SEW EURODRIVE

Addendum to the Operating Instructions

EDRN71 – 160 Motors of Category 3 and EPL .c with VFCe Operating Data

Edition 02/2023

27806413/EN

Table of Contents

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1 General information

1.1 How to use this documentation

The documentation is an integral part of the product and contains important information on operation and service. The documentation is intended for all employees who perform assembly, installation, startup and service work on the product.

The documentation must be accessible and legible. Make sure that persons responsible for the system and its operation, as well as persons who work independently on the unit, have read through the documentation carefully and understood it. If you are unclear about any information or if you require further information, contact SEW-EURODRIVE.

This addendum to the operating instructions is only to be used in conjunction with the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX", or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx" and the documentation of the inverter in use.

1.2 Structure of the safety notes

1.2.1 Meaning of signal words

The following table shows the graduation and meaning of the signal words for safety notes.

Signal word	Meaning	Consequences if disregarded
⚠ **DANGER**	Imminent hazard	Severe or fatal injuries
⚠ **WARNING**	Possible dangerous situation	Severe or fatal injuries
⚠ **CAUTION**	Possible dangerous situation	Minor injuries
NOTICE	Possible damage to property	Damage to the product or its environment
INFORMATION ON EXPLOSION PROTECTION	Important information about explosion protection	
INFORMATION	Useful information or tip: Simplifies handling of the product.	

1.2.2 Structure of section-related safety notes

Section-related safety notes do not apply to a specific action but to several actions pertaining to one subject. The hazard symbols used either indicate a general hazard or a specific hazard.

This is the formal structure of a safety note for a specific section:

SIGNAL WORD

Type and source of hazard.

Possible consequence(s) if disregarded.

- Measure(s) to prevent the hazard.

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Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard

1.2.3 Structure of embedded safety notes

Embedded safety notes are directly integrated into the instructions just before the description of the dangerous action.

This is the formal structure of an embedded safety note:

⚠ **SIGNAL WORD!** Type and source of hazard. Possible consequence(s) if disregarded. Measure(s) to prevent the hazard.

1.3 Rights to claim under limited warranty

Read the information in this documentation. This is essential for fault-free operation and fulfillment of any rights to claim under limited warranty. Read the documentation before you start working with the product.

1.4 Product names and trademarks

The brands and product names in this documentation are trademarks or registered trademarks of their respective titleholders.

1.5 Copyright notice

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2 Safety notes

2.1 Other applicable documentation

You may only use this addendum to the operating instructions in conjunction with the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX", or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx" and the documentation of the inverter in use.

Read the safety notes in the above mentioned operating instructions before you start working.

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3 System description

3.1 EDRN.. motors

The explosion-protected motors of the EDRN... series, in combination with a high-resolution sine/cosine encoder (e.g. EK8S) and a voltage-controlled frequency inverter that has a field-oriented control method, achieve a larger control range and higher overload dynamics.

These two characteristics are indicated on the nameplate of the frequency inverter by the lettering "VFCe" (Voltage Flux Control extended).

The motors are available in 3G, 3D and 3GD designs for all countries requiring the ATEX design, or in 3G-c, 3D-c and 3GD-c designs for the international market.

The motor design with VFCe operating data is only available with speed feedback via an encoder.

3.2 Setting range

The minimum frequency of EDRN.. motors with VFC operating data is 5 Hz.

For EDRN.. motors with VFCe operating data, the setting range in the lower speed range is extended to speed 0.

The motors with a nominal frequency of 50 Hz can be run with both the 50 Hz and 87 Hz characteristic curve, and the motors with a nominal frequency of 60 Hz can be run with the 60 Hz and/or 104 Hz characteristic curve.

The upper limit of the maximum permitted motor speed depends on the connection type and the motor size.

Operating data	Minimum frequency	Maximum frequency
VFC	5 Hz	120 Hz (up to 0.55 kW)
VFCe	0.3 Hz	100 Hz (from 0.75 kW)

For the precise values, refer to the chapter "Technical data" (→ 🗎 33).

3.3 Dynamics

The maximum torque of EDRN.. motors with VFC operating data is limited by the maximum motor current of 150% I_N.

EDRN.. motors with VFCe operating data have different maximum motor torques depending on the design.

Design	VFCe operating data M_{max}/M_N	VFC operating data I_{max}/I_N
3G(-c) and 3GD(-c)	160 to 190%	150%
3D(-c)	240 to 380%	

For the precise values, refer to the chapter "Technical data" (→ 🗎 33).

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3.4 Frequency inverters

3.4.1 SEW frequency inverters

EDRN.. motors with extended positioning range and higher overload capacity can generally be operated with a MOVIDRIVE® application inverter from the MOVI-C® modular automation system as well as with MOVIDRIVE® B. When using MOVIDRIVE®, select the "VFCplus" operating mode. For MOVIDRIVE® B, select the "VFC & n-control" operating mode.

MOVITRAC® advanced can only be used in combination with an EDRN.. motor with HTL encoder.

The power of the frequency inverter is determined by the current required to provide the maximum motor torque. The data needed for selecting the optimum inverter power is based on the project planning of the drive.

For more information on possible assignments of motor and inverter, refer to chapter "Project planning" (→ 🗎 15).

3.4.2 Third-party inverter

The following conditions must be met when using a third-party inverter:

- Utilizing a DC link inverter with a voltage-controlled, field-oriented control mode
- Constant magnetic flux in the basic setting range
- PWM frequency at least 3 kHz
- Speed limit for limiting the maximum permitted speed of the drive train
- Torque interface or current limit for limiting the motor torque
- Encoder evaluation for evaluating the motor encoder

The setting of the frequency inverter must ensure at all times that the approved motor current is not exceeded.

The dynamics of the system depends on the selected frequency inverter.

