Habasit	M1200 PE/AC	38	149.5	153.8	1.11				
	M1200 PP	38	154.0	158.6	1.15				
	M2500	20	165.0	163.5	1.18	23	190.5	189.7	1.16
	M5000	10	156.6	164.4	1.19	12	190.5	197.2	1.20

# OPTIONS LAGGING

For modular plastic belt applications

Belt manufacturer	Series	Lagging DM 0138				Lagging DM 0165			
		Z	OD [mm]	PCD [mm]	VF	Z	OD [mm]	PCD [mm]	VF
Intralox	800	10	156.8	164.4	1.19	12	190.0	196.3	1.20
	850					12	187.0	196.3	1.20
	1600	20	163.0	162.4	1.18	23	187.4	186.5	1.14
	1650	20	162.0	162.4	1.18	23	186.3	186.4	1.14
	1800	9	174.0	185.7	1.35				
	1100 FG PE/AC	32	150.0	157.8	1.14				
	1100 FG PP	32	151.0	158.8	1.15				
	1100 FT PE/AC	32	152.6	156.0	1.13				
	1100 FT PP	32	153.0	156.9	1.14	38	184.0	186.2	1.14
Rexnord	1010								
	2010	10	156.8	165.0	1.20				
Scanbelt	S.25-100 & 600	19	146.5	151.9	1.10				
	S.25-800	20	157.8	159.8	1.16				
	S.50-100 & 600	11	164.5	178.2	1.29	12	179.0	193.0	1.18
	S.50-800	10	155.2	163.9	1.19	12	185.0	193.2	1.18
	S.50-801	10	155.0	164.0	1.19	12	185.0	195.6	1.19
Forbo-Siegling	LM14 Series 4								
	LM14 Series 2								
	LM50 Series 3	10	157.0	161.8	1.17	12	189.0	193.2	1.18
	LM50 Series 6	11	170.6	180.0	1.30	13	205.0	208.9	1.27

Z = Number of teeth      PCD = Pitch diameter in mm  
OD = Outer diameter in mm      VF = Velocity factor

**Note:** Only possible for motors of DM series.

If your preferred belt type or manufacturer is not listed here, please contact Interroll.

## OPTIONS LAGGING

For modular plastic belt applications

Drum motor

Options and accessories

Application notes

## OPTIONS LAGGING

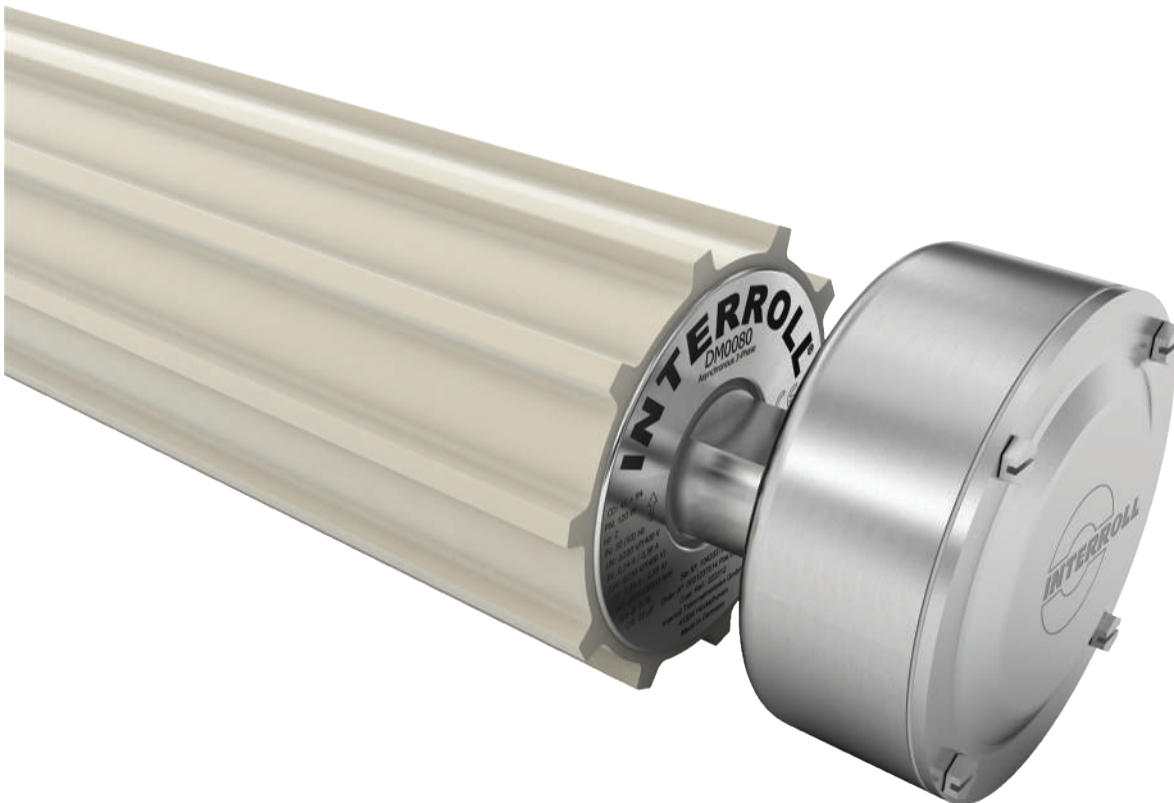
For positive drive solid homogeneous belts



### Hygienic and quiet

The lagging made of Interroll Premium Hygienic PU is suitable for applications in food processing with high hygienic requirements: Easy to clean and extremely resistant to oil, grease and chemicals. Furthermore, it ensures smooth running and provides a long lifespan of the belt due to its low abrasion. This lagging is available for the most common positive drive solid homogeneous belts as well as for motors in applications with positive drive belts.

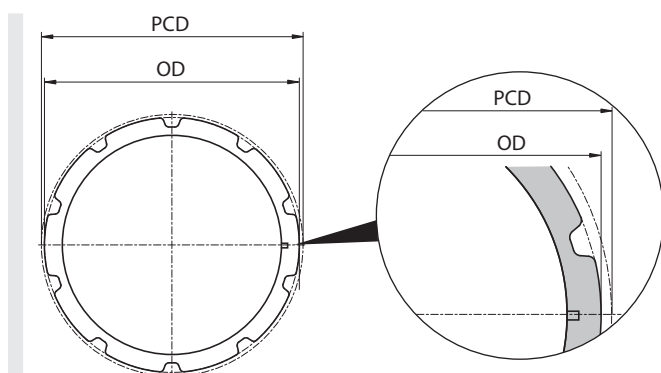
**Note:** It is important to incorporate a calculation of belt pull and speed that is adjusted to the greater outer diameter of the drum motor. Please refer to the velocity factor (VF) in the table page 77.



## Technical data

<b>Material</b>	Interroll Premium Hygienic PU
<b>Temperature range</b>	−40 to +80 °C
<b>Shore hardness</b>	82 ± 5 Shore D

## Versions



OD = Outer diameter in mm      PCD = Pitch diameter in mm

## DM 0080 and DM 0113 lagging product selection

Belt manufacturer	Series	Lagging DM 0080				Lagging DM 0113			
		Z	OD [mm]	PCD [mm]	VF	Z	OD [mm]	PCD [mm]	VF
<b>Intralox</b>	TD 8026 PU (endless)	13	104.2	OD + BT	1.32	18	144.3	OD + BT	1.32
	TD 8050 PU (endless)					9	142	145	1.28
<b>Volta</b>	DD 3 mm MW/MB (endless)					9	145.5	148.5	1.31
<b>Habasit</b>	CD.M50 (endless)					9	142	145	1.28
	CD.M50 - Lace					9	142	145	1.28
<b>Ammeraal</b>	SoliFlex PRO 2 mm (endless PU-light blue)	7	111	OD + BT	1.39	9	143.5	145.5	1.28
	SoliFlex PRO 3 mm (endless PU-light blue)	7	111	OD + BT	1.40	9	143.5	146.5	1.29

# OPTIONS

## LAGGING

For positive drive solid homogeneous belts

### DM 0138 and DM 0165 lagging product selection

Belt manufacturer	Series	Lagging DM 0138				Lagging DM 0165			
		Z	OD [mm]	PCD [mm]	VF	Z	OD [mm]	PCD [mm]	VF
Intralox	TD 8026 PU (endless)	20	161.5	OD+BT					
	TD 8050 PU (endless)	10	158	161	1.17	12	190.2	193.2	1.18
	TD 8050 PU/XT (endless)					12	190.2	193.2	1.18
Volta	DD 3 mm MW/MB (endless)	10	162	165	1.2				
Habasit	CD.M50 (endless)	10	158	161	1.17	12	190.2	193.2	1.18
	CD.M50 - Lace	10	158	161	1.17	12	190.2	193.2	1.18
Ammeraal	SoliFlex PRO 2 mm (endless PU-light blue)	10	159.8	161.8	1.17				
	SoliFlex PRO 3 mm (endless PU-light blue)	10	159.8	162.8	1.18	12	192.4	195.4	1.19
	SoliFlex PRO 4 mm (endless PU-light blue)					12	192.4	196.4	1.2

Z = Number of teeth      VF = Velocity factor  
 OD = Outer diameter in mm      BT = Belt thickness  
 PCD = Reference diameter in mm

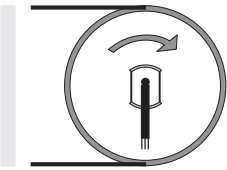
**Note:** Lace versions cannot be driven with our PU laggings.  
Only possible for motors of DM series.

If your preferred belt type or manufacturer is not listed here, please contact Interroll.

### Backstops and balancing

#### Backstops

Backstops prevent a run-back of the belt and load when the power supply is off. Since such a stop is installed directly at the rotor shaft and operates mechanically, no electrical connection is required: The bearing runs only in one direction. This principle achieves a higher holding torque than does an electromagnetic brake.



**Note:** Backstops are available only for asynchronous drum motors.

Rotational direction looking from the connector side: Available for clockwise (standard) or counterclockwise direction.

#### Balancing

In principle, static or dynamic balancing can be applied - depending on requirement or motor type. The goal in each case is to reduce vibrations and out-of-balance running for sensitive high speed or dynamic weighing applications. Static balancing is applied to the drum motor shell only; therefore the result must be tested for each application. Dynamic balancing, on the other hand, includes the drum motor rotor, shell and end housings, thus meeting a balancing grade of G2.5.

Any external modification, such as fixtures, laggings or sprockets, has an impact on the imbalance.

#### Technical data for dynamic balancing

End housing	Stainless steel
Rubber lagging material	Only hot vulcanized NBR and PU may be used
Max. balancing length	FW ≤ 800 mm

# OPTIONS

## ELECTROMAGNETIC BRAKES

### Electromagnetic brakes

To safely hold loads on reversible inclined and declined conveyors, electromagnetic brakes are used. They operate via rectifiers. The braking force is applied directly to the rotor shaft of the drum motor. When power to the motor is disrupted, the brake will close automatically. Special advantage: Electromagnetic brakes are quiet and operate with low wear.

#### Technical data

	DM 0080		DM 0113			DM 0138			DM 0165		
Rated torque M [Nm]	0.7	0.7	1.5	1.5	1.5	2.9	2.9	2.9	5.95	5.95	5.95
Rated power [W]	8	10	16	17	16	25	22	22	33	33	33
Rated voltage [V DC]	24	104	24	104	207	24	104	207	24	104	207
Rated current [A]	0.33	0.096	0.66	0.163	0.077	1.0	0.211	0.11	1.38	0.32	0.16
DC switching t1 [ms]	13	13	26	26	26	26	26	26	46	46	46
AC switching t1 [ms]	80	80	200	200	200	200	200	200	260	260	260
Opening delay time t2 [ms]	20	20	30	30	30	30	30	30	40	40	40

#### Response time

The brake opening and closing response time can vary substantially depending on the following:

- Oil type and viscosity
- Oil quantity in the drum motor
- Ambient temperature
- Internal operating temperature of the motor
- Switching at input (AC switching) or at output (DC switching)

The difference between AC switching and DC switching is shown in the following table:

	AC switching	DC switching
Closing response time	Slow	Fast
Brake voltage	approx. 1 V	approx. 500 V

**Note:** For DC switching, the switching contacts must be protected against damage from high voltage.



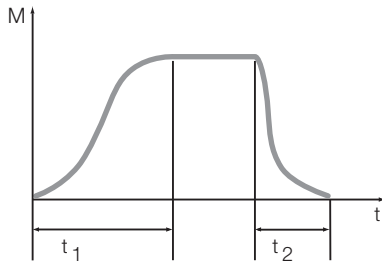


Fig.: Closing and opening response time

$t_1$  = Closing response time  
 $t_2$  = Opening response time

### Reduction of braking torque

The rated braking torque is heavily influenced by the operating conditions inside the drum motor (operation in oil at high temperatures) and the ambient temperature. To calculate the holding torque limit on the drum shell, you need to multiply the rated torque of the brake by the gear ratio of the drum motor. For safety reasons, the calculated brake torque has to be at least 25 % higher than the needed load torque.

# OPTIONS RECTIFIERS

## Rectifiers

Electromagnetic brakes on drum motors are operated via rectifiers. Different versions are available depending on the applications: Half-wave and bridge rectifiers for standard applications as well as fast acting and multiswitch rectifiers for applications in which short opening delay times are necessary.

**Note:** Rectifiers, just like electromagnetic brakes, are available only for asynchronous drum motors.

Every rectifier is an external component that must be covered or installed in a control box as close to the brake as possible.

### Technical data

Input voltage [V AC]	Brake voltage [V DC]	Starting voltage [V DC]	Holding voltage [V DC]	Version	Application	Article number
115	104	104	52	Fast-acting rectifier	A or B	61 011 343
230	207	207	104	Fast-acting rectifier	A or B	61 011 343
230	104	104	104	Half wave/bridge rectifier	A or B	1 001 440
230	104	190	52	Phase rectifier	A	1 001 442
400	104	180	104	Multiswitch rectifier	A	1 003 326
460	104	180	104	Multiswitch rectifier	A	1 003 326
460	207	207	207	Half wave/bridge rectifier	A or B	1 001 441

A = Continuous operation

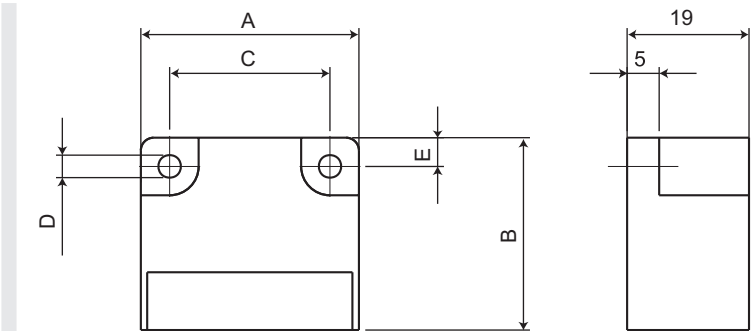
B = Frequent starts/stops

Using a fast acting rectifier or a phase rectifier will save energy because the holding voltage is lower than the starting voltage.

Shielded cables should be used to protect against EMC.

