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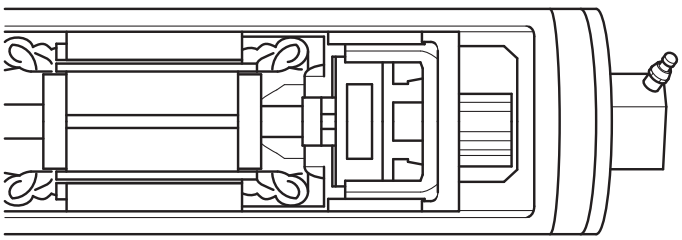

User Manual

Interroll Drum motor

DL series

Version 1.0 (12/2019) en
Translation of original operating instructions

Manufacturer

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Contents

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Information about working with the operating instructions

The following drum motor types are described in this instruction manual:

- DL 0080, DL 0113

Contents

These operating instructions contain important notes and information about the various operating phases of the drum motor.

The operating instructions describe the drum motor as it is delivered by Interroll.

In addition to these operating instructions, special contractual agreements and technical documents apply to special versions.

The operating instructions are part of the product

- For trouble-free, safe operation and warranty claims, read the instructions first and follow the notices.
- Keep the instructions close to the drum motor.
- Pass the instructions on to any subsequent operator or owner.
- **NOTICE! The manufacturer does not accept any liability for damage and malfunctions due to non-observance of these instructions.**
- If you still have questions after reading the instructions, please contact Interroll's customer service. Contact persons close to you can be found on the Internet under www.interroll.com/contact.

Safety

State of the art

The conveyor is designed according to the state of the art and is reliable in operation, once distributed. However, risks may still arise.

Disregarding the notices in this manual may lead to serious injury.

- Carefully read the manual and follow its content.

Intended use

The drum motor is intended for use in industrial environments, supermarkets and airports and is used for transporting general cargo, such as parts, cardboard boxes or boxes, as well as transporting bulk material such as granular material, powder and other fluid materials. The drum motor must be integrated into a conveyor module or conveyor system. Any other use is considered inappropriate.

Use of the drum motor is only allowed in the areas described in the product information chapter.

Any modifications that affect the safety of the product are not permitted.

The drum motor may only be operated within the defined operating limits.

Unintended use

The drum motor must not be used for transporting people.

The drum motor is not intended for use under impact or shock loads.

The drum motor is not designed to be used under water. Such a use leads to personal or fatal injuries from electrocution as well as the penetration of water, resulting in a short circuit or motor damage.

The drum motor may not be used as a drive for cranes or lifting devices or for the corresponding hoist ropes, cables or chains.

Use of the drum motor for anything other than the intended purpose is subject to approval by Interroll.

Unless otherwise stated in writing and/or specified in a quote, Interroll and its dealers shall assume no liability for product damage or failure which result from failure to observe these specification and restrictions (see the chapter "Electrical data" of the respective series).

Personnel qualification

Unqualified personnel cannot recognize risks and, as a result, is subject to greater dangers.

- Authorize only qualified personnel to perform the activities described in these instructions.
- The operating company must ensure that personnel follow locally applicable regulations and rules about safety and hazards while working.

The following target groups are addressed in these instructions:

Operators Operators have been instructed in operating and cleaning the drum motor and follow the safety guidelines.

Service personnel The service personnel features a technical training or has undergone training by the manufacturer and performs the maintenance and repair tasks.

Electricians Persons working on electrical installations must have pertinent technical training.

Dangers

The following list informs you about the various types of danger or damage that may occur while working with the drum motor.

Bodily injury

- Maintenance or repair work must only be executed by authorized and qualified persons in accordance with the applicable regulations.
- Before turning on the drum motor, ensure that no unauthorized persons are near the conveyor.

Electricity

- Perform any installation and maintenance tasks only after following the five safety rules:
  - Disconnect
  - Secure against reactivation
  - Determine de-energized state at all poles
  - Ground and short circuit
  - Cover or block neighboring live parts

Oil

- Do not ingest the oil. In general, the oil used is relatively non-toxic, but it can still contain hazardous substances. Ingestion can lead to nausea, vomiting and/or diarrhea. Generally, medical care is not required, unless large quantities have been ingested. Nevertheless, a physician should be consulted.
- Avoid skin and eye contact. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin and lead to skin problems such as oil acne and folliculitis.
- Wipe up spilled oil as quickly as possible to avoid slippery surfaces. Ensure that oil does not reach the environment. Properly dispose of dirty rags or cleaning materials to avoid self-ignition and fires.
- Extinguish oil fires with foam, spraying water or water mist, dry chemical powder or carbon dioxide. Do not extinguish with water jet. Wear suitable protective clothing, incl. breathing mask.
- Observe the corresponding certificates at www.interroll.com.

Safety

Rotating parts

- Do not reach into areas between drum motor and conveyor belts or roller chains.
- Tie long hair together.
- Never wear loose clothing.
- Never wear jewelery, such as necklaces or bracelets.

Hot motor parts

- Do not touch the surface of the drum motor. It can result in burns, even under regular operating temperature.
- Install corresponding warnings on the conveyor.

Working environment

- Do not use the drum motor in explosive atmospheres.
- Remove equipment or material which is not required from the workspace.
- Wear safety shoes.
- Clearly specify and monitor the way materials are placed on the conveyor.

Faults during operation

- Regularly check the drum motor for visible damage.
- In case of fumes, unusual noise or blocked or damaged materials, stop the drum motor at once and ensure that the RollerDrive cannot be started accidentally.
- Contact qualified personnel immediately to find the source of the fault.
- During operation, do not step on the drum motor or the conveyor/the system in which it is installed.

Maintenance

- Check the product regularly for visible damages, unusual noise and firm seating of fittings, screws and nuts. An additional maintenance is not required.
- Do not open the drum motor.

Accidental motor start

- Take care during installation, maintenance work and cleaning or in the event of a drum motor fault: The drum motor could start up unintentionally.

Interfaces to other devices

Hazards may occur while integrating the drum motor into a complete system. These are not part of this manual and have to be analyzed during the design, installation and startup of the complete system.

- After assembling the drum motor in a conveyor module, check the whole system for a new potential dangerous spot before switching on the conveyor.
- Additional constructive measures may be required.

General technical information

Product description

The drum motor is a completely enclosed electrical drive roller. It replaces external components such as motors and gears, which require frequent maintenance.

The drum motor can be used in environments with high coarse and fine dust exposure as well as exposed to water jets and spraying water and is resistant to most aggressive ambient conditions. In aggressive environments and environments with salt water, only stainless steel motors should be used. Thanks to protection class IP66 and its stainless steel design (upon request), the drum motor is also suitable for use in the food processing and pharmaceutical industries, as well as for applications with high hygienic demands. The drum motor can be used with or without a drum coating to increase friction between drum motor and conveyor belt, or with a profile coating to drive form-fit driven belts.

DL series drum motors are driven by an asynchronous three-phase induction motor. That motor is available at different power levels and for most international supply voltages.

The drum motor contains oil as lubricant and coolant which dissipates the heat via the drum shell and the conveyor belt.

Options

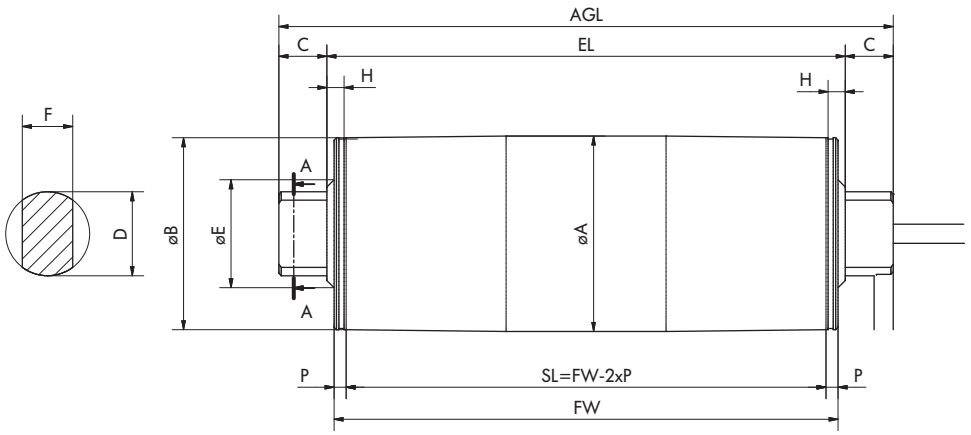
Integrated thermal overload protection: A thermal circuit breaker integrated in the winding head protects against overheating. The switch trips if the motor overheats. However, it must be connected to a suitable external control device that interrupts the power supply to the motor in case of overheating (*see "Thermal protection", page 14*).

Dimensions of DL series drum motor

Some dimensions are listed as "FW+". FW is the abbreviation for "Face Width" (drum width). This information is located on the type plate of the drum motor.

All length-related dimensions in the catalog and in these operating instructions comply with the requirements of DIN/ISO 2768 (medium quality).

The recommended distance between the mounting brackets (EL) while taking into account the maximum thermal expansion and internal tolerances is EL + 2 mm.



Dimensions of DL series drum motor

Type	A mm	B mm	C mm	D mm	E mm	F mm	H mm	P mm	SL mm	EL mm	AGL mm
DL 0080 crowned SL 260 to 602 mm	81.5	80	20	35	45	21	8	5	FW10	FW+6	FW+46
DL 0080 crowned, steel, center untreated SL 603 to 952 mm	82.7	81	20	35	45	21	8	5	FW-10	FW+6	FW+46
DL 0080 crowned, stainless steel, center untreated SL 603 to 952 mm	83	80	20	35	45	21	8	5	FW-10	FW+6	FW+46
DL 0080 cylindrical SL 260 to 602 mm	80.5	80.5	20	35	45	21	8	5	FW-10	FW+6	FW+46
DL 0080 cylindrical, steel, outside untreated SL 603 to 952 mm	82.7	82.7	20	35	45	21	8	5	FW-10	FW+6	FW+46

General technical information

Type	A mm	B mm	C mm	D mm	E mm	F mm	H mm	P mm	SL mm	EL mm	AGL mm
DL 0080 cylindrical, stainless steel, outside untreated SL 603 to 952 mm	83	83	20	35	45	21	8	5	FW-10	FW+6	FW+46
DL 0113 crowned SL 240 to 1090 mm	113.3	112.4	20	35	45	21	14	11	FW-22	FW+6	FW+46
DL 0113 cylindrical SL 240 to 1090 mm	113.0	113.0	20	35	45	21	14	11	FW-22	FW+6	FW+46
DL 0113 cylindrical SL 1091 to 2450 mm	114.3	114.3	20	35	45	21	14	11	FW-22	FW+6	FW+46

Technical data

Protection class	IP66
Ambient temperature range for standard applications	+5 °C to +40 °C
Ambient temperature range for low-temperature applications [1)]	–25 °C to +15 °C
Ambient temperature range for reduced drum motors	+5 °C to +25 °C
Ramp times	DL series: ≥ 1 s
Installation altitude above sea level	max. 1000 m

[1)] For ambient temperatures below +1 °C, Interroll recommends anti-condensation heating and special cables.

Product identification

The serial number is sufficient to identify a drum motor. As an alternative, the information listed below is required. The values for a specific drum motor can be entered in the last column.

Information	Possible value	Own value
Type plate of drum motor	Motor type and design: Circumferential speed v_N: Diameter of tube ø: FW drum width: Number of poles n_p: Rated power P_N:	
Drum design (tube design)	e.g. Drum material Coating type (color, material, profile, grooves)	
End cover	Material Features deviating from the standard	
Shafts	Material Features deviating from the standard	

Thermal protection

Under normal operating conditions, the thermal circuit breaker integrated in the stator winding is closed. When the motor limit temperature is reached (overheating), the switch opens at a preset temperature to prevent damage to the motor.

