Servodyn-D

Asynchronous Motors DU

Version 101

BOSCH
Automationstechnik

Servodyn-D

Asynchronous Motors DU

1070 066 027-101 (96.04) GB

Reg. Nr. 16149-03

Discretionary charge 10.– DM

Table of contents

1 Safety instructions

This manual contains information which is required for the correct use of the products described here.

It is intended for technically qualified personnel who have been specifically trained in or who have relevant knowledge of measuring technology and automatic control engineering.

1.1 Markings on components

The following symbols are found on various components and are used as warnings to point out possible danger, or to call your attention to important information:


➧ Danger due to high voltage.


➧ Electrostatically sensitive devices!


➧ PE conductor


➧ Screen


➧ Protect from impact and jolts

1.2 Hazard warnings in the manual

Observe and comply with the safety notes and danger warnings given in this manual (“DANGER”, “CAUTION”, and the highlighted information provided under “Note”) in order to avoid serious injury and property damage.

The chapter and page number of the safety instructions is indicated beside the safety note.
The Appendix provides translations of the safety instructions in all official EC languages.

1.3 Qualified personnel

Low voltage motors have hazardous **live** and **rotating** parts as well as hot surfaces in some cases.
Only **qualified, responsible** specialist personnel may carry out transportation, terminal connection, commissioning and servicing.
Improper handling or non-compliance with the warnings listed in this manual or indicated on the components may result in **serious personal injury or damage to property.**

1.1

! DANGER !

Maintenance and installation of the components to be carried out only by electrotechnicians (VDE 1000-10) under observation of the accident prevention regulations and installation regulations (EN 60204-part 1, prEN 50178).

For this reason, only **electrotechnicians** in acc. with VDE 1000-10 who are familiar with the contents of this manual may perform the procedures as authorized in the manual.

Such personnel are

- those who, being well trained and experienced in their field and familiar with the relevant norms, are able to analyse the jobs being carried out and recognise any hazards which may have arisen.
- those who have acquired the same amount of expert knowledge through years of experience that would normally be acquired through formal technical training.

Please note that we offer a comprehensive training program. You will find an overview of our seminar program on the inside back page.
Our training centre will be pleased to provide you with further information.

1.4 Proper use

These low voltage motors are intended for **commercial or industrial** systems. They meet the requirements of the standardised norms in the DIN VDE 0530/EN 60034 series. Employment in potentially explosive areas is prohibited unless otherwise indicated.
Air-cooled versions should be employed under ambient temperatures of between −20 °C and +40 °C and installation heights of ≦ 1000 m above sea level. Comply with any exceptional information on the rating plate. The conditions at the place of employment should meet the requirements specified on the rating plate.

Low voltage motors are **components** which are installed in machine in accordance with the Machine Guideline 89/392/EEC.
Before starting up, you should ensure that the machine accommodating the motors meets the requirements of the Machine Guideline (observe EN 60204-1).

These products pose no danger to persons or property if they are used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.

! DANGER !

The safe and reliable operation of this product requires its proper transport, storage, set-up, and assembly as well as conscientious operation and use.

1.2

Your notes:

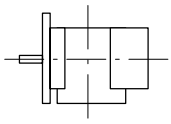
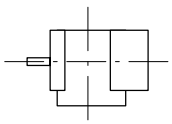
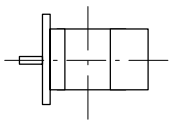
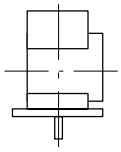
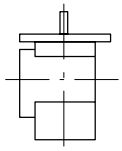
Asynchronous motors type DU

2 Design of the engine series

2.1 Concept

Bosch asynchronous motors of the DU type are designed for use in a speed range up to 12 000 min^{-1}.
They are equipped with an incremental encoder for speed control and tuned for operation with Bosch three-phase modules of the Servodyn-D type.

2.2 Designs in accordance with EN 60034-7

Code in acc. with EN 60034-7	Diagram	Method of attachment
IM B 35 (standard version for BG 90 ... 160)		Mounting on base and/or flange
IM B 3 (standard version for BG 180)		Mounting on base
IM B 5		Mounting on flange
IM V 15		Mounting on wall and/or flange
IM V 36		Mounting on wall and/or flange

2.3 Type designation

DU [B] 100U 090–060 / 4G 35 S 0000 [ ]

Main spindle motor for Servodyn - D

□ = Motor without brake
B = with brake, closed-circuit current principle

Size and overall length
S = short L = long
M = medium U = overlength

Maximum speed, e.g. 065 = 6500 min^{-1}

Corner frequency in [Hz]

Number of poles

Encoder
G = Standard encoder (RCN 1313)
Z = Gear encoder

Basic designs IM B3, IM B5, IM B35
(can also be used as IM V15)

S = ventilator suction AS → BS (Standard)
B = ventilator blowing BS → AS
F = liquid coolant

1st character: 0 = Deep-groove ball bearing, vibration severity grade “R”
1 = Deep-groove ball bearing, vibration severity grade “S”
2 = Deep-groove ball bearing, vibration severity grade “S1”
3 = Precision spindle bearing, vibration severity grade “S”
4 = Precision spindle bearing, vibration severity grade “S1”
5 = Precision spindle bearing, vibration severity grade “S2”
6 = Precision spindle bearing, vibration severity grade “S3”
7 = Precision spindle bearing, vibration severity grade “R”

2nd character: 0 = Solid shaft, smooth, balance with smooth shaft
1 = Solid shaft, keyway and key, balance with full featherkey
2 = Solid shaft, keyway and key, balance with half featherkey
3 = Solid shaft, keyway and key, balance without featherkey
4 = Hollow shaft, smooth, balance with smooth shaft
5 = e.g. special featherkey

3rd character: 0 = without oil-tight driving-end end plate, without gears
1 = with oil-tight driving-end end plate
2 = with gears
3 = with oil-tight driving-end end plate, with gears

4th character: 0 = Terminal box above
1 = Terminal box right
2 = Terminal box left

Construction index □ = Standard

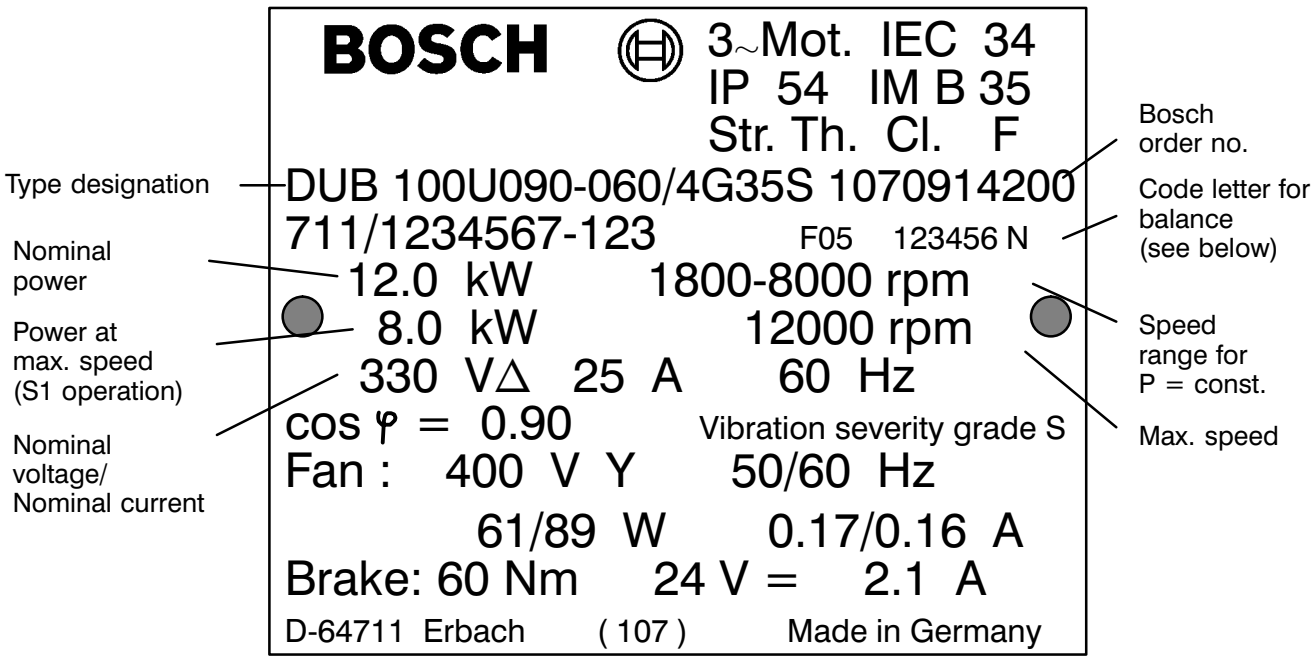
2.4 Scope of delivery

- Construction IM B 35, for size 180 IM B 3
- Smooth shaft
- Vibration severity grade “R”
- Flange accuracy “N”
- Terminal box above, capable of swivelling by 4 x 90°
- BG 90, 100, 132: Aluminium housing, deep-groove ball bearing
  BG 160: Cast iron housing, deep-groove ball bearing
- Mating connector for integrated encoder
- Second rating plate with special code “Z”
- Maintenance and operating instructions
- For option “shaft with keyway and key”:
  Featherkey inserted in shaft keyway
- For option vibration severity grade “S”, “S1” “S2” and “S3”:
  Test report included in terminal box

2.5 Options

- Terminal box lateral (right or left)
- Higher speeds, refer to section 3.2
- Vibration severity grade “S” on the basis of DIN VDE 0530-14
  (not possible for motors with holding brake)
- Vibration severity grades “S1”, “S2”, “S3” on the basis of
  DIN VDE 0530-14
  (not possible for motors with holding brake)
  Higher vibration severity grades available on request.
- Oil-tight driving-end end plate
  The motors are available with a VITON rotary shaft seal at the drive end. This limits the circumferential speed of the shaft to 25-30 m/s
- Increased flange accuracy “R” in accordance with DIN 42955
- Holding brake
  The maximum speed for motors with holding brakes is limited during vertical motor operations (IM V15, IM V36; refer to section 3.2).
- Shaft with keyway and featherkey
- Reinforced drive-end bearing
- Increased protection standard IP 55 in accordance with EN 60034-5

2.6 Rating plate



Code letter for balancing in accordance with DIN ISO 8821

The type of motor balancing can be read off by means of a code letter:

X = the motor is balanced with smooth shaft

N = the motor is balanced without featherkey, shaft with keyway

H = the motor is balanced with half featherkey

F = the motor is balanced with full featherkey

3 Technical data

3.1 Motor data

Permitted ambient temperature	Cooling air temp. max. 40 °C, > 40 °C refer to Derating, section 3.2
Protection class in acc. with EN 60034-5	Motor IP 54
Designs in acc. with DIN IEC 34-7	Design IM B 3, IM B 35 for all sizes, can also be used as IM V15 and IM V36. Flange dimensions in accordance with DIN 42948
Bearing	Locating bearing at the drive end, minimum service life 20,000 h
Shaft end	Cylindrical shaft end, analagous to DIN 748-3, IEC 72, but with smooth shaft. Thread for mounting/removing drive elements. Radial runout, concentricity and axial run-out tolerance for flange motors in accordance with DIN 42955 (standard “N”) and IEC 72. Oil-tight drive-end end shield option.
Vibration severity grade	Basic version: Vibration severity grade “R” on the basis of DIN VDE 0530-14 Optional vibration severity grades S, S1, S2, S3 Refer to rating plate for information on balancing (Section 2.6).
Insulation	Motor production in thermal class F in accordance with IEC 34-1. The insulation is resistant to gases and vapours of combustible substances and complies with the requirements for foundry dust insulation. Special insulation is necessary for a relative humidity of >85 % or in the event of exposure to mold or termites.
Cooling	Integrated external fan, suction from drive end to non-drive end. Refer to Section 4.2.2 for further information.
Thermal motor protection	Two NTC temperature detectors integrated in the winding, with evaluation in the three-phase current module.
Speed encoder	Incremental encoder type RCN 1313
Holding brake	Backlash-free, spring-actuated, single-disk brake in accordance with the closed-circuit current principle as an option. Data, refer to Section 3.2.
Paint finish	Priming with modified alkyd resin varnish, color black (RAL 9005).
Terminal box	At top as standard, capable of swivelling by 4 x 90°

3.2 Performance data

Size			90	100			132		
DU motors			**90L**	**100M**	**100L**	**100U**	**132S**	**132M**	**132L**
Nominal power[1)]	P_N	[kW]	4,2	6,6	9,0	12	15	18,5	22
Nominal frequency Nominal speed Max. speed (standard) Speed range	f_N n_N	[Hz] [rpm] [rpm] [rpm]	60 1800 9000 1800-8000/12000	60 1800 9000 1800-8000/12000			50 1500 6500 1500-6000/9000		
Power range		[kW]	4,2/2,8	6,6/4,4	9,0/6,0	12/8,0	15/12	18,5/13,5	22/15
Max. speed with holding brake **and** vertical installation (IM V15, IM V36)		[rpm]	7 000	6 000			4 000		
Nominal torque	M_N	[Nm]	22	35	48	63,5	95,5	118	140
Nominal current	I_N	[A]	11	15,5	20	25	29	37	42
Dimensions: Shaft	d x l	[mm]	∅ 28 x 60	∅ 38 x 80			∅ 42 x 110		
Length without holding br.		[mm]	523	610	675	740	720	770	820
Moment of inertia. J		[10^{-3} kgm^2]	5,55	18,4	24,2	29,1	82,7	101	119
Mass for IM B35		[kg]	37	53	64	73	115	133	144
Holding brake (option)									
Motor type			LT 32	LT 60			LT 150		
Holding torque		[Nm]	32	60			150		
Nominal current		[A]	1,7	2,1			3,6		
Moment of inertia		[10^{-3} kgm^2]	0,45	0,63			2,9		
Switch-on time (release)		[ms]	120	150			300		
Weight		[kg]	4,2	5,9			13,0		

1) The nominal motor power applies to converter operation with suction ventilation from the drive end (flange side) to the non-drive end
Overload capability, refer to Performance characteristics, Section 3.5.

Permissible motor-module combinations, see manual no. 35.

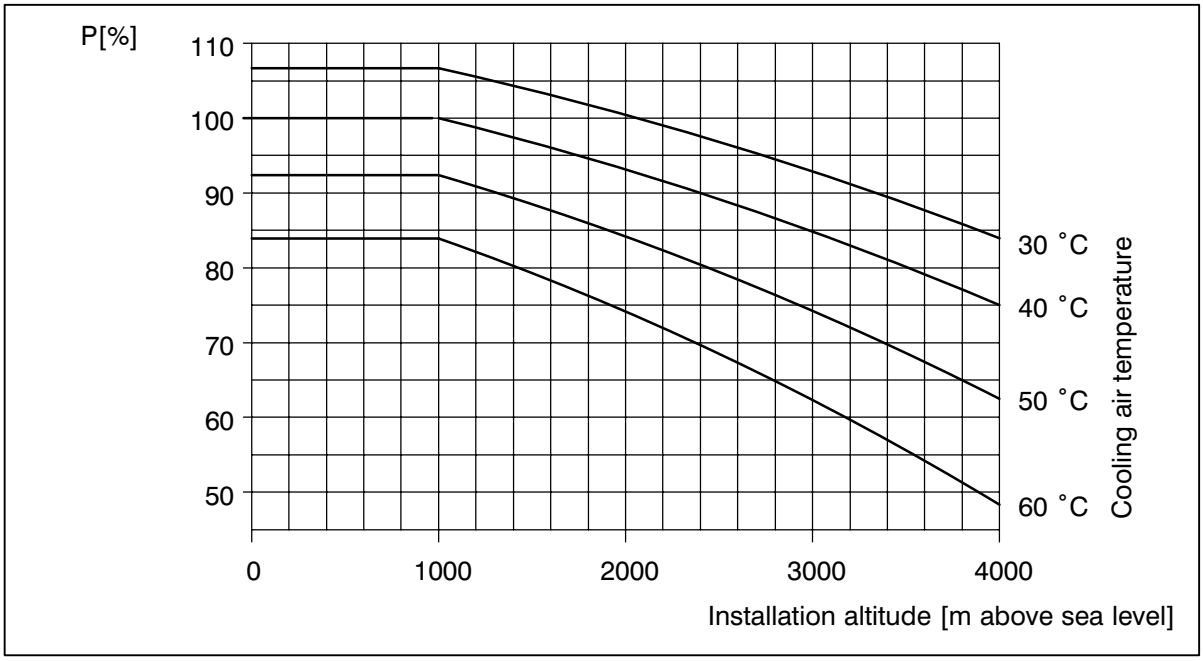
Size			160		
DU motors			**160S**	**160M**	**160L**
Nominal power[1)]	P_N	[kW]	30	37	45
Nominal frequency Nominal speed Max. speed (standard) Speed range	f_N n_N	[Hz] [rpm] [rpm] [rpm]	50 1500 6000 1500-6000/9000	50 1500 6000 1500-5500/9000	50 1500 6000 1500-4500/9000
Power range		[kW]	30/15	37/17	45/18
Max. speed with holding brake and vertical installation (IM V15, IM V36)		[rpm]	3 500		
Nominal torque	M_N	[Nm]	191	235	286
Nominal current	I_N	[A]	51	63	76
Dimensions: Shaft	d x l	[mm]	∅ 55 x 110		
Length without holding br.		[mm]	910	975	1040
Moment of inertia J		[10^{-3} kgm^2]	251	304	356
Mass for IMB35		[kg]	230	265	295
Holding brake (option)					
Motor type			LT 240		
Holding torque			240		
Nominal current		[A]	4,2		
Moment of inertia		[10^{-3} kgm^2]	7,3		
Switch-on time (release)		[ms]	400		
Weight		[kg]	20,0		

1) The nominal motor power applies to converter operation with suction ventilation from the drive end (flange side) to the non-drive end
Overload capability, refer to Performance characteristics, Section 3.5.

Permissible motor-module combinations, see manual no. 35.

Derating for θ_U > 40 °C and over 1000 m above sea level

Power is reduced at installation altitudes of over 1000 m NN and/or a cooling air temperature above 40 °C:



3.3 Noise generation

The tables below specify the mean measuring-surface sound-pressure level L_A at a distance of 1,0 m in accordance with ISO 1680.
The maximum operating noise level in the case of converter operation and idling including external ventilation unit is specified.

Operating noise level [dB(A)]
(without L_N wiring at the module)

Size	Speed [rpm]					
	1 000	1 500	3 600	6 000	7 200	9 000
90	66	65	63	64	64	66
100	72	70	69	69	70	70
132	69	70	70	71	74	75
160	76	79	75	75	76	79

3.4 Limit values of vibration severity grade

The following limit values were determined for the effective vibration velocity for the available vibration severity grades R, S, S1, S2 and S3 on the basis of DIN VDE 0530-14:

Size 90 to 132

Effective vibration velocity in [mm/s]

Operating speed	Vibration severity grade				
	R	S	S1	S2*	S3*
600 – 1800 rpm	0,71	0,45	0,28	0,18	0,11
1801 – 3600 rpm	1,12	0,71	0,45	0,28	0,18
3601 – 6000 rpm	1,8	1,12	0,71	0,45	0,28
6001 – 9000 rpm	2,8	1,8	1,12	0,71	0,45
9001 – 12000 rpm	4,5	2,8	1,8	1,12	0,71

* Motors with vibration severity grade S2 should, if possible, have a smooth shaft
In the case of shafts with keyway and feather key, the feather key must be screwed firmly into position; motors with vibration severity grade S3 must be designed with a smooth shaft

Size 160

Effective vibration velocity in [mm/s]

Operating speed	Vibration severity grade				
	R	S	S1	S2**	S3**
600 – 1800 rpm	1,12	0,71	0,45	0,28	0,18
1801 – 3600 rpm	1,8	1,12	0,71	0,45	0,28
3601 – 6000 rpm	2,8	1,8	1,12	0,71	0,45
6001 – 9000 rpm	4,5	2,8	1,8**	1,12	0,71

** Motors must have a smooth shaft!

☞ **Note**

Vibration severity grade S to S3 cannot be achieved with motors with holding brakes.
The motors must be designed with a smooth shaft for some vibration severity grades.

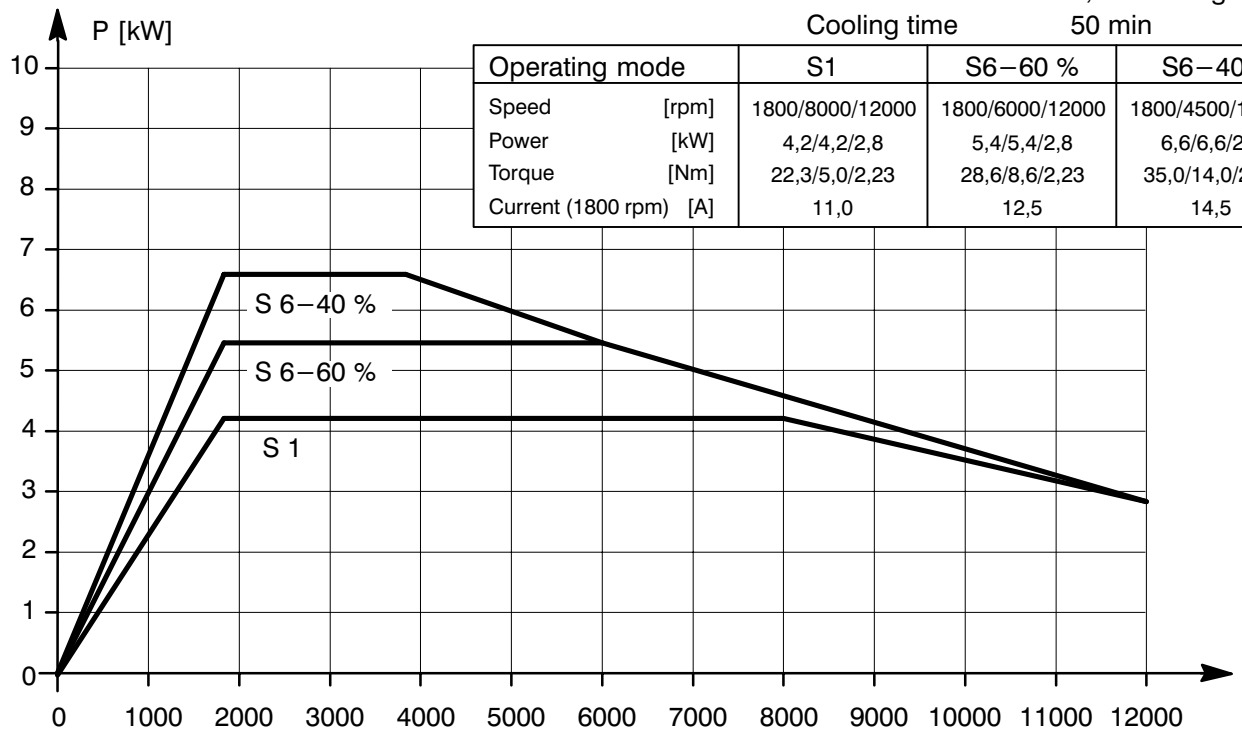
The motor is balanced without external moment of inertia.
Higher vibration severity grades available on request.

