



## The LSN servomotor – compact and low-cost

### Applications

The synchronous servomotors from LTI Motion are brushless three-phase motors for high-end servo applications and are available in all speed and voltage variants. They are particularly suitable for positioning tasks on machine tools, industrial robots, transfer lines, etc., as well as for applications with high demands on dynamic performance and stability.

The standard models of our servomotors are equipped to handle a wide range of applications. In addition, available options include, e.g., a holding brake, IP65 protection, a very wide variety of temperature monitors, a model with flying lead, high-resolution SSI and Hiperface encoders, as well as customer-specific flanges and special shafts. Optionally, we also offer our servomotors in EX (explosion-proof) variants. Please contact our drive specialists for details.

The LSN product range with stall torques ( $M_s$ ) from 0.28 Nm to 60 Nm (externally cooled up to 78 Nm) is the logical further development of the LSH product range (chap. 4) with the incorporation of the Q 158 and Q 190 space envelopes.

The motors are available as preferred types for DC link voltages of 560 V, 320 V as well as 24 V and 48 V.

The winding arrangement is a compound-die pole winding. An optimised thermal design has increased the power density by a further approximately 30% compared to the LSH product range. As such the power density and dynamic performance of the LSN servomotors are at the highest level.

### Performance features of the LSN servomotors

- Very high power density and high dynamic performance
- Nd-Fe-B magnets (alloy of neodymium, iron and boron)
- Resolver (sine commutation)
- Connectors for connections
- Good price/performance ratio
- Fully encapsulated winding
- UL acceptance
- Various encoders available as options

# Declaration of conformity for LSN servomotors



## EG-Konformitätserklärung EC Declaration of Conformity

Der Hersteller  
*The manufacturer* LTI Motion GmbH  
Gewerbestraße 5-9  
35633 Lahnau

erklärt hiermit, dass die folgenden Produkte  
*declares that the following products*

Produktbezeichnung:  
*Product designation:* Synchron-Servomotor  
*Synchronous Servomotor*

Produkttypen:  
*Product types:* LSH, LST, LSN  
*LSH, LST, LSN*

den Sicherheitsbestimmungen der nachstehenden EG-Richtlinie entsprechen:  
*comply with the essential requirements of the following EC Directive*

2006/95/EG  
*2006/95/EC* [Niederspannungsrichtlinie]  
*[Low Voltage Directive]*

2011/65/EU  
*2011/65/EC* [RoHS-Richtlinie]  
*[Restriction of the use of certain Hazardous Substances]*

und dass folgende angeführte harmonisierten Normen angewandt wurde:  
*and that the following harmonised standards have been applied:*

EN 60034-1:2010 Drehende elektrische Maschinen - Teil 1: Bemessung und Betriebsverhalten  
*Rotating electrical machines – Part 1: Rating and performance*

EN 60034-5:2001+A1: 2007 Drehende elektrische Maschinen – Teil 5: Schutzarten aufgrund der Gesamtkonstruktion von drehenden elektrischen Maschinen (IP-Code) – Einteilung  
*Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP-Code)*

EN 60034-6:1993: Drehende elektrische Maschinen – Teil 6: Einteilung der Kühlverfahren (IC-Code)  
*Rotating electrical machines – Part 6: Methods of cooling (IC-Code)*

EN 60034-9:2005+A1:2007 Drehende elektrische Maschinen – Teil 9: Geräuschgrenzwerte  
*Rotating electrical machines – Part 9: Noise limits*

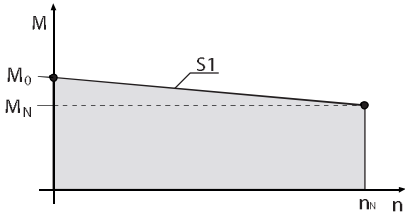
Jahr der CE-Kennzeichnung / *Year of CE-marking:* 2015

**Unterschrift / signature**

Name / *name:*   
Stellung / *position:* Dr. Josef Wiesing  
Datum / *date:* Geschäftsführer / *Managing Director*  
07.09.2015

Dokument: 0970.0DK.3-00

## Properties of LSN servomotors

Machine type	Permanently excited three-phase synchronous servomotor
Magnet material	Neodymium iron boron
Design (DIN 42948)	B5, V1, V3
Protection (DIN 40050)	IP64, IP54 according to EN 60034-5 (rotating machinery), IP65 available as an option
Insulation class	Insulation class F according to VDE0530, winding overtemperature $\Delta t = 100\text{ }^\circ\text{C}$ , ambient temperature $t_u = -20\text{ }^\circ\text{C}$ to $+40\text{ }^\circ\text{C}$ , no condensation!!!
Paint finish	RAL 9005 (matt black)
Shaft end on the D-end	Smooth shaft (feather key and feather keyway DIN 6885, tolerance band k6 as option)
Run-out, concentricity and axial run-out according to DIN 42955	Tolerance N (normal), tolerance R (reduced) on request
Thermal motor monitoring	DIN-PTC in a stator winding (standard)
Torque load	To exclude thermal overload of the motor, the effective load torque at medium speed must not be above the S1 characteristic.
 $M_{\text{eff}} = \sqrt{\frac{S (M_n^2 \times t_n)}{t_{\text{ges}}}} \quad \bar{n} = \frac{S (n_n \times t_n)}{t_{\text{ges}}}$	
Maximum pulse torque	Typically 2 to 4-times the rated torque for max. 0.2 s, depending on controller assignment
Vibration according to ISO 2373	Level N, optionally R
Bearing service life	The average service life under nominal conditions ( $M_{\text{max}} \leq M_N$ ) is 20,000 h
Type of connection of motor, thermistor and holding brake	Using connectors
Type of connection of the encoder system	Signal connector (mating connector not included in the scope of supply)

## Cooling

The rated data stated relate to a max. ambient temperature of  $40\text{ }^\circ\text{C}$  and the attachment of the motor to an aluminium plate with a max. temperature of  $40\text{ }^\circ\text{C}$  and an installation altitude of max. 1000 m above MSL.

Minimum fastening area: 2.5 x area of the motor flange

Thickness of the fastening area: min. 10 mm

If the motor is mounted so it is insulated (no heat dissipation via the flange), the rated torque must be reduced. From an installation altitude  $> 1000\text{ m}$  above MSL a power reduction of 1 % per 100 m is required. The maximum installation altitude is 4000 m.

At ambient temperatures  $> 40\text{ }^\circ\text{C}$  a power reduction of 1 % per  $1\text{ }^\circ\text{C}$  is required.

The maximum ambient temperature is  $50\text{ }^\circ\text{C}$ .

# Order codes, LTI Motion synchronous motors in the LSN product range



**NOTE:**

Preferred types are motors or options that are available at short notice from stock. The wide range of variants means there are many possible combinations. The order options marked with a "★" are preferred types and are available with short delivery times.

LSN - 074 - 0115 - 30 - 320 / T1 , B , P , X , K , S4 , G6.1S , W		Options (if available, sequence varies)	
<b>LTI synchronous motor product range N</b>			
<b>Edge dimensions in mm (not flange dimensions)</b>	050 074 097 127 158 190		
<b>Stall torque</b>	0.28 Nm → <b>0028</b> 0.54 Nm → <b>0054</b> 0.75 Nm → <b>0075</b> 0.95 Nm → <b>0095</b> 1.15 Nm → <b>0115</b> 2.05 Nm → <b>0205</b> 3.50 Nm → <b>0350</b> 4.80 Nm → <b>0480</b> 5.10 Nm → <b>0510</b> 7.50 Nm → <b>0750</b> 9.60 Nm → <b>0960</b>	11.30 Nm → <b>1130</b> 12.00 Nm → <b>1200</b> 16.00 Nm → <b>1600</b> 18.00 Nm → <b>1800</b> 20.00 Nm → <b>2000</b> 24.00 Nm → <b>2400</b> 30.00 Nm → <b>3000</b> 38.00 Nm → <b>3800</b> 40.00 Nm → <b>4000</b> 44.00 Nm → <b>4400</b> 50.00 Nm → <b>5000</b> 60.00 Nm → <b>6000</b>	
<b>Rated speed (x100) in min<sup>-1</sup></b>		30 45	
<b>Controller DC link voltage (VDC)</b>		320 560	
<b>Options</b>		Thermal switch / e.g. Klixon → <b>T0</b>	
<b>Thermal protection</b>	(DIN-PTC double basic insulation) <b>Standard!</b>	→ <b>*T1</b> KTY84-130 → <b>T4</b>	
<b>Brake option</b>		Holding brake 24 VDC → <b>*B</b>	
<b>Feather key option</b>		Feather key according to DIN 6885, sheet 1 → <b>*P</b>	
<b>Customer-specific special design</b>	(e.g. special flange / shaft / housing / encoder / etc.)	→ <b>X</b>	
<b>Cable option</b>		Cable, 1 m, flying leads → <b>K</b>	
<b>Connection option</b> (The D-end of the motor is the shaft end)		Angled connector, alignment toward D-end → <b>S1</b> Angled connector, alignment toward N-end → <b>S2</b> Angled connector, alignment rotated 90° → <b>S3</b> Angled / rotating connector → <b>*S4</b> From size LSN-127, angled, rotating connector with raised body, rotation angle 270° → <b>S7</b>	
<b>Options</b>		Resolver with 1 pole pair → <b>*1R</b>	
<b>Encoder system</b> (For details see following table)		Resolver with 1 pole pair Safety → <b>1RY</b> Resolver with 3 pole pairs → <b>3R</b> Resolver with 5 pole pairs → <b>5R</b> Multiturn absolute value encoder EQN 1325 → <b>G3</b> Singleturn absolute value encoder ECN 1313 → <b>G5</b> Singleturn absolute value encoder SRS 50 → <b>G6.1S</b> Multiturn absolute value encoder SRM 50 → <b>G6.1M</b> Singleturn absolute value encoder SKS 36 → <b>G6.2S</b> Singleturn absolute value encoder SKS 36 Safety → <b>G6.2SY</b> Multiturn absolute value encoder SKM 36 → <b>G6.2M</b> Multiturn absolute value encoder SKM 36 Safety → <b>G6.2MY</b> Singleturn absolute value encoder SEK 37 → <b>G6.3S</b> Multiturn absolute value encoder SEL 37 → <b>G6.3M</b> Singleturn absolute value encoder ECN 1313 → <b>G12.1S</b> Multiturn absolute value encoder EQN 1325 → <b>G12.1M</b> Singleturn absolute value encoder ECN 1113 → <b>G12.2S</b> Multiturn absolute value encoder EQN 1125 → <b>G12.2M</b>	
<b>Options</b>		Protection IP65 with shaft seal (approx. 10 mm longer) → <b>W</b>	
<b>Shaft seal</b>		Protection IP65 without shaft seal → <b>V</b>	

Table 2.1 Order codes, LSN servomotors  
The order options marked with a "★" are preferred types and are available with short delivery times.

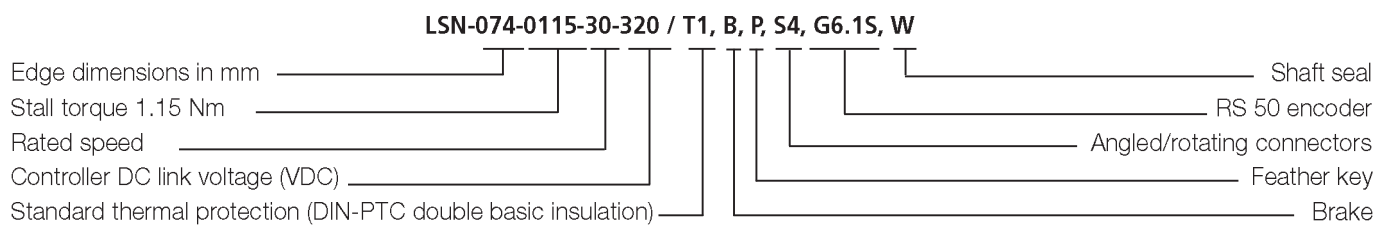


## Features of the standard version

- Smooth motor shaft (no feather key)
- Resolver with 1 pole pair 1R
- IP64 according to DIN 40050 except flange
- IP54 according to DIN VDE0530-5 and EN60034-5 (rotating machinery)
- Resolver connector straight
- Power connector straight
- Double basic insulation (winding and PTC) T1

Table 2.2 Definition of standard model

## Ordering example LSN servomotors:



## Ordering options

- Holding brake
- Various encoders
- Feather key DIN 6885
- Special shaft/flange
- Special mechanical design
- Servo gearboxes
- Flying lead
- UL approval
- ATEX acceptance
- etc.

## Encoder system options



### NOTE:

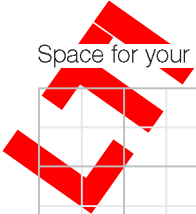
Preferred types are motors or options that are available at short notice from stock. The wide range of variants means there are many possible combinations. The order options marked with a "\*" are preferred types and are available with short delivery times.

Ordering options	Description	Interface	Analogue periods	Multiturn resolution	Compatible with
*1R	Resolver with 1 pole pair	Analogue	1	-	All LSN
1RY	Resolver with 1 pole pair Safety	Analogue	1	-	All LSN <sup>1)</sup>
3R	Resolver with 3 pole pairs	Analogue	3	-	Only LSN-050
5R	Resolver with 5 pole pairs	Analogue	5	-	From LSN-074
G3	Multiturn absolute value encoder EQN 1325	Analogue and SSI	2048	12 bits	From LSN-074
G5	Singleturn absolute value encoder ECN 1313	Analogue and SSI	2048	-	From LSN-074
G6.1S	Singleturn absolute value encoder SRS 50	Analogue and Hiperface	1024	-	From LSN-074
G6.1M	Multiturn absolute value encoder SRM 50	Analogue and Hiperface	1024	12 bits	From LSN-074
G6.2S	Singleturn absolute value encoder SKS 36	Analogue and Hiperface	128	-	All LSN
G6.2SY	Singleturn absolute value encoder SKS 36 Safety	Analogue and Hiperface	128	-	From LSN-050 <sup>1)</sup> (ServoOne safety)
G6.2M	Multiturn absolute value encoder SKM 36	Analogue and Hiperface	128	12 bits	All LSN
G6.2MY	Multiturn absolute value encoder SKM 36 Safety	Analogue and Hiperface	128	12 bits	All LSN <sup>1)</sup> (ServoOne safety)
G6.3S	Singleturn absolute value encoder SEK 37	Analogue and Hiperface	16	12 bits	All LSN
G6.3M	Multiturn absolute value encoder SEL 37	Analogue and Hiperface	16	12 bits	All LSN
G12.1S	Singleturn absolute value encoder ECN 1313	Analogue and Endat 2.1	2048	-	From LSN-074
G12.1M	Multiturn absolute value encoder EQN 1325	Analogue and Endat 2.1	2048	12 bits	From LSN-074
G12.2S	Singleturn absolute value encoder ECN 1113	Analogue and Endat 2.1	512	-	Only LSN-050
G12.2M	Multiturn absolute value encoder EQN 1125	Analogue and Endat 2.1	512	12 bits	Only LSN-050

Table 2.3 Explanation of encoder systems

1) Suitable for safety-related applications as per EN 62061 and IEC 61508 as well as EN ISO 13849-1

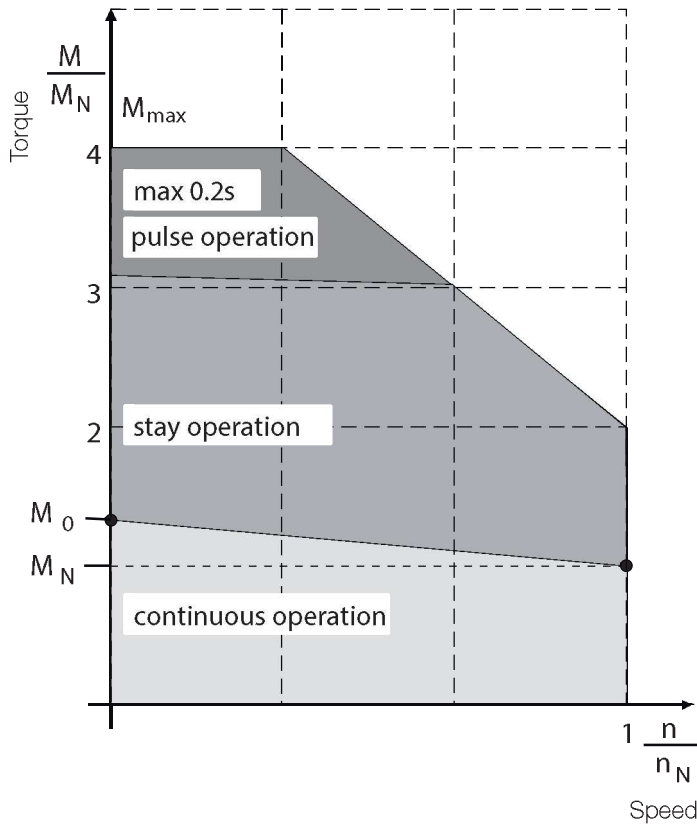
Space for your notes



A large grid area for taking notes, consisting of approximately 20 columns and 30 rows of small squares.

## Typical M-n characteristic for the LSN servomotors

The characteristic shows how the speed of the servomotor behaves with increasing load.



### M-n characteristic for synchronous motors

Term	Explanation
$n_N$ Rated speed	Speed at which a motor outputs the highest possible power (rated power) under full load.
$M_0$ Stall torque	Thermal limit torque of the motor at standstill. The motor can deliver this torque for an unlimited length of time.
$I_0$ Stall current	Effective value of the motor phase current required to generate the stall torque.
$M_n$ Rated torque	Thermal limit torque of the motor at rated speed $n_n$ .
$I_N$ Rated current	Effective value of the motor phase current required to generate the rated torque.
$P_N$ Rated power	Continuous motor power at the rated operating point ( $M_n, n_n$ ) at rated current $I_n$ and rated voltage $U_n$ .
$M_{MAX}, I_{MAX}$ Limit characteristic	A maximum of four times the rated current is allowed to be applied to the motors.

Table 2.4 Explanation of terms for M-n characteristic for synchronous motors

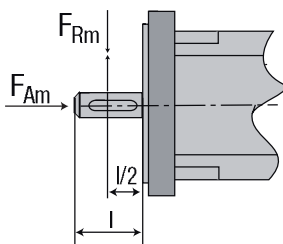
# Permissible axial and lateral forces on the LSN servomotors

Servomotor without brake

Sizes	Radial force $F_{Rm}$ [N] at rated speed $n$ [min <sup>-1</sup> ]					Axial force $F_{Am}$ [N] at rated speed $n$ [min <sup>-1</sup> ]					$F_G$ [N]
	1000	2000	3000	4500	6000	1000	2000	3000	4500	6000	
LSN-050-0028	312	247	216	189	172	59	47	41	37	33	2
LSN-050-0054	338	268	234	205	186	64	51	45	39	35	2
LSN-050-0075	355	281	246	215	195	67	53	47	41	37	2
LSN-050-0095	366	291	254	222	201	70	55	48	42	38	2
LSN-074-0115	408	324	283	247	225	78	62	54	47	43	6
LSN-074-0205	472	374	327	286	260	90	71	62	54	49	6
LSN-074-0350	514	408	356	311	283	98	77	68	59	54	6
LSN-074-0480	566	449	392	343	311	108	85	75	65	59	6
LSN-097-0510	859	681	595	520	472	163	129	113	99	90	18
LSN-097-0750	942	748	653	571	519	179	142	124	108	99	18
LSN-097-0960	993	788	689	602	547	189	150	131	114	104	18
LSN-097-1130	1028	816	713	623	566	195	155	135	118	107	18
LSN-127-1200	959	761	665	581	528	182	145	126	110	100	34
LSN-127-1600	1029	817	713	623	566	196	155	136	118	108	34
LSN-127-2000	1076	854	746	652	592	204	162	142	124	113	34
LSN-127-2400	1110	881	770	672	611	211	167	146	128	116	34
LSN-158-1800	919	729	637	557	506	175	139	121	106	96	60
LSN-158-2400	986	782	684	597	543	187	149	130	113	103	60
LSN-158-3000	1034	820	717	626	569	196	156	136	119	108	60
LSN-158-3800	1069	849	741	648	588	203	161	141	123	112	60
LSN-158-4400	1097	871	761	664	604	208	165	145	126	115	60
LSN-190-3000	1752	1390	1214	1061	964	333	264	231	202	183	100
LSN-190-4000	1862	1478	1291	1128	1025	354	281	245	214	195	100
LSN-190-5000	1942	1541	1346	1176	1069	369	293	256	223	203	100
LSN-190-6000	2001	1588	1388	1212	1101	380	302	264	230	209	100

Table 2.5 Permissible axial and lateral forces on the LSN servomotors up to a service life of 20,000 h.

$F_G$  ... force due to weight of the rotor.



The table shows the max. permissible lateral force (radial force  $F_R$ ) at the point of application  $l/2$  and the max. permissible axial force  $F_{Am}$  for a service life of 20,000 h. A lateral force that does not act on the middle of the end of the shaft can be simply converted to the different leverage.

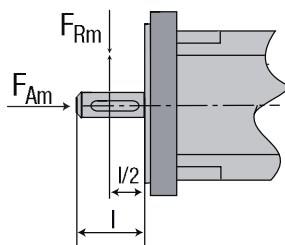
Either the permissible radial force or the axial force is allowed to act on the motor shaft!