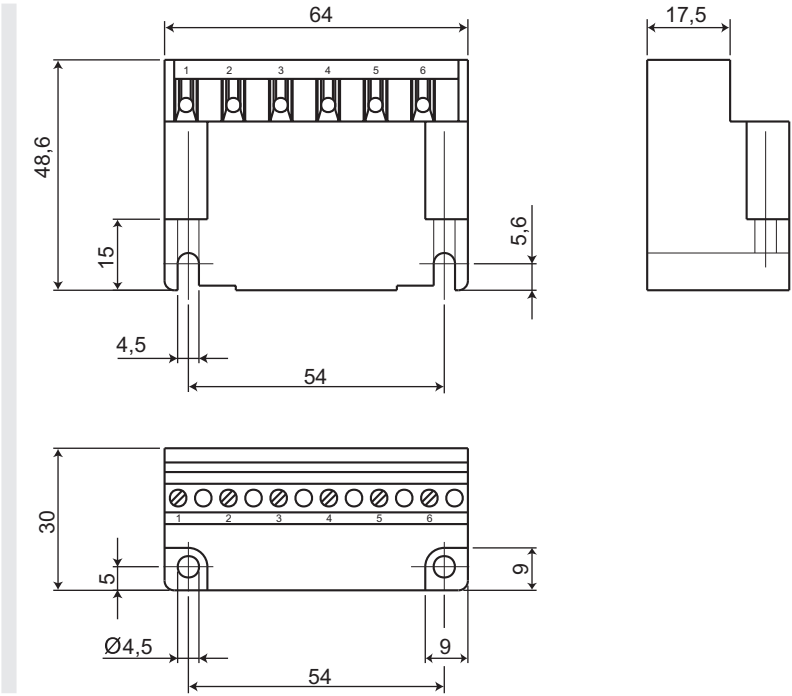
Dimensions

Half wave/bridge rectifier



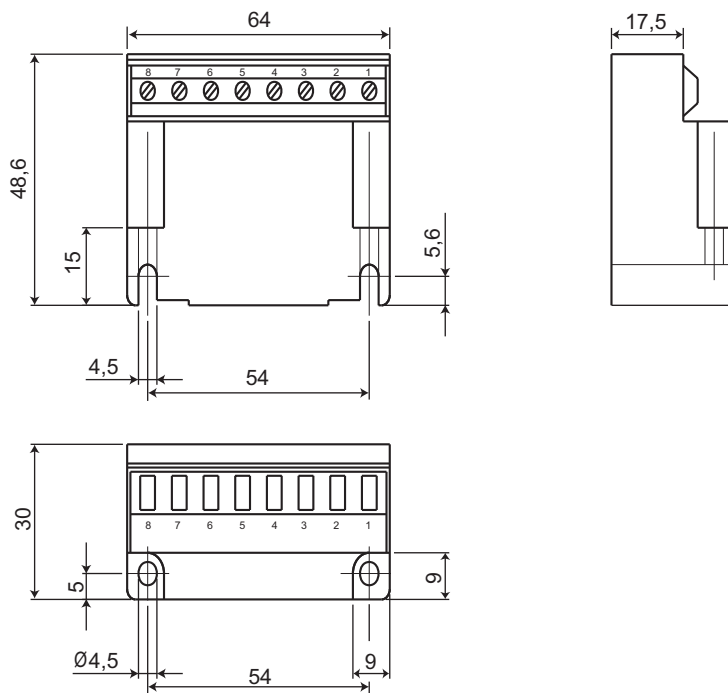
Article number	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]
1001440	34	30	25	3.5	4.5
1001441	64	30	54	4.5	5

Phase rectifier

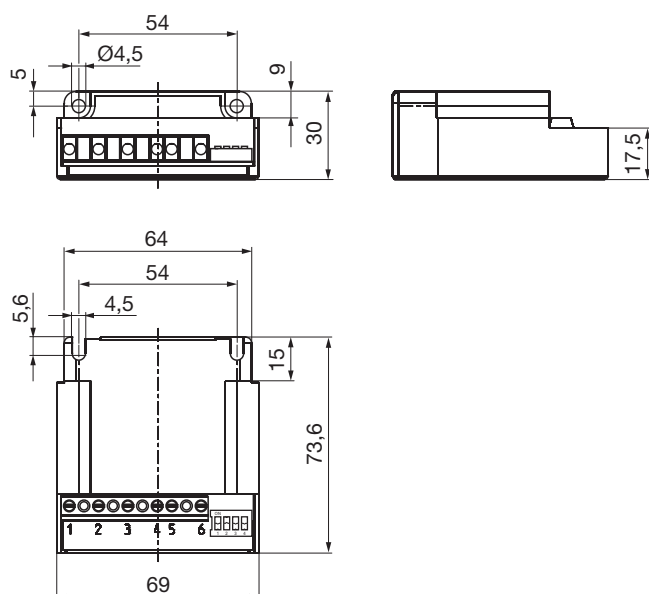


# OPTIONS RECTIFIERS

## Fast-acting rectifier



## Multiswitch rectifier



## Connection diagram

Interroll recommends installing a switch between (3) and (4) for fast brake release.

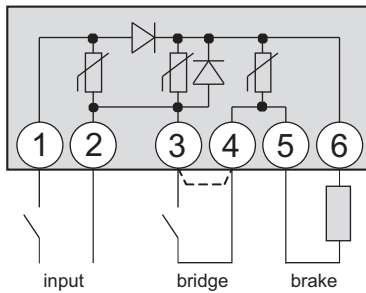


Fig.: Half-wave rectifier

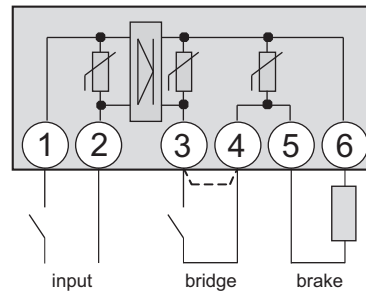


Fig.: Bridge rectifier

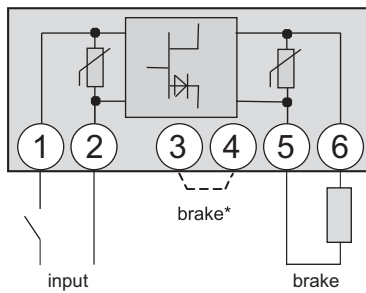


Fig.: Phase rectifier

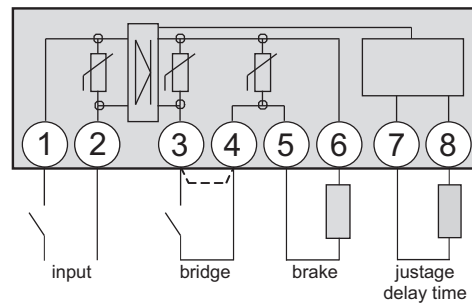


Fig.: Fast-acting rectifier

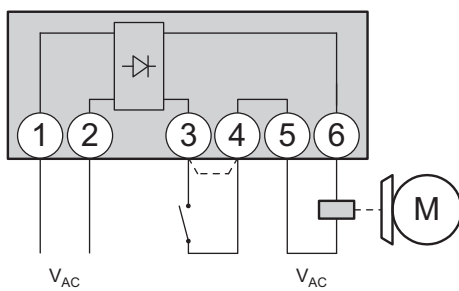


Fig.: Multiswitch rectifier

# OPTIONS

## FEEDBACK DEVICES

### Feedback devices

If speed, direction and position of the belt or load are to be permanently monitored and controlled, the use of an encoder is recommended. It enables a system control with closed control loop by transmitting low- to high-resolution signals to an external control unit. An encoder is installed onto the rotor shaft or embedded in the rotor bearing and cannot be used simultaneously with a brake or a backstop. Incremental and absolute value encoders are available as encoder types.

All resolutions and speeds provided in the following table refer to the rotor shaft. The drum motor gear ratio must be considered to find the values related to the drum shell.

Encoder types		Asynchronous drum motors	Synchronous drum motors
SKF 32 incremental encoder	32 pulses	●	
RLS incremental encoder	64 to 2048 pulses	●	●
LTN resolver	2-pole resolver	●	●

### Technical data

#### SKF 32 incremental encoder

Power supply	$V_{dd} = 5 - 24 \text{ V}$
Current consumption	Max. 20 mA
Electrical interface	Open collector NPN
Output increments	A, B
Increments resolution	32 pulses/revolution
Max. cable length	10 m

**Note:** Interroll recommends the use of an optocoupler for the following reasons:

- To protect the encoder
- To enable connection to other levels such as PNP
- To get the maximum potential between high and low signal

#### RLS incremental encoder

	RS422A 5 V	Push-pull 24 V
Supply voltage	$5 \text{ V} \pm 5 \%$	8–26 V
Power supply	35 mA	50 mA at 24 V
Increments resolution	32, 64, 128, 256, 512, 1024, 2048	32, 64, 128, 256, 512, 1024, 2048
Output signal	A, /A, B, /B, Z, /Z	A, /A, B, /B, Z, /Z
Max. cable length	5 m	5 m

## LTN resolver

Power supply	7 V
Input frequency range	5 kHz / 10 kHz
Input current	58 mA / 36 mA
Number of poles	2
Transformation ratio	0.5 ± 10 %
Max. cable length	10 m

## SKS36 Hiperface\* (Sick/Stegman)

Power supply	7 to 12 V (recommended 8 V)
Current consumption	max. 60 mA
Data transfer	Hiperface
Serial data	RS485
Single turn resolution	4096 positions / revolution
Sine/cosine periods per revolution	128
Max. cable length	10 m

\* More information about the SKS36 Hiperface (Sick/Stegman) is available from your Interroll customer representative.

## Connection diagrams

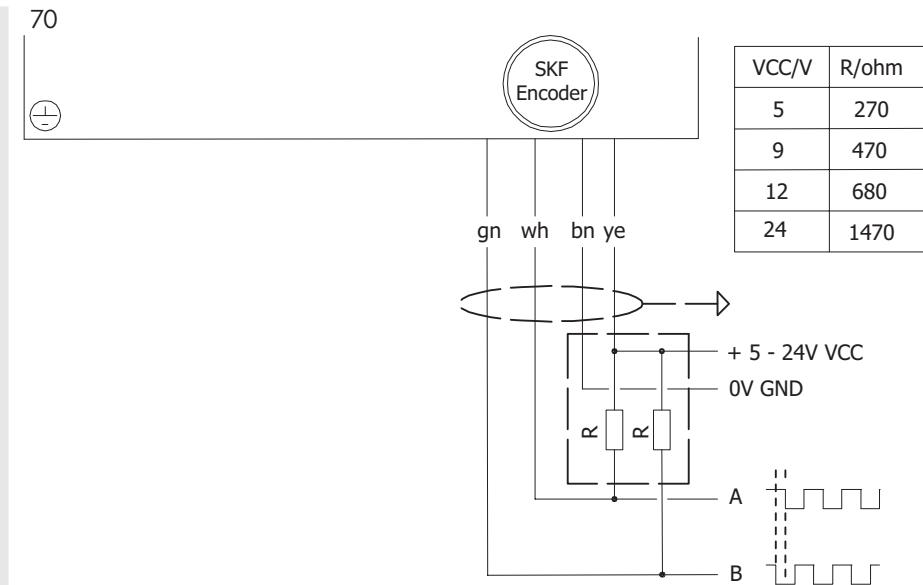
### Abbreviations

ye/gn = yellow/green  
wh = white  
bn = brown  
gn = green  
ye = yellow  
() = other color  
gy = gray

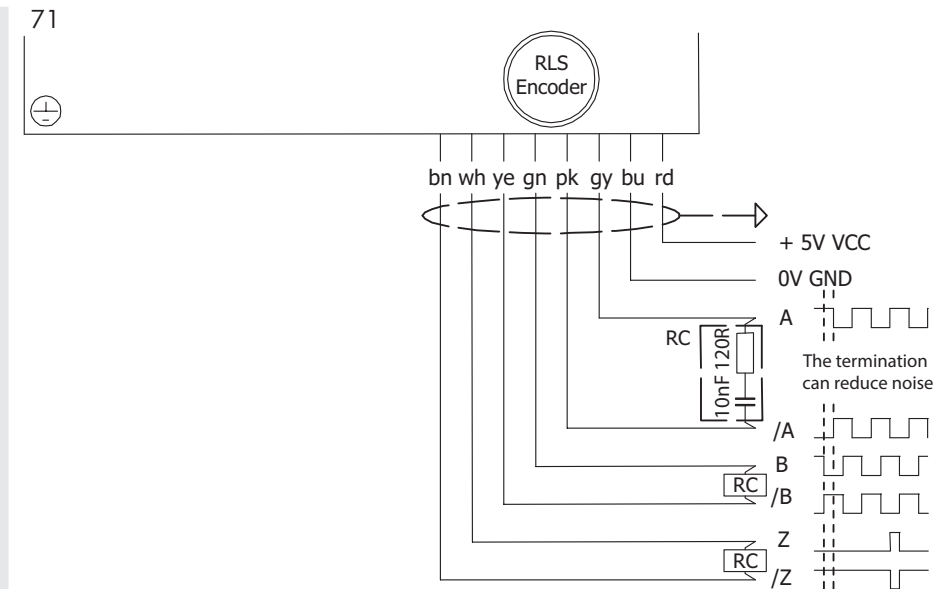
pk = pink  
rd = red  
bu = blue  
TC = Thermal controller (WSK)  
BR = Electromagnetic brakes  
NC = Not connected

# OPTIONS FEEDBACK DEVICES

SKF 32 incremental encoder

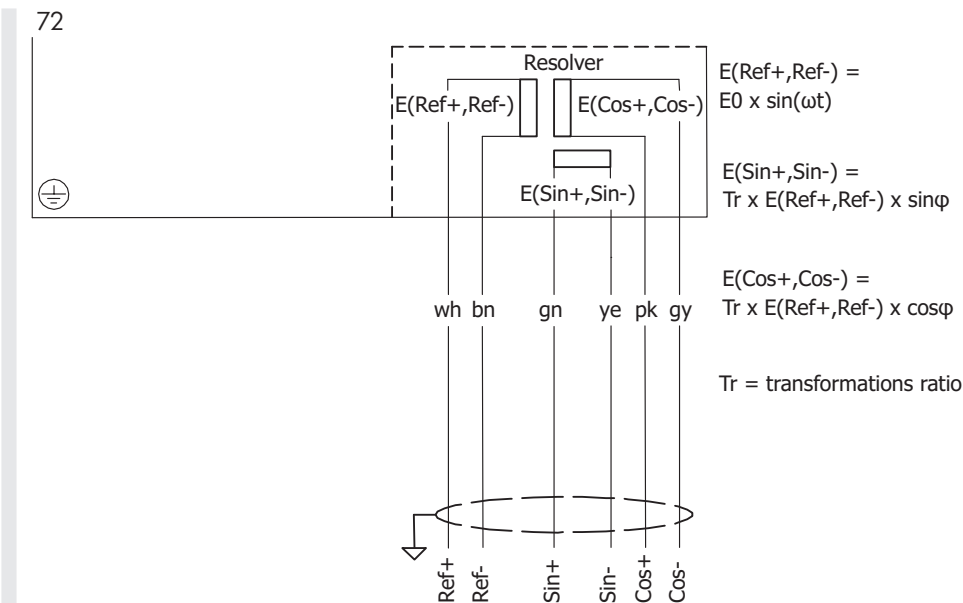


RLS incremental encoder

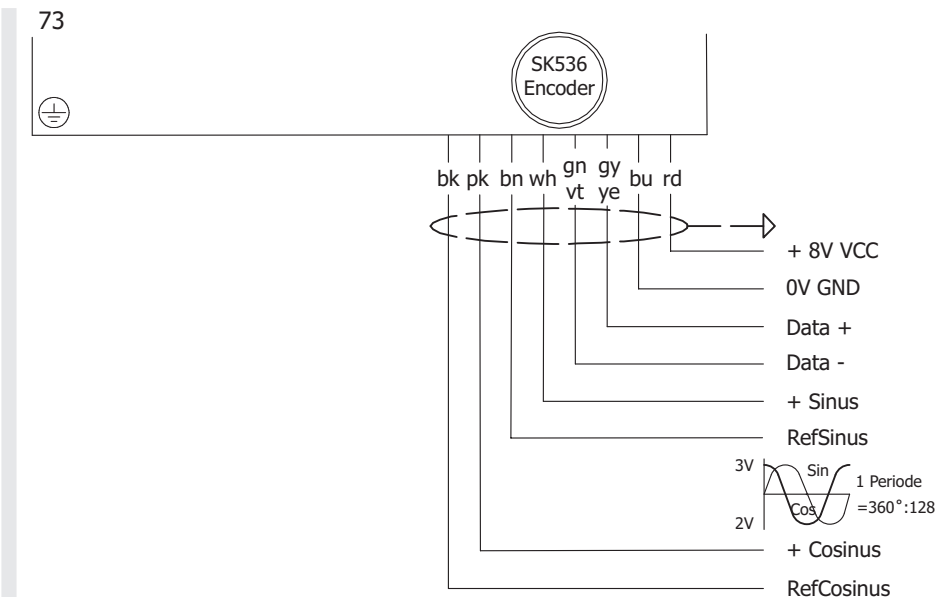




## LTN resolver



## SKS36 Hiperface\* (Sick/Stegman)



\* More information about the SKS36 Hiperface (Sick/Stegman) is available from your Interroll customer representative.