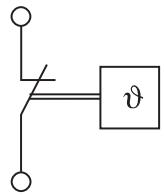
⚠ WARNING

The thermal circuit breaker is automatically reset after the motor has cooled off.

Inadvertent start-up of the motor

- Connect the thermal circuit breaker in series with a suitable relay or contactor so that the current supply to the motor is safely interrupted when the switch trips.
- Ensure that the motor can be switched on again after overheating only with a confirmation button.
- After the switch has tripped, wait until the motor has cooled off, and ensure prior to switch-on that there is no danger to persons.

Standard design: temperature limiter, automatically switching back



Service life: 10,000 cycles			
AC	cos φ = 1	2.5 A	250 V AC
	cos φ = 0.6	1.6 A	250 V AC
DC		1.6 A	24 V DC
		1.25 A	48 V DC
Service life: 2000 cycles			
AC	cos φ = 1	6.3 A	250 V AC
Reset temperature		40 K ± 15 K	
Resistance		< 50 mΩ	
Contact bounce time		< 1 ms	

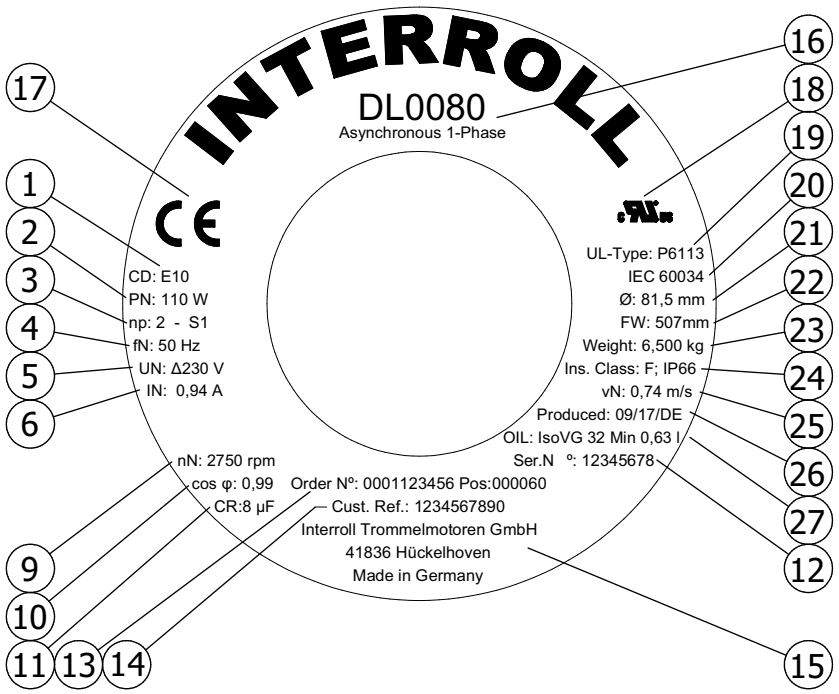
Product information for DL series asynchronous 1-phase

Type plate of DL series asynchronous 1-phase

The information on the type plate of the drum motor is used to identify it. This is the only way for the drum motor to be used properly.

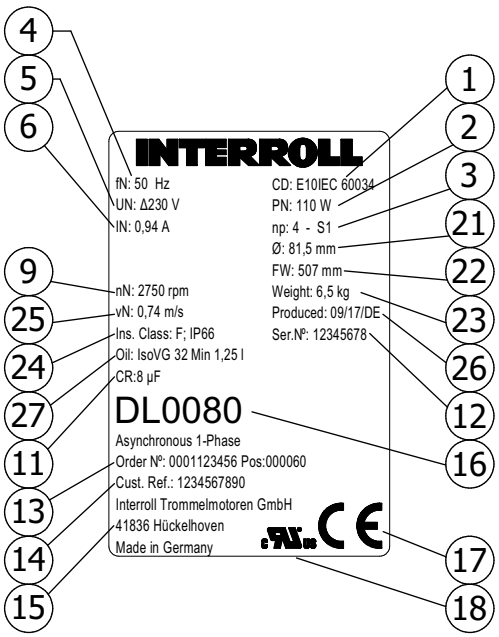
DL series drum motors have different kinds of type plates:

1. Round type plate (1) on the end cover of the drum motor (glued or laser-engraved)
2. Rectangular type plate (2) on the terminal box (if available, glued or laser-engraved)
3. Rectangular type plate (3) included with the motor

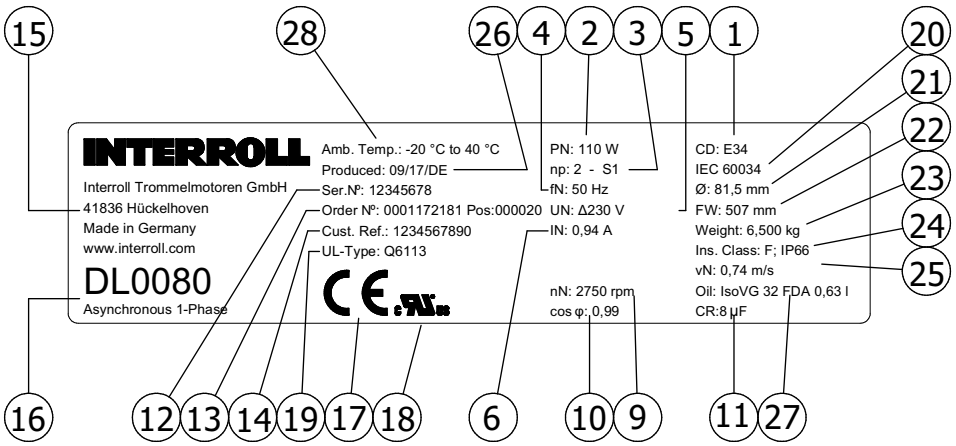


Type plate (1) for DL series asynchronous 1-phase

Product information for DL series asynchronous 1-phase



Type plate (2) for DL series asynchronous 1-phase



Type plate (3) for DL series asynchronous 1-phase

Interroll DL series drum motor

Product information for DL series asynchronous 1-phase

1	Connection diagram number	16	Type and design
2	Rated power	17	CE mark
3	Number of poles + operating mode	18	UL mark
4	Rated frequency [1)]	19	Type of UL standard
5	Rated voltage at rated frequency	20	International Electrotechnical Commission: Standard for drum motors
6	Rated current at rated frequency	21	Drum tube diameter
9	Rated speed of rotor [1)]	22	Drum width
10	Power factor	23	Weight
11	Running capacitor	24	Insulation class and protection rate
12	Serial number	25	Circumferential speed of drum tube [1)]
13	Order number + item	26	Manufactured week/year/country
14	Customer item number	27	Oil type and quantity
15	Manufacturer's address	28	Operating temperature

[1)] The value depends on the voltage used. All values in parentheses refer to the rated voltage in parentheses.

Electrical data for DL series asynchronous 1-phase

Abbreviations see *"List of abbreviations", page 56*

DL 0080 1-phase

P_N	n_P	n_N	f_N	U_N	I_N	cosφ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	$U_{SH\sim}$	C_r
W		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	µF
25	4	1320	50	230	0.39	1	0.28	1.3	2.19	1.11	1.37	1.11	0.18	150	44	3
50	2	2750	50	230	0.54	1	0.4	0.9	3.08	0.94	1.71	0.94	0.17	82	33	3
75	2	2750	50	230	0.68	1	0.48	1	3.19	0.74	1.37	0.74	0.26	66	34	4
75	2	3300	60	230	0.68	1	0.49	1.3	4.89	1	1.83	1	0.22	38	19	6
85	2	2750	50	230	0.73	0.98	0.53	1.3	5.24	0.93	1.6	0.93	0.3	52	28	6
85	2	2750	50	230	0.73	0.98	0.53	1.3	5.24	0.93	1.6	0.93	0.3	52	28	6
85	2	3300	60	230	0.72	1	0.52	1.3	4.89	1	1.83	1	0.25	38	20	6
110	2	2750	50	230	0.94	1	0.51	1.3	1.97	0.73	1.15	0.73	0.38	51	36	8

DM 0113 1-phase

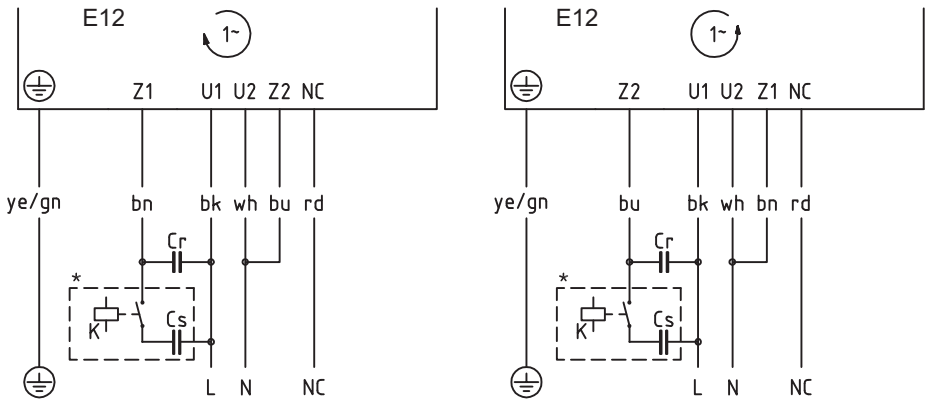
P_N	n_P	n_N	f_N	U_N	I_N	cosφ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	$U_{SH\sim}$	C_r
W		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	µF
60	4	1300	50	230	0.75	0.98	0.36	2.3	2.58	1.29	2.6	1.29	0.44	63.5	35	4
60	4	1560	60	230	0.86	0.97	0.32	2.3	2.58	1.29	2.6	1.29	0.37	63.5	40	4
80	6	890	50	230	1.35	0.99	0.26	4	1.88	0.7	1.65	0.7	0.86	45.9	46	8
90	4	1300	50	230	0.99	0.91	0.43	2.3	2.42	1.24	2.42	1.24	0.66	42.5	29	6
90	4	1300	50	230	0.99	0.91	0.43	2.3	2.42	1.24	2.42	1.24	0.66	42.5	29	6
90	4	1560	60	230	1.1	0.96	0.37	2.3	2.42	1.24	2.42	1.24	0.55	42.5	34	6
90	4	1560	60	230	1.1	0.96	0.37	2.3	2.42	1.24	2.42	1.24	0.55	42.5	34	6
110	4	1300	50	230	1.13	0.88	0.48	3.3	2.93	1.06	2.31	1.06	0.81	32.5	24	6
110	4	1560	60	115	2.2	0.94	0.46	3.3	3.24	1.08	2.8	1.08	0.67	6.3	10	16
110	4	1560	60	115	2.2	0.94	0.46	3.3	3.24	1.08	2.8	1.08	0.67	6.3	10	16
110	4	1560	60	230	1.16	0.99	0.41	3.3	2.93	1.06	2.31	1.06	0.67	32.5	28	6
150	4	1560	60	115	2.8	0.89	0.52	4	3.57	1.04	2.99	1.04	0.92	4	7	20

Connection diagrams of DL series asynchronous 1-phase

These operating instructions list only standard connection diagrams. For other connection types, the connection diagram is supplied separately with the drum motor.