Servomotor with brake

Sizes	Radial force $F_{Rm}$ [N] at rated speed $n$ [min <sup>-1</sup> ]					Axial force $F_{Am}$ [N] at rated speed $n$ [min <sup>-1</sup> ]					$F_G$ [N]
	1000	2000	3000	4500	6000	1000	2000	3000	4500	6000	
LSN-050-0028	356	283	247	216	196	68	54	47	41	37	2
LSN-050-0054	367	291	254	222	202	70	55	48	42	38	2
LSN-050-0075	374	297	260	227	206	71	56	49	43	39	2
LSN-050-0095	380	302	264	230	209	72	57	50	44	40	2
LSN-074-0115	431	342	299	261	237	82	65	57	50	45	6
LSN-074-0205	484	384	335	293	266	92	73	64	56	51	6
LSN-074-0350	520	413	360	315	286	99	78	68	60	54	6
LSN-074-0480	567	450	393	343	312	108	86	75	65	59	6
LSN-097-0510	881	699	611	534	485	167	133	116	101	92	18
LSN-097-0750	951	755	660	576	524	181	143	125	109	99	18
LSN-097-0960	997	791	691	604	548	189	150	131	115	104	18
LSN-097-1130	1028	816	713	623	566	195	155	135	118	108	18
LSN-127-1200	982	779	681	595	540	187	148	129	113	103	34
LSN-127-1600	1044	829	724	632	575	198	157	138	120	109	34
LSN-127-2000	1087	863	754	658	598	207	164	143	125	114	34
LSN-127-2400	1118	888	775	677	615	212	169	147	129	117	34
LSN-158-1800	1008	800	699	610	555	191	152	133	116	105	60
LSN-158-2400	1035	822	718	627	570	197	156	136	119	108	60
LSN-158-3000	1057	839	733	640	582	201	159	139	122	111	60
LSN-158-3800	1075	853	745	651	591	204	162	142	124	112	60
LSN-158-4400	1089	864	755	660	599	207	164	143	125	114	60
LSN-190-3000	1936	1537	1342	1173	1065	368	292	255	223	202	100
LSN-190-4000	1997	1585	1384	1209	1099	379	301	263	230	209	100
LSN-190-5000	2044	1622	1417	1238	1125	388	308	269	235	214	100
LSN-190-6000	2082	1652	1443	1261	1146	396	314	274	240	218	100

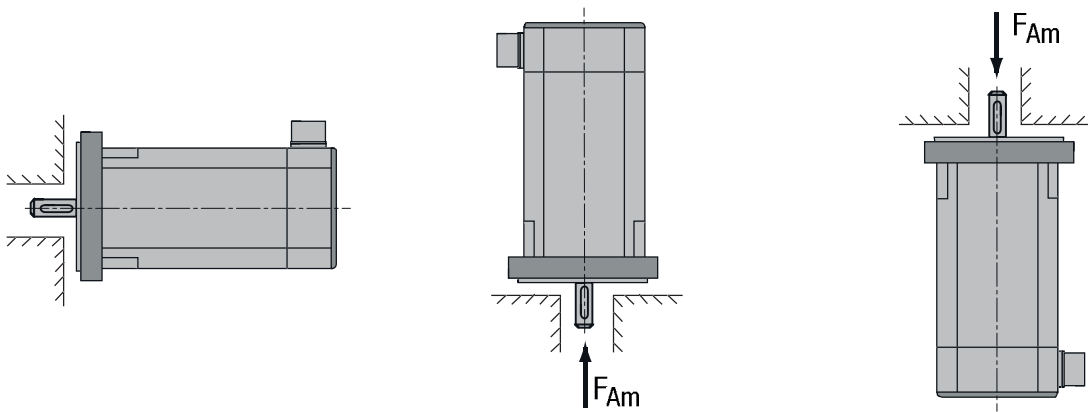
Table 2.6 Permissible axial and lateral forces on the LSN servomotors up to a service life of 20,000 h.  
 $F_G$  ... force due to weight of the rotor.



The table shows the max. permissible lateral force (radial force  $F_R$ ) at the point of application  $l/2$  and the max. permissible axial force  $F_{Am}$  for a service life of 20,000 h. A lateral force that does not act on the middle of the end of the shaft can be simply converted to the different leverage.

Either the permissible radial force or the axial force is allowed to act on the motor shaft!

Technical data, design



2

Design	B5	V1	V3
Shaft	Open end of the shaft	Open end of the shaft at bottom	Open end of the shaft at top
Fastening	Flange mounting Access from the housing side	Flange mounting at bottom Access from the housing side	Flange mounting at top Access from the housing side



**NOTE:**

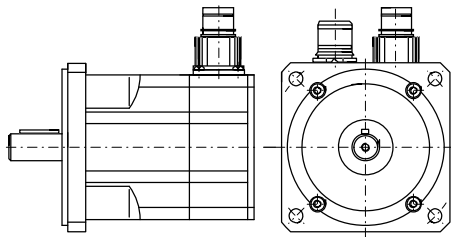
The permissible axial forces ( $F_A$ ) apply for vertical mounting (V1). On vertical mounting upwards (V3) the permissible axial forces are reduced by the force due to the weight of the rotor ( $F_G$ ).

# Connection system



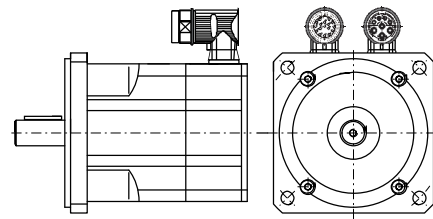
LST-074-0115-30-320/S4\*, G6.1\*  
Connector alignment  
Pin assignment  
\*Example

## Standard model



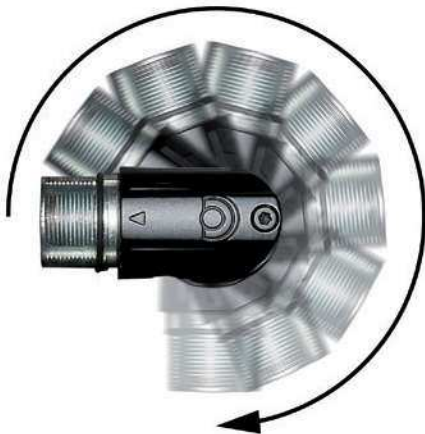
Straight connector

## S4 model



Angled / rotating connector

## S7 model

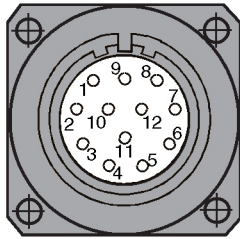


Angled connector that can be rotated by 270°

From size LSN-127 raised bodies are used for angled / rotating connectors with an angle of rotation of 270°.

## Encoder connections

### Encoder connection xR (resolver)

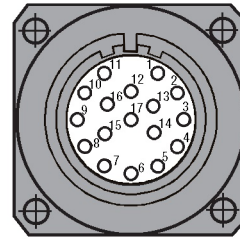


12-pin socket contacts Ø 1 mm

Pin	Des.	Designation
1	Cos+	(S1)
2	COS-	(S3)
3	SIN+	(S2)
4	SIN-	(S4)
6	REF+	(R1)
7	REF-	(R2)
11	PTC+	Motor PTC
12	PTC-	Motor PTC
5, 8, 9, 10	n. c.	Not used

Table 2.7 Encoder connection xR (resolver)

### Encoder connection Gx (optical encoder)



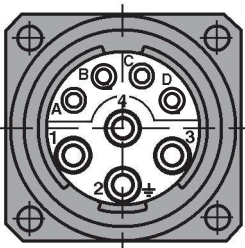
17-pin socket contacts Ø 1 mm

Pin	Des. G3, G5, G12.x	Des. G6.x
1	A+	A+
2	A-	A-
3	B+	B+
4	B-	B-
7	GND / OV	GND / OV
8	VCC +5 V/150 mA	-
9	-	VCC 7-12V/100mA
10	DATA+	DATA+
11	DATA-	DATA-
12	CLK+	-
13	CLK-	-
16	VCC sense	-
17	GND sense	-
5, 6, 14, 15	n. c.	n. c.

Table 2.8 Encoder connection Gx (optical encoder)

## Power connections

### Power connection



8-pin socket contacts  
for pin 1 ... 4 Ø 2 mm  
for pin A ... D Ø 1 mm

Pin	Des.	Designation
1	U	Motor phase U
2	PE	PE
3	W	Motor phase W
4	V	Motor phase V
A	Brake +	Brake +
B	Brake -	Brake -
C	PTC+	Motor PTC <sup>1)</sup>
D	PTC-	Motor PTC <sup>1)</sup>

<sup>1)</sup> On motors with resolver, not used

Table 2.9 Power connection on LST servomotors



## Definition of the most important terminology

---

**Stall torque  $M_0$  [Nm]**

The stall torque can be output for an unlimited time at speed  $n=0 \text{ min}^{-1}$  and under rated ambient conditions.

---

**Rated torque  $M_n$  [Nm]**

The rated torque is output if the motor is drawing rated current at rated speed. The rated torque can be output for an unlimited time at rated speed in continuous operation.

---

**Stall current  $I_0$  [A]**

The stall current is the effective sinusoidal current the motor draws at standstill to output the stall torque.

---

**Rated current  $I_n$  [A]**

The rated current is the effective sinusoidal current the motor draws at rated speed to output the rated torque.

---

**Maximum permissible current (peak current)  $I_{\max}$  [A]**

The peak current (effective sinusoidal value) should not be more than 4 times the rated current. The peak current of the inverter used defines the actual value.

---

**Torque constant  $K_T$  [Nm/A]**

The torque constant defines how much torque in Nm the motor generates with 1 A effective sinusoidal current. The following applies:  $M=I \times K_T$

---

**EMF constant  $K_E$  [V/1000  $\text{min}^{-1}$ ]**

The EMF constant defines the motor EMF induced between two terminals as a sinusoidal peak value, referred to 1000 rev/min.

---

**Moment of inertia of rotor  $J$  [kgcm<sup>2</sup>]**

The constant  $J$  is a measure of the mass inertia of the motor.

---

**Thermal time constant  $T_{th}$  [min]**

The constant  $T_{th}$  defines the warm-up time for the cold motor under load with  $I_0$  until  $0.63 \times 10^5$  Kelvin overtemperature is reached. Under load with peak current, the warm-up time is significantly shorter.

---


**Rated speed  $n_n$  [ $\text{min}^{-1}$ ]**

The rated speed is the speed at which a servomotor outputs the highest possible power – the so-called rated power – under full load.

---

Table 2.10 Definition of the most important terminology





# Overview of LSN servomotors



2

## Technical data

Motor type	Motor type/ rating plate	DC link voltage $U_{dc}$ [V]	Stall torque $M_0$ [Nm]	Rated torque $M_n$ [Nm]	Rated current $I_n$ [A]	Rated speed $n_n$ [min <sup>-1</sup> ]
LSN-050	LSN-050-0028-45-320	320	0.28	0.25	0.96	4500
	LSN-050-0054-45-320		0.54	0.48	1.12	4500
	LSN-050-0075-45-320		0.75	0.68	1.48	4500
	LSN-050-0095-45-320		0.95	0.85	1.70	4500
	LSN-050-0028-45-560	560	0.28	0.25	0.96	4500
	LSN-050-0054-45-560		0.54	0.48	0.90	4500
	LSN-050-0075-45-560		0.75	0.68	0.83	4500
	LSN-050-0095-45-560		0.95	0.85	1.07	4500
LSN-074	LSN-074-0115-30-320	320	1.15	1.13	2.30	3000
	LSN-074-0205-30-320		2.05	1.90	3.10	3000
	LSN-074-0350-30-320		3.50	3.00	4.30	3000
	LSN-074-0480-30-320		4.80	3.70	4.50	3000
	LSN-074-0115-30-560	560	1.15	1.13	1.30	3000
	LSN-074-0205-30-560		2.05	1.90	1.70	3000
	LSN-074-0350-30-560		3.50	3.00	2.40	3000
	LSN-074-0480-30-560		4.80	3.70	2.60	3000
LSN-097	LSN-097-0510-30-320	320	5.10	4.20	7.00	3000
	LSN-097-0750-30-320		7.50	6.10	8.80	3000
	LSN-097-0960-30-320		9.60	7.70	10.80	3000
	LSN-097-1130-30-320		11.30	8.80	10.70	3000
	LSN-097-0510-30-560	560	5.10	4.20	3.90	3000
	LSN-097-0750-30-560		7.50	6.10	5.10	3000
	LSN-097-0960-30-560		9.60	7.70	6.00	3000
	LSN-097-1130-30-560		11.30	8.80	6.90	3000

Table 2.11 Technical data for the LSN servomotor product range - All figures with a tolerance of  $\pm 5\%$

Motor type	Motor type/ rating plate	DC link voltage $U_{dc}$ [V]	Stall torque $M_0$ [Nm]	Rated torque $M_n$ [Nm]	Rated current $I_n$ [A]	Rated speed $n_n$ [min <sup>-1</sup> ]
LSN-127	LSN-127-1200-30-560	560	12.00	10.50	8.30	3000
	LSN-127-1600-30-560		16.00	13.80	9.90	3000
	LSN-127-2000-30-560		20.00	16.00	11.50	3000
	LSN-127-2400-30-560		24.00	20.00	14.10	3000
LSN-158	LSN-158-1800-20-560	560	18.00	14.80	8.60	2000
	LSN-158-2400-20-560		24.00	20.00	10.70	2000
	LSN-158-3000-20-560		30.00	25.30	12.90	2000
	LSN-158-3800-20-560		38.00	29.00	15.00	2000
	LSN-158-4400-20-560		44.00	36.50	17.30	2000
	LSN-158-1800-30-560	560	18.00	13.00	11.00	3000
	LSN-158-2400-30-560		24.00	17.00	13.80	3000
	LSN-158-3000-30-560		30.00	21.00	16.20	3000
	LSN-158-3800-30-560		38.00	25.00	19.70	3000
	LSN-158-4400-30-560		44.00	30.00	24.40	3000
LSN-190	LSN-190-3000-20-560	560	30.00	26.10	13.20	2000
	LSN-190-4000-20-560		40.00	32.80	15.40	2000
	LSN-190-5000-20-560		50.00	40.40	21.80	2000
	LSN-190-6000-10-560		60.00	54.00	14.60	1000
	LSN-190-3000-30-560	560	30.00	23.00	15.50	3000
	LSN-190-4000-30-560		40.00	25.00	20.10	3000
	LSN-190-5000-30-560		50.00	30.00	24.40	3000
	LSN-190-6000-25-560		60.00	36.20	20.70	2500

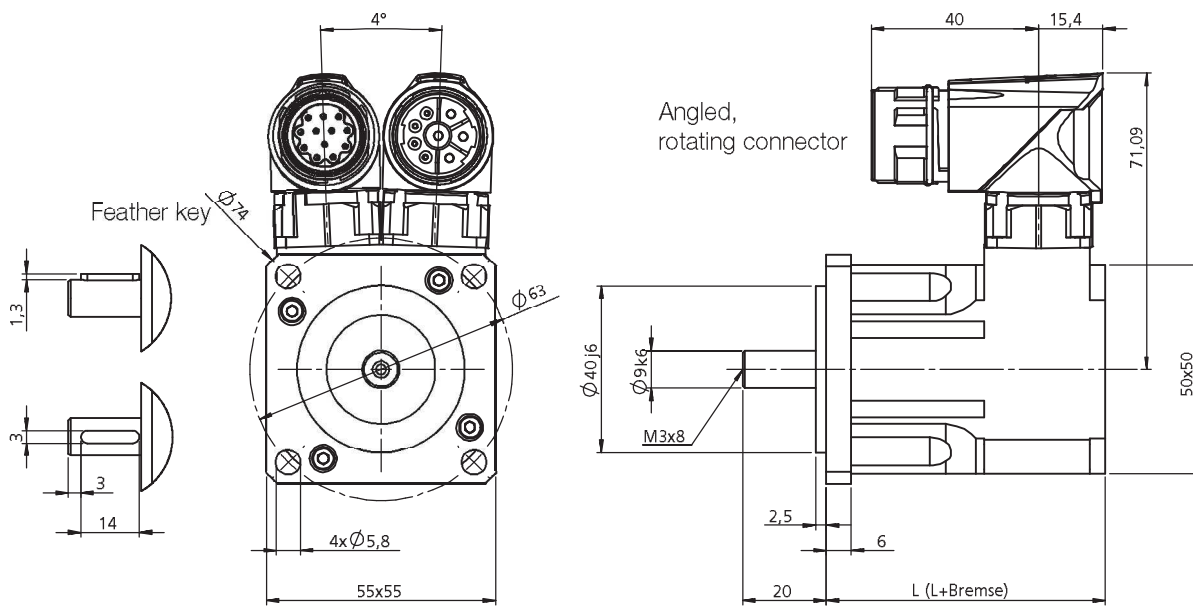
Table 2.11 Technical data for the LSN servomotor product range - All figures with a tolerance of  $\pm 5\%$



# Motor type: LSN-050 ( $U_{dc} = 320\text{ V}$ )



## Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-050-0028	67	105	121	159
LSN-050-0054	82	120	136	174
LSN-050-0075	97	135	151	189
LSN-050-0095	112	150	166	204

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-050-0028	In preparation	In preparation	94	128	82	In preparation
LSN-050-0054	In preparation	In preparation	109	143	97	In preparation
LSN-050-0075	In preparation	In preparation	124	158	112	In preparation
LSN-050-0095	In preparation	In preparation	139	173	127	In preparation

Table 2.12 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-050-0028	LSN-050-0054	LSN-050-0075	LSN-050-0095
Rated speed	$n_n$	4500 min <sup>-1</sup>	4500 min <sup>-1</sup>	4500 min <sup>-1</sup>	4500 min <sup>-1</sup>
Rated frequency	$f_N$	225 Hz	225 Hz	225 Hz	225 Hz
DC link voltage (controller)	$U_{dc}$	320 V	320 V	320 V	320 V
Rated voltage	$U_n$	220 V	220 V	220 V	220 V
Rated torque	$M_n$	0.25 Nm	0.48 Nm	0.68 Nm	0.85 Nm
Rated current	$I_n$	0.96 A	1.12 A	1.48 A	1.70 A
Power	P	0.12 kW	0.23 kW	0.32 kW	0.40 kW
Stall torque	$M_0$	0.28 Nm	0.54 Nm	0.75 Nm	0.95 Nm
Stall current	$I_0$	0.97 A	1.17 A	1.54 A	1.82 A
Maximum permissible torque	$M_{max}$	1.1 Nm	2.2 Nm	3.0 Nm	3.8 Nm
Maximum permissible current	$I_{max}$	4.5 A	5.4 A	7.1 A	8.4 A
Maximum permissible speed	$n_{max}$	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>
EMF constant	$K_E$	17.5 V/1000 min <sup>-1</sup>	28.0 V/1000 min <sup>-1</sup>	29.5 V/1000 min <sup>-1</sup>	31.5 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	0.29 Nm/A	0.46 Nm/A	0.49 Nm/A	0.52 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	28.30 $\Omega$	25.90 $\Omega$	17.00 $\Omega$	13.10 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	28.40 mH	32.30 mH	22.70 mH	19.00 mH
No load speed	$n_0$	12260 min <sup>-1</sup>	7740 min <sup>-1</sup>	7380 min <sup>-1</sup>	6950 min <sup>-1</sup>
Electrical time constant	$T_{el}$	1.0 ms	1.2 ms	1.3 ms	1.45 ms
Thermal time constant	$T_{th}$	10 min.	12 min.	15 min.	18 min.
Moment of inertia of rotor	J	0.000005 kgm <sup>2</sup>	0.000007 kgm <sup>2</sup>	0.000009 kgm <sup>2</sup>	0.000011 kgm <sup>2</sup>
Mass	m	0.76 kg	0.93 kg	1.1 kg	1.27 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	0.46 A			
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	0.41 x 10 <sup>6</sup> Js			
Moment of inertia	$J_B$	0.0000068 kgm <sup>2</sup>			
Mass	m	0.44 kg			
Braking torque	$M_H$	2.00 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1; $T_\lambda = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.