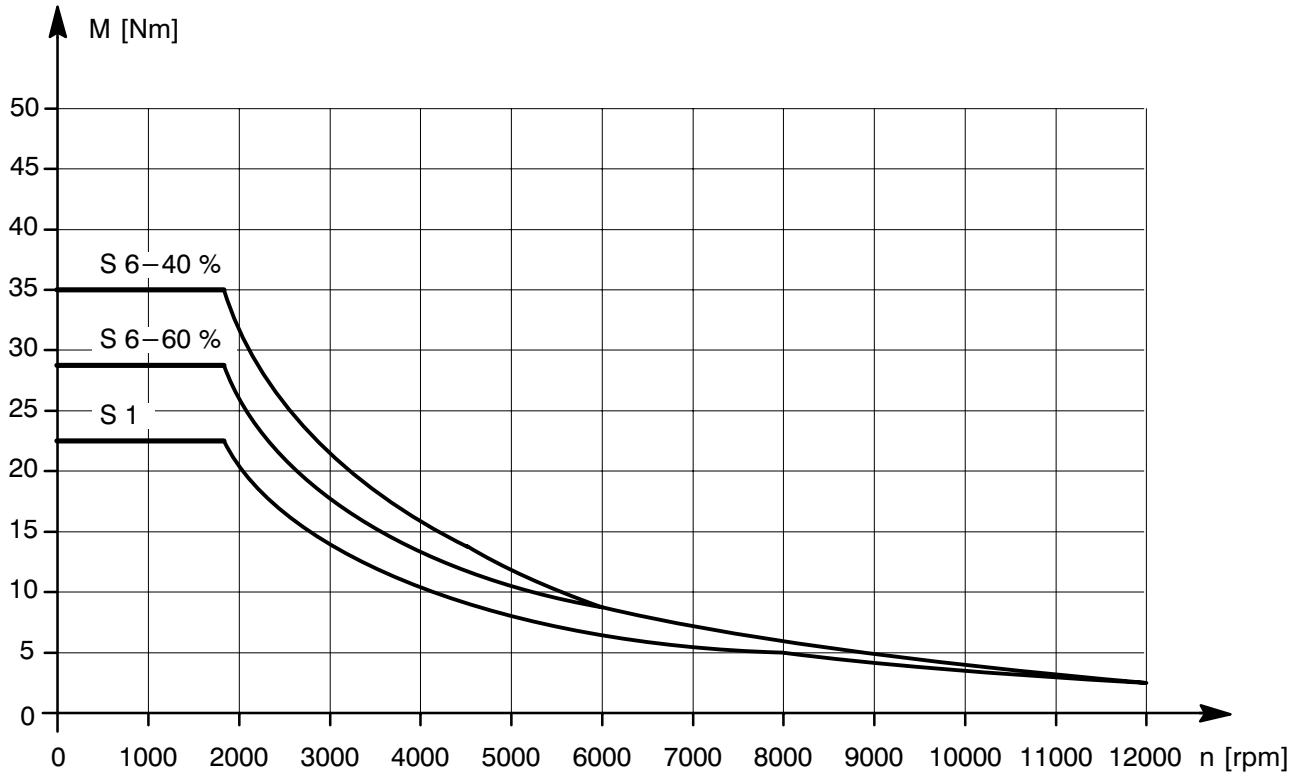
3.5 Power and torque characteristics

DU□ 90L 120-060..

Nominal power	4,2 kW
Moment of inertia	5,55 10^{-3} kgm^2
Cooling time	50 min

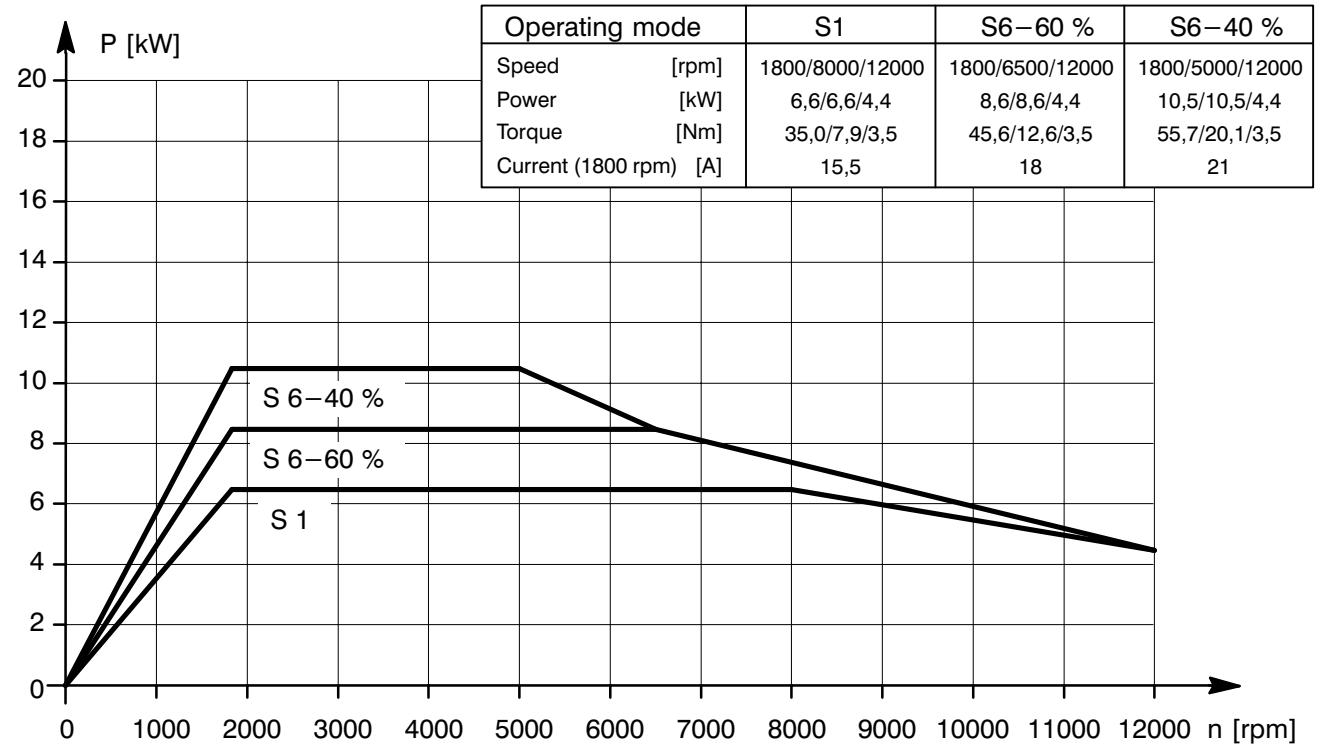
Operating mode		S1	S6−60 %	S6−40 %
Speed	[rpm]	1800/8000/12000	1800/6000/12000	1800/4500/12000
Power	[kW]	4,2/4,2/2,8	5,4/5,4/2,8	6,6/6,6/2,8
Torque	[Nm]	22,3/5,0/2,23	28,6/8,6/2,23	35,0/14,0/2,23
Current (1800 rpm)	[A]	11,0	12,5	14,5

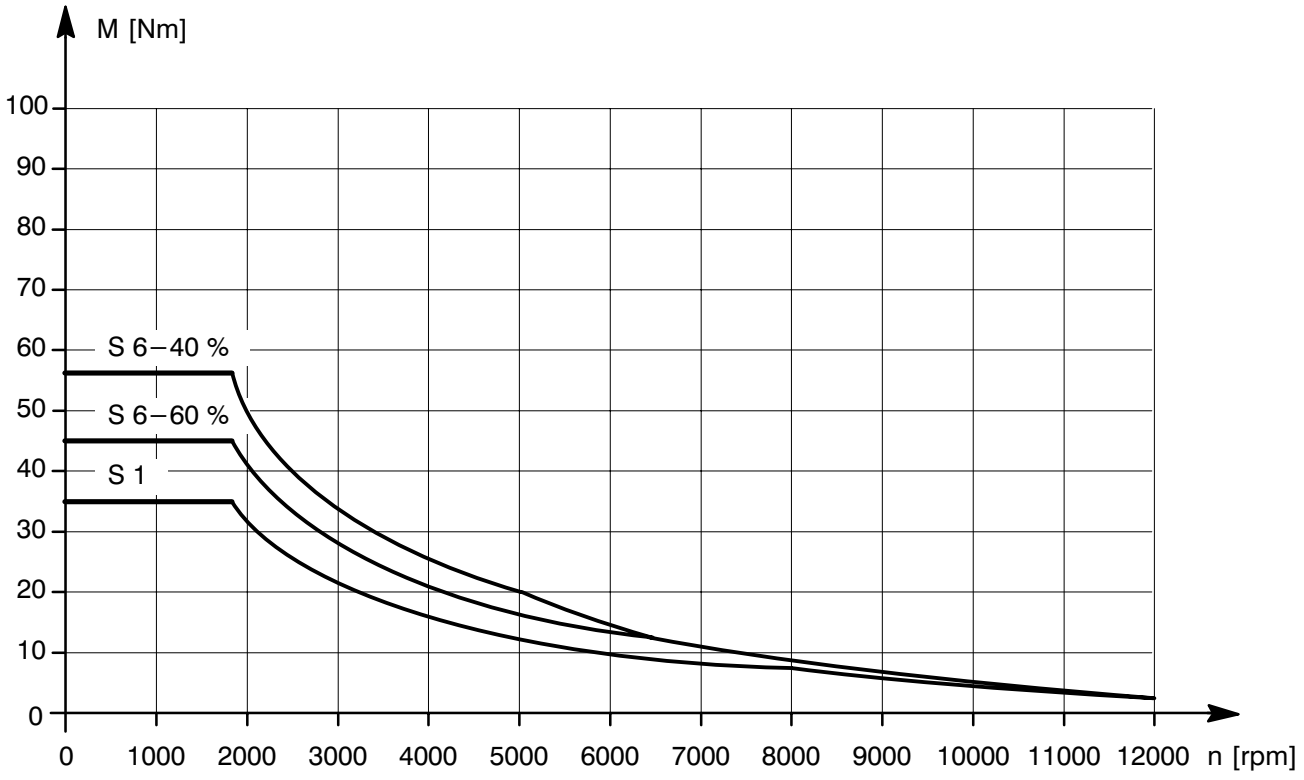




DU□ 100M 120−060.. Nominal power 6,6 kW
Moment of inertia 18,4 10^{-3} kgm^2
Cooling time 65 min

Operating mode		S1	S6−60 %	S6−40 %
Speed	[rpm]	1800/8000/12000	1800/6500/12000	1800/5000/12000
Power	[kW]	6,6/6,6/4,4	8,6/8,6/4,4	10,5/10,5/4,4
Torque	[Nm]	35,0/7,9/3,5	45,6/12,6/3,5	55,7/20,1/3,5
Current (1800 rpm)	[A]	15,5	18	21

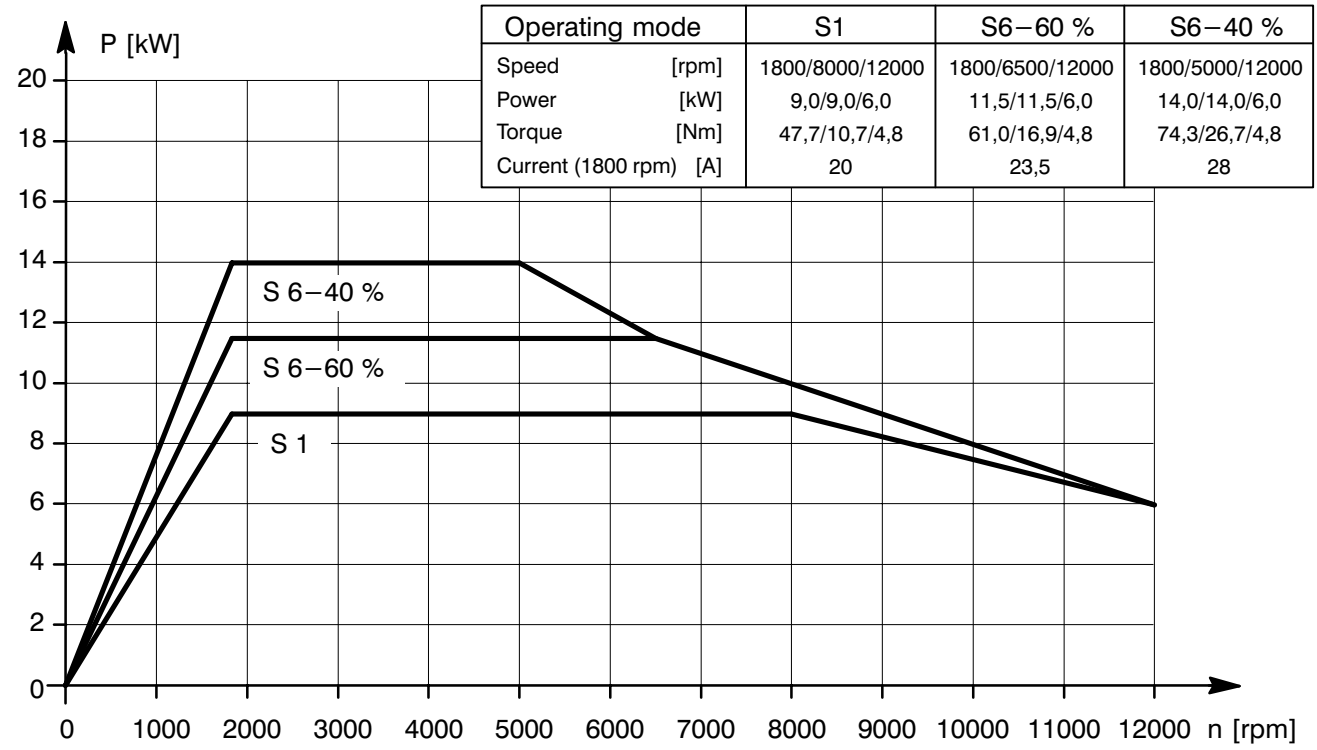


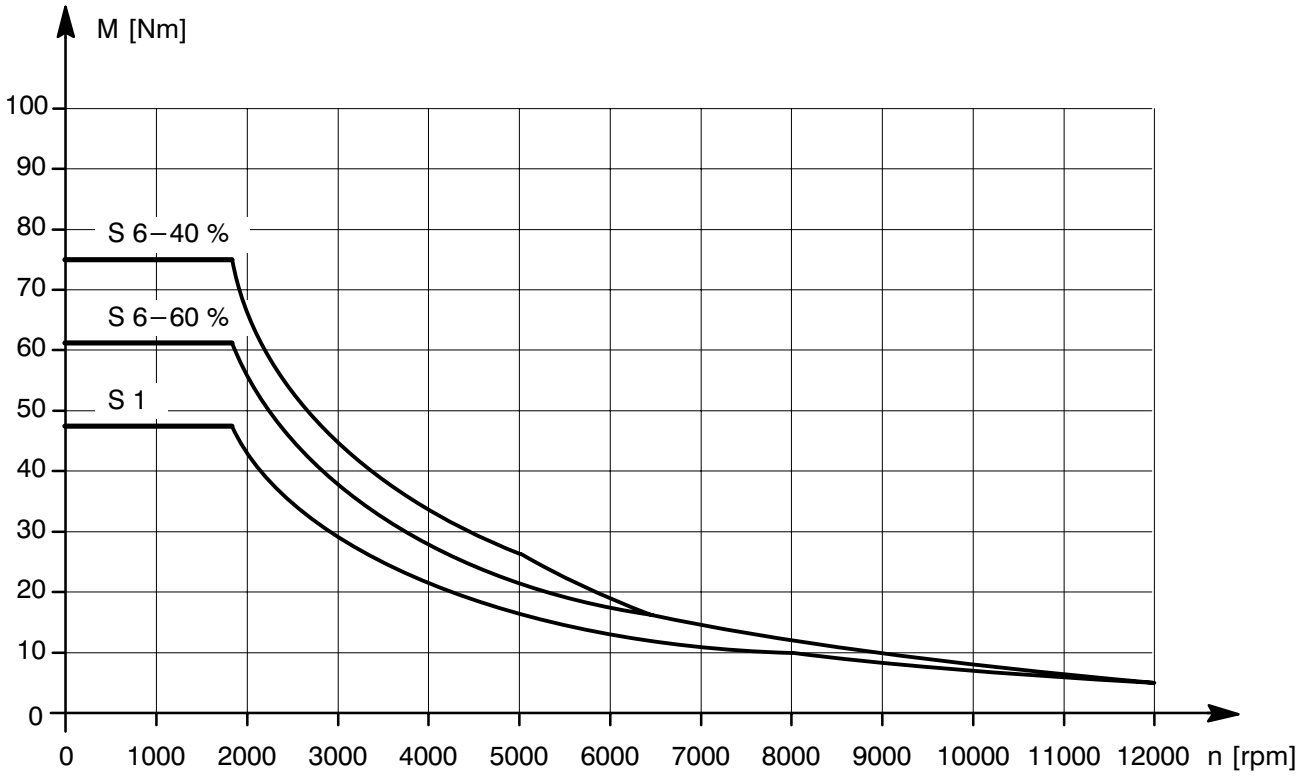


DU□ 100L 120−060..

Nominal power	9,0 kW
Moment of inertia	24,2 10^{-3} kgm^2
Cooling time	70 min

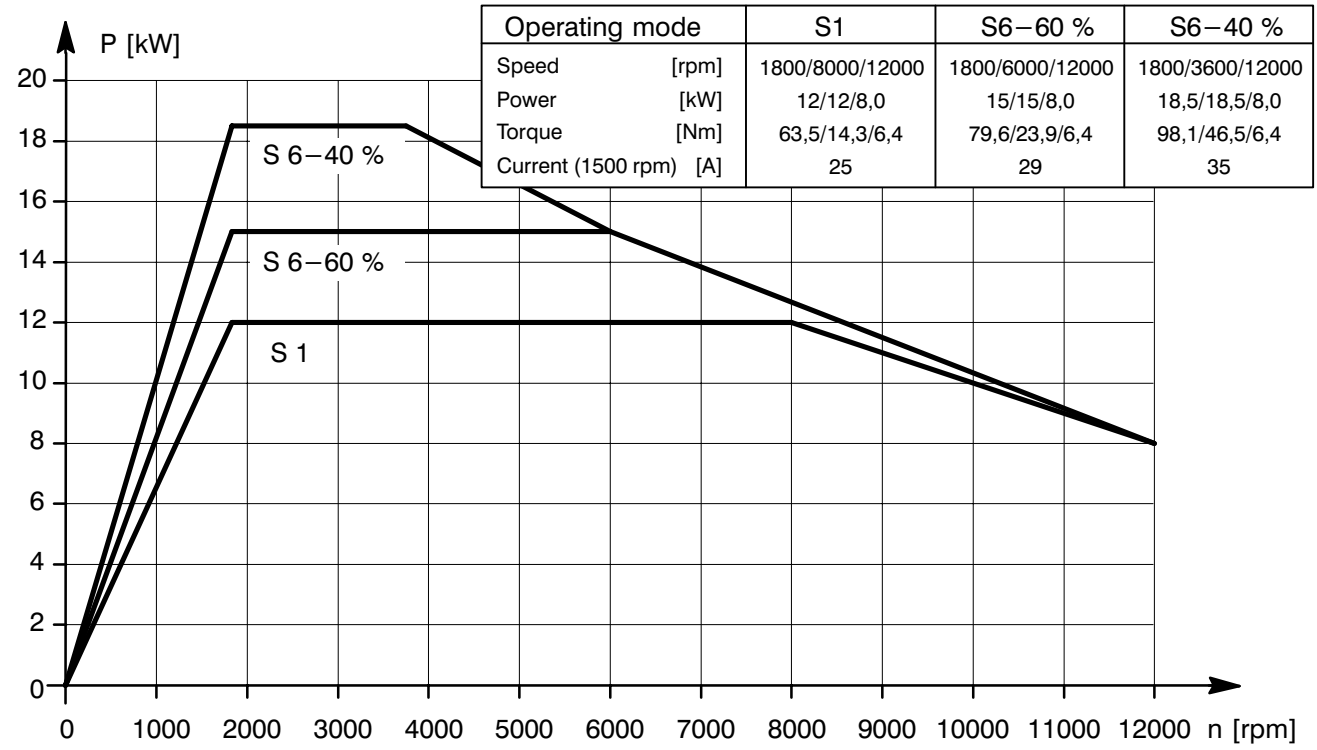
Operating mode		S1	S6−60 %	S6−40 %
Speed	[rpm]	1800/8000/12000	1800/6500/12000	1800/5000/12000
Power	[kW]	9,0/9,0/6,0	11,5/11,5/6,0	14,0/14,0/6,0
Torque	[Nm]	47,7/10,7/4,8	61,0/16,9/4,8	74,3/26,7/4,8
Current (1800 rpm)	[A]	20	23,5	28

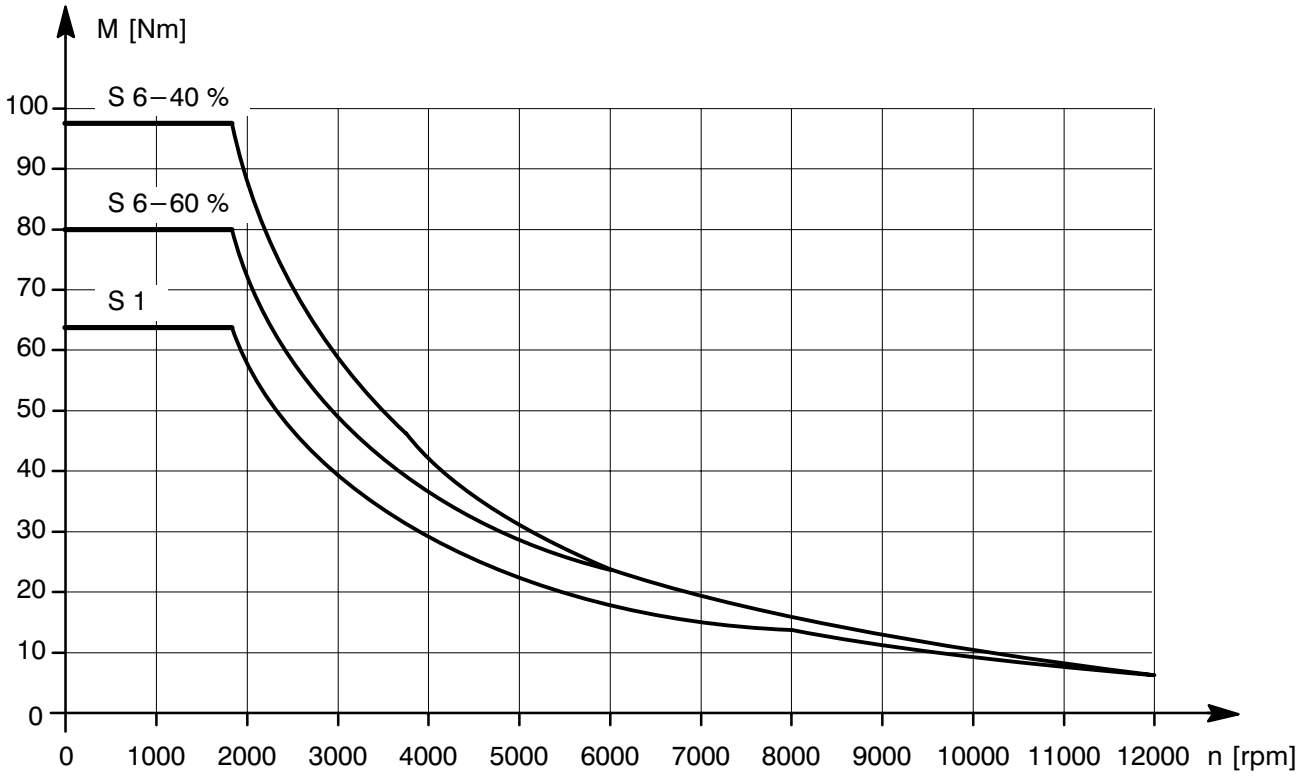




DU□ 100U 120−060.. Nominal power 12 kW
Moment of inertia 29,1 10^{-3} kgm^2
Cooling time 80 min

Operating mode		S1	S6−60 %	S6−40 %
Speed	[rpm]	1800/8000/12000	1800/6000/12000	1800/3600/12000
Power	[kW]	12/12/8,0	15/15/8,0	18,5/18,5/8,0
Torque	[Nm]	63,5/14,3/6,4	79,6/23,9/6,4	98,1/46,5/6,4
Current (1500 rpm)	[A]	25	29	35