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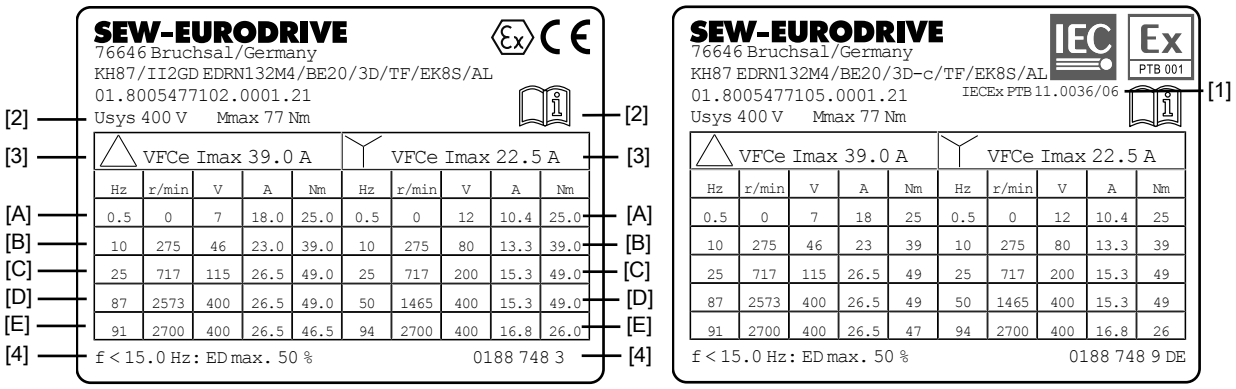
3.5 Additional nameplate of EDRN.. motors for frequency inverter operation

The following figure shows an example of the additional nameplate of an EDRN.. motor in 3D or 3D-c design for frequency inverter operation (FI additional nameplate in short) with VFCe operating data:



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Line	Specification
[1]	Certificate of Conformity (IECEx CoC) for frequency inverter operation
[2]	Connection type, operating mode of the inverter with VFCe Operating data and maximum permitted peak current
[3]	System voltage – line voltage of the frequency inverter Min. permitted torque of the motor Note to observe the operating instructions
[A]	The additional frequency inverter nameplate lists the thermal limit characteristic curve of the motor in a table (point A to E) taking account of voltage and frequency, see chapter "Limit characteristic curves of EDRS and EDRE motors in inverter operation". The minimum and maximum frequency can deviate depending on the option.
[B]	
[C]	
[D]	
[E]	
[4]	Maximum permitted duty cycle of the brakemotor in the reduced speed/frequency range

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4 Motor structure

For the structure of the motors, refer to the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX" or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx".

INFORMATION

EDRN.. motors with VFCe operating mode are always equipped with an encoder.

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5 Mechanical installation

For information on mechanical installation, refer to the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX" or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx".

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6 Electrical installation

For information on electrical installation, refer to the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX", or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx" and the documentation of the inverter in use.

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7 Operating modes and limit values

For information on operating modes and limit values, refer to the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX" or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx".

7.1 Permitted operating modes and protection concept for cat. 3 and EPL .c motors

Design	Duty types acc. to nameplate	Additional nameplate	Permitted operating modes	Protection against excessive heating	Identification on the nameplate
3G(-c) 3D(-c) 3GD(-c)	S1	VFCe	Inverter operation	PTC thermistor /TF[1)]	Additional nameplate: Indicates the permitted continuous currents depending on the frequency as well as I_{max} and M_{max}

1) The catalog designation for PTC thermistors is "/TF". Monitoring of the PTC thermistor by a thermistor "monitoring device for the protection of explosion-protected drives" (e.g. Directive 2014/34/EU).

INFORMATION

All motors must be protected from impermissible heating according to EN/IEC 60079-14. Safety equipment required for safe operation is affected by these standards and must be certified for this reason.

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8 Project planning

Project planning is the basic requirement for safe operation of explosion-protected motors. For information on the project planning, refer to the catalogs "Explosion-Protected AC Motors EDRN63 – EDRN315 ATEX and IECEx" and "Explosion-Protected Drives".

8.1 Additional documentation

In addition to the information in this publication, SEW-EURODRIVE offers extensive documentation covering the entire topic of electrical drive engineering. These are mainly the publications of the "Drive Engineering – Practical Implementation" series as well as the manuals and catalogs for electronically controlled drives.

You will find additional links to a wide selection of our documentation in many languages for download on the SEW-EURODRIVE homepage (http://www.sew-eurodrive.com). The list below includes other documents that are of interest in terms of project planning. You can order these publications from SEW-EURODRIVE.

8.1.1 Technical data for motors and gear units

The following publications are available from SEW-EURODRIVE in addition to the present documentation:

- "Explosion-Protected AC Motors" catalog
- "Explosion-Protected Drives" catalog

8.1.2 Electronics documentation

- MOVIDRIVE® system manual
- MOVIDRIVE® MDX60/61B system manual
- Documentation of third-party inverters used

8.1.3 Mechanical brakes

- "DR.., DRN.., DR2.., EDR.., EDRN.. AC Motors, Project Planning of Brake BE.., Standard Brake/Safety Brake" manual

8.2 Motor/inverter characteristic curves

The maximum permitted dynamic limit torque of the motor can be found in the technical data, see chapter "Technical data" (→ 🗎 33).

Possible assignment of motors and inverters can be found in the motor/inverter characteristic tool.

You can find the tool on the SEW-EURODRIVE homepage under "Online support" -> Engineering & selection -> Motor/inverter characteristics.

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8.3 Thermal limit characteristic curve of EDRN.. motors

If EDRN.. motors are operated with inverter, the thermally permitted torque must be observed during drive project planning.

The thermally permitted torque depends on the following factors:

- Motor size
- Type of cooling – Self-cooling or forced cooling fan
- Base frequency: f_{base} = 50 Hz (400 V ⅄) or f_{base} = 87 Hz (230 V △)
- Motor terminal voltage

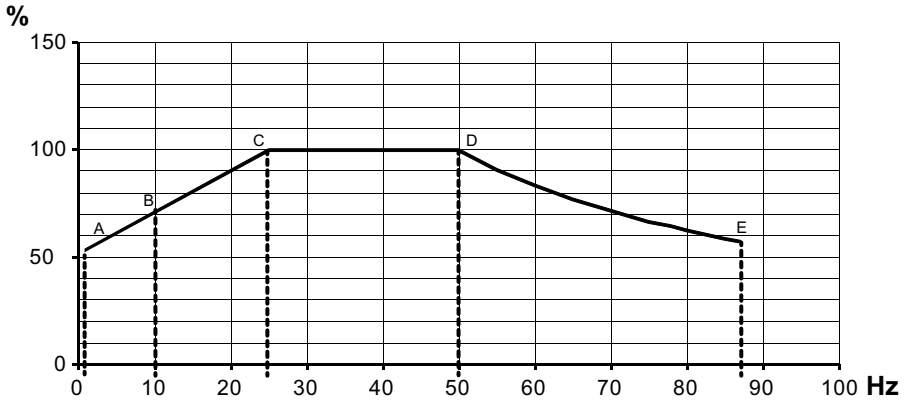
The effective operating point resulting from the travel cycle must lie below the thermal limit characteristic curve. It comprises the effective torque and the mean rotational speed.

