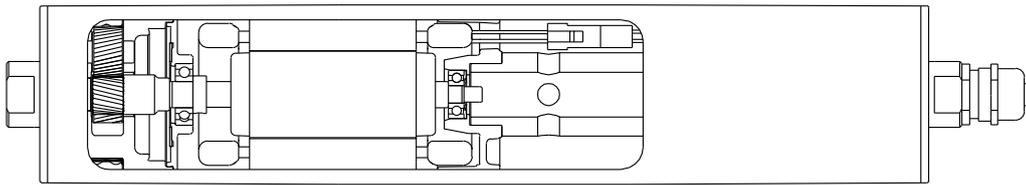


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# **User Manual**

## **Interroll Drum motor**

### **DM series**

**Manufacturer**

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**Contents**

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### Information about the manual

In this instruction manual, the following drum motor types are described:

- DM series

### Contents

This instruction manual contains important notes and information about the various operating phases of the drum motor:

The instruction manual describes the drum motor as it is delivered by Interroll.

In addition to this instruction manual, special contractual agreements and technical documents apply to special versions.

### The instruction manual is part of the product

- ▶ For trouble-free, safe operation and warranty claims, read the instruction manual first and follow the instructions.
- ▶ Keep the instruction manual close to the drum motor.
- ▶ Pass the instruction manual on to any subsequent operator or occupant.
- ▶ **NOTICE! The manufacturer does not accept any liability for faults or defects due to non-observance of this instruction manual.**
- ▶ If you still have questions after reading the instruction manual, please contact Interroll customer service. Contact persons close to you can be found on the Internet under [www.interroll.com/contact](http://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.
- ▶ Observe local accident prevention regulations and general safety regulations that apply in the area of use.

### 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).

## Interroll Drum motor DM series

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### Safety

#### 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:

<b>Operators</b>	Operators have been instructed in operating and cleaning the drum motor and follow the safety guidelines.
<b>Service personnel</b>	The service personnel features a technical training or has undergone training by the manufacturer and performs the maintenance and repair tasks.
<b>Electricians</b>	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.

<b>Bodily injury</b>	<ul style="list-style-type: none"><li>▶ Maintenance or repair work must only be executed by authorized and qualified persons in accordance with the applicable regulations.</li><li>▶ Before turning on the drum motor, ensure that no unauthorized persons are near the conveyor.</li></ul>
<b>Electricity</b>	<ul style="list-style-type: none"><li>▶ Perform any installation and maintenance tasks only after following the five safety rules:<ul style="list-style-type: none"><li>• Disconnect</li><li>• Secure against reactivation</li><li>• Determine de-energized state at all poles</li><li>• Ground and short circuit</li><li>• Cover or block neighboring live parts</li></ul></li></ul>
<b>Oil</b>	<ul style="list-style-type: none"><li>▶ 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.</li><li>▶ 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.</li><li>▶ 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.</li></ul>

## Interroll Drum motor DM series

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### Safety

- ▶ 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](http://www.interroll.com).
- 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 jewelry, 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 of the aggressive ambient conditions. In aggressive environments and environments with salt water, only stainless steel motors should be used. Thanks to protection classification IP69k and its stainless steel design (upon request), the drum motor is also suitable for use in the food processing industry and pharmaceutical industry, as well as for applications with high hygienic demands. The drum motor can be used with or without a drum coating to increase the friction between drum motor and conveyor belt or with profile coating for the drive of form-fit driven belts.

The drum motors of the 1-phase and 3-phase DM series are driven by an asynchronous three-phase induction motor. It is available in different power stages and for most of the international supply voltages.

The drum motors of the synchronous DM series are driven by a synchronous motor and must be connected to a suitable drive control unit. For additional information about the drive control unit, see the corresponding manual.

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 has to be connected to a suitable external control device that interrupts the current supply to the motor in case of overheating (see "*Thermal protection*", page 15).

**Integrated electromagnetic brake:** The integrated electromagnetic brake can hold loads. It acts directly on the rotor shaft of the drum motor and is driven by a rectifier. The holding force of each drum motor with brake has to be calculated first and does not always correspond to the belt pull of the motor. The electromagnetic brake is available only for 3-phase asynchronous motors and DM series synchronous motors (see "*Electrical data for DM series asynchronous 3-phase*", page 22 and see "*Electrical data for DM series synchronous*", page 39).

**Mechanical backstop:** The mechanical backstop attached to the rotor shaft can be used for ascending conveyors. It prevents the belt from running in reverse direction in case of a power failure. The mechanical backstop is available for all DM series asynchronous motors.

**Encoder:** The signal of the encoder can be used to determine the position and for controlling the speed and rotational direction (see "*Options and accessories*", page 45).

## Interroll Drum motor DM series

### General technical information

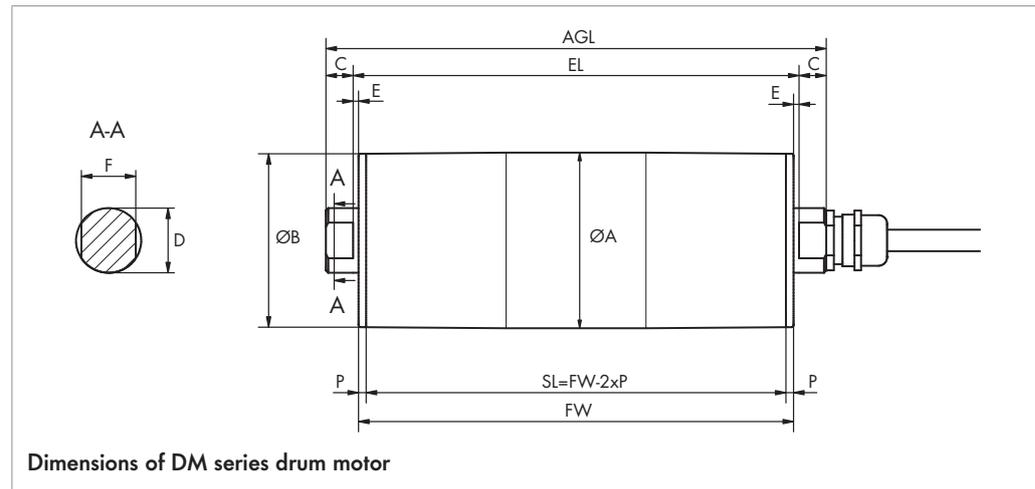
#### Dimensions of DM series drum motor

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  $EL + 2 \text{ mm}$ .



Type	A mm	B mm	C mm	D mm	S mm	F mm	P mm	SL mm	EL mm	AGL mm
DM 0080 crowned	81.5	80.5	12.5	30	2.5	25	3.5	FW - 7	FW + 5	FW + 30
DM 0080 crowned	81.5	80.5	12.5	25	2.5	20	3.5	FW - 7	FW + 5	FW + 30
DM 0080 crowned	81.5	80.5	12.5	17	2.5	13.5	3.5	FW - 7	FW + 5	FW + 30
DM 0080 cylindrical	81	81	12.5	30	2.5	25	3.5	FW - 7	FW + 5	FW + 30
DM 0080 cylindrical	81	81	12.5	25	2.5	20	3.5	FW - 7	FW + 5	FW + 30
DM 0080 cylindrical	81	81	12.5	17	2.5	13.5	3.5	FW - 7	FW + 5	FW + 30
DM 0080 cylindrical + key	81.7	81.7	12.5	30	2.5	25	3.5	FW - 7	FW + 5	FW + 30
DM 0080 cylindrical + key	81.7	81.7	12.5	25	2.5	20	3.5	FW - 7	FW + 5	FW + 30
DM 0080 cylindrical + key	81.7	81.7	12.5	17	2.5	13.5	3.5	FW - 7	FW + 5	FW + 30
DM 0113 crowned	113.5	112	25	30	6.5	25	3.5	FW - 7	FW + 13	FW + 63
DM 0113 crowned	113.5	112	25	25	6.5	20	3.5	FW - 7	FW + 13	FW + 63
DM 0113 cylindrical	112	112	25	30	6.5	25	3.5	FW - 7	FW + 13	FW + 63
DM 0113 cylindrical	112	112	25	25	6.5	20	3.5	FW - 7	FW + 13	FW + 63
DM 0113 cylindrical + key	113	113	25	30	6.5	25	3.5	FW - 7	FW + 13	FW + 63
DM 0113 cylindrical + key	113	113	25	25	6.5	20	3.5	FW - 7	FW + 13	FW + 63
DM 0138 crowned	138	136	25	30	11.5	25	3.5	FW - 7	FW + 23	FW + 73

## Interroll Drum motor DM series

### General technical information

DM 0138 crowned	138	136	25	30	11.5	20	3.5	FW - 7	FW + 23	FW + 73
DM 0138 cylindrical	136	136	25	30	11.5	25	3.5	FW - 7	FW + 23	FW + 73
DM 0138 cylindrical	136	136	25	30	11.5	20	3.5	FW - 7	FW + 23	FW + 73
DM 0138 cylindrical + key	137	137	25	30	11.5	25	3.5	FW - 7	FW + 23	FW + 73
DM 0138 cylindrical + key	137	137	25	30	11.5	20	3.5	FW - 7	FW + 23	FW + 73
DM 0165 crowned	164	162	45	40	16.5	30	3.5	FW - 7	FW + 33	FW + 123
DM 0165 crowned	164	162	25	30	16.5	25	3.5	FW - 7	FW + 33	FW + 123
DM 0165 cylindrical	162	162	45	40	16.5	30	3.5	FW - 7	FW + 33	FW + 123
DM 0165 cylindrical	162	162	25	30	16.5	25	3.5	FW - 7	FW + 33	FW + 123
DM 0165 cylindrical + key	162	162	45	40	16.5	30	3.5	FW - 7	FW + 33	FW + 123
DM 0165 cylindrical + key	162	162	25	30	16.5	25	3.5	FW - 7	FW + 33	FW + 123
DM 0217 crowned	217.5	215.5	45	40	16.5	30	5	FW - 10	FW + 33	FW + 123
DM 0217 crowned	217.5	215.5	45	30	16.5	25	5	FW - 10	FW + 33	FW + 123
DM 0217 cylindrical	215.5	215.5	45	40	16.5	30	5	FW - 10	FW + 33	FW + 123
DM 0217 cylindrical	215.5	215.5	45	30	16.5	25	5	FW - 10	FW + 33	FW + 123

## Interroll Drum motor DM series

### General technical information

#### Technical data

Protection class	IP69k
Ambient temperature range for standard applications <sup>1)</sup>	+2 °C to +40 °C
Ambient temperature range for low-temperature applications <sup>1)</sup>	-25 °C to +15 °C
Cycle times	max. 3 starts/stops per minute <sup>2)</sup>
Ramp times	DM series asynchronous 3-phase: $\geq 0.5$ s DM series asynchronous 1-phase: $\geq 1$ s DM series synchronous: $\leq 0.5$ s
Installation altitude above sea level	max. 1000 m

<sup>1)</sup> For ambient temperatures below +1 °C, Interroll recommends anti-condensation heating and special cables or plastic terminal boxes.

<sup>2)</sup> For start/stop applications, motor displacements must be designed completely backlash-free. If this requirement is met, higher cycle times with more than 3 starts/stops per minute are possible. Interroll strongly recommends using frequency inverters (FI) with set ramp ups or ramp downs, or special designs. This is used to reduce starting torques, e.g. to prevent damage to the gear box. If you have questions, please contact Interroll.

#### 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 $\varnothing$ : 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	
Screwed connection	For the plug variant, the screwed connection is identified with a plug symbol.	

## Interroll Drum motor DM series

### General technical information

#### 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.

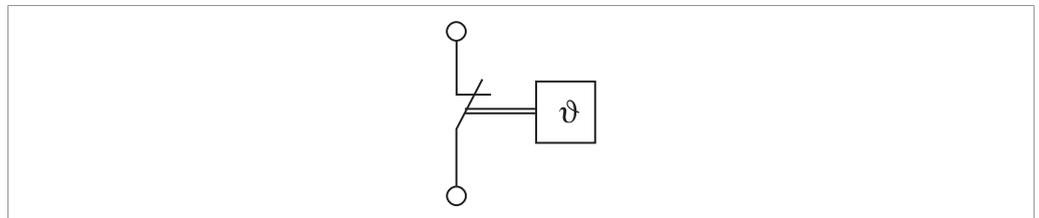
#### **⚠ WARNING**

**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	$\cos \varphi = 1$	2.5 A	250 V AC
	$\cos \varphi = 0.6$	1.6 A	250 V AC
DC		1.6 A	24 V DC
		1.25 A	48 V DC

#### Service life: 2000 cycles

AC	$\cos \varphi = 1$	6.3 A	250 V AC
Reset temperature		40 K $\pm$ 15 K	
Resistance		< 50 m $\Omega$	
Contact bounce time		< 1 ms	

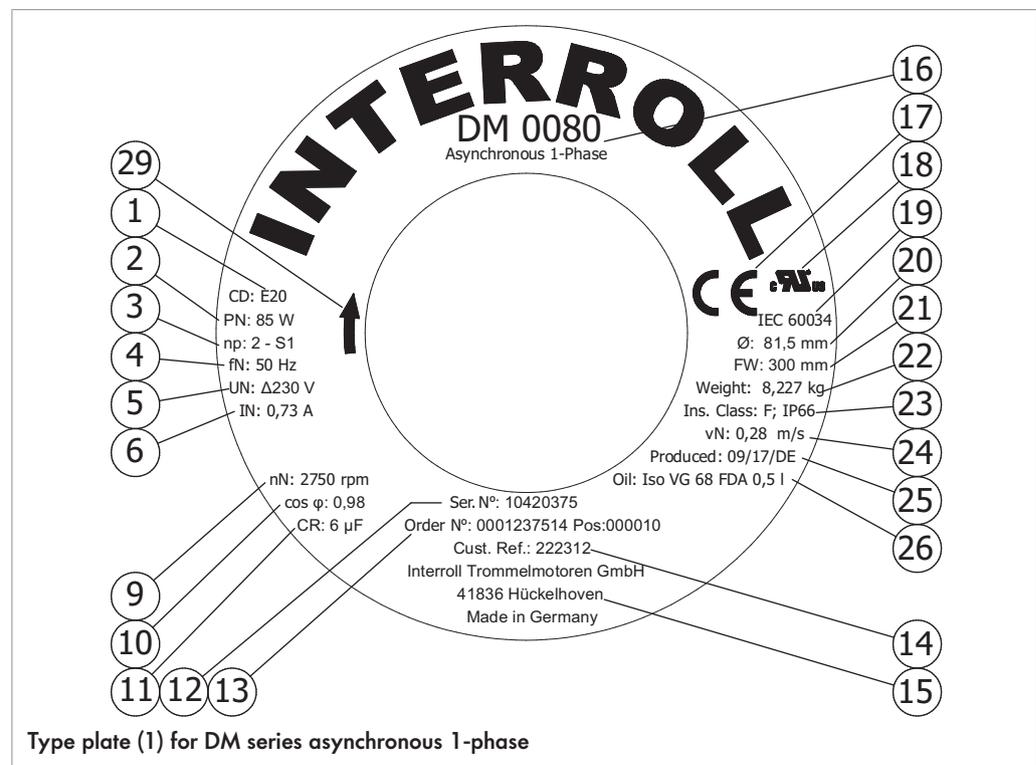
## Product information of DM series asynchronous 1-phase

### Type plate of DM 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.

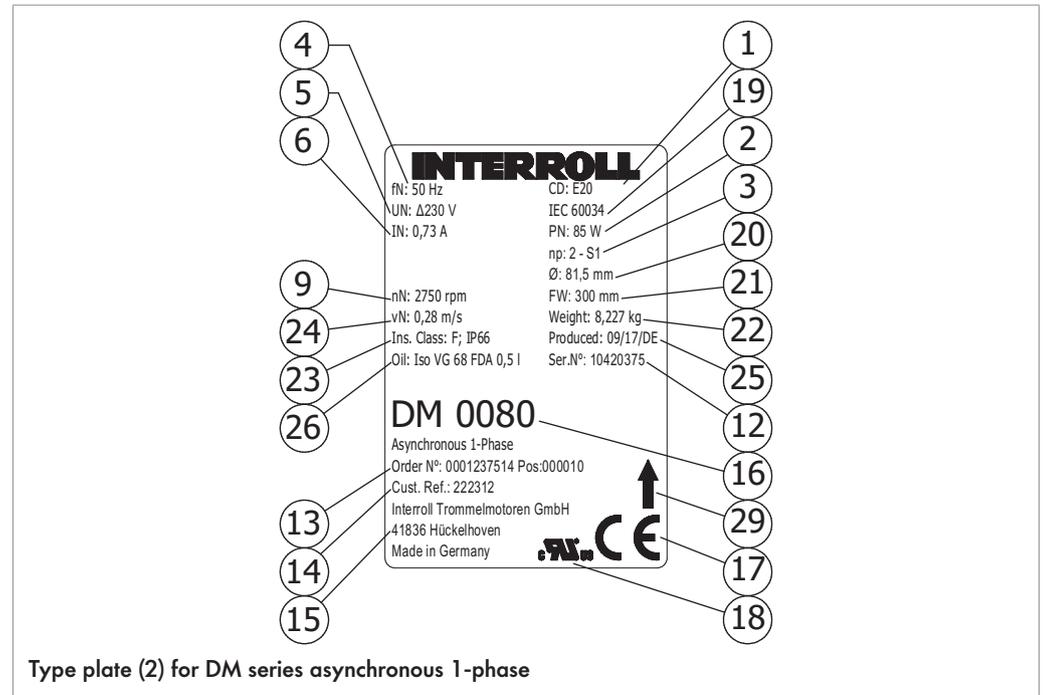
Drum motors of the DM series have different kinds of type plates:

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

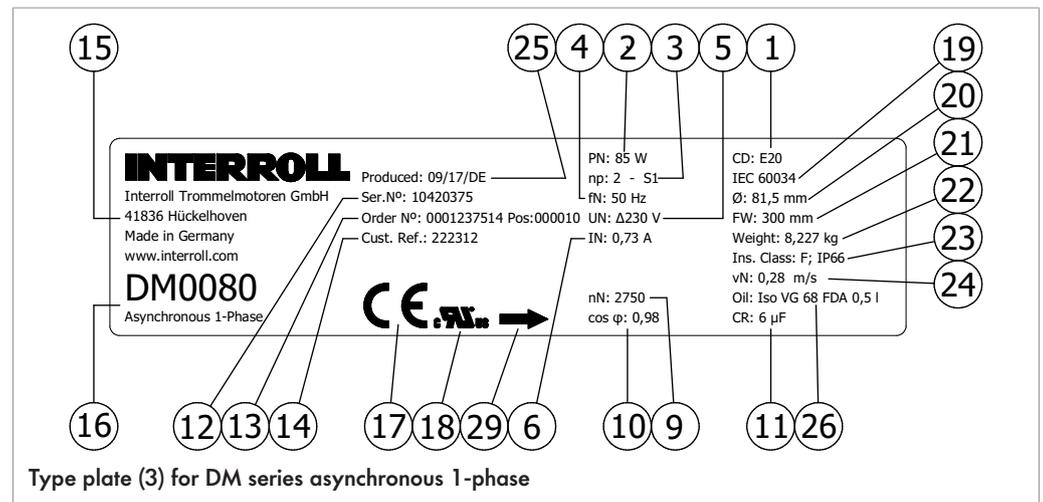


## Interroll Drum motor DM series

### Product information of DM series asynchronous 1-phase



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



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

- |    |                                    |    |   |
|----|------------------------------------|----|---|
| 1  | Connection diagram number          | 16 | Type + design   |
| 2  | Rated power                        | 17 | CE mark   |
| 3  | Number of poles + operating mode   | 18 | UL mark   |
| 4  | Rated frequency <sup>1)</sup>      | 19 | International Electrotechnical Commission: Standard for drum motors |
| 5  | Rated voltage at rated frequency   | 20 | Drum tube diameter  |
| 6  | Rated current at rated frequency   | 21 | Drum width  |
| 9  | Rated speed of rotor <sup>1)</sup> | 22 | Weight  |
| 10 | Power factor                       | 23 | Insulation class and protection rate                                |

## Interroll Drum motor DM series

### Product information of DM series asynchronous 1-phase

12	Serial number	24	Circumferential speed of drum tube <sup>1)</sup>
13	Order number + item	25	Manufactured week/year/country
14	Customer item number	26	Oil type and quantity
15	Manufacturer's address	29	Direction of travel (for backstop only)

<sup>1)</sup> The value depends on the voltage used. All values in parentheses refer to the rated voltage in parentheses.