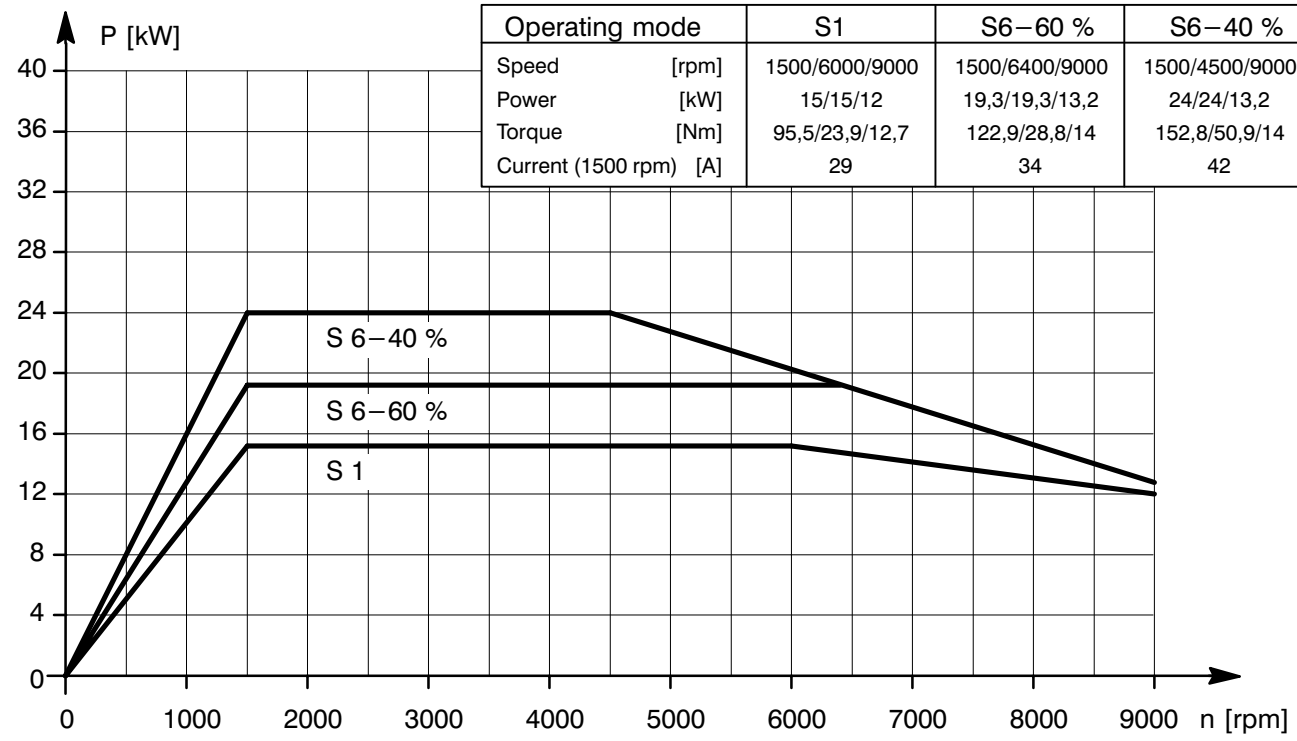


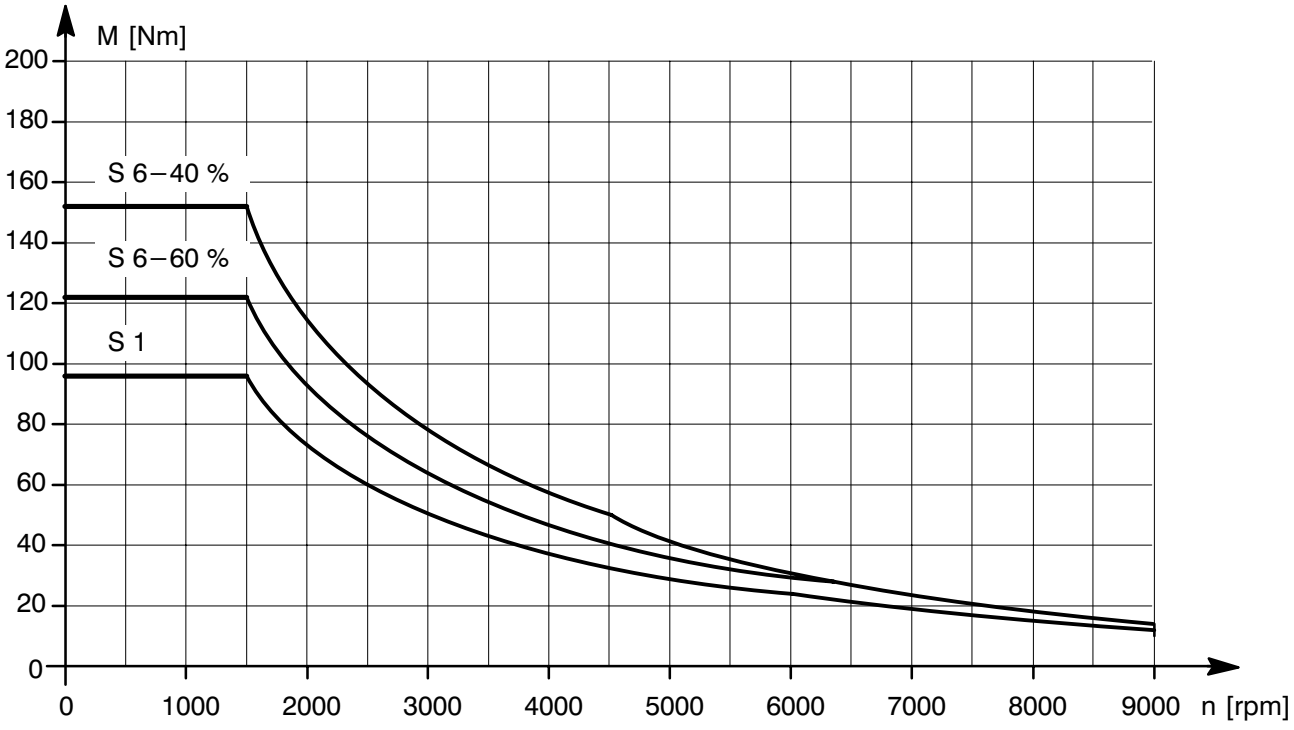


DU□ 132S 090−050..

Nominal power	15 kW
Moment of inertia	82,7 10^{-3} kgm^2
Cooling time	110 min

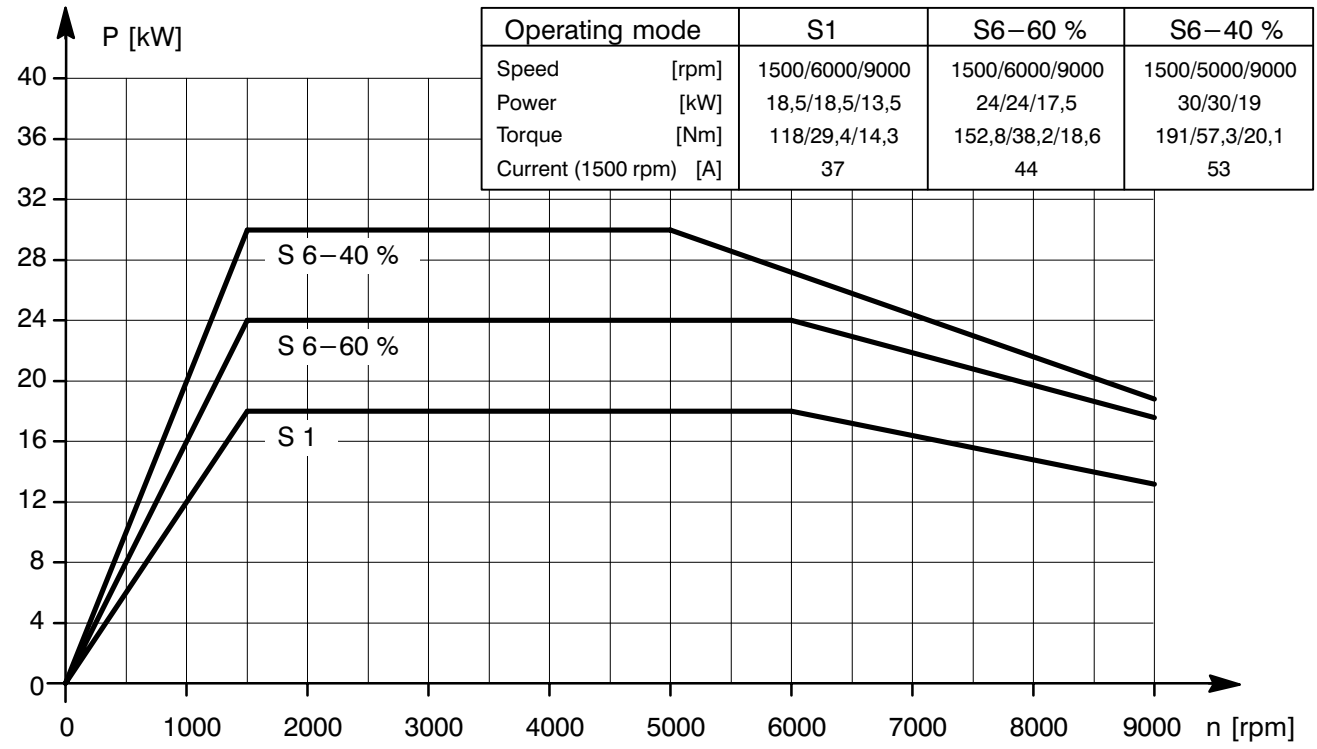
Operating mode		S1	S6−60 %	S6−40 %
Speed	[rpm]	1500/6000/9000	1500/6400/9000	1500/4500/9000
Power	[kW]	15/15/12	19,3/19,3/13,2	24/24/13,2
Torque	[Nm]	95,5/23,9/12,7	122,9/28,8/14	152,8/50,9/14
Current (1500 rpm)	[A]	29	34	42

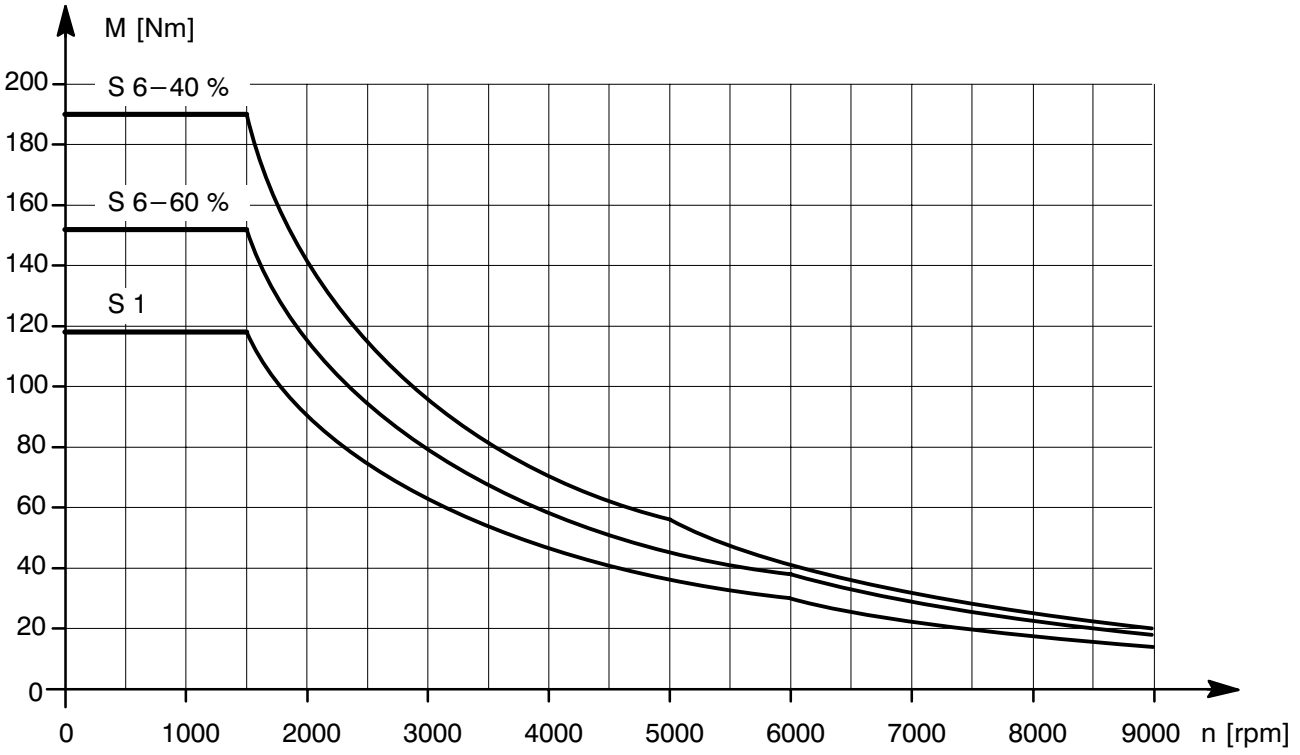




DU□ 132M 090−050.. Nominal power 18,5 kW
Moment of inertia 101 10^{-3} kgm^2
Cooling time 115 min

Operating mode		S1	S6−60 %	S6−40 %
Speed	[rpm]	1500/6000/9000	1500/6000/9000	1500/5000/9000
Power	[kW]	18,5/18,5/13,5	24/24/17,5	30/30/19
Torque	[Nm]	118/29,4/14,3	152,8/38,2/18,6	191/57,3/20,1
Current (1500 rpm)	[A]	37	44	53

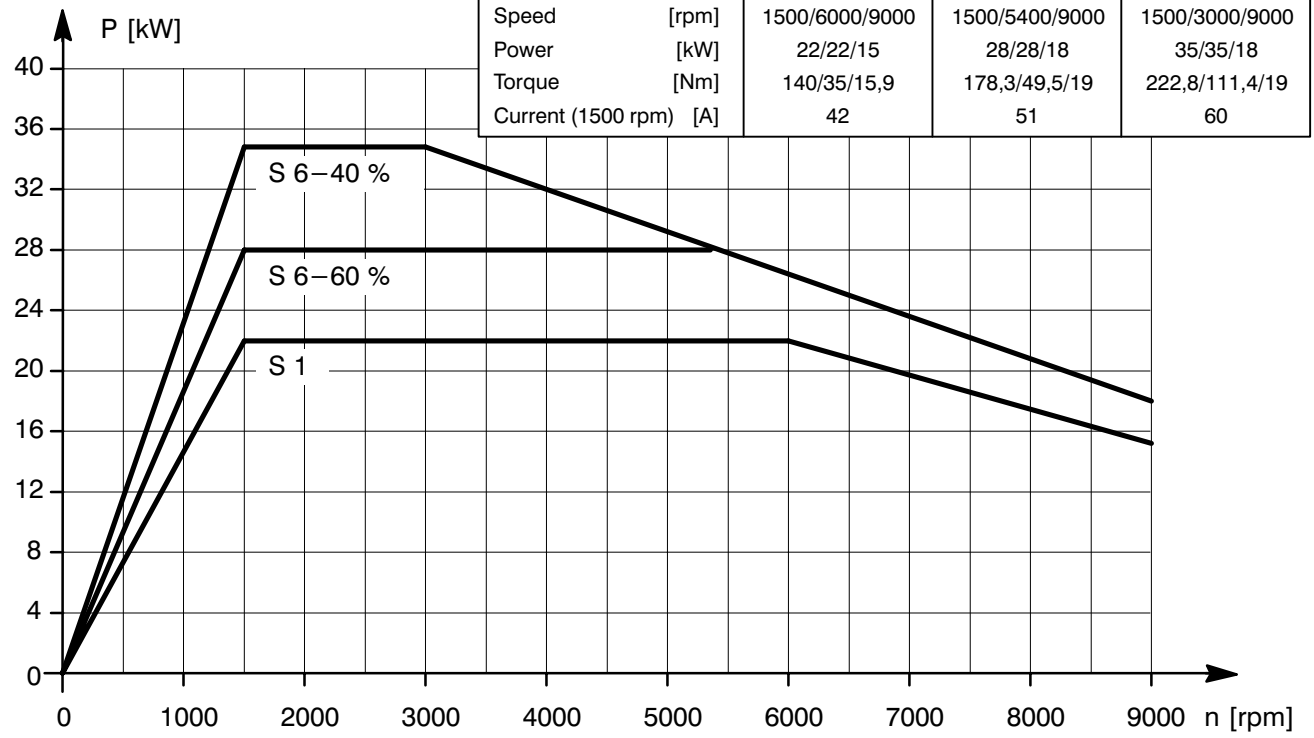


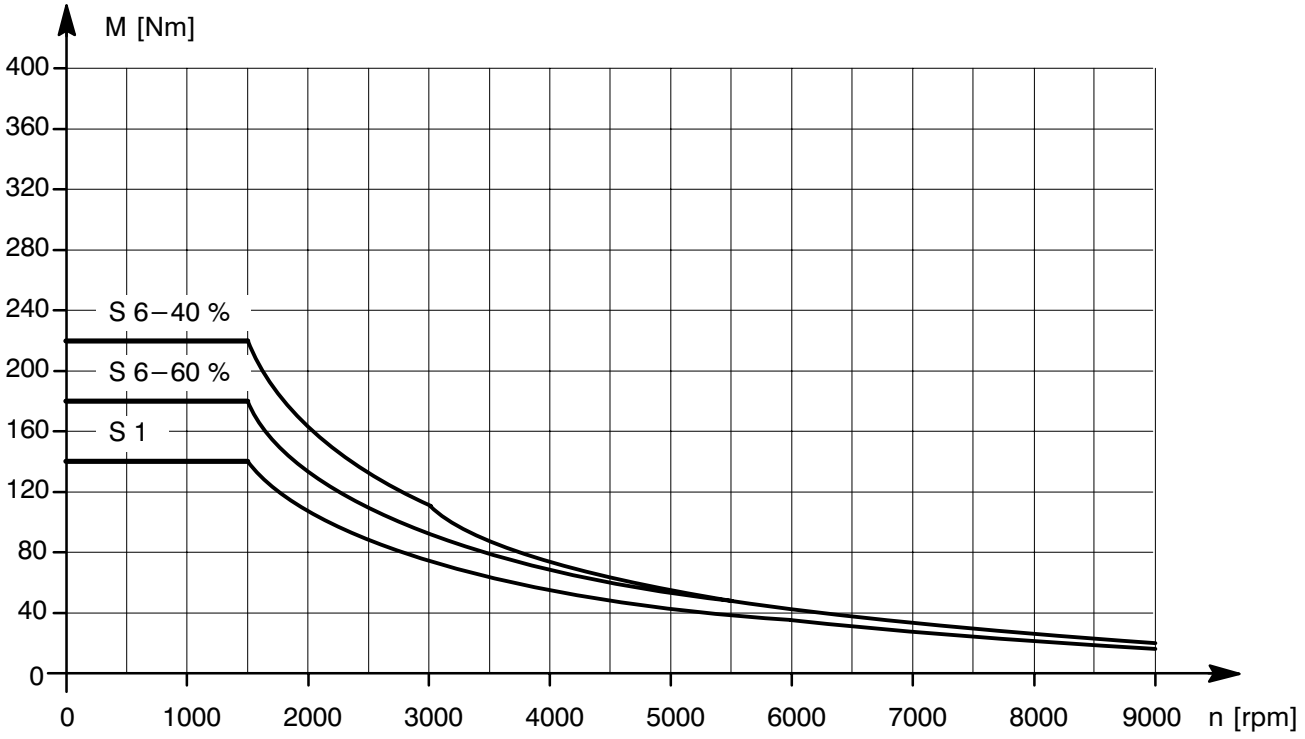


DU□ 132L 090−050..

Nominal power	22 kW
Moment of inertia	119 10^{-3} kgm^2
Cooling time	120 min

Operating mode		S1	S6−60 %	S6−40 %
Speed	[rpm]	1500/6000/9000	1500/5400/9000	1500/3000/9000
Power	[kW]	22/22/15	28/28/18	35/35/18
Torque	[Nm]	140/35/15,9	178,3/49,5/19	222,8/111,4/19
Current (1500 rpm)	[A]	42	51	60

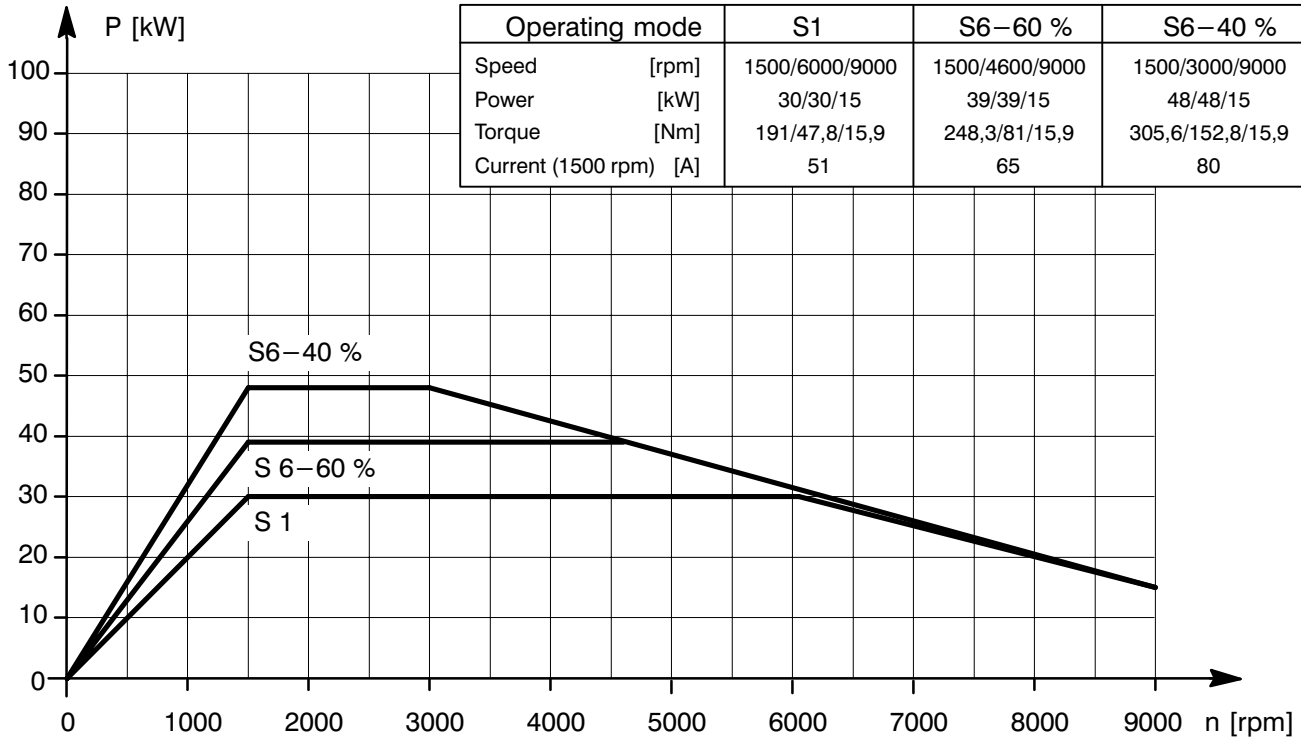


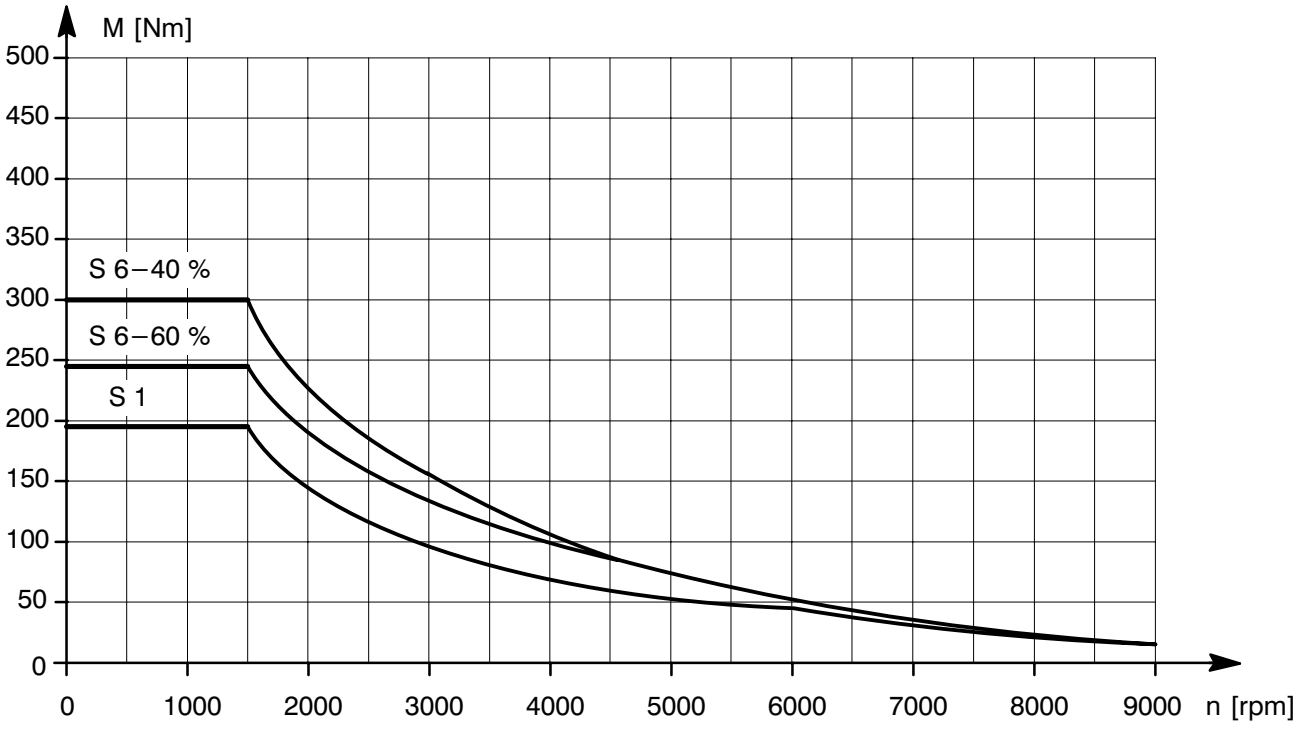


DU□ 160S 090−050..