# Characteristics

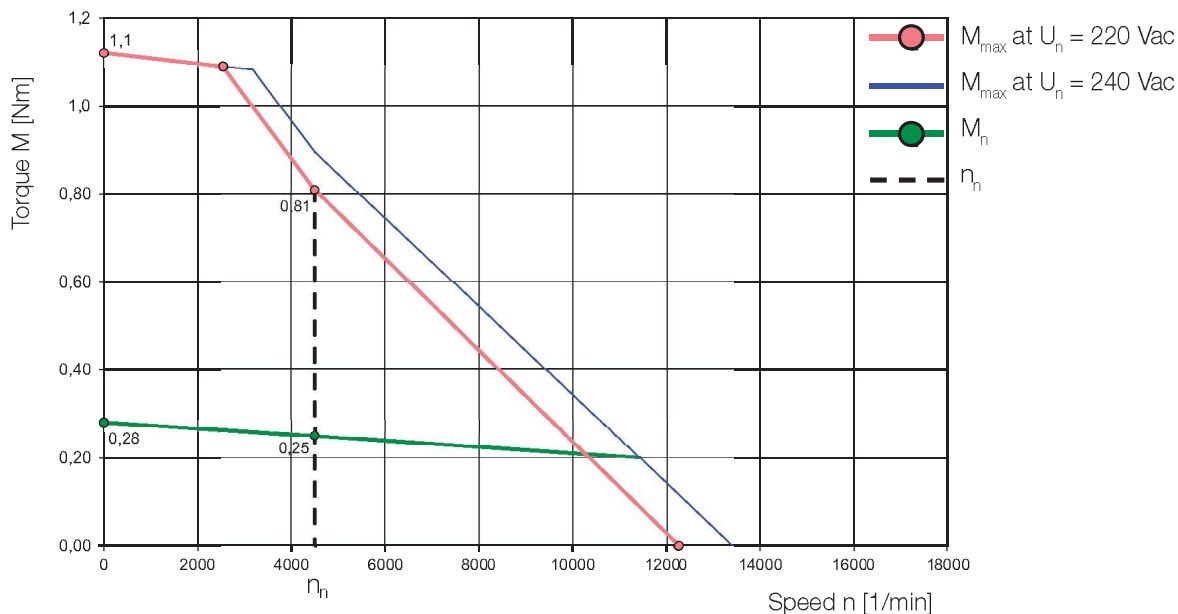
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

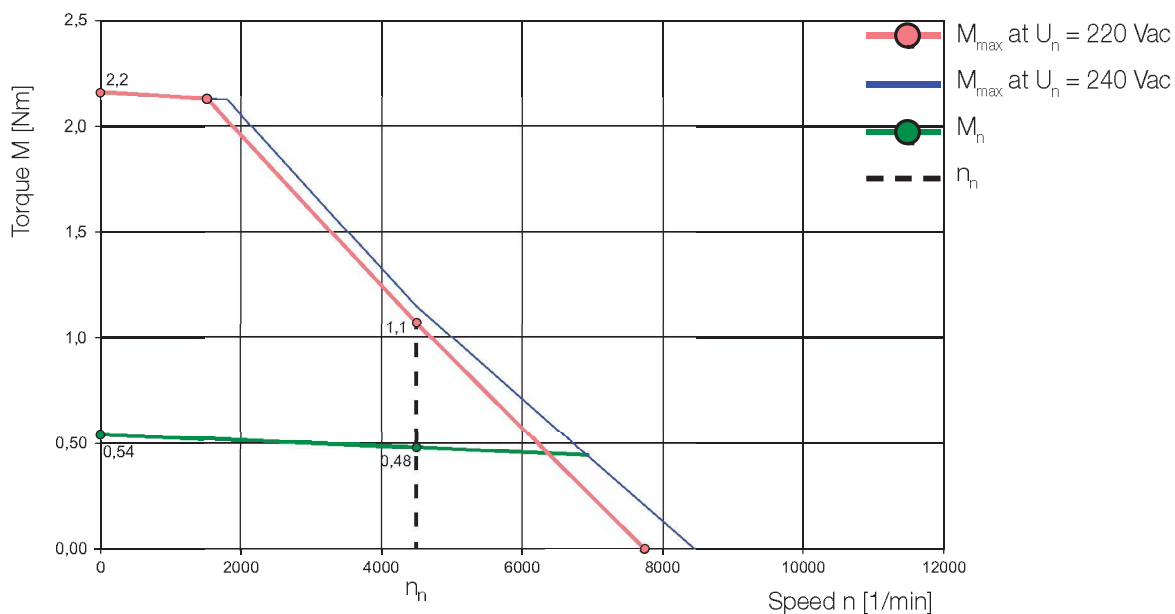
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

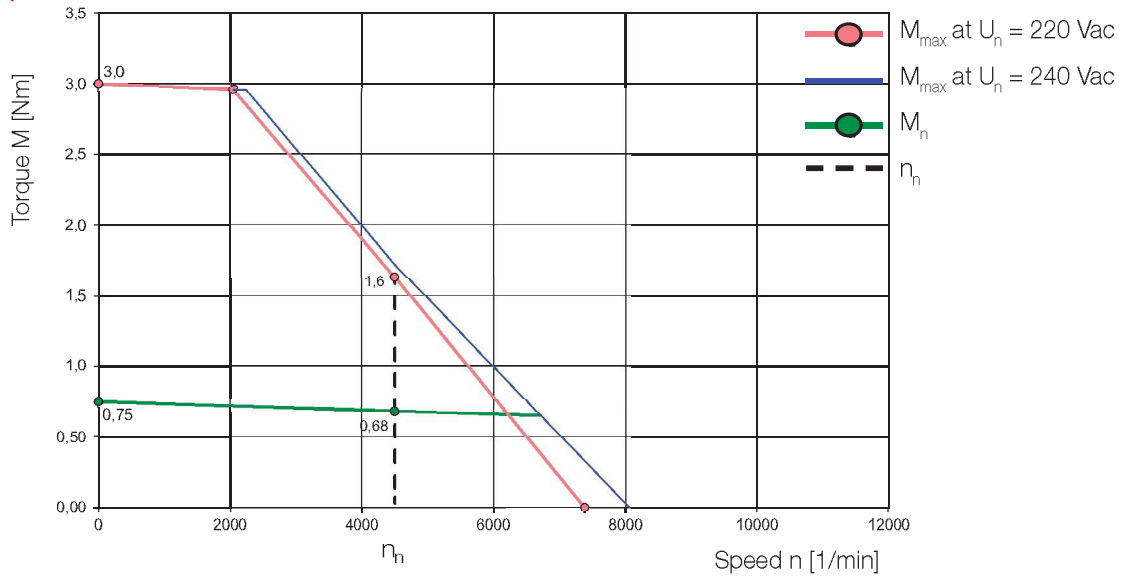
## LSN-050-0028-45-320



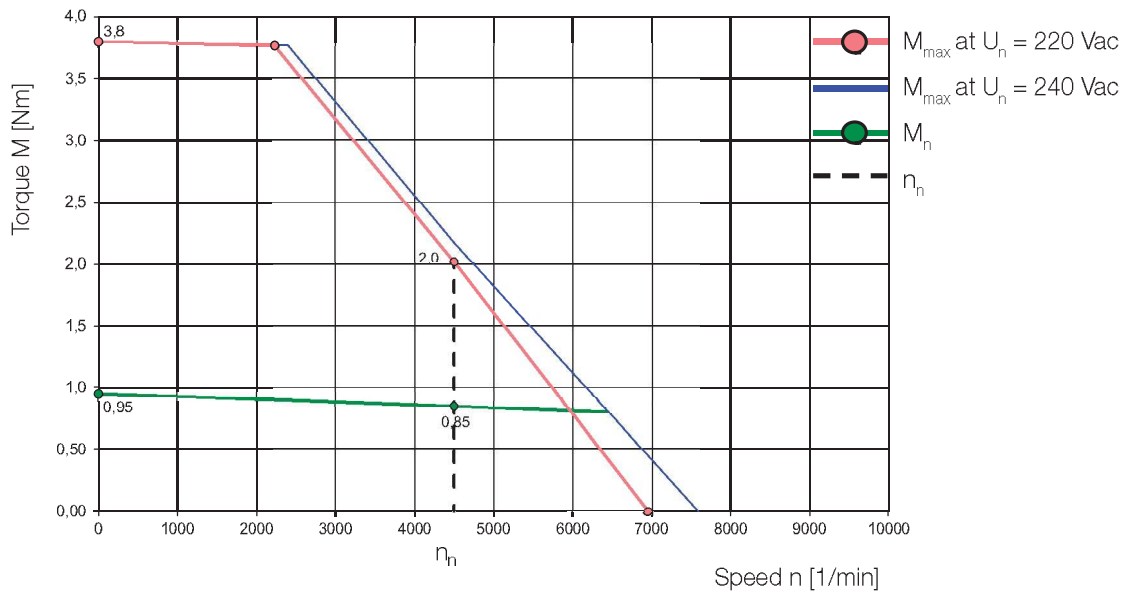
## LSN-050-0054-45-320



**LSN**  
LSN-050-0075-45-320



LSN-050-0095-45-320

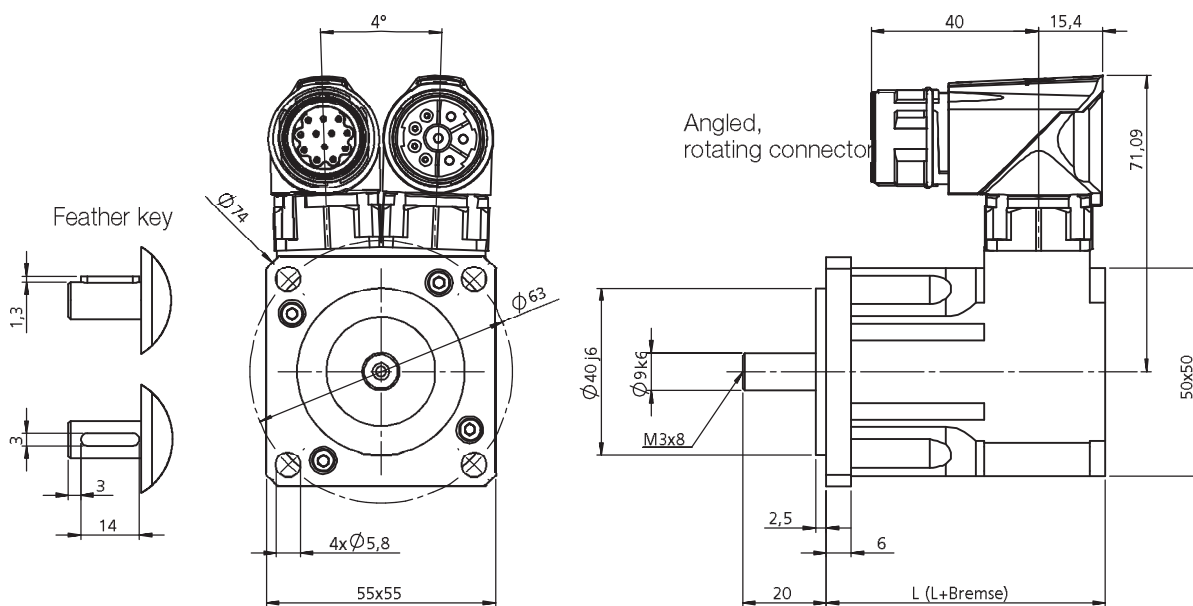


2

# Motor type: LSN-050 ( $U_{dc} = 560\text{ V}$ )



## Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-050-0028	67	105	121	159
LSN-050-0054	82	120	136	174
LSN-050-0075	97	135	151	189
LSN-050-0095	112	150	166	204

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-050-0028	In preparation	In preparation	94	128	82	In preparation
LSN-050-0054	In preparation	In preparation	109	143	97	In preparation
LSN-050-0075	In preparation	In preparation	124	158	112	In preparation
LSN-050-0095	In preparation	In preparation	139	173	127	In preparation

Table 2.13 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-050-0028	LSN-050-0054	LSN-050-0075	LSN-050-0095
Rated speed	$n_n$	4500 min <sup>-1</sup>	4500 min <sup>-1</sup>	4500 min <sup>-1</sup>	4500 min <sup>-1</sup>
Rated frequency	$f_N$	225 Hz	225 Hz	225 Hz	225 Hz
DC link voltage (controller)	$U_{dc}$	560 V	560 V	560 V	560 V
Rated voltage	$U_n$	380 V	380 V	380 V	380 V
Rated torque	$M_n$	0.25 Nm	0.48 Nm	0.68 Nm	0.85 Nm
Rated current	$I_n$	0.96 A	0.90 A	0.83 A	1.07 A
Power	$P$	0.12 kW	0.23 kW	0.32 kW	0.40 kW
Stall torque	$M_0$	0.28 Nm	0.54 Nm	0.75 Nm	0.95 Nm
Stall current	$I_0$	0.97 A	0.93 A	0.86 A	1.15 A
Maximum permissible torque	$M_{max}$	1.1 Nm	2.2 Nm	3.0 Nm	3.8 Nm
Maximum permissible current	$I_{max}$	4.5 A	4.3 A	3.9 A	5.3 A
Maximum permissible speed	$n_{max}$	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>
EMF constant	$K_E$	17.5 V/1000 min <sup>-1</sup>	35.0 V/1000 min <sup>-1</sup>	53.0 V/1000 min <sup>-1</sup>	50.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	0.29 Nm/A	0.58 Nm/A	0.88 Nm/A	0.83 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	28.30 $\Omega$	41.10 $\Omega$	54.00 $\Omega$	33.60 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	28.40 mH	51.00 mH	72.00 mH	48.50 mH
No load speed	$n_0$	21170 min <sup>-1</sup>	10710 min <sup>-1</sup>	7100 min <sup>-1</sup>	7560 min <sup>-1</sup>
Electrical time constant	$T_{el}$	1.0 ms	1.2 ms	1.3 ms	1.45 ms
Thermal time constant	$T_{th}$	10 min.	12 min.	15 min.	18 min.
Moment of inertia of rotor	$J$	0.000005 kgm <sup>2</sup>	0.000007 kgm <sup>2</sup>	0.000009 kgm <sup>2</sup>	0.000011 kgm <sup>2</sup>
Mass	$m$	0.76 kg	0.93 kg	1.1 kg	1.27 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	0.46 A			
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	0.41 x 10 <sup>6</sup> Ws			
Moment of inertia	$J_B$	0.0000068 kgm <sup>2</sup>			
Mass	$m$	0.44 kg			
Braking torque	$M_H$	2.00 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1, $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

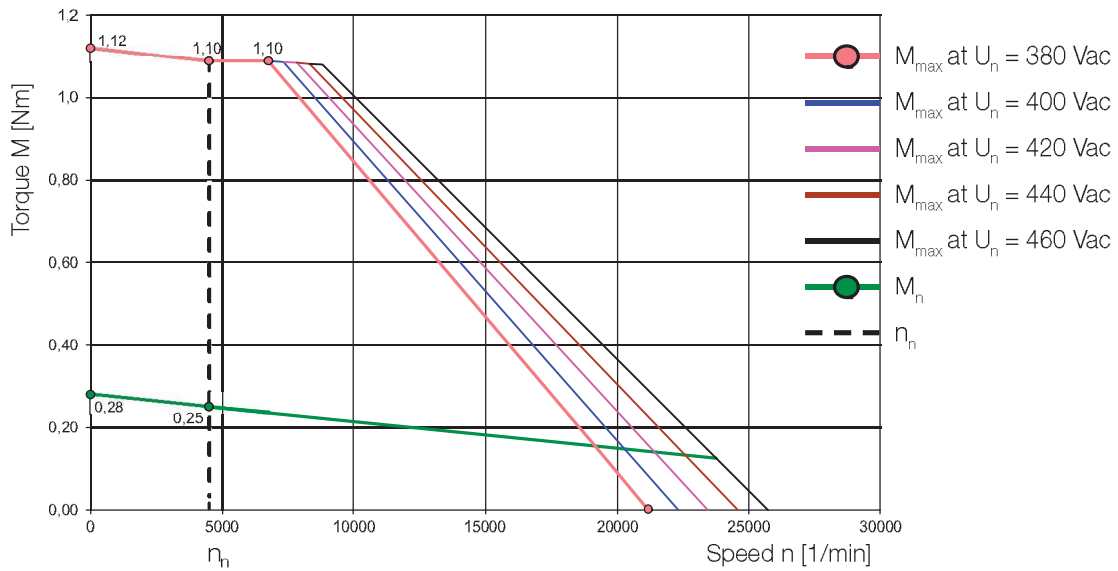
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

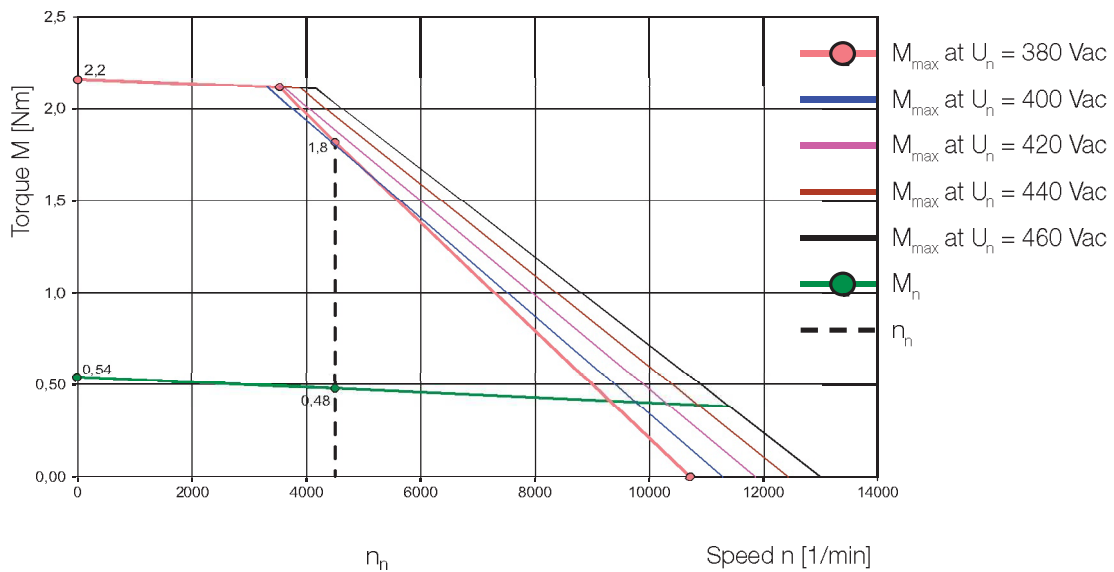
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

## LSN-050-0028-45-560

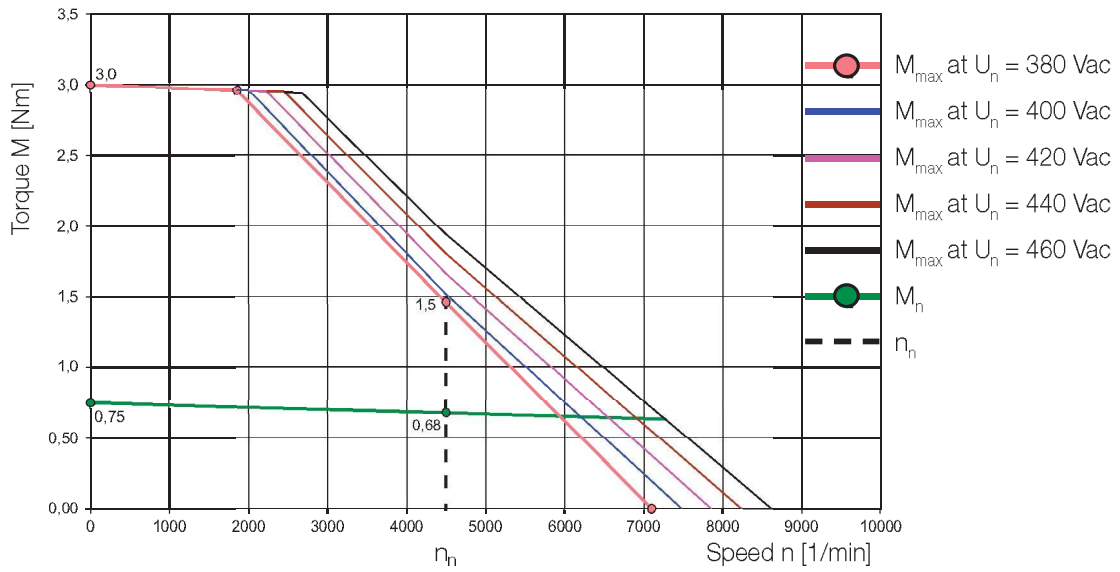


## LSN-050-0054-45-560

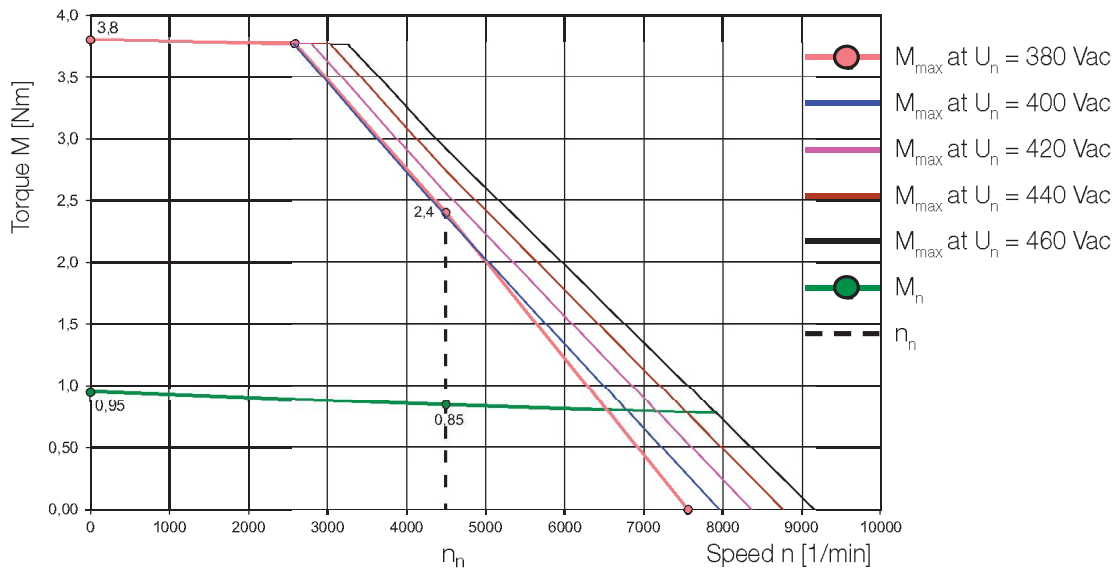




LSN-050-0075-45-560



LSN-050-0095-45-560

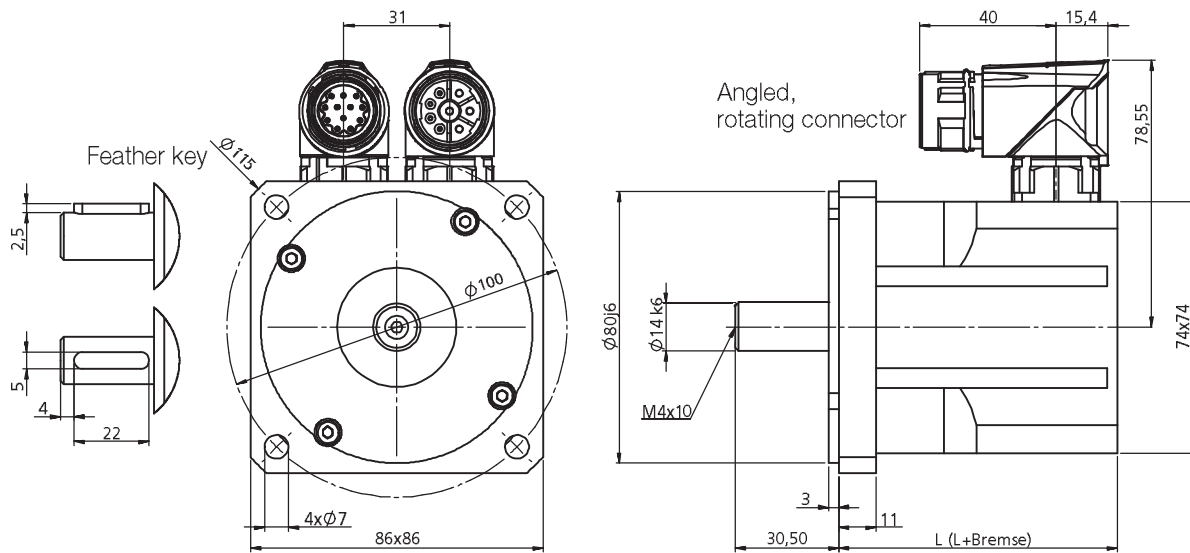


2

# Motor type: LSN-074 ( $U_{dc} = 320\text{ V}$ )



## Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-074-0115	82	120	123	165.5
LSN-074-0205	100	138	141	183.5
LSN-074-0350	136	174	177	219.5
LSN-074-0480	172	210	213	In preparation