8.3.1 Thermal limit characteristic curve

Points A to E describe the motor torque curve in the ideal case where the motor terminal voltage corresponds to the rated motor voltage.

Points A, B and C define the "reduced" torque in the lower speed range caused by the reduced motor cooling. These values are independent of the voltage.

Points D to E describe the curve of the torque characteristic in the field weakening. Field weakening begins at point D. Point E is the permitted thermal torque at limit speed. Both points depend on the voltage and must be calculated when configuring the motor.



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The ideal case described above does not occur in reality because drive components such as inverters, filters, and cables are subject to voltage losses. To avoid having to configure the voltage-dependent part of the characteristic curve (points D and E) for each motor, the "typical application case" is defined for explosion-protected motors according to ATEX and IECEx.

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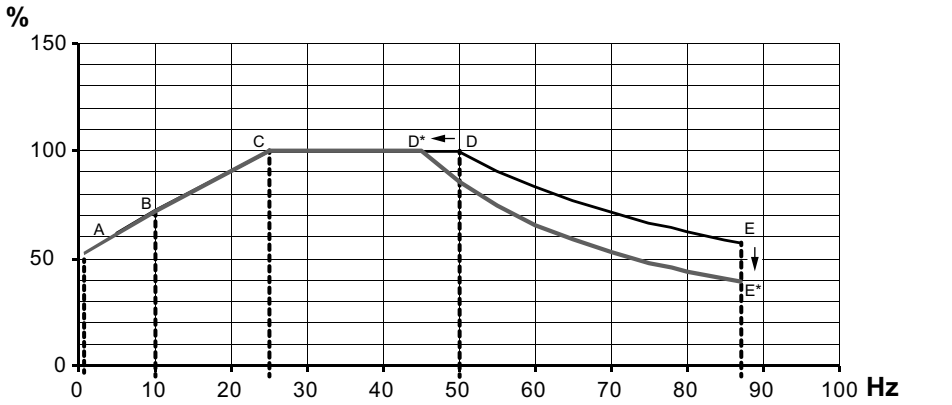
Points A, B, C, D* and E* describe the motor torque curve for a typical application case. This case is distinguished by the fact that not the entire supply voltage is available at the motor terminal board due to the voltage drop in the inverter and in the motor cable. This means that points D and E shift and the new points D* and E* result in a new field weakening curve.



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The typical application is defined by the following conditions:

- Rated motor voltage = Line voltage

  For example, rated motor voltage 230/400 V at a line voltage of 400 V
- Line voltage tolerance ≤ 5%
- Motor cable length ≤ 100 m and voltage drop of the motor cable ≤ 10 V
- MOVIDRIVE®, MOVIDRIVE® B, and MOVITRAC® advanced inverter series are used
- No line chokes or sine filter are used

If all conditions are met, a motor terminal voltage of at least 360 V is ensured. The thermal limit characteristics in the form of a table with points A, B, C, D* and E* can be used.

If one of the above conditions is not met, the motor terminal voltage must be calculated on the basis of the specific application (see "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX" or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx" operating instructions).

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8.3.2 Thermal limit characteristic in the form of a table

INFORMATION

These limit characteristics apply to the motor. In the case of brakemotors, the limitation of the duty cycle must also be observed. (See chapter "Mechanical brakes" (→ 🗎 15).)

INFORMATION

Motors with the forced cooling fan option reach the rated motor torque up to speed 0 min^{-1}.

System voltage 400 V, 50 Hz

Star connection

		A	B	C	D	E	D*	E*
EDRN71MS4	Frequency in Hz	1.7	10	25	50	120	45	120
0.25 kW	Speed in min^{-1}	0	225	655	1400	3190	1251	3190
	Torque in Nm	0.85	1.46	1.7	1.7	0.7	1.7	0.44
EDRN71M4	Frequency in Hz	1.5	10	25	50	120	45	120
0.37 kW	Speed in min^{-1}	0	220	660	1410	3185	1260	3185
	Torque in Nm	1.25	2.15	2.5	2.5	1.1	2.5	0.65
EDRN80MK4	Frequency in Hz	1.2	10	25	50	120	45	120
0.55 kW	Speed in min^{-1}	0	250	690	1430	3390	1282	3390
	Torque in Nm	1.85	3.15	3.65	3.65	1.52	3.65	0.94
EDRN80M4	Frequency in Hz	1	10	25	50	100	45	100
0.75 kW	Speed in min^{-1}	0	254	692	1436	2856	1287	2856
	Torque in Nm	2.5	4	4.95	4.95	2.5	4.95	1.62
EDRN90S4	Frequency in Hz	0.7	10	25	50	100	45	100
1.1 kW	Speed in min^{-1}	0	269	710	1454	2881	1305	2881
	Torque in Nm	3.6	5.8	7.2	7.2	3.6	7.2	2.35
EDRN90L4	Frequency in Hz	0.7	10	25	50	100	45	100
1.5 kW	Speed in min^{-1}	0	268	710	1457	2897	1308	2897
	Torque in Nm	4.9	7.8	9.8	9.8	4.9	9.8	3.2
EDRN100LS4	Frequency in Hz	0.9	10	25	50	100	45	100
2.2 kW	Speed in min^{-1}	0	259	699	1445	2878	1296	2878
	Torque in Nm	7.3	11.6	14.5	14.5	7.2	14.5	4.75
EDRN100L4	Frequency in Hz	0.7	10	25	50	100	45	100
3 kW	Speed in min^{-1}	0	263	703	1450	2890	1301	2890
	Torque in Nm	9.9	15.8	19.7	19.7	9.8	19.7	6.4

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		A	B	C	D	E	D*	E*
EDRN112M4	Frequency in Hz	0.6	10	25	50	100	45	100
4 kW	Speed in min^{-1}	0	268	707	1453	2884	1304	2884
	Torque in Nm	13	20.8	26	26	10.4	26	8.5
EDRN132S4	Frequency in Hz	0.7	10	25	50	100	45	100
5.5 kW	Speed in min^{-1}	0	268	707	1453	2879	1304	2879
	Torque in Nm	18	28.8	36	36	18	36	11.7
EDRN132M4	Frequency in Hz	0.5	10	25	50	100	45	100
7.5 kW	Speed in min^{-1}	0	275	717	1465	2869	1315	2869
	Torque in Nm	25	39	49	49	24.5	49	16
EDRN132L4	Frequency in Hz	0.5	10	25	50	100	45	100
9.2 kW	Speed in min^{-1}	0	277	719	1468	2887	1318	2887
	Torque in Nm	30	48	60	60	30	60	19.6
EDRN160M4	Frequency in Hz	0.4	10	25	50	100	45	100
11 kW	Speed in min^{-1}	0	279	721	1469	2905	1319	2905
	Torque in Nm	36	57	71	71	36	71	23
EDRN160L4	Frequency in Hz	0.4	10	25	50	100	45	100
15 kW	Speed in min^{-1}	0	279	722	1470	2912	1320	2912
	Torque in Nm	49	78	97	97	49	97	31.5