Nominal power	30 kW
Moment of inertia	251 10^{-3} kgm^2
Cooling time	150 min

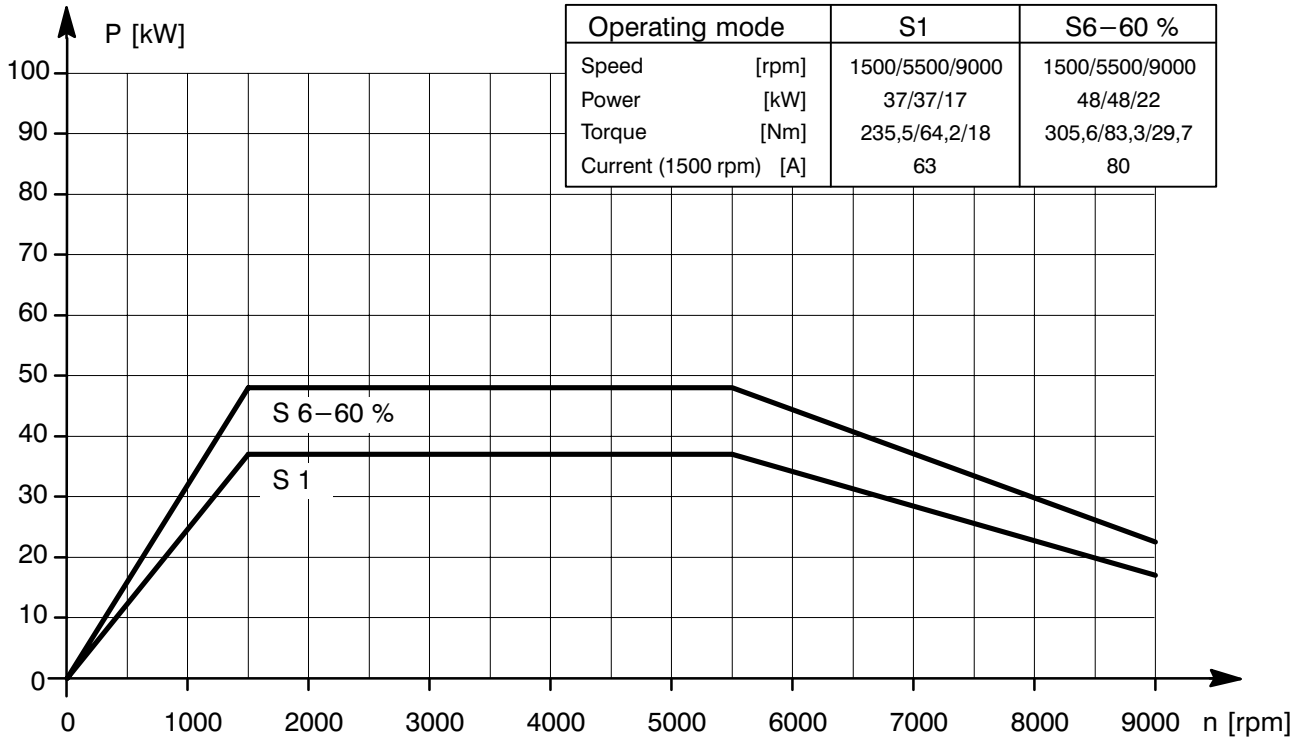
Operating mode		S1	S6−60 %	S6−40 %
Speed	[rpm]	1500/6000/9000	1500/4600/9000	1500/3000/9000
Power	[kW]	30/30/15	39/39/15	48/48/15
Torque	[Nm]	191/47,8/15,9	248,3/81/15,9	305,6/152,8/15,9
Current (1500 rpm)	[A]	51	65	80

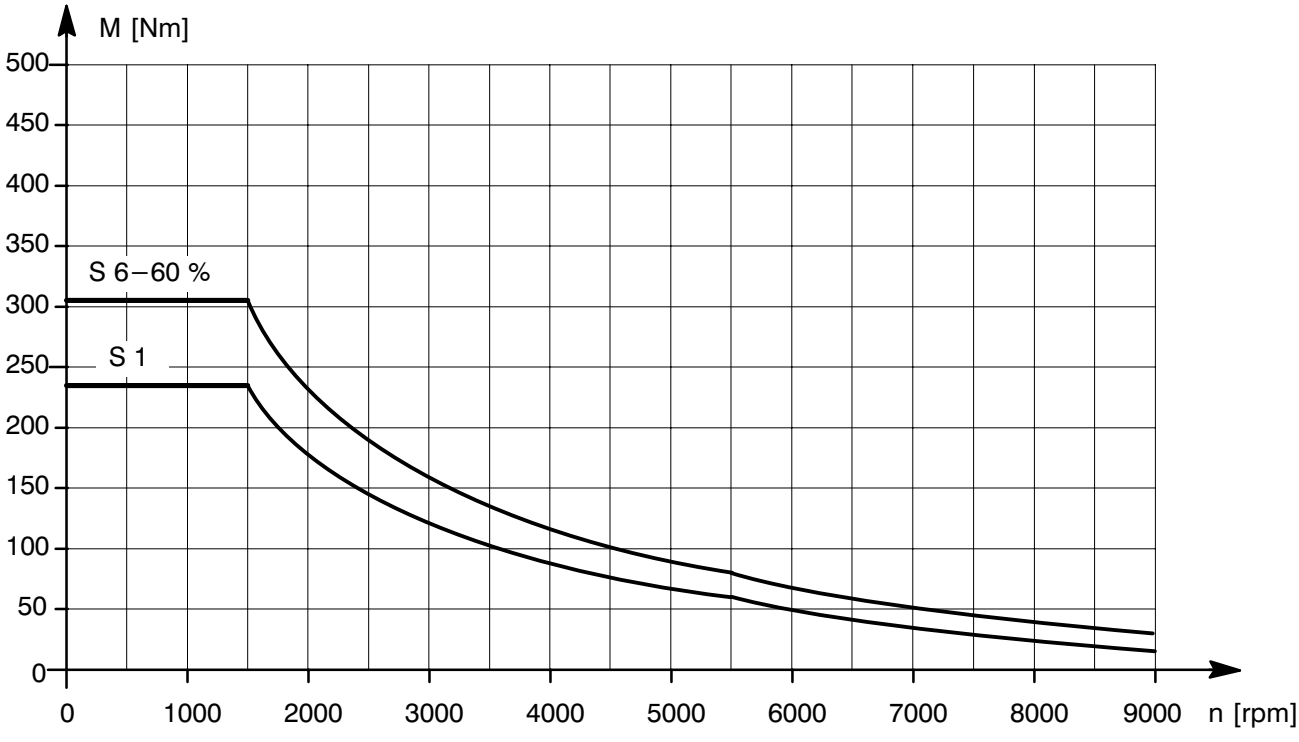




DU□ 160M 090−050.. Nominal power 37 kW
Moment of inertia 304 10^{-3} kgm^2
Cooling time 160 min

Operating mode		S1	S6−60 %
Speed	[rpm]	1500/5500/9000	1500/5500/9000
Power	[kW]	37/37/17	48/48/22
Torque	[Nm]	235,5/64,2/18	305,6/83,3/29,7
Current (1500 rpm)	[A]	63	80

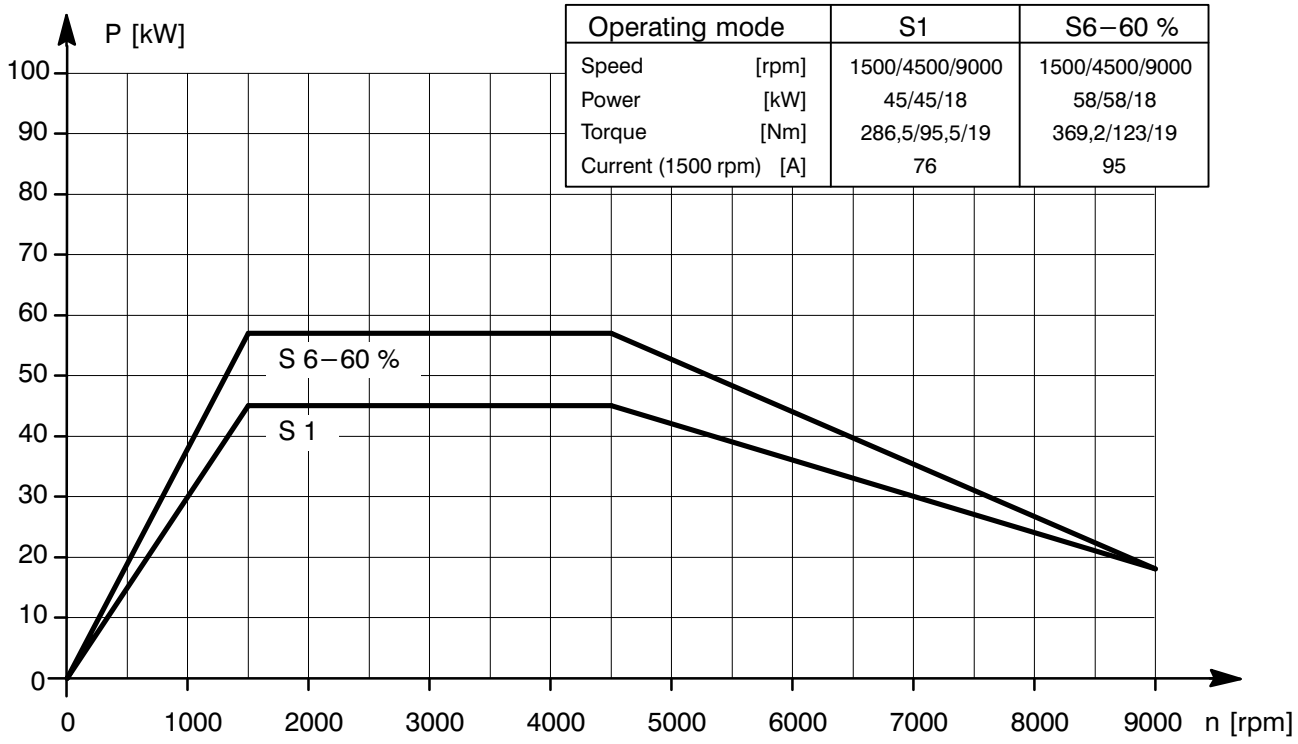


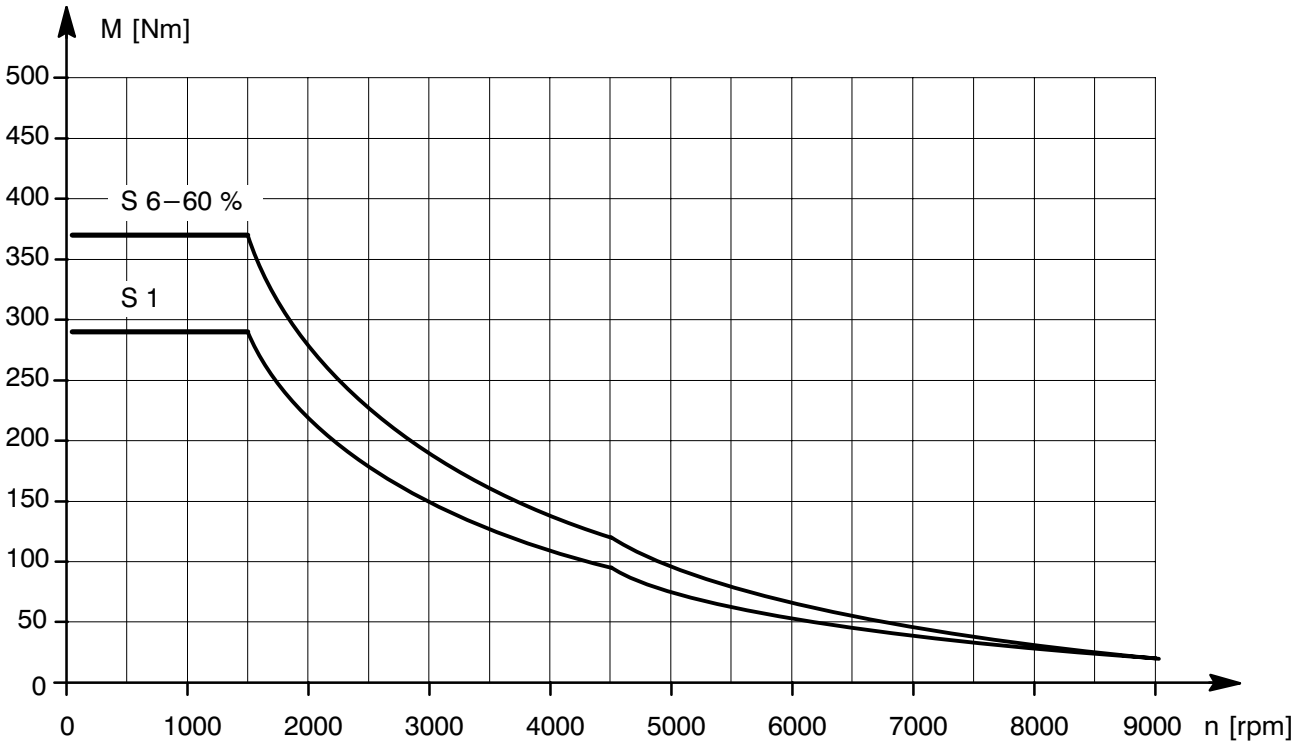


DU□ 160L ..

Nominal power 45 kW
Moment of inertia 356 10^{-3} kgm^2
Cooling time 170 min

Operating mode		S1	S6–60 %
Speed	[rpm]	1500/4500/9000	1500/4500/9000
Power	[kW]	45/45/18	58/58/18
Torque	[Nm]	286,5/95,5/19	369,2/123/19
Current (1500 rpm)	[A]	76	95





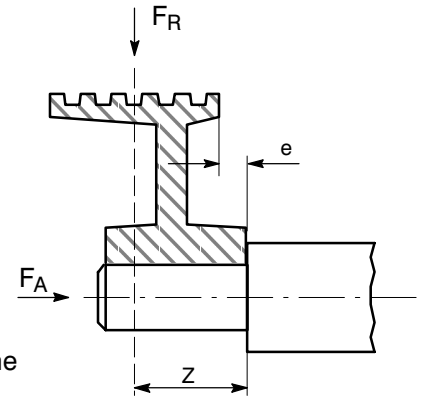
3.6 Mechanical motor shaft load

Torsionally flexible or torsionally rigid couplings are to be provided for **direct coupling.** These must be able to compensate for parallel and longitudinal misalignment as well as angular errors of the shafts which are to be connected.
In particular, the thermal expansion of the motor shaft must be compensated for so that the axial force F_A occurring does not exceed the permitted bearing load (see diagrams).

During **power transmission via a V-belt or a flat belt,** the permitted values for radial shaft load F_R must not be exceeded.
When dimensioning the belt pulley, you must make sure that the pulley width does not exceed double the length of the shaft and that a distance of "e" of 7 mm is observed between the face and the shaft shoulder in order to avoid scraping of the pulley belt.

❑ Calculate the radial force F_R occurring for belt pulleys in accordance with the following formula:

$$F_R = 19{,}1 \cdot 10^6 \frac{P}{n \cdot D} \cdot K_C$$



F_R : Radial shaft load in [N]

P : Nominal power of the motor in [kW]

n : Max. operating speed of the motor in [rpm]

D : Diameter of the belt pulley in [mm]

K_C : Belt tensioning factor, ask the belt supplier.
This can be assumed approximately as follows:
3.0 for normal flat belts
2.2...2.5 for V-belts

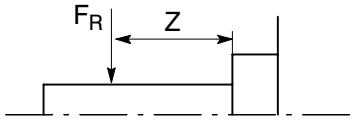
e : Minimum distance of 7 mm between face and shaft shoulder

Z : Distance of belt pulley centre from shaft shoulder

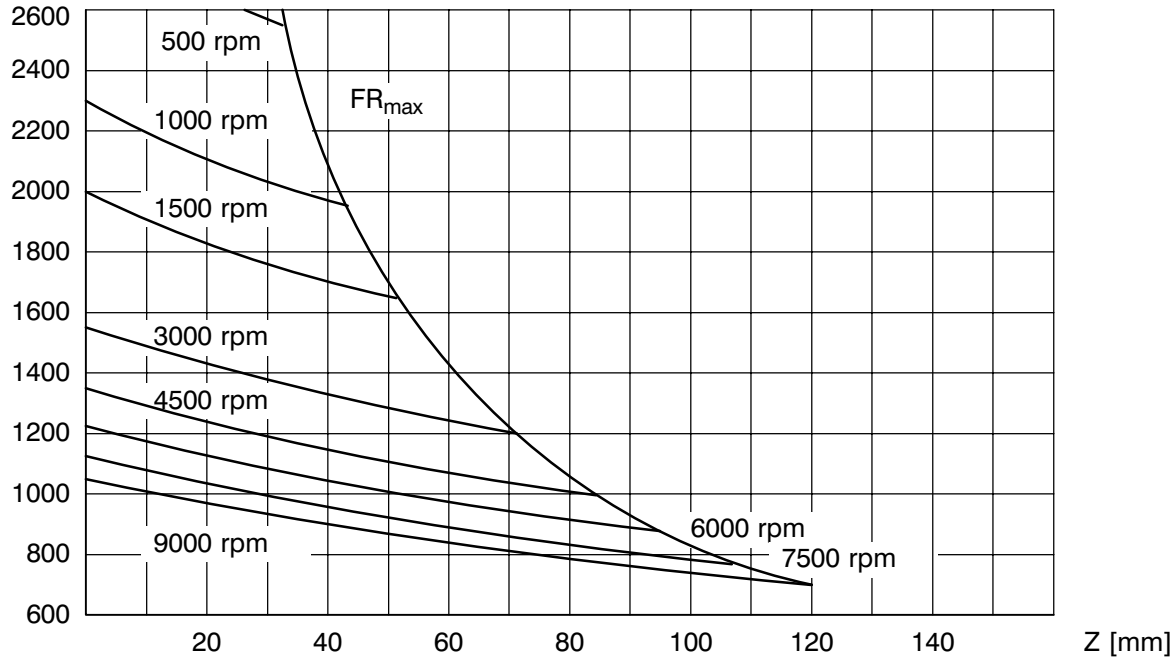
❑ Compare the calculated values for the radial force F_R with the corresponding diagram of the DU motor:

- □ To do this, read the permitted F_R value from the diagram for the distance Z and the maximum operating speed of the motor.
- □ If the calculated radial shaft load F_R is greater than the permitted load, a belt pulley with a larger diameter must be used. A reinforced drive-end bearing is available on request.

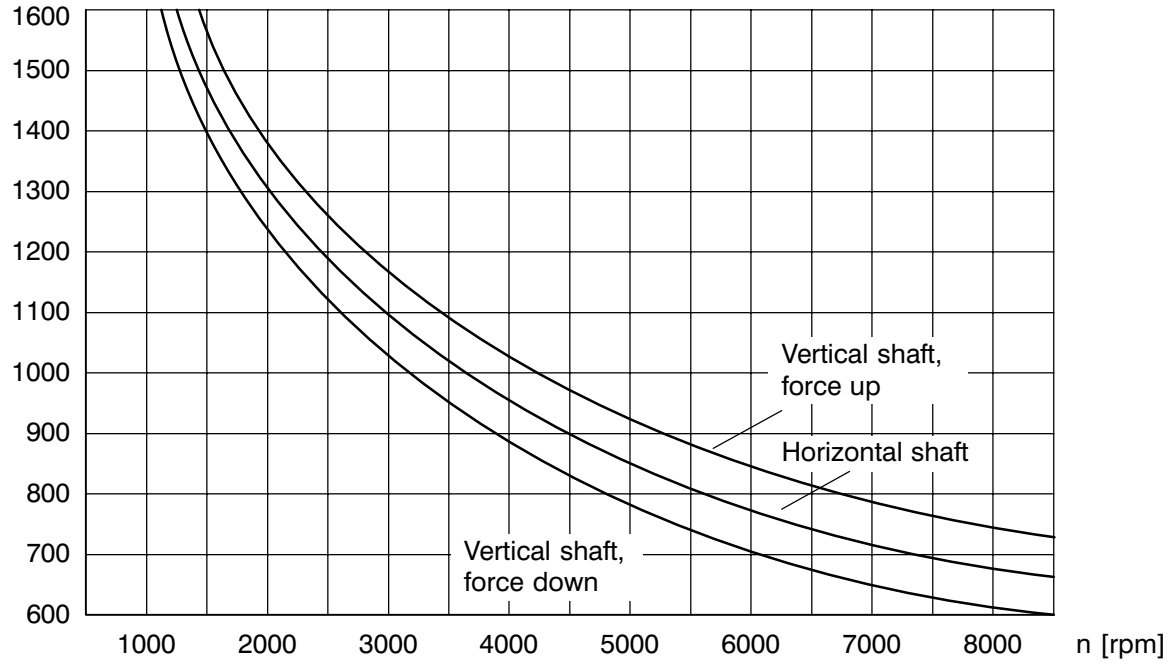
DU 90 L
Deep-groove ball bearing: AS 6306-C3; BS 6206-C3; fixed bearing at drive end; shaft end: Ø 28 x 60 mm



FR [N] Permitted radial force at shaft end

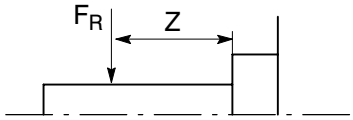


FA [N] Permitted axial force at shaft end

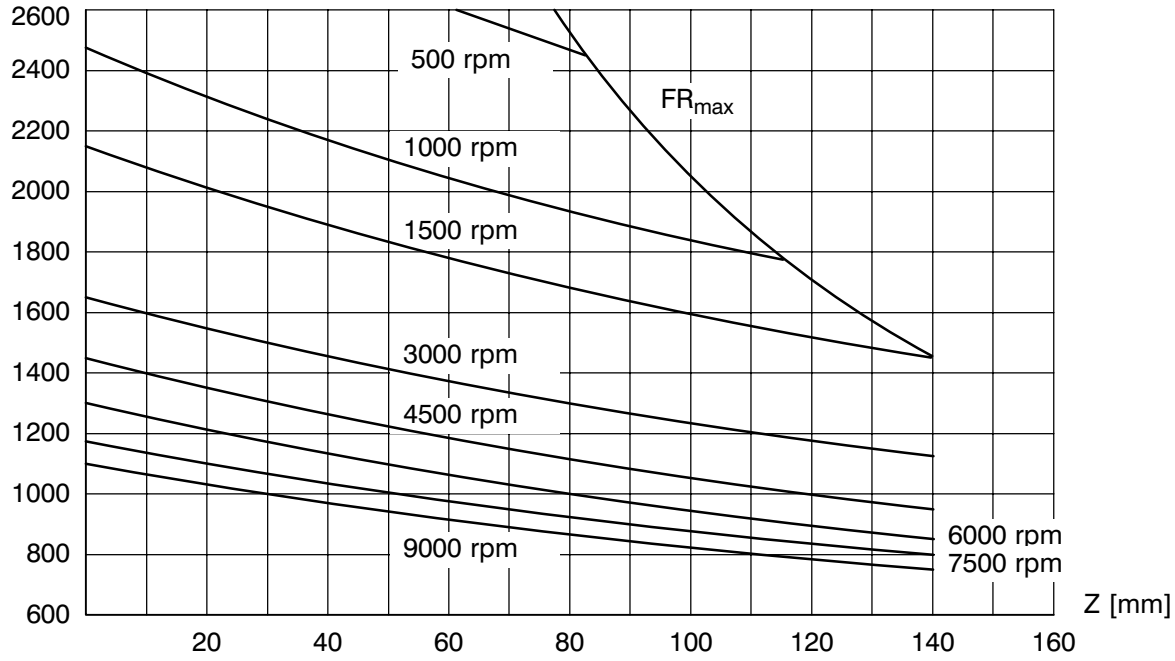


An individual check is necessary if there is simultaneous radial and axial loading!