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-074-0115	101.5	148	99	In preparation	82	132
LSN-074-0205	119.5	166	117	In preparation	100	150
LSN-074-0350	155.5	202	153	In preparation	136	186
LSN-074-0480	191.5	238	189	In preparation	172	222

Table 2.14 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-074-0115	LSN-074-0205	LSN-074-0350	LSN-074-0480
Rated speed	$n_n$	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>
Rated frequency	$f_N$	250 Hz	250 Hz	250 Hz	250 Hz
DC link voltage (controller)	$U_{dc}$	320 V	320 V	320 V	320 V
Rated voltage	$U_n$	220 V	220 V	220 V	220 V
Rated torque	$M_n$	1.13 Nm	1.90 Nm	3.00 Nm	3.70 Nm
Rated current	$I_n$	2.30 A	3.10 A	4.30 A	4.50 A
Power	P	0.36 kW	0.60 kW	0.94 kW	1.16 kW
Stall torque	$M_0$	1.15 Nm	2.05 Nm	3.50 Nm	4.80 Nm
Stall current	$I_0$	2.00 A	2.80 A	4.20 A	4.80 A
Maximum permissible torque	$M_{max}$	3.50 Nm	6.20 Nm	10.50 Nm	14.40 Nm
Maximum permissible current	$I_{max}$	9.2 A	12.7 A	19.4 A	17.3 A
Maximum permissible speed	$n_{max}$	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>
EMF constant	$K_E$	34.5 V/1000 min <sup>-1</sup>	44.5 V/1000 min <sup>-1</sup>	50.0 V/1000 min <sup>-1</sup>	60.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	0.57 Nm/A	0.74 Nm/A	0.83 Nm/A	0.99 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	8.40 $\Omega$	5.40 $\Omega$	2.80 $\Omega$	2.50 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	18.0 mH	13.3 mH	8.1 mH	7.5 mH
No load speed	$n_0$	6320 min <sup>-1</sup>	4920 min <sup>-1</sup>	4390 min <sup>-1</sup>	3660 min <sup>-1</sup>
Electrical time constant	$T_{el}$	2.1 ms	2.5 ms	2.9 ms	3.0 ms
Thermal time constant	$T_{th}$	21 min.	23 min.	27 min.	30 min.
Moment of inertia of rotor	J	0.000031 kgm <sup>2</sup>	0.000055 kgm <sup>2</sup>	0.000104 kgm <sup>2</sup>	0.000152 kgm <sup>2</sup>
Mass	m	1.50 kg	2.00 kg	2.90 kg	3.80 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	0.50 A			
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	0.58 x 10 <sup>6</sup> Ws			
Moment of inertia	$J_B$	0.000018 kgm <sup>2</sup>			
Mass	m	0.5 kg			
Braking torque	$M_H$	4.50 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1, $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

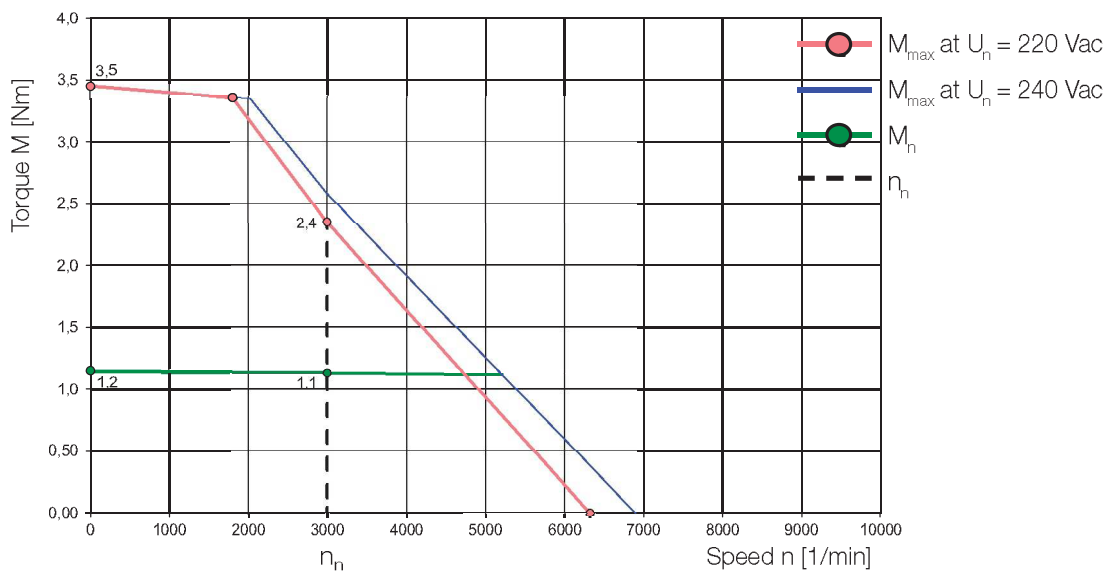
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

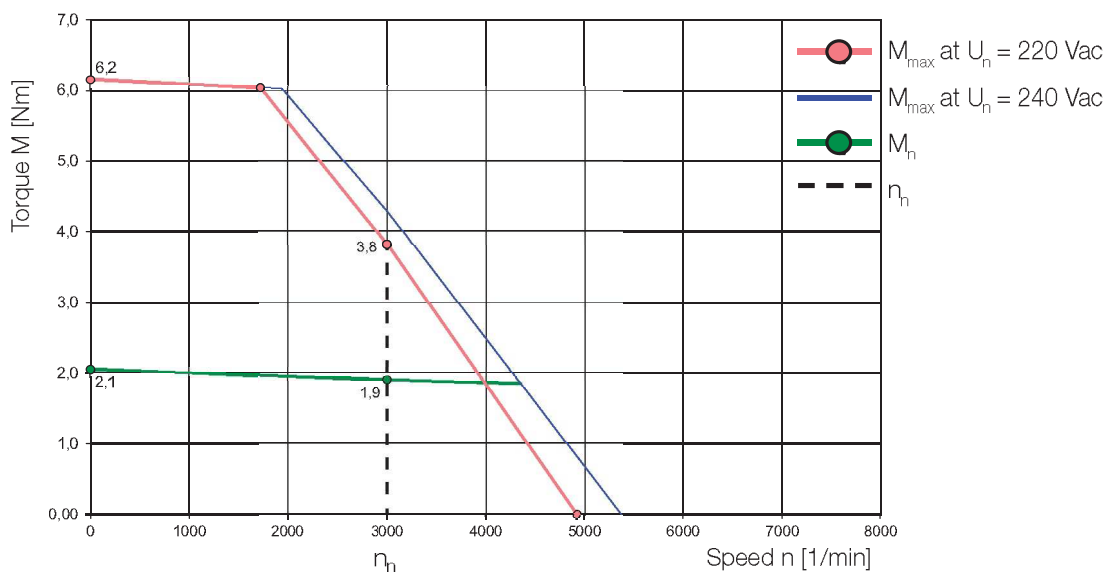
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{n,max}$  (for  $n_{n,max}$  see the table "Technical data").

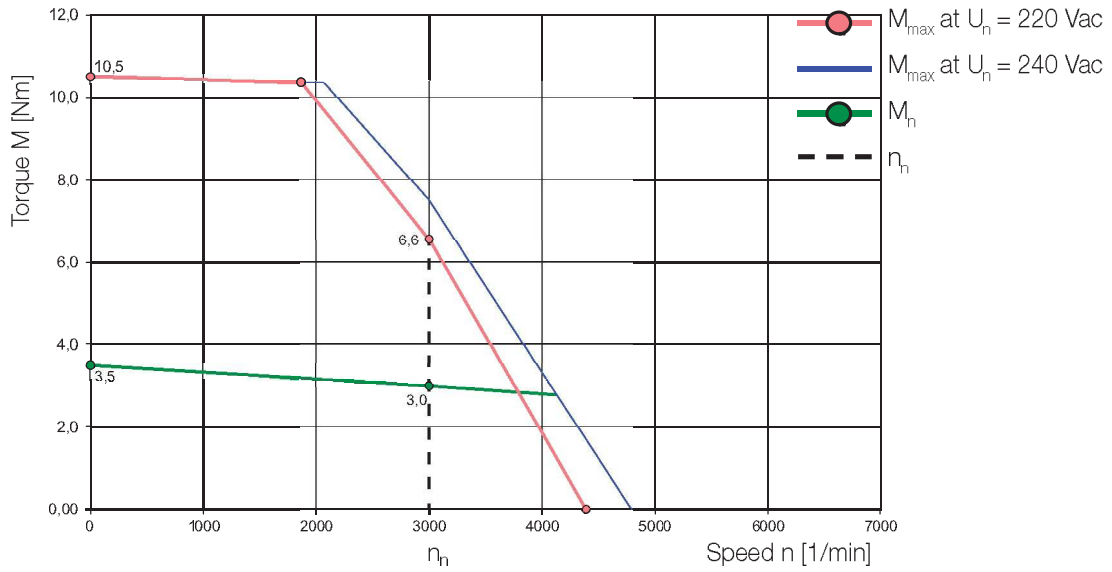
## LSN-074-0115-30-320



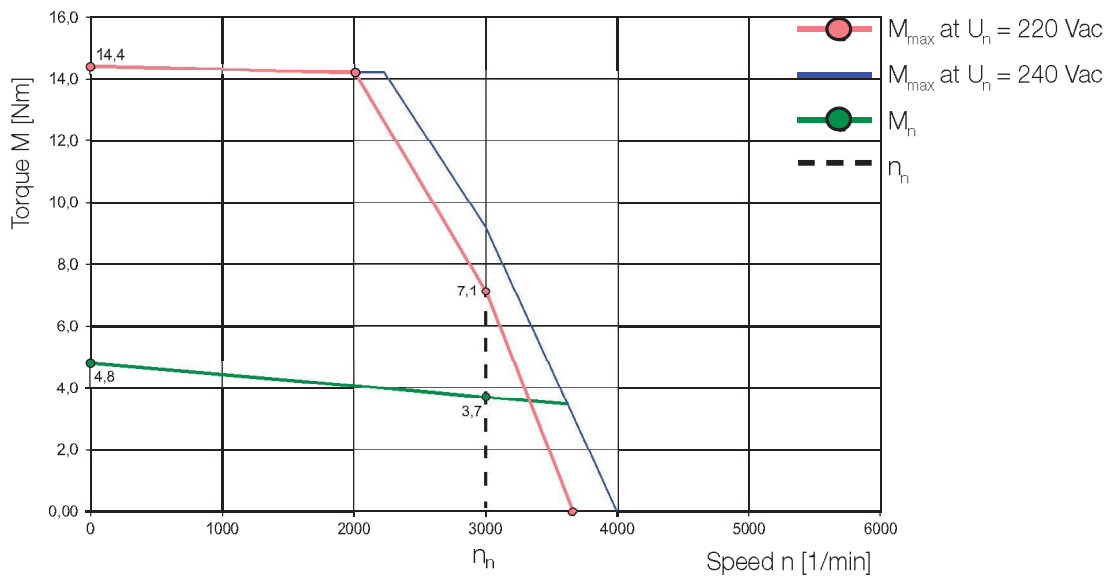
## LSN-074-0205-30-320



LSN-074-0350-30-320



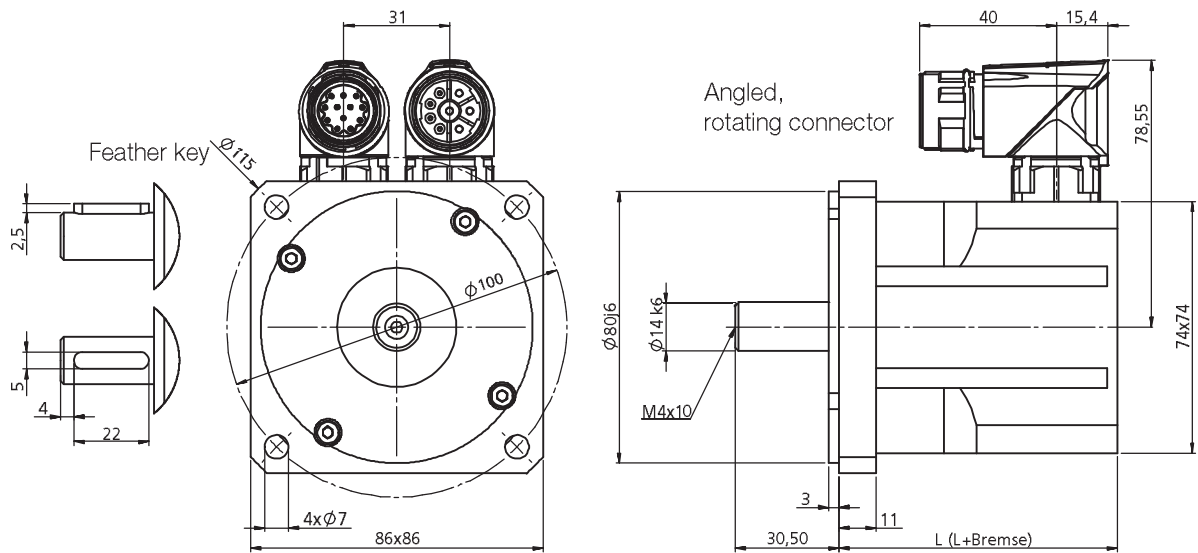
LSN-074-0480-30-320



# Motor type: LSN-074 ( $U_{dc} = 560$ V)



## Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-074-0115	82	120	123	165.5
LSN-074-0205	100	138	141	183.5
LSN-074-0350	136	174	177	219.5
LSN-074-0480	172	210	213	In preparation

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-074-0115	101.5	148	99	In preparation	82	132
LSN-074-0205	119.5	166	117	In preparation	100	150
LSN-074-0350	155.5	202	153	In preparation	136	186
LSN-074-0480	191.5	238	189	In preparation	172	222

Table 2.15 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-074-0115	LSN-074-0205	LSN-074-0350	LSN-074-0480
Rated speed	$n_n$	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>
Rated frequency	$f_N$	250 Hz	250 Hz	250 Hz	250 Hz
DC link voltage (controller)	$U_{dc}$	560 V	560 V	560 V	560 V
Rated voltage	$U_n$	380 V	380 V	380 V	380 V
Rated torque	$M_n$	1.13 Nm	1.90 Nm	3.00 Nm	3.70 Nm
Rated current	$I_n$	1.30 A	1.70 A	2.40 A	2.60 A
Power	$P$	0.36 kW	0.60 kW	0.94 kW	1.16 kW
Stall torque	$M_0$	1.15 Nm	2.05 Nm	3.50 Nm	4.80 Nm
Stall current	$I_0$	1.10 A	1.60 A	2.40 A	2.80 A
Maximum permissible torque	$M_{max}$	3.50 Nm	6.20 Nm	10.50 Nm	14.40 Nm
Maximum permissible current	$I_{max}$	5.0 A	7.2 A	10.9 A	10.1 A
Maximum permissible speed	$n_{max}$	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>	12000 min <sup>-1</sup>
EMF constant	$K_E$	63.0 V/1000 min <sup>-1</sup>	79.0 V/1000 min <sup>-1</sup>	89.0 V/1000 min <sup>-1</sup>	103.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	1.04 Nm/A	1.31 Nm/A	1.47 Nm/A	1.70 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	27.80 $\Omega$	17.30 $\Omega$	8.90 $\Omega$	7.50 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	59.3 mH	42.4 mH	25.5 mH	22.7 mH
No load speed	$n_0$	5980 min <sup>-1</sup>	4790 min <sup>-1</sup>	4260 min <sup>-1</sup>	3680 min <sup>-1</sup>
Electrical time constant	$T_{el}$	2.1 ms	2.5 ms	2.9 ms	3.0 ms
Thermal time constant	$T_{th}$	21 min.	23 min.	27 min.	30 min.
Moment of inertia of rotor	$J$	0.000031 kgm <sup>2</sup>	0.000055 kgm <sup>2</sup>	0.000104 kgm <sup>2</sup>	0.000152 kgm <sup>2</sup>
Mass	$m$	1.50 kg	2.00 kg	2.90 kg	3.80 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	0.50 A			
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	0.58 x 10 <sup>6</sup> Ws			
Moment of inertia	$J_B$	0.000018 kgm <sup>2</sup>			
Mass	$m$	0.5 kg			
Braking torque	$M_H$	4.50 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1, $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

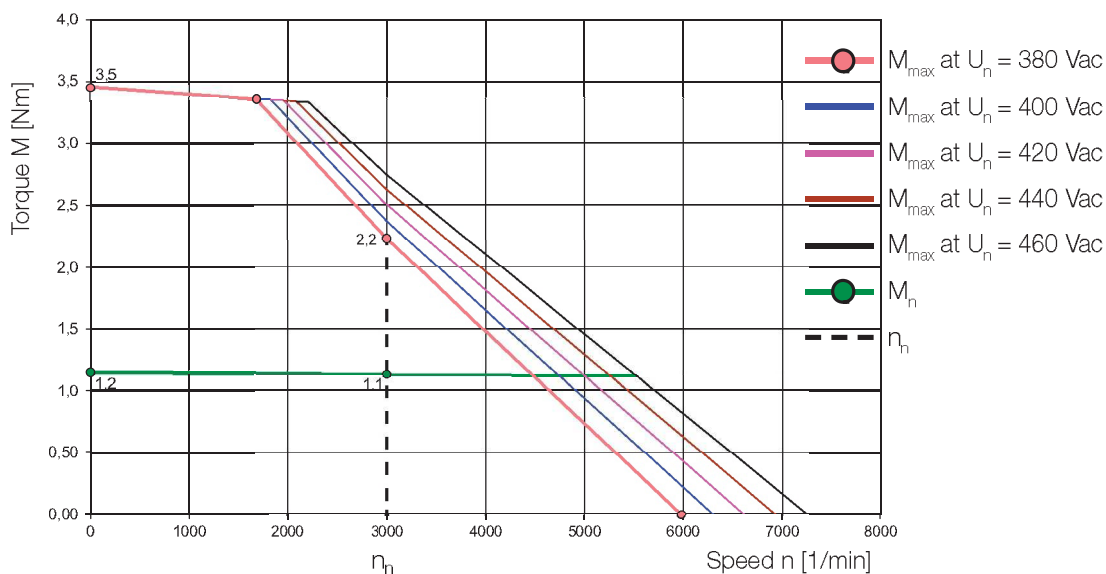
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