### Electrical data for DM series asynchronous 1-phase

Abbreviations see "List of abbreviations", page 94

#### DM 0080 asynchronous 1-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH \sim}$	$C_r$
W		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	$\mu\text{F}$
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	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 asynchronous 1-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH \sim}$	$C_r$
W		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	$\mu\text{F}$
250	4	1360	50	230	2.4	0.97	0.5	7.2	1.25	1.1	1.1	1.1	1.76	12.7	44.3	12

## Interroll Drum motor DM series

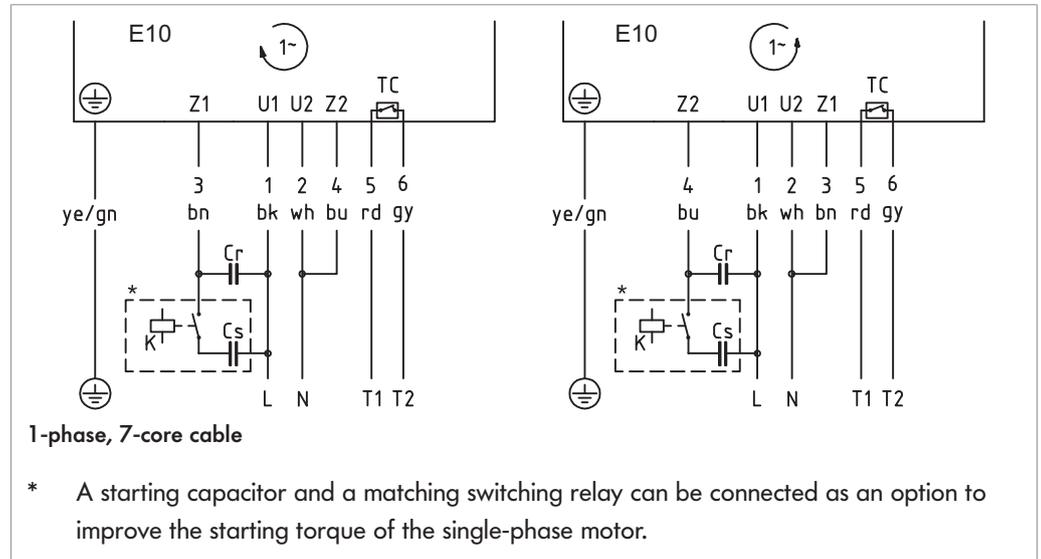
### Product information of DM series asynchronous 1-phase

### Connection diagrams of DM series asynchronous 1-phase

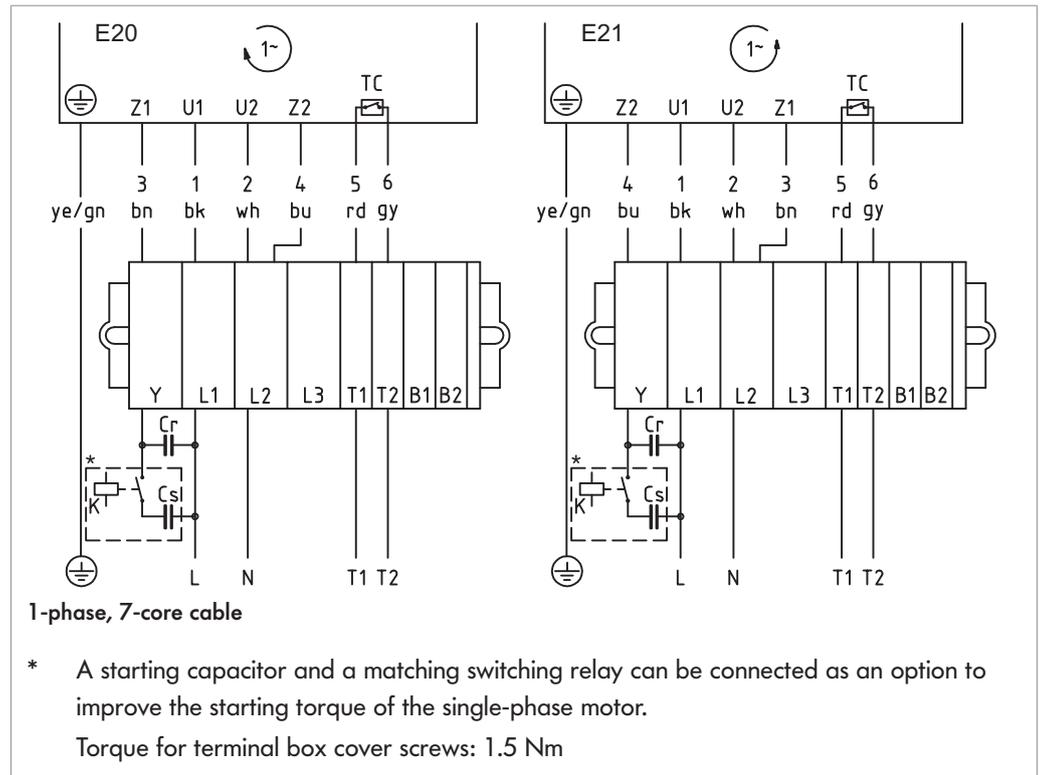
This instruction manual lists only standard connection diagrams. For other connection types, the connection diagram is supplied separately with the drum motor.

Abbreviations see "List of abbreviations", page 94

#### Cable connections



#### Connections in the terminal box



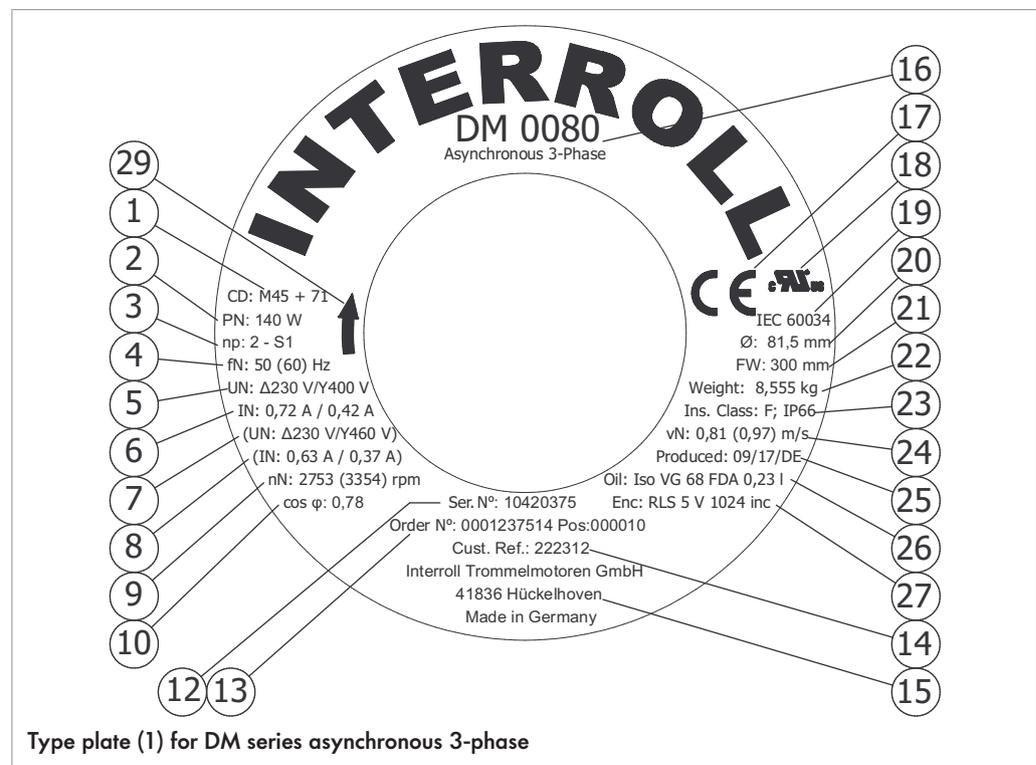
## Product information of DM series asynchronous 3-phase

### Type plate of DM 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.

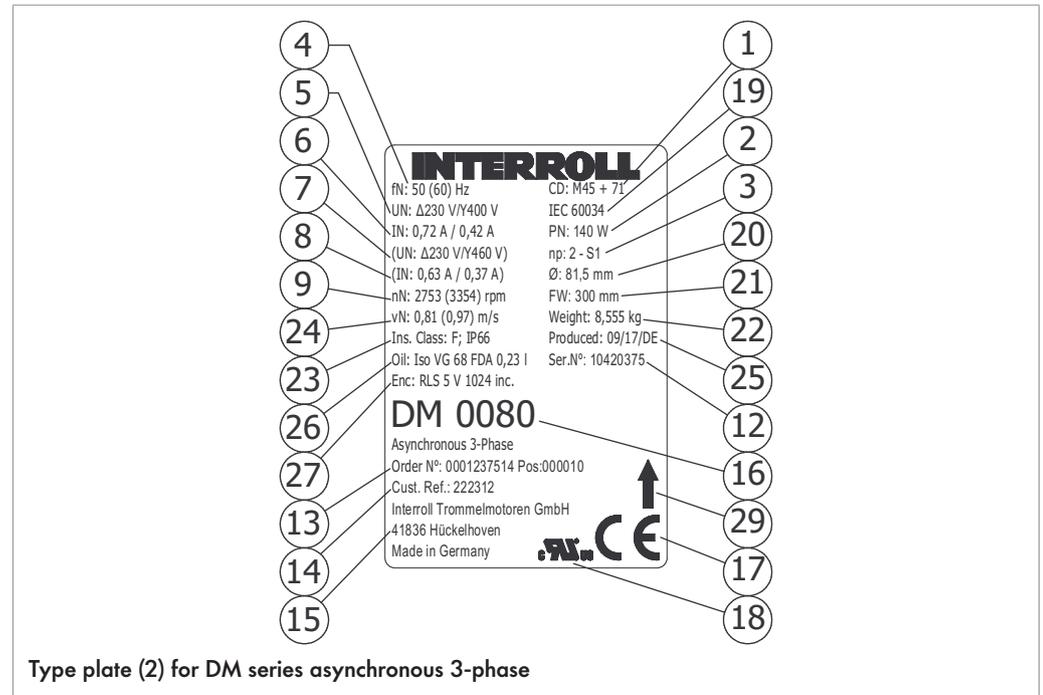
Drum motors of the DM series have different kinds of type plates:

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

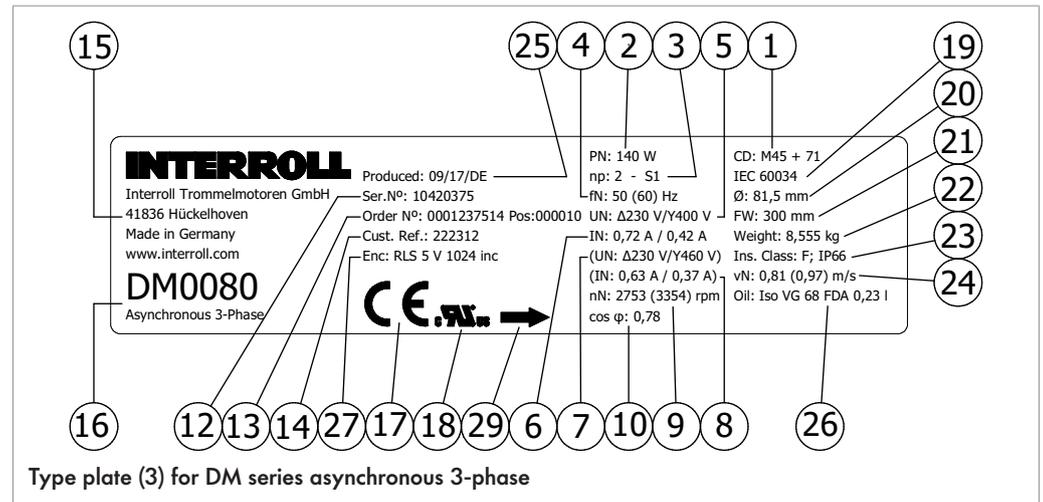


## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase



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



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

- |   |  |    |  |
|---|--|----|--|
| 1 | Connection diagram number                        | 16 | Type + design  |
| 2 | Rated power                                      | 17 | CE mark  |
| 3 | Number of poles + operating mode                 | 18 | UL mark  |
| 4 | Rated frequency <sup>1)</sup>                    | 19 | International Electrotechnical Commission:<br>Standard for drum motors |
| 5 | Rated voltage at rated frequency                 | 20 | Drum tube diameter   |
| 6 | Rated current at rated frequency                 | 21 | Drum width   |
| 7 | (Rated voltage at rated frequency) <sup>1)</sup> | 22 | Weight   |
| 8 | (Rated current at rated frequency) <sup>1)</sup> | 23 | Insulation class and protection rate                                   |

## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

9	Rated speed of rotor <sup>1)</sup>	24	Circumferential speed of drum tube <sup>1)</sup>
10	Power factor	25	Manufactured week/year/country
12	Serial number	26	Oil type and quantity
13	Order number + item	27	Technical data of option
14	Customer item number	29	Direction of travel (for backstop only)
15	Manufacturer's address		

<sup>1)</sup> The value depends on the voltage used. All values in parentheses refer to the rated voltage in parentheses.

### Electrical data for DM series asynchronous 3-phase

Abbreviations see "List of abbreviations", page 94

#### DM 0080 asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
W		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
40	4	1319	50	230	0.34	0.71	0.42	0.67	1.93	1.31	1.51	1.31	0.29	295	35.4	-
40	4	1319	50	400	0.20	0.71	0.42	0.67	1.93	1.31	1.51	1.31	0.29	295	-	61.4
40	4	1550	60	230	0.33	0.72	0.43	0.67	1.89	1.34	1.43	1.34	0.25	295	35.0	-
40	4	1644	60	460	0.21	0.61	0.41	0.67	1.98	1.85	2.08	1.85	0.23	295	-	56.6
40	4	1625	60	575	0.17	0.64	0.37	0.67	1.86	1.53	1.91	1.53	0.24	465	-	75.9
40	4	1335	50	550	0.19	0.67	0.33	0.67	1.68	1.50	1.80	1.50	0.29	465	-	88.8
40	4	1627	60	380	0.23	0.65	0.40	0.67	2.01	1.53	1.84	1.53	0.23	215	-	48.2
40	4	1300	50	200	0.45	0.71	0.37	0.67	1.73	1.26	1.53	1.26	0.29	215	34.3	-
80	4	1331	50	230	0.58	0.67	0.51	1.25	2.20	1.46	1.65	1.46	0.57	133	25.9	-
80	4	1331	50	400	0.34	0.67	0.51	1.25	2.20	1.46	1.65	1.46	0.57	133	-	44.8
80	4	1571	60	230	0.55	0.69	0.53	1.25	2.17	1.42	1.55	1.42	0.49	133	25.1	-
80	4	1658	60	460	0.34	0.57	0.51	1.25	2.40	2.09	2.25	2.09	0.46	133	-	38.5
80	4	1643	60	575	0.27	0.60	0.49	1.25	2.22	1.92	2.05	1.92	0.47	217	-	52.7
80	4	1344	50	550	0.32	0.61	0.43	1.25	1.95	1.88	1.96	1.88	0.57	217	-	63.5
80	4	1630	60	380	0.41	0.63	0.47	1.25	2.08	1.74	1.87	1.74	0.47	102	-	39.5
80	4	1309	50	200	0.78	0.68	0.43	1.25	1.87	1.48	1.56	1.48	0.58	102	27.1	-
75	2	2730	50	230	0.39	0.83	0.58	0.67	3.04	1.48	1.70	1.48	0.26	164	26.4	-
75	2	2730	50	400	0.22	0.83	0.58	0.67	3.04	1.48	1.70	1.48	0.26	164	-	45.8
75	2	3248	60	230	0.37	0.85	0.60	0.67	3.00	1.54	1.68	1.54	0.22	164	25.9	-
75	2	3376	60	460	0.21	0.73	0.61	0.67	3.52	2.03	2.39	2.03	0.21	164	-	37.8

## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_b/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
<b>W</b>		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
75	2	3310	60	575	0.17	0.79	0.55	0.67	3.06	1.76	2.01	1.76	0.22	270	-	54.4
75	2	2728	50	550	0.19	0.78	0.52	0.67	2.82	1.64	1.89	1.64	0.26	270	-	60.0
75	2	3358	60	380	0.27	0.77	0.56	0.67	3.04	1.76	2.09	1.76	0.21	120	-	37.4
75	2	2745	50	200	0.50	0.78	0.55	0.67	2.85	1.53	1.86	1.53	0.26	120	23.4	-
140	2	2796	50	230	0.65	0.79	0.67	1.25	3.86	1.88	2.03	1.88	0.48	73	19.0	-
140	2	2796	50	400	0.38	0.79	0.67	1.25	3.86	1.88	2.03	1.88	0.48	73	-	32.9
140	2	3354	60	230	0.63	0.81	0.69	1.25	3.84	1.75	1.91	1.75	0.40	73	18.5	-
140	2	3430	60	460	0.37	0.69	0.68	1.25	4.45	2.48	2.67	2.48	0.39	73	-	27.8
140	2	3394	60	575	0.27	0.76	0.67	1.25	3.70	1.89	2.41	1.89	0.39	120	-	36.9
140	2	2812	50	550	0.32	0.72	0.64	1.25	3.34	2.02	2.34	2.02	0.48	120	-	41.5
140	2	3415	60	380	0.44	0.74	0.66	1.25	3.89	2.15	2.51	2.15	0.39	51	-	24.9
140	2	2798	50	200	0.85	0.75	0.63	1.25	3.26	1.82	2.09	1.82	0.48	51	16.3	-
140	2	3387	60	208	0.74	0.78	0.68	1.25	4.12	2.06	2.36	2.06	0.39	51	14.7	-
140	2	2724	50	230	0.63	0.87	0.62	1.25	3.21	1.44	1.50	1.44	0.49	93	25.6	-
140	2	2724	50	400	0.36	0.87	0.62	1.25	3.21	1.44	1.50	1.44	0.49	93	-	44.4

#### DM 0080 asynchronous partial load-optimized

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_b/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
<b>W</b>		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
116.2	2	2793	50	230	0.54	0.82	0.65	1.25	3.79	1.78	1.85	1.78	0.4	93	20.5	
116.2	2	2793	50	400	0.31	0.82	0.65	1.25	3.79	1.78	1.85	1.78	0.4	93		35.4



## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

#### DM 0113 asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
W		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
160	4	1397	50	400	0.54	0.70	0.61	3.84	3.05	1.92	2.13	1.92	1.09	63.7		36.4
160	4	1397	50	230	0.94	0.70	0.61	3.84	3.05	1.92	2.13	1.92	1.09	63.7	20.9	
160	4	1714	60	460	0.50	0.63	0.64	3.84	3.63	2.24	2.74	2.24	0.89	63.7		29.9
160	4	1667	60	230	0.83	0.75	0.65	3.84	3.26	1.74	2.00	1.74	0.92	63.7	19.7	
160	4	1390	50	200	1.12	0.69	0.59	3.84	2.87	1.93	2.21	1.93	1.10	47.9	18.6	
160	4	1698	60	380	0.59	0.66	0.62	3.84	3.27	2.22	2.57	2.22	0.90	47.9		27.9
160	4	1698	60	220	1.02	0.66	0.62	3.84	3.27	2.22	2.57	2.22	0.90	47.9	16.1	
160	4	1682	60	360	0.58	0.70	0.63	3.84	3.16	1.97	2.27	1.97	0.91	47.9		29.1
160	4	1682	60	208	1.00	0.70	0.63	3.84	3.16	1.97	2.27	1.97	0.91	47.9	16.8	
160	4	1355	50	500	0.39	0.78	0.60	3.84	2.62	1.53	1.73	1.53	1.14	124.0		57.0
160	4	1678	60	575	0.35	0.71	0.64	3.84	3.16	1.96	2.24	1.96	0.91	124.0		46.6
160	4	1395	50	690	0.33	0.68	0.59	3.84	2.90	2.00	2.29	2.00	1.10	192.1		65.1
160	4	1400	50	400	0.53	0.69	0.63	5.28	3.20	2.21	2.43	2.21	1.09	54.6		29.9
160	4	1400	50	230	0.92	0.69	0.63	5.28	3.20	2.21	2.43	2.21	1.09	54.6	17.3	
225	2	2758	50	400	0.56	0.86	0.68	2.48	4.32	2.57	2.62	2.57	0.78	39.3		28.1
225	2	2758	50	230	0.96	0.86	0.68	2.48	4.32	2.57	2.62	2.57	0.78	39.3	16.2	
225	2	3385	60	460	0.49	0.83	0.69	2.48	5.50	3.31	3.31	3.13	0.64	39.3		24.1
225	2	3294	60	230	0.90	0.90	0.69	2.48	4.60	2.45	2.45	2.31	0.65	39.3	16.0	
225	2	2744	50	200	1.08	0.87	0.68	2.48	4.25	2.27	2.52	2.27	0.78	28.5	13.5	
225	2	3358	60	380	0.56	0.87	0.71	2.48	5.03	2.59	2.96	2.59	0.64	28.5		20.6
225	2	3358	60	220	0.97	0.87	0.71	2.48	5.03	2.59	2.96	2.59	0.64	28.5	11.9	
225	2	3321	60	360	0.58	0.89	0.70	2.48	4.60	2.29	2.62	2.29	0.65	28.5		22.0
225	2	3321	60	208	1.00	0.89	0.70	2.48	4.60	2.29	2.62	2.29	0.65	28.5	12.7	
225	2	2605	50	500	0.43	0.93	0.65	2.48	3.26	1.66	1.83	1.66	0.82	76.6		45.9
225	2	3288	60	575	0.36	0.90	0.70	2.48	4.33	2.14	2.44	2.14	0.65	76.6		37.1
225	2	2739	50	690	0.31	0.88	0.68	2.48	4.19	2.23	2.47	2.23	0.78	116.9		48.0
300	4	1371	50	400	0.81	0.76	0.70	6.80	3.28	1.80	1.95	1.80	2.09	33.5		30.9
300	4	1371	50	230	1.40	0.76	0.70	6.80	3.28	1.80	1.95	1.80	2.09	33.5	17.9	
300	4	1688	60	460	0.70	0.74	0.73	6.80	3.87	2.39	2.53	2.39	1.70	33.5		25.9
300	4	1634	60	230	1.29	0.81	0.71	6.80	3.14	1.74	1.84	1.74	1.75	33.5	17.6	
300	4	1356	50	200	1.64	0.77	0.68	6.80	3.07	1.91	1.99	1.91	2.11	23.3	14.8	

## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_b/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
<b>W</b>		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
300	4	1666	60	380	0.85	0.75	0.71	6.80	3.51	2.14	2.26	2.14	1.72	23.3		22.2
300	4	1666	60	220	1.46	0.75	0.71	6.80	3.51	2.14	2.26	2.14	1.72	23.3	12.8	
300	4	1645	60	360	0.87	0.78	0.71	6.80	3.25	1.90	2.00	1.90	1.74	23.3		23.6
300	4	1645	60	208	1.50	0.78	0.71	6.80	3.25	1.90	2.00	1.90	1.74	23.3	13.7	
300	4	1365	50	500	0.67	0.76	0.67	6.80	3.10	1.94	2.04	1.94	2.10	49.2		37.7
300	4	1688	60	575	0.60	0.71	0.71	6.80	3.74	2.42	2.57	2.42	1.70	49.2		31.2
370	4	1392	50	200	2.34	0.69	0.66	6.80	3.24	2.30	2.44	2.30	2.54	15.8	12.7	
370	4	1698	60	380	1.21	0.67	0.69	6.80	3.70	2.59	2.78	2.59	2.08	15.8		19.2
370	4	1698	60	220	2.10	0.67	0.69	6.80	3.70	2.59	2.78	2.59	2.08	15.8	11.1	
370	4	1683	60	360	1.20	0.71	0.70	6.80	3.55	2.30	2.46	2.30	2.10	15.8		20.1
370	4	1683	60	208	2.08	0.71	0.70	6.80	3.55	2.30	2.46	2.30	2.10	15.8	11.6	
370	4	1359	50	500	0.85	0.76	0.66	6.80	2.95	1.84	1.96	1.84	2.60	41.9		40.7
370	4	1685	60	575	0.76	0.70	0.69	6.80	3.55	2.31	2.49	2.31	2.10	41.9		33.5
370	4	1396	50	690	0.70	0.68	0.65	6.80	3.24	2.33	2.49	2.33	2.53	63.8		45.3
370	4	1396	50	400	1.15	0.70	0.67	8.40	3.38	2.33	2.47	2.33	2.53	22.1		26.5
370	4	1396	50	230	1.98	0.70	0.67	8.40	3.38	2.33	2.47	2.33	2.53	22.1	15.3	
370	4	1713	60	460	1.05	0.64	0.69	8.40	3.98	2.90	3.12	2.90	2.06	22.1		22.2
370	4	1676	60	230	1.78	0.74	0.70	8.40	3.53	2.14	2.30	2.14	2.11	22.1	14.5	
370	2	2779	50	400	0.82	0.87	0.74	4.40	5.47	2.91	2.91	2.88	1.27	19.9		21.3
370	2	2779	50	230	1.42	0.87	0.74	4.40	5.47	2.91	2.91	2.88	1.27	19.9	12.3	
370	2	3425	60	460	0.73	0.85	0.75	4.40	6.84	3.79	3.79	3.54	1.03	19.9		18.4
370	2	3356	60	230	1.38	0.90	0.74	4.40	5.38	2.75	2.75	2.62	1.05	19.9	12.4	
370	2	2792	50	200	1.61	0.88	0.75	4.40	5.37	2.78	3.08	2.78	1.27	14.5	10.4	
370	2	3400	60	380	0.84	0.88	0.76	4.40	6.25	3.10	3.56	3.10	1.04	14.5		16.0
370	2	3400	60	220	1.45	0.88	0.76	4.40	6.25	3.10	3.56	3.10	1.04	14.5	9.2	
370	2	3372	60	360	0.87	0.90	0.76	4.40	5.71	2.75	3.16	2.75	1.05	14.5		17.0
370	2	3372	60	208	1.50	0.90	0.76	4.40	5.71	2.75	3.16	2.75	1.05	14.5	9.8	
370	2	2763	50	500	0.63	0.90	0.74	4.40	5.02	2.59	2.84	2.59	1.28	32.5		27.8
370	2	3398	60	575	0.55	0.88	0.77	4.40	6.32	3.18	3.62	3.18	1.04	32.5		23.6
370	2	2816	50	690	0.48	0.86	0.74	4.40	5.62	2.93	3.28	2.93	1.25	49.9		31.0
550	2	2813	50	400	1.23	0.85	0.77	5.44	5.77	3.27	3.27	3.15	1.87	11.6		18.1
550	2	2813	50	230	2.13	0.85	0.77	5.44	5.77	3.27	3.27	3.15	1.87	11.6	10.5	
550	2	3438	60	460	1.07	0.82	0.79	5.44	7.57	4.52	4.52	4.52	1.53	11.6		15.3



## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
W		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
550	2	3373	60	230	1.99	0.89	0.78	5.44	5.83	3.08	3.08	3.08	1.56	11.6	10.3	
550	2	2794	50	200	2.34	0.88	0.76	5.44	5.42	2.71	3.03	2.71	1.88	9.3	9.7	
550	2	3403	60	380	1.21	0.88	0.78	5.44	6.32	3.01	3.50	3.01	1.54	9.3		15.0
550	2	3403	60	220	2.09	0.88	0.78	5.44	6.32	3.01	3.50	3.01	1.54	9.3	8.6	
550	2	3375	60	360	1.26	0.90	0.77	5.44	5.77	2.68	3.11	2.68	1.56	9.3		15.9
550	2	3375	60	208	2.18	0.90	0.77	5.44	5.77	2.68	3.11	2.68	1.56	9.3	9.2	
550	2	2736	50	500	0.92	0.92	0.74	5.44	4.58	2.23	2.48	2.23	1.92	22.3		28.4
550	2	3379	60	575	0.79	0.90	0.78	5.44	5.87	2.75	3.18	2.75	1.55	22.3		23.7
550	2	2796	50	690	0.68	0.89	0.76	5.44	5.46	2.75	3.06	2.75	1.88	34.6		31.3

## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

#### DM 0113 asynchronous partial load-optimized

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
W		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
160	4	1715	60	460	0.49	0.63	0.65	5.28	3.74	2.78	3.08	2.78	0.89	54.6		25.3
160	4	1715	60	266	0.85	0.63	0.65	5.28	3.74	2.78	3.08	2.78	0.89	54.6	14.6	
160	4	1679	60	400	0.48	0.73	0.66	5.28	3.36	2.05	2.27	2.05	0.91	54.6		28.4
160	4	1679	60	230	0.82	0.73	0.66	5.28	3.36	2.05	2.27	2.05	0.91	54.6	16.4	
225	2	2798	50	400	0.52	0.87	0.72	3.42	5.23	2.78	3.09	2.78	0.77	31.1		21.0
225	2	2798	50	230	0.90	0.87	0.72	3.42	5.23	2.78	3.09	2.78	0.77	31.1	12.1	
225	2	3426	60	460	0.46	0.84	0.73	3.42	6.49	3.45	3.97	3.45	0.63	31.1		18.0
225	2	3353	60	230	0.87	0.90	0.72	3.42	5.21	2.54	2.92	2.54	0.64	31.1	12.1	
370	4	1388	50	400	1.10	0.71	0.68	6.80	3.67	2.35	2.43	2.29	2.55	22.1		25.8
370	4	1388	50	230	1.90	0.71	0.68	6.80	3.67	2.35	2.43	2.29	2.55	22.1	14.9	
370	4	1704	60	460	0.99	0.66	0.71	6.80	4.46	2.94	3.09	2.90	2.07	22.1		21.6
370	4	1662	60	230	1.70	0.77	0.71	6.80	3.88	2.12	2.26	2.07	2.13	22.1	14.4	
370	2	2825	50	400	0.80	0.87	0.76	5.44	6.25	3.31	3.65	3.31	1.25	15.6		16.3
370	2	2825	50	230	1.39	0.87	0.76	5.44	6.25	3.31	3.65	3.31	1.25	15.6	9.4	
370	2	3448	60	460	0.71	0.84	0.77	5.44	7.70	4.01	4.62	4.01	1.02	15.6		14.0
370	2	3388	60	230	1.33	0.90	0.77	5.44	6.18	2.98	3.43	2.98	1.04	15.6	9.3	



## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

#### DM 0138 asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_5/I_N$	$M_S/M_N$	$M_B/M_N$	$M_P/M_N$	$M_N$	$R_M$	$U_{SH\ \text{delta}}$	$U_{SH\ \text{star}}$
W		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
160	4	1390	50	400	0.46	0.76	0.67	3.98	3.50	1.86	2.13	1.86	1.10	60.2		31.4
160	4	1390	50	230	0.79	0.76	0.67	3.98	3.50	1.86	2.13	1.86	1.10	60.2	18.2	
160	4	1704	60	460	0.40	0.70	0.70	3.98	4.35	2.25	2.92	2.25	0.90	60.2		25.6
160	4	1661	60	230	0.72	0.80	0.70	3.98	3.68	1.65	2.15	1.65	0.92	60.2	17.3	
160	4	1383	50	200	0.87	0.77	0.68	3.98	3.65	1.72	2.18	1.72	1.10	45.1	15.2	
160	4	1691	60	380	0.45	0.75	0.72	3.98	4.16	1.85	2.50	1.85	0.90	45.1		22.7
160	4	1691	60	220	0.78	0.75	0.72	3.98	4.16	1.85	2.50	1.85	0.90	45.1	13.1	
160	4	1674	60	360	0.46	0.79	0.72	3.98	3.87	1.64	2.22	1.64	0.91	45.1		24.2
160	4	1674	60	208	0.79	0.79	0.72	3.98	3.87	1.64	2.22	1.64	0.91	45.1	14.0	
160	4	1369	50	500	0.34	0.81	0.67	3.98	3.38	1.51	1.94	1.51	1.12	107.5		44.3
160	4	1693	60	575	0.30	0.75	0.72	3.98	4.12	1.81	2.47	1.81	0.90	107.5		36.1
160	4	1393	50	690	0.26	0.76	0.68	3.98	3.74	1.79	2.29	1.79	1.10	174.9		51.3
370	4	1389	50	400	1.01	0.75	0.71	6.48	4.07	2.24	2.28	2.00	2.54	21.1		23.7
370	4	1389	50	230	1.74	0.75	0.71	6.48	4.07	2.24	2.28	2.00	2.54	21.1	13.7	
370	4	1713	60	460	0.86	0.71	0.76	6.48	4.75	2.21	3.08	2.21	2.06	21.1		19.4
370	4	1679	60	230	1.50	0.82	0.75	6.48	4.12	1.65	2.28	1.65	2.10	21.1	13.0	
370	4	1386	50	200	1.85	0.80	0.72	6.48	3.86	1.72	2.24	1.72	2.55	17.25	12.7	
370	4	1693	60	380	0.94	0.78	0.76	6.48	4.36	1.78	2.52	1.78	2.09	17.25		19.1
370	4	1693	60	220	1.63	0.78	0.76	6.48	4.36	1.78	2.52	1.78	2.09	17.25	11.0	
370	4	1676	60	360	0.97	0.81	0.75	6.48	4.03	1.59	2.24	1.59	2.11	17.25		20.3
370	4	1676	60	208	1.67	0.81	0.75	6.48	4.03	1.59	2.24	1.59	2.11	17.25	11.7	
370	4	1375	50	500	0.73	0.82	0.71	6.48	3.61	1.54	2.02	1.54	2.57	41.06		36.9
370	4	1697	60	575	0.63	0.78	0.75	6.48	4.37	1.78	2.53	1.78	2.08	41.06		30.3
370	4	1391	50	690	0.54	0.79	0.72	6.48	3.90	1.75	2.29	1.75	2.54	68.85		44.2
750	4	1400	50	400	1.86	0.77	0.77	11.45	4.47	2.29	2.41	2.07	5.11	9.1		19.4
750	4	1400	50	230	3.22	0.77	0.77	11.45	4.47	2.29	2.41	2.07	5.11	9.1	11.2	
750	4	1712	60	460	1.57	0.74	0.82	11.45	5.24	2.35	3.23	2.35	4.18	9.1		15.7
750	4	1675	60	230	2.84	0.82	0.80	11.45	4.35	1.87	2.54	1.87	4.28	9.1	10.6	
750	4	1393	50	200	3.54	0.79	0.78	11.45	4.30	1.98	2.51	1.98	5.14	7.27	10.1	
750	4	1698	60	380	1.81	0.78	0.81	11.45	4.84	2.03	2.79	2.03	4.22	7.27		15.4
750	4	1698	60	220	3.13	0.78	0.81	11.45	4.84	2.03	2.79	2.03	4.22	7.27	8.9	

## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_b/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
<b>W</b>		$\text{min}^{-1}$	<b>Hz</b>	<b>V</b>	<b>A</b>			$\text{kgcm}^2$					<b>Nm</b>	$\Omega$	<b>V DC</b>	<b>V DC</b>
750	4	1683	60	360	1.85	0.81	0.80	11.45	4.49	1.81	2.48	1.81	4.26	7.27		16.3
750	4	1683	60	208	3.20	0.81	0.80	11.45	4.49	1.81	2.48	1.81	4.26	7.27	9.4	
750	4	1380	50	500	1.37	0.81	0.77	11.45	4.08	1.84	2.31	1.84	5.19	15.8951		26.7
750	4	1699	60	575	1.19	0.78	0.81	11.45	4.90	2.07	2.84	2.07	4.22	15.8951		22.1
750	4	1392	50	690	1.02	0.79	0.78	11.45	4.28	1.96	2.49	1.96	5.15	29.1		35.2
550	2	2855	50	400	1.28	0.77	0.80	4.21	5.49	2.82	3.26	2.82	1.84	11.8		17.4
550	2	2855	50	230	2.22	0.77	0.80	4.21	5.49	2.82	3.26	2.82	1.84	11.8	10.1	
550	2	3461	60	460	1.06	0.78	0.83	4.21	7.04	3.21	4.13	3.21	1.52	11.8		14.8
550	2	3408	60	230	1.90	0.88	0.82	4.21	5.93	2.40	3.06	2.40	1.54	11.8	9.9	
550	2	2828	50	200	2.35	0.84	0.80	4.21	5.56	2.51	3.05	2.51	1.86	9.81	9.7	
550	2	3436	60	380	1.19	0.85	0.83	4.21	6.47	2.68	3.45	2.68	1.53	9.81		14.9
550	2	3436	60	220	2.07	0.85	0.83	4.21	6.47	2.68	3.45	2.68	1.53	9.81	8.6	
550	2	3413	60	360	1.22	0.88	0.82	4.21	5.98	2.39	3.08	2.39	1.54	9.81		15.8
550	2	3413	60	208	2.12	0.88	0.82	4.21	5.98	2.39	3.08	2.39	1.54	9.81	9.1	
550	2	2804	50	500	0.91	0.88	0.79	4.21	5.15	2.22	2.69	2.22	1.87	23.17		27.8
550	2	3434	60	575	0.79	0.85	0.82	4.21	6.39	2.62	3.38	2.62	1.53	23.17		23.3
550	2	2841	50	690	0.71	0.81	0.80	4.21	5.67	2.64	3.22	2.64	1.85	37.69		32.5
1000	2	2850	50	400	2.04	0.84	0.84	7.45	6.25	2.91	3.12	2.91	3.36	5.7		14.7
1000	2	2850	50	230	3.54	0.84	0.84	7.45	6.25	2.91	3.12	2.91	3.36	5.7	8.5	
1000	2	3464	60	460	1.69	0.86	0.86	7.45	7.82	3.08	4.14	3.08	2.76	5.7		12.4
1000	2	3411	60	230	3.23	0.91	0.85	7.45	6.18	2.30	3.08	2.30	2.80	5.7	8.4	
1000	2	2845	50	200	3.91	0.88	0.84	7.45	6.47	2.71	3.38	2.71	3.36	4.309	7.4	
1000	2	3451	60	380	2.00	0.88	0.86	7.45	7.30	2.78	3.75	2.78	2.77	4.309		11.4
1000	2	3451	60	220	3.47	0.88	0.86	7.45	7.30	2.78	3.75	2.78	2.77	4.309	6.6	
1000	2	3430	60	360	2.08	0.90	0.85	7.45	6.66	2.48	3.34	2.48	2.78	4.309		12.1
1000	2	3430	60	208	3.61	0.90	0.85	7.45	6.66	2.48	3.34	2.48	2.78	4.309	7.0	
1000	2	2824	50	500	1.53	0.90	0.84	7.45	6.06	2.53	3.13	2.53	3.38	9.161		18.9
1000	2	3448	60	575	1.32	0.88	0.86	7.45	7.35	2.84	3.81	2.84	2.77	9.161		16.0
1000	2	2840	50	690	1.13	0.89	0.84	7.45	6.36	2.65	3.30	2.65	3.36	17.41		26.1

## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

#### DM 0165 asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_p/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
W		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
306	12	456	50	400	1.45	0.62	0.49	35.1	1.80	1.74	1.98	1.57	6.41	22.4		30.0
306	12	456	50	230	2.51	0.62	0.49	35.1	1.80	1.74	1.98	1.57	6.41	22.4	17.0	
306	8	690	50	400	1.15	0.62	0.62	22.6	2.90	1.24	1.40	1.16	3.48	28.0		30.0
306	8	690	50	230	1.97	0.62	0.62	22.6	2.90	1.24	1.40	1.16	3.48	28.0	17.0	
370	4	1375	50	400	1.10	0.77	0.66	11.30	3.20	1.60	1.80	1.60	2.70	29.2		37.0
370	4	1375	50	230	1.90	0.77	0.66	11.30	3.20	1.60	1.80	1.60	2.70	29.2	21.0	
*370	8	690	50	400	1.50	0.62	0.57	22.60	2.87	1.90	2.35	1.90	5.12	22.0		31.0
*370	8	690	50	230	2.42	0.62	0.57	22.60	2.87	1.90	2.35	1.90	5.12	22.0	17.0	
370	12	456	50	400	1.60	0.63	0.53	35.10	2.00	1.20	1.50	1.20	7.75	27.3		29.0
370	12	456	50	230	2.77	0.63	0.53	35.10	2.00	1.20	1.50	1.20	7.75	27.3	17.0	
455	6	845	50	400	1.18	0.75	0.74	22.60	3.10	1.07	1.07	1.07	5.14	25.0		33.0
455	6	845	50	230	2.40	0.75	0.74	22.60	3.10	1.07	1.07	1.07	5.14	25.0	19.0	
*550	6	845	50	400	1.60	0.69	0.72	22.60	3.40	1.40	1.65	1.40	6.22	19.5		32.0
*550	6	845	50	230	2.77	0.69	0.72	22.60	3.40	1.40	1.65	1.40	6.22	19.5	19.0	
620	6	865	50	400	1.91	0.78	0.60	22.60	3.20	1.17	1.20	1.16	6.85	6.2		14.0
620	6	865	50	230	3.30	0.78	0.60	22.60	3.20	1.17	1.20	1.16	6.85	6.2	8.0	
620	4	1378	50	400	1.48	0.80	0.76	11.30	3.60	1.26	1.49	1.07	4.30	14.4		36.0
620	4	1378	50	230	2.55	0.80	0.76	11.30	3.60	1.26	1.49	1.07	4.30	14.4	21.0	
*750	4	1355	50	400	1.80	0.80	0.75	11.30	3.50	1.53	1.80	1.30	5.29	11.6		52.0
*750	4	1355	50	230	3.12	0.80	0.75	11.30	3.50	1.53	1.80	1.30	5.29	11.6	30.0	
750	6	845	50	400	2.10	0.81	0.64	22.60	3.50	1.75	2.00	1.75	8.48	11.8		16.0
750	6	845	50	230	3.64	0.81	0.64	22.60	3.50	1.75	2.00	1.75	8.48	11.8	9.0	
909	4	1320	50	400	2.27	0.84	0.69	11.30	3.70	1.16	1.24	1.07	6.58	8.3		24.0
909	4	1320	50	230	3.92	0.84	0.69	11.30	3.70	1.16	1.24	1.07	6.58	8.3	14.0	
909	2	2860	50	400	1.91	0.86	0.80	7.30	4.60	2.48	2.64	1.74	3.04	6.2		15.0
909	2	2860	50	230	3.30	0.86	0.80	7.30	4.60	2.48	2.64	1.74	3.04	6.2	9.0	
*1100	2	2845	50	400	2.40	0.86	0.77	7.60	5.20	3.15	3.42	2.10	3.69	5.8		9.0
*1100	2	2845	50	230	4.16	0.86	0.77	7.60	5.20	3.15	3.42	2.10	3.69	5.8	5.0	
*1100	4	1320	50	400	2.80	0.82	0.69	11.30	3.50	1.50	1.70	1.30	7.96	6.18		25.0
*1100	4	1320	50	230	4.85	0.82	0.69	11.30	3.50	1.50	1.70	1.30	7.96	6.18	14.0	
1240	4	1393	50	400	2.86	0.80	0.78	19.80	3.50	1.18	1.21	1.07	8.50	6.2		21.0

## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_P/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
<b>W</b>		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
1240	4	1393	59	230	4.94	0.80	0.78	19.80	3.50	1.18	1.21	1.07	8.50	6.2	12.0	
1500	4	1393	50	400	3.50	0.87	0.71	19.80	3.80	1.55	2.10	1.55	10.28	5.2		24.0
1500	4	1393	50	230	6.06	0.87	0.71	19.80	3.80	1.55	2.10	1.55	10.28	5.2	14.0	
1818	2	2850	50	400	3.73	0.85	0.83	7.60	4.80	2.07	2.31	1.65	6.09	6.2		29.0
1818	2	2850	50	230	6.43	0.85	0.83	7.60	4.80	2.07	2.31	1.65	6.09	6.2	17.0	
2200	2	2840	50	400	4.55	0.86	0.81	7.60	5.30	2.60	3.20	2.60	7.40	2.3		36.0
2200	2	2840	50	230	7.88	0.86	0.81	7.60	5.30	2.60	3.20	2.60	7.40	2.3	21.0	

Values marked with \* also for DM 0217

#### DM 0217 asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_P/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
<b>W</b>		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
306	8	690	50	400	1.15	0.62	0.62	22.6	2.90	1.24	1.40	1.16	3.48	28.0		30.0
306	8	690	50	230	1.97	0.62	0.62	22.6	2.90	1.24	1.40	1.16	3.48	28.0	17.0	
455	6	845	50	400	1.18	0.75	0.74	22.60	3.10	1.07	1.07	1.07	5.14	25.0		33.0
455	6	845	50	230	2.04	0.75	0.74	22.60	3.10	1.07	1.07	1.07	5.14	25.0	19.0	
620	4	1378	50	400	1.48	0.80	0.76	11.30	3.60	1.26	1.49	1.07	4.30	14.4		26.0
620	4	1378	50	230	2.55	0.80	0.76	11.30	3.60	1.26	1.49	1.07	4.30	14.4	15.0	
909	4	1320	50	400	2.27	0.84	0.69	11.30	3.70	1.16	1.24	1.07	6.58	8.3		24.0
909	4	1320	50	230	3.92	0.84	0.69	11.30	3.70	1.16	1.24	1.07	6.58	8.3	14.0	
909	2	2860	50	400	1.91	0.86	0.80	7.30	4.60	2.48	2.64	1.74	3.04	6.2		15.0
909	2	2860	50	230	3.30	0.86	0.80	7.30	4.60	2.48	2.64	1.74	3.04	6.2	9.0	
1100	8	695	50	400	3.20	0.81	0.61	86.00	4.50	1.80	2.20	1.70	15.12	6.3		24.0
1100	8	695	50	230	5.54	0.81	0.61	86.00	4.50	1.80	2.20	1.70	15.12	6.3	14.0	
1500	6	960	50	400	4.00	0.82	0.66	86.00	4.80	2.10	2.50	1.90	14.92	4.3		21.0
1500	6	960	50	230	6.93	0.82	0.66	86.00	4.80	2.10	2.50	1.90	14.92	4.3	12.0	
1500	4	1410	50	400	3.70	0.87	0.67	49.60	5.50	2.20	2.50	1.80	10.16	3.6		17.0
1500	4	1410	50	230	6.41	0.87	0.67	49.60	5.50	2.20	2.50	1.80	10.16	3.6	10.0	
2200	4	1420	50	400	5.20	0.87	0.70	60.00	2.90	2.40	2.90	2.30	14.80	3.55		24.0
2200	4	1420	50	230	9.01	0.87	0.70	60.00	2.90	2.40	2.90	2.30	14.80	3.55	14.0	
2200	2	2794	50	400	5.10	0.88	0.71	26.00	6.40	2.60	3.02	2.30	7.52	2.95		20.0



## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

$P_N$	$n_p$	$n_N$	$f_N$	$U_N$	$I_N$	$\cos\varphi$	$\eta$	$J_R$	$I_s/I_N$	$M_s/M_N$	$M_B/M_N$	$M_P/M_N$	$M_N$	$R_M$	$U_{SH\ delta}$	$U_{SH\ star}$
<b>W</b>		$\text{min}^{-1}$	Hz	V	A			$\text{kgcm}^2$					Nm	$\Omega$	V DC	V DC
2200	2	2794	50	230	8.83	0.88	0.71	26.00	6.40	2.60	3.02	2.30	7.52	2.95	11.0	
3,000	4	1420	50	400	7.00	0.82	0.76	46.90	5.00	2.40	2.90	2.30	20.19	1.85		16.0
3,000	4	1420	50	230	12.12	0.82	0.76	46.90	5.00	2.40	2.90	2.30	20.19	1.85	9.0	
3,000	2	2812	50	400	6.65	0.82	0.80	37.10	6.50	2.60	3.40	2.40	10.19	1.55		13.0
3,000	2	2812	50	230	11.52	0.82	0.80	37.10	6.50	2.60	3.40	2.40	10.19	1.55	7.0	

## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

### Connection diagrams of DM series asynchronous 3-phase

## NOTICE

### Damage to the drum motor due to incorrect connection at the backstop

- ▶ For counterclockwise operation with backstop, swap the feed lines L1 and L2.