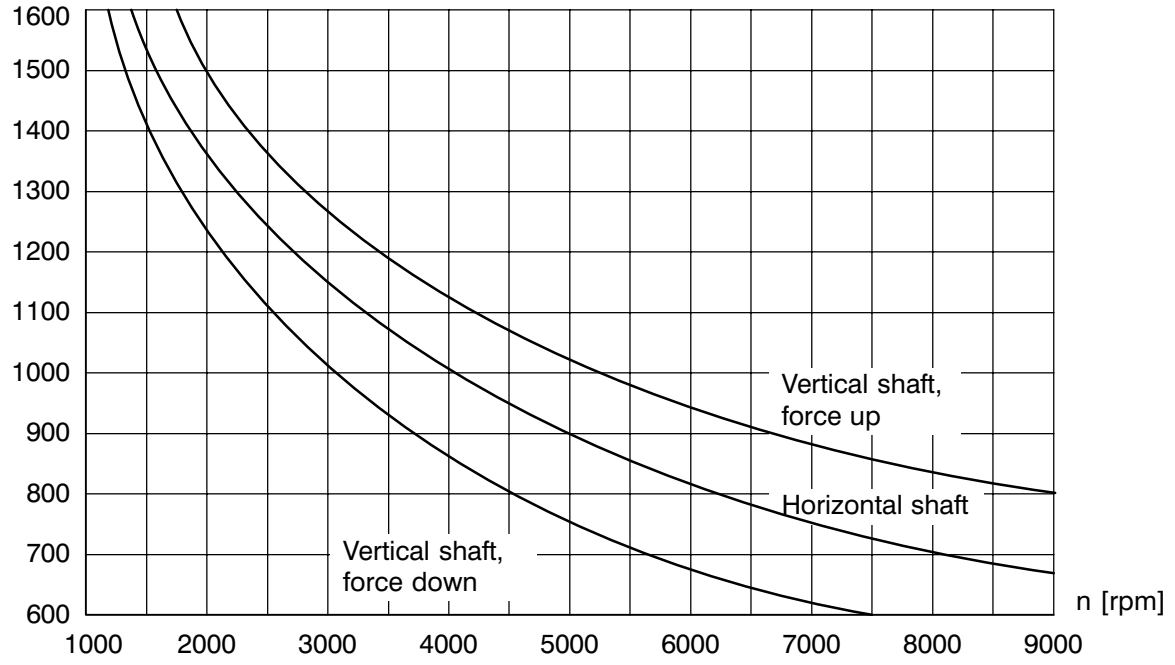
DU 100 M, L, U
Deep-groove ball bearing: AS 6208-C3; BS 6206-C3;
fixed bearing at drive end; shaft end: Ø 38 x 80 mm



FR [N] Permitted radial force at shaft end

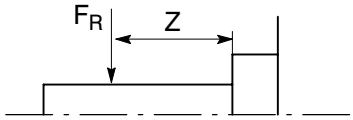


FA [N] Permitted axial force at shaft end

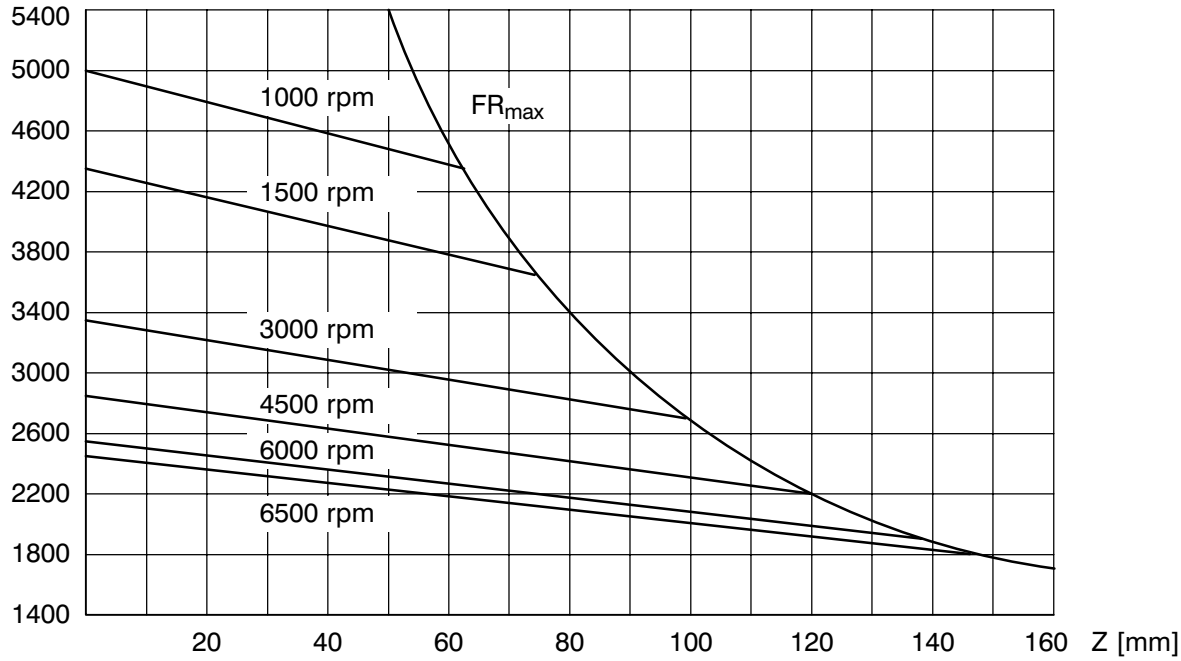


An individual check is necessary if there is simultaneous radial and axial loading!

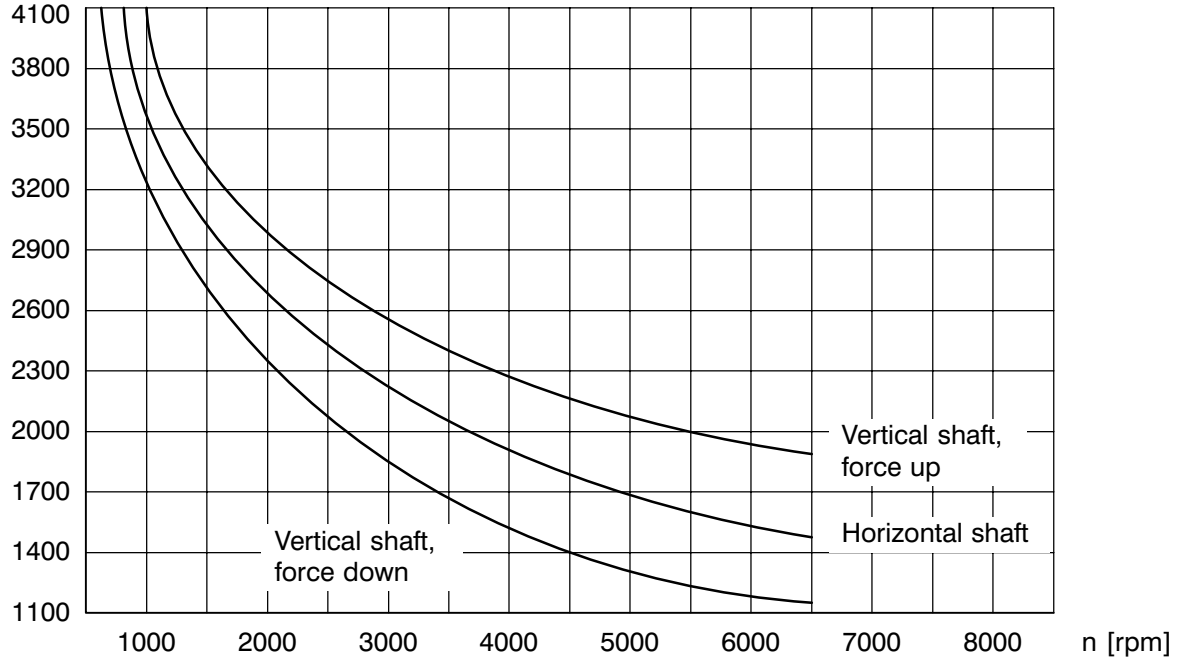
DU 132 S... L
Deep-groove ball bearing: AS 6310-C3; BS 6210-C3;
fixed bearing at drive end; shaft end: Ø 42 x 110 mm



FR [N] Permitted radial force at shaft end

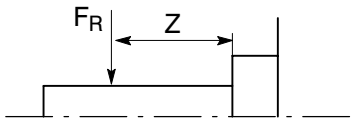


FA [N] Permitted axial force at shaft end

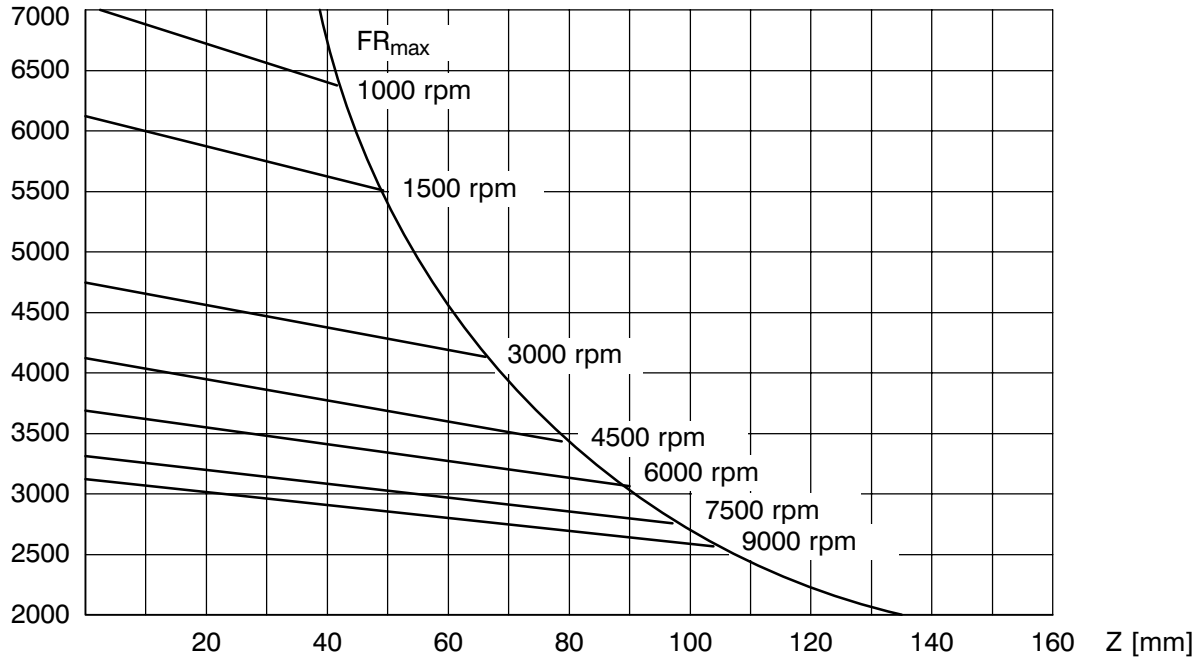


An individual check is necessary if there is simultaneous radial and axial loading!

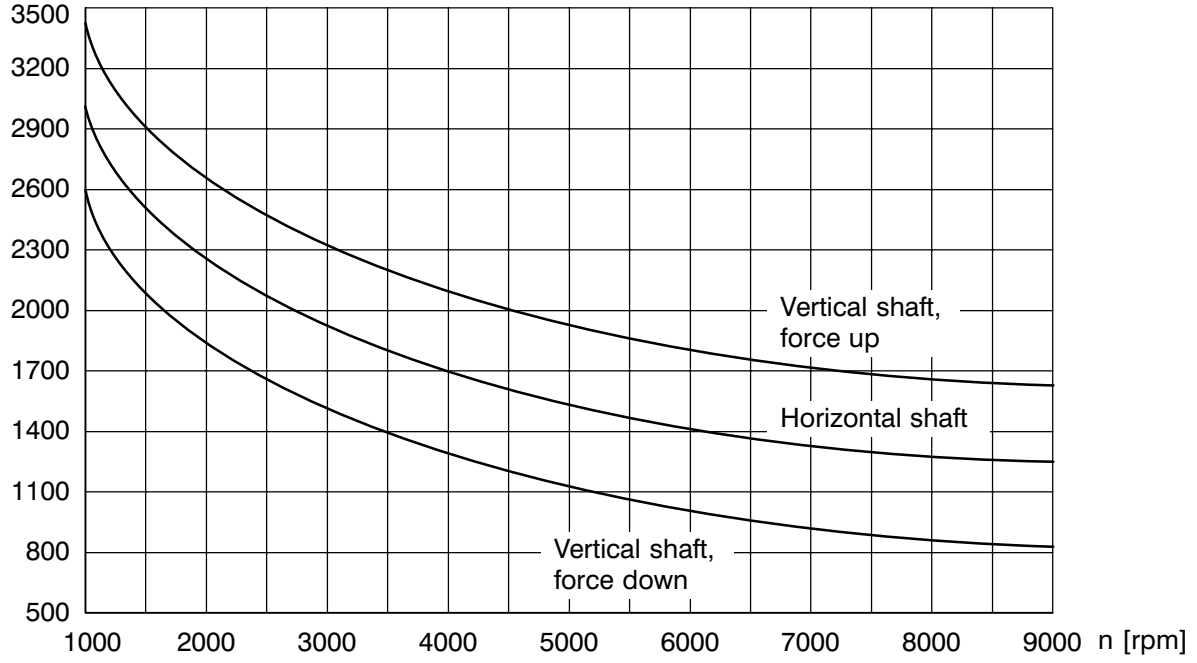
DU 132 S... L
Precision spindle bearing: AS 2x 7210 CDGA/P4A; BS 6208-2ZC3;
fixed bearing at drive end; shaft end: Ø 42 x 110 mm



FR [N] Permitted axial force at shaft end

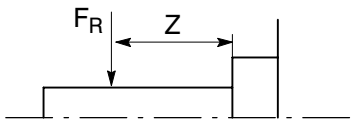


FA [N] Permitted axial force at shaft end

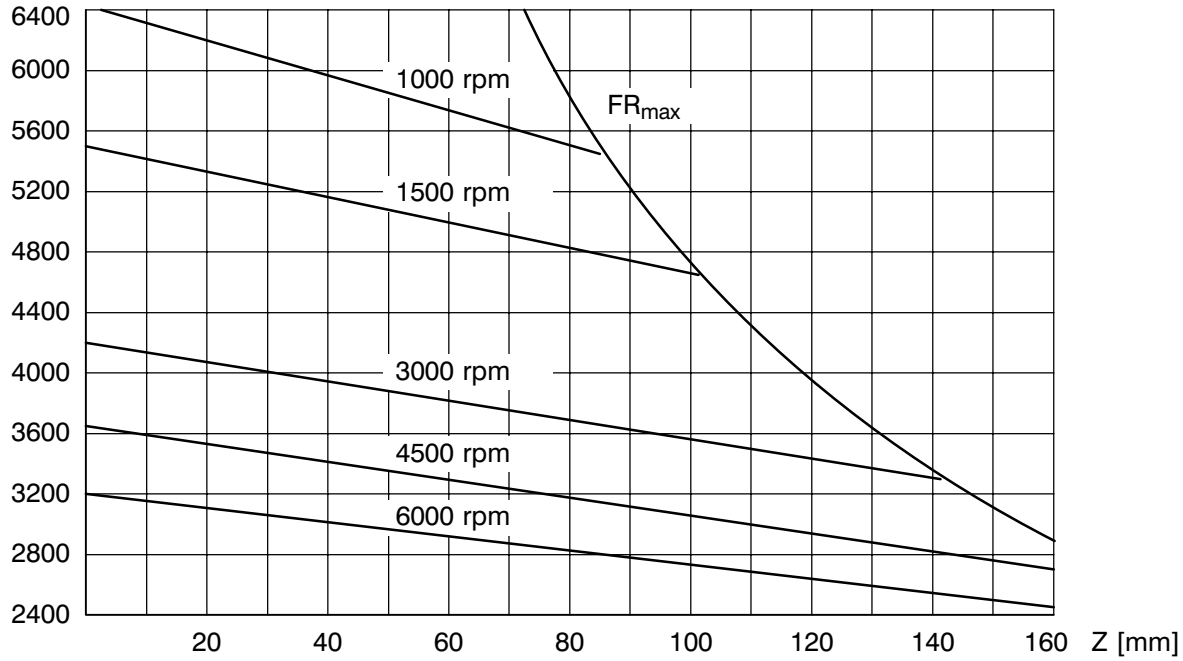


An individual check is necessary if there is simultaneous radial and axial loading!

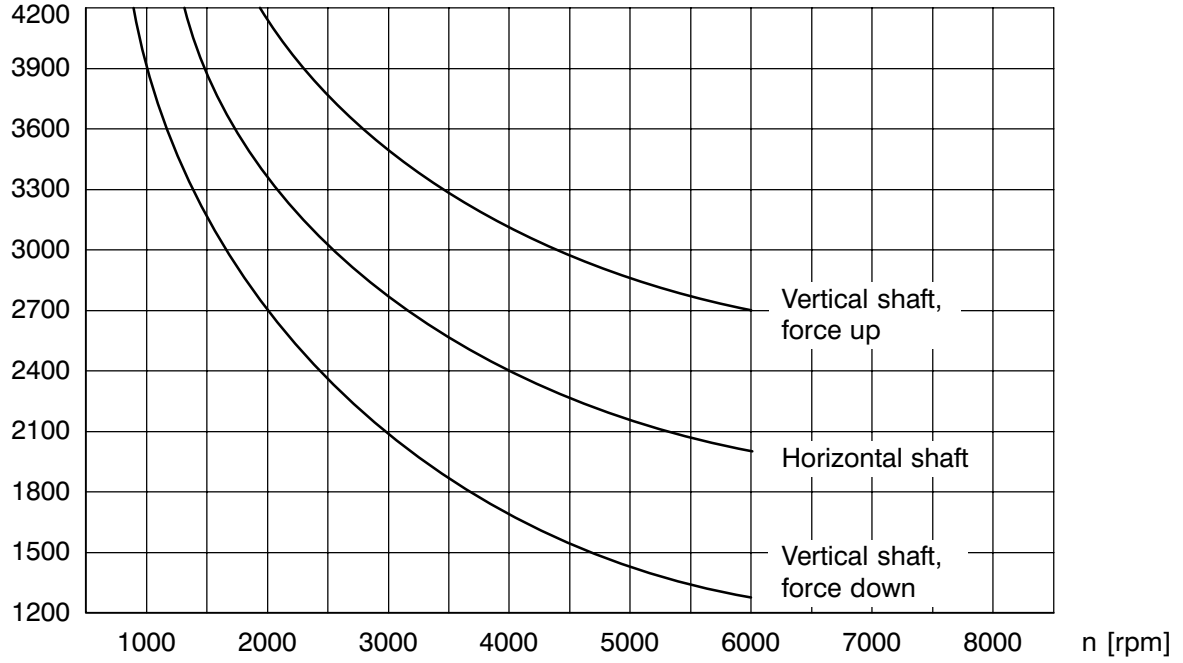
DU 160 S, M, L
Deep-groove ball bearing: AS 6312-C3; BS 6213-C3; fixed bearing at drive end; shaft end: Ø 55 x 110 mm



FR [N] Permitted radial force at shaft end

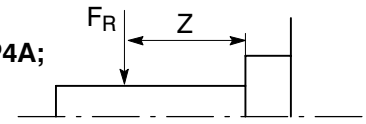


FA [N] Permitted axial force at shaft end

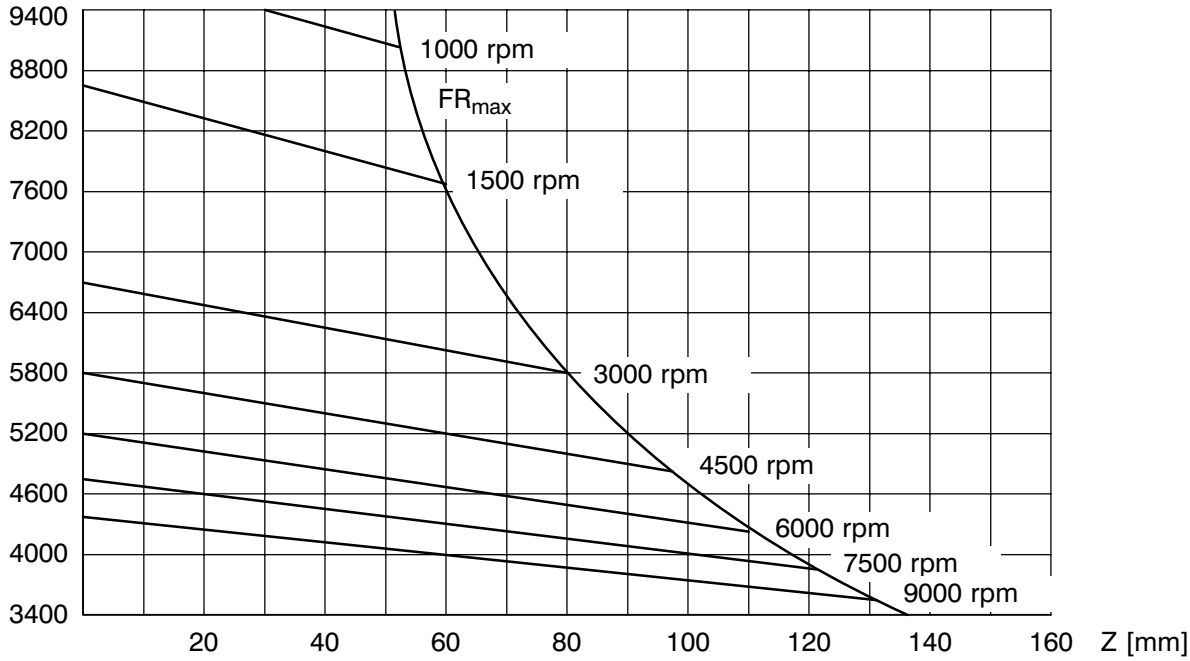


An individual check is necessary if there is simultaneous radial and axial loading!

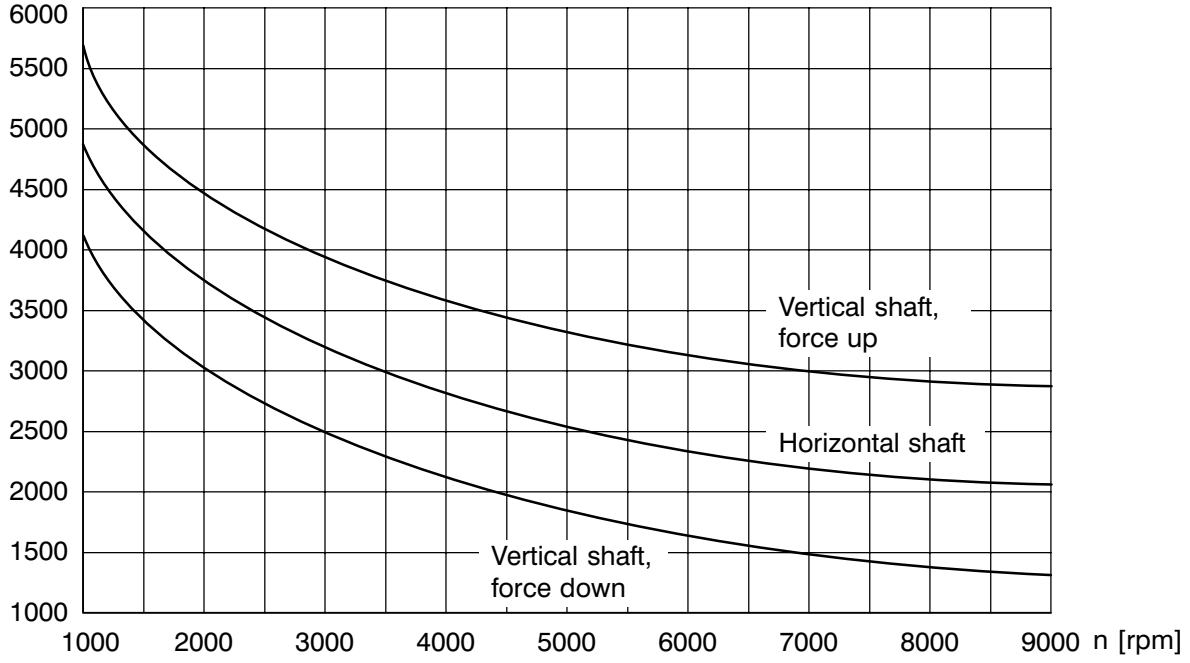
DU 160 S, M, L
Precision spindle bearing: AS 2x 7213 CDGA/P4A; BS 7211 CDGA/P4A;
fixed bearing at drive end; shaft end: Ø 55 x 110 mm



FR [N] Permitted radial force at shaft end



FA [N] Permitted axial force at shaft end



An individual check is necessary if there is simultaneous radial and axial loading!

4 Connection conditions

4.1 Installation instructions

ATTENTION !

Please observe the local system-specific regulations and requirements and the correct use of tools, lifting and transport devices as well as the appropriate norms, regulations and accident prevention regulations.

4.1

- The motors are equipped for **transport** with ring bolts in accordance with DIN 580 (lugs). Screw in ring bolts tightly, and do not attach any additional loads.

- When **installing**, ensure that the system is on level ground and has good base and flange mountings.
  Careful **alignment** of the motors is absolutely essential. The seat in the fit/centering edge must be precisely observed in the case of flange motors. Even the slightest shaft alignment errors will lead to premature bearing damage.

- Avoid construction-related **resonances** with the speed frequency and the double system frequency.

- No additional attachments or built-in components may be fitted on the motor in the case of **flange assembly** of the motor **DU 160L** in order to avoid excessive loading of the flange mounting points.

ATTENTION !

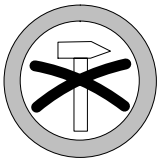
The cooling air must not be obstructed. Comply with the required cooling air volume.
A minimum distance of 100 mm must be maintained from the non-driving end protective screen.
The protective grille must be cleaned at regular intervals.