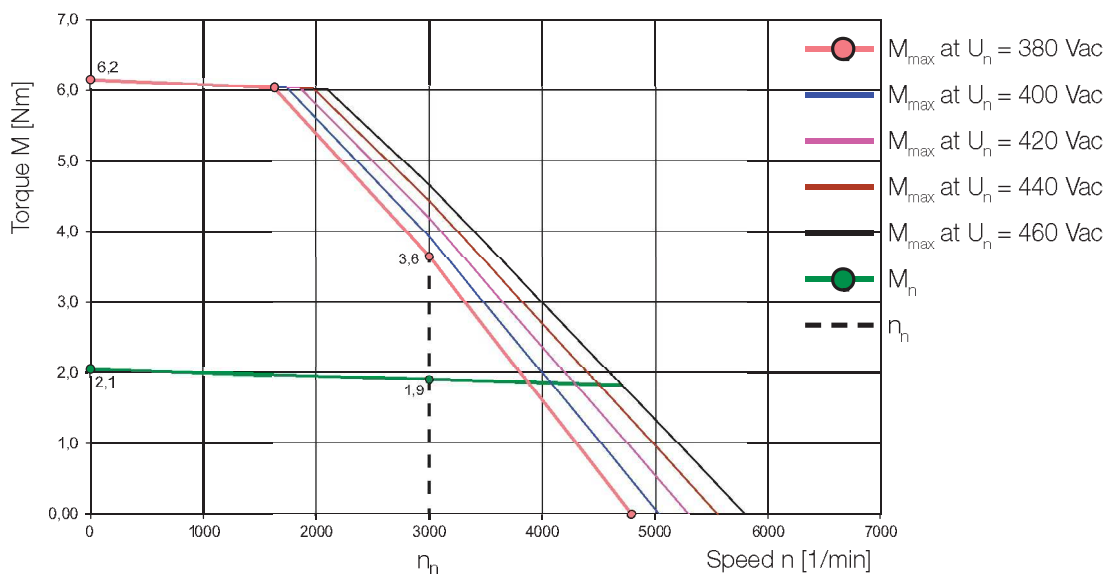
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

## LSN-074-0115-30-560

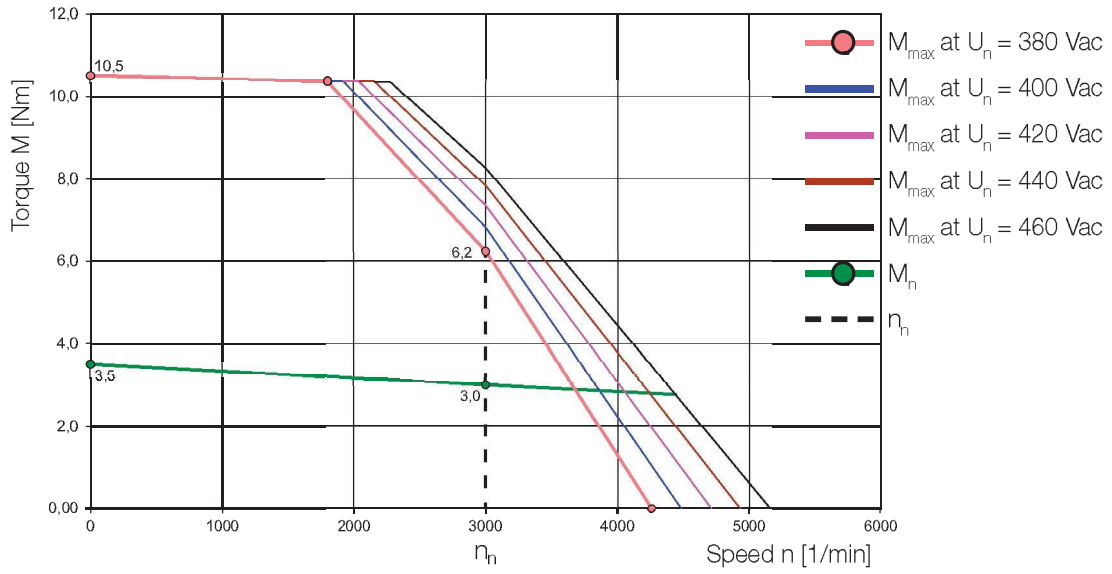


## LSN-074-0205-30-560

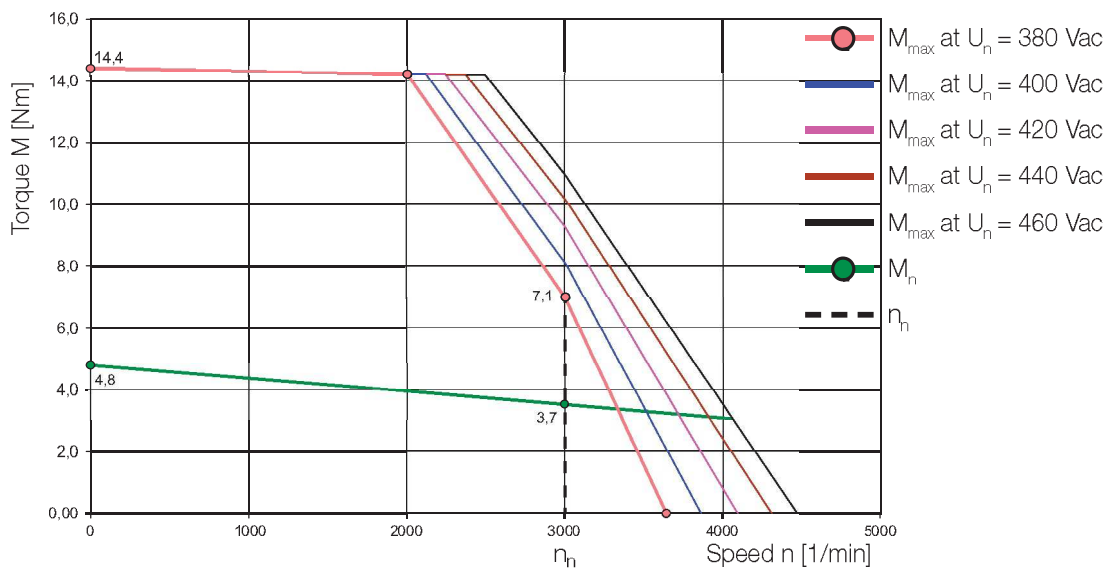




LSN-074-0350-30-560



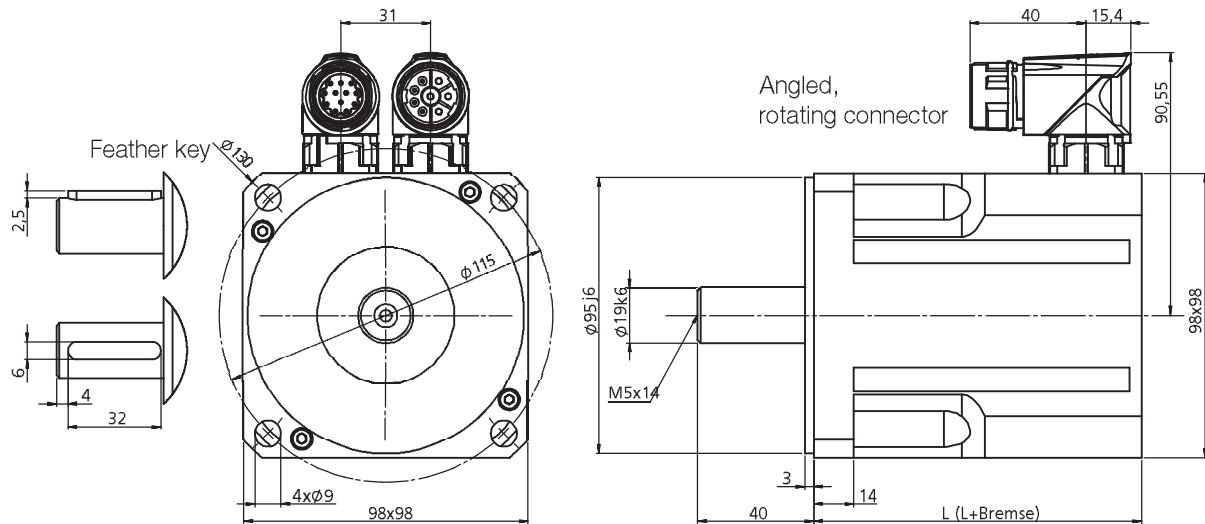
LSN-074-0480-30-560



# Motor type: LSN-097 ( $U_{dc} = 320\text{ V}$ )



## Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-097-0510	113	154	150	190.5
LSN-097-0750	143	184	180	220.5
LSN-097-0960	173	214	210	250.5
LSN-097-1130	203	244	240	280.5

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-097-0510	135	184	132	In preparation	113	158
LSN-097-0750	165	214	162	In preparation	143	188
LSN-097-0960	195	244	192	In preparation	173	218
LSN-097-1130	225	274	222	In preparation	203	248

Table 2.16 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-097-0510	LSN-097-0750	LSN-097-0960	LSN-097-1130
Rated speed	$n_n$	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>
Rated frequency	$f_N$	250 Hz	250 Hz	250 Hz	250 Hz
DC link voltage (controller)	$U_{dc}$	320 V	320 V	320 V	320 V
Rated voltage	$U_n$	220 V	220 V	220 V	220 V
Rated torque	$M_n$	4.20 Nm	6.10 Nm	7.70 Nm	8.80 Nm
Rated current	$I_n$	7.00 A	8.80 A	10.80 A	10.70 A
Power	P	1.32 kW	1.92 kW	2.42 kW	2.76 kW
Stall torque	$M_0$	5.10 Nm	7.50 Nm	9.60 Nm	11.30 Nm
Stall current	$I_0$	6.8 A	8.9 A	10.7 A	11.0 A
Maximum permissible torque	$M_{max}$	15.3 Nm	22.5 Nm	28.8 Nm	34.0 Nm
Maximum permissible current	$I_{max}$	31.0 A	40.7 A	49.2 A	41.0 A
Maximum permissible speed	$n_{max}$	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>
EMF constant	$K_E$	45.5 V/1000 min <sup>-1</sup>	51.0 V/1000 min <sup>-1</sup>	54.0 V/1000 min <sup>-1</sup>	62.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	0.75 Nm/A	0.84 Nm/A	0.89 Nm/A	1.03 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	1.24 $\Omega$	0.79 $\Omega$	0.62 $\Omega$	0.61 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	6.8 mH	4.8 mH	3.6 mH	3.8 mH
No load speed	$n_0$	4800 min <sup>-1</sup>	4300 min <sup>-1</sup>	4060 min <sup>-1</sup>	3540 min <sup>-1</sup>
Electrical time constant	$T_{el}$	5.5 ms	6.1 ms	5.8 ms	6.2 ms
Thermal time constant	$T_{th}$	25 min.	30 min.	35 min.	40 min.
Moment of inertia of rotor	J	0.000204 kgm <sup>2</sup>	0.000326 kgm <sup>2</sup>	0.000449 kgm <sup>2</sup>	0.000570 kgm <sup>2</sup>
Mass	m	3.80 kg	5.10 kg	6.40 kg	7.70 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	0.75 A			
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	0.89 x 10 <sup>6</sup> Js			
Moment of inertia	$J_B$	0.000054 kgm <sup>2</sup>			
Mass	m	0.82 kg			
Braking torque	$M_H$	9.00 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1; $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

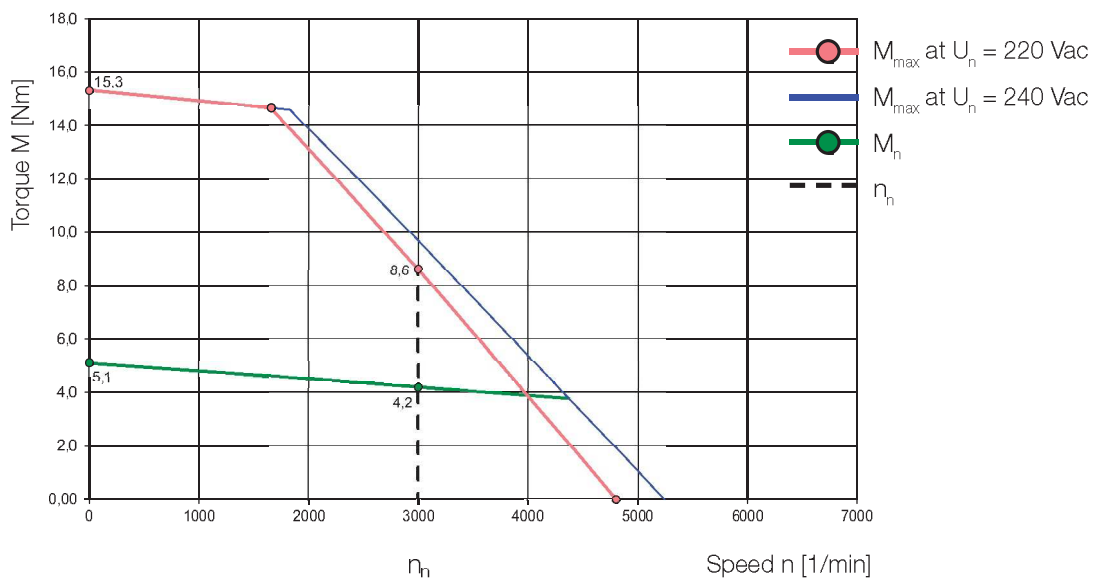
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

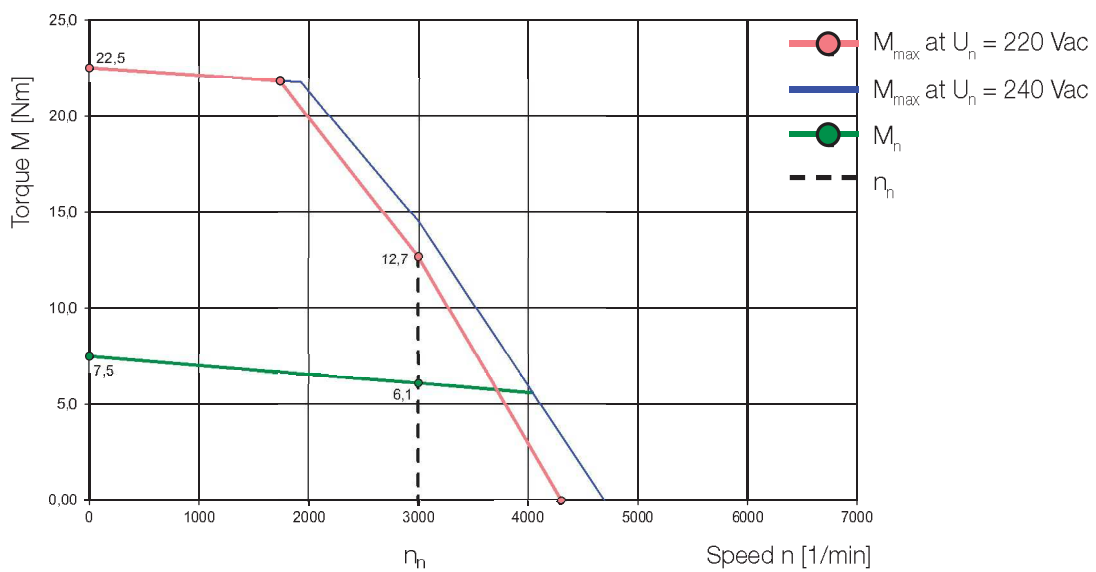
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

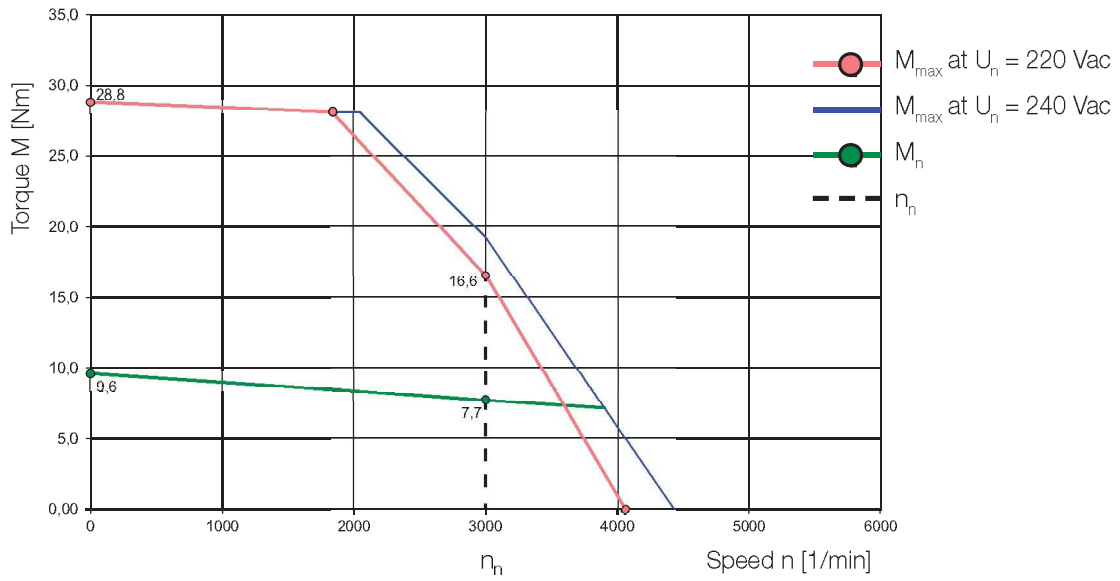
## LSN-097-0510-30-320



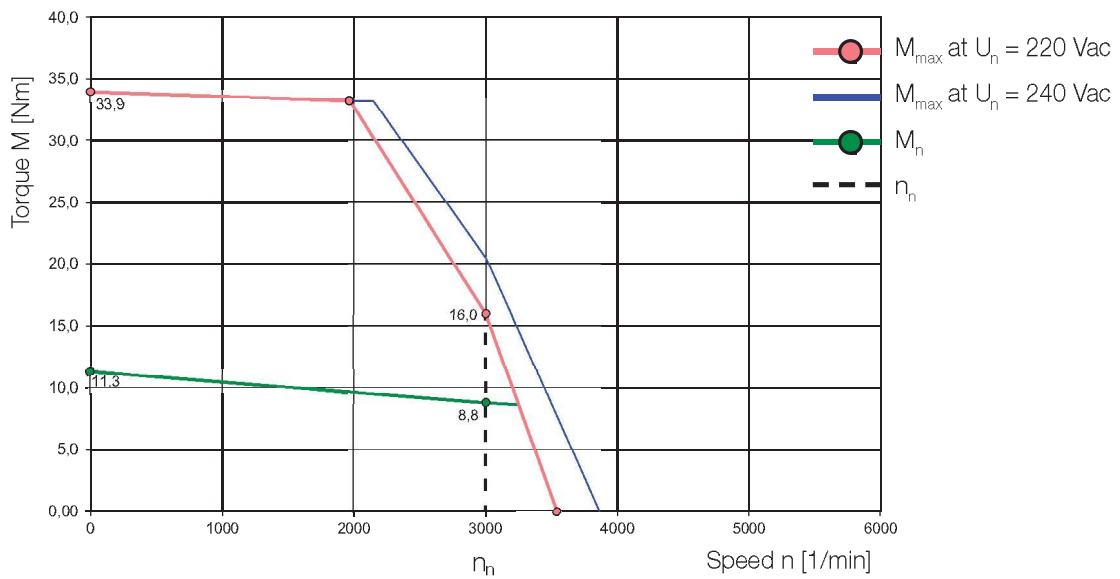
## LSN-097-0750-30-320



LSN-097-0960-30-320



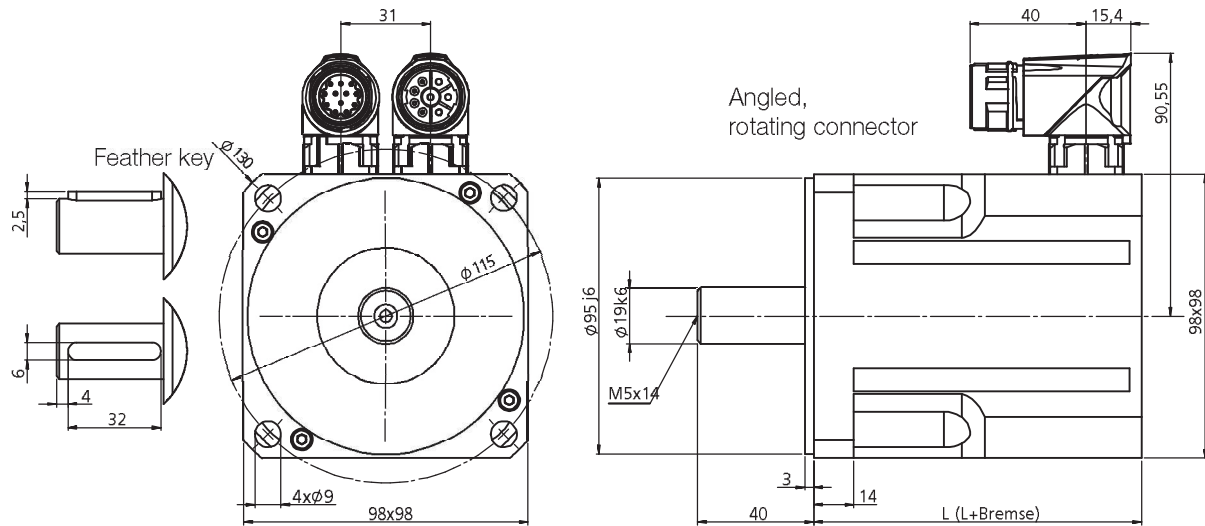
LSN-097-1130-30-320



Motor type: LSN-097 ( $U_{dc} = 560\text{ V}$ )



Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-097-0510	113	154	150	190.5
LSN-097-0750	143	184	180	220.5
LSN-097-0960	173	214	210	250.5
LSN-097-1130	203	244	240	280.5

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-097-0510	135	184	132	In preparation	113	158
LSN-097-0750	165	214	162	In preparation	143	188
LSN-097-0960	195	244	192	In preparation	173	218
LSN-097-1130	225	274	222	In preparation	203	248

Table 2.17 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-097-0510	LSN-097-0750	LSN-097-0960	LSN-097-1130
Rated speed	$n_n$	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>
Rated frequency	$f_N$	250 Hz	250 Hz	250 Hz	250 Hz
DC link voltage (controller)	$U_{dc}$	560 V	560 V	560 V	560 V
Rated voltage	$U_n$	380 V	380 V	380 V	380 V
Rated torque	$M_n$	4.20 Nm	6.10 Nm	7.70 Nm	8.80 Nm
Rated current	$I_n$	3.90 A	5.10 A	6.00 A	6.90 A
Power	$P$	1.32 kW	1.92 kW	2.42 kW	2.76 kW
Stall torque	$M_0$	5.10 Nm	7.50 Nm	9.60 Nm	11.30 Nm
Stall current	$I_0$	3.8 A	5.2 A	6.0 A	7.1 A
Maximum permissible torque	$M_{max}$	15.3 Nm	22.5 Nm	28.8 Nm	34.0 Nm
Maximum permissible current	$I_{max}$	17.4 A	23.8 A	27.4 A	27.0 A
Maximum permissible speed	$n_{max}$	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>
EMF constant	$K_E$	81.0 V/1000 min <sup>-1</sup>	87.0 V/1000 min <sup>-1</sup>	97.0 V/1000 min <sup>-1</sup>	96.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	1.34 Nm/A	1.44 Nm/A	1.60 Nm/A	1.59 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	4.00 $\Omega$	2.29 $\Omega$	2.00 $\Omega$	1.49 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	21.7 mH	13.5 mH	11.9 mH	9.1 mH
No load speed	$n_0$	4650 min <sup>-1</sup>	4350 min <sup>-1</sup>	3910 min <sup>-1</sup>	3950 min <sup>-1</sup>
Electrical time constant	$T_{el}$	5.5 ms	5.9 ms	6.0 ms	6.1 ms
Thermal time constant	$T_{th}$	25 min.	30 min.	35 min.	40 min.
Moment of inertia of rotor	$J$	0.000204 kgm <sup>2</sup>	0.000326 kgm <sup>2</sup>	0.000449 kgm <sup>2</sup>	0.000570 kgm <sup>2</sup>
Mass	$m$	3.80 kg	5.10 kg	6.40 kg	7.70 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	0.75 A			
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	0.89 x 10 <sup>6</sup> Ws			
Moment of inertia	$J_B$	0.000054 kgm <sup>2</sup>			
Mass	$m$	0.82 kg			
Braking torque	$M_H$	9.00 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1, $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

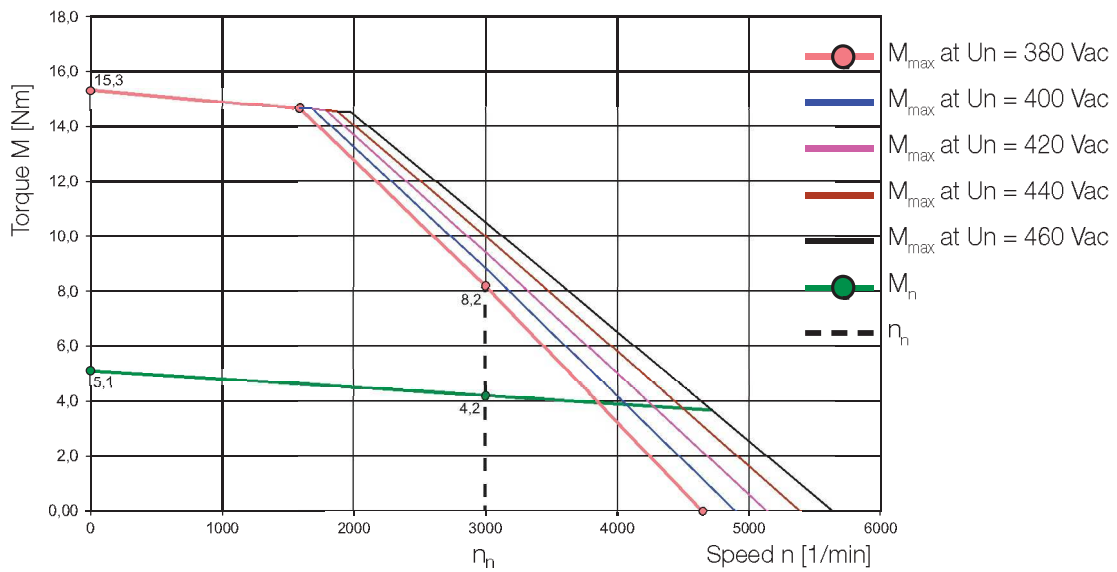
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

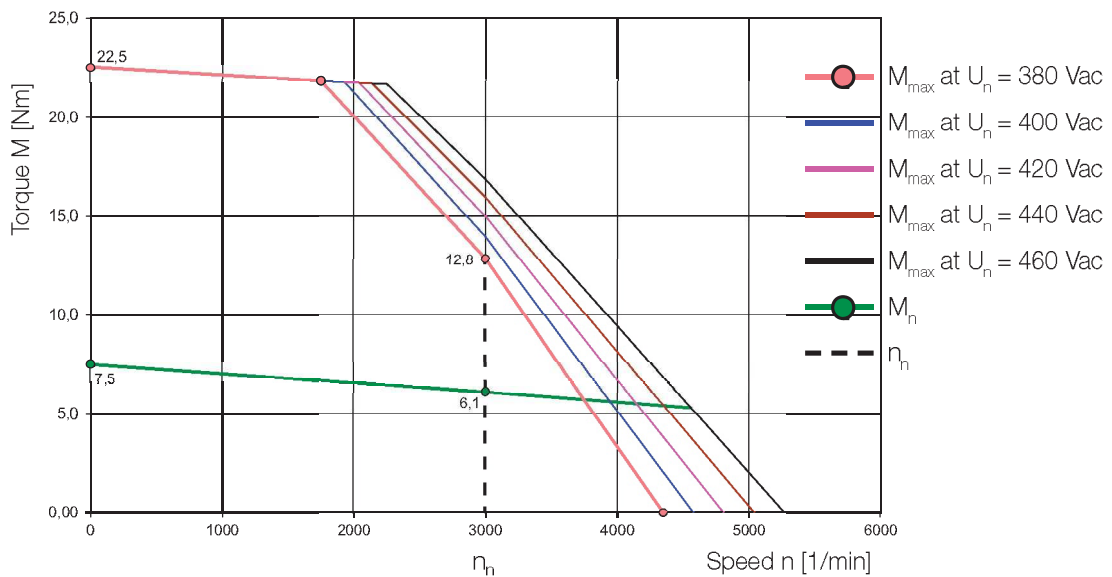
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

## LSN-097-0510-30-560

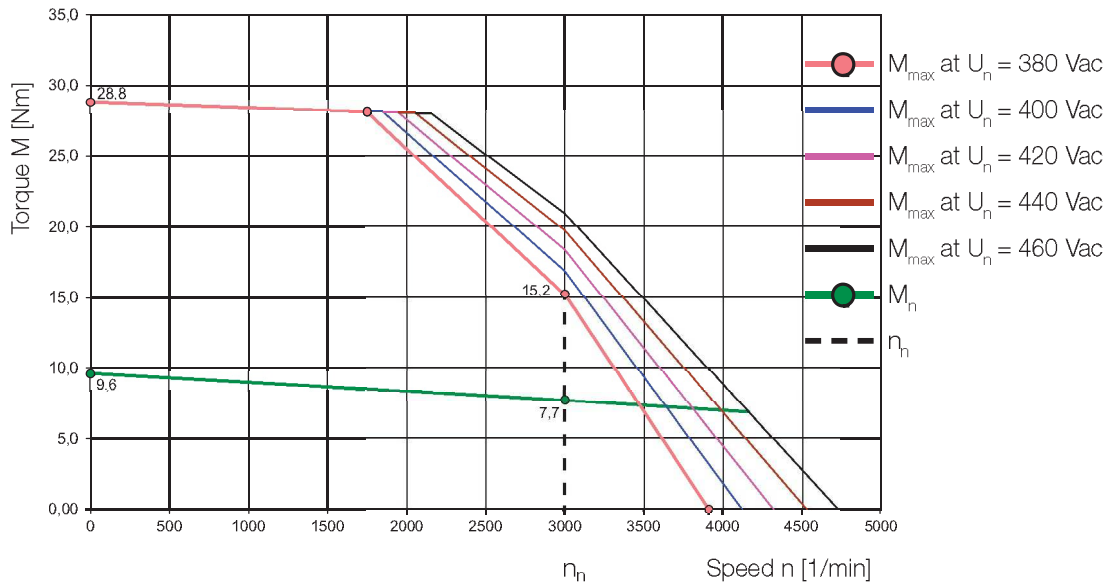


## LSN-097-0750-30-560



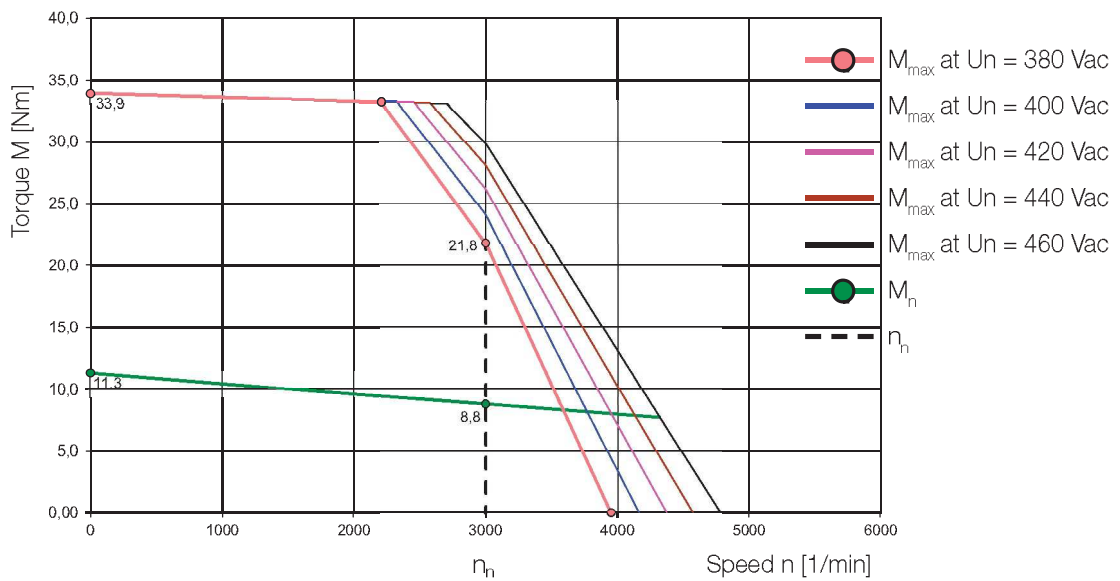


LSN-097-0960-30-560



2

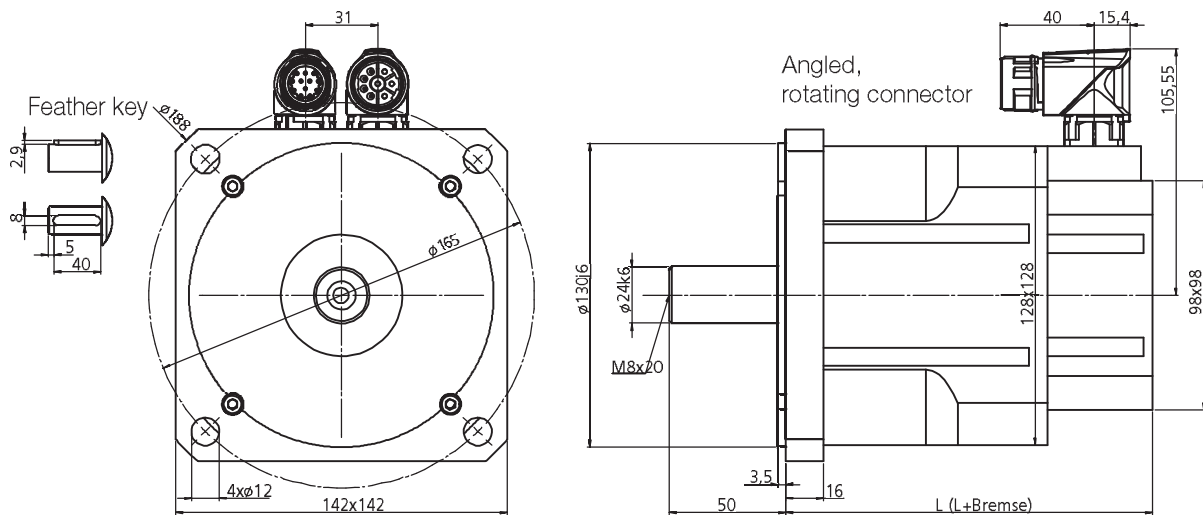
LSN-097-1130-30-560



# Motor type: LSN-127 ( $U_{dc} = 560\text{ V}$ )



## Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-127-1200	145	181	177	224
LSN-127-1600	175	211	207	254
LSN-127-2000	205	241	237	284
LSN-127-2400	235	271	267	314

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-127-1200	173	209	157	206	166	179.5*
LSN-127-1600	203	239	187	236	196	209.5*
LSN-127-2000	233	269	217	266	226	239.5*
LSN-127-2400	263	299	247	296	256	269.5*

Table 2.18 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-127-1200	LSN-127-1600	LSN-127-2000	LSN-127-2400
Rated speed	$n_n$	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>
Rated frequency	$f_N$	250 Hz	250 Hz	166.67 Hz	166.67 Hz
DC link voltage (controller)	$U_{dc}$	560 V	560 V	560 V	560 V
Rated voltage	$U_n$	380 V	380 V	380 V	380 V
Rated torque	$M_n$	10.50 Nm	13.80 Nm	16.00 Nm	20.00 Nm
Rated current	$I_n$	8.30 A	9.90 A	11.50 A	14.10 A
Power	P	3.30 kW	4.33 kW	5.03 kW	6.28 kW
Stall torque	$M_0$	12.0 Nm	16.0 Nm	20.0 Nm	24.0 Nm
Stall current	$I_0$	8.0 A	10.1 A	11.6 A	13.8 A
Maximum permissible torque	$M_{max}$	36.0 Nm	48.0 Nm	60.0 Nm	72.0 Nm
Maximum permissible current	$I_{max}$	29.0 A	36.0 A	40.0 A	47.0 A
Maximum permissible speed	$n_{max}$	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>	9000 min <sup>-1</sup>
EMF constant	$K_E$	91.0 V/1000 min <sup>-1</sup>	96.0 V/1000 min <sup>-1</sup>	104.0 V/1000 min <sup>-1</sup>	105.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	1.51 Nm/A	1.59 Nm/A	1.72 Nm/A	1.74 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	1.33 $\Omega$	0.88 $\Omega$	0.72 $\Omega$	0.56 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	10.9 mH	7.5 mH	6.3 mH	4.9 mH
No load speed	$n_0$	4170 min <sup>-1</sup>	3950 min <sup>-1</sup>	3650 min <sup>-1</sup>	3650 min <sup>-1</sup>
Electrical time constant	$T_{el}$	8.2 ms	8.5 ms	8.8 ms	8.8 ms
Thermal time constant	$T_{th}$	45 min.	55 min.	65 min.	75 min.
Moment of inertia of rotor	J	0.00096 kgm <sup>2</sup>	0.00133 kgm <sup>2</sup>	0.00171 kgm <sup>2</sup>	0.00208 kgm <sup>2</sup>
Mass	m	7.50 kg	9.50 kg	11.5 kg	13.5 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	1.00 A			
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	1.29 x 10 <sup>6</sup> Ws			
Moment of inertia	$J_B$	0.000166 kgm <sup>2</sup>			
Mass	m	1.1 kg			
Braking torque	$M_H$	18.00 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1, $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

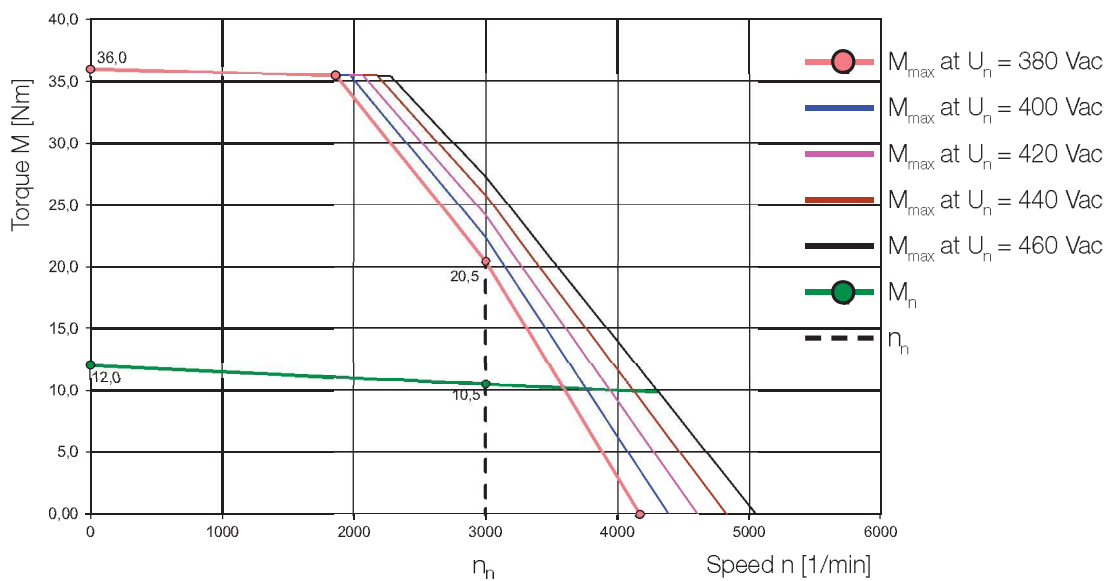
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

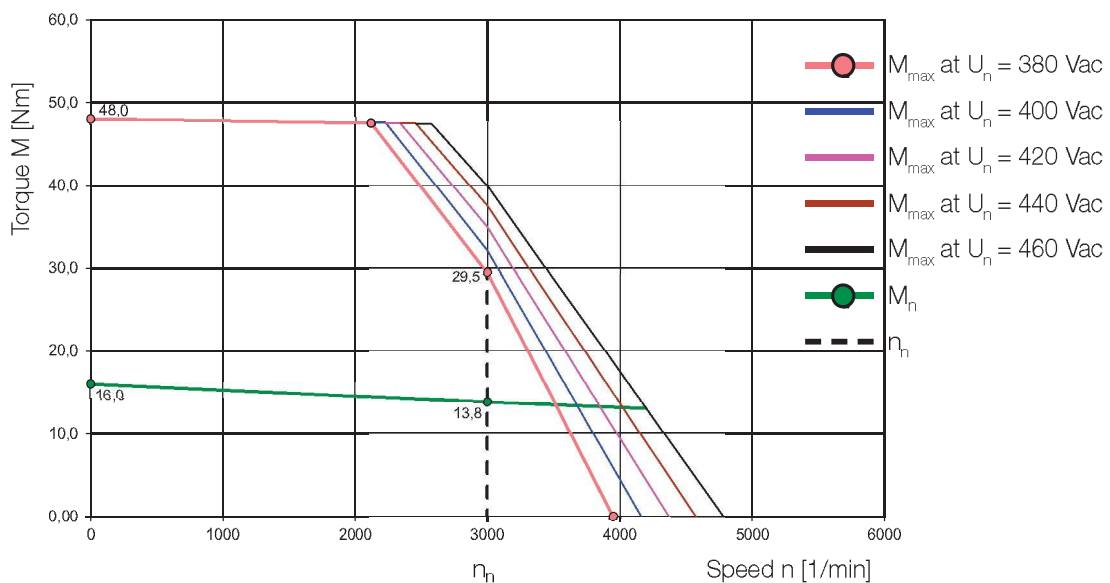
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