## OPTIONS

### FEEDBACK DEVICES

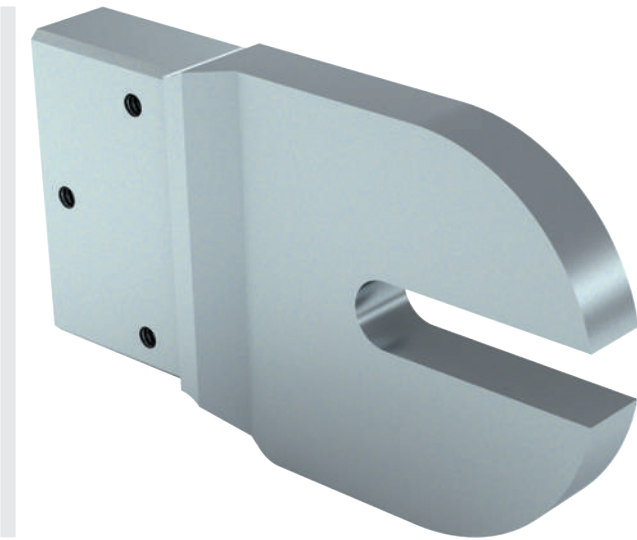
#### Cable

	Cable for incremental encoder SKF 32	Cable for incremental encoder RLS	Cable for resolver LTN	SKS36 Hiperface (Sick/Stegman)
Main cores (number)	4	8	6	8
Cross section	0.14 mm <sup>2</sup>	0.14 mm <sup>2</sup>	0.14 mm <sup>2</sup>	0.15 mm <sup>2</sup>
Numeric code and color code	Color code	Color code	Color code	Color code
Insulation conductors (main cores)	PVC	PVC	PVC	PP
Insulation conductors (data cores)	PVC	PVC	PVC	PUR
Halogen-free	No	Yes	No	Yes
Color of outer sheath	Gray	Gray	Gray	Black
Shielded	Copper	Copper	Copper	Copper
Outside diameter	4.3 ± 0.3 mm	5.0 ± 0.2 mm	5.8 ± 0.3 mm	5.3 ± 0.3 mm
Operating voltage max.	250 V	524 V	350 V	250 V
Temperature range	-20 to +105 °C according to UL	-20 to +105 °C according to UL	-20 to +80 °C according to UL	-20 to +80 °C according to UL

## ACCESSORIES MOUNTING BRACKETS

For drum motors and idler pulleys

### Mounting brackets



In order to securely fasten Interroll Drum Motors, the corresponding idler pulleys or motors with cable connectors or terminal boxes, suitable brackets made of stainless steel, aluminum and PE are available. It is important that the drum motors feature a continuous threaded hole in the front shaft and idler pulleys a corresponding drilled hole in both shaft ends.

For the dimensions of shafts with threaded holes, refer to the dimensional drawings for the corresponding drum motor.

### Product selection

Drum motor	Idler pulley	Fastening set	Material	Electrical connector	Article number			
					WAF 13.5 mm	WAF 20 mm	WAF 25 mm	WAF 30 mm
DM 0080		A + B	Aluminum	Elbow connector Straight connector Terminal box	61008694	61113879	61113880	
	IM 0080	B + C	Aluminum		61008696	61113885	61113886	
DM 0080		A + B	PE	Elbow connector Straight connector Terminal box	61008693	61113889	61113890	
	IM 0080	B + C	PE		61008695	61113895	61113896	
DM 0080		A + B	VA	Elbow connector Straight connector Terminal box	61113943	61113944	61113945	
	IM 0080	B + C	VA		61113946	61113947	61113948	

## ACCESSORIES

### MOUNTING BRACKETS

For drum motors and idler pulleys

Drum motor	Idler pulley	Fastening set	Material	Electrical connector	Article number			
					WAF 13.5 mm	WAF 20 mm	WAF 25 mm	WAF 30 mm
DM 0113		A + B	Aluminum	Elbow connector Straight connector Terminal box		61008698	61115658	
DM 0113		A + B	Aluminum	Cable connection slot		61008699	61115661	
	IM 0113	B + C	Aluminum			61008701	61115664	
DM 0113		A + B	PE	Elbow connector Straight connector Terminal box		61006805	61115659	
DM 0113		A + B	PE	Cable connection slot		61008697	61115662	
	IM 0113	B + C	PE			61008700	61115665	
DM 0113		A + B	VA	Elbow connector Straight connector Terminal box		61115655	61115657	
DM 0113		A + B	VA	Cable connection slot		61115656	61115660	
	IM 0113	B + C	VA			61115654	61115663	
DM 0138		A + B	Aluminum	Elbow connector Straight connector Terminal box		61008704	61116284	
DM 0138		A + B	Aluminum	Cable connection slot		61103900	61116285	
	IM 0138	B + C	Aluminum			61008706	61116286	
DM 0138		A + B	PE	Elbow connector Straight connector Terminal box		61008702	61116287	
DM 0138		A + B	PE	Cable connection slot		61100570	61116288	
	IM 0138	B + C	PE			61008705	61116289	
DM 0138		A + B	VA	Elbow connector Straight connector Terminal box		61116298	61116295	
DM 0138		A + B	VA	Cable connection slot		61116299	61116296	
	IM 0138	B + C	VA			61116300	61116297	
DM 0165*		A + B	Aluminum	Elbow connector Straight connector Terminal box				61008707
DM 0165*		A + B	Aluminum	Cable connection slot				61103901
	IM 0165*	B + C	Aluminum					61008708

\* DM 0165 only with key flat lengths of 25 mm

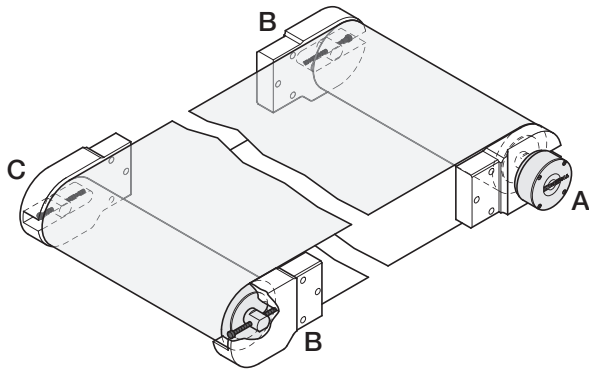
WAF = Width across flats

# ACCESSORIES MOUNTING BRACKETS

For drum motors and idler pulleys

## Mounting overview

Brackets must be mounted in the following way:



## Dimensions DM 0080

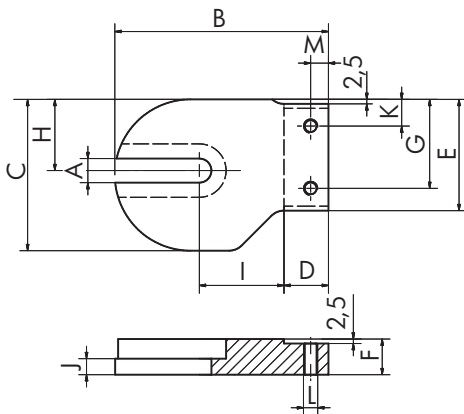


Fig.: Right bracket (A) aluminum or VA

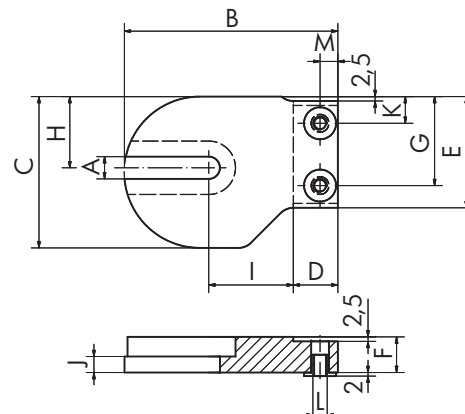


Fig.: Right bracket (A) PE

Drum motor/deflection roller	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]	J [mm]	K [mm]	L	M [mm]
DM 0080	13.5	120	85	25	62.5	20	50	40	47.5	9	15	M8	10
	20	120	85	25	62.5	20	50	40	47.5	9	15	M8	10
	25	120	85	25	62.5	20	50	40	47.5	9	15	M8	10

# ACCESSORIES

## MOUNTING BRACKETS

For drum motors and idler pulleys

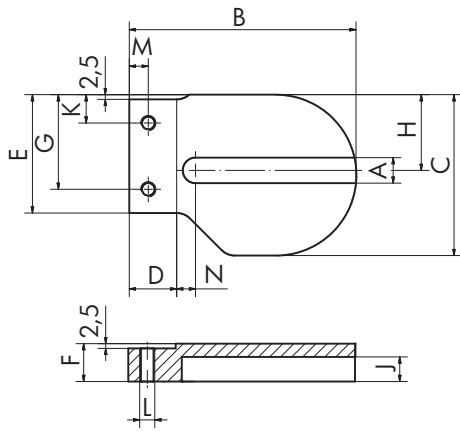


Fig.: Left bracket (B) aluminum or VA

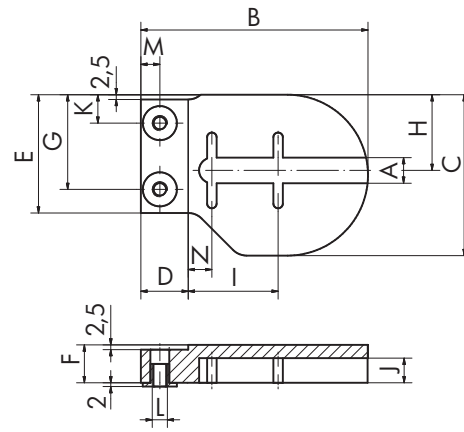


Fig.: Left bracket (B) PE

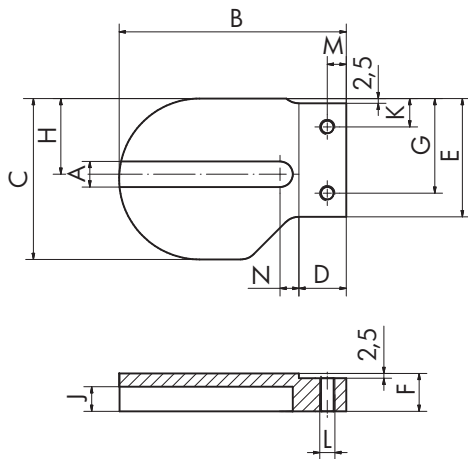


Fig.: Right bracket (C) aluminum or VA

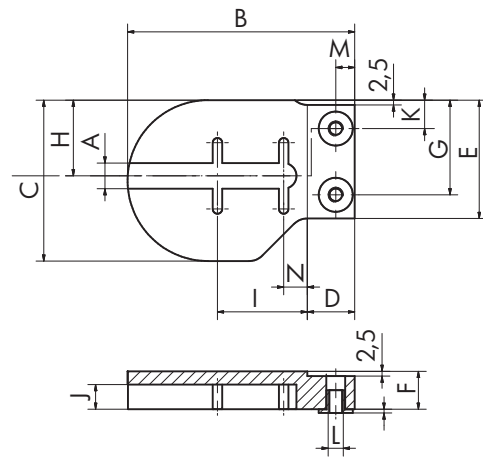


Fig.: Right bracket (C) PE

Drum motor/ idler pulley	Material	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]	G [mm]	H [mm]	I [mm]	J [mm]	K [mm]	L	M [mm]	N [mm]
DM 0080	Aluminum	13.5	120	85	25	62.5	20	50	40	–	13	15	M8	10	10
		20	120	85	25	62.5	20	50	40	–	13	15	M8	10	10
		25	120	85	25	62.5	20	50	40	–	13	15	M8	10	10
	PE	13.5	120	85	25	62.5	20	50	40	42.5	13	15	M8	10	12.5
		20	120	85	25	62.5	20	50	40	42.5	13	15	M8	10	12.5
		25	120	85	25	62.5	20	50	40	42.5	13	15	M8	10	12.5
	VA	13.5	120	85	25	62.5	20	50	40	–	13	15	M8	10	10
		20	120	85	25	62.5	20	50	40	–	13	15	M8	10	10
		25	120	85	25	62.5	20	50	40	–	13	15	M8	10	10

# ACCESSORIES MOUNTING BRACKETS

For drum motors and idler pulleys

## DM 0113, DM 0138 and DM 0165 dimensions

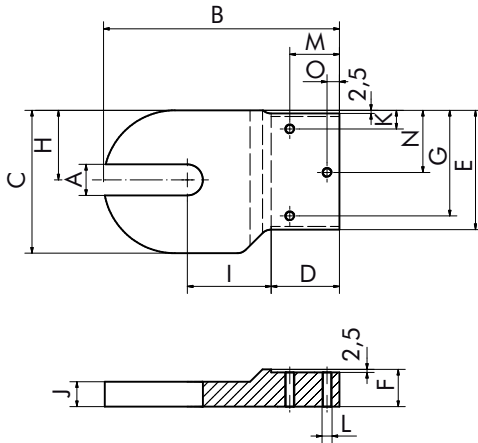


Fig.: Right bracket (A) aluminum or VA

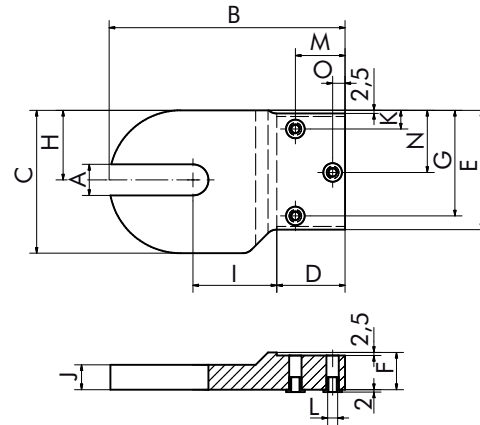


Fig.: Right bracket (A) PE

Drum motor/ deflection roller	A [mm]	B [mm]	C [mm]	D [mm]	S [mm]	F [mm]	G [mm]	H [mm]	I [mm]	J [mm]	K [mm]	L	M [mm]	N [mm]	O [mm]
DM 0113	20	190	115	55	96	30	85	56	67.5	20	15	M8	40	50	10
	25	190	115	55	96	30	85	56	67.5	20	15	M8	40	50	10
DM 0138	20	200	140	55	121	30	110	67	65	20	15	M10	40	62.5	10
	25	200	140	55	121	30	110	67	65	20	15	M10	40	62.5	10
DM 0165	30	240	170	55	146	30	122.5	81	100	20	27.5	M10	40	75	10

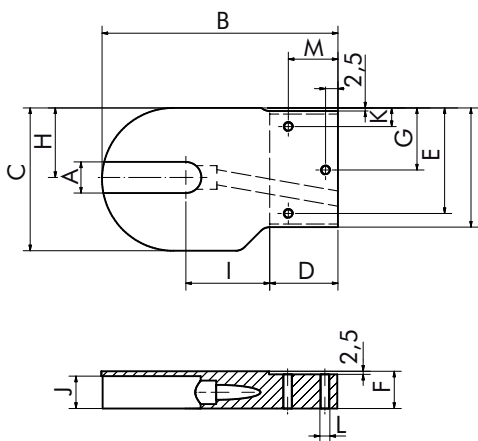


Fig.: Right bracket (A) aluminum or VA with cable connection slot

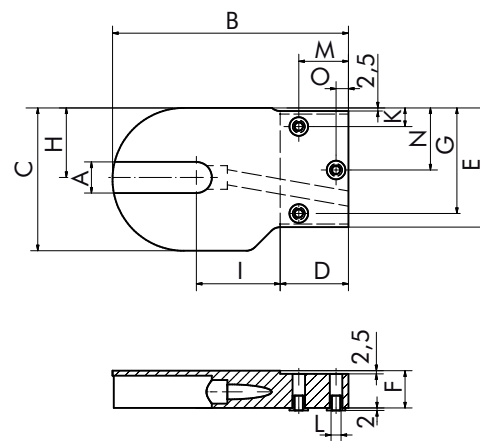


Fig.: Right bracket (A) PE for drum motor with cable connection slot

## ACCESSORIES

### MOUNTING BRACKETS

For drum motors and idler pulleys

Drum motor/ deflection roller	A [mm]	B [mm]	C [mm]	D [mm]	S [mm]	F [mm]	G [mm]	H [mm]	I [mm]	J [mm]	K [mm]	L	M [mm]	N [mm]	O [mm]
DM 0113	20	190	115	55	96	30	85	56	67.5	26	15	M8	40	50	10
	25	190	115	55	96	30	85	56	67.5	26	15	M8	40	50	10
DM 0138	20	200	140	55	121	30	110	67	65	20	15	M10	40	62.5	10
	25	200	140	55	121	30	110	67	65	20	15	M10	40	62.5	10
DM 0165	30	240	170	55	146	30	122.5	81	100	20	27.5	M10	40	75	10