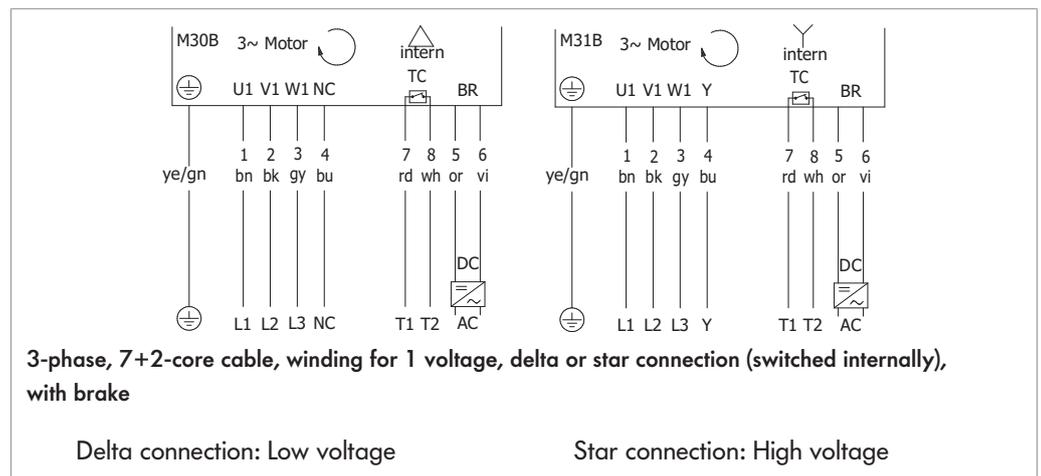
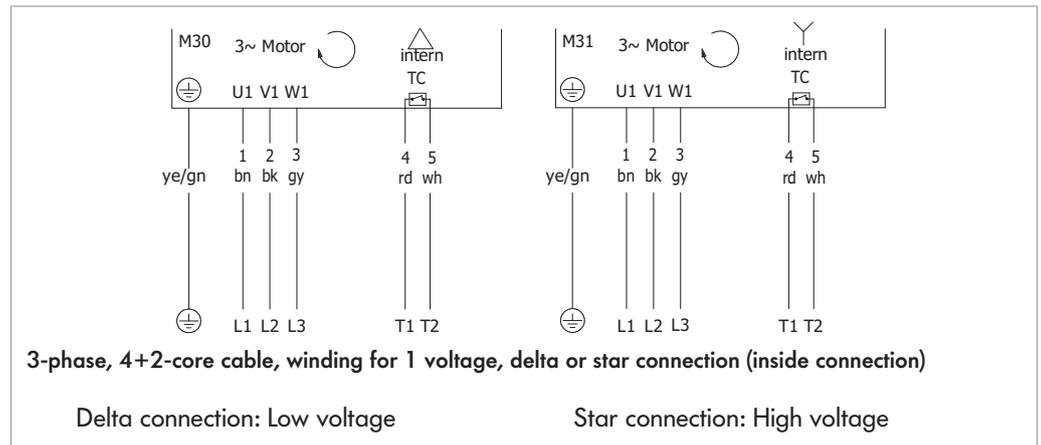


Reversal of direction of rotation: Swapping the feed lines L1 and L2

This instruction manual lists only standard connection diagrams. For other connection types, the connection diagram is supplied separately with the drum motor. For the connection diagrams of the encoders, see "Options and accessories", page 45.

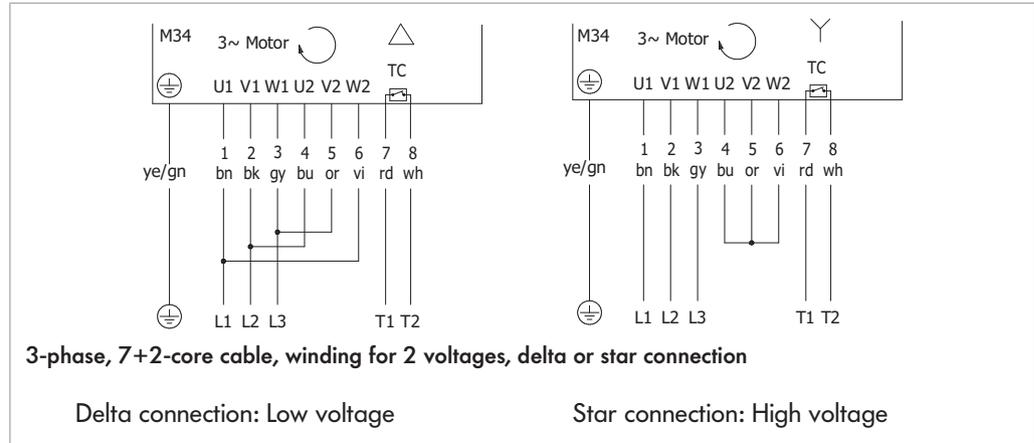
Abbreviations see "List of abbreviations", page 94

### Cable connections

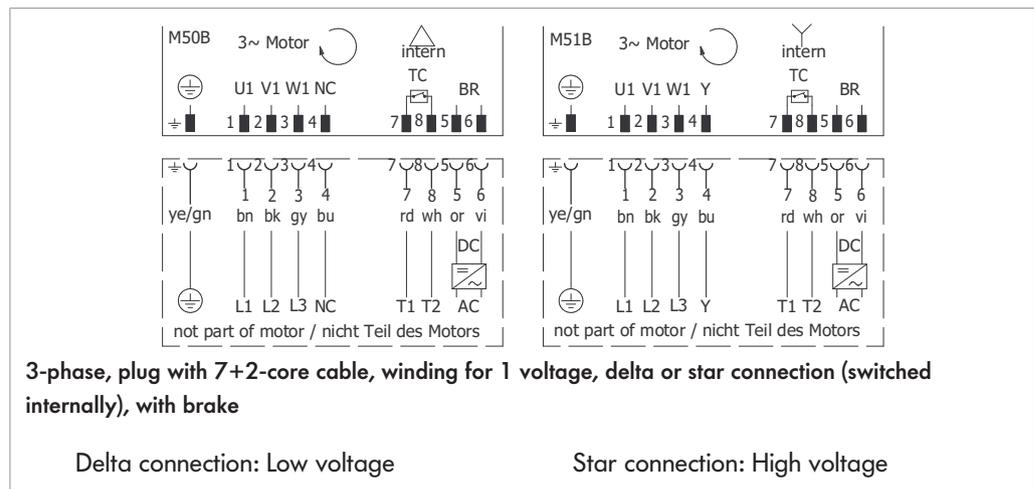
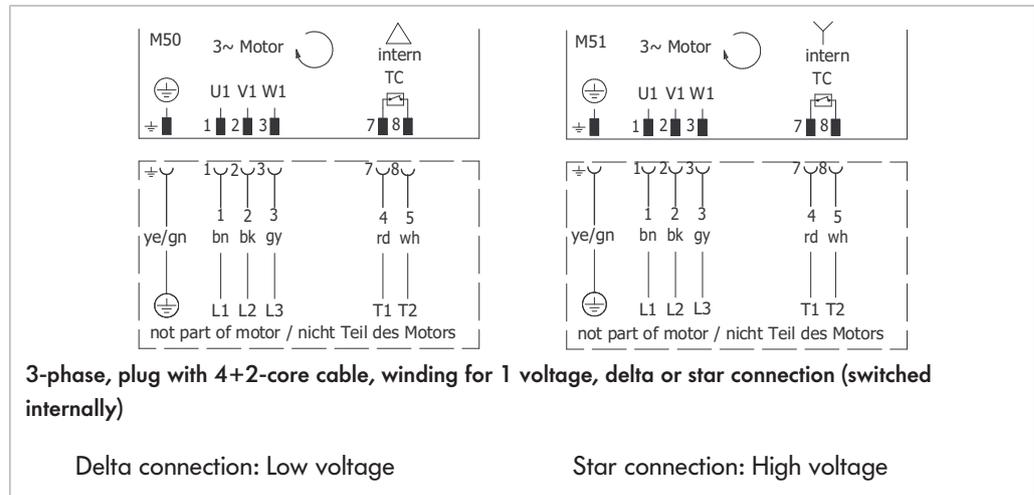


## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

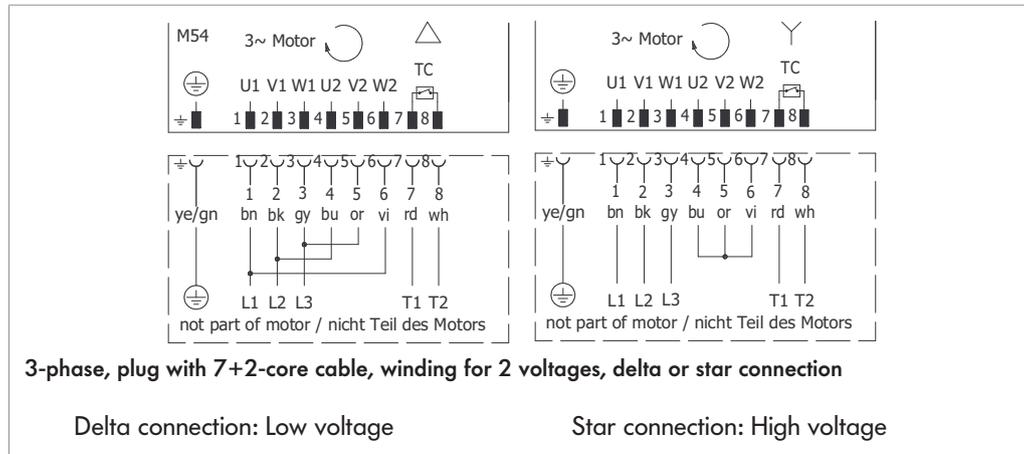


### Connections with plug connection

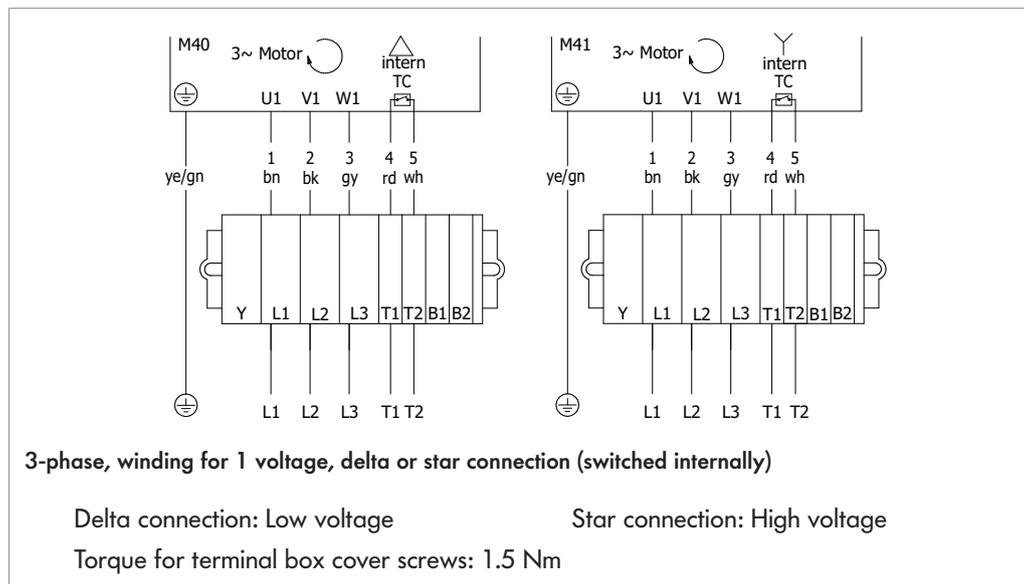


## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase

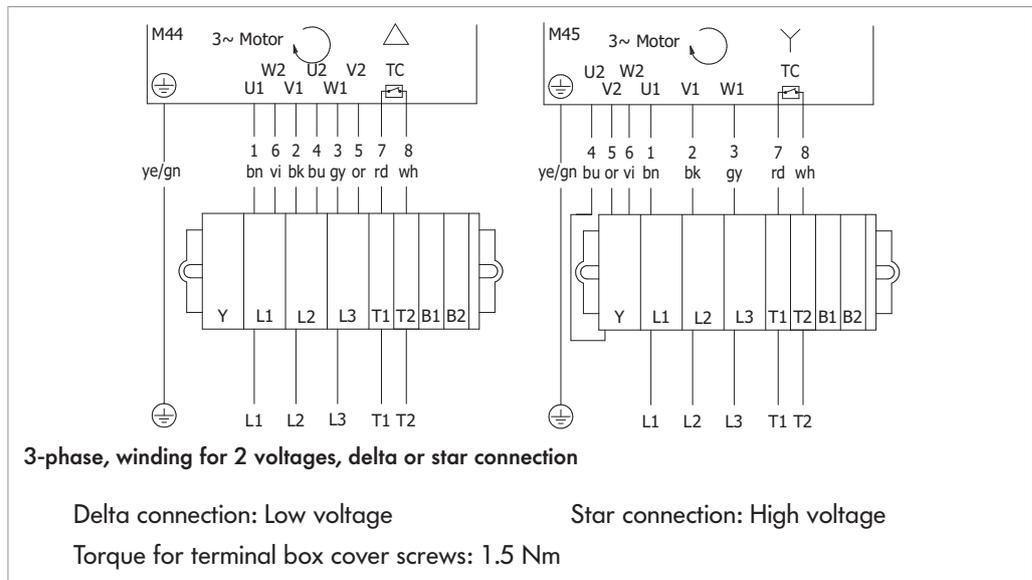
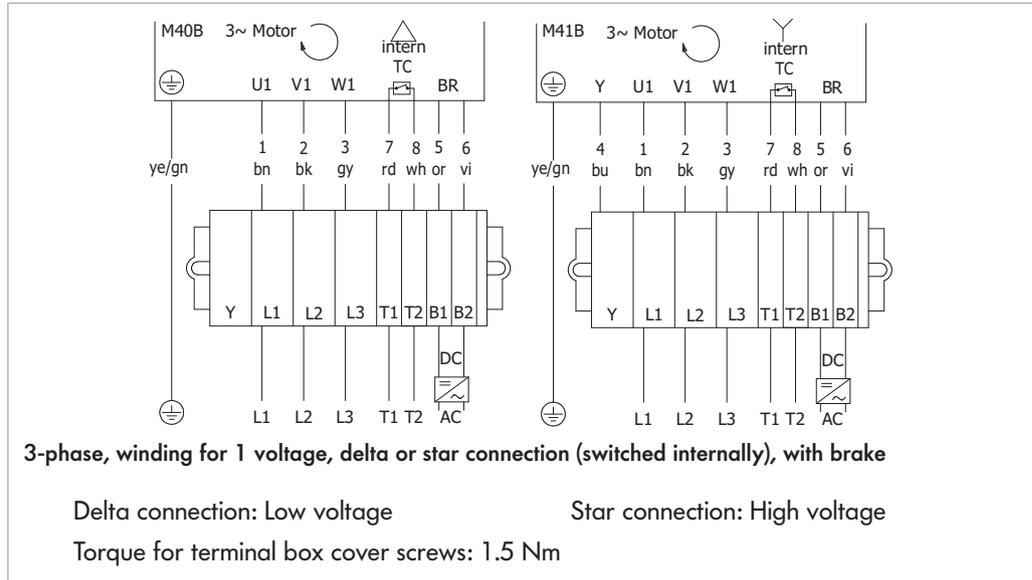


### Connections in the terminal box



## Interroll Drum motor DM series

### Product information of DM series asynchronous 3-phase



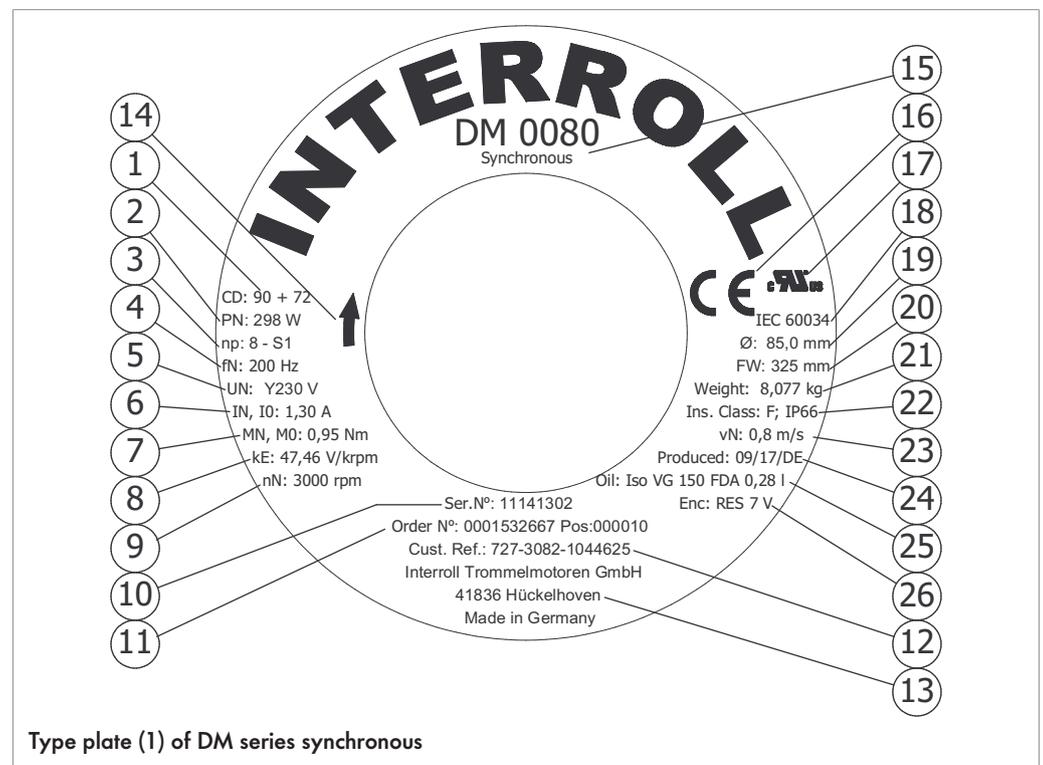
### Product information for DM series synchronous

#### Type plate of DM series synchronous

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.

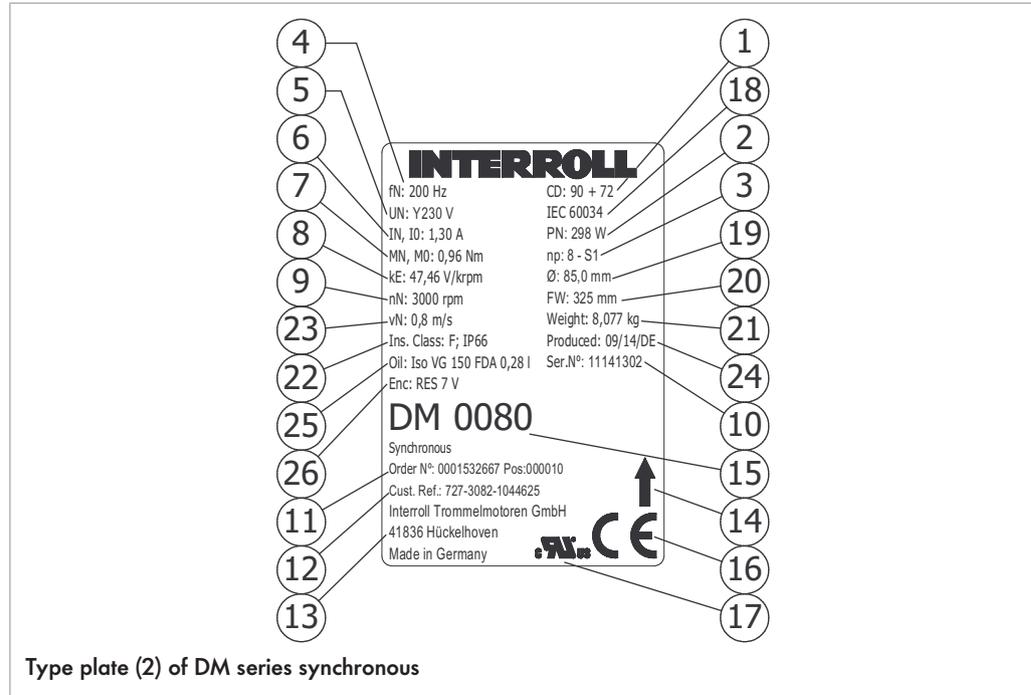
Drum motors of the DM series have different kinds of type plates:

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

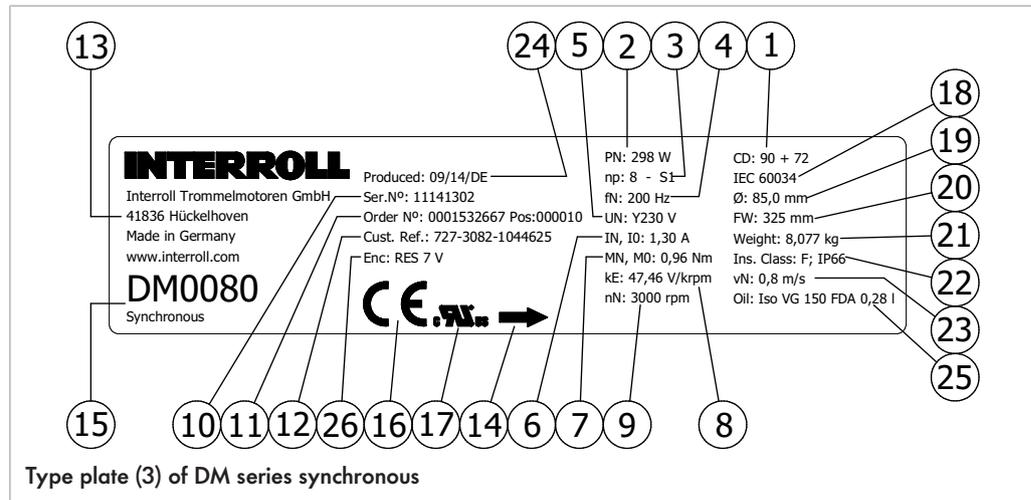


## Interroll Drum motor DM series

### Product information for DM series synchronous



Type plate (2) of DM series synchronous



Type plate (3) of DM series synchronous

- |   |                                  |    |  |
|---|----------------------------------|----|--|
| 1 | Connection diagram number        | 14 | Direction of travel (for backstop only)                                |
| 2 | Rated power                      | 15 | Type + design  |
| 3 | Number of poles + operating mode | 16 | CE mark  |
| 4 | Rated frequency                  | 17 | UL mark  |
| 5 | Rated voltage                    | 18 | International Electrotechnical Commission:<br>Standard for drum motors |
| 6 | Rated current                    | 19 | Tube diameter  |
| 7 | Rated torque of rotor            | 20 | Drum width   |
| 8 | Induced motor voltage            | 21 | Weight   |

## Interroll Drum motor DM series

### Product information for DM series synchronous

9	Rated speed of rotor	22	Insulation class and protection rate
10	Serial number	23	Circumferential speed of tube
11	Order number + item	24	Manufactured week/year/country
12	Customer item number	25	Oil type and quantity
13	Manufacturer's address	26	Technical data of option

### Electrical data for DM series synchronous

Abbreviations see "List of abbreviations", page 94

#### DM 0080 synchronous

Number of poles	8 (4 pairs of poles)
Rated speed of rotor	3000 1/min
Rated frequency	200 Hz
Winding connection	Star
Thermal protection type	TC 130 °C

$P_N$	$U_N$	$I_N$	$I_0$	$I_{max}$	$\eta$	$J_R$	$M_N$	$M_0$	$M_{max}$	$R_M$	$L_{sd}$	$L_{sq}$	$k_e$	$T_e$	$k_{TN}$	$U_{SH}$
W	V	A	A	A		kgcm <sup>2</sup>	Nm	Nm	Nm	$\Omega$	mH	mH	V/krpm	ms	Nm/A	V
145	230	0.81	0.81	2.43	0.85	0.14	0.46	0.46	1.38	21.6	45.6	53.7	41.57	4.97	0.57	25.00
145	400	0.47	0.47	1.41	0.83	0.14	0.46	0.46	1.38	62.5	130.7	138.0	72.23	4.41	0.98	36.00
298	230	1.30	1.30	3.90	0.86	0.28	0.95	0.95	2.85	10.2	27.8	29.3	47.46	5.75	0.73	19.00
298	400	0.78	0.78	2.34	0.87	0.28	0.95	0.95	2.85	29.1	81.9	94.1	83.09	6.48	1.22	32.00
425	230	2.30	2.30	6.90	0.87	0.42	1.35	1.35	4.05	5.66	16.3	19.4	45.81	6.86	0.59	19.00
425	400	1.32	1.32	3.96	0.86	0.42	1.35	1.35	4.05	17.6	49.8	59.0	80.80	6.70	1.02	33.00
550	230	2.94	2.94	8.83	0.90	0.60	1.75	1.75	5.25	3.89	10.2	11.8	38.45	6.06	0.59	5.73
550	400	1.70	1.70	5.10	0.90	0.60	1.75	1.75	5.25	9.20	24.1	27.6	66.60	6.00	1.03	23.46

$$\text{Averaged inductance: } L_{sm} = (L_{sd} + L_{sq}) / 2$$

## Interroll Drum motor DM series

### Product information for DM series synchronous

#### DM 0113 synchronous

Number of poles	8 (4 pairs of poles)
Rated speed of rotor	3000 1/min
Rated frequency	200 Hz
Winding connection	Star
Thermal protection type	TC 130 °C

$P_N$	$U_N$	$I_N$	$I_0$	$I_{max}$	$\eta$	$J_R$	$M_N$	$M_0$	$M_{max}$	$R_M$	$L_{sd}$	$L_{sq}$	$k_e$	$T_e$	$k_{TN}$	$U_{SH}$
W	V	A	A	A		kgcm <sup>2</sup>	Nm	Nm	Nm	$\Omega$	mH	mH	V/krpm	ms	Nm/A	V
300	230	1.25	1.25	3.76	0.85	1.8	0.96	0.96	2.88	11.47	5.5	10.2	50.34	3.57	0.76	10.78
300	400	0.72	0.72	2.17	0.85	1.8	0.96	0.96	2.88	34.40	16.5	30.7	87.20	3.57	1.32	18.68
700	230	2.67	2.67	8.00	0.89	5.4	2.23	2.23	6.69	2.63	2.5	4.4	55.48	6.73	0.84	5.27
700	400	1.54	1.54	4.62	0.89	5.4	2.23	2.23	6.69	7.90	7.4	13.3	96.10	6.73	1.45	9.12
1100	230	3.97	3.97	11.90	0.92	7.2	3.50	3.50	10.49	1.88	1.9	3.2	56.52	6.78	0.88	5.61
1100	400	2.29	2.29	6.87	0.92	7.2	3.50	3.50	10.49	5.66	5.8	9.6	97.90	6.78	1.53	9.72

$$\text{Averaged inductance: } L_{sm} = (L_{sd} + L_{sq}) / 2$$

#### DM 0138 synchronous

Number of poles	8 (4 pairs of poles)
Rated speed of rotor	3000 1/min
Rated frequency	200 Hz
Winding connection	Star
Thermal protection type	TC 130 °C

$P_N$	$U_N$	$I_N$	$I_0$	$I_{max}$	$\eta$	$J_R$	$M_N$	$M_0$	$M_{max}$	$R_M$	$L_{sd}$	$L_{sq}$	$k_e$	$T_e$	$k_{TN}$	$U_{SH}$
W	V	A	A	A		kgcm <sup>2</sup>	Nm	Nm	Nm	$\Omega$	mH	mH	V/krpm	ms	Nm/A	V
1800	230	5.94	5.94	17.82	0.92	14.4	5.73	5.73	17.19	1.45	3.9	5.6	63.62	15.58	0.96	6.45
1800	400	3.43	3.43	10.29	0.92	14.4	5.73	5.73	17.19	4.34	11.6	16.9	110.20	15.58	1.67	11.16

$$\text{Averaged inductance: } L_{sm} = (L_{sd} + L_{sq}) / 2$$

## Interroll Drum motor DM series

### Product information for DM series synchronous

### Electrical data for DM series synchronous oil-free

Abbreviations see "List of abbreviations", page 94

#### DM 0080 synchronous oil-free

Number of poles	8 (4 pairs of poles)
Rated speed of rotor	3000 1/min
Rated frequency	200 Hz
Winding connection	Star
Thermal protection type	TC 130 °C

$P_N$	$U_N$	$I_N$	$I_0$	$I_{max}$	$\eta$	$J_R$	$M_N$	$M_0$	$M_{max}$	$R_M$	$L_{sd}$	$L_{sq}$	$k_e$	$T_e$	$k_{TN}$	$U_{SH}$
W	V	A	A	A		kgcm <sup>2</sup>	Nm	Nm	Nm	$\Omega$	mH	mH	V/krpm	ms	Nm/A	V
80	230	0.45	0.45	1.34	0.85	0.14	0.25	0.25	0.76	21.62	45.6	53.7	41.57	4.97	0.57	25
80	400	0.26	0.26	0.78	0.83	0.14	0.25	0.25	0.76	62.54	130.7	138.0	72.23	4.41	0.98	36
110	230	0.48	0.48	1.44	0.86	0.28	0.35	0.35	1.05	10.20	27.8	29.3	47.46	5.75	0.73	19
110	400	0.29	0.29	0.86	0.87	0.28	0.35	0.35	1.05	29.06	81.9	94.1	83.09	6.48	1.22	32
180	230	1.97	1.97	2.91	0.87	0.42	0.57	0.57	1.72	5.66	16.3	19.4	45.81	6.86	0.59	19
180	400	0.56	0.56	1.69	0.86	0.42	0.57	0.57	1.72	17.60	49.8	59.0	80.80	6.70	1.02	33
235	230	1.30	1.30	3.90	0.92	0.60	0.75	0.75	2.25	3.89	10.2	11.8	38.45	6.06	0.58	2.53
235	400	0.75	0.75	2.25	0.92	0.60	0.75	0.75	2.25	9.20	24.1	27.6	66.60	6.00	1.00	3.45

Averaged inductance:  $L_{sm} = (L_{sd} + L_{sq}) / 2$

#### DM 0113 synchronous oil-free

Number of poles	8 (4 pairs of poles)
Rated speed of rotor	3000 1/min
Rated frequency	200 Hz
Winding connection	Star
Thermal protection type	TC 130 °C



## Interroll Drum motor DM series

### Product information for DM series synchronous

$P_N$	$U_N$	$I_N$	$I_0$	$I_{max}$	$\eta$	$J_R$	$M_N$	$M_0$	$M_{max}$	$R_M$	$L_{sd}$	$L_{sq}$	$k_e$	$T_e$	$k_{TN}$	$U_{SH}$
W	V	A	A	A		kgcm <sup>2</sup>	Nm	Nm	Nm	$\Omega$	mH	mH	V/krpm	ms	Nm/A	V
190	230	0.80	0.80	2.39	0.88	1.8	0.60	0.60	1.81	11.47	5.5	10.2	50.34	3.57	0.76	6.85
190	400	0.46	0.46	1.38	0.88	1.8	0.60	0.60	1.81	34.40	16.5	30.7	87.20	3.57	1.31	11.87
440	230	1.77	1.77	5.30	0.87	5.4	1.40	1.40	4.20	2.49	2.5	4.4	55.48	7.13	0.79	3.29
440	400	1.02	1.02	3.06	0.87	5.4	1.40	1.40	4.20	7.46	7.4	13.3	96.10	7.13	1.37	5.71
700	230	2.55	2.55	7.64	0.94	7.2	2.23	2.23	6.69	1.88	1.9	3.2	56.52	6.78	0.88	3.60
700	400	1.47	1.47	4.41	0.94	7.2	2.23	2.23	6.69	5.66	5.8	9.6	97.90	6.78	1.52	6.24

Averaged inductance:  $L_{sm} = (L_{sd} + L_{sq}) / 2$

#### DM 0138 synchronous oil-free

Number of poles	8 (4 pairs of poles)
Rated speed of rotor	3000 1/min
Rated frequency	200 Hz
Winding connection	Star
Thermal protection type	TC 130 °C

$P_N$	$U_N$	$I_N$	$I_0$	$I_{max}$	$\eta$	$J_R$	$M_N$	$M_0$	$M_{max}$	$R_M$	$L_{sd}$	$L_{sq}$	$k_e$	$T_e$	$k_{TN}$	$U_{SH}$
W	V	A	A	A		kgcm <sup>2</sup>	Nm	Nm	Nm	$\Omega$	mH	mH	V/krpm	ms	Nm/A	V
1000	230	3.36	3.36	10.08	0.93	14.4	3.18	3.18	9.54	1.45	3.9	5.6	63.62	15.58	0.95	3.65
1000	400	1.94	1.94	5.82	0.93	14.4	3.18	3.18	9.54	4.34	11.6	16.9	110.20	15.58	1.64	6.31

Averaged inductance:  $L_{sm} = (L_{sd} + L_{sq}) / 2$

## Interroll Drum motor DM series

### Product information for DM series synchronous

### Connection diagrams of DM series synchronous

This instruction manual lists only standard connection diagrams. For other connection types, the connection diagram is supplied separately with the drum motor. For the connection diagrams of the encoders, see "Options and accessories", page 45.

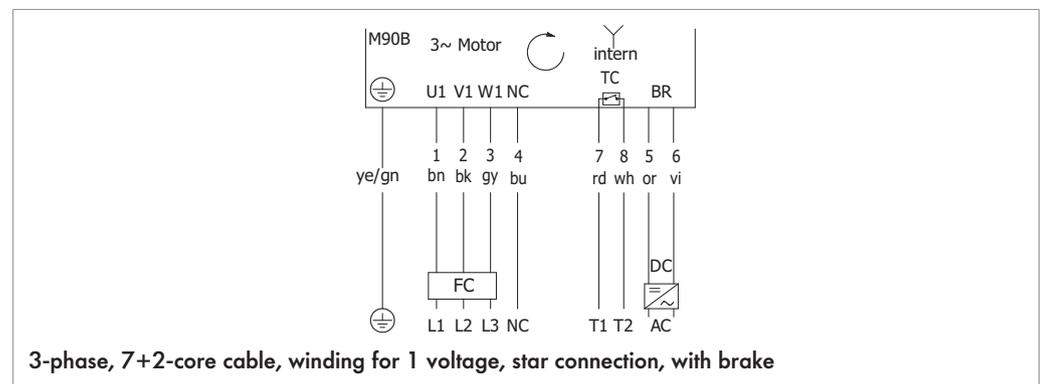
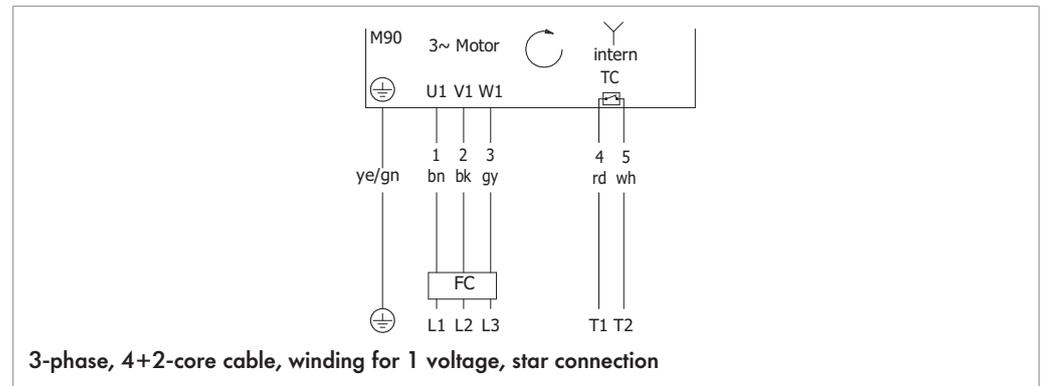
## NOTICE

### Damage to the drum motor due to incorrect connection

- ▶ Do not connect DM series synchronous drum motors directly to the power supply system; instead, operate them only via a suitable frequency inverter.

Abbreviations see "List of abbreviations", page 94

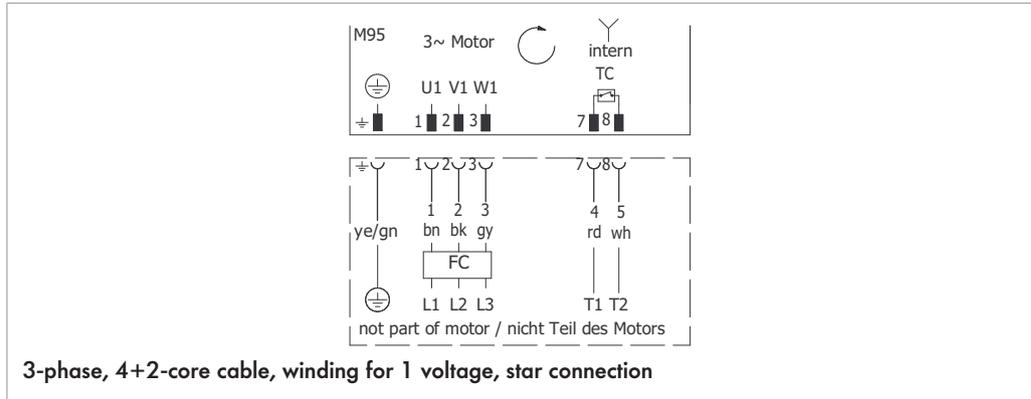
### Cable connections



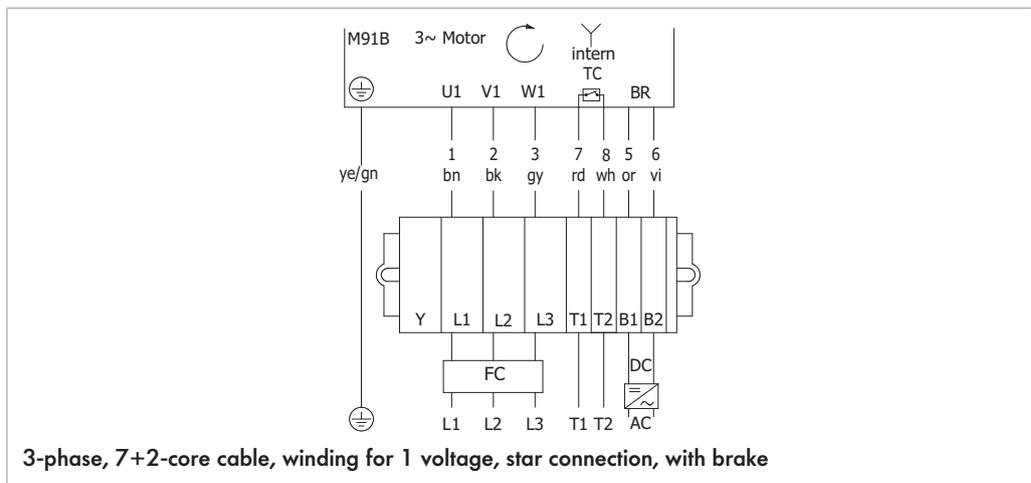
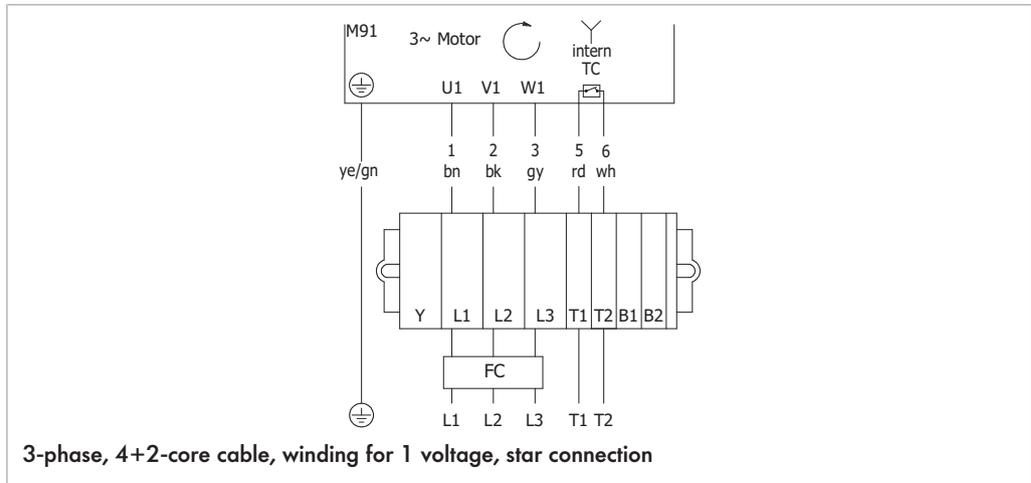
## Interroll Drum motor DM series

### Product information for DM series synchronous

#### Connections with plug connection



#### Connections in the terminal box



## Interroll Drum motor DM series

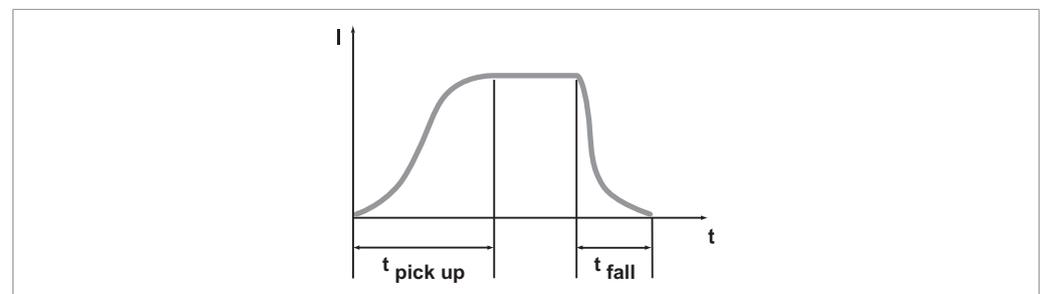
### Options and accessories

#### Electromagnetic brake for DM series asynchronous 3-phase

$M$	Rated continuous torque of brake
$J_{BR}$	Brake moment of inertia
$U_{BR}$	Rated voltage
$P_{BR}$	Rated power
$I_{BR}$	Rated current
$t_{pick\ up}$	Brake response time
$t_{fall\ delay\ AC}$	Brake release switching time with AC-based switching
$t_{fall\ delay\ DC}$	Brake release switching time with DC-based switching

Motor	Brake size	$M$	$J_{BR}$	$P_{BR}$	$U_{BR}$	$I_{BR}$	$t_{pick\ up}$	$t_{fall\ delay\ AC}$	$t_{fall\ delay\ DC}$
		Nm	kgcm <sup>2</sup>	W	V DC	A	ms	ms	ms
DM 0080 asynchronous	2	0.7	0.04	12	24 104	0.50 0.12	20	80	13
DM 0113 asynchronous		1.5	0.08	24	24 104 207	1 0.23 0.12	30	200	26
DM 0138 asynchronous		2.9	0.23	24	24 104 207	1 0.23 0.12	30	200	26
DM 0165/ DM 0217* asynchronous	5	5.95	0.68	33	24 104 207	1.38 0.32 0.16	40	260	46
DM 0217 asynchronous	12			50	104 207	0.48 0.24	60	500	60

DM 0217\* see "DM 0165 asynchronous 3-phase", page 30



## Interroll Drum motor DM series

### Options and accessories

AC-switching (The input voltage at terminals 1 and 2 of the brake rectifier is switched.)	Long fall delay
	Brake voltage approx. 1 V
	Brake is softly applied
DC-switching (The output voltage is switched via terminals 3 and 4 of the brake rectifier.) The switching contact must be suitable for high-voltage peaks and resulting contact-breaking sparks during DC switching.	Short fall delay
	Brake voltage approx. 500 V
	Brake is abruptly applied
Electronic rectifier	Behavior similar to DC-switching

Overexcitation voltage = 2 x rated operating voltage,  $t_{pick\ up}$  is halved.