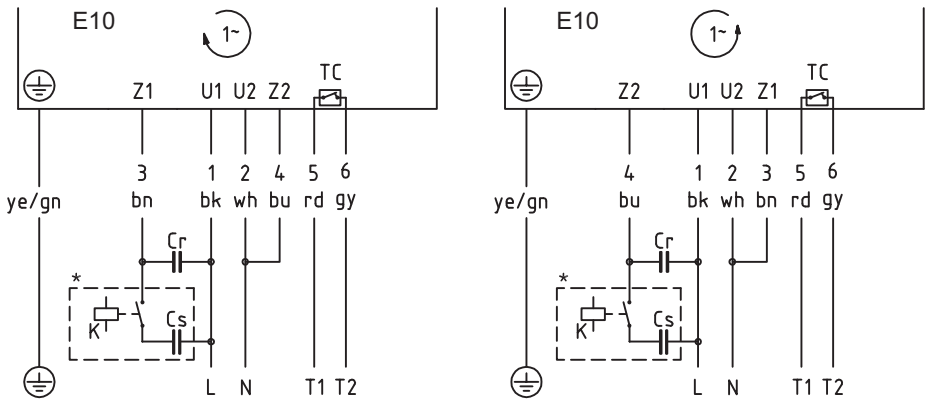
Abbreviations *see "List of abbreviations", page 56*

Cable connections



1-phase, 6-core cable

* A starting capacitor and a matching switching relay can be connected as an option to improve the starting torque of the single-phase motor.

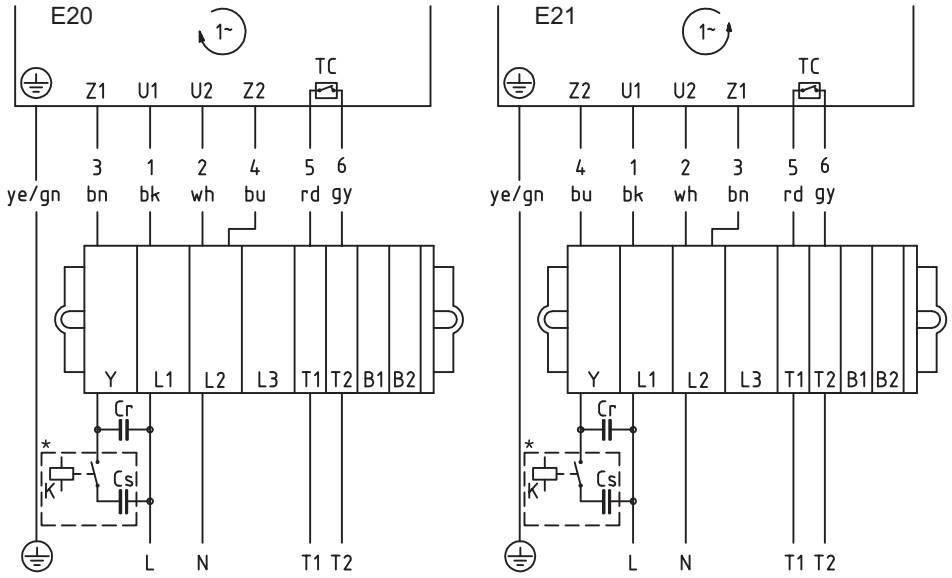


1-phase, 7-core cable

* A starting capacitor and a matching switching relay can be connected as an option to improve the starting torque of the single-phase motor.

Product information for DL series asynchronous 1-phase

Connections in the terminal box



1-phase, 7-core cable

* A starting capacitor and a matching switching relay can be connected as an option to improve the starting torque of the single-phase motor.

Maximum torque for terminal box cover screws: 1.5 Nm

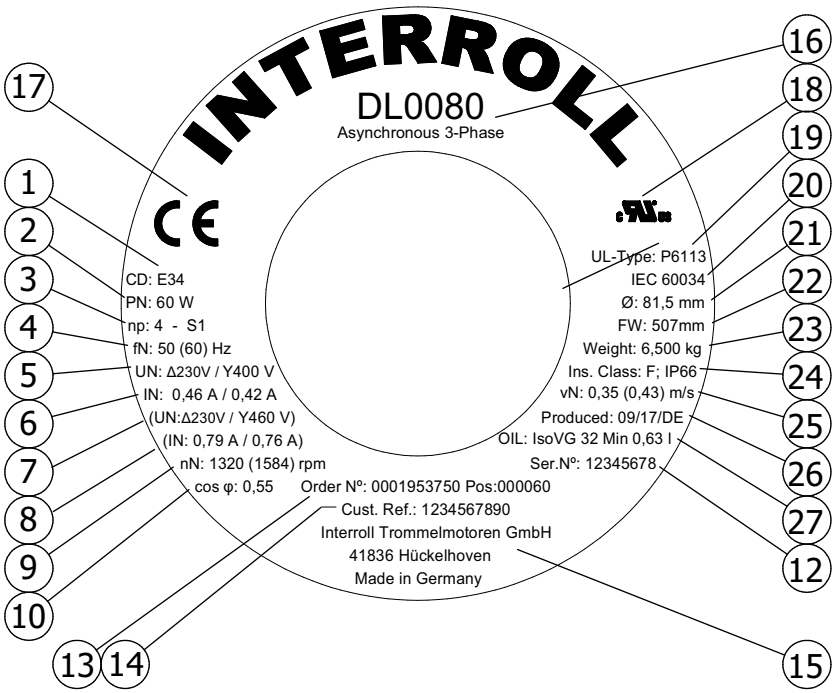
Product information for DL series asynchronous 3-phase

Type plate of DL series asynchronous 3-phase

The information on the type plate of the drum motor is used to identify it. This is the only way for the drum motor to be used properly.

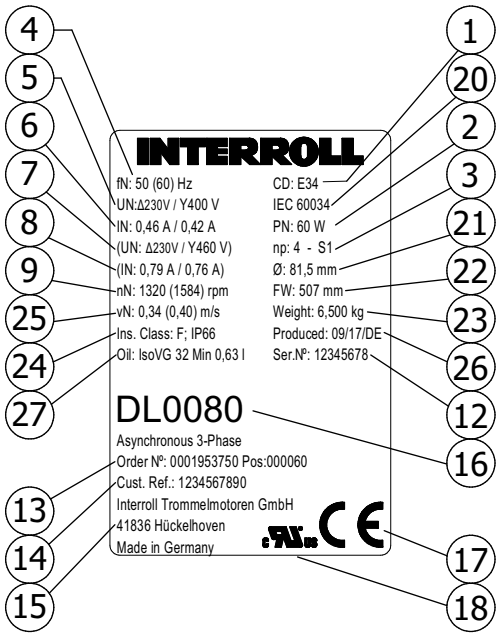
DL series drum motors have different kinds of type plates:

1. Round type plate (1) on the end cover of the drum motor (glued or laser-engraved)
2. Rectangular type plate (2) on the terminal box (if available, glued or laser-engraved)
3. Rectangular type plate (3) included with the motor

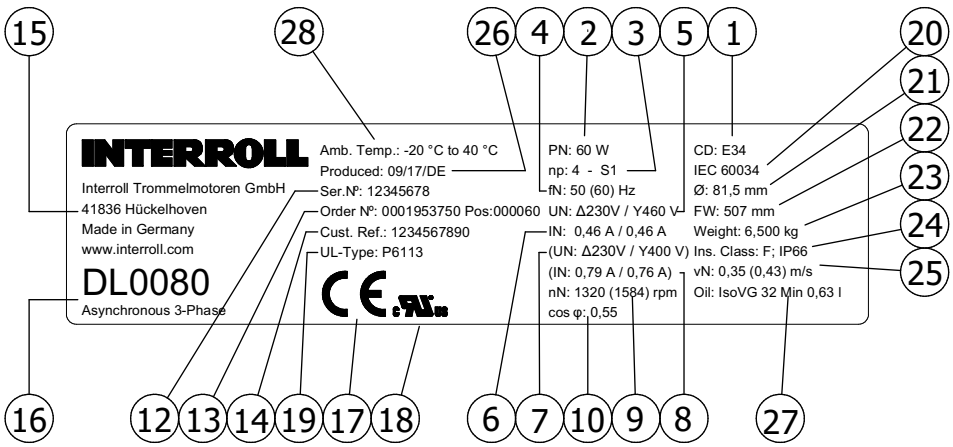


Type plate (1) for DL series asynchronous 3-phase

Product information for DL series asynchronous 3-phase



Type plate (2) for DL series asynchronous 3-phase



Type plate (3) for DL series asynchronous 3-phase

Interroll DL series drum motor

Product information for DL series asynchronous 3-phase

1	Connection diagram number	16	Type and design
2	Rated power	17	CE mark
3	Number of poles + operating mode	18	UL mark
4	Rated frequency [1)]	19	Type of UL standard
5	Rated voltage at rated frequency	20	International Electrotechnical Commission: Standard for drum motors
6	Rated current at rated frequency	21	Drum tube diameter
7	(Rated voltage)[1)]	22	Drum width
8	(Rated current)[1)]	23	Weight
9	Rated speed of rotor [1)]	24	Insulation class and protection rate
10	Power factor	25	Circumferential speed of drum tube [1)]
12	Serial number	26	Manufactured week/year/country
13	Order number + item	27	Oil type and quantity
14	Customer item number	28	Operating temperature
15	Manufacturer's address		

[1)] The value depends on the voltage used. All values in parentheses refer to the rated voltage in parentheses.

Electrical data for DL series asynchronous 3-phase

Abbreviations see *"List of abbreviations", page 56*

DL 0080 3-phase

P_N	n_P	n_N	f_N	U_N	I_N	cosφ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	$U_{SH\ delta}$	$U_{SH\ star}$	C_r
W		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
40	4	1320	50	230	0.71	0.65	0.21	1	1.77	1.6	1.6	1.6	0.29	156.5	36	-	10
40	4	1320	50	400	0.43	0.65	0.21	1	1.77	1.6	1.6	1.6	0.29	156.5	-	66	10
50	2	2750	50	230	0.46	0.57	0.47	1	4.58	3.82	3.82	3.82	0.17	111.3	-	-	-
50	2	3300	60	230	0.45	0.64	0.42	1	5.67	3.29	3.29	3.29	0.14	111.3	-	-	-
50	2	2750	50	400	0.22	0.71	0.45	1	4.35	2.35	2.35	2.35	0.17	171	-	40	-
60	4	1320	50	230	0.79	0.65	0.29	1	1.77	1.6	1.6	1.6	0.43	156.5	40	-	11
60	4	1584	60	230	0.76	0.65	0.15	1	1.72	1.6	1.6	1.6	0.36	156.5	39	-	13
60	4	1320	50	400	0.46	0.65	0.29	1	1.77	1.6	1.6	1.6	0.43	156.5	-	70	11
60	4	1584	60	460	0.76	0.65	0.15	1	1.72	1.6	1.6	1.6	0.36	156.5	-	116	13
75	2	2820	50	230	0.51	0.69	0.53	1	4.58	2.5	2.5	2.5	0.25	111.3	-	-	-
75	2	3300	60	230	0.49	0.74	0.53	1	5.67	2.19	2.19	2.19	0.22	111.3	-	-	-
75	2	2820	50	400	0.3	0.7	0.51	1	4.46	2.5	2.5	2.5	0.25	113	-	36	-
75	2	3300	60	460	0.28	0.7	0.49	1	5.23	2.95	2.95	2.95	0.22	113	-	33	-
85	2	2800	50	230	0.53	0.73	0.55	1	4.58	2.24	2.24	2.24	0.29	111.3	-	-	-
85	2	3300	60	230	0.5	0.78	0.56	1	5.67	1.92	1.92	1.92	0.25	111.3	-	-	-
85	2	2800	50	400	0.32	0.74	0.52	1	4.46	2.24	2.24	2.24	0.29	113	-	40	-
85	2	3300	60	460	0.29	0.74	0.51	1	5.23	2.71	2.71	2.71	0.25	113	-	36	-