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Delta connection

		A	B	C	D	E	D*	E*
EDRN71MS4	Frequency in Hz	1.7	10	25	87	120	78	120
0.25 kW	Speed in min^{-1}	0	225	655	2515	3460	2245	3460
	Torque in Nm	0.85	1.46	1.7	1.7	1.24	1.7	0.91
EDRN71M4	Frequency in Hz	1.5	10	25	87	120	78	120
0.37 kW	Speed in min^{-1}	0	220	660	2520	3470	2250	3470
	Torque in Nm	1.25	2.15	2.5	2.5	1.81	2.5	1.34
EDRN80MK4	Frequency in Hz	1.2	10	25	87	120	78	120
0.55 kW	Speed in min^{-1}	0	250	690	2540	3505	2271	3505
	Torque in Nm	1.85	3.15	3.65	3.65	2.65	3.65	1.96
EDRN80M4	Frequency in Hz	1	10	25	87	100	78	100
0.75 kW	Speed in min^{-1}	0	254	692	2547	2923	2278	2923
	Torque in Nm	2.5	4	4.95	4.95	4.5	4.95	3.45
EDRN90S4	Frequency in Hz	0.7	10	25	87	100	78	100
1.1 kW	Speed in min^{-1}	0	269	710	2566	2945	2297	2945
	Torque in Nm	3.6	5.8	7.2	7.2	6.5	7.2	5
EDRN90L4	Frequency in Hz	0.7	10	25	87	100	78	100
1.5 kW	Speed in min^{-1}	0	268	710	2568	2948	2298	2948
	Torque in Nm	4.9	7.8	9.8	9.8	8.8	9.8	6.8
EDRN100LS4	Frequency in Hz	0.9	10	25	87	100	78	100
2.2 kW	Speed in min^{-1}	0	259	699	2556	2933	2286	2933
	Torque in Nm	7.3	11.6	14.5	14.5	13	14.5	10.1
EDRN100L4	Frequency in Hz	0.7	10	25	87	100	78	100
3 kW	Speed in min^{-1}	0	263	703	2560	2939	2290	2939
	Torque in Nm	9.9	15.8	19.7	19.7	17.7	19.7	13.7
EDRN112M4	Frequency in Hz	0.6	10	25	87	100	78	100
4 kW	Speed in min^{-1}	0	268	707	2562	2935	2293	2935
	Torque in Nm	13	20.8	26	26	23.4	26	18
EDRN132S4	Frequency in Hz	0.7	10	25	87	100	78	100
5.5 kW	Speed in min^{-1}	0	268	707	2562	2939	2293	2939
	Torque in Nm	18	28.8	36	36	32.4	36	25
EDRN132M4	Frequency in Hz	0.5	10	25	87	100	78	100
7.5 kW	Speed in min^{-1}	0	275	717	2573	2953	2304	2953
	Torque in Nm	25	39	49	49	44.1	49	34
EDRN132L4	Frequency in Hz	0.5	10	25	87	100	78	100
9.2 kW	Speed in min^{-1}	0	277	719	2576	2957	2306	2957
	Torque in Nm	30	48	60	60	54	60	41.5

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		A	B	C	D	E	D*	E*
EDRN160M4	Frequency in Hz	0.4	10	25	87	100	78	100
11 kW	Speed in min^{-1}	0	279	721	2578	2960	2308	2960
	Torque in Nm	36	57	71	71	64	71	49.5
EDRN160L4	Frequency in Hz	0.4	10	25	87	100	78	100
15 kW	Speed in min^{-1}	0	279	722	2579	2960	2309	2960
	Torque in Nm	49	77.6	97	97	87	97	67

System voltage 440 V, 60 Hz

Star connection

		A	B	C	D	E	D*	E*
EDRN71MS4	Frequency in Hz	1.4	10	25	60	120	54	120
0.25 kW	Speed in min^{-1}	0	235	670	1680	3350	1507	3350
	Torque in Nm	0.7	1.13	1.39	1.39	0.56	1.39	0.46
EDRN71M4	Frequency in Hz	1.2	10	25	60	120	54	120
0.37 kW	Speed in min^{-1}	0	240	675	1695	3370	1520	3370
	Torque in Nm	1.03	1.66	2.05	2.05	0.84	2.05	0.67
EDRN80MK4	Frequency in Hz	0.9	10	25	60	120	54	120
0.55 kW	Speed in min^{-1}	0	255	695	1715	3380	1540	3380
	Torque in Nm	1.5	2.45	3	3	1.5	3	0.98
EDRN80M4	Frequency in Hz	0.8	10	25	60	104	54	104
0.75 kW	Speed in min^{-1}	0	256	695	1740	3014	1561	3014
	Torque in Nm	2.1	3.3	4.1	4.1	2.3	4.1	1.62
EDRN90S4	Frequency in Hz	0.6	10	25	60	104	54	104
1.1 kW	Speed in min^{-1}	0	270	712	1758	3037	1579	3037
	Torque in Nm	3	4.8	6	6	3.3	6	2.35
EDRN90L4	Frequency in Hz	0.5	10	25	60	104	54	104
1.5 kW	Speed in min^{-1}	0	271	713	1760	3048	1581	3048
	Torque in Nm	4.1	6.5	8.1	8.1	4.5	8.1	3.2
EDRN100LS4	Frequency in Hz	0.9	10	25	60	104	54	104
2.2 kW	Speed in min^{-1}	0	267	708	1755	3037	1576	3037
	Torque in Nm	6	9.5	11.9	11.9	6.5	11.9	4.7
EDRN100L4	Frequency in Hz	0.6	10	25	60	104	54	104
3 kW	Speed in min^{-1}	0	266	707	1754	3040	1575	3040
	Torque in Nm	8.1	13	16.2	16.2	8.9	16.2	6.4
EDRN112M4	Frequency in Hz	0.5	10	25	60	104	54	104
4 kW	Speed in min^{-1}	0	272	711	1757	2992	1578	2992
	Torque in Nm	10.8	17.2	21.5	21.5	11.8	21.5	8.5