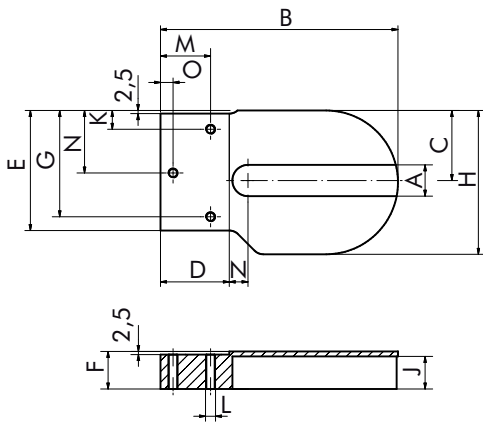


Fig.: Left bracket (B) aluminum or PE

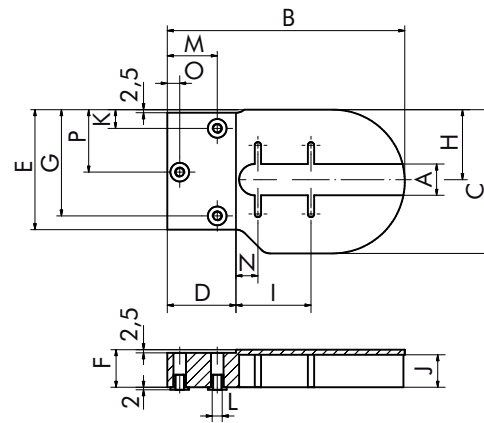


Fig.: Left bracket (B) PE

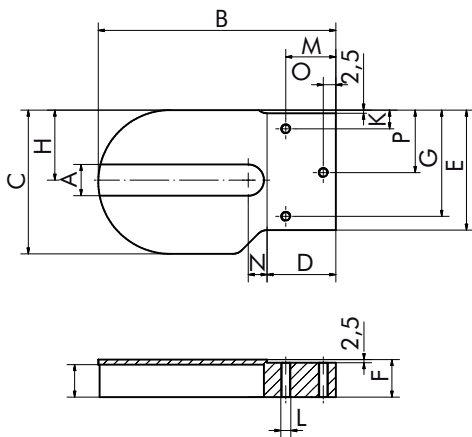


Fig.: Right bracket (C) aluminum or PE

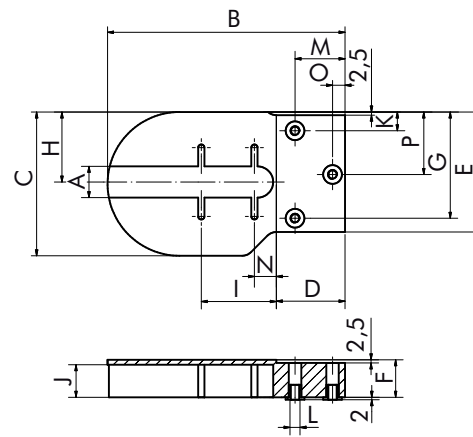


Fig.: Right bracket (C) PE



## ACCESSORIES MOUNTING BRACKETS

For drum motors and idler pulleys

Drum motor/ idler pulley	Material	A [mm]	B [mm]	C [mm]	D [mm]	S [mm]	F [mm]	G [mm]	H [mm]	I [mm]	J [mm]	K [mm]	L	M [mm]	N [mm]	O [mm]	P [mm]
DM 0113	Aluminum	20	190	115	55	96	30	85	56	–	26	15	M8	40	15	10	50
		25	190	115	55	96	30	85	56	–	26	15	M8	40	15	10	50
	PE	20	190	115	55	96	30	85	56	60	26	15	M8	40	17.5	10	50
		25	190	115	55	96	30	85	56	60	26	15	M8	40	17.5	10	50
	VA	20	190	115	55	96	30	85	56	–	26	15	M8	40	15	10	50
		25	190	115	55	96	30	85	56	–	26	15	M8	40	15	10	50
DM 0138	Aluminum	20	200	140	55	121	30	110	67	–	26	15	M10	40	15	10	62.5
		25	200	140	55	121	30	110	67	–	26	15	M10	40	15	10	62.5
	PE	20	200	140	55	121	30	110	67	62.5	26	15	M10	40	17.5	10	62.5
		25	200	140	55	121	30	110	67	62.5	26	15	M10	40	17.5	10	62.5
	VA	20	200	140	55	121	30	110	67	–	26	15	M10	40	15	10	62.5
		25	200	140	55	121	30	110	67	–	26	15	M10	40	15	10	62.5
DM 0165		30	240	170	55	146	30	122.5	81	–	26	27.5	M10	40	20	10	75

Drum motor

Options and accessories

Application notes

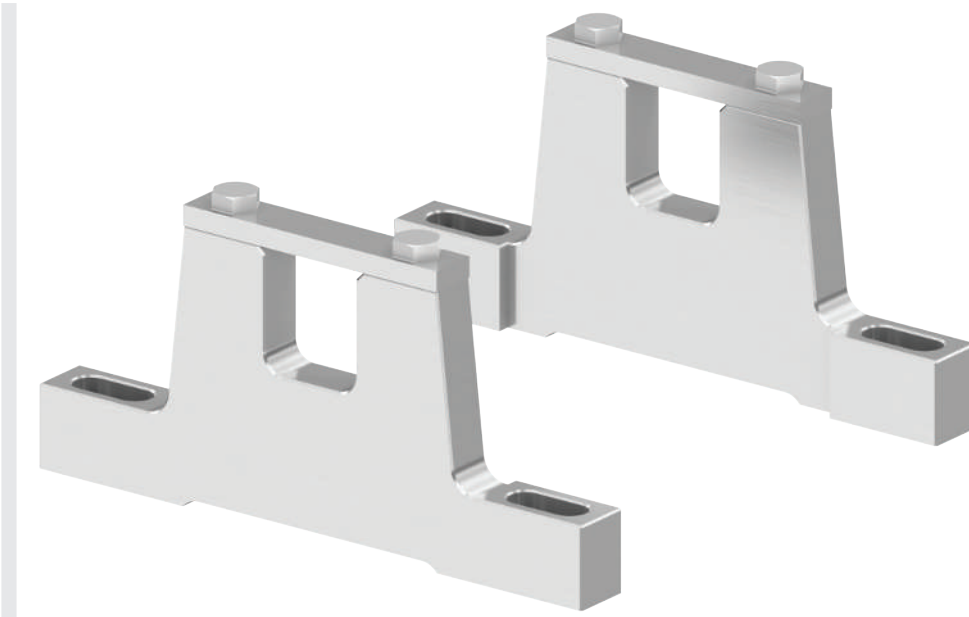
## ACCESSORIES

### PLUMMER BLOCK

For drum motors and idler pulleys

#### Plummer block

The plummer block bracket supports a simple assembly of the drum motors and idler pulleys.



#### Product selection

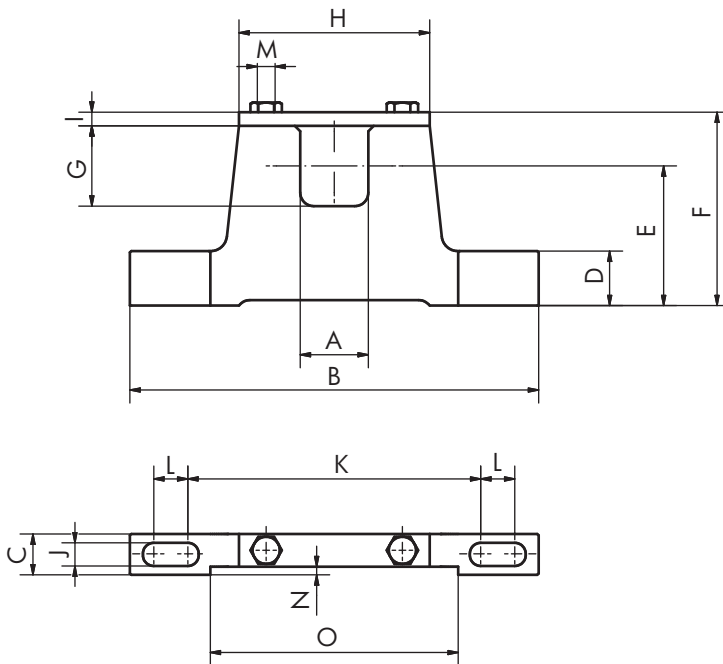
Drum motor	Material	Article number			
		WAF 13.5 mm	WAF 20 mm	WAF 25	WAF 30
DM 0080	Aluminum	61008580	61113900	61010381	
DM 0080	VA	61113949	61113950	61113951	
DM 0113	Aluminum	—	61008581	61115653	
DM 0113	VA	—	61115651	61115652	
DM 0138	Aluminum	—	61008582	61116301	
DM 0138	VA	—	61116302	61116303	
DM 0165	Cast iron	—	—	—	61009983
DM 0165	Aluminum	—	—	—	61100431

WAF = Width across flats

## ACCESSORIES PLUMMER BLOCK

For drum motors and idler pulleys

### Dimensions



Drum motor/ idler pulley	A [mm]	B [mm]	C [mm]	D [mm]	S [mm]	F [mm]	G [mm]	H [mm]	I [mm]	J [mm]	K [mm]	L [mm]	M [mm]	N [mm]	O [mm]
DM 0080	13.5	100	10	12	35	47.5	16.5	35	4	6.5	72.5	7.5	M6	–	–
	20	150	15	20	51	68.5	24.5	70	5	8.5	108	12	M6	3	91
	25	150	15	20	51	71	29.5	70	5	8.5	108	12	M6	3	91
DM 0113	20	150	20	15	42.5	59.5	24.5	55	5	8.5	118.5	6.5	M6	–	–
	25	150	20	15	40	59.5	29.5	55	5	8.5	118.5	6.5	M6	–	–
DM 0138	20	150	20	15	44.5	64.5	29.5	55	5	8.5	118.5	6.5	M6	–	–
	25	150	20	15	44.5	64.5	29.5	55	5	8.5	118.5	6.5	M6	–	–
DM 0165	30	170	20	20	50	75	39.5	70	5	11	116	14	M8	–	–
	30	187	40	22	50	75	36	72	5	14	110	20	M10	–	–

## ACCESSORIES

### IDLER PULLEY WITH INTEGRATED BEARINGS



Interroll deflection rollers can be used on the driven side of conveyor belts. The deflection roller with integrated bearings has a fixed shaft and the same dimensions as a drum motor.



# ACCESSORIES

## IDLER PULLEY WITH INTEGRATED BEARINGS

### Technical data

Protection rate	IP66/IP69k
Max. belt tension	See equivalent drum motor
Max. belt speed	See equivalent drum motor
Tube length	See equivalent drum motor
Internal shaft sealing system	NBR
External shaft sealing system	PTFE

### Design versions

For idler pulleys you can choose the following design versions:

Component	Option	Material			
		Aluminum	Mild steel	Stainless steel	PTFE
Shell	Crowned		●	●	
	Cylindrical		●	●	
	Cylindrical + key for sprockets		●	●	
End housing		●		●	
Shaft				●	
External seal	PTFE				●

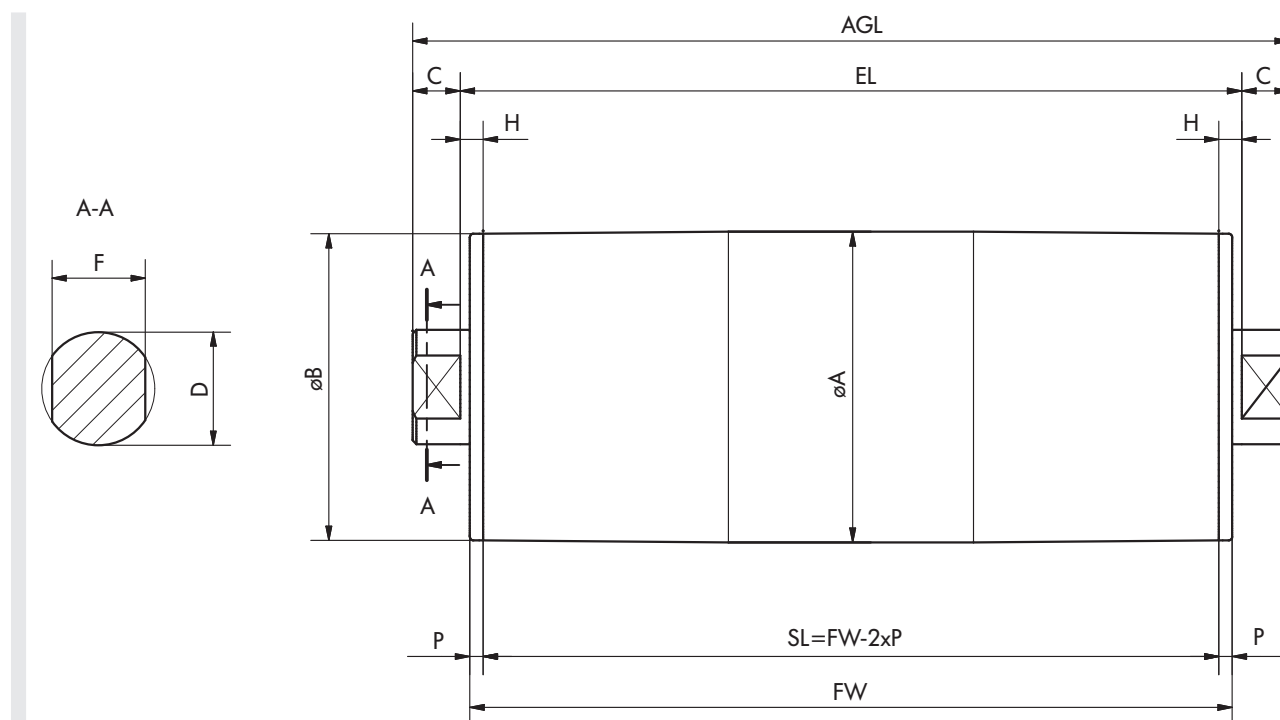
### Versions

- Laggings for friction drive belts, Lagging
- Laggings for modular plastic belts, Lagging
- Laggings for positive drive solid homogeneous belts, Lagging

# ACCESSORIES

## IDLER PULLEY WITH INTEGRATED BEARINGS

### Dimensions



Type	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	H [mm]	P [mm]	SL [mm]	EL [mm]	AGL [mm]
IM 0080 crowned	81.5	80.5	12.5	30	25	6	3.5	FW - 7	FW + 5	FW + 30
IM 0080 crowned	81.5	80.5	12.5	25	20	6	3.5	FW - 7	FW + 5	FW + 30
IM 0080 crowned	81.5	80.5	12.5	17	13.5	6	3.5	FW - 7	FW + 5	FW + 30
IM 0080 cylindrical	81	81	12.5	30	25	6	3.5	FW - 7	FW + 5	FW + 30
IM 0080 cylindrical	81	81	12.5	25	20	6	3.5	FW - 7	FW + 5	FW + 30
IM 0080 cylindrical	81	81	12.5	17	13.5	6	3.5	FW - 7	FW + 5	FW + 30
IM 0113 crowned	113	112	25	30	25	10	3.5	FW - 7	FW + 13	FW + 63
IM 0113 crowned	113	112	25	25	20	10	3.5	FW - 7	FW + 13	FW + 63
IM 0113 cylindrical	112	112	25	30	25	10	3.5	FW - 7	FW + 13	FW + 63
IM 0113 cylindrical	112	112	25	25	20	10	3.5	FW - 7	FW + 13	FW + 63
IM 0113 cylindrical + key	113	113	25	30	25	10	3.5	FW - 7	FW + 13	FW + 63
IM 0113 cylindrical + key	113	113	25	25	20	10	3.5	FW - 7	FW + 13	FW + 63

## ACCESSORIES

### IDLER PULLEY WITH INTEGRATED BEARINGS

Type	A [mm]	B [mm]	C [mm]	D [mm]	F [mm]	H [mm]	P [mm]	SL [mm]	EL [mm]	AGL [mm]
IM 0138 crowned	138	136	25	30	25	15	3.5	FW – 7	FW + 23	FW + 73
IM 0138 crowned	138	136	25	30	20	15	3.5	FW – 7	FW + 23	FW + 73
IM 0138 cylindrical	136	136	25	30	25	15	3.5	FW – 7	FW + 23	FW + 73
IM 0138 cylindrical	136	136	25	30	20	15	3.5	FW – 7	FW + 23	FW + 73
IM 0138 cylindrical + key	137	137	25	30	25	15	3.5	FW – 7	FW + 23	FW + 73
IM 0138 cylindrical + key	137	137	25	30	20	15	3.5	FW – 7	FW + 23	FW + 73
IM 0165 crowned	164	162	45	40	30	20	3.5	FW – 7	FW + 33	FW + 123
IM 0165 cylindrical	162	162	45	40	30	20	3.5	FW – 7	FW + 33	FW + 123
IM 0165 cylindrical + key	162	162	45	40	30	20	3.5	FW – 7	FW + 33	FW + 123

# APPLICATION NOTES

## APPLICATION PRINCIPLES

### Application principles

Most of the Interroll Drum Motors are used in unit handling conveyors that are transporting small packages, boxes, cardboard containers, small pallets or other material. Depending on the type of application, friction drive or positive drive belts can be used with asynchronous or with synchronous drum motors.

Examples of applications:

- Logistics, such as postal sorting and distribution centers
- Airport baggage handling
- Seafood, meat and poultry
- Bakeries
- Fruit and vegetables
- Beverage and brewing industry
- Snacks
- Weighing equipment for packages

### Friction drive belts



Friction drive belts are driven via the friction between drum motor and conveyor belt. The drum motor is normally crowned to prevent belt wander. The belt must be tensioned in order to transfer the torque from the drum motor. The top surface of the belt can be flat, plain or have a ribbed, grooved or diamond pattern.

### Lagging

Interroll offers a broad spectrum of hot and cold-vulcanized laggings made of different materials to increase the friction between belt and drum shell. For more information, Lagging.

### Positive drive belts



Modular plastic belts, solid homogeneous belts, steel mesh or wire belts are positively driven, i.e., with no belt tension. Since the belt has hardly any direct contact with the drum shell, the heat

dissipation is less effective in these applications. For this reason, the drum motor should be used with a frequency inverter that is optimized for this application.