DM 0113 3-phase

P_N	n_P	n_N	f_N	U_N	I_N	cosφ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	$U_{SH\ delta}$	$U_{SH\ star}$	C_r
W		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
40	8	720	50	230	0.64	0.58	0.27	3.9	1.53	1.59	1.59	1.49	0.53	187.5	35	-	9
40	8	864	60	230	0.55	0.58	0.24	3.9	1.53	1.92	1.92	1.79	0.44	187.5	30	-	6
40	8	720	50	400	0.37	0.58	0.27	3.9	1.53	1.59	1.59	1.49	0.53	187.5	-	60	9
40	8	864	60	460	0.36	0.58	0.24	3.9	1.53	1.92	1.92	1.79	0.44	187.5	-	59	6
110	6	865	50	230	1.05	0.67	0.39	4	2.25	2.24	2.35	2.24	1.21	30	-	-	15
110	6	865	50	400	0.62	0.62	0.41	4	2.03	3.14	3.35	3.14	1.21	92	-	53	15
110	4	1384	50	230	0.8	0.67	0.52	2.3	2.47	2.89	2.92	2.89	0.76	28	-	-	11
110	4	1384	50	400	0.45	0.72	0.49	2.3	3.33	2.82	2.86	2.82	0.76	83.5	-	41	11

Interroll DL series drum motor

Product information for DL series asynchronous 3-phase

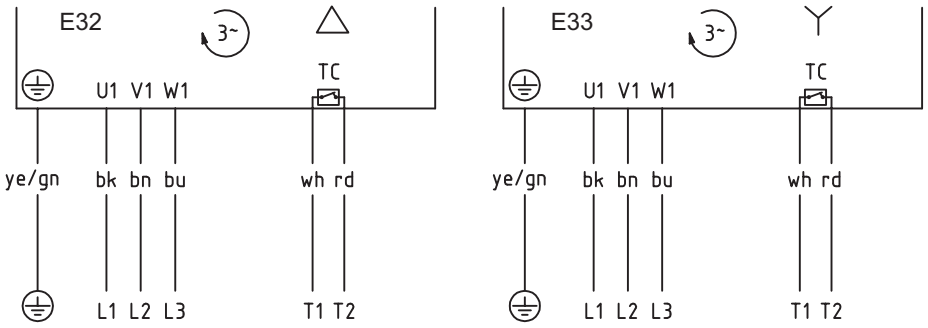
P_N	n_P	n_N	f_N	U_N	I_N	cosφ	η	J_R	I_S/I_N	M_S/M_N	M_B/M_N	M_P/M_N	M_N	R_M	$U_{SH\ delta}$	$U_{SH\ star}$	C_r
W		min^{-1}	Hz	V	A			$kgcm^2$					Nm	Ω	V DC	V DC	µF
110	4	1365	50	230	0.8	0.73	0.47	2.3	3.65	3.38	3.39	3.38	0.77	84	-	-	11
110	4	1365	50	400	0.45	0.75	0.47	2.3	3.64	3.41	3.42	3.41	0.77	84	-	43	11
110	4	1635	60	230	0.75	0.73	0.5	2.3	2.72	3.18	3.19	3.18	0.64	84	-	-	9
110	4	1635	60	460	0.43	0.75	0.43	2.3	1.81	4.37	4.4	4.37	0.64	84	-	41	7
160	4	1665	60	230	0.87	0.78	0.5	3.9	1.8	2.09	2.09	2.09	0.92	64.1	22	-	9
160	4	1384	50	230	0.99	0.76	0.53	3.3	4.28	2.73	2.82	2.73	1.1	24.2	-	-	14
160	4	1348	50	400	0.57	0.76	0.53	3.3	3.85	3.29	3.39	3.29	1.13	60.5	-	39	14
160	4	1350	50	230	0.98	0.76	0.54	3.3	4.02	3.22	3.33	3.22	1.13	59.2	-	-	14
160	4	1350	50	400	0.57	0.75	0.54	3.3	3.98	3.25	3.35	3.25	1.13	59.2	-	38	14
160	4	1665	60	460	0.52	0.78	0.5	3.9	1.8	2.09	2.09	2.09	0.92	64.1	-	39	9
160	4	1610	60	230	1	0.76	0.53	3.3	4.28	3.07	2.99	3.07	0.95	59.2	-	-	12
160	4	1672	60	460	0.55	0.75	0.49	3.3	4.86	4.27	4.15	4.27	0.91	59.2	-	37	10
180	4	1383	50	230	0.98	0.76	0.55	5.6	3.71	1.76	2.08	1.76	1.24	47	18	-	15
180	4	1384	50	230	1	0.76	0.59	4	4	2.73	2.9	2.73	1.24	15	-	-	14
180	4	1384	50	400	0.62	0.76	0.55	4	3.71	3.13	3.27	3.13	1.24	47	-	33	15
180	4	1383	50	400	0.62	0.76	0.55	5.6	3.71	1.76	2.08	1.76	1.24	47	-	33	15
180	4	1355	50	230	1	0.77	0.59	4	4.37	3.54	3.74	3.54	1.27	45.5	-	-	14
180	4	1355	50	400	0.62	0.76	0.55	4	4.42	3.6	3.79	3.6	1.27	45.5	-	32	15
180	4	1665	60	575	0.47	0.73	0.53	4	3.91	3.23	3.15	3.23	1.03	88.5	-	46	6.5
180	4	1620	60	230	1.08	0.77	0.54	4	4.59	3.44	3.27	3.44	1.06	45.5	-	-	12
180	4	1675	60	460	0.62	0.76	0.48	4	5.22	4.76	4.54	4.76	1.03	45.5	-	32	11
330	2	2800	50	230	1.74	0.76	0.68	3.3	4.5	3.57	3.57	2.62	1.13	21.5	14	-	-
330	2	3420	60	230	1.43	0.73	0.68	3.3	4.5	3.2	3.2	3.2	0.92	21.5	11	-	-
330	2	2800	50	400	0.93	0.76	0.68	3.3	4.5	3.57	3.57	2.62	1.13	21.5	-	23	-
330	2	3420	60	460	0.83	0.73	0.68	3.3	4.5	3.2	3.2	3.2	0.92	21.5	-	20	-

Connection diagrams of DL series asynchronous 3-phase

These operating instructions list only standard connection diagrams. For other connection types, the connection diagram is supplied separately with the drum motor.

Abbreviations *see "List of Abbreviations", page 56*

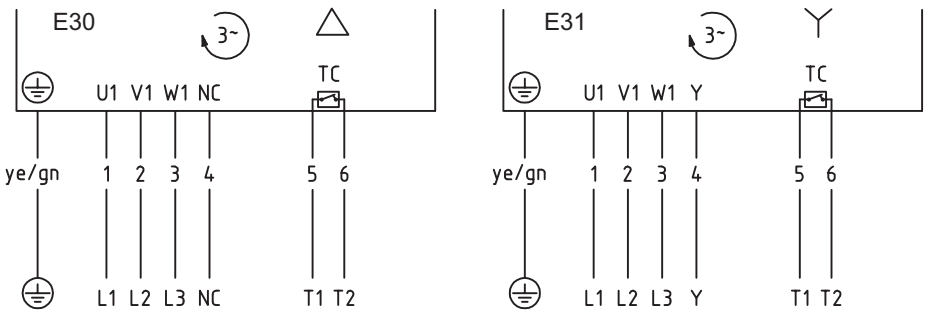
Cable connections



3-phase, 6-core cable, winding for 1 voltage, delta or star connection (internally connected)

Delta connection: Low voltage

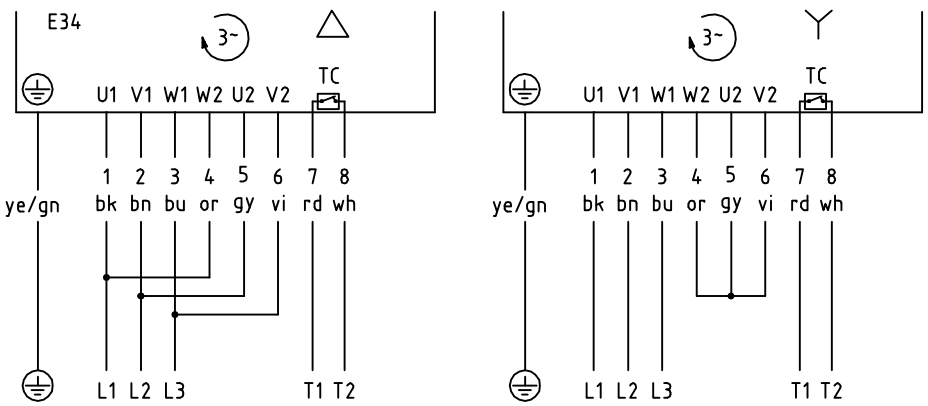
Star connection: High voltage



3-phase, 7-core cable, winding for 1 voltage, delta or star connection (internally connected)

Delta connection: Low voltage

Star connection: High voltage



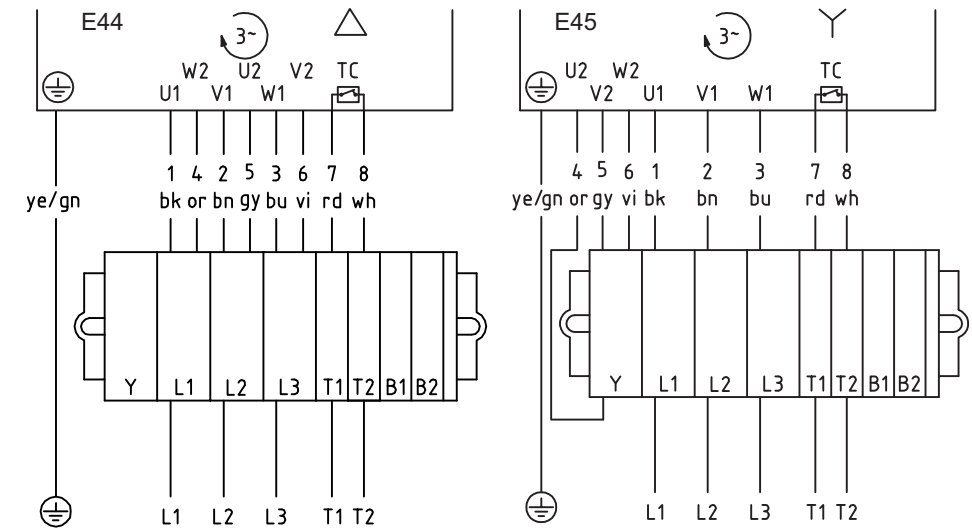
3-phase, 9-core cable, winding for 2 voltages, delta or star connection

Delta connection: Low voltage

Star connection: High voltage

Product information for DL series asynchronous 3-phase

Connections in the terminal box



3-phase, 9-core cable, winding for 2 voltages, delta or star connection

Delta connection: Low voltage

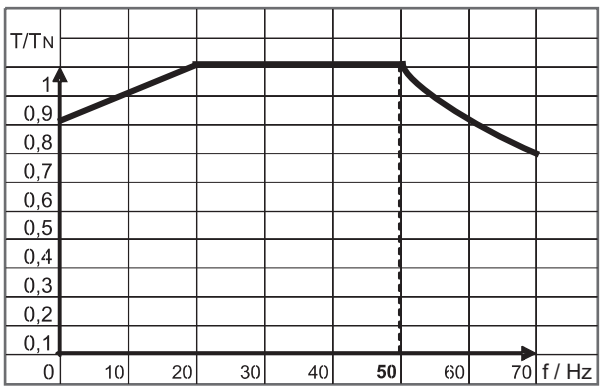
Star connection: High voltage

Maximum torque for terminal box cover screws: 1.5 Nm

Options and accessories

Asynchronous drum motors with frequency inverters

Torque depends on input frequency



Operating frequency [Hz]		5	10	15	20	25	30–50	55	60	65	70	75	80
		Available motor torque in %											
Rated motor frequency	50 Hz	80	85	90	95	100	100	91	83	77	71		
	60 Hz	75	80	85	90	95	100	100	100	92	86	80	75

Value 1: Based on a rated motor frequency of 50 Hz (50-Hz motors should be operated only up to 70 Hz in the speed range under field control.)