4.2

- Install a cover on **vertical constructions** to prevent impurities from falling into the fan.

- Conduit thread screw glands must be used and their cable cross-sections observed in order to maintain the **protection standard** of the terminal box.

- The **balance** is indicated on the rating plate. If the motor concerned has a half-featherkey (H), the coupling must also be balanced with a half-featherkey. Work off any part of the featherkey which is protruding or still visible.



- Drive elements such as belt pulleys, coupling disks, gear wheels or similar may only be assembled or dismantled by uniformly heating up the drive elements to approx. 60 to 80 ˚C or by using a suitable **mounting or pulling device**. Use the thread in the shaft end.

4.3

ATTENTION !

The shaft end must not be subjected to impact or jolts under any circumstances!
This damages the rotary encoder and ball bearings.

- All **drive elements** must be dynamically balanced and then covered with a touch guard before mounting.

4.4

ATTENTION !

In addition to the run-in procedure/initial grease distribution procedure carried out in the factory, linear acceleration is necessary over a period of 10 min. up to the max. operating speed each time the motor is transported and each time the motor is relubricated (only DU 160 with spindle bearing)!

- **Mechanical running** must be checked when the motor is accelerated for the first time. Check the entire configuration if there are any unusual noises or vibrations (unbalance, alignment).

4.5

ATTENTION !

The precision spindle bearings of the motors and DU 160 (9000 rpm option) must be relubricated at the drive end and non-drive end.

Refer to the lubrication plan on the motor for lubrication amounts and intervals as well as the type of lubrication.

- Asynchronous motors of the type DU may **not be dismantled.** All work on the motor is performed by the manufacturer.

4.2 Electrical connection

The rating plate information must be compared with the required power and the motor-module combination checked before the asynchronous motors are put into operation.

! DANGER !

Disconect the unit from the mains power supply and ensure it is in an energy-free state!

4.6

Motor end

The incremental encoders and NTC temperature detectors are connected via a connector.

The following electrical connections are made in the terminal box:

- Power connections
- External fan
- Holding brake option

The cable is fed in by means of two conduit thread glands. Refer to the dimension sheets in section 5.
The terminal box is located on the top as standard and can be swivelled 4 x 90°. Diagram on the terminal box lid.

Connection must result in the retension of a permanently safe, electrical connection (no stray wire ends).
The terminal box should be free of impurities, dirt or damp. Ensure that unused cable entry openings and the terminal box itself are sealed tightly against the intrusion of dust or water.

The **PE wire cross-sectional area** must, in accordance with DIN VDE 0160, be designed for $\sqrt{3}$ -times the rated load of the power conductors.

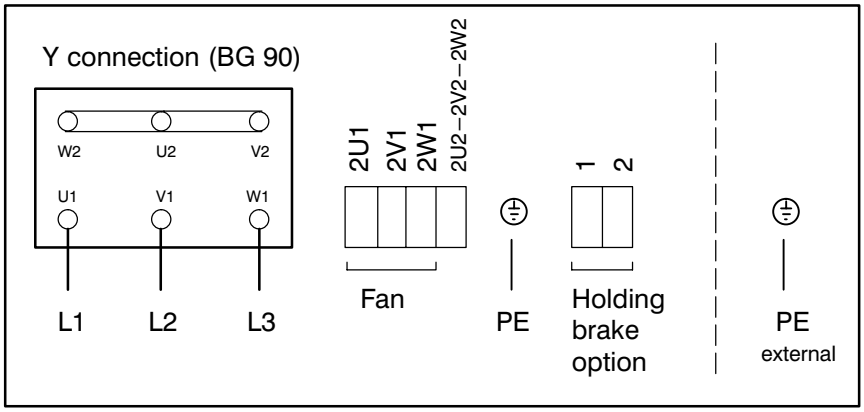
A PE terminal in the terminal box and an external PE terminal at the side underneath the terminal box are provided for protective earthing purposes.
Separate cable routing of PE conductors and power conductors at a distance of >10 cm is recommended for longer motor cables (>10m) or cross-sections of > 6mm^2. In this case, only use the external PE terminal.

Module end

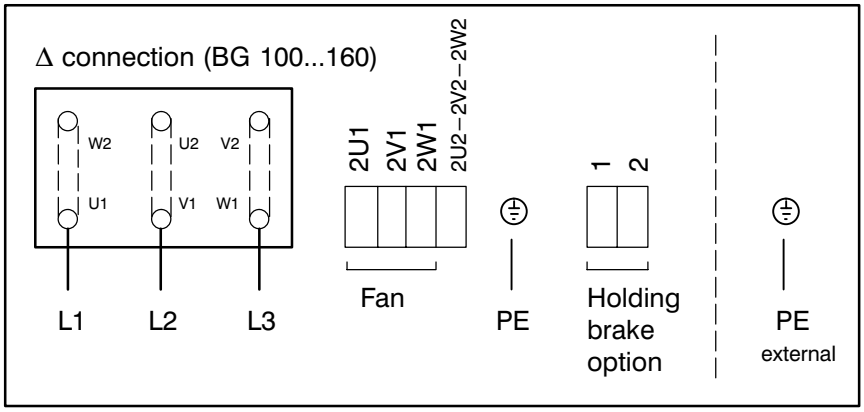
Power connection with cable lugs at the backplane module.
Screws' tightening torque: 6,0 Nm

4.2.1 Power connection

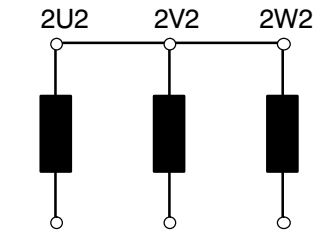
Power connection Size 90L



Power connection Sizes 100...160M



4.2.2 External fan



Max. connection voltage:

3 x 400 V ±10 %, 50 Hz
3 x 415 V ±10 %, 60 Hz

ATTENTION !

The fan's direction of rotation must correspond to the direction of the arrow.

4.7

Suction ventilation from the drive end to the non-drive end (standard)

Size		**90 L**		**100 M, L**		**100 U**		**132**		**160**	
Fan type		Axial fan 785188		Axial fan 754500		Radial fan 776441		Radial fan 754415		Radial fan 756853	
Voltage	[V]	3 x 400									
Frequency	[Hz]	50	60	50	60	50	60	50	60	50	60
Current	[A]	0,12	0,09	0,14	0,13	0,17	0,16	0,19	0,22	0,34	0,47
Power	[W]	44,5	47,5	51	66,5	61	89	90	130	196	302
Speed	[rpm]	2650	2950	2819	3240	2867	3325	2730	3045	2770	3145
Direction of rotation		to the right		to the right		to the left		to the left		to the left	
Required cooling air volume	[m^3/s]	0,015		0,025				0,118		0,145	

Blowing ventilation from the non-drive end to the drive end

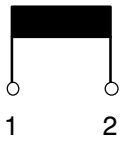
Size		**90 L**		**100 M, L**		**100 U**		**132**		**160**	
Fan type		Axial fan 710402		Axial fan 710402		Axial fan 402391		Axial fan 235502		Axial fan 196199	
Voltage	[V]	3 x 400									
Frequency	[Hz]	50	60	50	60	50	60	50	60	50	60
Current	[A]	0,12	0,09	0,12	0,09	0,14	0,11	0,26	0,33	0,37	0,51
Power	[W]	46	47,5	43,5	46,5	41	48,5	156	217	250	350
Speed	[rpm]	2680	3010	2680	3012	2865	3335	2530	2680	2460	2450
Direction of rotation		to the left		to the left		to the left		to the left		to the left	

ATTENTION !

The cooling air must not be obstructed. Comply with the required cooling air volume.
A minimum distance of 100 mm must be maintained from the non-driving end protective screen.
The protective grille must be cleaned at regular intervals.

4.8

4.2.3 Holding brake (option)



Supply voltage for releasing the brake:

24 V = ±10 %

The polarity sequence is arbitrary.

4.9

! DANGER !

The maximum speed for motors with holding brakes is limited during vertical motor operations (IM V15, IM V36; refer to section 3.2).

If this speed is exceeded, the brake function is impaired due to wear and tear of the brake.

A spring-operated, dry-running, single-disk brake is integrated in the main spindle motors as a holding brake.
The spring forces of the holding brake ensure a backlash-free locking of the motor shaft when the DC voltage is switched off. When a voltage of 24 V DC is applied, a magnetic field is built up which cancels out the effect of the spring force and releases the brake or keeps it open.
There is no residual torque in the open condition.

The parking brake option requires a housing extension.

4.10

! DANGER !

The holding brake is not a working brake and may be operated only when the shaft is stationary.

EMERGENCY-STOP braking operations are only possible if a cooling-down time of at least 30 min is observed between the individual braking operations (for $J_{Load} = J_{Motor}$).

The holding brake must be inspected before each start-up.

4.2.4 Connection of motor encoder type RCN 1313

Number of encoder lines		2 048
Max. speed (electr.)		15 000 rpm
Protection standard (DIN 40050)		IP 65
Permissible shaft loading		Torque ≤ 0,01 Nm
Accuracy		± 20 angular seconds
Moment of inertia of rotor		2,6 $\cdot 10^{-6}$ kgm^2
Operating temperature range Storage temperature range		−20 °C to +105 °C −30 °C to +120 °C
Light source		LED
Power supply		5 V ± 5%; max. 200 mA (without load)
Code signal	Data input	CLOCK and $\overline{\text{CLOCK}}$ signals for differential signal receiver in acc. with EIA standard RS-485 with cable terminal Z_0 = 120 Ω
	Data output	Synchronous-serial, DATA and $\overline{\text{DATA}}$ signals from differential line driver in acc. with EIA standard RS-485. Data in Gray Code or Dual Code.
Signal level		Differential output voltage > 1.3 V
Load carrying capacity		Min. terminating resistance R > 100 Ω, Outputs short circuit-proof
Direction of rotation		Ascending code values when roatation is to right (looking at shaft)
Incremental signals		Two virtually sinusoidal signals A and B. B lagging to A, clockwise (looking at shaft). Size of signal approx. 1 V_{ss} with 120 Ω terminating resistance
−3dB maximum operating frequency −6dB maximum operating frequency		≥ 200 Hz ≥ 500 Hz
Permissible cable lengths		max. 150 m to associated electronics

Connection of RCN encoder

The encoder cable is plugged into the connection socket X5 at the DM.

Connecting socket Encoder			Signal	Bosch encoder cable		DM X5
Pin	Colour			Cross sect. [mm^2]	Colour	Pin
1	blue	Blu	+5V sensor	0,5	blue	19
2	–		–	–	–	–
3	white	Wh	Mot.temp.3	0,14	red	3
4	white	Wh	$\overline{0V}$ sensor	0,5	white	10
5	orange	Or	Mot.temp.1	0,14	brown	1
6	blue	Blu	Mot.temp.2	0,14	green	2
7	brown/ green	BrGn	$\overline{+5V}$ supply	0,5	brown/ green	26
8	violet	Vt	Clock	0,14	violet	20
9	yellow	Ye	$\overline{\text{Clock}}$	0,14	yellow	21
10	white/ green	WhGn	0V supply	0,5	white/ green	18
11	–		–	–	–	–
12	blue/ black	BluBla	UB+	0,14	blue/black	23
13	red/ black	RdBla	UB–	0,14	red/black	24
14	grey	Gr	Data	0,14	grey	11
15	green/ black	GnBla	UA+	0,14	green/ black	5
16	yellow/ black	YeBla	UA–	0,14	yellow/ black	6
17	pink	Pk	$\overline{\text{Data}}$	0,14	pink	12
–	–		Inner screen		–	15

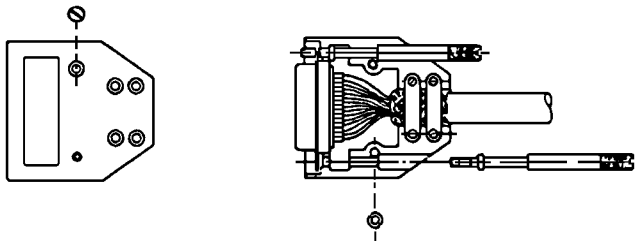
Screen connection in the mating connector

Encoder end

The screen braiding is clamped beneath the strain-relief clamp. This connects it to the connector housing.

Module end

The screen must be properly secured with the strain-relief clamp in the mating connector. This conductively connects the screen to the connector housing.



! DANGER !

Uncontrolled drive connections may result from omitting to make screen connections on encoder cables.
Faultless screen connections are essential to prevent danger.

4.11

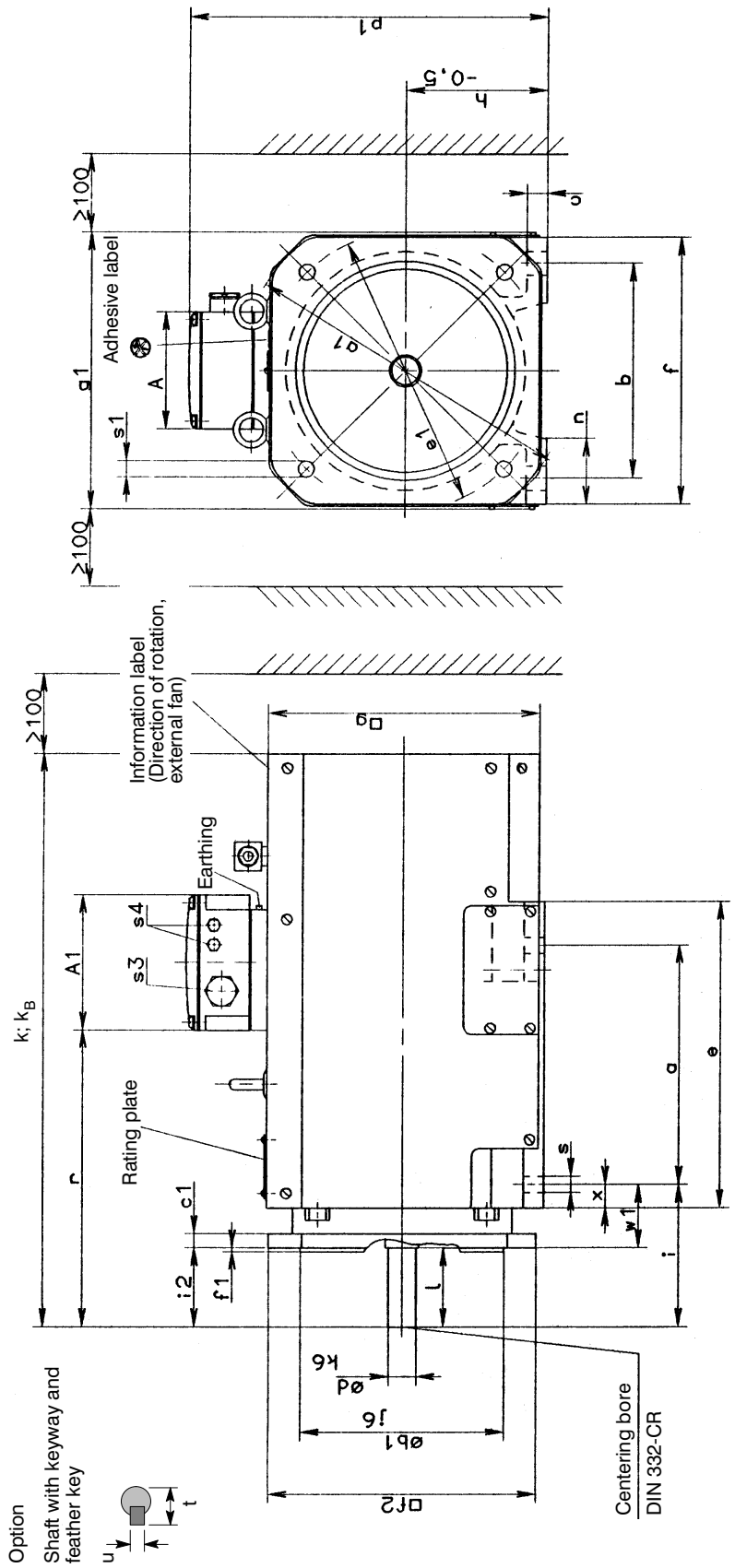
Plug-in connections for disconnecting encoder connection cables, for example on the control cabinet wall, are permitted.
However, connectors with a completely screened metal housing must be used.

The connectors must be insulated and the screen may only be routed via the connector housing.

Your notes:

5 Dimensioned drawings

5.1 U 90 and 100, version with base and flange (IM B 35)

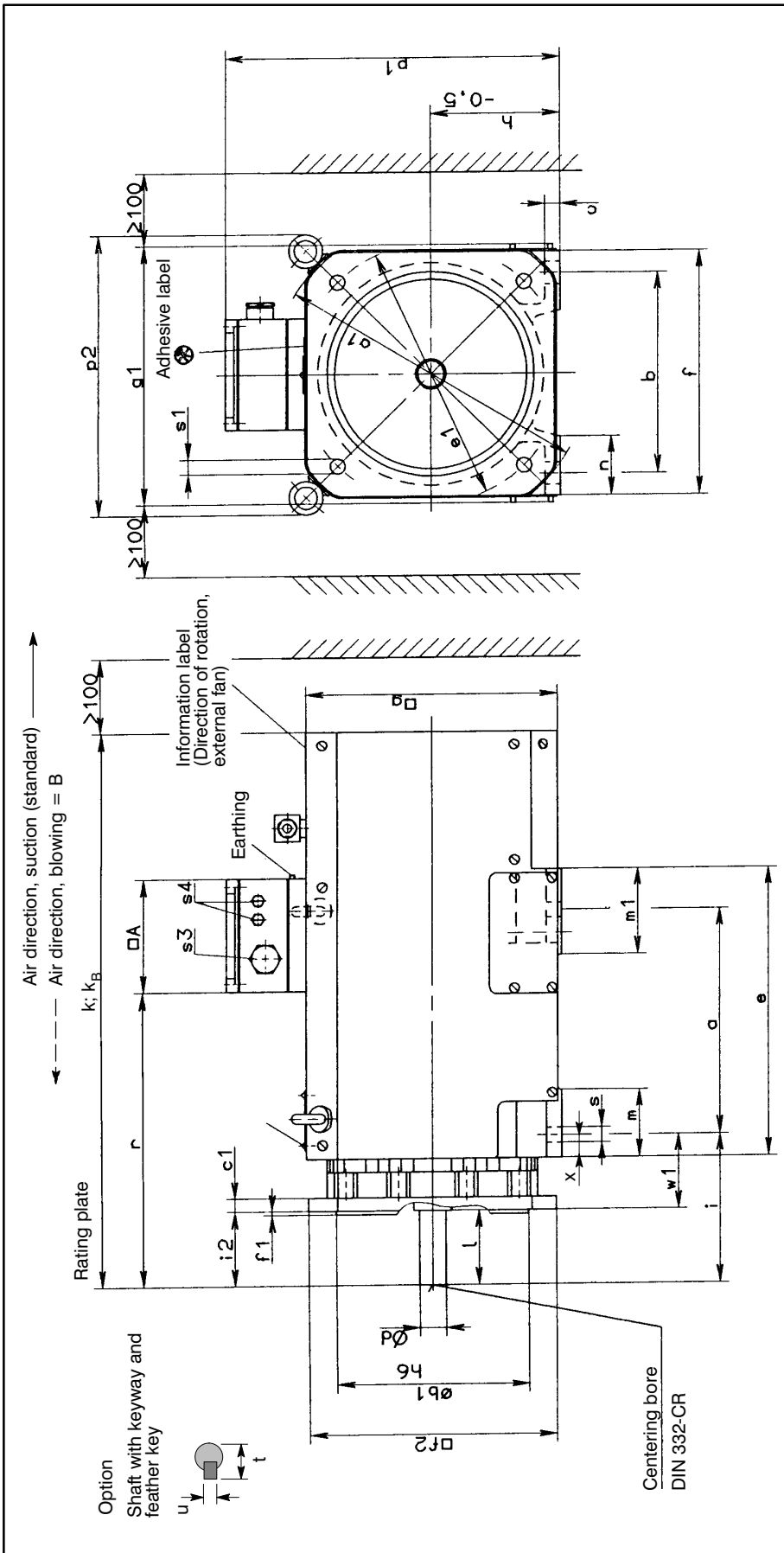


	Shaft					Base													Flange										Motor										
BG	d	l	t	u	a	b	c	e	f	n	s	x	a1	b1	c1	e1	f1	f2	i2	s1	g	g1	p1	h	i	k	k_B	r	s3	s4	w1	A	A1	DR
90L	28	60	31	8	190	140	10	243	174	37	10	11	200	130	12	165	3,5	160	60	11,5	176,5	185	258,5	90	116	523	590	222,5	1xC4 Pg21	2xC4 Pg9	56	117	142	M10
100M	38	80	41	10	230	160	11,5	291	194	40,5	12	13	250	180	13	215	4	190	80	14	197	207,5	278,5	100	143	610	685	294,5	1xC4 Pg21	2xC4 Pg9	63	117	142	M12
100L					295			356																		675	750	359,5						
100U					350			411																		740	815	414,5						

k_B = DUB, with holding brake

Dimensions for terminal box left or right, refer to page 5-4 and 5-5.

5.2 U 132 and 160, version with base and flange (IM B 35)

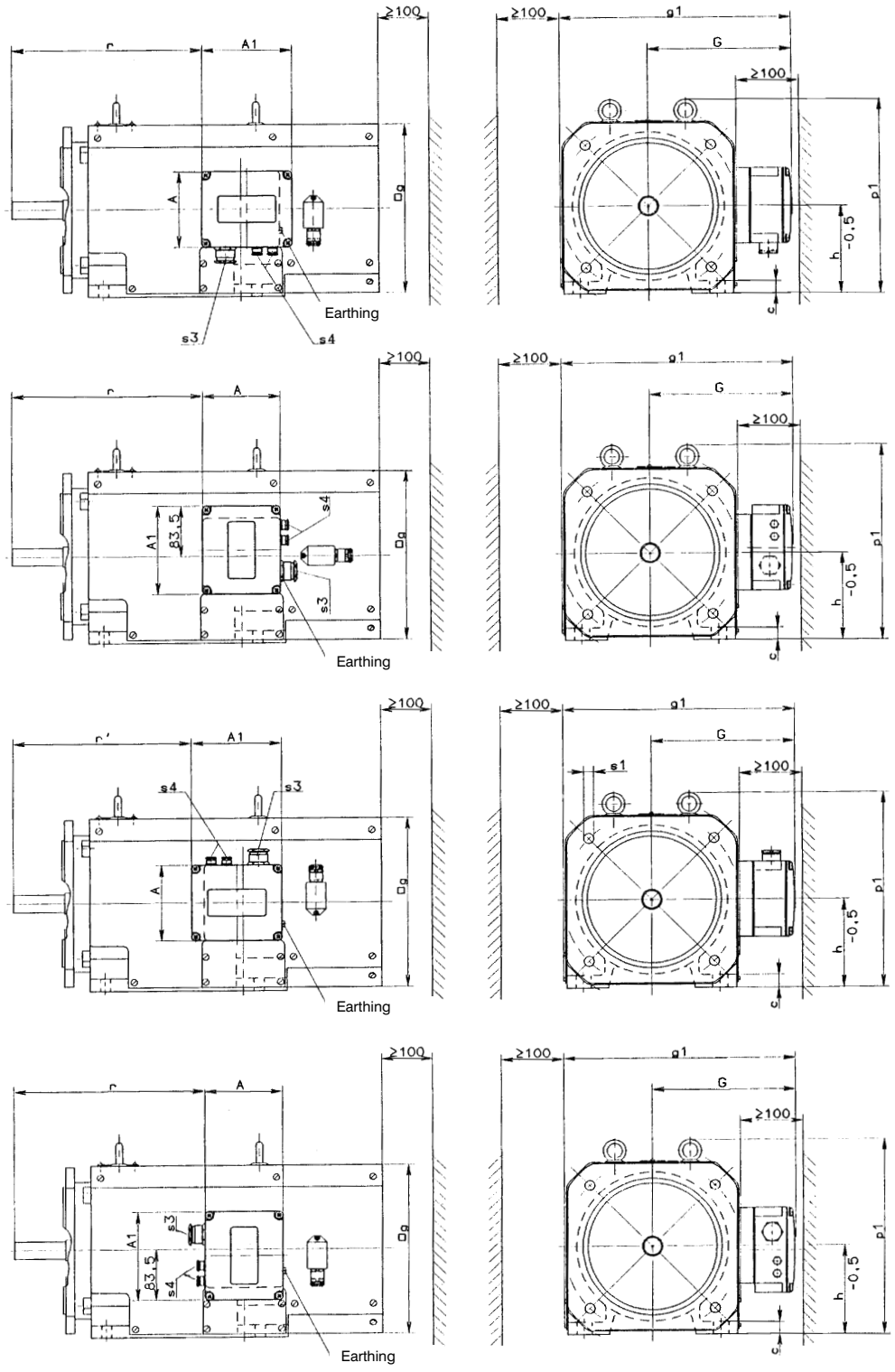


	Shaft					Base																Flange										Motor					
BG	d	l	t	u	a	b	c	e	f	m	m1	n	s	x	a1	b1	c1	e1	f1	f2	i2	s1	g	g1	p1	p2	h	i	k	k_B	r	s3	s4*	w1	A	DR
132S	42 k6	110	45	12	265	216	15	338	262	70	95	48	12	21	350	250	18	300	5	260	110	18	263	275,5	356	316	132	199	720	816	354,5	1xC4 Pg29	2xC4 Pg9	89	150	M16
132M					315			388																					770	866	404,5					
132L					365			438																					820	916	454,5					
160S	55 m6	110	59	16	345	254	17	427	313	80	100	58,5	14	25	400	300	20	350	5	316	110	18	316	326,5	428	374	160	218	910	977	445,5	1xC4 Pg36	2xC4 Pg9	108	165	M20
160M					410			492																					975	1042	510,5					
160L					475			557																					1040	1107	575,5	2xC4 Pg36				

DU 160 with spindle bearing is equipped with lubricating device. Lubricating nipple in acc. with DIN 71412.
Rolling bearing grease , lubrication quantity and lubrication interval are stamped on the lubrication plate.