Positive drive belts use less power than friction drive belts, allowing longer conveyors. Because these belts are not tensioned, there is less stress on the bearings and internal parts of the drum motor resulting in a longer service life.

Interroll recommends the use of profiled lagging wherever possible to ensure easy cleaning, evenly distributed torque transmission and torque dampening at start-up. Stainless steel sprockets can be supplied for belts where profiled lagging is not suitable.

Interroll offers a wide range of profiled lagging according to the belt manufacturers' specifications. For more information, Lagging.

### Non-belt applications



For applications without a conveyor belt or with a narrow belt covering less than 70 % of the drum motor face width, heat from the motor can no longer be dissipated via the belt contact. For these applications, we recommend using a 2-pole asynchronous drum motor or synchronous drum motor with frequency inverter.

### Examples of non-belt applications include the following:

- Pallet roller drive and pallet transfer
- V-belt drive for driving roller conveyors
- Chain conveyors
- Narrow belts covering less than 70 % of the shell width

For some non-belt applications the drum motor can be mounted in a non-horizontal position. For more information, page 118.



### Ambient conditions

### Hygienic conditions



For food processing and other applications where hygiene is paramount we recommend the following materials, connectors and accessories:

- Stainless steel shell
- Stainless steel cover
- Stainless steel shafts
- External shaft seals made of PTFE
- Food grade synthetic oil
- NBR hot-vulcanized (FDA & EC 1935/2004)
- Molded PU, Shore hardness 82D (FDA & EC 1935/2004 only)
- A lagging of hot vulcanized NBR or molded PU should be combined only with a stainless steel shell.
- Diamond patterned lagging is not suitable for food processing applications.

### Cable connectors/terminal boxes and cables

All cable connectors, terminal boxes and cables are not included in our (EC) 1935/2004 and FDA declaration. These components are considered "Not in direct contact with food stuffs" as described in the following regulations: Commission regulation (EC) No. 2023/2006 of December 22, 2006 on good manufacturing practice for materials and articles intended to come into contact with food. Article 3, definition (d): "Non-food-contact side" means the surface of the material or article that is not directly in contact with food.

FDA Food Code 2009: Chapter 1 - Purpose and Definitions - "Food-contact surface" means

- (1) A surface of equipment or a utensil with which food normally comes into contact; or
- (2) A surface of equipment or a utensil from which food may drain, drip, or splash:
  - (a) Into a food, or
  - (b) onto a surface normally in contact with food.

NSF: On request

USDA & 3A: no compliance

For food processing applications, Interroll recommends using cable connectors and terminal boxes in stainless steel or Technopolymer.

### Hygienic design

All Interroll Drum Motors are designed in accordance with EU Directives for Hygienic Design:

- Machinery Directive (Directive 98/37/EC) Food Machinery section, Appendix 1, point 2.1 (to be replaced by 2006/42/EC)
- Document 13 EHEDG-Guideline to the hygienic design of apparatus for open processes, prepared in collaboration with 3-A and NSF International

### EHEDG-compliant drum motors

Interroll Drum Motors configured with components listed below comply with EHEDG, Class I "Open Equipment". They are ideally suited for ultra-hygienic environments and tolerate high water pressure washing (IP69k):

- Stainless steel shell: cylindrical or crowned
- Stainless steel cover
- Stainless steel shafts
- Shaft seals made of PTFE
- Food grade synthetic oil

### Conveyor frame

EHEDG design rules recommend the use of rust-free open conveyor frames to facilitate easy cleaning, wash down and disinfection of the conveyor, drum motor and belt. The drum motor should be mounted in the conveyor frame in such a way that there is no metal-on-metal contact between motor shaft and frame support, e.g. by using a rubber seal between shaft and frame support. The sealing material shall be FDA and EC 1935/2004 compliant.

### Cleaning materials

Cleaning specialist Ecolab has certified a 5-year minimum lifetime of materials used by Interroll when exposed to typical cleaning and disinfecting procedures using Ecolab's Topax range of products: P3-topax 19, P3-topax 686, P3-topax 56 and P3-topactive DES.



# APPLICATION NOTES

## AMBIENT CONDITIONS

### High pressure cleaning

Max. 80 °C / 80 bar for PTFE sealing with IP69k

**Note:** Changes in ambient temperature and humidity can cause condensation and lead to water inside the terminal box (especially in stainless steel terminal boxes). For example, this can occur when the motor is operated below 5 °C and then cleaned with hot water or steam. Interroll recommends using the cable option in such cases.

### High temperatures

Interroll Drum Motors are generally cooled by dissipating heat through the contact between the surface of the drum shell and the conveyor belt. It is essential that each drum motor has an adequate thermal gradient between the internal motor and its ambient operating temperatures.

All drum motors in the catalog are designed and tested in accordance with EN 60034 (without lagging and with a belt) for use at a maximum ambient temperature of +40 °C. Any material can be used, but stainless steel has less heat dissipation.

Laggings can cause thermal overload for positive driven belts. For this reason, use motors with frequency inverters that ensure an optimum temperature. As an alternative, it is also possible to use synchronous motors. Rubber lagging for friction drive belts can also cause thermal overload. External cooling systems can also be used to prevent thermal overload.

If you need a motor for applications with ambient temperatures above +40 °C, please contact Interroll.

### Low temperatures

When a drum motor is operated in low temperatures (below +2 °C), consider the viscosity of the oil and temperature of the motor while it is not running. For additional information and notes, please contact Interroll.

### Anti-condensation heating for asynchronous drum motors

In ambient temperatures below +1 °C, the motor windings should be heated to regulate the oil viscosity and to keep seals and internal parts at a constant temperature.

$$I_{DC} = \frac{U_{SH\Delta} \cdot 3}{R_{Motor} \cdot 2}$$

Fig.: Delta connection

If the motor current is switched off for some time and the ambient temperature is very low, then the motor oil becomes viscous. In these conditions problems may occur when starting the motor and at temperatures of around zero frost crystals can form on the sealing surfaces, causing oil leakage. To prevent these problems use anti-condensation heating.

The heater applies a DC voltage to the motor winding. This causes current to flow either in the two motor phases of a 3-phase motor or the main winding of a 1-phase motor. The amperage depends on the voltage applied and the winding resistance. This current creates a power loss in the winding which heats up the motor to a certain temperature. This temperature is determined by the ambient temperature and the amperage.

Information on the correct voltage is available in the motor version tables. The values listed are average values, which can be increased or decreased depending on the required motor temperature and the ambient temperature. Interroll strongly recommends determining the correct voltage by testing under actual operating conditions.

Only DC voltage may be used to heat the motor. The use of AC voltage can cause the motor to move unexpectedly, leading to serious damage or injury.

The stationary heating system should only be used when the motor is actually idle. The heating voltage must be switched off before the motor is operated. This can be ensured by using simple relays or switches.

The suggested voltages are calculated to prevent the formation of condensation. If the motor needs to be held at a specific temperature, then the stationary heating system must be set up accordingly. In this case, please contact your Interroll customer consultant.

The anti-condensation heating voltage must be connected to any two phases of a 3-phase motor. The heating current supplied by the heating system can be calculated as follows:

$$I_{DC} = \frac{U_{SH\star} \cdot 3}{R_{Motor} \cdot 2}$$

Fig.: Star connection

### Low noise



All Interroll Drum Motors excel with relatively low noise development and vibrations. The performance levels are not specified or guaranteed in this catalog because they can vary depending on the type of motor, number of poles, speed and application. For specific low-noise applications, please contact your Interroll customer consultant.

### Altitudes above 1000 m

Operating a drum motor at an altitude of more than 1000 m may result in power loss and thermal overload due to the low atmospheric pressure. This must be considered when calculating your power requirement. For more information, please contact your Interroll customer consultant.

### Supply voltage (asynchronous drum motors only)

#### Using 3-phase 50 Hz motors in a 60 Hz supply system with the same voltage

- Motor rated: 230/400 V – 3 ph – 50 Hz
- Supply voltage: 230/400 V – 3 ph – 60 Hz

Using a 3-phase 50 Hz motor in a 60 Hz supply system will increase the frequency, and therefore the speed, by 20 %. If the other rated motor parameters are to be kept constant, a 20 % higher input voltage is required (U/f law). However, if this 20 % higher voltage is not supplied, all voltage-dependent parameters will be affected in accordance with the following table:

System voltage = rated motor voltage

Motor data			
Power	P	kW	100 %
Rated speed	$n_n$	rpm	120 %
Rated torque	$M_n$	Nm	83.3 %
Starting torque	$M_A$	Nm	64 %

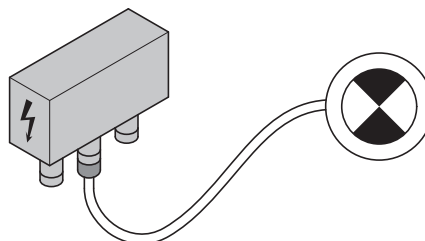
#### Motor data

Pull-up torque	$M_s$	Nm	64 %
Pull-out torque	$M_k$	Nm	64 %
Rated current	$I_N$	A	96 %
Starting current	$I_A$	A	80 %
Power factor	$\cos \varphi$		106 %
Efficiency	$\eta$		99.5 %

#### Supply voltage

#### Motor rated

230/400 V	230/400 V
3 ph	3 ph
60 Hz	50 Hz



#### Using 3-phase 50 Hz motors in a 60 Hz supply system with 15/20 % higher voltage

- Motor rated: 230/400 V – 3 ph – 50
- Supply voltage: 276/480 V – 3 ph – 60 – 2 and 4 poles (motor voltage + 20 %)

Using a 3-phase 50 Hz motor in a 60 Hz supply system with 20 % higher voltage will increase the frequency and therefore the speed by 20 %, but will maintain all the rated motor parameters subject to small variations (U/f law).

**Note:** If the supply voltage is increased by 15 % compared to the motor voltage, the actual motor output decreases to 92 % of the original motor output.

Supply voltage = 1.2 x rated motor voltage (for motors with 2 and 4 poles)

# APPLICATION NOTES INDUSTRIAL SOLUTIONS

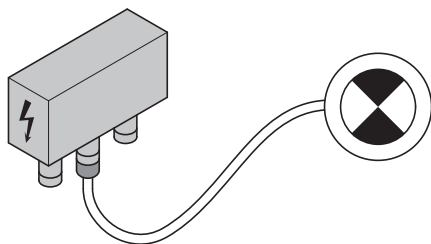
## Motor data

Power	P	kW	100 %
Rated speed	$n_n$	rpm	120 %
Rated torque	$M_n$	Nm	100 %
Starting torque	$M_A$	Nm	100 %
Pull-up torque	$M_S$	Nm	100 %
Pull-out torque	$M_K$	Nm	100 %
Rated current	$I_N$	A	102 %
Starting current	$I_A$	A	100 %
Power factor	$\cos \varphi$		100 %
Efficiency	$\eta$		98 %

## Supply voltage

## Motor rated

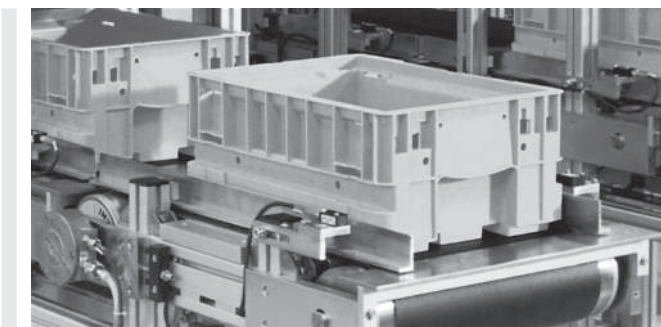
230/480 V	230/400 V
3 ph	3 ph
60 Hz	50 Hz



## Industrial solutions

Interroll offers a wide range of industrial solutions for its drum motors. In this chapter, only the most important solutions will be explained.

## General logistics



Conveying in logistics, warehousing and storage sectors covers a wide spectrum of applications in industries, such as electronics, chemicals, food, automotive and general manufacturing. All motors in this catalog are suitable for general logistics applications.

## High performance and dynamic conveying



Modern Industry today expects high efficiency and increased productivity as well as fast bus communication between zones and zero maintenance. Interroll provides the perfect drives for high performance applications that typically use smart belts, packaging machines, weighing machines and sorting equipment. This type of equipment requires high torque, fast acceleration/ deceleration, dynamic braking and bus communication. If more control is needed, the motor can be fitted with an encoder to run it as a servo-drive.

### Food processing



Interroll Drum Motors are ultra-hygienic and easy to clean. All drum motors for food processing comply with EC 1935-2004 and FDA. NSF-compliant motors are available on request. Interroll is a member of the EHEDG (European Hygienic Engineering Design Group).

Consider the ambient conditions before choosing drum motor versions, options and accessories.

#### Suitable drum motors

- For friction drive belts use an asynchronous drum motor.
- For positive drive belts use either a drum motor for applications with positive drive belts or no belts, or an asynchronous drum motor with frequency inverter.
- A synchronous drum motor can also be used for all applications.

#### Torque transmission

For moist or wet food applications with friction drive belts Interroll recommends rubber lagging on the drum motor to improve the friction between the belt and drum shell. In continuously wet conditions, longitudinal grooved lagging can be used to dissipate the water flow and improve the grip.

#### Options and accessories

- Stainless steel or other materials approved for food or hygienic applications.
- Drum motors for food processing are supplied with food-grade oil.
- Interroll offers a variety of hot-vulcanized lagging materials approved for use in food processing (FDA and EC 1935/2004).
- Hot-vulcanized NBR and molded PU lagging has a longer service life, withstands higher torques and is easier to keep clean than cold-vulcanized lagging.

#### Conveyor frame

EHEDG design rules recommend the use of rust-free open conveyor frames to facilitate easy cleaning, wash down and disinfection of the conveyor, drum motor and belt. The drum motor should be mounted in the conveyor frame in such a way that there is no metal-on-metal contact between motor shaft and

frame support, e.g. by using a rubber seal between shaft and frame support. The sealing material shall be FDA and EC 1935/2004 compliant.

#### Cleaning Materials

Cleaning specialist Ecolab has certified a 5-year minimum lifetime of materials used for Interroll Drum Motors when exposed to typical cleaning and disinfecting procedures using Ecolab's Topax range of products: P3-topax 19, P3-topax 686, P3-topax 56 and P3-topactive DES.

### Airport logistics



Airport applications, such as conveyors at check-in, X-Ray machines and scanning equipment, require low noise and frequent starts and stops. Most applications use friction drive belts made of PU, PVC or rubber.

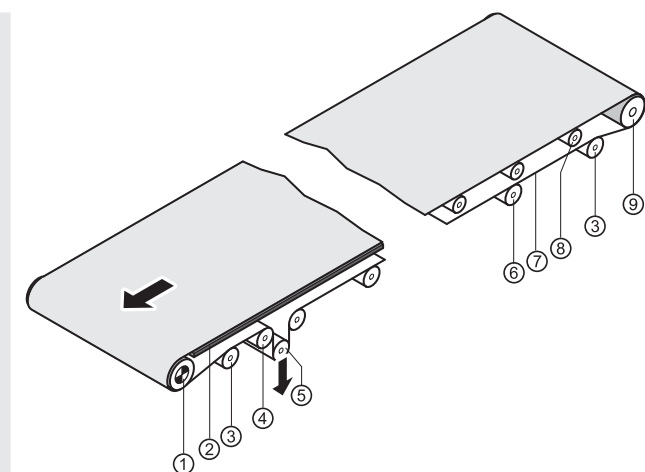
### Design guidelines

A belt conveyor is designed primarily to transport or transfer materials from one place to another. In its simplest form, a belt conveyor normally consists of a longitudinal frame with a drum motor at one end and an idler pulley at the other end around which a continuous belt revolves. The belt, which carries the materials, can be supported either by rollers or a steel, wood or plastic slider bed. This chapter on design guidelines is subdivided into two sections: friction drive belt conveyors and positive drive belt conveyors, since each type requires a different method of torque transfer.

# APPLICATION NOTES

## DESIGN GUIDELINES

### Friction drive belt conveyors



- |                     |                     |
|---------------------|---------------------|
| 1 Drum motor        | 6 Supporting roller |
| 2 Slider bed        | 7 Conveyor belt     |
| 3 Tie-in roller     | 8 Roller            |
| 4 Steering idler    | 9 Idler pulley      |
| 5 Tensioning roller |                     |

Friction drive belt conveyors, e.g. rubber, PVC or PU flat belts, rely on high friction between the drum motor and belt and sufficient belt tension in order to transmit the torque from the drum motor to the belt. For typical friction factors, refer to the table page 110.

#### Torque transmission

Normally the steel crowned shell of the drum motor is sufficient to transmit the torque but care must be taken not to over-tension the belt, which could damage the drum motor shaft bearings or even the belt itself.