Standard 104 V DC, available off-the-shelf



The braking torque at the drum tube corresponds to the gear ratio of the motor times the braking torque listed in the table above. For safety reasons, a reserve of 25 % must be factored in when dimensioning the brake. The brake is not a safety holding brake. Since there are motor combinations that feature a higher torque than braking torque, we always recommend that the greatest possible gear ratio be used when a brake is used.

All brakes are dimensioned for start/stop operation.

The rise and fall delays of the brakes can vary significantly depending on the following factors:

- Oil type and viscosity
- Oil quantity in drum motor
- Ambient temperature
- Internal operating temperature of motor

## Interroll Drum motor DM series

### Options and accessories

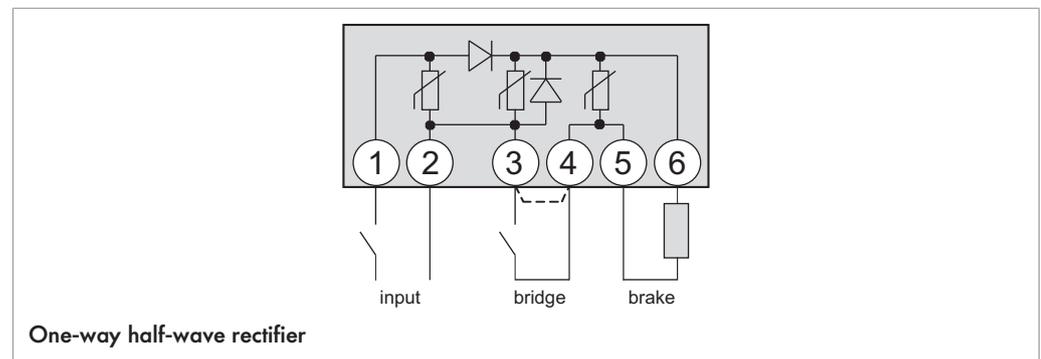
#### Brake rectifier for DM series asynchronous 3-phase

Input voltage V AC	Brake voltage V DC	Starting voltage V DC	Holding voltage V DC	Type	Application	Reference number
115	104	104	52	Fast-switching rectifier	Start/stop applications or continuous operation	61011343
230	207	207	104	Fast-switching rectifier	Start/stop applications or continuous operation	61011343
230	104	104	104	One-way half-wave rectifier and bridge rectifier	Start/stop applications or continuous operation	1001440
230	104	190	52	Phase rectifier	Continuous operation	1001442
400	104	180	104	Multi-switch	Continuous operation	1003326
460	104	180	104	Multi-switch	Continuous operation	1003326
460	207	207	207	One-way half-wave rectifier and bridge rectifier	Start/stop applications or continuous operation	1001441

The use of a fast-acting or phase rectifier allows saving energy since the holding voltage is lower than the rated braking voltage.

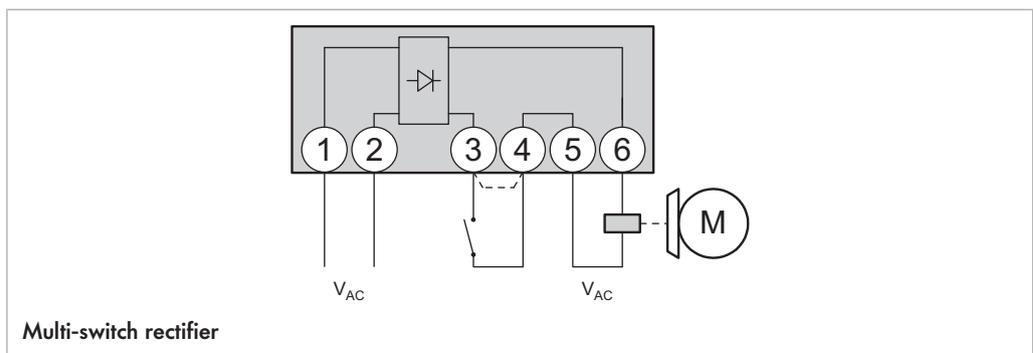
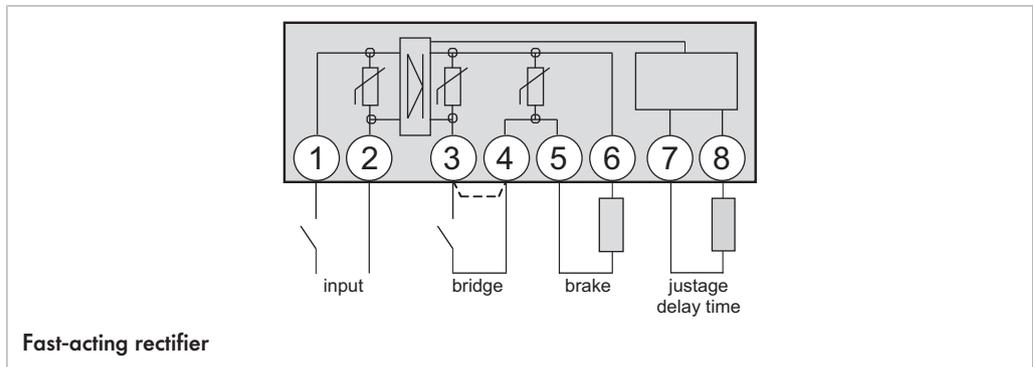
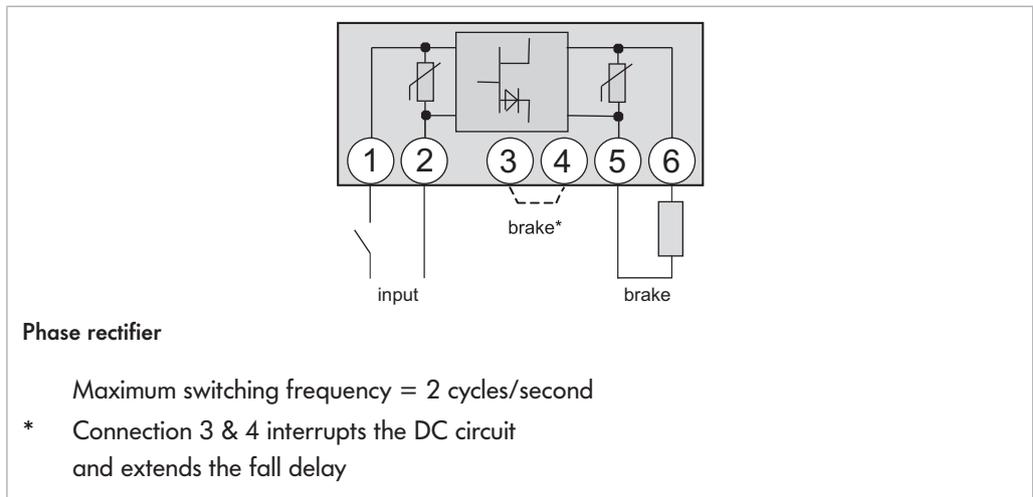
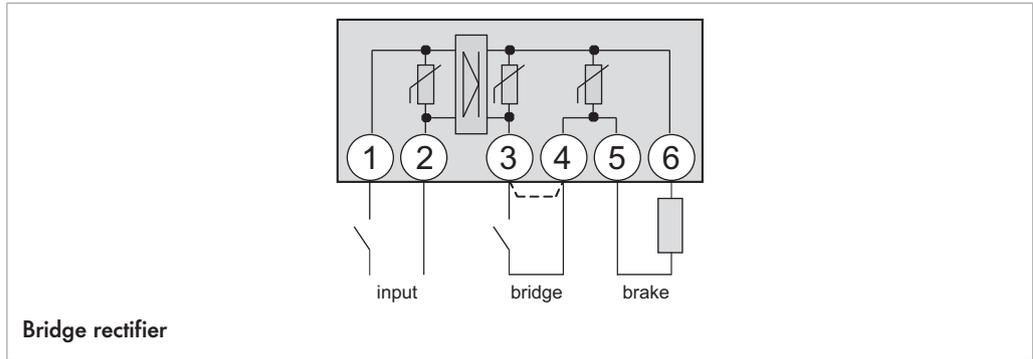
#### Brake rectifier connections

Interroll recommends installing a switch between 3 and 4 for a faster release of the brake.



## Interroll Drum motor DM series

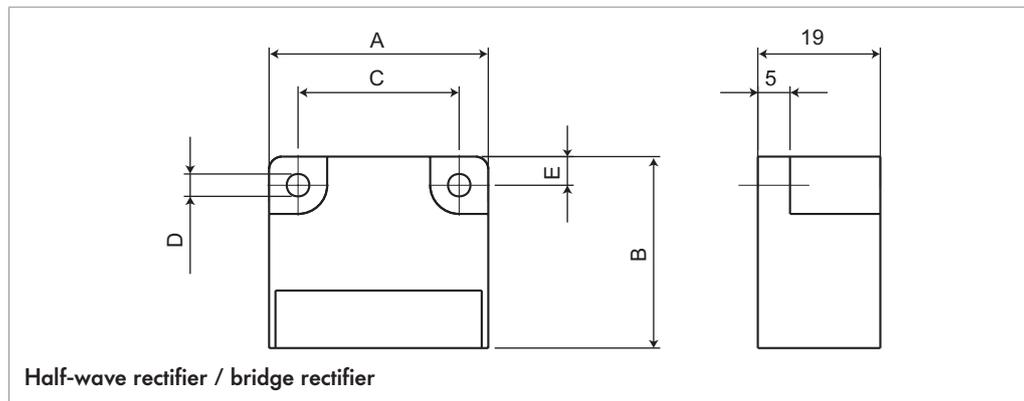
### Options and accessories



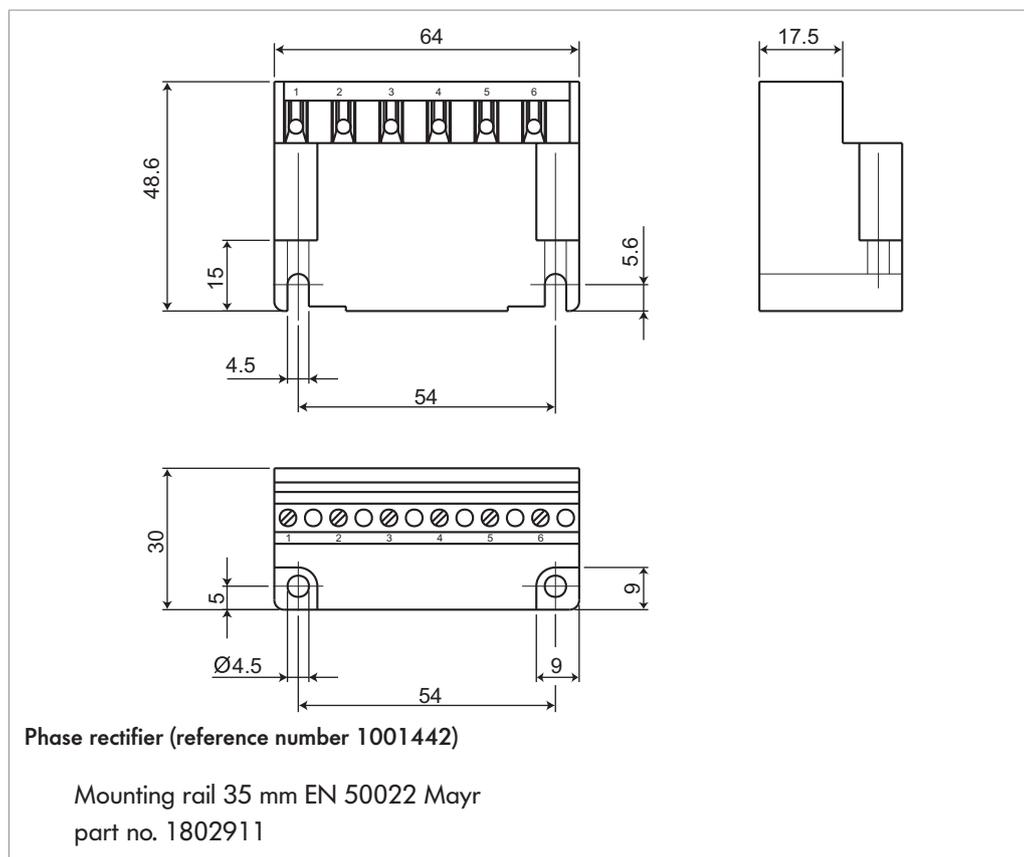
## Interroll Drum motor DM series

### Options and accessories

#### Brake rectifier dimensions

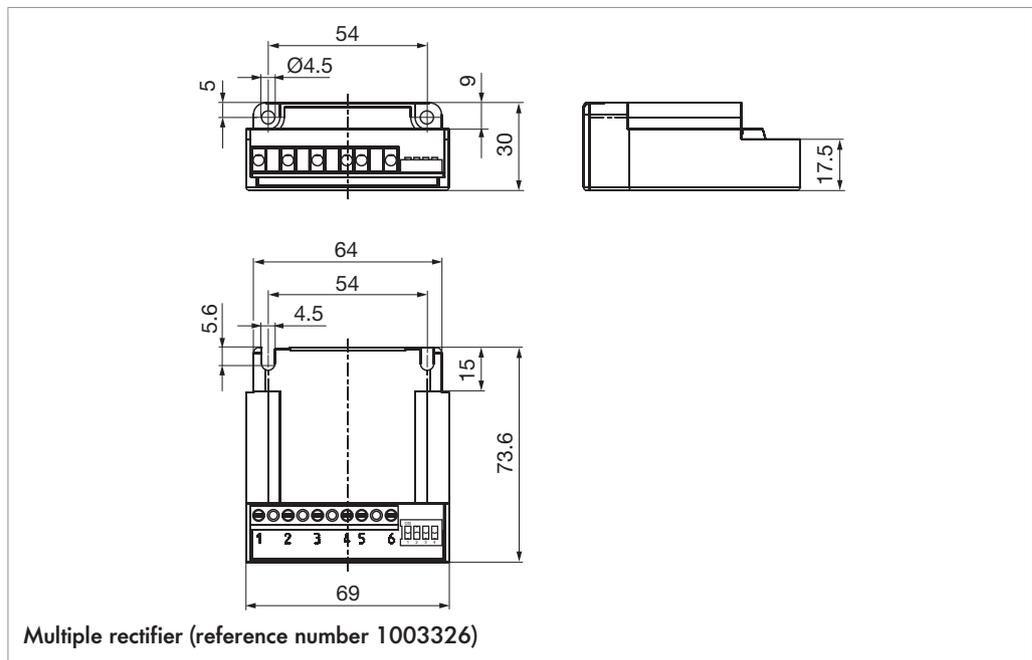
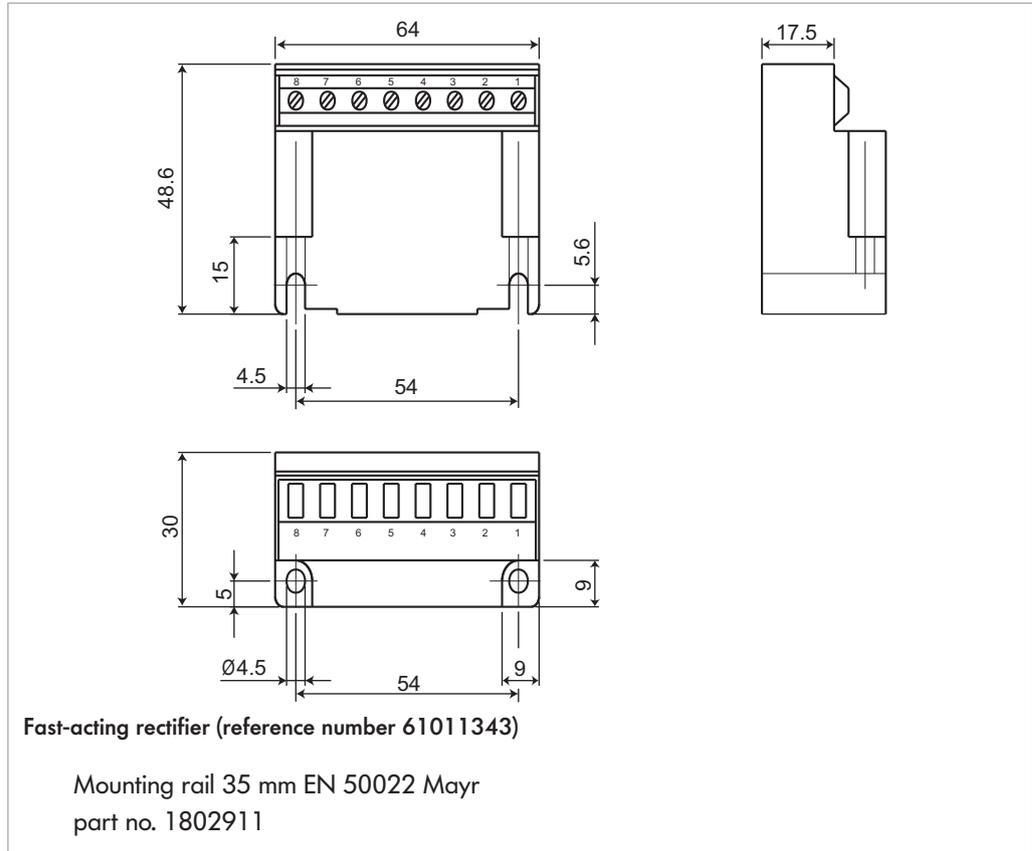


Reference number	A mm	B mm	C mm	D mm	E mm
1001440	34	30	25	3.5	4.5
1001441	64	30	54	4.5	5



## Interroll Drum motor DM series

### Options and accessories

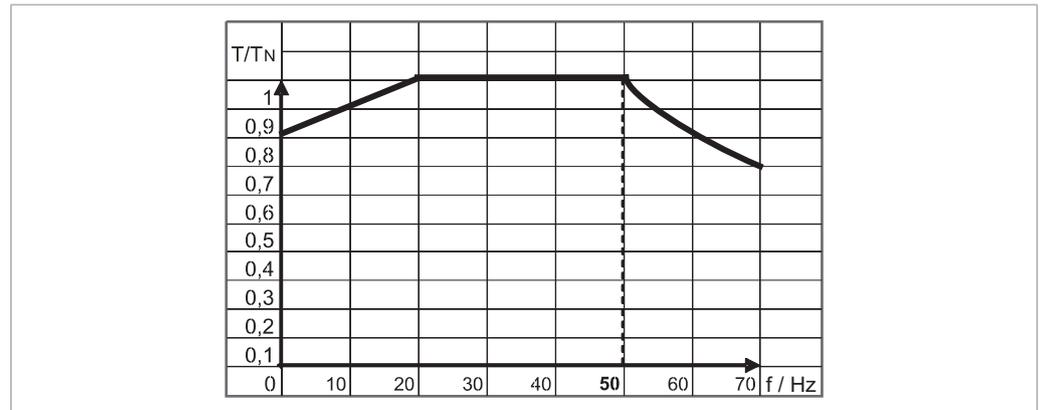


## Interroll Drum motor DM series

### Options and accessories

### Asynchronous drum motors with frequency inverters

Torque dependent on input frequency



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

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  $P = T \times \omega$ . With a reduced operating frequency of below 20/24 Hz, the motor torque is reduced by changing heat dissipation conditions. The power loss dissipation is a result of the oil quantity, in contrast to standard ventilated 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 with a quadratic function which is the result of the effect of the pull-out torque and the voltage. The output/frequency characteristics of most frequency inverters supplied with 3 x 400 V / 3 x 460 V can be parameterized to 400 V / 87 Hz in order to connect motors with 230 V / 50 Hz. This may create further losses in the motor and lead to its overheating if the motor is dimensioned 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 smooth running test quality (motor is running smoothly) and noise development are also affected positively by high frequencies.
- **Voltage increase:** Interroll motor windings are dimensioned 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 drum motors from Interroll run in an oil bath, the risk of overheating or damage of the motor due to large voltage increase rates is extremely low. Contact your local Interroll dealer about the need for motor chokes.

## Interroll Drum motor DM series

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### Options and accessories

- **Voltage:** If a frequency inverter with single-phase supply is installed at the drum motor, it must be ensured that the specified motor is dimensioned for the frequency inverter output voltage and is connected accordingly. Single-phase motors cannot be operated on the 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 they can reduce the rated output torque of the motor.

With 87-Hz technology, asynchronous motors can be operated up to a maximum frequency of 87 Hz. However, at 87 Hz the motor must not consume more power than specified on the type plate of the motor. 87-Hz technology requires a motor that has at least 75 % power reserves in 50-Hz operation. Caution should be exercised when using V/f-regulated inverters with frequencies below 20 Hz since doing so could result in overheating or power loss of the motor. For information about required power reserves, contact your local Interroll dealer. Synchronous motors can be operated with frequency inverters that are sold by Interroll between 7 Hz and 200 Hz.

- **Motor output:** Not all frequency inverters can operate 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 have to be adjusted to the respective motor. For frequency inverters sold by Interroll, startup instructions specifically created for drum motors for the respective frequency inverters can be supplied upon request.

## Interroll Drum motor DM series

### Options and accessories

#### Encoder type BMB-6202 & BMB-6205 SKF for the DM series

##### Manufacturer: SKF

The encoder consists of two components: a standard bearing with built-in magnetic encoder and a corresponding load resistance whose size varies depending on the operating voltage. The load resistance is not included.

The resolution INC is determined by the size of the bearing and, therefore, by the motor size.