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		A	B	C	D	E	D*	E*
EDRN132S4	Frequency in Hz	0.6	10	25	60	104	54	104
5.5 kW	Speed in min^{-1}	0	270	711	1758	3039	1579	3039
	Torque in Nm	14.8	23.5	29.5	29.5	16.2	29.5	11.6
EDRN132M4	Frequency in Hz	0.4	10	25	60	104	54	104
7.5 kW	Speed in min^{-1}	0	277	720	1768	3051	1588	3051
	Torque in Nm	20.5	32.5	40.5	40.5	22.5	40.5	16
EDRN132L4	Frequency in Hz	0.4	10	25	60	104	54	104
9.2 kW	Speed in min^{-1}	0	279	722	1770	3059	1590	3059
	Torque in Nm	25	39.5	49.5	49.5	27	49.5	19.5
EDRN160M4	Frequency in Hz	0.3	10	25	60	104	54	104
11 kW	Speed in min^{-1}	0	280	723	1771	3062	1591	3062
	Torque in Nm	30	47	59	59	32.5	59	23.5
EDRN160L4	Frequency in Hz	0.3	10	25	60	104	54	104
15 kW	Speed in min^{-1}	0	280	723	1772	3064	1592	3064
	Torque in Nm	41	65	81	81	44.5	81	32

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Delta connection

		A	B	C	D	E	D*	E*
EDRN71MS4	Frequency in Hz	1.4	10	25	104	120	94	120
0.25 kW	Speed in min^{-1}	0	235	670	3010	3465	2714	3465
	Torque in Nm	0.7	1.13	1.39	1.39	1.2	1.39	0.97
EDRN71M4	Frequency in Hz	1.2	10	25	104	120	94	120
0.37 kW	Speed in min^{-1}	0	240	675	3015	3475	2719	3475
	Torque in Nm	1.03	1.66	2.05	2.05	1.78	2.05	1.43
EDRN80MK4	Frequency in Hz	0.9	10	25	104	120	94	120
0.55 kW	Speed in min^{-1}	0	255	695	3040	3500	2743	3500
	Torque in Nm	1.5	2.45	3	3	2.6	3	2.1
EDRN80M4	Frequency in Hz	0.8	10	25	104	104	94	104
0.75 kW	Speed in min^{-1}	0	256	695	3060	3060	2761	3060
	Torque in Nm	2.1	3.3	4.1	4.1	4.1	4.1	3.55
EDRN90S4	Frequency in Hz	0.6	10	25	104	104	94	104
1.1 kW	Speed in min^{-1}	0	270	712	3077	3077	2778	3077
	Torque in Nm	3	4.8	6	6	6	6	5.2
EDRN90L4	Frequency in Hz	0.5	10	25	104	104	94	104
1.5 kW	Speed in min^{-1}	0	271	713	3080	3080	2780	3080
	Torque in Nm	4.1	6.5	8.1	8.1	8.1	8.1	7
EDRN100LS4	Frequency in Hz	0.9	10	25	104	104	94	104
2.2 kW	Speed in min^{-1}	0	267	708	3075	3075	2775	3075
	Torque in Nm	6	9.5	11.9	11.9	11.9	11.9	10.2
EDRN100L4	Frequency in Hz	0.6	10	25	104	104	94	104
3 kW	Speed in min^{-1}	0	266	707	3073	3073	2774	3073
	Torque in Nm	8.1	13	16.2	16.2	16.2	16.2	13.9
EDRN112M4	Frequency in Hz	0.5	10	25	104	104	94	104
4 kW	Speed in min^{-1}	0	272	711	3074	3074	2775	3074
	Torque in Nm	10.8	17.2	21.5	21.5	21.5	21.5	18.5
EDRN132S4	Frequency in Hz	0.6	10	25	104	104	94	104
5.5 kW	Speed in min^{-1}	0	270	711	3075	3075	2776	3075
	Torque in Nm	14.8	23.5	29.5	29.5	29.5	29.5	25.5
EDRN132M4	Frequency in Hz	0.4	10	25	104	104	94	104
7.5 kW	Speed in min^{-1}	0	277	720	3085	3085	2786	3085
	Torque in Nm	20.5	32.5	40.5	40.5	40.5	40.5	35
EDRN132L4	Frequency in Hz	0.4	10	25	104	104	94	104
9.2 kW	Speed in min^{-1}	0	279	722	3089	3089	2789	3089
	Torque in Nm	25	39.5	49.5	49.5	49.5	49.5	42.5

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		A	B	C	D	E	D*	E*
EDRN160M4	Frequency in Hz	0.3	10	25	104	104	94	104
11 kW	Speed in min^{-1}	0	280	723	3090	3090	2790	3090
	Torque in Nm	30	47	59	59	59	59	51
EDRN160L4	Frequency in Hz	0.3	10	25	104	104	94	104
15 kW	Speed in min^{-1}	0	280	723	3090	3090	2790	3090
	Torque in Nm	41	65	81	81	81	81	70

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9 Startup

9.1 General

For information on startup, refer to the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX", or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx" and the documentation of the inverter in use.

When starting up explosion-protected motors of category 3 or EPL c, the parameters "Maximum speed" and "Torque or current limit" must be set or limited on the frequency inverter.

9.1.1 Setting the maximum speed

The maximum motor speed is limited by the motor itself and, if applicable, by the gear unit used or other external components.

When setting the maximum motor speed in the frequency inverter, observe the maximum permitted motor speed, the maximum permitted gear unit input speed $n_{e\ max}$ and the maximum permitted speed of the external components.

With project planning

The value for setting the maximum speed is provided by the project planning for the drive.

Setting in the frequency inverter:

Maximum speed ≤ maximum speed from project planning

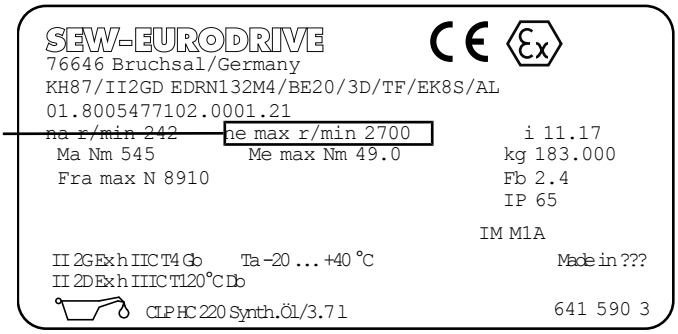
Without project planning

If the project planning is not available at startup, the speeds of all components must be taken into account. The frequency inverter must be limited to the smallest value of all drive components.

Setting in the frequency inverter:

Maximum speed ≤ maximum gear unit input speed $n_{e\ max}$ ≤ maximum motor speed

You find the data on the respective nameplates.