#### Belt tension

The conveyor belt should only be tensioned in line with the manufacturer's recommendations and the tension should only be enough to drive the belt and load without belt slip. Over-tensioning can damage the drum motor and belt. Maximum belt tensions for the drum motors can be found in the product pages of this catalog.

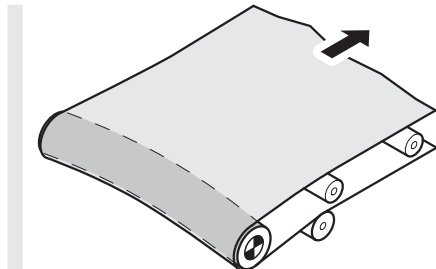


Fig.: Damaged drum motor due to over-tensioning

#### Lagging

To improve the torque transmitted from the drum motor to the belt, rubber lagging can be applied to the drum shell to produce more grip.

A smooth lagging or a lagging with diamond pattern is well suited for dry applications. It is also possible to use laggings with grooves or other laggings. Longitudinal grooved lagging is advisable to dissipate water in food processing or wet applications. Diamond patterned lagging can be used for non-food wet applications.

When external belt tracking devices are installed, cylindrical shells can be used to prevent opposing influences.

#### Additional friction factor

Depending on the belt material, the friction between conveyor belt and drum motor can vary.

Consider the following friction factors when calculating the belt tension:

Drum motor surface	Steel		Smooth lagging	Grooved lagging
Conditions	Dry	Wet	Dry	Wet
Belt material				
Frictioned rubber	0.25	0.20	0.30	0.25
PVC	0.35	0.25	0.40	0.30
Polyester fabrics	0.20	0.15	0.25	0.20
Impregnation with Ropanol	0.25	0.20	0.30	0.25



### Belt wrap angle

There is another way to improve the torque transmitted from the drum motor to the belt: You can increase the angle of belt wrap around the drum motor. The belt wrap angle is measured in degrees. A larger belt wrap angle gives better traction between the belt and drum motor, and the belt requires less belt tension. A minimum angle of  $180^\circ$  is generally recommended to transfer the full torque to the belt. Increasing the angle to  $230^\circ$  or more is indeed possible to reduce the belt tension and, therefore, the wear of drum motor and belt.

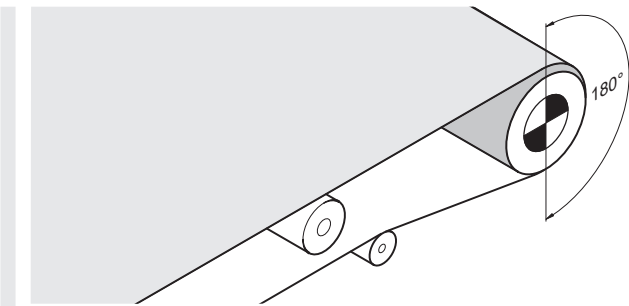


Fig.: Minimum belt wrap angle for friction drive belt conveyors

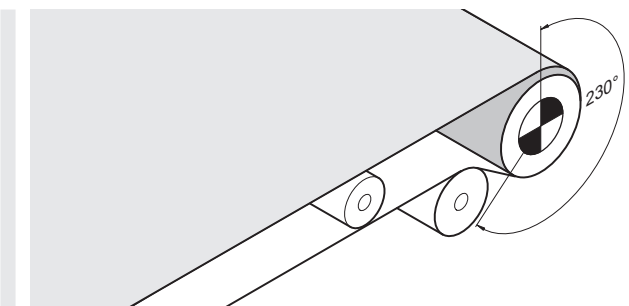


Fig.: Increased belt wrap angle for friction drive belt conveyors

### Roller bed conveyor

Due to their lower friction, roller bed conveyors require less power, less belt tension and are therefore more efficient than slider bed conveyors. Roller bed conveyors are especially suitable for longer conveyors with heavy loads.

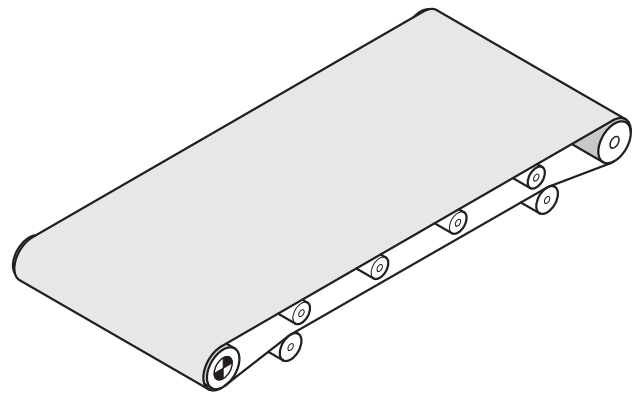


Fig.: Roller bed conveyor

### Slider bed conveyor

Belt conveyors using a slider bed have more friction and require higher power and belt tension than belt conveyors with rollers and are therefore less efficient. However, the transported goods lie on the belt with greater stability. Due to its simple construction, it is a lower cost option than the roller bed conveyor.

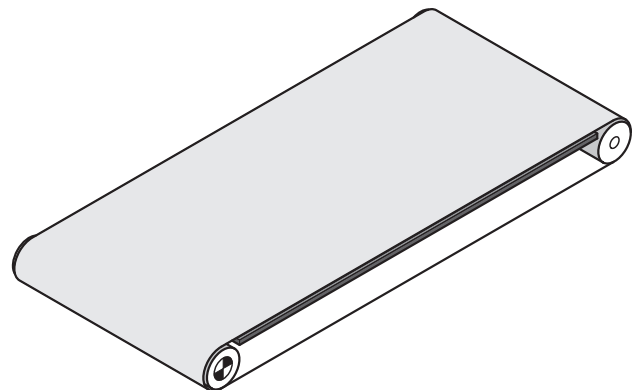


Fig.: Slider bed conveyor

### Drive positions

The drum motor is usually positioned at the head or discharge end of the conveyor but can be positioned elsewhere to suit the application or design.

### Head drive

The head drive positioning (discharge end) is the most common and preferred option for non-reversible conveyors and is ideal because it is simple to design and easy to install. Furthermore most of the belt tension is on the carrying side and allows the drum motor to transfer its full torque to the belt.

# APPLICATION NOTES

## DESIGN GUIDELINES

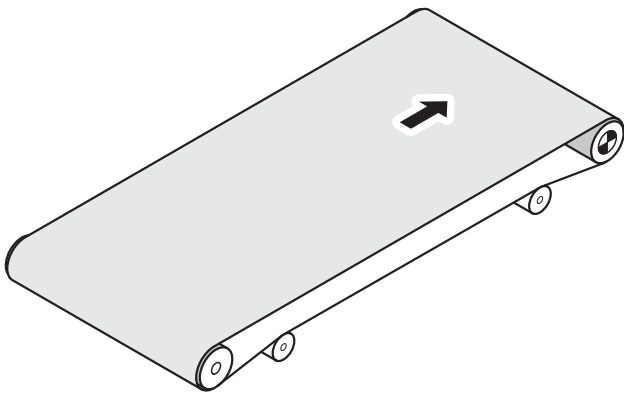


Fig.: Non-reversible conveyor with head drive

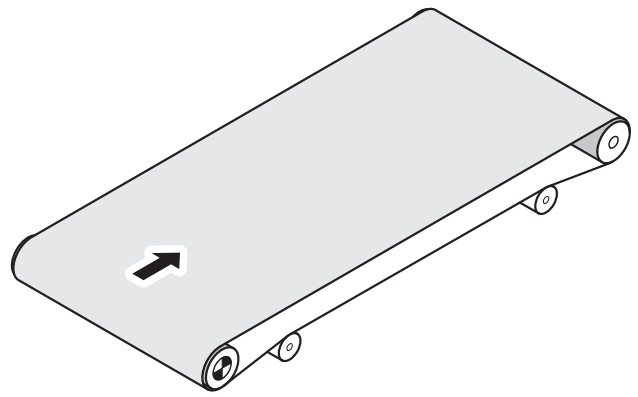


Fig.: Short friction drive belt conveyor with tail drive

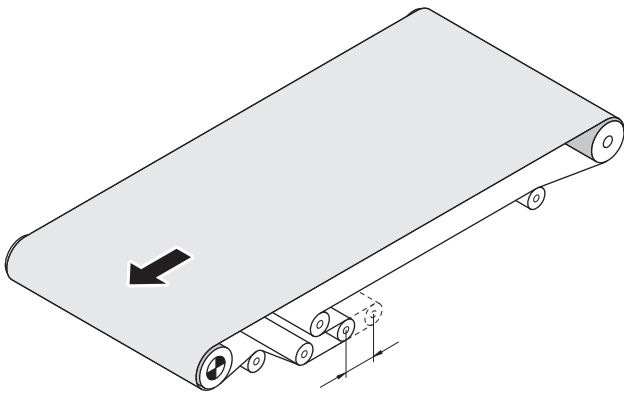


Fig.: Optional design for non-reversible long conveyor with center take-up

### Tail drive

A conveyor's tail end (loading or receiving end) is not the ideal drive position as the drum motor is pushing the carrying side of the belt and more tension is applied to the return side. Therefore, the full torque of the drive may not be applied. This type of drive can lead to belt waves (belt lifting on the top side), jumping and undesirable belt wander. If a tail drive is necessary, it is recommended only for use with short friction drive belt conveyors of 2 to 3 meters in length with light loads. (It is not recommended for positive drive belts.)

### Center drive

A center drive can be used for longer belt conveyors where a large diameter drum motor is required and there is insufficient space available at the head end. The center drive can also be used for reversible conveyors because the belt tension is distributed more evenly between the carrying and return side of the belt. Belt tracking issues for forward and reverse operation can be minimized.

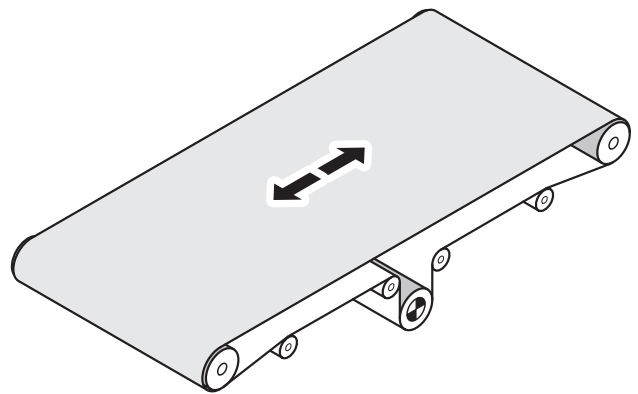


Fig.: Long belt conveyor with center drive



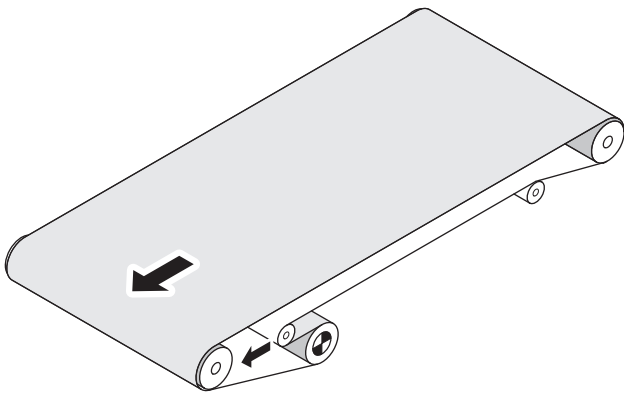
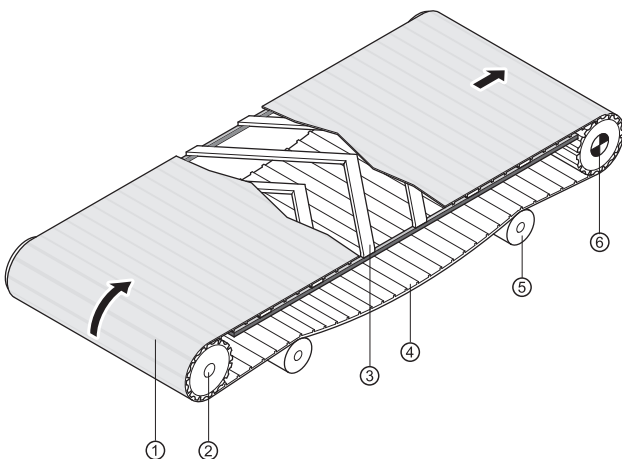


Fig.: Center drive for long belt conveyor with increased belt wrap

### Reversible drive

Interroll Drum Motors are suitable for reversing unless fitted with a backstop. However, the motor control must be designed in such a way that the drum motor is brought to a complete standstill before reversing, otherwise serious damage to the gear box could occur. Drum motors with a backstop may be used only for conveying in one direction. The direction is indicated by an arrow on the end housing.

### Positive drive belt conveyors



- 1 Modular plastic belt
- 2 Idler pulley with sprockets
- 3 Support slats
- 4 Catenary sag
- 5 Support rollers
- 6 Drum motor

Positive drive belt systems have a lower power consumption than friction drive belts, enabling longer conveyor constructions. As there is no belt tension, there is less stress on the drum motor

bearings. Since the belt has no direct contact with the drum shell, the heat dissipation is less effective in these applications. For this reason, the drum motor should be used with a frequency inverter that is optimized for this application. Alternatively, motors for applications with positive drive belts or no belts can be used.

Examples of positive driven belts include the following:

- Modular plastic belts
- Positive drive solid homogeneous belts
- Steel slatted belts
- Steel mesh or wire belts
- Toothed belt
- Chain conveyor

Positive drive belt installations can be quite complex and are not discussed in detail in this catalog. Please refer to the belt supplier's instructions and contact Interroll if further advice is required.

### Torque transmission

Drum motors for positive drive belt conveyors are normally supplied with full-width machined rubber lagging that engages the profile of the conveyor belt on the underside. Alternatively, a cylindrical drum shell with a laterally welded key can be supplied enabling any type of steel, stainless steel or plastic sprocket wheels to be fitted to the shell. The number of sprockets depends on the belt width and load but there must be a minimum of three. The calculation of the number of sprockets required can be found in the belt manufacturer's catalog. Due to the thermal expansion of the belt, all sprockets supplied by Interroll are floating and therefore it may be necessary to guide the belt using side guides built into the conveyor frame in order to achieve a center belt tracking. As an alternative, Interroll can supply a fixed sprocket positioned in the center of the belt.

# APPLICATION NOTES

## DESIGN GUIDELINES

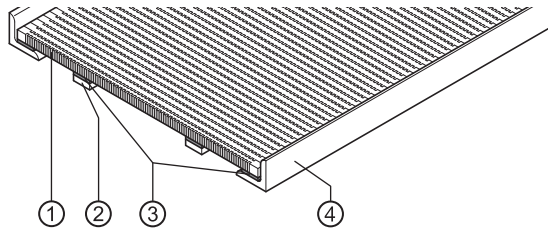


Fig.: Belt tracking

- 1 Belt
- 2 Support slats
- 3 Wear strips
- 4 Side supports/side guides

### Belt tension

Due to its positive drive, the conveyor belt generally requires no belt tension and uses only the gravity from its own weight to engage the lagging or sprocket profile. On the return side, the belt should hang loose to accommodate the changing length of the belt due to thermal expansion and contraction. The installation and conveyor design should comply with the belt manufacturer's recommendations.

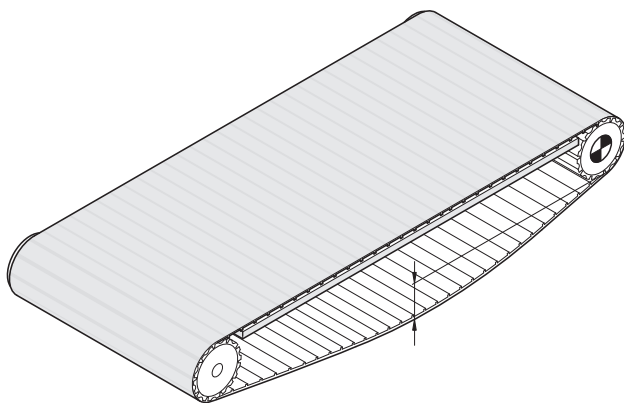


Fig.: Short conveyor without support rollers on the return belt

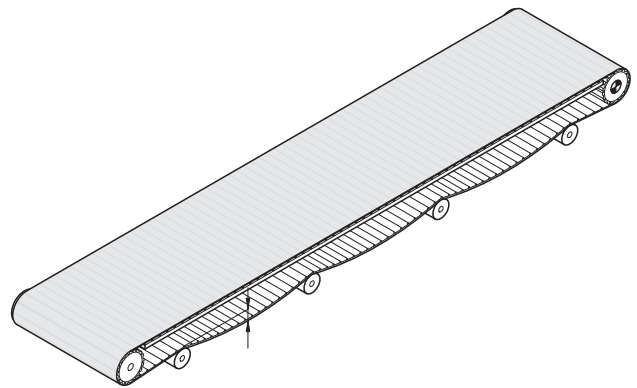


Fig.: Medium and long conveyor with catenary sag and support rollers on the return belt

### Velocity factor

The increased diameter of the drum motor when fitted with lagging or sprockets will affect the rated speed of the motors shown in this catalog. In order to calculate the final belt speed, please use the following calculation. The velocity factor VF can be found in the Options section, page 71.

$$V_{\text{belt}} = V_{\text{dm}} \times VF$$

$V_{\text{belt}}$  = Belt speed

$VF$  = Velocity factor

$V_{\text{dm}}$  = Rated speed of drum motor

The torque is transmitted directly from the drum shell via the lagging or indirectly through the key and sprockets to the belt. This transfers up to 97 % of the mechanical output onto the belt. In start-stop applications, the use of a soft start function or frequency inverter will increase the lifespan of the belt, sprockets and gear box.