The resolution INC in increments per drum revolution is calculated as follows:

$$\text{INC} = p \times \text{gear ratio (i)}$$

The gear ratio (i) is listed in the main catalog of drum motors or can be requested from Interroll.

p = number of encoder pulses per rotor revolution, selected based on the following table:

Encoder type	Bearing size	Drum motor size	Pulses per rotor revolution (p)
EB-6202-SKF- HTLOC-32-N-0,5	6202	DM 0080 – DM 0138	32
EB-6205-SKF- HTLOC-48-N-0,5	6205	DM 0165 – DM 0217	48

#### Technical data

Rated operating voltage	4.5 to 24 V DC
Max. rated output current	20 mA
Max. operating current	8 to 10 mA
Pulses per revolution (p)	32/48
High voltage	> 3.5 V
Low voltage	< 0.1 V

## Interroll Drum motor DM series

### Options and accessories

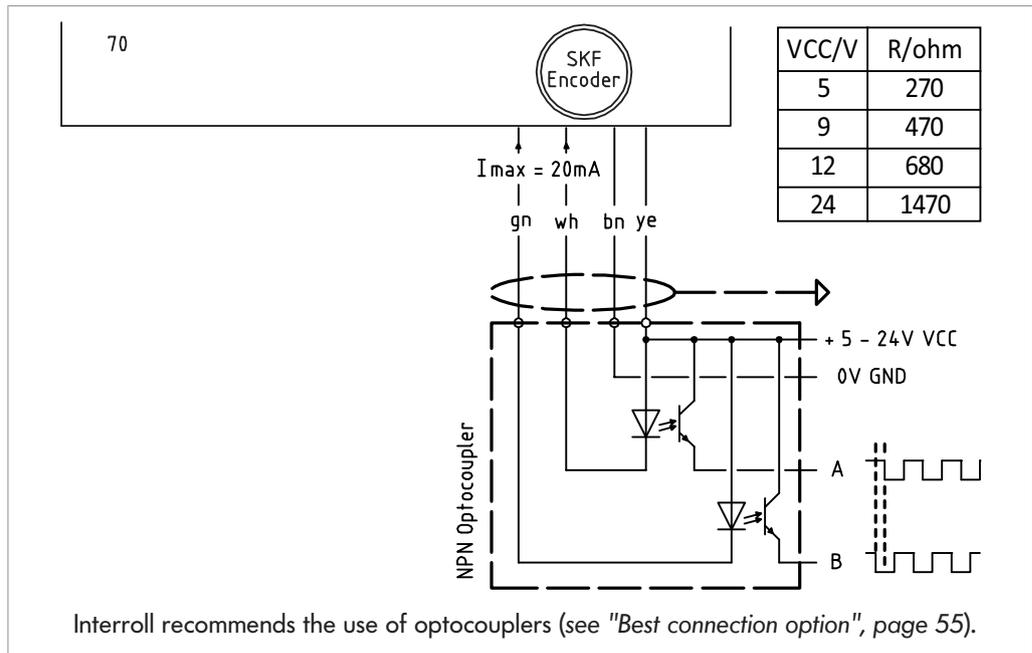
#### Connections

### NOTICE

#### Damage to encoder from excessive voltages/currents

- ▶ Ensure that the maximum switching current is always less than 20 mA.
- ▶ Do not operate the encoder with voltages above 24 V.

Abbreviations see "List of abbreviations", page 94



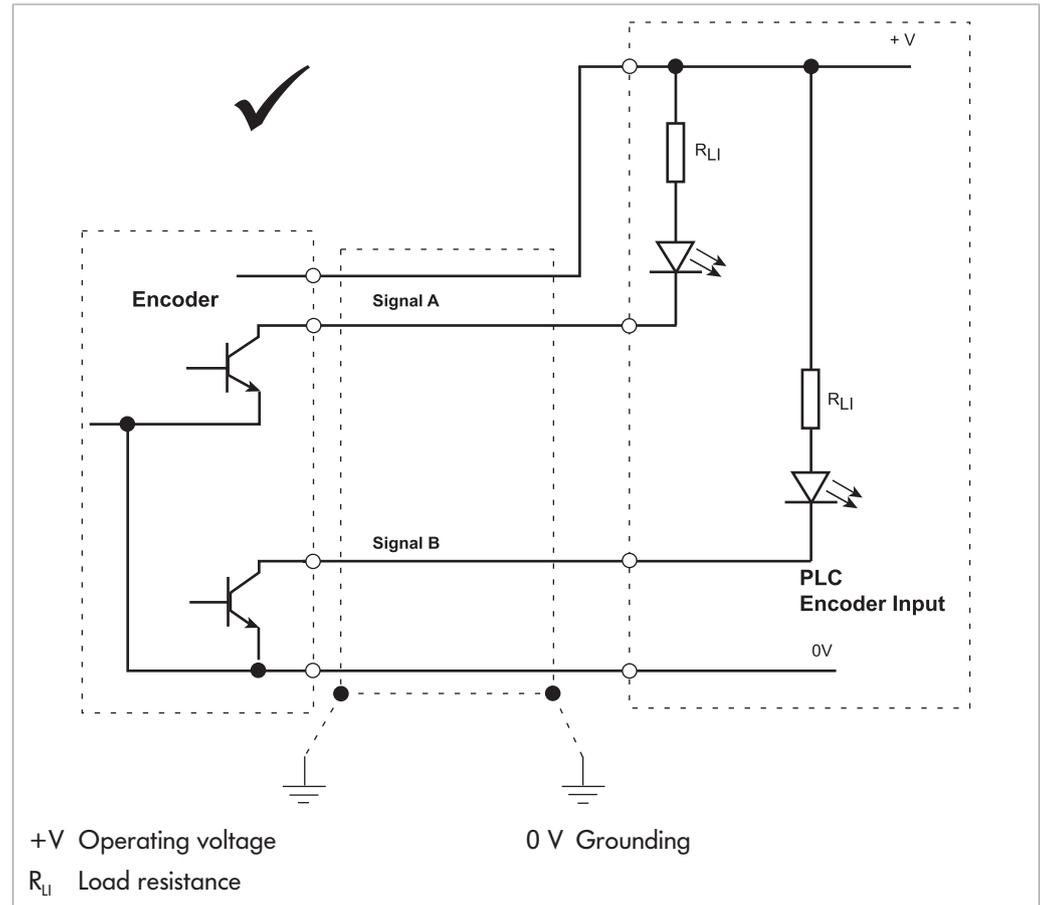
The signal sequence of A and B depends on the gear stages of the drum motor. For this reason, the direction of rotation varies for drum motors with identical number of poles and output, but different gear stages. In this case, the signal cables A and B can be swapped with each other.

## Interroll Drum motor DM series

### Options and accessories

#### Best connection option

#### Best connection option of an encoder with NPN open-collector output to an input device



#### Requirement:

- $R_L$  must be dimensioned for the specified output current range of the encoder.
- ▶ Connect the encoder to an interface, following the illustration above as best as possible. The integrated load resistance  $R_L$  is generally dimensioned for a load current range of 15 mA so that no overload occurs at the encoder output. The signal level of some input devices can be set to NPN or PNP via the hardware or via the software. In this case, NPN is required.
- ▶ If this is not possible, use a signal coupler. The function of a signal coupler is shown in the illustration above. The following can be used:

WAGO	Electronics terminal with optocoupler	Reference no. 859-758
PHOENIX	Input optocoupler	Type: DEK-OE-24DC/24DC/100kHz
WEIDMUELLER	Optocoupler Waveseries	Type: MOS 12-28VDC 100kHz



## Interroll Drum motor DM series

### Options and accessories

#### Encoder type RM44-RLS for the DM series

##### Output: Incremental, RS422A 5 V, push-pull, 24 V

The resolution INC in increments per drum revolution is calculated as follows:

$$INC = p \times i$$

p = number of encoder pulses per rotor revolution

i = gear ratio of drum motor

#### Technical data

	RS422A 5 V	Push-pull 24 V
Supply voltage	5 V $\pm$ 5 %	8 - 26 V
Power supply	35 mA	50 mA at 24 V
Resolution p (pulses per revolution)	1024, 512, 256, 128, 64, 32 <sup>1)</sup>	1024, 512, 256, 128, 32 <sup>1)</sup>
Output signal (RS422A)	A/ $\bar{A}$ , B/ $\bar{B}$ , Z/ $\bar{Z}$	A/ $\bar{A}$ , B/ $\bar{B}$ , Z/ $\bar{Z}$
Max. signal transmission	50 m	20 m
Accuracy <sup>2)</sup>	$\pm$ 0.5°	$\pm$ 0.5°
Hysteresis	0.18°	0.18°

<sup>1)</sup> Additional resolutions upon request. Please contact Interroll.

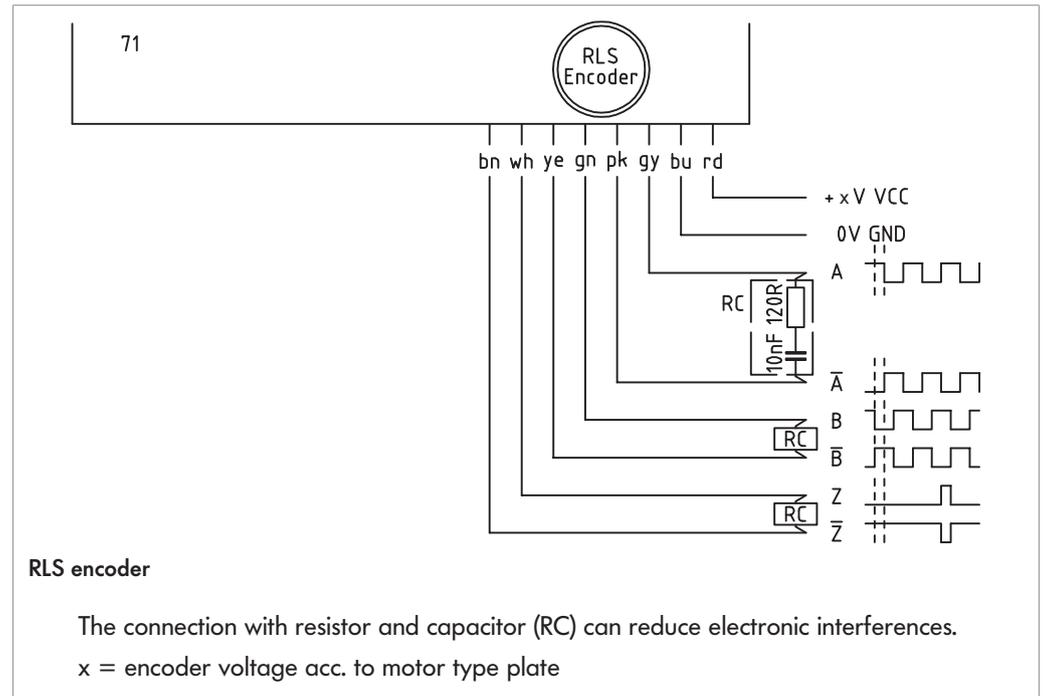
<sup>2)</sup> Worst-case scenario within operating parameters, including magnet position and temperature.

## Interroll Drum motor DM series

### Options and accessories

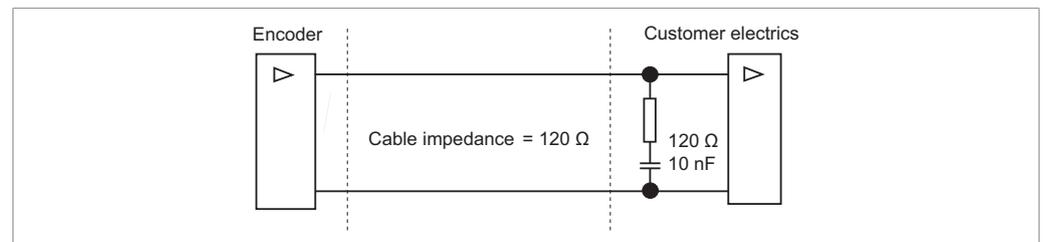
#### Connections

Abbreviations see "List of abbreviations", page 94



The signal sequence of A and  $\bar{A}$ , and B and  $\bar{B}$ , depends on the gear stages of the drum motor. For this reason, the rotational direction varies for drum motors with identical number of poles and output, but different gear stages. In this case, the signal cables A and  $\bar{A}$ , and B and  $\bar{B}$  can be swapped with each other.

#### Signal connection



## Interroll Drum motor DM series

### Options and accessories

#### Resolver type RE-15-1-LTN

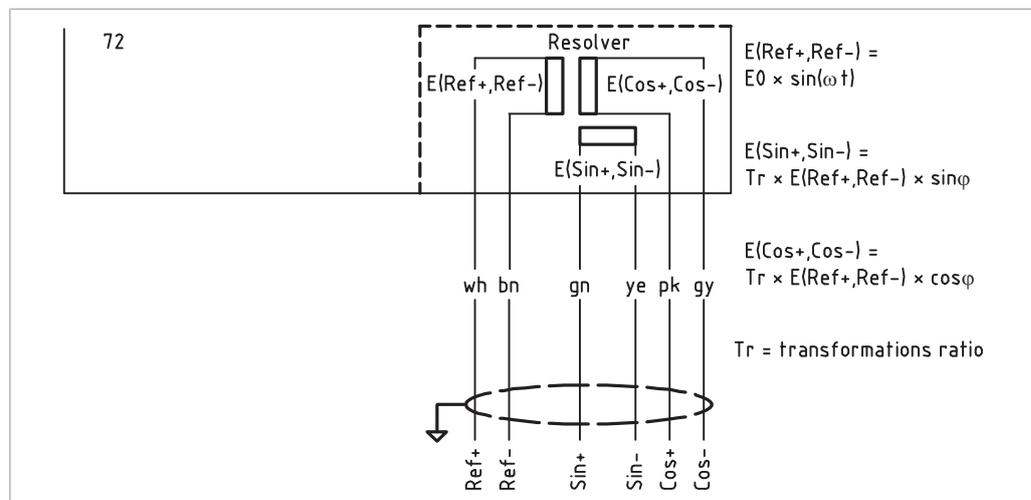
A resolver is an inductive, robust feedback system. It is integrated in the drum motor and is used primarily in servo systems.

#### Technical data

Input frequency	5 kHz	10 kHz
Input voltage	7 V <sub>rms</sub>	
Input current	58 mA	36 mA
Phase shift (± 3°)	8°	-6°
Zero voltage	max. 30 mV	
Accuracy	± 10', ± 6' upon request	
Harmonic	max. 1'	
Operating temperature	-55 °C to +155 °C	
Max. permissible speed	20,000 1/min	
Rotor weight	25 g	
Stator weight	60 g	
Rotor moment of inertia	0.02 kgcm <sup>2</sup>	
Hi-Pot housing/winding	min. 500 V	
Hi-Pot winding/winding	min. 250 V	
Stator length	16.1 mm	

#### Connections

Abbreviations see "List of abbreviations", page 94



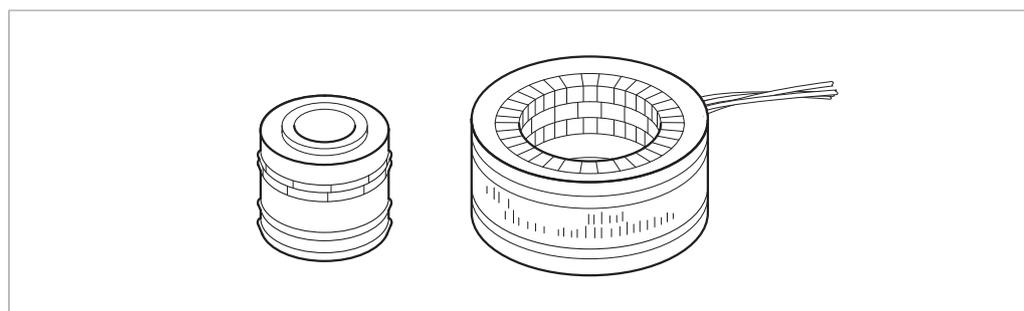
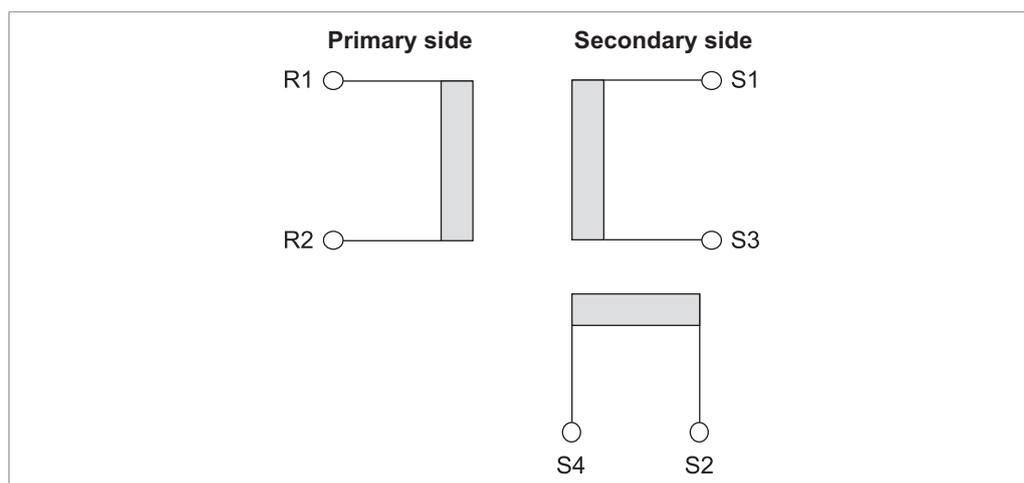
Connection	Ref+ to Ref-	Cos+ to Cos-	Sin+ to Sin-
Resistance	40 Ω	102 Ω	102 Ω

## Interroll Drum motor DM series

### Options and accessories

#### Impedance

Input frequency	5 kHz	10 kHz
$Z_{ro}$ in $\Omega$	75j 98	110j 159
$Z_{rs}$ in $\Omega$	70j 85	96j 150
$Z_{so}$ in $\Omega$	180j 230	245j 400
$Z_{ss}$ in $\Omega$	170j 200	216j 370



## Interroll Drum motor DM series

### Options and accessories

#### Encoder type Hiperface SKS36/SEK37 for the DM series

##### Manufacturer: SICK

Motor feedback systems with HIPERFACE are a mixture of incremental and absolute value encoders and combine the advantages of both encoder types. By using highly linear sine and cosine signals, the high resolution required for speed control is achieved through interpolation in the drive controller.

The resolution INC in increments per drum revolution is calculated as follows:

$$INC = p \times i$$

p = number of encoder pulses per rotor revolution

i = gear ratio of drum motor

#### Technical data

<b>SKS36</b>	
<b>Performance</b>	
Number of sine/cosine periods per revolution	128
Total increment count	4,096
Measuring increment	2.5 angular seconds for interpolation of sine/cosine signals, e.g. with 12 bit
Integral non-linearity, typically	± 80 angular seconds (error limits for evaluation of sine/cosine signals)
Differential non-linearity	± 40 angular seconds (non-linearity of a sine/cosine period)
<b>Interfaces</b>	
Code sequence	Increasing with clockwise rotation viewed from the cable side
Interface signals	Process data channel SIN, REFSIN, COS, REFCOS: analog, differential Parameter channel RS 485: digital

## Interroll Drum motor DM series

### Options and accessories

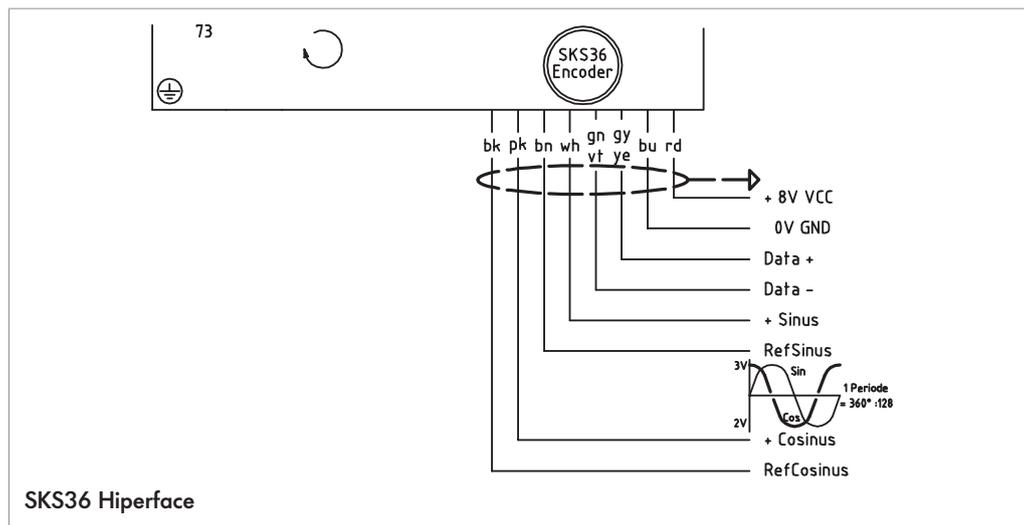
#### SKS36

#### Electrical data

Electrical interface	HIPERFACE
Operating voltage range/supply voltage	7 V DC – 12 V DC
Recommended supply voltage	8 V DC
Operating current without load	60 mA
Output frequency for sine/cosine signals	0 kHz – 65 kHz

### Connections

Abbreviations see "List of abbreviations", page 94



## 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 at the cable or at 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 DM series motors that are 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 a transport damage, immediately notify the carrier and Interroll to avoid losing any claims for compensation.

## Interroll Drum motor DM series

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### Transport and storage

#### 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.



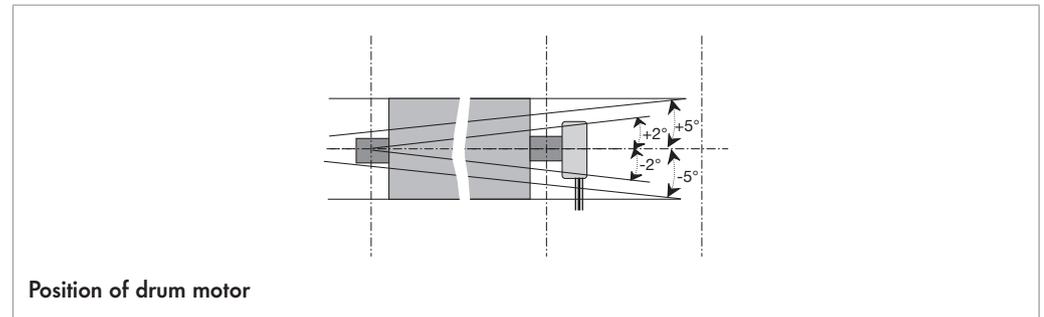
A special design must be used to install the drum motor in non-horizontal applications. The exact version must be specified when ordering. In case of doubt, contact Interroll.



The drum motor must be mounted horizontally with a clearance of  $\pm 5^\circ$ , unless specified otherwise in the order confirmation.

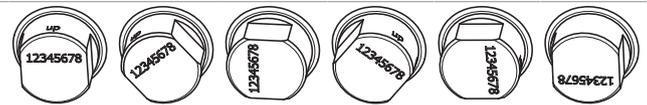
## Interroll Drum motor DM series

### Assembly and installation



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

The DM series 0080 to 0138 can be installed in any orientation.