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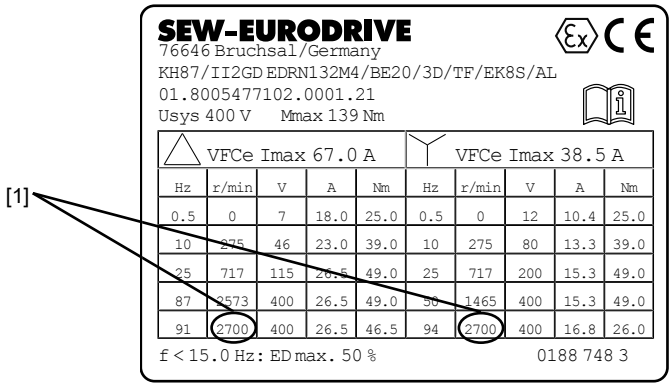
[1] Maximum gear unit input speed $n_{e\ max}$



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[1] Maximum motor speed

9.1.2 Setting the torque limit/current limit

The torque of the asynchronous motor must be limited either by the torque limit or the current limit. If the frequency inverter used has a torque interface, the limitation must be made via the torque. The torque limit setting is based on the actual torque requirement, and the current limit setting is based on the actual current requirement of the asynchronous motor.

When setting the torque limit in the frequency inverter, observe the maximum motor torque, the maximum gear unit input torque, and the maximum torque of the external components.

With project planning

The value for setting the torque limit/current limit is provided by the project planning for the drive.

Setting in the frequency inverter:

Torque limit ≤ maximum motor torque from the project planning

Current limit ≤ maximum motor current from the project planning

Without project planning

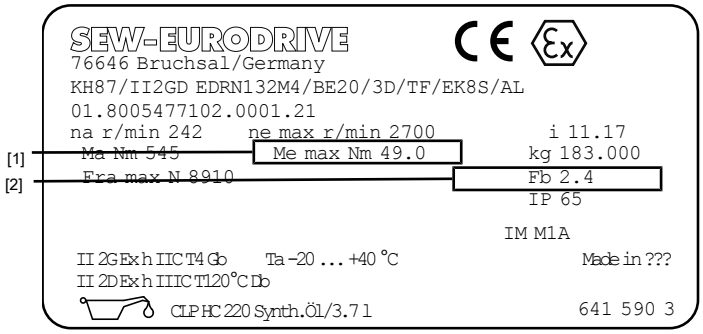
If the project planning is not available at startup, the permitted torques of all components must be taken into account. The frequency inverter must be limited to the smallest value of all drive components.

Setting in the frequency inverter:

Torque limit ≤ maximum permitted gearmotor torque

Current limit ≤ current "maximum permitted gearmotor torque"

You find the data on the respective nameplates.



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[1] Nominal motor torque
[2] Service factor

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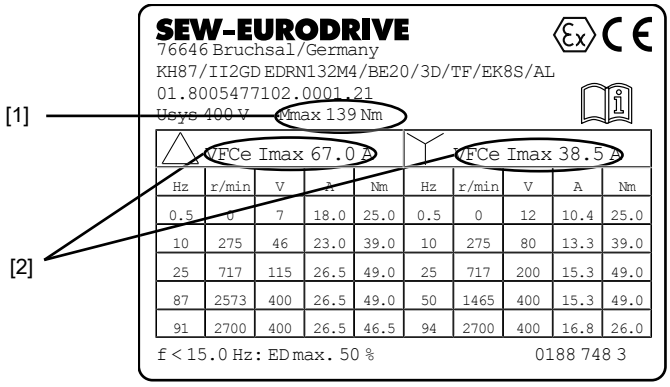

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[1] Maximum motor torque M_{max}
[2] Maximum motor current I_{max}

Determining the torque limit

The following applies:

Maximum permitted gearmotor torque ≤ maximum gear unit input torque ≤ maximum motor torque

$M_x \leq M_{e\_max\_total} \leq M_{max}$

Definitions:

Maximum permitted gearmotor torque: M_x

Nominal motor torque: M_{e_max}

Service factor: f_B

Maximum gear unit input torque: $M_{e\_max\_total}$

$$M_{e\_max\_total} = M_{e\_max} \times f_B$$

M_{max}: maximum motor torque

The torque limit in the inverter must be set to the "maximum permitted gearmotor torque".

Example for MOVIDRIVE®:

Determining the torque limit:

$$M_{e\_max\_total} = M_{e\_max} \times f_B = 49\ \text{Nm} \times 2.4 = 117.6\ \text{Nm}$$

$$M_{max} = 139\ \text{Nm}$$

$$M_X \leq 117.6\ \text{Nm} \leq 139\ \text{Nm}$$

$$M_X \leq 117.6\ \text{Nm}$$

Calculation for setting the torque limit in the frequency inverter:

For MOVIDRIVE® frequency inverters, the torque limit must be set depending on the nominal motor torque M_N.

Torque limit ≤ M_x / M_N × 100%

Torque limit ≤ 117.6 Nm / 49 Nm × 100%

Torque limit ≤ 240%

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Determining the current limit

If the frequency inverter used has only a "Current limit" parameter, you must calculate the current of the "Maximum permitted gearmotor torque".

The current value is calculated by linear interpolation between the nominal points (M_N and I_N) and the maximum points (M_{max} and I_{max})

The following applies:

$$I_X = I_C + \frac{(I_{max} - I_C)}{(M_{max} - M_N)} \times (M_X - M_N)$$

Definitions:

"Maximum permitted gearmotor torque" current: I_X

Maximum permitted gearmotor torque: M_X

Nominal motor current: I_C

Maximum motor current: I_{max}

Nominal motor torque: M_N

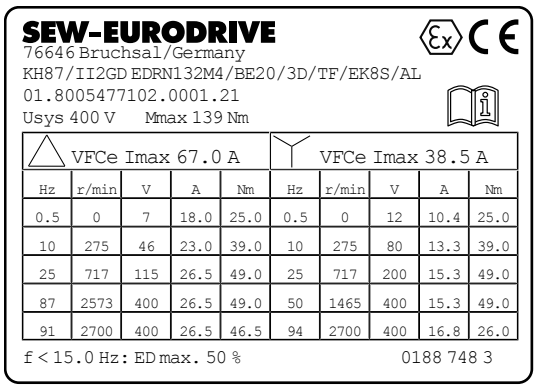
Maximum motor torque: M_{max}

The current limit in the inverter must be set to the current "Maximum permitted gearmotor torque".