Value 2: Based on a rated motor frequency of 60 Hz (60-Hz motors should be operated only up to 80 Hz in the speed range under field control.)

The torque dependency depicted in the figure above is expressed as $P = T \times \omega$. At a reduced operating frequency of below 20/24 Hz, motor torque is reduced by changing the conditions for heat dissipation. Due to the oil quantity, power loss dissipation is different from standard fan motors. For frequencies starting at 80- 85/95- 100 Hz, the curve for the output torque does not have a hyperbolic shape, but is instead replaced by a quadratic function that results from the effect of the pull-out torque and voltage. The output/frequency characteristic curve of most frequency inverters that are supplied at 3 x 400 V/3 x 460 V can be parameterized to 400 V/87 Hz in order to connect motors at 230 V/50 Hz. This may create further losses in the motor and lead to its overheating, if the motor has been designed with insufficient power reserves.

Frequency inverter parameters

- **Clock frequency:** A high clock frequency leads to a better utilization factor of the motor. Optimum frequencies are 8 or 16 kHz. Parameters such as the quality of smooth running tests (motor is running smoothly) and noise development are also affected positively by high frequencies.

Options and accessories

- **Voltage increase:** Interroll motor windings are designed for a rated voltage increase rate of 1 kV/µs. If a frequency inverter generates a steeper voltage increase, motor chokes must be installed between the frequency inverter and the motor. But since all Interroll drum motors run in an oil bath, the risk of overheating or damage to the motor due to high voltage increase speeds is extremely low. Contact your local Interroll dealer about the need for motor chokes.
- **Voltage:** If a frequency inverter with single-phase supply is installed in the drum motor, it must be ensured that the specified motor is designed for the frequency inverter output voltage and is connected accordingly. Single-phase motors cannot be operated with a frequency inverter.
- **Output frequency:** Applications with output frequencies in the speed range under field control above 70 Hz should be avoided (for asynchronous motors only). High frequencies can cause noise, vibrations and resonances, and reduce the rated output torque of the motor.
- **Motor output:** Not all frequency inverters can run motors with more than 6 poles and/or output powers below 0.2 KW/0.27 PS. If in doubt, please contact your local Interroll dealer or the supplier of the frequency inverters.
- **Frequency inverter parameters:** Frequency inverters are usually delivered with factory settings. Given these settings, the inverter is generally not immediately ready for operation. The parameters must be adjusted to the corresponding motor. For frequency inverters sold by Interroll, startup instructions for the corresponding frequency inverters that were specifically created for drum motors can be supplied upon request.

Transport and storage

Transport

⚠ CAUTION

Improper transport poses a risk of injury.

- Transport-related tasks should only be carried out by qualified and authorized persons.
- For drum motors with a weight of 20 kg or more, use a crane or hoisting equipment during the transport. The rated load of the crane or hoisting equipment must be greater than the weight of the drum motor. Crane rope/cable and hoisting equipment must be securely fastened to the shafts of the drum motor during lifting.
- Do not stack pallets.
- Before the transport, ensure that the drum motor is sufficiently secured.

NOTICE

Risk of damage to the drum motor due to improper transport

- Avoid strong impacts during transport.
- Do not lift the drum motor using the cable or the terminal box.
- Do not transfer the drum motors between warm and cold environments. This may cause condensation to form.
- For transport in shipping containers, ensure that the temperature in the container is not permanently above 70 °C (158 °F).
- Ensure that DL series motors intended for vertical mounting are transported in a horizontal position.

- Check each drum motor for damage after transport.
- In the event of damage, take photos of the damaged parts.
- In case of transport damage, immediately notify the carrier and Interroll to avoid losing any claims for compensation.

Storage

⚠ CAUTION

Risk of injury due to improper storage

- Do not stack pallets.
- Do not stack more than four cardboard boxes on top of each other.
- Ensure that proper fastening is in place.

- Store the drum motor horizontally in a clean, dry and enclosed location at +15 to +30 °C; protect it from moisture and humidity.
- For storage times exceeding three months, turn the shaft occasionally to prevent damage to the shaft seals.
- Inspect each drum motor for damage after storage.

Assembly and installation

Warning notices concerning the installation

⚠ CAUTION

Rotating parts and inadvertent startup of the motor

Risk of crushing for fingers

- Do not reach into areas between drum motor and conveyor belts or roller chains.
- Install a protection device (such as a guard plate) to prevent fingers from getting trapped in the chain belts or roller chains.
- Install an appropriate warning on the conveyor.

NOTICE

Risk of damage leading to failure or shortened service life of the drum motor

- Observe the following safety information.

- Do not drop or mishandle the drum motor to avoid internal damages.
- Prior to the installation, inspect each drum motor for damage after storage.
- Do not hold, carry, or support the drum motor by the wires or terminal boxes extending out of the mounting shaft to avoid damage to the internal parts and seals.
- Do not twist the motor cable.
- Do not overtension the belt.

Installing the drum motor

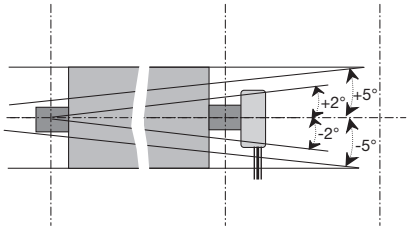
Positioning the drum motor

- Ensure that the data on the type plate are correct, and match the ordered and confirmed product.

A special design must be used to install the drum motor in non-horizontal applications. The exact version must be specified when ordering. In case of doubt, contact Interroll.

The drum motor must be mounted horizontally with a clearance of +/– 5° (drum motor DL 0113: +/– 2°), unless specified differently in the order confirmation.

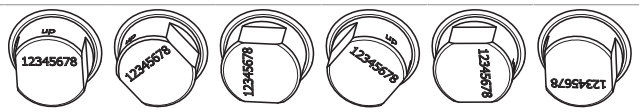
Assembly and installation



Position of the drum motor

All drum motors are identified by the serial number on one end of the shaft.

The DL series can be installed in any orientation.



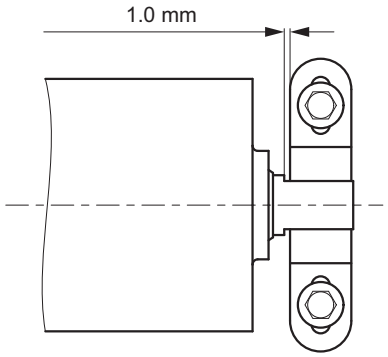
Motor type/mounting position	0°	–45°	–90°	45°	90°	180°
DL 0080/DL 0113	√	√	√	√	√	√

Installing the motor with mounting brackets

The mounting brackets must be sufficiently robust to withstand the motor torque.

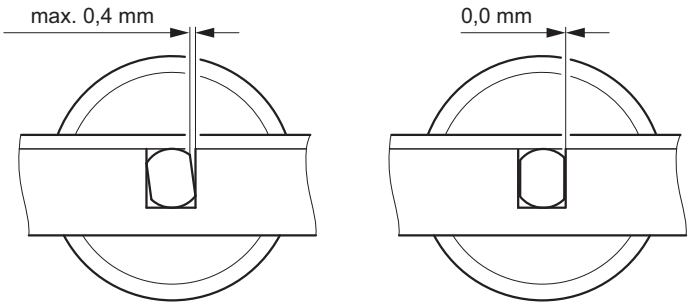
- Install the brackets at the conveyor or machine frame. Ensure that the drum motor is installed parallel to the idler pulley and at a right angle to the conveyor frame.
- Insert the shaft ends of the drum motor into the mounting brackets according to the "Mounting position" table (see above).
- If the shaft must be fastened to the mounting brackets (e.g. with a screw through a cross hole in the journal), it should be done only on one side so that the other side can move in axial direction in case of thermal expansion.
- Ensure that at least 80% of the drum motor flats are held by the mounting brackets.
- Ensure that the distance between the flats and the bracket is not more than 0.4 mm.
- If the drum motor is used for frequent reversing duty or for start/stop operation: Ensure that there is no gap between key surfaces and the mounting brackets.

The drum motor can also be installed without mounting brackets. In this case, the shaft ends must be installed into corresponding recesses in the conveyor frame; these recesses must be reinforced in such a way that they meet the aforementioned requirements.



Axial clearance

The entire axial clearance of the drum motor should be at least 1 mm (0.5 mm per side) and no more than 2 mm (1 mm per side).



Torsional clearance for standard applications (left) and for applications with frequent reversing duty or start/stop operation (right)

- If necessary, install a support plate above the mounting bracket to secure the drum motor shaft.

Belt assembly

Belt width / tube length

NOTICE

Risk of overheating if belt is too small

- Ensure that the drum motor is operated with a conveyor belt that covers at least 70 % of the drum tube.

For drum motors with less than 70 % belt contact and drum motors with form-fit driven belts or without belt, the required output should be multiplied by 1.2. This must be specified at the time of ordering. If in doubt, please contact Interroll.

Belt adjustment

Convex tubes center and guide the belt during regular operation. Nevertheless, the belt should be carefully aligned, frequently checked during startup and readjusted depending on the load.

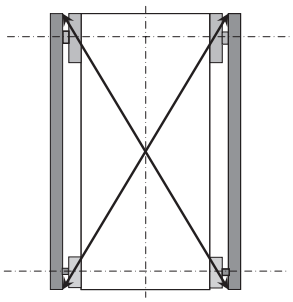
NOTICE

Adjustment errors can lead to a shortened service life as well as damages of the belt and the drum motor ball bearings.

- Adjust the drum motor, belt and idler pulleys according to the instructions in this instruction manual.

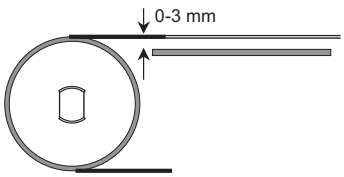
- Adjust the belt with the synchronous returning rollers and support rollers and/or (if available) with the idler pulleys or snub pulleys.
- Check the diagonal dimensions (between the shafts of the drum motor and the shafts of the end/guide rollers or from belt edge to belt edge).
  The difference must not be greater than 0.5 %.

The idler pulley should be cylindrical since a camber in the idler pulley could work against the camber in the drum motor, thereby causing a belt migration.



Diagonal check

The distance between the belt and the gliding plate must not exceed 3 mm.



Belt position

Tensioning the belt

The required belt tension depends on the respective application. The pertinent information is located in the catalog of the belt manufacturer, or contact Interroll.

NOTICE

Overtensioned belts can lead to a shortened service life, wear of bearings or oil leakage.

- Do not tension the belt beyond the value recommended by the manufacturer or specified in the product tables of the catalog.
- Link belts, steel belts, Teflon-coated fiberglass belts and hot-formed PU belts should not be tensioned (see the instructions from the belt manufacturer).

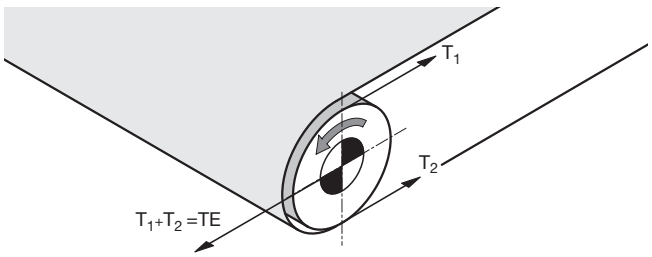
- Adjust the belt tension by tightening or loosening the corresponding screws on both sides of the conveyor to ensure that the drum motor is positioned at a right angle to the conveyor frame and parallel to the end roller/idler pulley.
- Tension the belt only so much that belt and load are being driven.