Motor type/mounting position	0°	-45°	-90°	45°	90°	180°
DM 0080 ... DM 0138	✓	✓	✓	✓	✓	✓
DM 0165	✓	✓	✓	✓	✓	
DM 0217	✓	✓	✓	✓	✓	

#### Installing the motor with mounting brackets

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

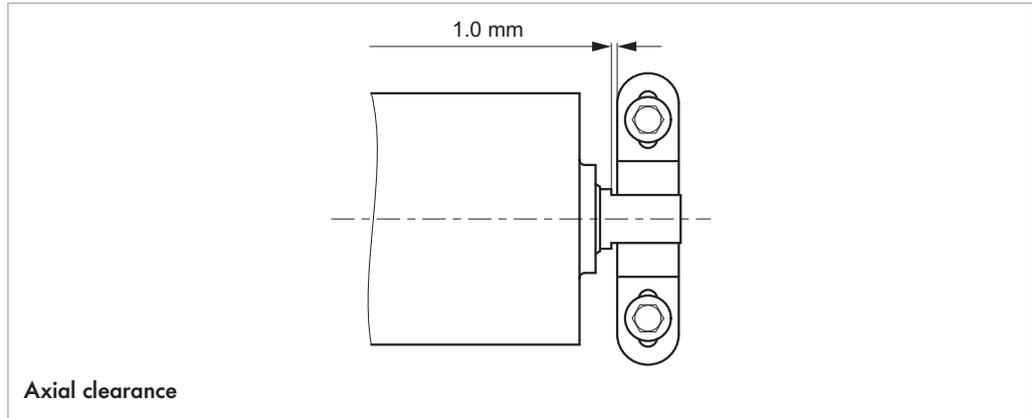
- ▶ Install the brackets at the conveyor or machine frame. Ensure that the drum motor is installed parallel to the idler pulley and at a right angle to the conveyor frame.
- ▶ Insert the shaft ends of the drum motor into the mounting brackets according to the "Mounting position" table (see above).
- ▶ 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.



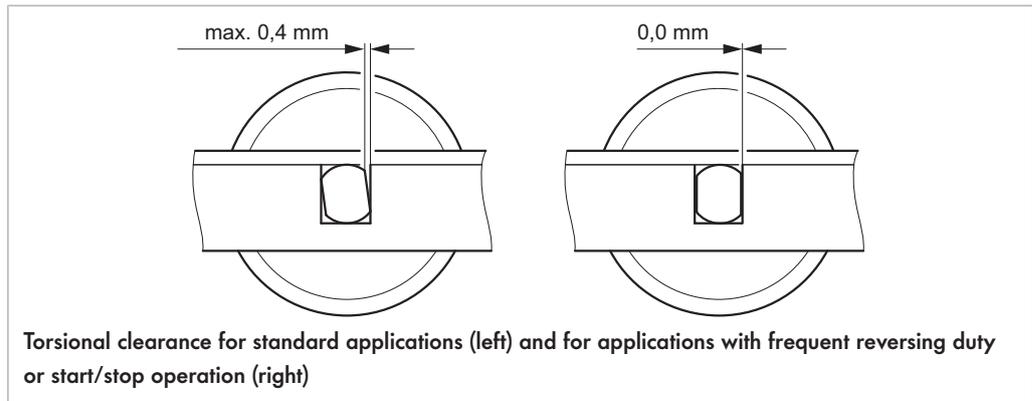
The drum motor can also be installed without mounting brackets. In this case, the shaft ends must be installed into corresponding recesses in the conveyor frame; these recesses must be reinforced in such a way that they meet the aforementioned requirements.

## Interroll Drum motor DM series

### Assembly and installation



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).



- ▶ 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.

## Interroll Drum motor DM series

### Assembly and installation

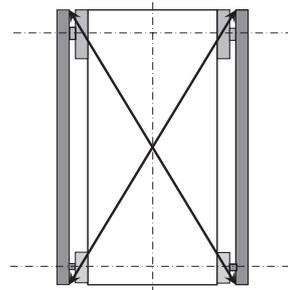
#### NOTICE

**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 %.

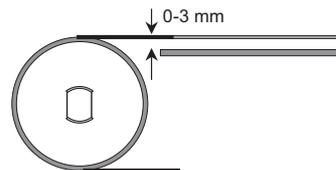


The idler pulley should be cylindrical since a camber in the idler pulley could work against the camber in the drum motor, thereby causing a belt migration.



Diagonal check

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



Belt position



## Interroll Drum motor DM series

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### Assembly and installation

#### 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.

## Interroll Drum motor DM series

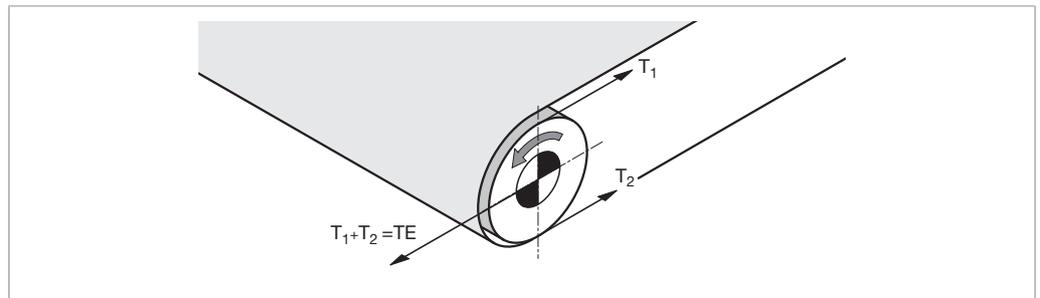
### Assembly and installation

#### 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.

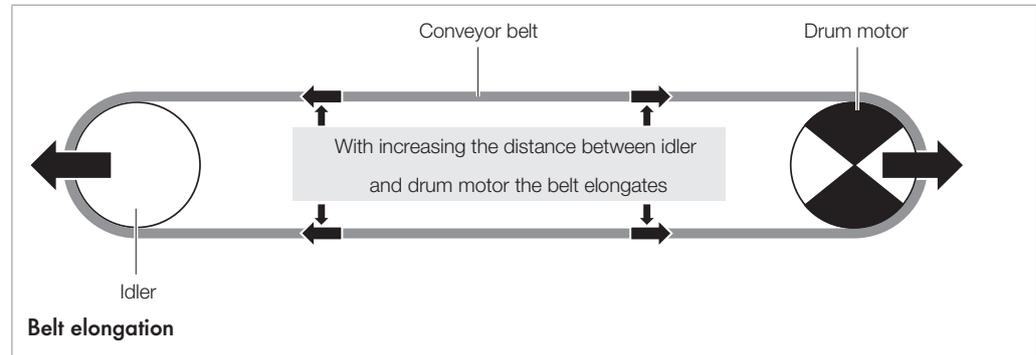
If the belt tension is too strong, it can damage the shaft bearings and/or other internal components of the drum motor and shorten the service life of the product.

#### 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.

## Interroll Drum motor DM series

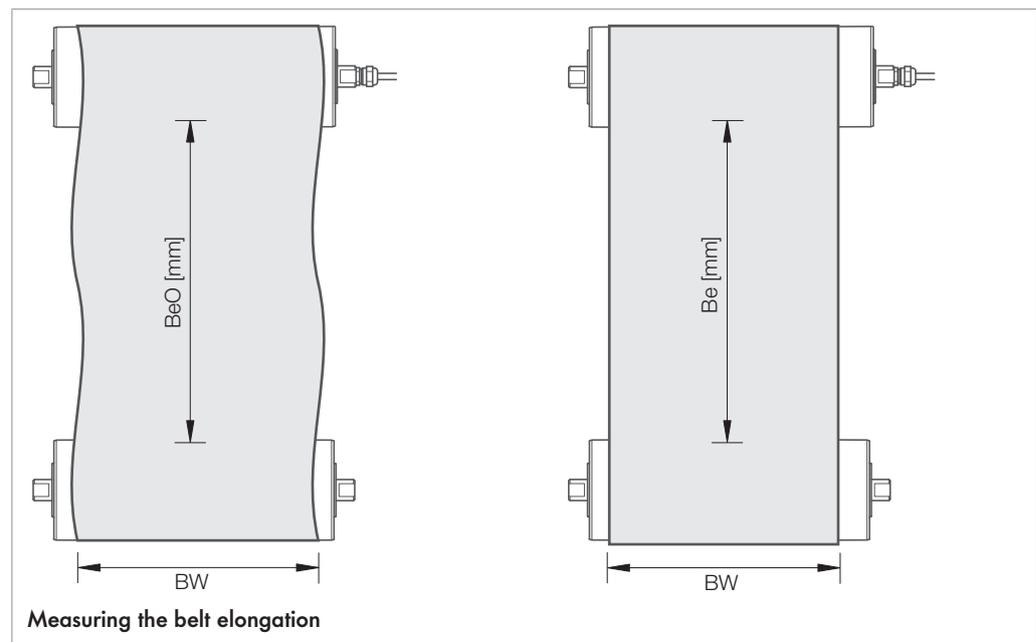
### Assembly and installation



#### 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.



## Interroll Drum motor DM series

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### Assembly and installation

#### 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

## Interroll Drum motor DM series

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### Assembly and installation

#### 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).

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### NOTICE

#### Damage to the belt

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

## Interroll Drum motor DM series

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### Assembly and installation

### Warning notices concerning the electrical installation

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#### **⚠ WARNING**

##### **Electrocution due to improper installation**

- ▶ All electrical work should 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 of the drum motor due to 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 lead to irreparable damages.
  - ▶ Do not connect drum motors of the synchronous DM series directly to the electrical supply system. Drum motors of the synchronous DM series must be operated via suitable frequency inverters or servo drive controllers.
- 

#### **Connecting the drum motor – with a cable**

##### **Electrical connection of the drum motor**

- ▶ 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 with the yellow-green cable.
  - ▶ Connect the drum motor according to the connection diagrams (see "*Connection diagrams of DM series asynchronous 1-phase*", page 19 or see "*Connection diagrams of DM series asynchronous 3-phase*", page 33 or see "*Connection diagrams of DM series synchronous*", page 43).
- 

#### **Connecting the drum motor – with a plug connection**

#### **NOTICE**

##### **Damage to the motor from incorrect connection**

- ▶ Use only original Interroll cables for plug connections.
  - ▶ Protect the socket in the motor and the cable plug against contamination.
- 
- ▶ Ensure that the supply voltage corresponds to the information on the motor type plate.
  - ▶ Remove dummy plug at the motor.
  - ▶ Install the plug connector in the motor according to the instructions in the cable manual.
  - ▶ Connect the drum motor according to the connection diagrams (connection diagrams of DM series asynchronous 3-phase see "*Connections with plug connection*", page 34 or connection diagrams of DM series synchronous see "*Connections with plug connection*", page 44).

## Interroll Drum motor DM series

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### Assembly and installation

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#### 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 DM series asynchronous 1-phase see "*Connections in the terminal box*", page 19 or connection diagrams of DM series asynchronous 3-phase see "*Connections in the terminal box*", page 35 or connection diagrams of DM series synchronous see "*Connections in the terminal box*", page 44).
  - ▶ Replace cover and seals. Tighten the screws of the cover with 1.5 Nm to ensure that the terminal box is tightly sealed.

#### Single-phase motor

If a starting torque of 100 % is required, single-phase drum motors should be connected to a starting capacitor and a run capacitor. An 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 DM series asynchronous 1-phase*", page 19).

#### External motor protection

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

Interroll synchronous motors may be operated only with frequency inverters that feature a control suitable for permanent magnet synchronous motors (PMSM).

The rated current must not be exceeded during continuous operation.

Basic thermal motor protection is provided by the integrated thermal circuit breaker, which must be analyzed by the inverter or the control.

For dynamic applications that cause the rated current to be briefly exceeded, additional protective functions, such as I<sup>2</sup>t motor protection and minimum speed monitoring, must be enabled. However, maximum values for current and torque must not be exceeded at any time. Complete overload protection of the motor only exists if the aforementioned protective functions in the frequency inverter or control are enabled in addition to analysis of the thermal circuit breaker. For correct parameterization, Interroll recommends contacting the manufacturer of the frequency inverter or control.

## Interroll Drum motor DM series

### Assembly and installation

The following parameters apply to the synchronous motor installed in Interroll applications (BM8465, BM8460, BM8461):

- Thermal circuit breaker: Enabled
- Blocking protection: Enabled via minimum speed monitoring
- $I^2t$ : 25 A<sup>2</sup>s (400 V)
- $I^2t$ : 75 A<sup>2</sup>s (230 V)

$P_N$	$U_N$	$I_N$	$I_0$	$I_{max}$	$\eta$	$J_R$	$M_N$	$M_0$	$M_{max}$	$R_M$	$L_{sd}$	$L_{sq}$	$K_e$	$T_e$	$k_{TN}$	$U_{SH}$
W	V	A	A	A		kgcm <sup>2</sup>	Nm	Nm	Nm	$\Omega$	mH	mH	V/krpm	ms	Nm/A	V
425	400	1.32	1.32	3.96	0.86	0.42	1.35	1.35	4.05	17.60	49.80	59.00	80.80	6.70	1.02	33
425	230	2.30	2.30	6.90	0.87	0.42	1.35	1.35	4.05	5.66	16.26	19.42	45.81	6.86	0.59	19

#### 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.

## Interroll Drum motor DM series

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### Assembly and installation

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 they 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.

#### Backstop

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### NOTICE

#### Damage to the drum motor with backstop due to incorrect connection of the rotational direction

- ▶ Check the rotating field before connecting the drum motor.
- ▶ Connect the drum motor according to the connection diagrams (see the chapter "Connection diagrams" for the corresponding series). An arrow on the type plate of the drum motor shows the correct rotational direction.

#### Electromagnetic brake

The drum motor is delivered with an installed electromagnetic brake (if it does not feature a 24V DC brake). The rectifier is an accessory part and must be ordered separately from the motor.

- ▶ Connect the rectifier and the brake according to the connection diagrams (see "Connection diagrams of DM series asynchronous 3-phase", page 33).



The rectifier has an AC input and a DC output to the brake winding.

## Interroll Drum motor DM series

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### Assembly and installation

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#### **DANGER**

##### **Risk of injuries when used as safety brake**

When large loads are being held, the motor can unexpectedly rotate in the opposite direction. As a result, loads may fall down and hit or fatally injure persons.

- ▶ Do not use the electromagnetic brake as safety brake.
  - ▶ If a safety brake is required, install a suitable additional safety brake system.
- 

#### **NOTICE**

##### **Damage of the drum motor and the brake if both are operated simultaneously**

- ▶ Route the control circuits in such a way that motor and brake do not work against each other.
  - ▶ Consider the response time for applying and releasing the brake (depending on temperature and oil viscosity, it can amount to 0.4 to 0.6 seconds).
  - ▶ Apply the brake only after the current supply to the motor has been switched off.
  - ▶ Start the motor only after the brake has been released.
- 

#### **NOTICE**

##### **Damage of the drum motor due to insufficient holding torque of the brake**

The holding torque of the brake can be too small for the rated torque of some motors.

- ▶ Ensure that the holding torque of the brake is sufficient. Contact Interroll for the required holding torque.
- 

The cable should be as short as possible, and the cable cross section should correspond to the national/international regulations so that the voltage supply at the rectifier does not deviate from the correct rated voltage by more than  $\pm 2\%$ .



If the drum motor with electromagnetic brake is used at an ambient temperature below  $+5\text{ }^{\circ}\text{C}$ , a special oil must be used. In case of doubt, contact Interroll.

The electromagnetic brake is a pure holding brake and should not be used for positioning or braking the motor. Positioning applications should be implemented with a frequency inverter in conjunction with an encoder integrated in the motor. Braking applications should be implemented with a frequency inverter.

### 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.

## Interroll Drum motor DM series

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### Initial startup and operation

### Operation

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#### 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 in reversing operation

- ▶ Ensure that a time delay is in place between forward and reversing movement. Before reversing, the motor must come to a complete standstill.
- 



If exact speeds are required, a frequency inverter and/or encoder may have to be used. The specified rated speeds of the motor can deviate by  $\pm 10\%$ . The belt speed indicated on the type plate is the calculated speed at the drum diameter under full load, rated voltage and rated frequency.

##### Checks before every startup

- ▶ Check the drum motor for visible damage.
- ▶ 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.
- ▶ Check all safety devices.
- ▶ Ensure that no bystanders are in dangerous areas around the conveyor.
- ▶ Clearly specify and monitor the way materials are placed on the conveyor.

##### Procedure in case of accident or fault

- ▶ Stop the drum motor at once and ensure that it cannot be started accidentally.
- ▶ In case of an accident: Provide first aid and make an emergency call.
- ▶ Inform the responsible person.
- ▶ Have the malfunction repaired by qualified persons.
- ▶ Start the drum motor only after this has been approved by qualified persons.

## Maintenance and cleaning

### Warning notices concerning maintenance and cleaning

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#### **⚠ 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.

## Interroll Drum motor DM series

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### Maintenance and cleaning

#### Oil change at drum motor

An oil change is not required, but can be performed for special reasons.

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#### **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 93).
  - ▶ Fill the drum motor with new oil (oil type and quantity according to the type plate).

## Interroll Drum motor DM series

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### Maintenance and cleaning

#### 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 pressure washer

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

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### 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.
- ▶ Perform the pressure washing of 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 +PTFE IP69K	80 °C	80 bar	for wet and food grade applications

## Interroll Drum motor DM series

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### Maintenance and cleaning

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#### 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](http://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 is 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.
	Brake is not triggered	Check whether the brake works during start-up. During the brake release, the clicking noise of the brake in the motor can generally be heard. It must then be possible to turn the drum tube manually. Depending on the gear ratio, the motors can be turned more easily or with more difficulty. Check connections and continuity of the brake winding. If connections and brake winding are OK, check the rectifiers.
Incorrect rotation of backstop	Immediately switch off the current supply and turn drum shell by hand to determine whether the backstop is already mechanically damaged. Check whether there is a clockwise rotating field at the connection. For clockwise free rotation, ensure that the feed lines match the connection diagram. For counterclockwise free rotation, swap the feed lines L1 and L2.	

## Interroll Drum motor DM series

### Troubleshooting

Fault	Possible cause	Remedy
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 the 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.

## Interroll Drum motor DM series

### 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	Check whether the number of stops/starts corresponds to the specifications of the drum motor and reduce this number, if necessary. Install a frequency inverter to optimize the motor output. For 1-phase and 3-phase DM series asynchronous motors, the start and stop ramps must be more than 0.5 seconds. Ramps can be set with a frequency inverter. For shorter ramps, a DM series synchronous motor must be used. Contact the local Interroll dealer.
	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.
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 position for that serial number.
	An outer conductor failed	Check connection, check power supply.

## Interroll Drum motor DM series

### Troubleshooting

Fault	Possible cause	Remedy
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.
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.

## Interroll Drum motor DM series

### Troubleshooting

Fault	Possible cause	Remedy
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.
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.

## Interroll Drum motor DM series

### Troubleshooting

<b>Fault</b>	<b>Possible cause</b>	<b>Remedy</b>
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 too high between belt and bracket/gliding plate	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.
Belt skips on drum motor	Belt blocked or material deposits on the drum shells	Ensure that belt and drum shell are not blocked and that all rollers and drum shells can turn freely.
	Poor or damaged belt connection	Check belt connection. Ensure that the motor pulls the belt and does not push it.
	Friction too high between belt and gliding plate	
Belt skips on drum motor	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".

## Interroll Drum motor DM series

### Troubleshooting

Fault	Possible cause	Remedy
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 materials 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.
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.
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.

## Interroll Drum motor DM series

### Troubleshooting

Fault	Possible cause	Remedy
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 (see "Oil change at drum motor", page 81).
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.
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°, check motor specifications of drum motor.
	Load or incorrect adjustment of shaft	Check whether screws have been overtightened 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	Excessive or frequent stops/starts, very high starting 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. Use frequency inverter with start-and-stop ramps (0.5 s or more).

## Interroll Drum motor DM series

### Troubleshooting

Fault	Possible cause	Remedy
Toothed sprocket worn or teeth/bolts broken off	Start-up under overload and/or impact load or while blocked	Check whether the application and load meet the specifications of the drum motor. Check whether start-up is blocked. Use frequency inverter with start-and-stop ramps (0.5 s or more).
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. Use frequency inverter with start-and-stop ramps (0.5 s or more).
Complete or temporary failure of brake and rectifier	Incorrect operating voltage applied	Ensure that the correct rectifier was installed and that the correct input voltage (V/Ph/Hz) exists.
	Incorrect connection	Never connect the rectifier to the frequency inverter. Ensure that the brake was connected according to the connection diagram.
	Insufficient shielding against external voltage spikes from cables and external devices	Ensure that all cables between brake, rectifier and voltage supply are shielded and grounded according to IEC recommendations.
Complete or temporary failure of brake and rectifier	Voltage drop due to cable with excessive length	Check whether a voltage drop occurs in long cables and ensure that the cable cross-section meets the IEC specifications.
	Excessive stops/starts	Ensure that the specifications for brake and rectifier meet the requirements of the application.
	Incorrect rectifier connected	Contact Interroll. We will provide you with the name of the correct rectifier for the corresponding brake and application.
	Excessive voltage/energy feedback when motor star point rectifier is connected	Conveyor belts with an incline can produce an overload of the motor and cause an energy feedback when motor star point voltage is applied.
	Short circuit of brake winding	Check continuity of winding and rectifier.
Slow switching of brake and rectifier	Incorrect brake/incorrect rectifier selected or specified	Ensure that the specifications for brake and rectifier meet the requirements of the application.
	Low ambient temperature or excessive oil viscosity	Ensure that the oil viscosity is suitable for the ambient temperature. If not, fill in new oil with the correct viscosity. Install a heater or a more powerful motor. In that case, contact the local Interroll dealer.
Encoder (temporarily) not working	Incorrect connection or loose/defective cable connection	Check connection diagram and determine whether cables are defective or connections are loose.
	Failure of electronic backfeed system	Troubleshooting should be performed only by an electrician.
	Error or failure of encoder	Troubleshooting should be performed only by an electrician.
	Error at PC or drive	Troubleshooting should be performed only by an electrician.

### 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

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



For the plug variant, the pressing screw is marked on 3 of the 6 wrench flats.

### 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 $\varphi$	Power factor
$\eta$	Efficiency
$J_R$ in kgcm <sup>2</sup>	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 $\Omega$	Phase resistance in ohms
$R_A$ in $\Omega$	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
$U_{SH \text{ delta}}$ in V	Standstill heating voltage in delta connection in volts
$U_{SH \text{ star}}$ 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 $\mu\text{F}$	Run capacitor (1~) / Steinmetz capacitor (3~) in microfarad

## Interroll Drum motor DM series

### 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



## Interroll Drum motor DM series

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### Appendix

#### Color coding

Color coding of cables in the connection diagrams:

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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			

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## Interroll Drum motor DM series

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### 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

- Drum motor DM series

is not a ready-to-use machine as defined by the EC Machinery Directive, but it complies with the following requirements according to Appendix I of this 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.



## Interroll Drum motor DM series

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### Appendix

Person authorized to prepare the technical documents:

Holger Hoefler, 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 - April 21, 2015

Dr. Hauke Tiedemann  
(Managing Director)

(This installation declaration can be obtained at [www.interroll.com](http://www.interroll.com), if needed.)



## Interroll Drum motor DM series

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