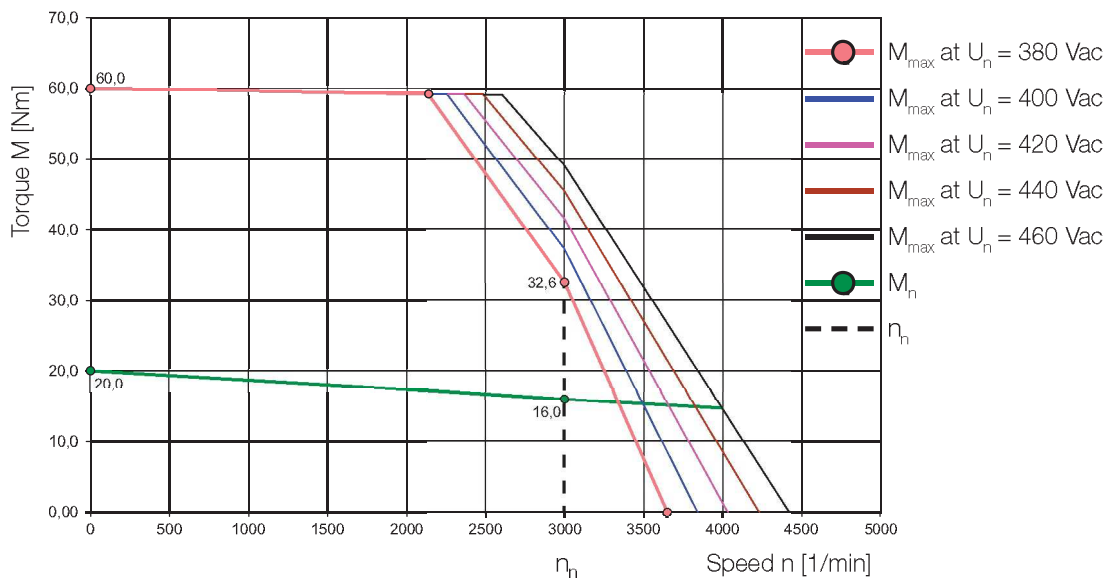
## LSN-127-1200-30-560



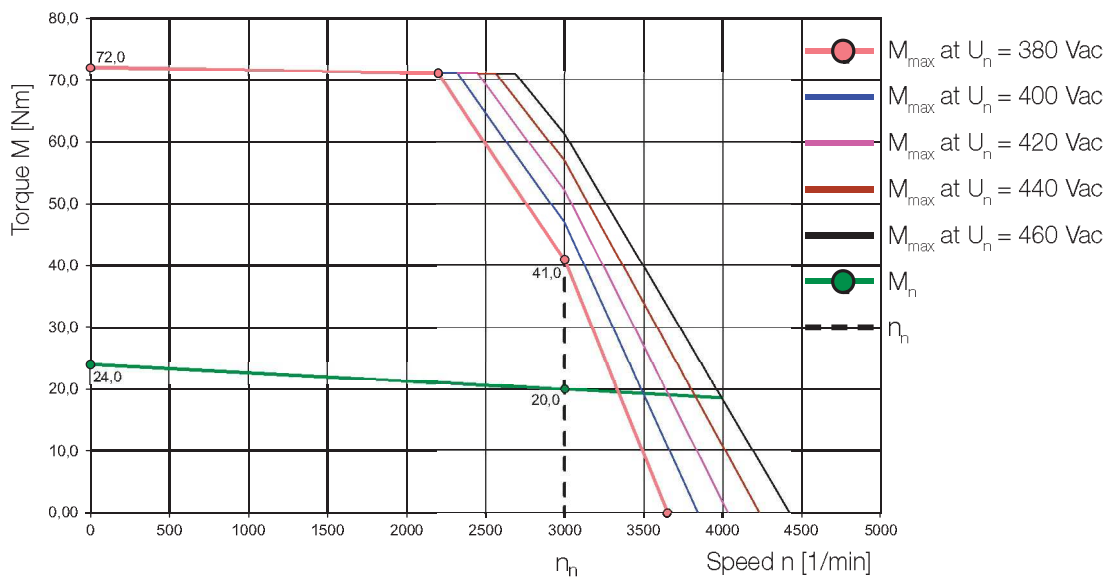
## LSN-127-1600-30-560



LSN-127-2000-30-560



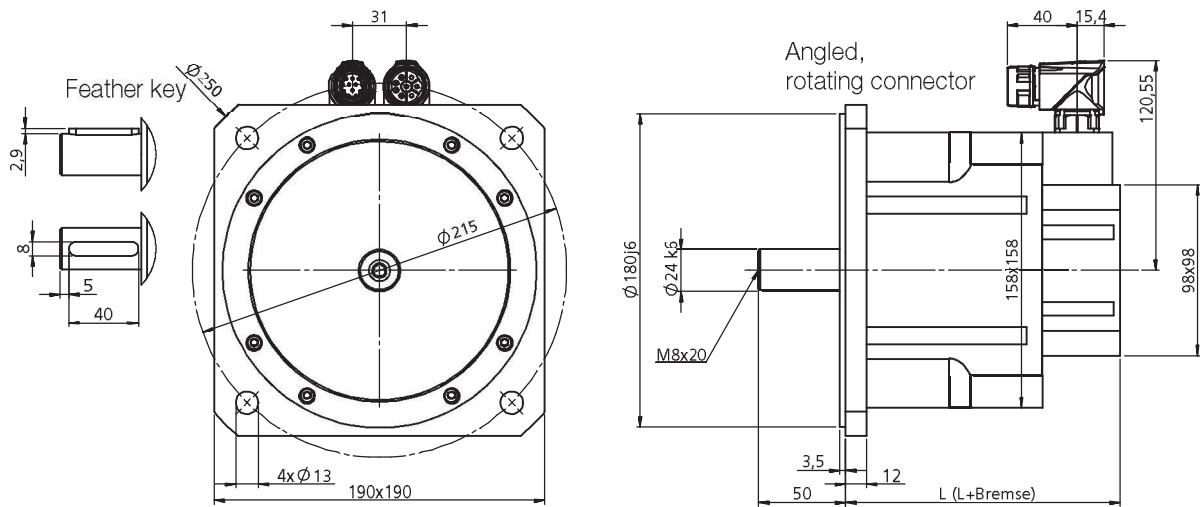
LSN-127-2400-30-560



# Motor type: LSN-158 ( $U_{dc} = 560 \text{ V}$ , $n_n = 2000 \text{ min}^{-1}$ )



## Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-158-1800	158	222	In preparation	In preparation
LSN-158-2400	183	247	In preparation	In preparation
LSN-158-3000	208	272	In preparation	In preparation
LSN-158-3800	233	297	In preparation	In preparation
LSN-158-4400	258	322	In preparation	In preparation

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-158-1800	161	In preparation	158	In preparation	In preparation	158
LSN-158-2400	186	In preparation	183	In preparation	In preparation	183
LSN-158-3000	211	In preparation	208	In preparation	In preparation	208
LSN-158-3800	236	In preparation	233	In preparation	In preparation	233
LSN-158-4400	261	In preparation	258	In preparation	In preparation	258

Table 2.19 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-158-1800-20	LSN-158-2400-20	LSN-158-3000-20	LSN-158-3800-20	LSN-158-4400-20
Rated speed	$n_n$	2000 min <sup>-1</sup>	2000 min <sup>-1</sup>	2000 min <sup>-1</sup>	2000 min <sup>-1</sup>	2000 min <sup>-1</sup>
Rated frequency	$f_N$	166.67 Hz	166.67 Hz	166.67 Hz	166.67 Hz	166.67 Hz
DC link voltage (controller)	$U_{dc}$	560 V	560 V	560 V	560 V	560 V
Rated voltage	$U_n$	380 V	380 V	380 V	380 V	380 V
Rated torque	$M_n$	14.80 Nm	20.00 Nm	25.30 Nm	29.00 Nm	36.50 Nm
Rated current	$I_n$	8.60 A	10.70 A	12.90 A	15.00 A	17.30 A
Power	P	3.01 kW	4.19 kW	5.30 kW	6.07 kW	7.64 kW
Stall torque	$M_0$	18.0 Nm	24.0 Nm	30.0 Nm	38.0 Nm	44.0 Nm
Stall current	$I_0$	8.9 A	10.8 A	12.8 A	16.7 A	17.7 A
Maximum permissible torque	$M_{max}$	51.0 Nm	72.0 Nm	90.0 Nm	114.0 Nm	132.0 Nm
Maximum permissible current	$I_{max}$	33.0 A	42.0 A	46.0 A	64.0 A	64.0 A
Maximum permissible speed	$n_{max}$	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>
EMF constant	$K_E$	123.0 V/1000 min <sup>-1</sup>	134.0 V/1000 min <sup>-1</sup>	142.0 V/1000 min <sup>-1</sup>	138.0 V/1000 min <sup>-1</sup>	150.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	2.00 Nm/A	2.20 Nm/A	2.40 Nm/A	2.30 Nm/A	2.50 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	1.19 $\Omega$	0.81 $\Omega$	0.63 $\Omega$	0.52 $\Omega$	0.49 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	13.7 mH	10.8 mH	9.2 mH	7.2 mH	7.0 mH
No load speed	$n_0$	3090 min <sup>-1</sup>	2830 min <sup>-1</sup>	5130 min <sup>-1</sup>	2750 min <sup>-1</sup>	2750 min <sup>-1</sup>
Electrical time constant	$T_{el}$	11.5 ms	13.3 ms	14.5 ms	13.8 ms	14.4 ms
Thermal time constant	$T_m$	42 min.	47 min.	52 min.	57 min.	62 min.
Moment of inertia of rotor	J	0.00185 kgm <sup>2</sup>	0.00256 kgm <sup>2</sup>	0.00327 kgm <sup>2</sup>	0.00399 kgm <sup>2</sup>	0.00470 kgm <sup>2</sup>
Mass	m	10.1 kg	12.8 kg	15.5 kg	18.3 kg	21.0 kg
<b>Brake (optional)</b>						
Rated voltage	$U_N$	24 V $\pm$ 10 %				
Rated current at 20 °C for releasing	$I_N$	1.10 A				
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>				
Permissible friction work	$W_R$	2.90 x 10 <sup>6</sup> Js				
Moment of inertia	$J_B$	0.000556 kgm <sup>2</sup>				
Mass	m	3.1 kg				
Braking torque	$M_H$	36.00 Nm				
<b>Further characteristic technical data</b>						
Protection	IP64, optionally IP65 or IP67					
Electrical connections	Intercontec connectors (2 pieces)					
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC					
Rated data	According to EN 60034-1, $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C					
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional					
Flange/shaft	According to DIN 42955 N, optionally R					

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

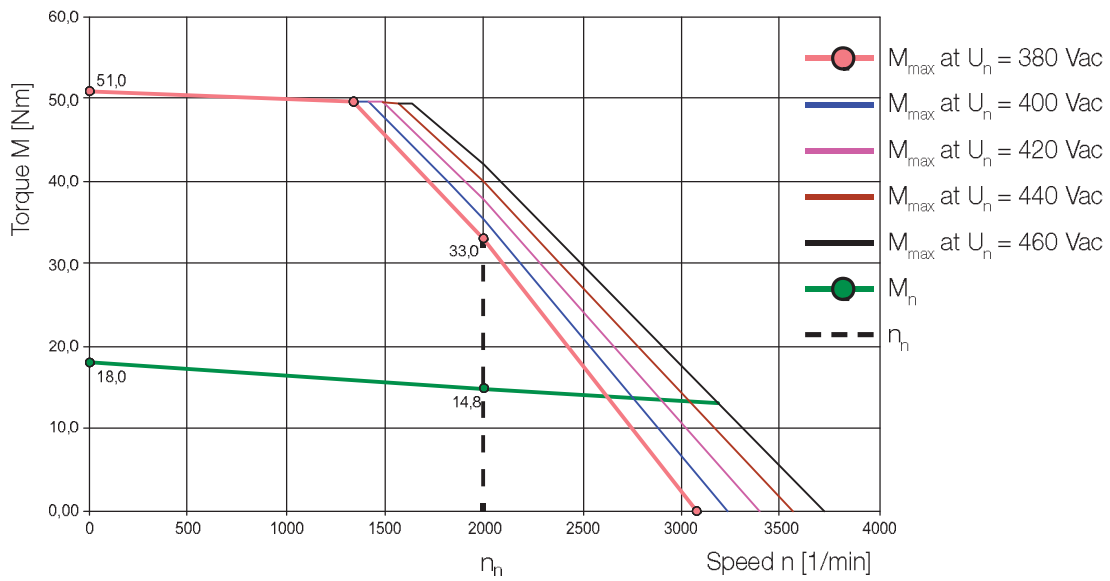
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

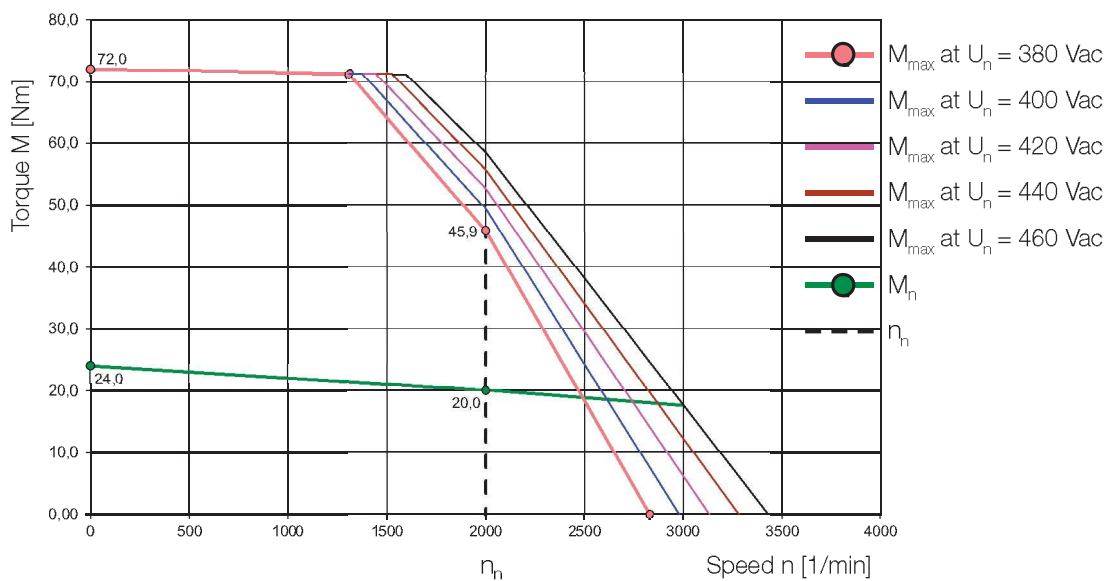
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

## LSN-158-1800-20-560

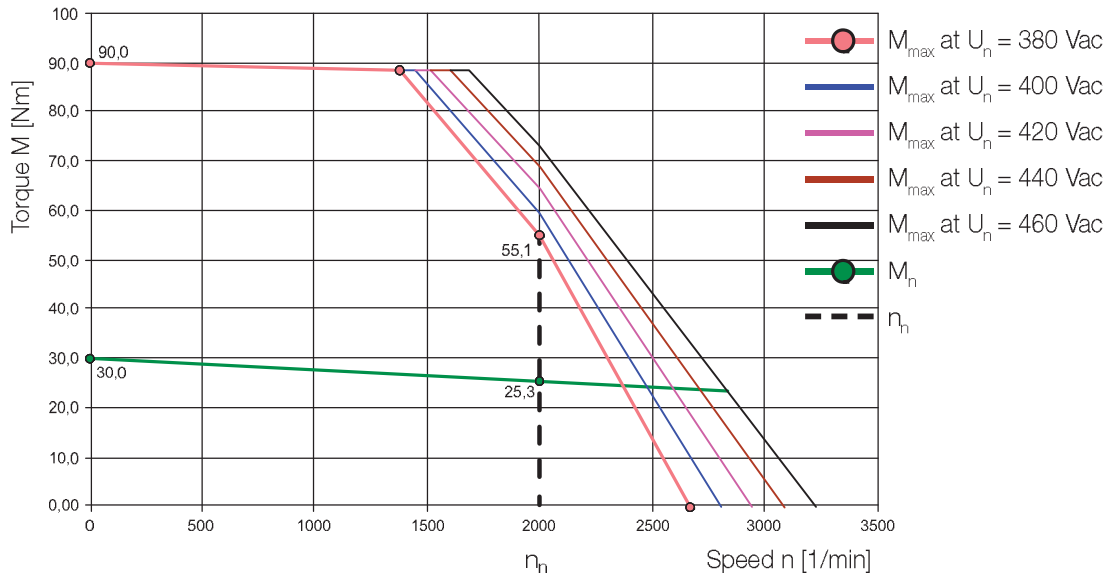


## LSN-158-2400-20-560

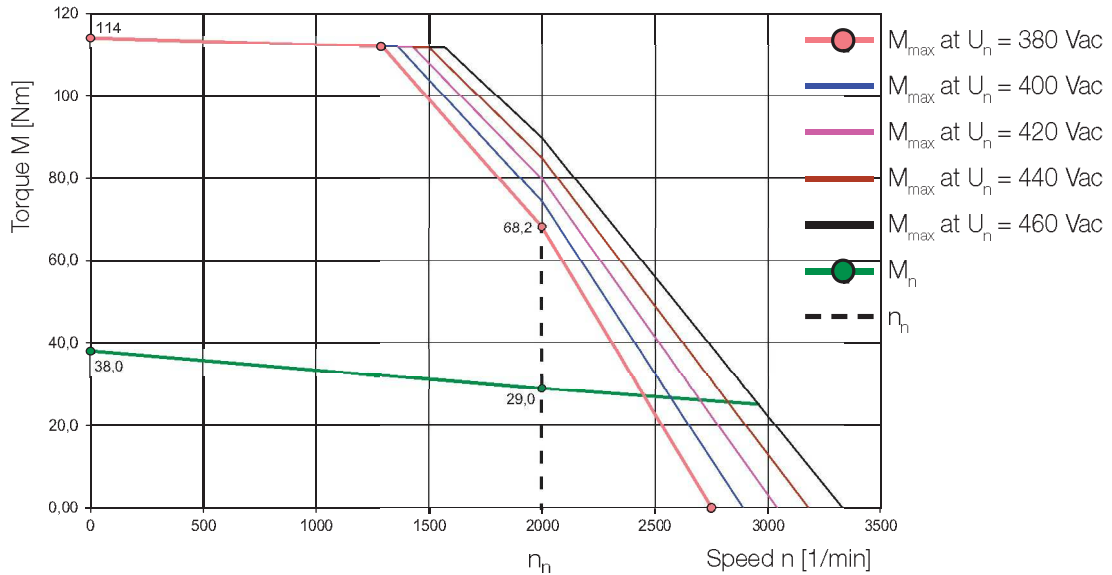




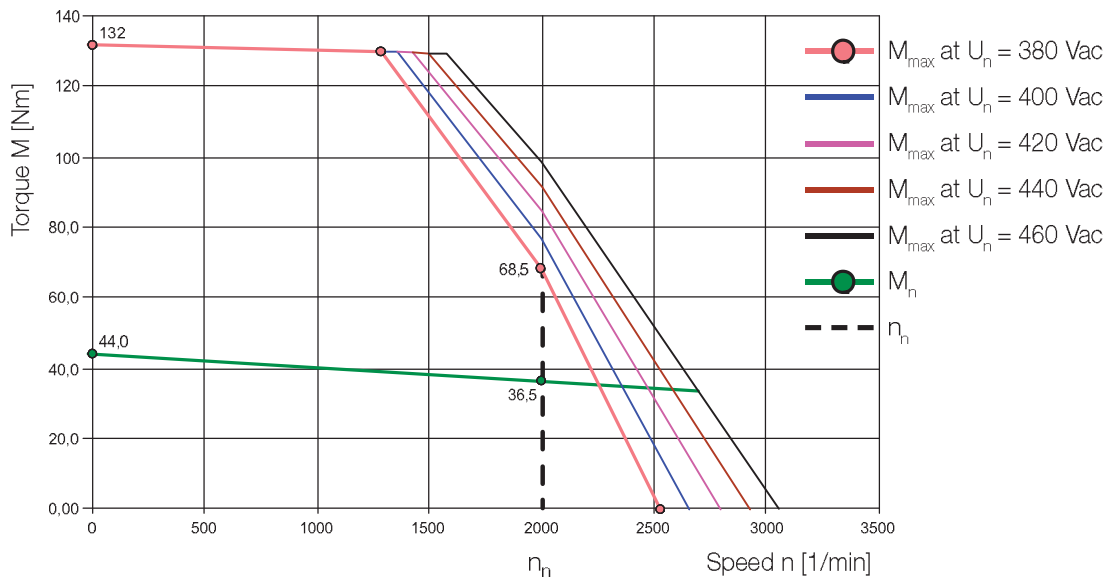
# LSN-158-3000-20-560



# LSN-158-3800-20-560



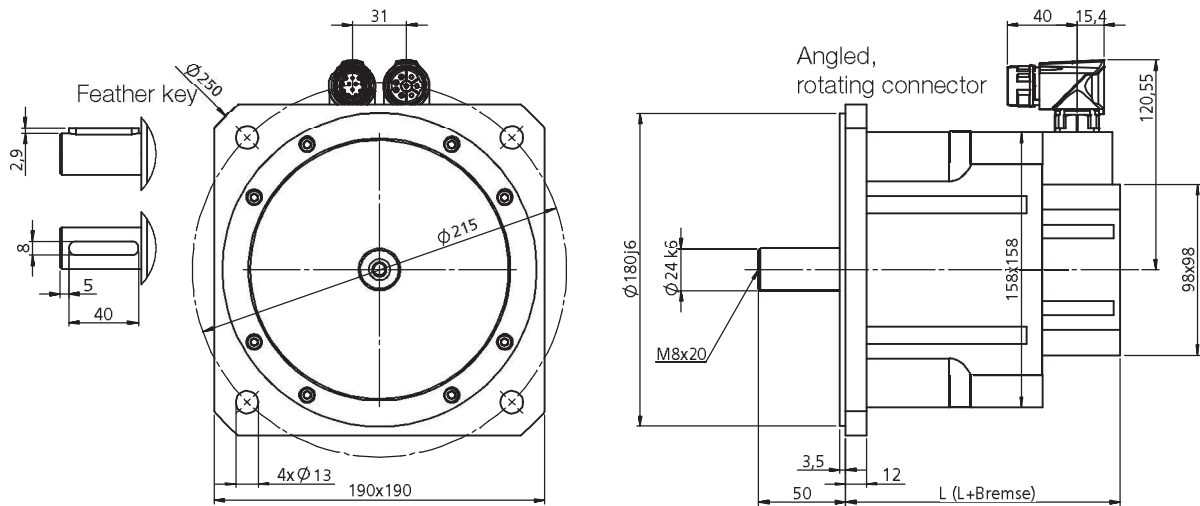
# LSN-158-4400-20-560



# Motor type: LSN-158 ( $U_{dc} = 560\text{ V}$ , $n_n = 3000\text{ min}^{-1}$ )



## Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-158-1800	158	222	In preparation	In preparation
LSN-158-2400	183	247	In preparation	In preparation
LSN-158-3000	208	272	In preparation	In preparation
LSN-158-3800	233	297	In preparation	In preparation
LSN-158-4400	258	322	In preparation	In preparation