Belt tension

The following must be observed when calculating the belt tension:

- Length and width of conveyor belt
- Belt type
- The belt tension required for transporting the load
- The belt elongation required for the assembly (depending on the load, the belt elongation for the assembly should measure between 0.2 and 0.5 % of the belt length)
- The required belt tension must not exceed the maximum belt tension (TE) of the drum motor.

The values for the belt tension and elongation are available from the belt manufacturer.



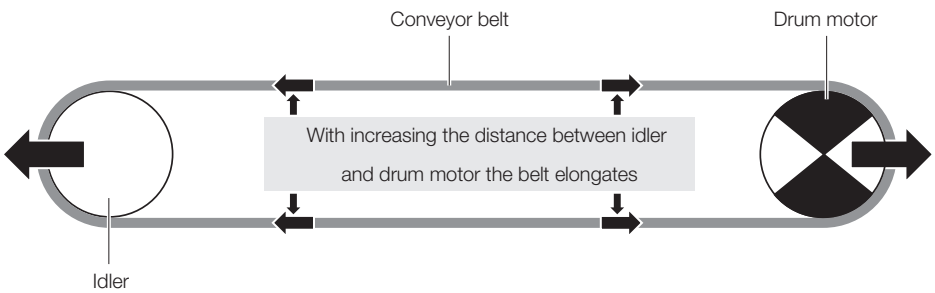
The required belt tension T1 (top) and T2 (bottom) can be calculated according to the specifications of DIN 22101 or CEMA. Based on the information from the belt manufacturer, the actual belt tension can be roughly determined by a measurement of the belt elongation during tensioning.

The maximum permissible belt tension (TE) of a drum motor is listed in the drum motor tables of the 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, it can lead to damages to the belt.

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 damages 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 of the catalog.

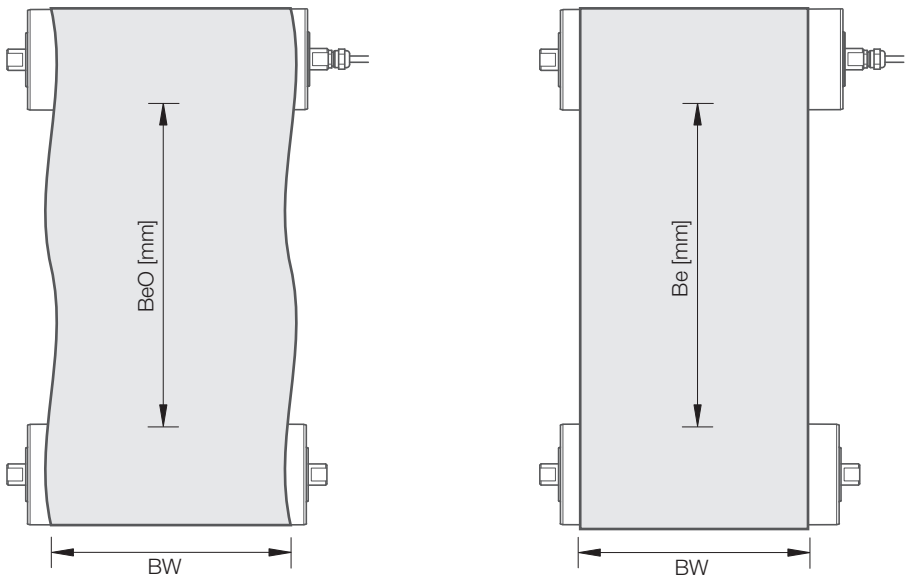


Belt elongation

Measuring the belt elongation

The belt elongation can very easily be determined using a measuring tape.

- Mark the untensioned belt at two points in the center where the outer diameter of the drum motor and the idler pulley are the largest due to the camber.
- Measure the distance between the two markings parallel to the belt edge (Be0). The greater the distance between the two markings, the more precise the belt elongation can be measured.
- Tension and align the belt.
- Measure the distance between the markings (Be) again.
  The belt elongation increases the distance.



Measuring the belt elongation

Calculating the belt elongation

The belt elongation can be calculated in % with the determined measure of the belt elongation.

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

Formula for calculating the belt elongation in %

Calculating the belt elongation requires the following values:

- Belt width in mm (BW)
- Static force per mm belt width with 1 % elongation in N/mm (k1 %). (The value is recorded on the data sheet for the belt or can be obtained from the belt supplier.)

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

Formula for calculating the static belt tensioning force in N

Drum coating

A drum coating (e.g. rubber coating) that was applied retroactively can cause the drum motor to overheat. For some drum motors, there may be restrictions concerning the thickness of the drum coating.

To avoid a thermal overload, the required output should be multiplied with 1.2.

Please contact Interroll concerning the type and maximum thickness of a drum coating if you want to apply one.

Sprockets

To operate link belts with sprockets requires that a sufficient number of sprockets are attached to the drum shell in order to support the belt and to correctly transfer the force. Sprockets that engage with the belt must have a floating fit to prevent them from interfering with the thermal expansion of the belt. Only one sprocket may be affixed for belt guidance; as an alternative, the belt may also be guided at the sides.

For a belt guidance with fixed sprocket, the number of sprockets should be odd so that the fixed sprocket can be arranged in the center. At least one sprocket should be used for every 100 mm belt width. The minimum number of sprockets is 3.

The force is transferred using a key steel welded onto the drum tube. In general, this key steel is 50 mm shorter than the tube length (SL).

NOTICE

Damage to the belt

- Do not use a fixed sprocket together with side guides.

Warning notices for electrical installation

⚠ WARNING

Electrocution due to improper installation

- All electrical work must only be performed by qualified and authorized persons.
- Disconnect the power supply before installing, removing or rewiring the drum motor.
- Always observe the connection instructions and ensure that the power and control circuits of the motor are correctly connected.
- Ensure that metal conveyor belt frames are sufficiently grounded.

NOTICE

Damage to the drum motor from incorrect power supply

- Do not connect an AC drum motor to an excessively high DC voltage supply and a DC drum motor to an AC voltage supply – this will cause irreparable damage.

Electrical connection of the drum motor

Connecting the drum motor – with a cable

- Ensure that the motor is connected to the correct supply voltage according to the motor type plate.
- Ensure that the drum motor is correctly grounded using the yellow-green cable.
- Connect the drum motor according to the connection diagrams (*see "Connection diagrams of DL series asynchronous 1-phase", page 19*, *see "Connection diagrams of DL series asynchronous 3-phase", page 26*).

Connecting the drum motor – with a terminal box

NOTICE

Damage to the internal wiring due to changes to the terminal box

- Do not disassemble, reassemble or modify the terminal box.

- Remove the cover of the terminal box.
- Ensure that the motor is connected to the correct supply voltage according to the motor type plate.
- Ensure that the terminal box of the drum motor is correctly grounded.
- Connect the drum motor according to the connection diagrams (connection diagrams of DL series asynchronous 1-phase *see "Connections in the terminal box", page 27* or connection diagrams of DL series asynchronous 3-phase *see "Connections in the terminal box", page 20*).
- Replace cover and seals. Tighten the screws of the cover with 1.5 Nm to ensure that the terminal box is tightly sealed.

Assembly and installation

Single-phase motor

If a starting torque of 100% is required, single-phase drum motors should be connected to a starting capacitor and a running capacitor. Operation without starting capacitor can reduce the starting torque to 70% of the rated torque listed in the Interroll catalog.

Connect the starting capacitors according to the connection diagrams (*see "Connection diagrams of DL series asynchronous 1-phase", page 19*).

External motor protection

The motor must always be installed together with a suitable motor protection, e.g. a motor circuit breaker or frequency inverter with overcurrent protective function. The protective device must be adjusted to the rated current of the respective motor (see type plate).

Integrated thermal protection

⚠ CAUTION

Accidental motor start

Crushing hazard for fingers

- Connect the integrated thermal circuit breaker to an external control device that interrupts the current supply to the motor at all poles in case of overheating.
- After the thermal circuit breaker has tripped, examine and remove the cause for overheating before the current supply is reactivated.

The standard maximum switching current of the thermal circuit breaker is 2.5 A. For other options, please contact Interroll.

For operational safety, the motor must be safeguarded against overload with an external motor protection, as well as an integrated thermal protection; otherwise, there is no warranty if the motor fails.

Frequency inverter

Asynchronous drum motors can be operated with frequency inverters. Frequency inverters from Interroll are general adjusted to factory setting and have to be parameterized for the respective drum motor. For this purpose, Interroll can supply parameterization instructions. In this case, please contact your local Interroll partner.

- If no frequency inverter from Interroll is used, the frequency inverter must be correctly parameterized according to the specified motor data. Interroll can provide only very limited support for frequency inverters that are not being sold by Interroll.
- Resonance frequencies in the power supply line must be prevented since the create voltage spikes in the motor.
  If the cable is too long, frequency inverters generate resonance frequencies in the line between frequency inverter and motor.
- Use a completely shielded cable to connect the frequency inverter to the motor.
- Install a sine-wave filter or a motor choke if the cable is longer than 10 meter or if a frequency inverter controls several motors.
- Ensure that the cable shield is connected to a grounded part according to the electrotechnical guidelines and local EMC recommendations.
- Always observe the installation guidelines of the frequency inverter manufacturer.

Initial startup and operation

Initial startup

The drum motor may be put into operation only if it is correctly installed and connected to the power supply and all rotating parts have been fitted with the corresponding protective devices and guards.

Checks before the initial startup

The drum motor is filled with the correct oil quantity at the factory and ready for installation. Prior to the initial startup of the motor, the following steps have to be performed:

- Ensure that the motor type plate matches the version ordered.
- Ensure that no contact points exist between objects, conveyor belts and rotating or moving parts.
- Ensure that the drum motor and the conveyor belt can move freely.
- Ensure that the belt features the correct tension according to the recommendations from Interroll.
- Ensure that all bolts are tightened according to the specifications.
- Ensure that no additional dangerous areas arise due to interfaces to other components.
- Ensure that the drum motor is correctly wired and connected to the voltage supply with the correct voltage.
- Check all safety devices.
- Ensure that no bystanders are in dangerous areas around the conveyor.
- Ensure that the external motor protection is correctly adjusted to the rated motor current and a corresponding switching device can switch off the motor voltage at all poles if the integrated thermal circuit breaker trips.

Operation

⚠ CAUTION

Rotating parts and accidental starting

Risk of crushing for fingers

- Do not reach between drum motor and belt.
- Do not remove the protection device.
- Keep fingers, hair and loose clothing away from the drum motor and the belt.
- Keep wristwatches , rings, necklaces, piercings and comparable jewelry away from the drum motor and the belt.

NOTICE

Damage of drum motor when operated in reverse

- Ensure that there is a delay between forward and reverse movements. Before reversing, the motor must come to a complete standstill.

Maintenance and cleaning

Warning notices concerning maintenance and cleaning

⚠ CAUTION

Risk of injury due to improper handling or accidental motor starts

- Maintenance work and cleaning must only be performed by qualified and authorized persons.
- Perform maintenance work only after switching off the power. Ensure that the drum motor cannot be turned on accidentally.
- Set up signs indicating that maintenance work is in progress.

Preparation for maintenance and cleaning by hand

- Switch off the power supply to the drum motor.
- Switch off the main power switch to switch off the drum motor.
- Open terminal box or distribution box and disconnect the cables.
- Attach a sign to the control station that maintenance work is in progress.

Maintenance

Generally, Interroll drum motors do not have to be maintained and require no special care during their regular service life. Nevertheless, certain checks have to be performed at regular intervals:

Checking the drum motor

- Ensure daily that the drum motor can rotate freely.
- Check the drum motor for visible damage every day.
- Ensure daily that the belt is correctly aligned and centered on the drum motor as well as parallel to the frame of the conveyor. Correct the alignment as necessary.
- Ensure weekly that motor shaft and brackets are firmly fastened to the conveyor frame.
- Ensure weekly that cables, lines and connections are in good condition and securely fastened.