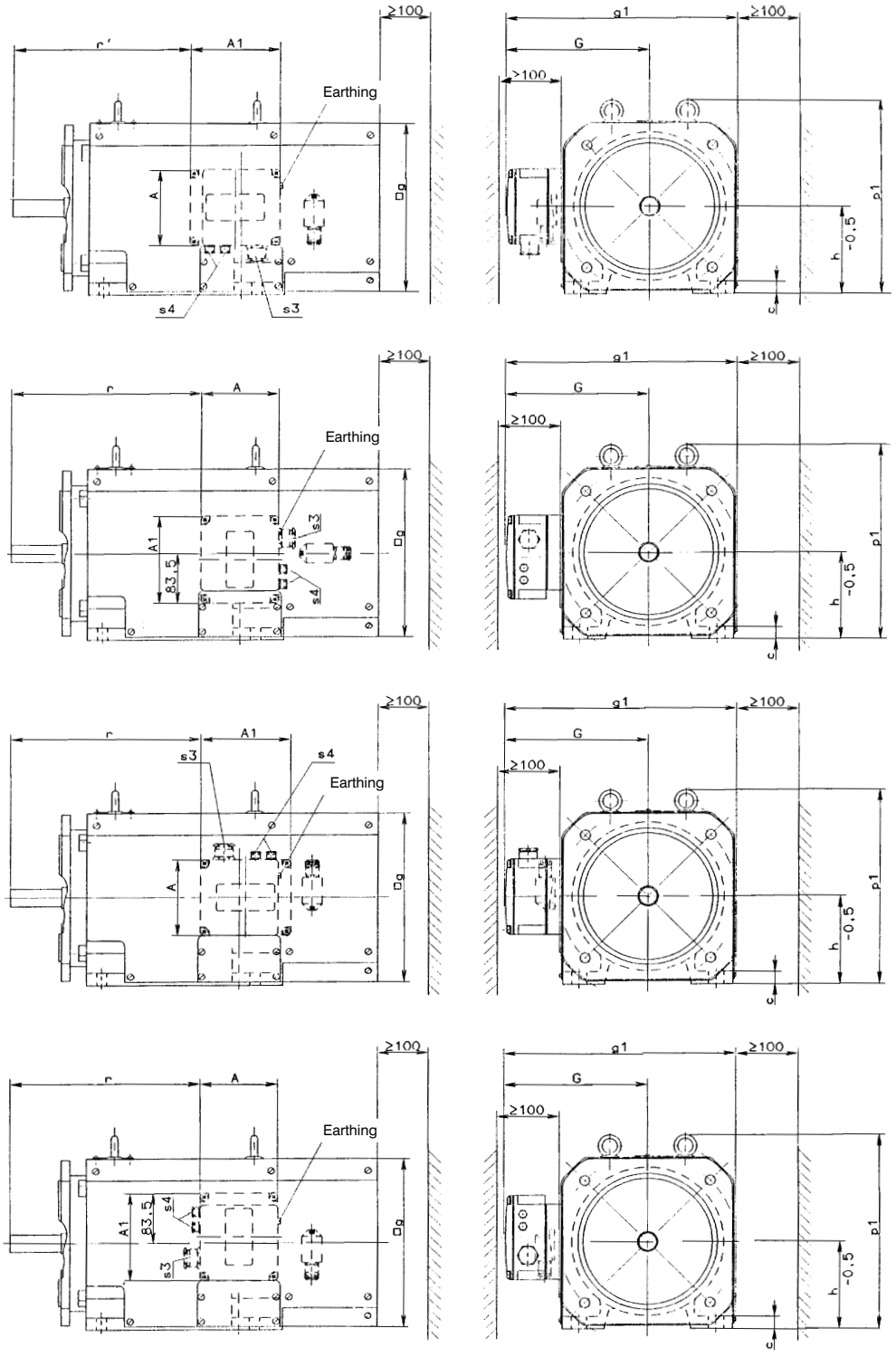
k_B = DUB, with holding brake
* For holding brake in addition to 1 x C4 PG

5.3 Dimensions of terminal box on the right



BG	c	g	g1	p1	h	r	r'	s3	s4	A	A1	G
90L	10	176,5	259	256,5	90	222,5	197,5	1xC4 Pg21	2xC4 Pg9	117	142	168,5
100M	11,5	197	280	276,5	100	294,5	269,5	1xC4 Pg21	2xC4 Pg9	117	142	178,5
100L						359,5	334,5					
100U						414,5	389,5					

5.4 Dimension of terminal box on the left



BG	c	g	g1	p1	h	r	r'	s3	s4	A	A1	G
90L	10	176,5	259	256,5	90	222,5	197,5	1xC4 Pg21	2xC4 Pg9	117	142	168,5
100M	11,5	197	280	276,5	100	294,5	269,5	1xC4 Pg21	2xC4 Pg9	117	142	178,5
100L						359,5	334,5					
100U						414,5	389,5					

6 Maintenance and operating instructions

6.1 Incoming goods

The main spindle motors left the factory in perfect condition after being inspected.

The motors must be checked for transport damage immediately after delivery. The first signs are damage to the packaging.
It should be possible to rotate the shaft easily. If any grounds for complaint should be established, a damage declaration must be issued in the presence of the forwarding agent.

6.2 Motor storage

The following points must be observed in order to ensure functional reliability:

- Do not store motors outdoors! The corrosion protection and packaging are not designed for unprotected storage
- The storage room must be dry, ventillated and free of vibrations

If motors are stored for more than two years, the roller bearing grease must be checked. If necessary, bearings must be relubricated or replaced.
Work on the motor may only be performed at the manufacturer's works.

6.3 Motor installation

ATTENTION !

The information on the rating plate must be observed under all circumstances and compared with the required data!

6.1

Pay attention to the class of protection.
A minimum distance of 100 mm must be observed at the cooling air intake and exit.

Permitted ambient temperature max. +40 °C or in accordance with information on the rating plate.

Careful alignment of the motors is absolutely essential. The seat in the fit/centering edge must be precisely observed in the case of flange motors. The slightest alignment error leads to premature bearing damage.

6.4 Drive elements

All drive elements such as belt pulleys, couplings etc. must be dynamically balanced before installation.

Drive elements may only be assembled or dismantled after they have been uniformly heated up to approx. 60 to 80 °C or by using a suitable pusher or pulling device. Use the thread at the shaft end.

ATTENTION !

The shaft end must not be subjected to impact or jolts under any circumstances! This damages the rotary encoder and ball bearings.

6.2

6.5 Electrical connection

Circuit diagram in the terminal box.

6.3

! DANGER !

Disconect the unit from the mains power supply and ensure it is in an energy-free state!

Converter	Connection of U, V, W and PE, plug connection for the speed encoder.
External fan motor	The fan's direction of rotation must correspond to the direction of the arrow on the external fan or motor.
Motor protection	It is essential that the temperature detectors are connected.
Holding brake	The holding brake is not a working brake and may only be operated at standstill! Supply voltage 24 V DC ±10 % in accordance with VDE 0580.

6.6 Putting into operation for the first time

6.4

ATTENTION !

In addition to the run-in procedure/initial grease distribution procedure carried out in the factory, linear acceleration is necessary over a period of 10 min. up to the max. operating speed each time the motor is transported and each time the motor is relubricated (only DU 160 with spindle bearing)!

Mechanical running must be checked when the motor is accelerated for the first time. Check the configuration if there are any unusual noises or vibrations (unbalance, alignment).

6.7 Motor maintenance

- The deep-groove ball bearings of the motors are lubricated with ESSO Unirex N3 high-performance grease and are designed for 20,000 hours of operation.
  The calculated service life can be reduced, depending on the load.
- It is generally recommended to have the bearings replaced at the manufacturer's works when the permitted number of operating hours has been reached or after an operating period of approx. five years.
- Relubricate the precision spindle bearings of the DU 160 motors in accordance with the lubrication plate on the motor.
- Clean the supply and discharge air areas of the motors at regular intervals.

7 Order numbers

7.1 Accessories, spare parts

Designation:	Order no.
Ready-made encoder cable with screen, 5 m	
16-core for RCN	1070 917 094
18-core for RCN and gear wheel encoder	on request
Encoder cable, available by the metre with screen	
16-core for RCN	1070 917 069
18-core for RCN and gear wheel encoder	1070 917 874
Encoder-mating connector, motor end	
for RCN and gear wheel encoder	1070 917 095

Your notes:

Application for asynchronous motor DU

When making new orders, please tick/fill out as appropriate and enclose for technical examination.

Company:

Contact partner for queries: Dept.: Tel:

Main spindle drive for following application:

Required electrical data:

Nominal power	..... kW	
Field weakening range from 1500 rpm to	☐ 6000 rpm	☐ 9000 rpm
Operating speed	..... rpm	
Speed range from	..... to ..... rpm	
Additional moment of inertia	..... kgm^2	
Starting operation/hour	Reversing operations/hour	
Maximum overload capacity	☐ S1	☐ to S6−60 % ☐ to S6−40 %
Ambient temperature	☐ ≦ 40 °C	☐ > 40°C
Installation height	☐ ≦1000 m above msl	☐ > 1000 m above msl

Required mechanical design:

Shaft	☐ smooth	☐ with keyway and feather key
Vibration severity grade	☐ “R”	☐ “S” ☐ .....
Flange precision	☐ standard	☐ increased, “R”
Mechanical motor shaft load	☐ coupling	☐ V-belt ☐ flat belt
(Data in accordance with section 3.6)	Axial force F_A = ... N Radial force F_R = ... N Distance Z = ... mm	
Ambient influences	☐ Dryness	☐ Dust
	☐ Moisture	☐ Chemical influence

Other required options:

Terminal box at the side	☐ on the right	☐ on the left
Holding brake	☐ no	☐ yes
Oil-tight driving-end end plate	☐ no	☐ yes
Reinforced drive-end bearing	☐ no	☐ yes

Date, signature:

Please provide any additional information overleaf

Other application information:

A Appendix

A.1 Safety instructions

A.1.1 Dansk

Farehenvisninger i håndbogen.

Følg sikkerhedshenvisningerne i håndbogen (FARE, ADVARSEL) om farer for liv og helbred og forebyggelse af materielle skader, såvel som de fremhævede informationer om produktet (Bemærk).

Alle sikkerhedshenvisninger har et fortløbende nummer med henvisning til kapitlerne, eksempelvis 1.1. I tillægget finder De de tilhørende oversættelser af disse sikkerhedshenvisninger på alle sprog indenfor EU.

! FARE ! 1.1

Vedligeholdelse og installation af komponenter må kun udføres af kvalificeret personale under overholdelse af de ulykkesforebyggende forskrifter samt installationsforskrifterne (EN 60204−del1, prEN 50178).

! FARE ! 1.2

En fejlfri og sikker brug af produktet, forudsætter formålstjenlig transport, korrekt oplagring, opstilling og montering såvel som en omhyggelig betjening.

ADVARSEL ! 4.1

Overhold de stedlige, anlægsspecifikke bestemmelser og krav, fagmæssigt korrekt brug af værktøj, løfte- og transportanordninger samt gældende normer, bestemmelser og ulykkesforebyggende forskrifter.

ADVARSEL ! 4.2, 4.8

Der må ikke være hindringer for køleluften. Vær opmærksom på køleluftmængderne. Der skal overholdes en minimumafstand på 100 mm til beskyttelsesgitteret på B-siden. Beskyttelsesgitteret skal rengøres regelmæssigt.

ADVARSEL ! 4.3, 6.2

Akselenderne må under ingen omstændigheder udsættes for slag og stød. Omdrejningsføler og kugleleje kan blive beskadiget.

ADVARSEL ! 4.4, 6.4

Som supplement til indkørings-/fedtfordelingskørslen fra fabrikkens side kræves der efter enhver transport og efter enhver eftersmøring (kun DU 160 med spindelleje) en tidsmæssigt lineær maskinacceleration over 10 minutter til maksimum driftsomdrejningstal !

ADVARSEL ! 4.5

Præcisionsspindellejerne for motorerne DU 160 (option 9000 min^{-1}) skal eftersmøres på A- og B-siden.

Eftersmøringsintervaller og -mængder samt fedttype, se smøreskilt på motoren.

! FARE ! 4.6, 6.3

Der må kun foretages tilslutnings- og montagearbejder i spændingsløs tilstand!

ADVARSEL ! 4.7

Ventilatorens omdrejningsretning skal stemme overens med pilen for omdrejningsretning.

! FARE ! 4.9

Ved vertikal motordrift (IM V15, IM V36) er maksimumomdrejningstallet begrænset for motorer med holdebremse (se afsnittet 3.2).
Ved overskridelser forringes bremsefunktionen pga. slid på bremsen.

! FARE ! 4.10

Holdebremsen er ikke en arbejdsbremse og må kun aktiveres, når akslerne er stoppet.
NØDSTOP–opbremsninger er kun mulige med en afkølingstid på min. 30 min mellem de enkelte opbremsninger (for $L_{tryk} = J_{motor}$).

Før fornyet ibrugtagning kræves en funktionstest af holdebremsen!

! FARE ! 4.11

Ikke pålagte skærmforbindelser på forsyningsledningerne kan føre til en ukontrolleret adfærd ved igangsætning.
For at undgå fare, skal der sørges for en fejlfri skærmforbindelse.

ADVARSEL ! 6.1

Angivelserne på effektskiltene skal ubetinget iagttages og sammenlignes med de nødvendige data!

A.1.2 Deutsch

Gefahrenhinweise im Handbuch

Beachten Sie die im Handbuch enthaltenen Sicherheitshinweise ('GEFAHR', 'ACHTUNG') zu Gefahren für Leben und Gesundheit und zur Vermeidung von Sachschäden, sowie die hervorgehobenen Informationen zum Produkt ('Hinweis').

Alle Sicherheitshinweise haben eine kapitelweise Nummerierung.
Im Anhang finden Sie die zugehörigen Übersetzungen dieser Sicherheitshinweise in allen Amtssprachen der EU.

! GEFAHR ! 1.1

Warten und Installieren der Komponenten nur durch Elektrofachkräfte (VDE 1000-10) unter Beachtung der Unfallverhütungsvorschriften (UVV VBG4, VDE 100, VDE 105) und Installationsvorschriften (EN 60204-Teil1, prEN 50178).

! GEFAHR ! 1.2

Der einwandfreie und sichere Betrieb des Produktes setzt sachgemäßen Transport, sachgerechte Lagerung, Aufstellung und Montage sowie sorgfältige Bedienung voraus.

ACHTUNG ! 4.1

Beachten Sie die örtlichen, anlagenspezifischen Bestimmungen und Erfordernisse und einen fachgerechten Einsatz von Werkzeugen, Hebe- und Transporteinrichtungen, sowie die einschlägigen Normen, Bestimmungen und Unfallverhütungsvorschriften.

ACHTUNG ! 4.2, 4.8

**Die Kühlluft darf nicht behindert werden. Beachten Sie die Kühlluftmengen.
Vom B-seitigen Schutzgitter ist ein Mindestabstand von 100 mm einzuhalten.
Das Schutzgitter muß regelmäßig gereinigt werden.**

ACHTUNG ! 4.3, 6.2

**Unter keinen Umständen dürfen Schläge und Stöße auf das Wellenende einwirken.
Drehgeber und Kugellager werden dadurch beschädigt.**

ACHTUNG ! 4.4, 6.4

Zusätzlich zum werksseitigen Einlauf/ Fettverteilungslauf ist nach jedem Transport und nach jedem Nachschmieren (nur DU 160 mit Spindellager) ein zeitlich linearer Hochlauf über 10 min bis zur max. Betriebsdrehzahl erforderlich!

ACHTUNG ! 4.5

Die Genauigkeitsspindellagerungen der Motoren DU 160 (Option 9000 min^{-1}) sind A-seitig und B-seitig nachzuschmieren.

Nachschmierfristen und -mengen sowie Fett-Typ siehe Schmierschild am Motor.

! GEFAHR ! 4.6, 6.3

Alle Anschluß- und Montagearbeiten dürfen nur in spannungslosem Zustand erfolgen!

ACHTUNG ! 4.7

Die Lüfterdrehrichtung muß mit dem Drehrichtungspfeil übereinstimmen.

! GEFAHR ! 4.9

Bei vertikalem Motorbetrieb (IM V15, IM V36) ist für Motoren mit Haltebremse die Maximaldrehzahl begrenzt (siehe Abschnitt 3.2). Bei Überschreitungen wird durch Verschleiß an der Bremse die Bremsenfunktion beeinträchtigt.

! GEFAHR ! 4.10

Die Haltebremse ist keine Arbeitsbremse und darf nur im Stillstand der Achse betätigt werden. NOT-AUS-Bremsungen sind nur möglich mit einer Abkühlzeit von mind. 30 min zwischen den einzelnen Bremsvorgängen (für $J_{Last} = J_{Motor}$).

Vor erneuter Inbetriebnahme ist eine Funktionsprüfung der Haltebremse erforderlich!

! GEFAHR ! 4.11

Nicht aufgelegte Schirmverbindungen an Geberleitungen können zu einem unkontrollierten Antriebsverhalten führen. Um Gefahren abzuwenden, muß auf eine einwandfreie Schirmverbindung geachtet werden.

ACHTUNG ! 6.1

Die Leistungsschildangaben sind unbedingt zu beachten und mit den erforderlichen Daten zu vergleichen!

A.1.3 Ελληνικά

Υποδείξεις για πηγές κινδύνου στο Εγχειρίδιο

Προσέξτε τις υποδείξεις ασφαλείας στο Εγχειρίδιο (”ΚΙΝΔΥΝΟΣ”, ”ΠΡΟΣΟΧΗ”) για την πρόληψη κινδύνων για τη ζωή και την υγεία, καθώς και για την αποφυγή υλικών ζημιών, και τις πληροφορίες για το προϊόν (”Υπόδειξη”).

Ολες οι υποδείξεις ασφαλείας έχουν έναν αύξοντα αριθμό που αντιστοιχεί στα επιμέρους κεφάλαια, π.χ. 1.1. Στο παράρτημα βρίσκετε τη μετάφραση αυτών των υποδείξεων ασφαλείας σε όλες τις επίσημες γλώσσες της Ευρωπαϊκής Ενωσης.

! ΚΙΝΔΥΝΟΣ ! **1.1**

Η συντήρηση και εγκατάσταση των στοιχείων πρέπει να γίνεται μόνο από ειδικευμένο προσωπικό τηρώντας τις προδιαγραφές πρόληψης ατυχημάτων και τις προδιαγραφές ασφαλείας (EN 60204 Μέρος 1, προEN 50178).

! ΚΙΝΔΥΝΟΣ ! **1.2**

Η απρόσκοπτη και ασφαλής λειτουργία του προϊόντος προϋποθέτει σωστή μεταφορά, κατάλληλη αποθήκευση, τοποθέτηση και συναρμολόγηση καθώς και προσεκτικό χειρισμό

ΠΡΟΣΟΧΗ ! **4.1**

Προσέχετε τους τοπικούς, ειδικούς όρους και απαιτήσεις, την τεχνικά σωστή εφαρμογή εργαλείων, μονάδων ανύψωσης και μεταφοράς καθώς και τις σχετικές προδιαγραφές, κανονισμούς και διατάξεις προστασίας από ατυχήματα.

ΠΡΟΣΟΧΗ ! **4.2, 4.8**

Ο αέρας ψύξης δεν πρέπει να παρεμποδίζεται. Προσέξτε τις ποσότητες αέρα ψύξης. Από το προστατευτικό πλέγμα της πλευράς B πρέπει να τηρείτε απόσταση τουλάχιστον 100 mm. Το προστατευτικό πλέγμα πρέπει να καθαρίζεται τακτικά.

ΠΡΟΣΟΧΗ ! **4.3, 6.2**

Σε καμιά περίπτωση δεν πρέπει να προκαλούνται κρούσεις και δονήσεις στην άκρη του άξονα. Μπορούν έτσι να προξενηθούν βλάβες στη μονάδα μετάδοσης στροφών και στο ένσφαιρο έδρανο.

PROSOXH ! **4.4, 6.4**

Συμπληρωματικά στην κατανομή λίπανσης από το εργοστάσιο, πρέπει μετά από κάθε μεταφορά και μετά από κάθε λίπανση (μόνο DU 160 με έδρανο άξονα), η μηχανή να λειτουργεί γραμμικά για ένα χρονικό διάστημα 10 λεπτών, μέχρι τον μέγιστο αριθμό στροφών!

PROSOXH ! **4.5**

Τα έδρανα ακριβείας του άξονα των κινητήρων DU 160 (τύπος 9000/min), πρέπει να λιπαίνονται από την πλευρά A και από την πλευρά B.

Για τους χρόνους, τις ποσότητες λίπανσης και τους τύπους λιπαντικών, βλέπε το διάγραμμα λίπανσης πάνω στον κινητήρα.

! ΚΙΝΔΥΝΟΣ ! **4.6, 6.3**

Ολες οι εργασίες σύνδεσης και συναρμολόγησης πρέπει να γίνονται όσο η συσκευή δεν έχει ρεύμα.

ΠΡΟΣΟΧΗ ! **4.7**

Η διεύθυνση περιστροφής του ανεμιστήρα πρέπει να συμφωνεί με το βέλος διεύθυνσης περιστροφής.

! ΚΙΝΔΥΝΟΣ ! **4.9**

Σε κάθετη λειτουργία του κινητήρα (IM V.15, IM V36), για κινητήρες με φρένα στάσεως, ο μέγιστος αριθμός στροφών είναι περιορισμένος (βλ. απόσπασμα 3.2).
Σε υπερβάσεις, διαταράσσεται η λειτουργία των φρένων μέσω φθορών.

! ΚΙΝΔΥΝΟΣ ! **4.10**

Η πέδη στάσης δεν είναι πέδη εργασίας και πρέπει να τίθεται σε λειτουργία μόνο όταν ο άξονας είναι ακινητοποιημένος. Πεδήσεις Στάσης κινδύνου (NOT−AUS) είναι δυνατές μόνο με χρόνο ψύξης διάρκειας τουλάχιστον 30 λεπτών ανάμεσα στις μεμονωμένες φάσεις πέδησης (για $J_{Φορτίο} = J_{Κινητήρας}$).

Πριν επανέναρξη λειτουργίας απαιτείται έλεγχος της πέδης στάσης!

! ΚΙΝΔΥΝΟΣ ! **4.11**

Η μη τοποθέτηση προστατευτικών συνδέσεων σε αγωγούς παροχής μπορεί να έχει σαν αποτέλεσμα μια ανεξέλεγκτη κίνηση.
Για την αποφυγή κινδύνων πρέπει να υπάρχει οπωσδήποτε μια κατάλληλη προστατευτική σύνδεση.

ΠΡΟΣΟΧΗ ! 6.1

Πρέπει να προσέχετε οπωσδήποτε όσα αναφέρονται στην ταμπέλα ισχύος και να τα συγκρίνετε με τα απαιτούμενα δεδομένα!

A.1.4 Español

Indicaciones de peligro incluidas en el manual

Observe las indicaciones de seguridad incluidas en el manual (PELIGRO, ATENCION) referentes a peligros para la vida y la salud y para prevenir daños materiales, así como las informaciones destacadas sobre el producto (Nota).

Todas las indicaciones de seguridad tienen un número consecutivo con referencia a los capítulos, p. ej. 1.1. En el anexo usted encontrará las traducciones respectivas en todos los idiomas oficiales de la UE.