### Belt pull correction factor

When using lagging or sprockets, the rated belt pull of the drum motor will be reduced. The actual belt pull is calculated as follows:

$$\text{Corrected belt pull} = \text{Rated belt pull} / VF$$

### Drive positions

For positive drive belt conveyors either a head drive or center drive is possible.

### Head drive

The drum motor should be positioned at the head (discharge end) of the conveyor so that the carrying side of the belt is pulled under tension.

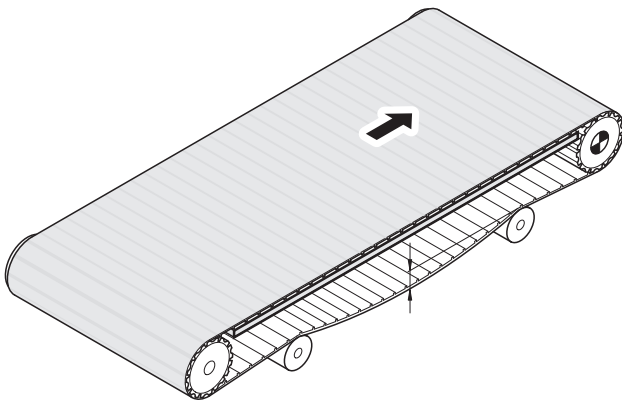


Fig.: Head drive for positive drive belt conveyors

### Tail drive

Tail drives are not recommended. If the drum motor is located at the tail end (loading side) of the conveyor and attempts to push the belt, then the belt tension at the return belt is greater than at the carrying side of the belt. The belt "jumps" over the profile of the lagging or the sprockets and forms buckles in the excessive belt length – a safe transport of the material is no longer ensured.

### Center drive

Center drives can be used for long unidirectional conveyors or for reversible conveyors. In the case of reversible conveyors, great care and attention is required for their design. Please contact the belt manufacturer for advice.

## Other conveyors

### Inclined conveyors

Inclined conveyors require more power and higher belt tension than horizontal conveyors to move the same load. A backstop should be considered for single direction inclined conveyors to prevent rollback of the belt and load.

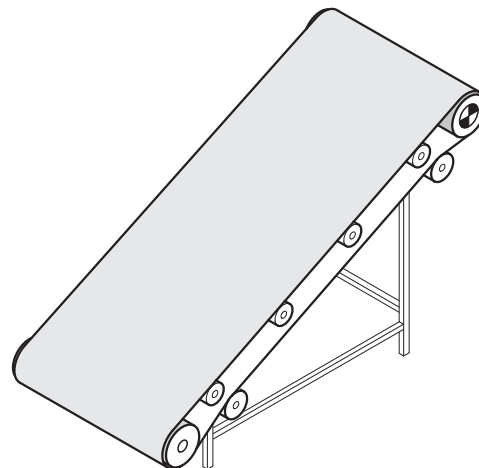


Fig.: Inclined conveyor

### Reversible inclined or declined conveyors

An electromagnetic brake should be considered to prevent accidental reversal and rollback of the belt and load. To reduce acceleration and over-run of the belt and load on a declined conveyor calculate the power required as for an inclined conveyor.

### Knife-edge conveyors

Knife edges reduce the gap between the transfer points of two conveyors. However, with friction drive belt conveyors, knife edges can severely increase the belt pull and tension required to overcome the increased friction between belt and knife edge. To reduce this friction the belt transfer angle should be increased as much as possible and a roller with a small diameter should replace the knife edge.

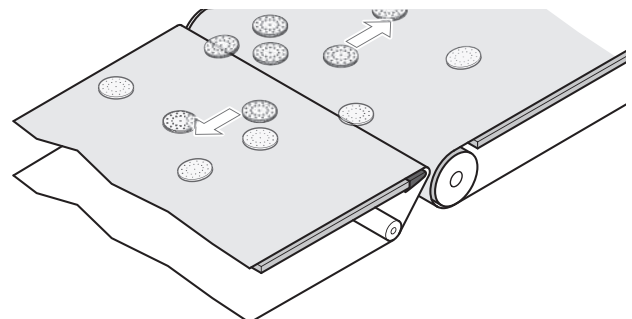


Fig.: Knife-edge conveyor

# APPLICATION NOTES

## DESIGN GUIDELINES

### Food processing conveyors

EHEDG design rules recommend the use of rust-free open conveyor frames to facilitate easy cleaning, wash down and disinfection of the conveyor, drum motor and belt.

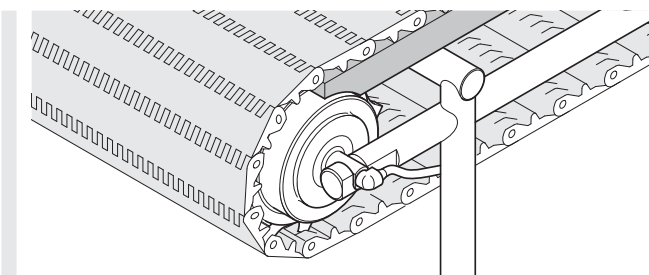


Fig.: Open conveyor design for hygienic cleaning

### Plough and diverter units

If the drum motor is installed in a plough or diverter unit, it is frequently installed in a vertical position. This requires ordering a special motor design.

### Frequent starts/stops

Frequent starts and stops can cause thermal overload of the motor and premature wear of the gear box, reducing the lifespan of the drum motor. In applications such as these, Interroll recommends the use of a frequency inverter to optimize the heat loss of the motor and a soft-start function to reduce the start-up load on the gear box. Synchronous or asynchronous drum motors with a frequency inverter are ideal for these applications.

### Control systems

Interroll supplies brakes, backstops, encoders and frequency inverters for its range of drum motors.

### What drive control system do you need?

As with any drive system, when you select a drum motor, you also must decide on the type and scope of control you will need to optimize your application. You should therefore select a motor and control system that ensures efficient and trouble-free operation right from the outset. Interroll offers a series of user-friendly drive and control solutions in its standard product range.

### Overview of controls for AC asynchronous motors

	Direct connection to power supply	Direct connection to power supply
Direct connection to power supply	●	
Voltage-controlled frequency		●
Sensorless vector control		●
Control loop closed		●

### Overview of controls for AC asynchronous permanent magnet motors

	Frequency inverter from third parties or servo driver	Frequency inverter or servo driver recommended by Interroll
Direct connection to power supply		
Voltage-controlled frequency		
Sensorless vector control	●	●
Control loop closed	●	●

### Speed setting

The drum motor and therefore the conveyor belt speed will be influenced by the load, belt tension and rubber lagging thickness. Speeds provided in the product pages are based on rated load and accurate to  $\pm 10\%$ ; for more accurate speeds use a frequency inverter/drive control to overcome these influences. For precise speeds use a frequency inverter/drive control combined with an encoder or other feedback device. Frequency inverters can also be used with asynchronous motors to increase the rated speed. However, the available torque will then be reduced starting at a frequency of 50 Hz. Synchronous drum motors with a suitable frequency inverter will offer solutions for most of these issues and can increase performance, throughput and efficiency.

For asynchronous drum motor brakes and backstops, see Backstops and balancing.

### Merges transfers and in-feed control

For asynchronous drum motors use a frequency inverter with DC braking (with or without encoder) to control the merge process. Alternatively, for precise, dynamic control and/or high throughput, use a synchronous drum motor.

### Feedback system

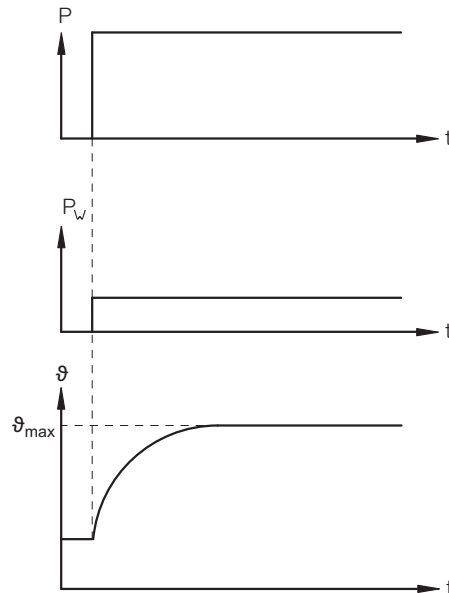
Use an integrated encoder or other feedback device for precise speed and positioning data (see Feedback devices).

### Operating modes

The following operating modes comply with IEC 60034-1.

#### Continuous running duty S1

Operation at constant load which is long enough to reach a thermal steady-state condition.



$P$  = Power input  
 $P_w$  = Electrical losses  
 $\theta$  = Temperature  
 $\theta_{max}$  = Max. temperature achieved  
 $t$  = Time

The majority of Interroll Drum Motor windings with an efficiency of over 50 % are suitable for operating mode S1 and continuous running duty. Please refer to the electrical data tables for standard motors and motors for applications with positive drive belts or no belts. The value is listed with the symbol  $\eta$  for efficiency.

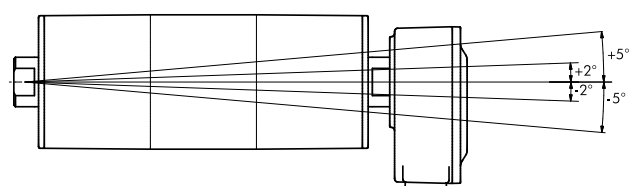
#### S2 to S10

For operating modes S2 to S10, consider the duty cycles and consult Interroll.

### Mounting requirements

#### Horizontal mounting

A drum motor is normally mounted horizontally – parallel to the idler pulley and perpendicular to the conveyor frame – to ensure that the belt will run centrally without belt wander.



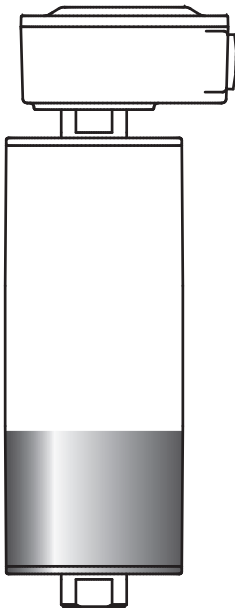
All drum motors must be mounted within  $\pm 5^\circ$  of the horizontal.

# APPLICATION NOTES

## DESIGN GUIDELINES

### Non-horizontal mounting

This requires a special motor design. The cable connection must always be at the top and a specific volume of oil is also needed for non-horizontal drum motors.



### Examples

- Carton turning
- Plough transfer units
- Deflector conveyors

### Mounting brackets

The mounting brackets must be strong enough to withstand the drum motor belt pull and its start-up torque. They must be fully supported and fastened to the conveyor frame so that the shaft ends do not move or deform. Shaft end key flats must always be fully supported by the brackets.

Use the mounting brackets specified for each drum motor model  
– see accessories starting at Mounting brackets.

### Axial play

The axial play between the shaft key flats and the mounting brackets must be 1.0 mm to allow for component heat expansion.

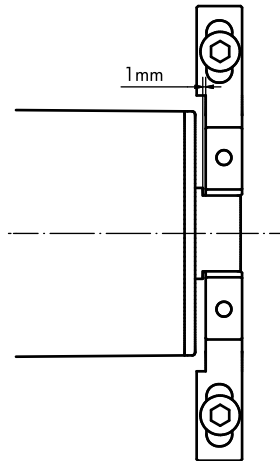


Fig.: Maximum axial play

### Torsion play

The torsion play between the shaft key flats and the mounting brackets must be no more than 0.4 mm.

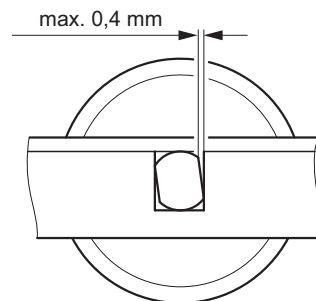


Fig.: Maximum torsion play

There must be no clearance between the shaft key flats and mounting bracket if the drum motor is to be used for frequent reversible operations or a large number of starts and stops.

### Supported length

At least 80 % of the key flats must rest on the mounting bracket.

### Other mounting devices

The drum motor can also be installed directly in the conveyor frame without mounting brackets. In this case, the shafts must rest in recesses in the conveyor frame that have been reinforced accordingly to meet all of the conditions listed above.

### Belt adjustment

Drum motors for friction drive belts are normally supplied with crowned shells in order to ensure central belt tracking and prevent misalignment of the belt during operation. However, the belt must be checked and adjusted at its initial start up and maintained as necessary.

### Diagonal check

The conveyor side frames must be parallel to each other and level on both sides ensuring the drum motor fits exactly at 90 degrees square to the frame.

This can be checked using the following procedure:

- The difference in length of the two diagonals must not be more than 0.5 %.
- The diagonals are measured from the drum motor shaft to the idler pulley shaft or from belt edge to belt edge.

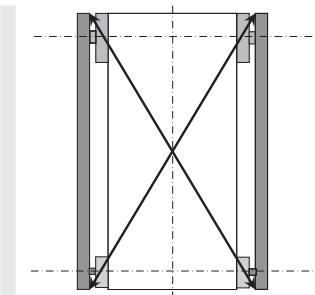


Fig.: Diagonal check

### Belt position

The underside of the belt should be flush with the conveyor slide or roller bed and must not be more than 3 mm above these.

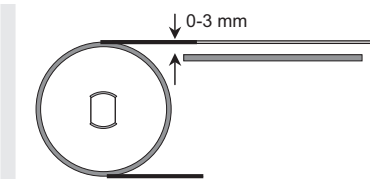
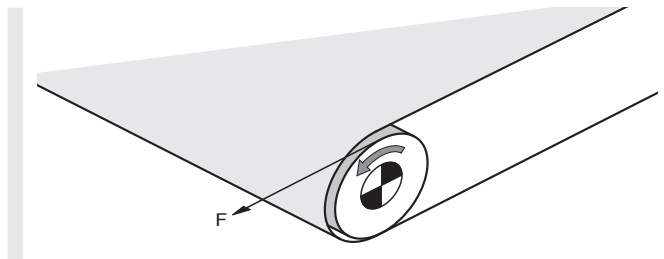


Fig.: Maximum distance between belt and conveyor bed

Misaligned drum motors, belts or idler pulleys may cause high friction and overheat the drum motor. This may also result in premature wear of the belt and lagging.

### Belt pull

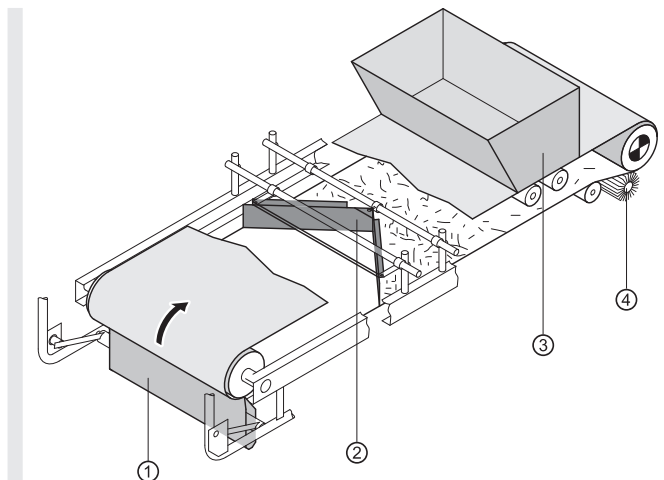
The rated belt pull, power and speed for each drum motor version are shown in this catalog.



You can calculate the belt pull F using the following formulas.

The formulas are only intended as guidelines since they are based on typical operating conditions. The effect of additional friction from the following factors is not taken into account:

- Hopper
- Rubber seals
- Cleaning devices, such as ploughs, scrapers and brushes
- Friction between the product and side guides



- 1 Scraper
- 2 Plough
- 3 Hopper
- 4 Brush

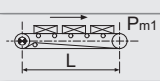

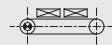
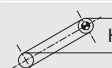
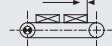
# APPLICATION NOTES

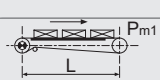
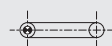



## DESIGN GUIDELINES

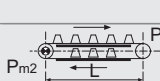

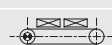
### Belt pull calculation (F) according to the conveyor system

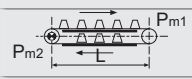
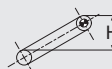
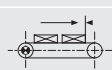
$$F = F_0 + F_1 + F_2 + F_3 + \text{safety factor}$$

Please add a safety factor of 20 % to this calculation.