Relubricating the drum motor

Some drum motors are equipped with grease nipples.

- In this case, refill the Shell Cassida RLS 2 foodgrade grease after every high-pressure cleaning with hot water.
- If cleaning is performed using only flowing warm water, relubricate the drum motor once every week.

Maintaining drum motors with optional, relubricating IP66 seals

- Lubricate the relubricating IP66 seals regularly with lubricant and/or a foodgrade grease according to operating and ambient conditions.
- Lubricate the motor more often if it is used under aggressive ambient conditions and in constant contact with water, salt, dust, etc. or under full load.

Oil change for drum motor

An oil change is not required, but it can be performed for special reasons (for i-series only).

⚠ WARNING

The oil can ignite, create slippery surfaces and contain hazardous substances.

Risk of damages to a person's health or the environment

- Do not ingest the oil. Ingestion can lead to nausea, vomiting and/or diarrhea. Generally, medical care is not required, unless large quantities have been ingested. Nevertheless, a physician should be consulted.
- Avoid skin and eye contact. Prolonged or repeated skin contact without proper cleaning can clog the pores of the skin and lead to skin problems such as oil acne and folliculitis.
- Wipe up spilled oil as quickly as possible to avoid slippery surfaces; ensure that the oil does not reach the environment. Properly dispose of dirty rags or cleaning materials to avoid self-ignition and fires.
- Extinguish oil fires with foam, spraying water or water mist, dry chemical powder or carbon dioxide. Do not extinguish with water jet. Wear suitable protective clothing, incl. breathing mask.

NOTICE

Damage to the motor from incorrect oil

- When changing the oil, observe the motor type plate or the list of oil types.
- Do not use oils with additives that could damage the motor insulation or seals.
- Do not use any oil containing graphite or molybdenum disulfide as well as other oils based on electrically conducting substances.

- Drain the oil from the drum motor and dispose of it according to the recommendations (see *"Disposal", page 55*).
- Fill the drum motor with new oil (oil type and quantity according to the type plate).

Cleaning

Material deposited on the drum motor or the underside of the belt can lead to slippage of the belt and to damage to the belt. Material deposited between belt and gliding plate or rollers can also lead to a decrease of the belt speed and to increased current consumption. Regular cleaning guarantees a high effect on the drive and a correct alignment of the belt.

- Remove foreign material from the drum shell.
- Do not use sharp-edged tools to clean the drum shell.

Cleaning the drum motor with a pressure washer

Only drum motors made of stainless steel with IP66 or IP69k seals are suitable for cleaning with a pressure washer.

NOTICE

Seal not tight due to excessive pressure

- Do not hold the nozzle in a position directed onto the shaft seal when cleaning the labyrinth or the seal.
- Move the nozzle continuously and evenly over the entire drum motor.

Observe the following when using a pressure washer:

- Ensure that the distance between the high-pressure nozzle and the drum motor is at least 30 cm.
- Observe the maximum pressure from the table below.
- Pressure wash the drum motor only during running operation; otherwise, water could enter or the seals could be damaged.

The maximum value for cleaning temperature and pressure depends on the seal type.

Seal type	Max. temperature	Max. water pressure	Comment
NBR - IP66	80 °C	50 bar	For general use
NBR IP66 seal that can be re-lubricated	60 °C	50 bar	DL series for wet and food-grade applications ▸ Re-lubricate DL series motors after cleaning (*see "Relubricating the drum motor", page 44*).

Hygienic cleaning

NOTICE

Risk of damages to the drum motor due to improper cleaning

- Never use an acidic cleaner together with a chlorinated cleaner since the resulting dangerous chlorine gases can damage stainless steel and rubber components.
- Do not apply any acidic cleaners to aluminum or zinc-plated components.
- Avoid temperatures over 55 °C so that no proteins can be deposited on the surface. Remove greases at lower temperatures and with suitable cleaners.
- Avoid water pressures over 20 bar so that no aerosols are created.
- Maintain a distance of 30 cm between the nozzle and the surface to be cleaned.
- Do not direct the nozzle directly onto the labyrinth and the seals.

- Wipe off larger, loose contamination.
- Pre-clean with water (20 bar, 55 °C).
- Direct the nozzle down onto the surface at an angle of 45°.
- For a more thorough cleaning, clean seals, grooves and other recesses with a soft brush.
- In case of heavy contamination, use a soft brush and/or a plastic scraper together with spraying water.
- Clean for approx. 15 minutes using a cold alkaline or acidic agent.
- Spray off cleaner with water (20 bar, 55 °C).
- Disinfect with cold agents for approx. 10 min.
- Spray off with water (20 bar, 55 °C).
- After cleaning, check surfaces, grooves and recesses for residues.

For scale deposits, we recommend the use of an acidic cleaner 1 to 4 times per month.
If a cleaning with chlorine is permissible, we recommend alkaline cleaners and disinfectants. In this case, the last disinfecting step can be omitted depending on the degree of contamination.

- Observe the corresponding certificates at www.interroll.com.

Troubleshooting

Troubleshooting

Fault	Possible cause	Remedy
Motor does not start or stops during operation	No voltage supply	Check the voltage supply.
	Incorrect connection or loose/ defective cable connection	Check connection according to connection diagram. Check whether cables are defective or connections are loose.
	Motor overheating	See the fault "Motor heats up during regular operation".
	Motor overload	Disconnect main power supply, determine and repair cause of overload.
	Internal thermal circuit breaker tripped/failure	Check whether there is overload or overheating. After cooling off, check continuity of internal thermal protection. See the fault "Motor heats up during regular operation".
	External overload protection tripped/failure	Check whether there is overload or overheating. Check continuity and function of external overload protection. Check whether the correct motor current has been set in the external overload protection.
	Motor winding phase error	Replace drum motor or contact the local Interroll dealer.
	Motor winding short circuit (insulation fault)	Replace drum motor or contact the local Interroll dealer.
Motor does not start or stops during operation	Drum shell or conveyor belt blocked	Ensure that belt and drum motor are not blocked and that all rollers and drum shells can turn freely. If the drum motor cannot turn freely, the gear box or bearing may be blocked. In that case, contact the local Interroll dealer.
	Low ambient temperature/ high oil viscosity	Install a heater or a more powerful drum motor. In that case, contact the local Interroll dealer.
	Gear box or bearing blocked	Check by hand if the drum shell can be turned freely. If not, replace the drum motor or contact the local Interroll dealer.
	Incorrect assembly	Check whether a starting capacitor is required for a single-phase motor. Ensure that the motor is not rubbing against the conveyor belt frame.
Motor is running, but drum shell does not turn	Transfer loss	Contact the local Interroll dealer.

Troubleshooting

Fault	Possible cause	Remedy
Motor heats up during regular operation	Overload of drum motor	Check rated current for overload. Ensure that the motor is not rubbing against the conveyor belt frame.
	Ambient temperature above 40 °C	Check ambient temperature. If the ambient temperature is too high, install a cooling unit. Contact the local Interroll dealer.
	Excessive or frequent stops/ starts	Do not use DL series motors for start-stop operation.
	Belt tension too high	Check belt tension and reduce as necessary.
	Motor is not suitable for the application	Check whether the application meets the specifications of the drum motor. Use special reduced-power motors for operation with link belts or without belts.
	Coating too thick	Replace coating or contact the local Interroll dealer.
	Incorrect voltage supply	Check the voltage supply. For 1-phase motors, ensure that the correct starting or running capacitors are used. For 3-phase motors, ensure that no phase has failed.
	Incorrect settings at frequency inverter	Check whether the frequency inverter settings meet the specifications of the drum motor and change them, if necessary.
Loud noise of drum motor during regular operation	Incorrect settings at frequency inverter	Check whether the frequency inverter settings meet the specifications of the drum motor and change them, if necessary.
	Loose motor mount	Check motor mount, shaft tolerances and fastening screws.
	Belt tension too high	Check belt tension and reduce as necessary.
	Wrong/incorrect profile between drum shell and belt	Ensure that belt and drum profile match and are correctly connected. Replace as needed. Observe belt manufacturer's installation guidelines.
	Drum motor incorrectly mounted	Check the mounting location of the serial number (Positioning the drum motor).
	An external conductor failed	Check connection, check power supply.
Drum motor vibrates heavily	Incorrect settings at frequency inverter	Check whether the frequency inverter settings meet the specifications of the drum motor and change them, if necessary.
	Loose motor mount	Check motor mount, shaft tolerances, and fastening screws.
	Drum motor runs unevenly	Check whether the specifications of the drum motor contain static or dynamic balancing and adjust the motor. Single-phase motors naturally do not run completely evenly and, for this reason, are louder and vibrate more than three-phase motors.

Troubleshooting

Fault	Possible cause	Remedy
Drum motor runs with interruptions	Drum motor/belt is occasionally or partially blocked	Ensure that belt and drum motor are not blocked and that all rollers and drum shells can turn freely.
	Incorrect or loose power cable connection	Check connections.
	Gear box is damaged	Check by hand if the drum shell can be turned freely. If not, replace the drum motor or contact the local Interroll dealer.
	Incorrect or faulty voltage supply	Check the voltage supply. For single-phase motors: check capacitors.
Drum motor/belt runs more slowly than specified	Incorrect motor speed ordered/delivered	Check drum motor specifications and tolerances. Replace drum motor or contact the local Interroll dealer.
	Drum motor/belt is occasionally or partially blocked	Ensure that belt and drum motor are not blocked and that all rollers and drum shells can turn freely.
	Incorrect settings at frequency inverter	Check whether the frequency inverter settings meet the specifications of the drum motor and change them, if necessary.
	Belt slips	See the fault "Belt slips on drum motor".
Drum motor/belt runs more slowly than specified	Coating slips on the drum shell	Check condition of coating and fasten coating to drum shell. Replace coating. Sandblast or abrade drum surface to guarantee good adhesion of the coating.
	Use of a 60-Hz motor in a 50-Hz supply system	Check whether motor specifications and tolerances correspond to the supply voltage/frequency. Replace drum motor or contact the local Interroll dealer.
Drum motor runs faster than specified.	Incorrect motor speed ordered/delivered	Check drum motor specifications and tolerances. Replace drum motor or contact the local Interroll dealer.
	Incorrect settings at frequency inverter	Check whether the frequency inverter settings meet the specifications of the drum motor and change them, if necessary.
	Use of a 50-Hz motor in a 60-Hz supply system	Check whether motor specifications and tolerances correspond to the supply voltage/frequency. Replace drum motor or contact the local Interroll dealer.
	Thickness of rubber coating increased the belt speed beyond the rated speed of the motor	Measure thickness of rubber coating and check whether this value was considered and calculated when the drum motor speed was selected. Reduce thickness of rubber coating, install a frequency inverter or install a new drum motor with lower speed.
Motor winding: one phase failed	Failure/overload of winding insulation	Check continuity, current and resistance of each phase winding. Replace drum motor or contact the local Interroll dealer.