Example for MOVIDRIVE® B:

Determining the current limit:

$$I_X = I_C + \frac{(I_{max} - I_C)}{(M_{max} - M_N)} \times (M_X - M_N)$$


SEW-EURODRIVE
76646 Bruchsal/Germany
KH87/II2GD EDRN132M4/BE20/3D/TF/EK8S/AL
01.8005477102.0001.21
Usys 400 V Mmax 139 Nm

VFCe Imax 67.0 A					VFCe Imax 38.5 A				
Hz	r/min	V	A	Nm	Hz	r/min	V	A	Nm
0.5	0	7	18.0	25.0	0.5	0	12	10.4	25.0
10	275	46	23.0	39.0	10	275	80	13.3	39.0
25	717	115	26.5	49.0	25	717	200	15.3	49.0
87	2573	400	26.5	49.0	50	1465	400	15.3	49.0
91	2700	400	26.5	46.5	94	2700	400	16.8	26.0

f < 15.0 Hz: ED max. 50 % 0188 748 3

34583101963

$$I_X = 26.5\ A + \frac{(67\ A - 26.5\ A)}{(139\ Nm - 49\ Nm)} \times (117.6\ Nm - 49\ Nm)$$

$$I_X = 57.4\ A$$

Calculation for setting the current limit in the frequency inverter:

For MOVIDRIVE® B frequency inverters, the current limit must be set depending on the nominal inverter current (I_{N_Inv}). A 22 kW inverter was used for this example.

Current limit ≤ I_x / I_{Inv} × 100%

Current limit ≤ 57.4 A / 46 A × 100%

Current limit ≤ 125%

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9.1.3 Thermal motor protection

Thermal motor protection is provided by the PTC thermistor temperature sensor /TF embedded in the winding.

The temperature sensor must be evaluated by a thermistor monitoring device for the protection of explosion-protected motors certified according to Directive 2014/34/EU. Observe the operating instructions of the evaluation unit when connecting the temperature sensor to the evaluation unit.

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9.2 Parameter setting: Frequency inverters

9.2.1 Startup procedure for MOVIDRIVE®

Observe the following points during startup:

- Use the latest version of the MOVISUITE® engineering software for startup.
- Motors in category 3/EPL .c can be started up and operated in drive trains 1 and 2.
- Select the motor type, frequency, nominal motor voltage, and connection type in the drive train. Options such as gear unit, motor encoder, additional transmission, and the user units are also configured in the drive train.
- When setting the controller, select the "VFCplus" operating mode as the control mode. Select "4Q (motor + generator mode)" braking operation. The functions "Flying start" and "DC braking" must not be used.
- For the system voltage, refer to the additional nameplate for frequency inverter operation.

Application limit positive/negative speed

First perform startup without specifying the user units in order to specify the speed limit in min^{-1}. Next, parameterize the user units.

Set the value as specified in chapter "Setting the maximum speed" (→ 🗎 25).

Application limit torque

Set the value as specified in chapter "Setting the torque limit/current limit" (→ 🗎 26).

9.2.2 Startup procedure for MOVIDRIVE® B

Observe the following points during startup:

- Use the latest MOVITOOLS® MotionStudio software version for startup. It is essential that the limitation of the maximum currents is checked/re-adjusted after each guided startup.
- Startup and operation of the motors in category 3/EPL .c is possible in parameter sets 1 and 2.
- A complete startup must always be performed for initial startup.
- Select the "VFC & n-control" mode as the control method.
- Select the required motor series from the "Motor type" window.
- In addition to selecting the motor, also select the equipment category, the line voltage, the motor voltage, the connection type, and the type of system configuration in the "Motor selection" window.
- For the application, you can only select speed control and hoist application. Do not use the options "DC braking" or "Flying start function".
- Always select the "4-quadrant operation" mode.

Maximum speed

Set the value as specified in chapter "Setting the maximum speed" (→ 🗎 25).

Current limit

Set the value as specified in chapter "Setting the torque limit/current limit" (→ 🗎 26).

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Automatic adjustment

The parameter *Automatic adjustment* is activated once startup has been carried out. As a result, the frequency inverter automatically sets the parameter *I×R value* with each approval. A manual change is not permitted.

9.2.3 Startup notes for third-party inverters

Observe the corresponding operating instructions of the manufacturer for starting up the frequency inverter. The data required for startup can be found on the nameplates of the motor and, in the case of a gearmotor, also on the gear unit.

Basic control range

Set the frequency inverter so that the motor can be operated with constant magnetic flux in the basic control range.

Maximum speed

Set the value as specified in chapter "Setting the maximum speed" (→ 🗎 25).

Torque limit/current limit

Set the value as specified in chapter "Setting the torque limit/current limit" (→ 🗎 26).

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10 Inspection/maintenance

For information on inspection and maintenance, refer to the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX" or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx".

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11 Technical data

11.1 Technical data of EDRN.. motors, 400 V system voltage, 50 Hz

					Motor data VFCe							
	Nominal data 230/400 V 50 Hz				3G (-c), 3GD (-c)			3D (-c)			Speed	
Motor	P_N in kW	M_N in Nm	I_N in A		M_{max} [1] in Nm	I_{max} in A		M_{max} [1] in Nm	I_{max} in A		n_{max} in min^{-1}	
			∆	Y		∆	Y		∆	Y	∆	Y
EDRN71MS4	0.25	1.71	1.37	0.77	3.25	1.89	1.09	4.25	2.65	1.53	3460	3190
EDRN71M4	0.37	2.5	1.92	1.1	4.65	2.65	1.54	7	4.1	2.35	3470	3185
EDRN80MK4	0.55	3.65	2.4	1.37	6.5	3.4	1.94	11.4	6.8	3.9	3505	3390
EDRN80M4	0.75	4.95	3.1	1.8	8.9	4.55	2.6	16.9	8.7	5	2923	2856
EDRN90S4	1.1	7.2	4.5	2.6	12.9	6.6	3.8	24	12.7	7.3	2945	2881
EDRN90L4	1.5	9.8	6.1	3.5	17.2	8.9	5.1	32.5	17.2	9.9	2948	2897
EDRN100LS4	2.2	14.5	8.6	4.9	25.5	12.9	7.4	48	24.5	14.2	2933	2878
EDRN100L4	3	19.7	11.4	6.6	33	16.6	9.5	73	34.5	19.9	2939	2890
EDRN112M4	4	26	14.5	8.4	43.5	21	12.2	94	43	25	2935	2884
EDRN132S4	5.5	36	18.7	10.7	58	28	16	126	58	33.5	2939	2879
EDRN132M4	7.5	49	26.5	15.3	79	40	23	139	67	38.5	2953	2869
EDRN132L4	9.2	60	34	19.4	95	49	28	165	82	47	2957	2887
EDRN160M4	11	71	37	21	115	55	31.5	215	103	59	2960	2905
EDRN160L4	15	97	50	29	155	75	43.5	310	147	84	2960	2912