Roller bed conveyor	
	$F_0 = 0.04 \cdot g \cdot L \cdot (2 P_n + P_{pr})$
Force without load	
	$F_1 = 0.04 \cdot g \cdot L \cdot P_{m1}$
Force to convey goods horizontally	
	$F_2 = g \cdot H \cdot P_{m1}^*$
Force to convey goods on incline	
	$F_3 = g \cdot L \cdot P_{m1} \cdot C_1$
Accumulation	

Slider bed conveyor	
	$F_0 = g \cdot L \cdot P_n \cdot C_2$
Force without load	
	$F_1 = g \cdot L \cdot P_{m1} \cdot C_2$
Force to convey goods horizontally	
	$F_2 = g \cdot H \cdot P_{m1}^*$
Force to convey goods on incline	
	$F_3 = g \cdot L \cdot P_{m1} \cdot C_1$
Accumulation	

Double slider bed conveyor	
	$F_0 = g \cdot L \cdot P_n \cdot (C_2 + C_4)$
Force without load	
	$F_1 = g \cdot L \cdot (P_{m1} \cdot C_2 + P_{m2} \cdot C_4)$
Force to convey goods horizontally	

Double slider bed conveyor	
	$F_2 = g \cdot H \cdot (P_{m1} - P_{m2})^*$
Force to convey goods on incline	
	$F_3 = g \cdot L \cdot (P_{m1} \cdot C_1 + P_{m2} \cdot C_3)$
Accumulation	

- $P_n$  in kg/m = Belt weight per meter
- $P_{pr}$  in kg/m = Weight of rotating parts of the belt conveyor (carrying and return section) per meter length
- $P_{m1}$  in kg/m = Weight of the conveyed product on the carrying section, for each meter of length of the belt conveyor
- $P_{m2}$  in kg/m = Weight of the conveyed product on the return section, for each meter of length of the belt conveyor
- $C_1$  = Coefficient of friction between product and carrying side \*\*
- $C_2$  = Coefficient of friction between carrying side and slider bed \*\*
- $C_3$  = Coefficient of friction between return side and product \*\*
- $C_4$  = Coefficient of friction between return side and slider bed \*\*
- $L$  in m = Center-to-center length
- $H$  in m = Height difference in conveyor
- $F_0$  to  $F_3$  in N = Belt pull components for operating conditions shown
- $g$  in  $m/s^2$  = 9.81

\* The value  $F_2$  is negative with declined conveyors. However, to prevent over-run acceleration due to gravity,  $F_2$  should be positively calculated as for inclined conveyors.

\*\* Information about friction factors page 110.



### Coefficient of friction

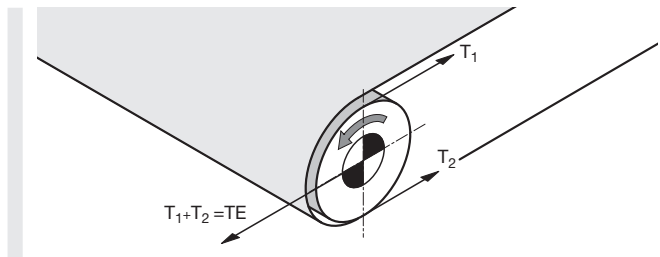
Belt material	Slider bed material $C_2, C_4$	
	PE	Steel
PE	0.30	0.15
PP	0.15	0.26
POM	0.10	0.20
PVC/PU		0.30
Polyamide or polyester		0.18
Rubber	0.40	0.40

Belt material	Product material $C_1, C_3$		
	Steel	Glass, Technopolymer	Technopolymer
PE	0.13	0.09	0.08
PP	0.32	0.19	0.17
POM	0.20	0.15	0.15
PVC/PU	0.30		0.30
Polyamide or polyester	0.18		0.17
Rubber	0.40		0.40

### Belt tension

The following must be observed when calculating the belt tension:

- Length and width of conveyor belt
- Belt type
- Check the belt tension required to transport the load
- Check the belt elongation necessary for the installation. Depending on the load, the belt elongation for the assembly should be between 0.2 – 0.5 % of the belt length.
- The values for the belt tension and elongation are available from the belt manufacturer.
- Ensure that the required belt tension does not exceed the maximum belt tension (TE) of the drum motor.



The required belt tension  $T_1$  (top side) and  $T_2$  (bottom side) can be calculated in accordance with DIN 22101 or the CEMA standard. Based on the information from the belt manufacturer, the actual belt tension can be roughly determined by a measurement of the belt elongation during tensioning.

The maximum allowable belt tension (TE) of each drum motor is specified in the drum motor tables in this catalog. Belt type, belt thickness and drum motor diameter must match the information from the belt manufacturer. If the diameter of the drum motor is too small, damage to the belt can result.

If the belt tension is too strong, it can damage the shaft bearings and/or other internal components of the drum motor and shorten the service life of the product.

### Belt elongation

The belt tension is created by the force of the belt when it is stretched in longitudinal direction. To prevent damage to the drum motor, it is absolutely necessary to measure the belt elongation and to determine the static belt tensioning force. The calculated belt tension must be equal to or lower than the values specified in the drum motor tables in this catalog.

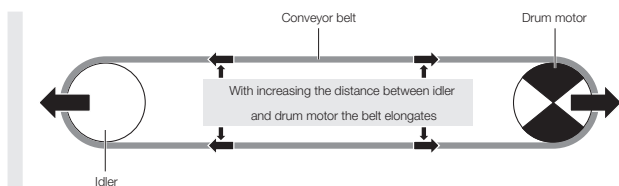


Fig.: Belt elongation

### Measuring the belt elongation

The belt elongation can very easily be determined using a measuring tape. Mark the not-tensioned belt on two points in the belt center, where the outer diameter of the drum motor and idler pulley is the biggest due to the crowning. Measure the distance between the two marks parallel to the belt edge (Be0). The longer the distance between the two marks, the more precise the measurement of elongation will be. Now start to tension the belt and adjust it. Once the belt is adjusted and tensioned measure the distance between the two marks again (Be). The belt elongation increases the distance.

# APPLICATION NOTES

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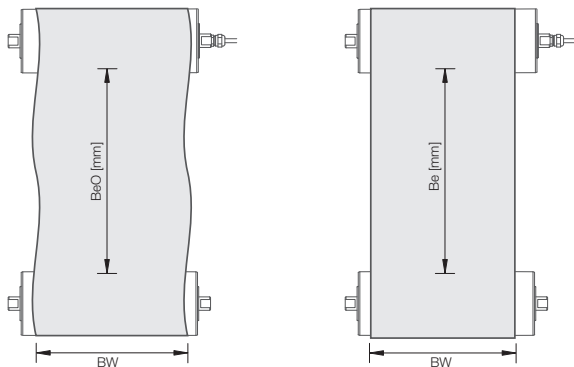


Fig.: Measuring the belt elongation

### Belt elongation calculation

With the belt elongation measurement you can calculate the belt elongation in %.

$$B_{e\%} = \frac{B_e \cdot 100\%}{B_{e0}} - 100$$

Fig.: Formula for calculating the belt elongation in %

For the calculation of belt elongation, the following values are needed:

- Belt width in mm (BW)
- Static force per mm belt width with 1 % elongation in N/mm (k1 %). This value is usually given in the belt data sheet or can be requested from the belt supplier.

$$TE_{[static]} = BW \cdot k1\% \cdot B_{e\%} \cdot 2$$

Fig.: Formula for calculating the static belt tensioning force in N

### Load and loading method

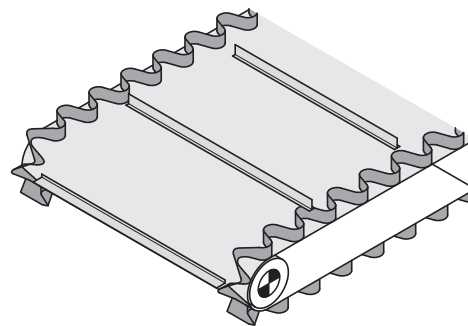
- Consider the method of loading, such as a feed conveyor, hopper loading or shock loading, and adjust the required belt pull and belt tension accordingly
- Consider the type and length of the load with regard to specific point loads and ensure that the weight of the point load (in Newtons) never exceeds the maximum belt tension (TE) of the drum motor.

### Drum motor diameter

- Choose the drum motor with the smallest diameter, but with due consideration of all application parameters and ambient conditions
- Check the minimum flexing diameter allowed for the belt and choose the drum motor diameter accordingly

All belts have a safe minimum diameter for normal or back flexing when used with drum motors or idler pulleys. Always refer to the belt manufacturer's specification for this information and choose the drum motor diameter accordingly, otherwise serious damage to the belt or drum motor may result. If the drum motor diameter is too small, insufficient torque will be transmitted to the belt and belt slip or "jumping" may occur.

To illustrate: The belt shown below has cross cleats and side frames and requires a larger diameter of drum motor than would be required for a plain flat belt.



### Single phase asynchronous motors

Single phase AC motors are typically used when 3-phase voltage is not available.

#### Principle

Single phase AC motors have a main winding and an auxiliary winding to create a rotating field. The phase shift between the main and auxiliary phase is created by a permanently connected running capacitor.

#### Starting torque/starting capacitors

The starting torque can be very limited because of the imperfect rotating field:

- The starting torque of a 3-phase AC motor is typically 120 – 410 % of rated torque
- The starting torque of a 1-phase AC motor is typically 65 – 115 % of rated torque

Some 1-phase AC motors – especially in the higher power range – need an additional starting capacitor to reach a starting torque of 150 – 200 % of the rated torque. This starting capacitor should be the same size as the running capacitor and has to be switched parallel to it. This should be done ideally via a current-dependent switch relay during the start-up sequence of the motor. When the right torque/current has been reached, the starting capacitor is switched off by the relay. The capacity value of the running capacitor is always stated on the motor type label.

### Noise

1-phase motors generally have a higher noise level at zero-load operation compared to 3-phase motors, because of the difference in the rotating field. Typically there is an erratic noise that increases steadily. This does not affect the operation of the drum motor and will normally disappear when belt tension is applied or the drum motor is run under load. Claims cannot be accepted due to this noise effect.

### Capacitors and relays

All capacitors must be ordered separately for single phase drum motors. A suitable current-dependent relay to convert the starting capacitor to a running capacitor can be supplied if needed. For more information, please contact your Interroll customer consultant. The correct installation of the starting capacitor is shown in the wiring diagram supplied with the drum motor.

Interroll strongly recommends the use of 3-phase motors, since they are more efficient and save energy. Improved efficiency can be achieved by using a 3-phase motor with a frequency inverter. If a single phase supply is the only option, consider using a 3-phase motor together with a frequency inverter that converts the single phase input voltage into a 3-phase output voltage.

Standard Interroll capacitors	Article number
3 µF	1100692
4 µF	1000477
6 µF	1100821
8 µF	1100724

**Note:** Capacitors can have different service lives. Use only B rated capacitors.

### Final design steps

Before deciding on the final design, additional factors, such as the motor's switching frequency, still must be taken into account. When using an asynchronous drum motor for stop/starts of more than one per minute, a frequency inverter with a ramp time  $\geq 0.5$  s should be considered. Alternatively, use a synchronous drum motor and frequency inverter. Choose the drum motor version with the required belt pull, belt tension, diameter and speed for your application. If you cannot find the required speed in the drum motor tables, use a frequency inverter and choose the drum motor version with the closest speed or contact Interroll. The Belt Drive Matchmaker at [www.interroll.com](http://www.interroll.com) provides support in the selection of the correct drum motor.

## Material specification

### Protection rate

Interroll drum motors are provided with IP69k protection as standard.

Protection against solid bodies	
IP, first number	Definition
5	Dust-protected
6	Dust-tight
Protection of internal equipment against harmful ingress of water	
IP, second number	Definition
4	Protected against spray water
5	Protected against water jets (P1 nozzle 6.3 mm, water delivery rate 12.5 l/min $\pm 5$ %)
6	Protected against water jets similar to marine swells (P2 nozzle 12.5 mm, water delivery rate 100 l/min $\pm 5$ %)
7	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in 1 m water under standardized conditions of pressure and time
9k	Protected against the effects of high-pressure liquids: <ul style="list-style-type: none"> <li>• Test with fan nozzle</li> <li>• Test unit on turntable (5 revolutions/minute)</li> <li>• Water delivery rate 14 – 16 l/min</li> <li>• Water pressure about 8,000 to 10,000 kPa at <math>80 \pm 5</math> °C with a duration of 30 s per position</li> <li>• Water aimed at the housing with increased pressure from any direction must not have any damaging effect</li> </ul>

### Lagging

#### NBR

This type of synthetic rubber has good wear characteristics, excellent resistance to oil, fuel, and other chemicals. On top of that, it is also easy to clean. Its resilience makes NBR the perfect material for the rubber lagging of drum motors. It can be used in most material handling applications. NBR withstands temperatures from  $-40$  to  $+120$  °C, nitrile rubber is generally resistant to aliphatic hydrocarbons but, like natural rubber, can be attacked

# APPLICATION NOTES

## MATERIAL SPECIFICATION

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by ozone, aromatic hydrocarbons, ketones, esters and aldehydes. White NBR is accepted for the food processing industry and is offered with FDA and EC1935/2004 approval.

### PU

PU represents any polymer consisting of a chain of organic units joined by urethane (carbonate) links. It is tear-resistant and is superior to rubber. Polyurethane has outstanding resistance to oxygen, ozone, sunlight and general weather conditions. Most PU formulations offer an extremely long lifespan, good resistance to heat and cold at temperatures of between  $-35$  and  $+80$  °C and is offered with EC 1935/2004 and FDA approval.

**Note:** Minimum PU thickness 4 mm, maximum shell length (SL) 1,200 mm.

### Hot vulcanization

Hot vulcanized NBR rubber lagging can be used to increase friction between the drum motor and conveyor belt for high torque applications and to reduce belt slip. Alternatively, it can be profiled to drive modular belts and other special applications. Due to the high temperature of the process, the lagging must be applied to the shell before the drum motors are assembled. The result is a very strong bonded rubber, suitable for high torque applications and completely sealed to the shell. This method guarantees a long service life and is recommended for hygienic applications.

NBR profiled lagging is not recommended for use with solid homogeneous belts due to the high friction that can cause the belt to jump.

### Cold vulcanization

Cold vulcanized NBR rubber lagging is used to increase the friction between the drum shell and belt in order to reduce belt slip. The cold process requires a special adhesive (cement) to glue the lagging onto the drum shell. Cold vulcanized white NBR is approved by the FDA. The lagging follows the original shape of the drum shell (crowned or cylindrical) and is not machined afterwards. However, the process can be applied quickly to finished assembled drum motors and therefore is a quick and easy solution.

#### Certifications

Interroll Drum Motors can be offered certified and approved according to UL 1004 for the North American market and cUL for the Canadian market.

Interroll Drum Motors for use in the food processing industry are EHEDG-compliant. The materials meet the requirements of the FDA, EC 1935/2004 and Ecolab. Cleaning specialist Ecolab has certified a 5-year minimum lifetime of materials used for Interroll Drum Motors when exposed to typical cleaning and disinfecting procedures using Ecolab's Topax range of products: P3-topax 19, P3-topax 686, P3-topax 56 and P3-topactive DES.



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**MATERIAL SPECIFICATION**

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The Interroll Competence Center in Baal (near Düsseldorf) concentrates on drum motors that are employed as drive solutions in belt conveyors in food processing and other systems of internal logistics as well as various branches of industry. In this product sector, the company is responsible within the global Interroll Group for all technical concerns ranging from development and application engineering to production and support for local Interroll companies. The production area also includes the Coating Center for rubber-coated drum motors, which are intended for the hygienic production lines of the food industry.

Visit [www.interroll.com](http://www.interroll.com) to find your local contact person.  
Interroll Trommelmotoren GmbH  
Opelstr. 3 | 41836 Hückelhoven/Baal |  
Germany Tel.: +49 (0)2433 44610

## LEGAL NOTICES

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#### **About Interroll**

The Interroll Group is a globally leading supplier of high-quality key products and services for internal logistics. The company supplies roughly 23,000 customers (system integrators and machine builders) throughout the world with a broad product range in the four product groups "Rollers" (conveyor rollers), "Drives" (motors and drives for conveyor systems), "Conveyors & Sorters" as well as "Pallet & Carton Flow" (flow storage systems). Core industries are courier, express and postal services, airports, food processing as well as distribution and other industries. With its headquarters in Sant'Antonino, Switzerland, Interroll features a worldwide network of 32 companies with roughly 2,000 employees. The company was founded in 1959 and is listed on the SIX Swiss Exchange since 1997 and represented in the SPI Index.

**[interroll.com](https://www.interroll.com)**

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