Troubleshooting

Fault	Possible cause	Remedy
Motor winding: two phases failed	Power failure in one phase which leads to overload in the other two phases/separating failure	Check power supply to all phases. Check continuity, current and resistance of each phase winding. Replace drum motor or contact the local Interroll dealer.
Motor winding: all three phases failed	Motor overload/incorrect power connection	Check whether the correct supply voltage is applied. Check continuity, current and resistance of each phase winding. Replace drum motor or contact the local Interroll dealer.
Belt slips on drum motor	Belt blocked	Ensure that belt and drum motor are not blocked and that all rollers and drum shells can turn freely.
	Friction between drum motor and belt too low	Check condition and tension of the belt. Check condition of drum shell or coating. Check whether there is oil or grease between belt and drum motor.
	Friction between belt and bracket/gliding plate too high	Check underside of belt and gliding plate for contamination/ defective surface coating. Check whether water entered between belt and gliding plate and suction/draft occurs.
	Belt tension too low	Check condition of belt, and tension or shorten it.
	Drum profile too low or incorrect for link belt	Ensure that belt and drum profiles/teeth are connected correctly. Ensure that height and tension of belt meet the manufacturer's specifications.
	Oil, lubricant or grease between belt and drum shell of drum motor	Remove excess oil, grease or lubricant. Ensure correct functioning of cleaning devices.
	Diameter of start roller/end roller/transfer roller too small for the belt	Check minimum drum diameter for belt. Knife edges/rollers with small diameters can cause excessive friction and therefore require more power.
	Coating slips on the drum shell	Check condition of coating and fasten coating to drum shell. Replace coating. Sandblast or abrade drum surface to guarantee good adhesion of the coating.

Troubleshooting

Fault	Possible cause	Remedy
Belt skips on drum motor	Belt blocked or material deposits on the drum shells Poor or damaged belt connection Friction between belt and gliding plate too high	Ensure that belt and drum shell are not blocked and that all rollers and drum shells can turn freely. Check belt connection. Ensure that the motor pulls the belt and does not push it.
	Conveyor belt loose or damaged	Check tension and condition of belt, as well as condition of coating. Check belt tracking and belt adjustment.
	Incorrect coating/sprocket profile for link belt	See the fault "Belt slips on drum motor".
Belt not correctly adjusted/ belt does not run centered	Material deposits on drum motor/rollers/belt	Ensure that belt and drum shell are not blocked and that all rollers and drum shells can turn freely. Check belt connection.
	Material deposits on rollers	Check whether material peels off and ensure that the cleaning devices function correctly.
	Defective or poorly affixed belt	Check belt condition and belt connection.
	Belt tension higher on one side	Ensure that the belt tension is equal on both sides. Check whether the belt's continuous connection was implemented in parallel.
	Top/bottom rollers not correctly adjusted	Check adjustment of support rollers and return wheels.
	Start roller/end roller/interim roller not correctly adjusted	Check adjustment of drum motor and roller.
	Conveyor frame not correctly adjusted	Ensure that the conveyor frame is rectangular, parallel and straight over its entire length.
	Feeding conveying goods from one side	Check force or friction at transfer point.
	Belt profile not connected to drum profile	Ensure that belt and drum profiles match and are correctly connected and adjusted.
	Drum crowning too low for belt	Check belt/drum motor specifications.

Troubleshooting

Fault	Possible cause	Remedy
Oil leaking at shaft seal	Shaft seal worn	Check whether adverse chemical or abrasive materials/ conditions are present. Check service life of seals.
	Shaft seal damaged	Ensure that there are no steel residues, material deposits or other particles on the seals.
	Cap bearing damaged/worn	Check whether the belt is tensioned too much or overloaded. Check whether water or chemicals have entered.
	Excess grease in labyrinth seal	Check whether oil or grease are leaking. Oil remains fluid and grease hardens when it cools down. Remove excess grease. If the problem persists, contact local Interroll dealer. Small amount of grease leaking in the DL series is normal and not a problem.
Oil leaking at cable/terminal box	Loose cable connection socket Defect at internal cable seal	Ensure that cable connection socket and seals are tight and not stressed by overheating or chemicals.
	Loose cable connection socket Seal at terminal box defective	Ensure that cable connection socket and seals at terminal box are tight and not stressed by overheating or chemicals.
Oil leaking at drum shell/ end cap	End cap in drum shell is loose	Check whether there are gaps between the drum shell and end covers. Check whether the belt is tensioned too much or impact-loaded.
	End cap/drum seal defective	Check whether the belt is overheated, tensioned too much or impact-loaded.
Oil discolored – metallic silver particles	Wear of gear teeth or bearings	Check condition of bearings and seals. Check whether there is an overload.
Oil discolored – white color	Contamination by water or other liquid	Check condition of seals and contamination by water/liquid. Change oil (Oil change at drum motor).
Oil discolored – black color	Extremely high operating temperature Overload No belt installed	Check whether the application/operating conditions meet(s) the specifications of the drum motor. Check whether there is an overload current or high ambient temperature.
Cable/terminal box defective or damaged	Incorrect operation by the customer or damage during installation	Check type of damage and possible cause. Replace terminal box.
	Damage during transport	Check type of damage and possible cause. Replace terminal box.

Troubleshooting

Fault	Possible cause	Remedy
Cap bearing failed	Overload	Check whether the load of the application meets the specifications of the drum motor.
	Impact load	Check whether the load of the application meets the specifications of the drum motor.
	Belt tension too high	Check whether the belt is tensioned too much. Reduce belt tension as necessary.
	Poor lubrication	Check oil level and installation of drum motor. With vertical mounting or if the motor is tilted by more than 5° (2° for DL 0113), check motor specifications of drum motor.
	Load or incorrect adjustment of shaft	Check whether screws have been tightened too much and whether frame or motor mount are incorrectly adjusted.
	Shaft seal damaged/worn	Check for external contamination. Contact the local Interroll dealer.
	Loose or tight seating of bearing on shaft	Contact the local Interroll dealer.
Gear box failure	Overload/impact load or regular wear	Check whether the load of the application meets the specifications of the drum motor. Check service life.
Rotor bearing worn/failed	Poor lubrication	Check correct oil type and oil level.
Rotor drive worn or teeth broken off	Very high startup torque	Check whether the load of the application meets the specifications of the drum motor. Check oil, maximum number of stops/starts and permissible starting torque.
Toothed sprocket worn or teeth/bolts broken off	Startup under overload and/or impact load or while blocked	Check whether the application and load meet the specifications of the drum motor. Check whether startup is blocked.
Interim gear box and bearing worn/failed	Poor lubrication, or worn gear box or bearing	Check oil level. Check service life and tolerances of journals and drives/shafts.

Decommissioning and disposal

- When disposing the motor oil, observe the disposal documents of the motor manufacturer.
- The packaging must be recycled to provide environmental relief.

Shutdown

⚠ CAUTION

Risk of injury due to incorrect handling

- Shut-down may only be executed by qualified and authorized persons.
- Only shut down the drum motor after switching off the power. Ensure that the drum motor cannot be turned on accidentally.

- Disconnect the motor cable from the power supply and motor control.
- Relax the belt.
- Remove holding plate from the motor mount.
- Remove the drum motor out of the conveyor frame.

Disposal

The operator is responsible for the proper disposal of the drum motor.

- In doing so, industry-specific and local provisions must be observed for the disposal of the drum motor and its packaging.

Appendix

List of abbreviations

Electrical data

P_N in kW	Rated output in kilowatt
np	Number of poles
n_N in 1/min.	Rated speed of rotor in revolutions per minute
f_N in Hz	Rated frequency in Hz
U_N in V	Rated voltage in volt
I_N in A	Rated current in amperes
I_0 in A	Rated open-circuit current in amperes
I_{max} in A	Maximum current in amperes
cos φ	Power factor
η	Efficiency
J_R in kgcm^2	Rotor moment of inertia
I_S/I_N	Ratio of startup current to rated current
M_S/M_N	Ratio of starting torque to rated torque
M_P/M_N	Ratio of pull-up torque to rated torque
M_B/M_N	Ratio of pull-out torque to rated torque
M_N in Nm	Rated torque of rotor in Newton meters
M_0 in Nm	Stalled torque in Newton meters
M_{max} in Nm	Maximum torque in Newton meters
R_M in Ω	Phase resistance in ohms
R_A in Ω	Phase resistance of auxiliary winding in ohms
L_{sd} in mH	Inductance of d-axles in millihenry
L_{sq} in mH	Inductance of q-axles in millihenry
L_{sm} in mH	Averaged inductance in millihenry
k_e in V/krpm	Induced motor voltage
T_e in ms	Electrical time constant in milliseconds
k_{TN} in Nm/A	Torque constant in Newton meter per ampere
U_{SH} in V	Heating voltage in volts
$U_{SH\ delta}$ in V	Standstill heating voltage in delta connection in volts
$U_{SH\ star}$ in V	Standstill heating voltage in star connection in volts
$U_{SH\ \sim}$ in V	Heating voltage for single-phase units in volts
C_r in µF	Run capacitor (1~) / Steinmetz capacitor (3~) in microfarad

Appendix

Connection diagrams

1~	Single-phase motor
3~	Three-phase motor
B1	Input of electromagnetic brake
B2	Output of electromagnetic brake
BR	Brake (optional)
Cos -	Cosine signal 0
Cos +	Cosine signal +
Cr	Run capacitor
Cs	Starting capacitor
FI	Frequency inverter
L1	Phase 1
L2	Phase 2
L3	Phase 3
N	Neutral conductor
NC	Not connected
RC	Series circuit of resistor and capacitor
Ref -	Reference signal 0
Ref +	Reference signal +
Sin -	Sine signal 0
Sin +	Sine signal +
T1	Input thermistor
T2	Output thermistor
TC	Thermal protection
U1	Input winding phase 1
U2	Output winding phase 1
V1	Input winding phase 2
V2	Output winding phase 2
W1	Input winding phase 3
W2	Output winding phase 3
Z1	Input auxiliary winding single-phase motor
Z2	Output auxiliary winding single-phase motor

Appendix

Color coding

Color coding of cables in the connection diagrams:

bk: black	gn: green	pk: pink	wh: white
bn: brown	gy: gray	rd: red	ye: yellow
bu: blue	or: orange	vi/vt: violet	ye/gn: yellow/green
( ): alternate color			

Appendix

Installation declaration

in accordance with the EC Machinery Directive 2006/42/EC, Appendix II B.

The manufacturer:
Interroll Trommelmotoren GmbH
Opelstr. 3
D - 41836 Hueckelhoven/Baal
Germany

hereby declares with sole responsibility that the product range

- DL series drum motor

is an incomplete machine as defined by the EC Machinery Directive, but complies with the following requirements according to Appendix I of that directive:
1.1.2, 1.1.3, 1.1.5, 1.5.8, 1.5.9, 1.6.4, 1.7.2.

The special technical documents mentioned in Appendix VII B have been prepared and will be sent to the responsible authority if required.

Applicable EC directives:

- EMC Directive 2014/30/EC
- RoHS Directive 2002/95/EC
- Low Voltage Directive 2014/35/EC

Applicable harmonized standards:

- EN ISO 12100:2010
- EN 60034-1:2010/AC: 2010
- EN 60034-11:2004
- EN 60034-14:2004
- EN 60034-5:2001/A1:2007
- EN 60034-6:1993
- EN 60204-1:2006/AC: 2010 +A1:2009

Additional standards applied:

- EN 61984:2009
- EN 61800-3:2012
  Cannot be applied to single drum motors. Can be applied only within the complete machine.
- EN 61800-5-1:2008
  Cannot be applied to single drum motors. Can be applied only within the complete drive system.
- EN 60664-1:2007

  The relevant technical documents for Appendix VII B are available and can be submitted electronically to the responsible national authorities - if required and conclusively substantiated.

Appendix

Person authorized to prepare the technical documents:
Holger Hoefer, Interroll Trommelmotoren GmbH, Opelstr. 3, D - 41836 Hueckelhoven, Germany

Important Note! The incomplete machine may only be put into operation if it has been determined that the overall machine/system, which the incomplete machine is to be installed, meets the requirements of this directive.

Hueckelhoven - May 30, 2016

Dr. Hauke Tiedemann
(managing director)

(This installation declaration can be obtained at www.interroll.com, if needed.)

For your local contacts please visit
interroll.com/contact

Version 1.0 (12/2019) en
Translation of original operating instructions