1) Mmax = Maximum electric motor torque (IEC shaft)

11.2 Technical data of EDRN.. motors, 440 V system voltage, 60 Hz

					Motor data VFCe							
	Nominal data 254/440 V 60 Hz				3G (-c), 3GD (-c)			3D (-c)			Speed	
Motor	P_N in kW	M_N in Nm	I_N in A		M_{max} [1] in Nm	I_{max} in A		M_{max} [1] in Nm	I_{max} in A		n_{max} in min^{-1}	
			∆	Y		∆	Y		∆	Y	∆	Y
EDRN71MS4	0.25	1.4	1.12	0.65	2.8	1.73	1	3.8	2.4	1.4	3350	3465
EDRN71M4	0.37	2.05	1.62	0.93	4.1	2.45	1.43	6.2	3.6	2.1	3370	3475
EDRN80MK4	0.55	3.05	2.05	1.18	5.7	3.15	1.81	10	5.2	3	3380	3500
EDRN80M4	0.75	4.1	2.8	1.7	7.5	4.05	2.4	16	8.3	4.8	3014	3060
EDRN90S4	1.1	6	4.3	2.5	10.7	6	3.5	21.5	10.9	6.3	3037	3077
EDRN90L4	1.5	8.1	5.5	3.2	14.1	7.8	4.5	29	15.2	8.8	3048	3080
EDRN100LM4	2.2	12	7.5	4.4	21.5	11.5	6.6	45.5	22.5	13	3037	3075
EDRN100L4	3	16.3	10.5	6.1	28	15.1	8.7	64	32	18.3	3040	3073
EDRN112M4	4	21.5	12.6	7.5	35.5	18.6	10.7	77.6	36.5	21	2992	3074
EDRN132S4	5.5	30	16.6	9.7	47.5	24.5	14.2	107	55	31.5	3039	3075
EDRN132M4	7.5	40.5	23.5	14	66	35	20.5	115	57	32.5	3051	3085
EDRN132L4	9.2	49.5	29.5	17.4	80	43.5	25	133	68	39.5	3059	3089
EDRN160M4	11	59	33	19.4	96	49.5	28.5	166	83	48	3062	3090
EDRN160L4	15	81	45	26	130	67	38.5	275	129	74	3064	3090

1) Mmax = Maximum electric motor torque (IEC shaft)

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12 Malfunctions

For information on malfunctions, refer to the operating instructions "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 ATEX", or "Explosion-Protected AC Motors EDR..71 – 315, EDRN63 – 315 IECEx" and the documentation of the inverter in use.

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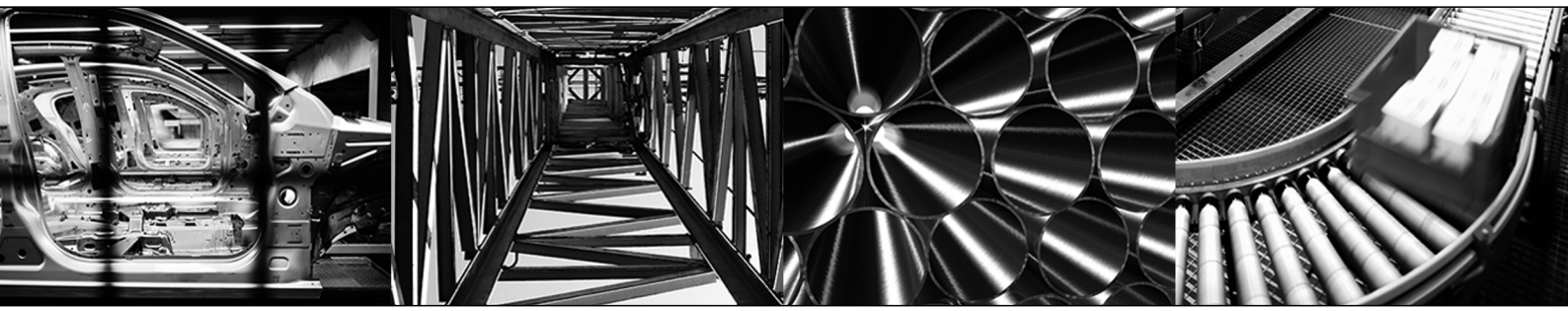

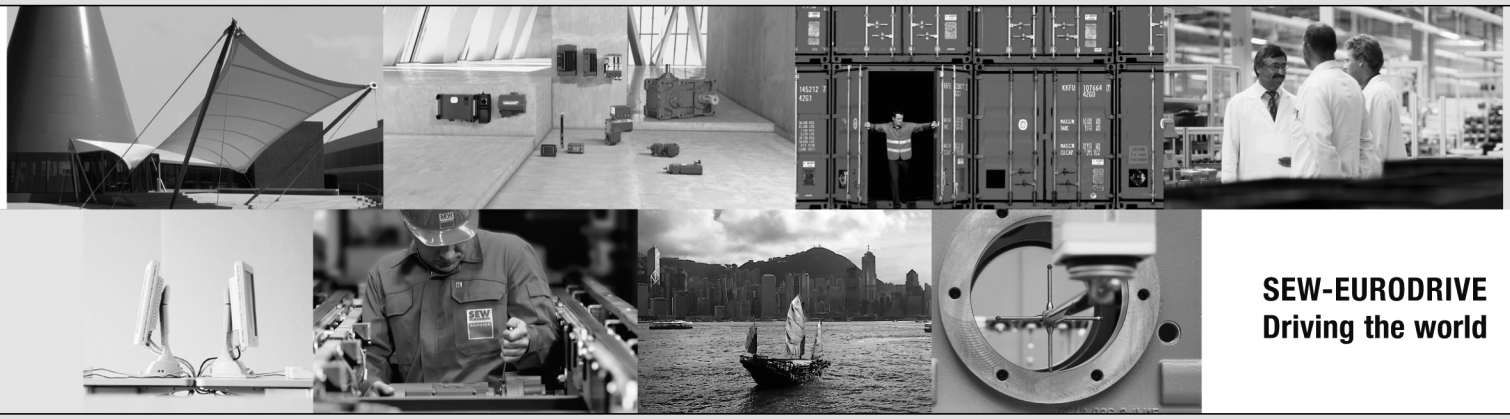

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