¡PELIGRO! 1.1

.El mantenimiento y la instalación de los componentes sólo serán realizados por personal cualificado y observando las normas para la prevención de accidentes y las instrucciones de instalación (EN 60204-1ª parte, prEN 50178).

¡PELIGRO! 1.2

Para que el producto funcione perfectamente y de forma segura es imprescindible que haya sido transportado, almacenado, instalado y montado de manera adecuada y que se maneje cuidadosamente.

¡ATENCION! 4.1

Observe las prescripciones y requisitos locales específicos para la instalación, haga uso adecuado de las herramientas y dispositivos de elevación y transporte y cumpla en todo momento las directrices y prescripciones vigentes y las normas para la prevención de accidentes.

¡ATENCION! 4.2, 4.8

El aire frío no debe tener ningún impedimento. Respete los volúmenes de aire frío necesarios. Se debe mantener una distancia mínima de 100 mm con respecto a la rejilla de protección del lado B. La rejilla de protección se debe limpiar en intervalos regulares.

¡ATENCION! 4.3, 6.2

El extremo del árbol no debe estar sometido bajo ningún concepto a golpes o sacudidas, ya que ello puede dañar el transmisor de giro y el rodamiento de bolas.

¡ATENCION! 4.4, 6.4

¡Adicionalmente al rodaje/marcha de distribución de grasa efectuados en la fábrica, se requiere después de cada transporte y de cada relubricación (sólo DU 160 con alojamiento de husillo) una aceleración lineal en tiempo durante 10 min. hasta la velocidad de régimen máx.!

¡ATENCION! 4.5

Los alojamientos de husillo de precisión de los motores DU 160 (opción 9000 r.p.m.) deberán relubricarse en los lados A y B.

Para los intervalos y las cantidades de relubricación, así como el tipo de grasa, véase la placa de lubricación en el motor.

¡ATENCION! 4.6, 6.3

¡Todos los trabajos de montaje y conexión se han de efectuar exclusivamente en estado desenergizado!

¡ATENCION! 4.7

La dirección de giro del ventilador debe coincidir con la de la flecha.

¡PELIGRO! 4.9

En los motores con posición de funcionamiento vertical (IM V15, IM V36), la velocidad máxima para motores con freno de retención está limitada (véase apartado 3.2).
En caso de velocidad excesiva, el desgaste producido afecta el funcionamiento del freno.

¡PELIGRO! 4.10

El freno de parada no es un freno de trabajo y sólo se debe accionar con el eje parado.
Los frenados de emergencia sólo se pueden efectuar dejando un intervalo de enfriamiento de al menos 30 min. entre los diferentes procesos de frenado (para $J_{carga} = J_{motor}$).

¡Antes de la nueva puesta en marcha es obligatorio comprobar si el freno de parada está en perfecto estado de funcionamiento!

¡PELIGRO! 4.11

Las uniones de apantallamiento no conectadas en las líneas de los transmisores pueden provocar un comportamiento incontrolado del accionamiento.
Con el fin de prevenir peligros, asegúrese de que la unión de apantallamiento es perfecta.

¡ATENCION! 6.1

¡Es obligatorio respetar los datos indicados en las placas de potencia y compararlos con los datos requeridos!

A.1.5 Français

Indications de danger dans le manuel

Tenez compte des consignes de sécurité contenu es dans le manuel (DANGER, ATTENTION) relatives aux dangers pour la vie et la santé et pour éviter les dommages matériels, ainsi que les informations particulières sur le produit (Remarque).

Toutes les consignes de sécurité ont une numérotation en c ontinu en rapport avec les chapitres, par exemple 1.1. En annexe vous trouverez les traductions correspondantes dans toutes les langues officielles de la CEE.

! DANGER ! 1.1

La maintenance et l'installation des composants doivent uniquement être effectuées par du personnel qualifié et en respect des prescriptions en matière d'accidents de travail et des consignes d'installation (NE 60204 section 1, NE pr 50178).

! DANGER ! 1.2

Le fonctionnement parfait et sûr du prod uit est conditionné par un transport professionnel, un stockage, une implantation et un montage corrects ainsi qu'une manipulation soigneuse.

ATTENTION ! 4.1

Respectez les prescriptions et conditions préalables locales et propres à l'installation. Le montage des outils, des dispositifs de levage et de transport doit être effectué de manière appropriée. Respectez également les normes, les consignes d'installation et prescriptions en matière de sécurité qui s'appliquent à cette installation.

ATTENTION ! 4.2, 4.8

N'entravez pas l'arrivée d'air de refroidissement. Observez les quantité d'air de refroidissement. Une distance de 100 mm doit être respectée devant la grille de protection située sur le côté B. Cette grille de protection doit être nettoyée régulièrement.

ATTENTION ! 4.3, 6.2

Le bout de l'arbre d'entraînement ne doit être exposé en aucun cas à des coups ou des chocs qui risqueraient d'endommager les roulements à billes et au résolveur.

ATTENTION ! 4.4, 6.4

En plus du rodage et du temps nécessaire à la répartition de la graisse, une période d'accélération linéaire de 10 mn doit être observée jusqu'à ce que la vitesse de rotation maximale soit atteinte, et ceci après chaque transport et après chaque opération de lubrification du moteur (ceci ne concerne que les logements de la broche des moteurs DU 160) !

ATTENTION ! 4.5

Les logements de la broche de précision des moteurs DU 160 (option 9000 min^{-1}) doivent être graissés sur les côtés A et B.

La quantité, l'intervalle de graissage ainsi que le type de graisse sont indiqués sur la plaquette apposée sur le moteur.

! DANGER ! 4.6, 6.3

Tous les travaux de montage et de raccordement ne doivent être effectués qu'en absence de tension!

ATTENTION ! 4.7

Le sens de rotation du ventilateur doit correspondre à la flèche du sens de rotation.

! DANGER ! 4.9

Dans le cas de fonctionnement vertical (IM V15 et IM V 38), la vitesse de rotation maximale pour les moteurs à frein d'arrêt est limitée (voir paragraphe 3.2).
Lorsque cette vitesse est dépassée, la fonction de freinage peut être entravée du fait d'une usure élevée.

! DANGER ! 4.10

Le frein d'arrêt ne constitue en aucun cas un frein de travail. Assurez−vous que l'axe est immobile avant de le manipuler. Les arrêts d'urgence sont seulement possibles si un intervalle de refroidissement de 30 min. au minimum est respecté entre les déclenchements d'arrêt d'urgence ($J_{charge} = J_{moteur}$).

Avant toute remise en service, le fonctionnement du frein d'arrêt doit être contrôlé.

! DANGER ! 4.11

Des raccordements de graissage non raccrochés sur les lignes du transmetteur peuvent provoquer un comportement non contrôlé de l'entraînement.
Pour prévenir des dangers, il faut veiller à un raccordement de graissage parfait.

ATTENTION ! 6.1

Les indications données sur les plaques signalétiques doivent être impérativement respectées est comparées aux données requises.

A.1.6 Italiano

Indicazioni di pericolo nel manuale

Osservare le indicazioni di sic urezza (PERICOLO, ATTENZIONE) contenute nel manuale relative ai pericoli anche mortali, alla salute e alle misure necessarie per evitare danni all'apparecchio, nonché le informazioni sul prodotto (Nota).

Tutte le indicazioni di sicurezza sono numerate in ordine crescente con riferimento al capitolo, come ad es. 1.1. Nell'appendice è riportata la traduzione corrispondente di tali norme di sicurezza, in tutte le lingue ufficiali dell'Unione Europea.

! PERICOLO ! 1.1

La manutenzione e installazione dei componenti vanno eseguite solamente da personale qualificato, in osservanza delle norme antinfortunistiche e d'installazione (EN 60204, parte 1 - prEN 50178).

! PERICOLO ! 1.2

Questo prodotto può funzionare in mod o sicuro e a regola d'arte solamente se il suo trasporto, magazzinaggio, installazione e montaggio sono avvenuti in modo appropriato e col presupposto di un corretto azionamento.

ATTENZIONE ! 4.1

Osservare le prescrizioni e richieste locali specifiche per gli impianti, un impiego professionale di utensili e dispositivi di sollevamento e trasporto, nonché le norme, regolamentazioni e prescrizioni riguardanti la prevenzione degli incidenti.

ATTENZIONE ! 4.2, 4.8

La circolazione dell'aria di raffreddamento non deve essere ostacolata. Osservarne la portata. Mantenere una distanza minima dalla grata di protezione sul lato B di almeno 100 mm. La grata di protezione deve essere regolarmente pulita.

ATTENZIONE ! 4.3, 6.2

Colpi e battute non devono in nessun caso influenzare l'estremità dell'albero Il trasduttore di velocità angolare e il cuscinetto a sfere potrebbero danneggiarsi.

ATTENZIONE ! 4.4, 6.4

Oltre al rodaggio/distribuzione del grasso eseguiti di fabbrica, dopo ogni trasporto e lubrificazione successiva (solo QUV 160 con cuscinetti dell'albero) è necessario un avviamento progressivo di oltre 10 minuti fino al reggime massimo!

ATTENZIONE ! 4.5

I cuscinetti di precisione dei motori DU 160 (opzionale 9000 min^{-1}) devono essere lubrificati dal lato A e B. Per gli intervalli di ingrassaggio e le quantità di grasso vedere l'apposita targhetta sul motore.

! PERICOLO ! 4.6, 6.3

I lavori di allacciamento e montaggio vanno eseguiti solamente quando l'apparecchio è separato dalla rete di corrente!

ATTENZIONE ! 4.7

Il senso di rotazione dei ventilatori deve corrispondere con la direzione della freccia.

! PERICOLO ! 4.9

Con l'esercizio in verticale (IM V15, IM V36) di motori con freno di arresto il numero massimo di giri è limitato (vedere paragrafo 3.2). Il superamento di questo limite comporta l'usura dei freni compromettendone il funzionamento.

! PERICOLO ! 4.10

Il freno di arresto non è un freno d'esercizio e deve essere azionato solo quando l'asse è fermo. Frenate di EMERGENZA sono possibili solo con tempo di raffreddamento di almeno 30 minuti tra le singole frenate (per $J_{carico} = J_{motore}$).

Prima della rimessa in funzione è necessario un controllo del funzionamento del freno!

! PERICOLO ! 4.11

I collegamenti schermati per i fili dei trasduttori, se non applicati, possono causare un azionamento incontrollato. Per evitare situazioni di pericolo, accertarsi che i collegamenti schermati siano in perfetto stato.

ATTENZIONE ! 6.1

Attenersi assolutamente alle indicazioni di potenza della relativa targhetta e confrontarli con i dati necessari!

A.1.7 Nederlands

Waarschuwingswenken in het handboek

Neemt u de in het handboek vermelde veiligheidswenken (GEVAAR, ATTENTIE) voor de gevaren van leven en gezondheid en ter voorkoming van schade, en de geaccentueerde informatie over het produkt (Tip).

Alle veiligheidswenken hebben een doorlopend nummer met betrekking op de hoofdstukken, b.v. 1.1. In het aanhangsel vindt u de bijbehorende vertalingen van deze veiligheidswenken in alle officiele van de EU.

! GEVAAR ! 1.1

Het onderhoud en de installatie van de componenten alleen door opgeleid personeel laten uitvoeren met inachtneming van de voorschriften ter voorkoming van ongevallen en de installatievoorschriften (EN 60204 deel 1, prEN 50178).

! GEVAAR ! 1.2

Het goed en veilig functioneren van het produkt stelt deskundig transport, goede opslag, opstelling en montage en zorgvuldige bediening voorop.

ATTENTIE ! 4.1

Neem de plaatselijke, voor de installatie specifieke bepalingen en eisen en een deskundig gebruik van gereedschap, hef- en transportinrichtingen, en de desbetreffende normen, bepalingen en voorschriften ter voorkoming van ongevallen in acht.

ATTENTIE ! 4.2, 4.8

De koellucht mag niet gehinderd worden. Neem de koelluchthoeveelheden in acht. Van het beschermrooster aan de B-kant moet een minimumafstand van 100 mm in acht genomen worden. Het beschermrooster moet regelmatig gereinigd worden.

ATTENTIE ! 4.3, 6.2

In geen geval mogen er slagen en stoten op het aseinde inwerken. Draaigever en kogellager worden daardoor beschadigd.

ATTENTIE ! 4.4, 6.4

Naast de vettoevoer/vetverdelingsloop in de fabriek, moet na ieder transport en na ieder nasmeren (alleen DU 160 met spillager) is een tijdelijk lineair opvoeren van 10 min. tot het max. bedrijfstoerental vereist !

ATTENTIE ! 4.5

De precieze spillegeringen van de motoren DU 160 (optie 9000 min^{-1}) moeten aan de A- en de B-kant nagesmeerd worden. Voor smeerintervallen en vethoeveelheden alsook het soort vet, zie smeerbordje op de motor.

! GEVAAR ! 4.6, 6.3

Alle aansluit- en montagewerkzaamheden mogen alleen in spanningsloze toestand geschieden!

ATTENTIE ! 4.7

De draairichting van de ventilator moet met de draairichtingspijl overeenstemmen.

! GEVAAR ! 4.9

Bij verticaal motorbedrijf (IM V15, IM V36) is bij motoren met vastzetrem het maximum toerental beperkt (zie hoofdstuk 3.2).

Bij overschrijding is in gevolge slijtage de goede werking de rem niet meer gewaarborgd.

! GEVAAR ! 4.10

De vastzetrem is geen bedrijfsrem en mag alleen met stilstaande as bediend worden. NOOD-UIT-rembewegingen zijn alleen mogelijk met een afkoeltijd van minimaal 30 min. tussen de afzonderlijke rembewegingen (voor $J_{last} = J_{motor}$).

Voor het opnieuw in gebruik nemen moet de werking van de vastzetrem gecontroleerd worden!

! GEVAAR ! 4.11

Niet opgelegde schermverbindingen op opneemleidingen kunnen tot een ongecontroleerd aandrijfgedrag leiden.

Om gevaren te voorkomen, moet er op een goede schermverbinding gelet worden.

ATTENTIE ! 6.1

De gegevens op de vermogensplaatjes moeten beslist in acht genomen worden en met de vereiste gegevens vergeleken worden!

A.1.8 Português

Notas de perigo no manual

Considere as notas de segurança (PERIGO, ATENÇÃO) do manual acerca de perigo de morte e de ferimento e para evitar danos materiais e, considere as informações destacadas sobre o produto (NOTA).

Todas as notas de segurança levam um número corrente que se refere aos capítulos em questão, por ex. 1.1. A tradução das notas em todas as línguas oficiais da CE encontra-se no anexo.

! PERIGO ! 1.1

A instalação e a manutenção devem ser realizadas somente por técnicos qualificados e levando−se em consideração as instruções para prevenção de acidentes e as instruções para instalação (EN 60204 − parte 1, prEN 50178).

! PERIGO ! 1.2

Premissas indispensáveis para o funcionamento impecável e seguro do produto são transporte, armazenamento, instalação e montagem competentes bem como o manejo correcto do mesmo.

ATENÇÃO ! 4.1

Observar as determinaçöes e as condiçöes locais específicas, garantindo uma utilização profissional das ferramentas e dos dispositivos de elevação e transporte, bem como a vigência das normas, determinaçöes e prescriçöes para prevenção de acidentes.

ATENÇÃO ! 4.2, 4.8

**O ar de refrigeraçäo näo deve ser bloquedo. Controlar a quantidade de ar de refrigeração.
Deve-se manter uma distância mínima de 100 mm do lado B da grelha supressora.
A grelha supressora deve ser regularmente limpa.**

ATENÇÃO ! 4.3, 6.2

**Em nenhuma circunstância devem ocorrer choques e golpes na saída de ondas.
Caso contrário, o emissor de rotação e o rolamento de esferas serão danificados.**

ATENÇÃO ! 4.4, 6.4

Além do amaciamento/distribuição de massa após cada transporte e após cada relubrificação (somente DU 160 com mancal do fuso), deverá efectuar uma aceleração a toda velocidade durante 10 minutos!

ATENÇÃO ! 4.5

O suporte de precisão do fuso
DU 160 (opção 9000 min^{-1}) deverão ser relubrificados no lado A e B.

Os intervalos e quantidades para a relubrificação, assim como os tipos de massa, estão descritos na placa de lubrificação no motor.

! PERIGO ! 4.6, 6.3

Todos os trabalhos de conexão e montagem apenas devem ser realizados com o sistema desligado da tensão eléctrica!

ATENÇÃO ! 4.7

O sentido de rotação da ventoinha têm que coincidir com a seta indicadora deste sentido.

! PERIGO ! 4.9

Em caso de operação vertical do motor (IM V15, IM V36) a velocidade máxima de rotação é limitada para os motores com travão de retenção (consulte o capítulo 3.2).

Se esta rotação for excedida, ocorrerá desgate do travão, provocando assim danos em seu funcionamento.

! PERIGO ! 4.10

O travão de parada não é travão de trabalho e só deve ser accionado com os eixos parados. Retardações de PARADA DE EMERGëNCIA somente são possíveis após um período de refrigeração de, no mín., 30 min entre cada processo de retardação (para $J_{carga} = J_{motor}$).

Antes de recolocar em funcionamento, é imprescindível um controlo da função do travão de parada!

! PERIGO ! 4.11

Se a blindagem dos condutores dadores não estiver conectada, poderá haver um comportamento descontrolado do motor.

Para evitar perigos, garantir a conexão perfeita da blindagem.

ATENÇÃO ! 6.1

É imprescindível que os dados da chapa indicadora de potência sejam observados e comparados aos dados requeridos!

A.1.9 Suomi

Käsikirjan varoitusohjeet

Ota huomioon käsikirjan hengenvaaraa ja terveysriskejä sekä tavaravahinkojen välttämistä koskevat turvallisuusohjeet (’VAARA’, ’HUOMIO’), sekä korostetut tuotetta koskevat tiedot (’Ohje’).

Kaikilla turvallisuusohjeilla on kappaleisiin liittyvä, juokseva numero, esim. 1.1 . Liitteestä löytyvät näiden turvallisuusohjeiden vastaavat käännökset kaikilla virallisilla EU-kielillä.

! VAARA ! 1.1

Komponenttien huollon ja asennuksen saa suorittaa ainoastaan koulutettu henkilökunta tapaturmantorjuntaohjeet ja asennusohjeet huomioon ottaen (EN 60204-osa1, prEN 50178).

! VAARA ! 1.2

Asianmukainen kuljetus, varastointi, sijoitus ja asennus sekä huolellinen käyttöön edellytyksenä tuotteen moitteettomalle ja varmalle toiminnalle.

HUOMIO ! 4.8, 4.2

Jäähdytysilman on päästävä kulkemaan vapaasti. Ota huomioon jäähdytysilmamäärät. B-puoleiseen suojaverkkoon on säilytettävä vähintään 100 mm väli. Suojaverkko on puhdistettava säännöllisin välein.

HUOMIO ! 4.1

Paikalliset, laitespesifiset määräykset ja vaatimukset sekä työkalujen, nosto- ja kuljetuslaitteistojen asianmukainen käyttö sekä asiaankuuluvat normit, määräykset ja tapaturmantorjuntamääräykset on otettava huomioon.

HUOMIO ! 4.3, 6.2

Akselin päähän ei missään tapauksessa saa osua iskuja. Kiertoanturi ja kuulalaakeri voivat silloin vahingoittua.

HUOMIO ! 4.4, 6.4

Tehtaalla suoritettavan käynnistyksen/rasvanlevityskäytön lisäksi täytyy aina kuljetuksen jälkeen ja jokaisen voitelun jälkeen (vain DU 160 karan laakeri) suorittaa 10 minuutin pituinen, ajallisesti lineaarinen käynnistys maksimaaliseen käyttökierroslukuun asti!

HUOMIO ! 4.5

Moottorien DU 160 (optio 9000 min^{-1}) tarkkuuskaralaakeroinnit täytyy voidella A-puolella ja B-puolella.

Voiteluvälit ja -määrät käyvät ilmi moottorin voitelukyltistä.

! VAARA ! 4.6, 6.3

Kaikki liitäntä- ja asennustyöt on suoritettava ainostaan jännitteettömässä tilassa!

HUOMIO ! 4.7

Tuulettimen pyörimissuunnan tulee vastata suuntanuolta.

! VAARA ! 4.9

Vertikaalisella moottorikäytöllä (IM V15, IM V36) pidätinjarruila varustettujen moottoreiden maksimaalinen kierrosluku on rajoitettu (katso kappale 3.2).
Jos kierrosluku ylitetään, jarrutoiminto heikkenee jarrun kulumisen takia.

! VAARA ! 4.10

Pidätinjarru ei ole mikään työskentelyjarru ja sen käyttö on sallittua ainoastaan akselin seisoessa. HÄTÄ-SEIS-jarrutukset ovat mahdollisia ainoastaan vähintään 30 minuutin pituisella jäähdytysajalla yksittäisten jarrutusten välillä ($J_{Last} = J_{Motor}$).

Ennen uudelleenkäyttöönottoa täytyy pidätysjarrun toiminta tarkastaa!

! VAARA ! 4.11

Jos anturijohdoissa ei ole suojaliitäntöjä, seurauksena voi olla kontrolloimaton toimintakäyttäytyminen.
Jotta vaaroilta vältytään, on moitteeton suojaliitäntä otettava huomioon.

HUOMIO ! 6.1

Tehokylttien tiedot on ehdottomasti otettava huomioon ja verratava vaadittujen tietojen kanssa!

A.1.10 Svenska

Anvisning om risker i handboken

Beakta de säkerhetsanvisningar som ingår handboken (”RISKER”, ”OBSERVERA”) över risker för liv och hälsa och hur sakskador undviks, samt de specificerade informationerna över produkten (”Anvisning”).

Alla säkerhetsanvisningarna är numrerade fortlöpande på samma sätt som kapitlen, t. ex. 1.1. I bilagan finns tillhörande översättningar över säkerhetsanvisningen i alla EU-språk.

! FARA ! 1.1

Underhåll och installation av komponenter endast av kvalificerad personal som skall beakta bestämmelserna över olycksfallsförebyggande och bestämmelserna för installation (EN 60204-Teil1, prEN 50178).

! FARA ! 1.2

Produktens perfekta och säkra drift förutsätter sakkunnig transport, riktig lagring, uppställning och montage samt noggrann manövrering.

OBSERVERA ! 4.8, 4.2

**Kylluften får inte blockeras. Beakta kylluftsvolymerna.
Från skyddsgallret på B-sidan skall ett minimiavstånd på 100 mm finnas.
Skyddsgallret skall rengöras regelbundet.**

OBSERVERA ! 4.1

Beakta lokala anläggningsspecifika bestämmelser och förutsättningar och en sakkunnig användning av verktyg, lyft- och transportanordningar, samt tillhörande normer, bestämmelser och bestämmelserna för olycksfallsförebyggande.

OBSERVERA ! 4.3, 6.2

**Under inga omständigheter får slag eller stötar göras mot axeländen.
Vridgivare och kullager skadas därigenom.**

OBSERVERA ! 4.4, 6.4

Förutom inkörningen/fettfördelningen från fabrik är efter varje transport och efter varje eftersmörjning (endast DU 160 med spindellager) en linjär start under 10 min upp till max. arbetsvarvtal erforderlig!

OBSERVERA ! 4.5

Motorernas precisions spindellager
DU 160 (option 9000 min^{-1}) skall eftersmörjas på A-sidan och B-sidan.

Eftersmörjningsfrister och –mängder samt typ av fett, se smörjskylten på motorn.

! FARA ! 4.6, 6.3

Anslutnings- och montagearbeten får endast genomföras i spänningsfritt tillstånd!

OBSERVERA ! 4.7

Fläktarnas rotationsriktning skall överensstämma med pilen för rotationsriktning.

! FARA ! 4.9

Vid vertikal motordrift (IM V15, IM V36) är maximalt varvtal begränsat för motorer med parkeringsbroms (se avsnitt 3.2).
Om varvtalet överskrids påverkas bromsfunktionen på grund av slitage på bromsen.

! FARA ! 4.10

Parkeringsbromsen är ingen arbetsbroms och får endast manövreras när axlarna står stilla.
NÖD/FRÅN-bromsningar är endast möjligt med en nedkylningstid på 30 min mellan de enstaka bromsningarna (för $J_{Last} = J_{Motor}$).

Före nytt idrifttagande erfordras en funktionskontroll av parkeringsbromsen!

! FARA ! 4.11

Skärmanslutningar som inte är anslutna till givarledningar kan medföra ett okontrollerat drivningsförlopp.
Se till att skärmanslutningen är utan felaktigheter för att undvika faror.

OBSERVERA ! 6.1

Uppgifterna på effektskylten skall ovillkorligen beaktas och jämföras med erforderliga data!

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