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-158-1800	161	In preparation	158	In preparation	In preparation	158
LSN-158-2400	186	In preparation	183	In preparation	In preparation	183
LSN-158-3000	211	In preparation	208	In preparation	In preparation	208
LSN-158-3800	236	In preparation	233	In preparation	In preparation	233
LSN-158-4400	261	In preparation	258	In preparation	In preparation	258

Table 2.20 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-158-1800-30	LSN-158-2400-30	LSN-158-3000-30	LSN-158-3800-30	LSN-158-4400-30
Rated speed	$n_n$	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>
Rated frequency	$f_N$	250 Hz	250 Hz	250 Hz	250 Hz	250 Hz
DC link voltage (controller)	$U_{dc}$	560 V	560 V	560 V	560 V	560 V
Rated voltage	$U_n$	380 V	380 V	380 V	380 V	380 V
Rated torque	$M_n$	13.00 Nm	17.00 Nm	21.00 Nm	25.00 Nm	30.00 Nm
Rated current	$I_n$	11.00 A	13.80 A	16.20 A	19.70 A	24.40 A
Power	P	4.08 kW	5.34 kW	6.60 kW	7.85 kW	9.42 kW
Stall torque	$M_0$	18.0 Nm	24.0 Nm	30.0 Nm	38.0 Nm	44.0 Nm
Stall current	$I_0$	12.2 A	15.3 A	17.8 A	23.9 A	28.3 A
Maximum permissible torque	$M_{max}$	51.0 Nm	72.0 Nm	90.0 Nm	114.0 Nm	132.0 Nm
Maximum permissible current	$I_{max}$	45.0 A	60.0 A	64.0 A	93.0 A	102.0 A
Maximum permissible speed	$n_{max}$	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>
EMF constant	$K_E$	89.0 V/1000 min <sup>-1</sup>	95.0 V/1000 min <sup>-1</sup>	102.0 V/1000 min <sup>-1</sup>	96.0 V/1000 min <sup>-1</sup>	94.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	1.47 Nm/A	1.57 Nm/A	1.69 Nm/A	1.59 Nm/A	1.55 Nm/A
Winding resistance (2 phases)	$R_{zph}$	0.62 $\Omega$	0.41 $\Omega$	0.33 $\Omega$	0.25 $\Omega$	0.19 $\Omega$
Winding inductance (2 phases)	$L_{zph}$	7.2 mH	5.5 mH	4.7 mH	3.5 mH	2.8 mH
No load speed	$n_0$	4260 min <sup>-1</sup>	4000 min <sup>-1</sup>	3720 min <sup>-1</sup>	3950 min <sup>-1</sup>	4040 min <sup>-1</sup>
Electrical time constant	$T_{el}$	11.6 ms	13.4 ms	14.2 ms	14.0 ms	14.5 ms
Thermal time constant	$T_{th}$	42 min.	47 min.	52 min.	57 min.	62 min.
Moment of inertia of rotor	J	0.00185 kgm <sup>2</sup>	0.00256 kgm <sup>2</sup>	0.00327 kgm <sup>2</sup>	0.00399 kgm <sup>2</sup>	0.00470 kgm <sup>2</sup>
Mass	m	10.1 kg	12.8 kg	15.5 kg	18.3 kg	21.0 kg

**Brake (optional)**

Rated voltage	$U_N$	24 V $\pm$ 10 %
Rated current at 20 °C for releasing	$I_N$	1.10 A
Permissible maximum speed	$n_{max}$	10,000 min <sup>-1</sup>
Permissible friction work	$W_{Fr}$	2.90 x 10 <sup>6</sup> Ws
Moment of inertia	$J_B$	0.000556 kgm <sup>2</sup>
Mass	m	3.1 kg
Braking torque	$M_H$	36.00 Nm

**Further characteristic technical data**

Protection	IP64, optionally IP65 or IP67
Electrical connections	Intercontec connectors (2 pieces)
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC
Rated data	According to EN 60034-1, $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional
Flange/shaft	According to DIN 42955 N, optionally R

<sup>1)</sup> All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

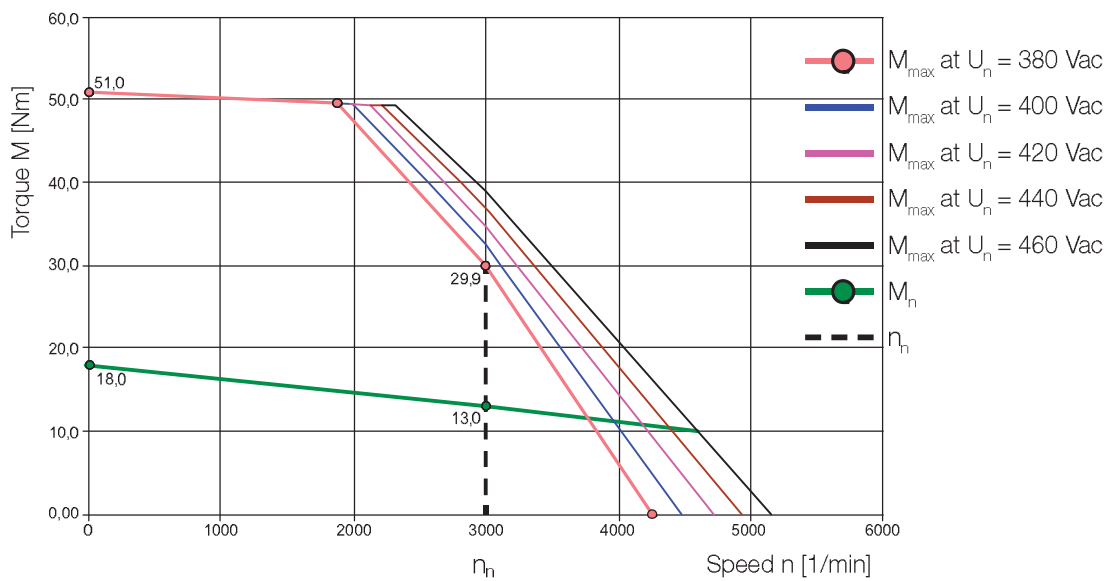
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

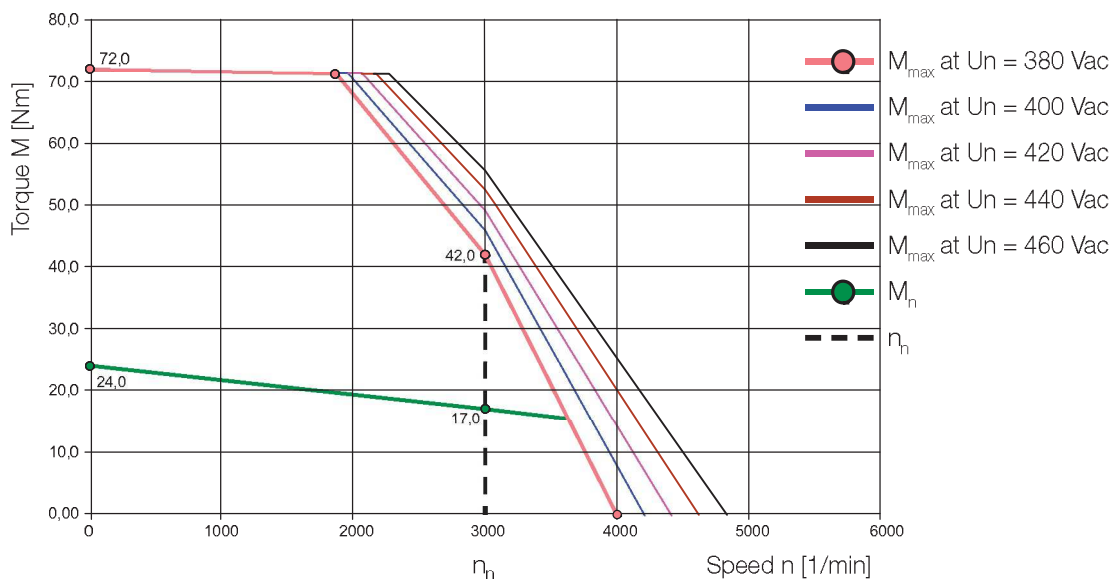
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

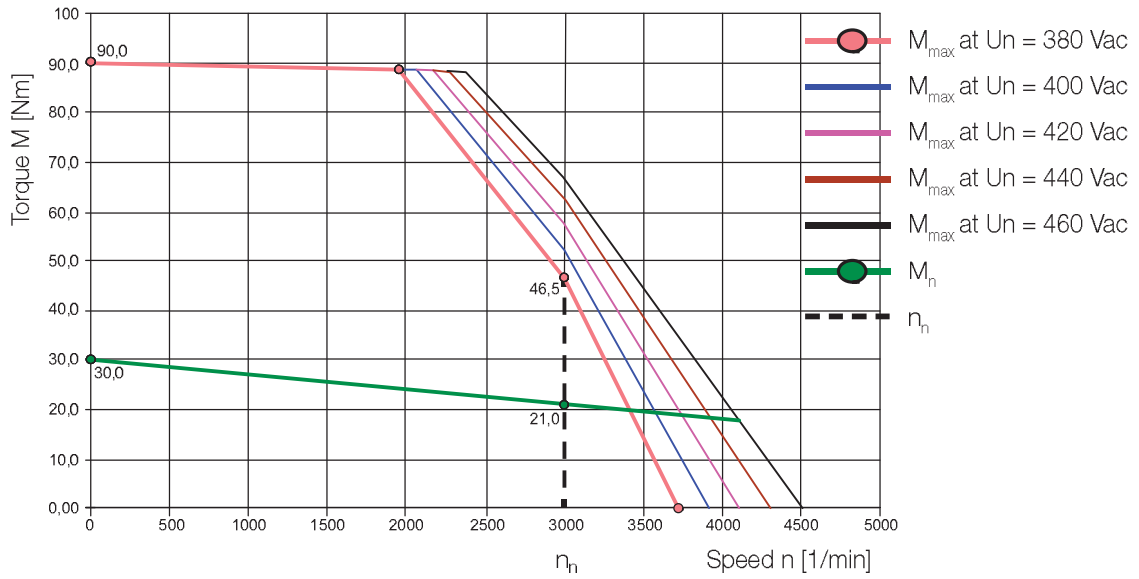
## LSN-158-1800-30-560



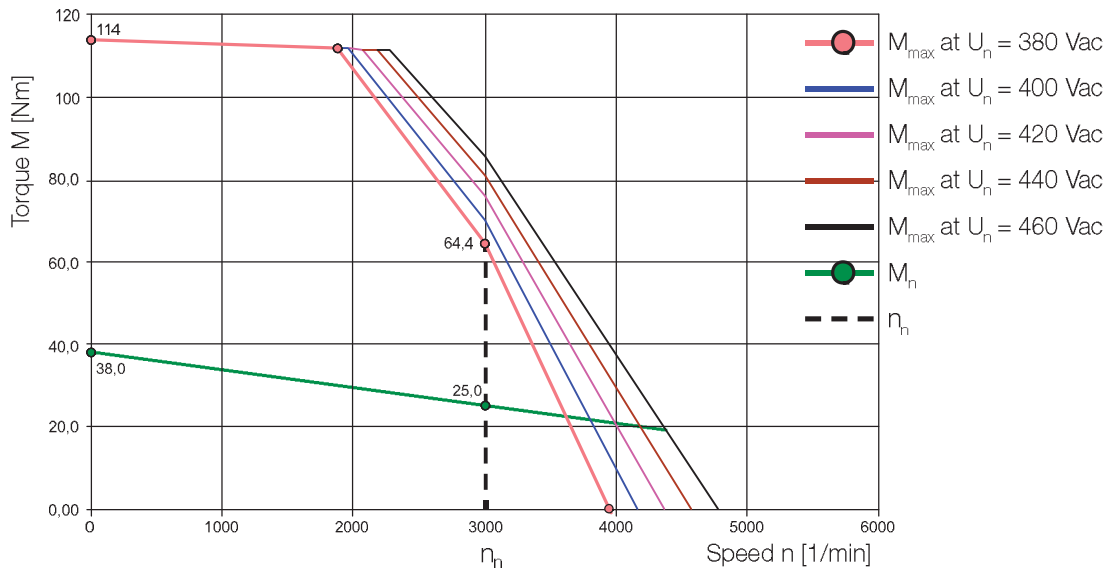
## LSN-158-2400-30-560



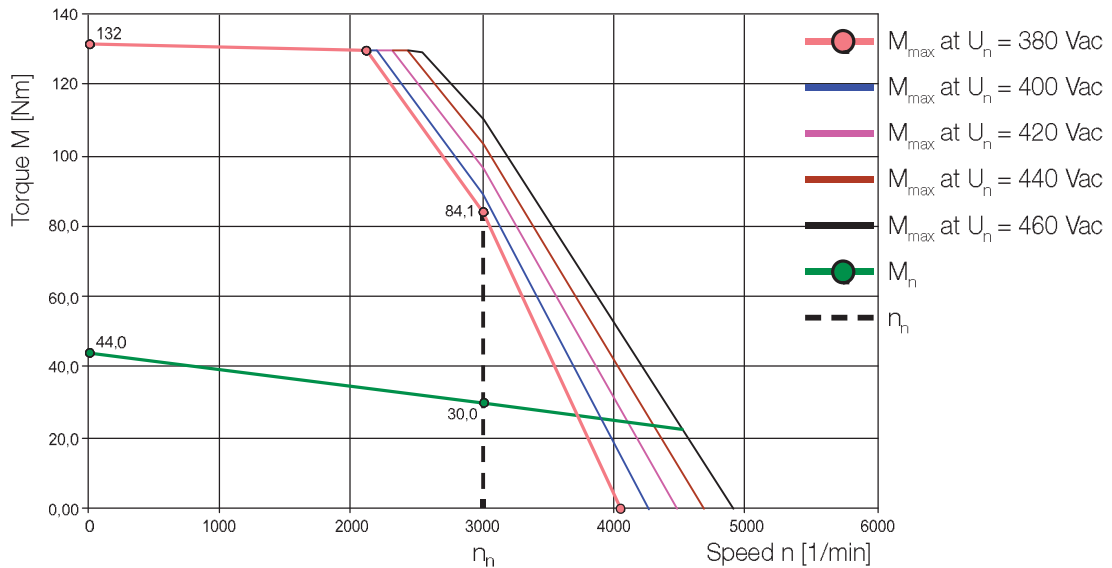
# LSN-158-3000-30-560



# LSN-158-3800-30-560



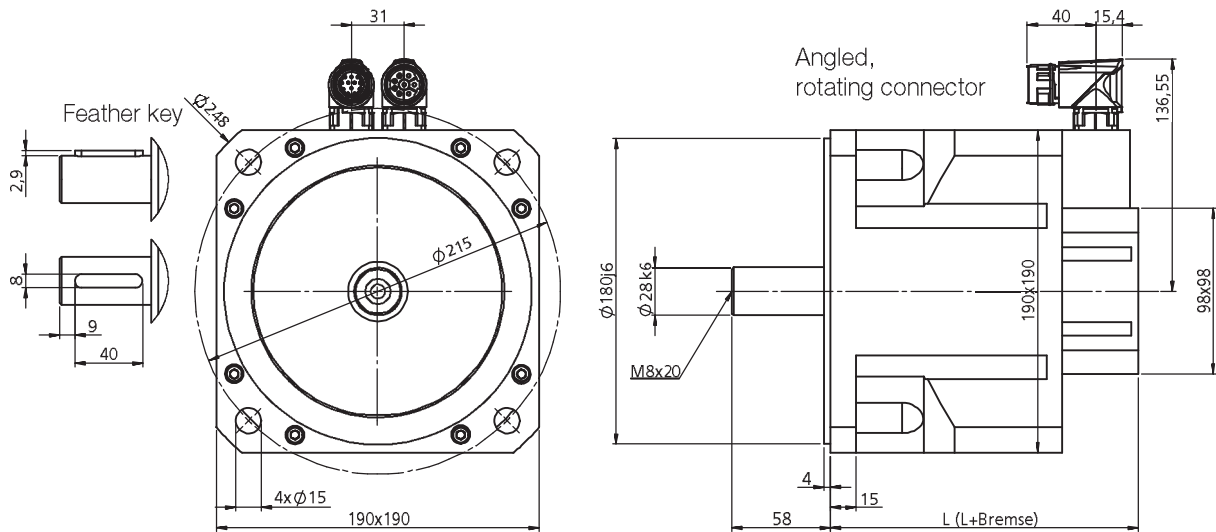
# LSN-158-4400-30-560



Motor type: LSN-190 ( $U_{dc} = 560 \text{ V}$ ,  $n_n = 2000 \text{ min}^{-1}/1000 \text{ min}^{-1}$ )



Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-190-3000	181	240	In preparation	In preparation
LSN-190-4000	211	270	In preparation	In preparation
LSN-190-5000	241	300	In preparation	In preparation
LSN-190-6000	271	330	In preparation	In preparation

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-190-3000	In preparation	In preparation	In preparation	In preparation	In preparation	In preparation
LSN-190-4000	In preparation	In preparation	In preparation	In preparation	In preparation	In preparation
LSN-190-5000	In preparation	In preparation	In preparation	In preparation	In preparation	In preparation
LSN-190-6000	In preparation	In preparation	In preparation	In preparation	In preparation	In preparation

Table 2.21 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-190-3000-20	LSN-190-4000-20	LSN-190-5000-20	LSN-190-6000-10
Rated speed	$n_n$	2000 min <sup>-1</sup>	2000 min <sup>-1</sup>	2000 min <sup>-1</sup>	1000 min <sup>-1</sup>
Rated frequency	$f_N$	166.67 Hz	166.67 Hz	166.67 Hz	83.33 Hz
DC link voltage (controller)	$U_{dc}$	560 V	560 V	560 V	560 V
Rated voltage	$U_n$	380 V	380 V	380 V	380 V
Rated torque	$M_n$	26.10 Nm	32.80 Nm	40.40 Nm	54.00 Nm
Rated current	$I_n$	13.20 A	15.40 A	21.80 A	14.60 A
Power	P	5.47 kW	6.87 kW	8.46 kW	5.65 kW
Stall torque	$M_0$	30.0 Nm	40.0 Nm	50.0 Nm	60.0 Nm
Stall current	$I_0$	13.0 A	16.7 A	22.7 A	15.8 A
Maximum permissible torque	$M_{max}$	85.0 Nm	120.0 Nm	150.0 Nm	180.0 Nm
Maximum permissible current	$I_{max}$	46.0 A	59.0 A	79.0 A	51.0 A
Maximum permissible speed	$n_{max}$	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>
EMF constant	$K_E$	139.0 V/1000 min <sup>-1</sup>	145.0 V/1000 min <sup>-1</sup>	133.0 V/1000 min <sup>-1</sup>	241.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	2.30 Nm/A	2.40 Nm/A	2.20 Nm/A	4.00 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	0.64 $\Omega$	0.43 $\Omega$	0.25 $\Omega$	0.62 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	10.1 mH	7.8 mH	4.9 mH	13.0 mH
No load speed	$n_0$	2730 min <sup>-1</sup>	2620 min <sup>-1</sup>	2850 min <sup>-1</sup>	1570 min <sup>-1</sup>
Electrical time constant	$T_{el}$	15.8 ms	18.1 ms	19.6 ms	21.0 ms
Thermal time constant	$T_{th}$	80 min.	90 min.	100 min.	108 min.
Moment of inertia of rotor	J	0.00495 kgm <sup>2</sup>	0.0069 kgm <sup>2</sup>	0.0088 kgm <sup>2</sup>	0.0107 kgm <sup>2</sup>
Mass	m	16.50 kg	21.50 kg	26.5 kg	31.5 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	1.10 A			
Permissible maximum speed	$n_{max}$	8,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	6.20 x 10 <sup>6</sup> Ws			
Moment of inertia	$J_B$	0.0016 kgm <sup>2</sup>			
Mass	m	3.6 kg			
Braking torque	$M_H$	36.00 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1, $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

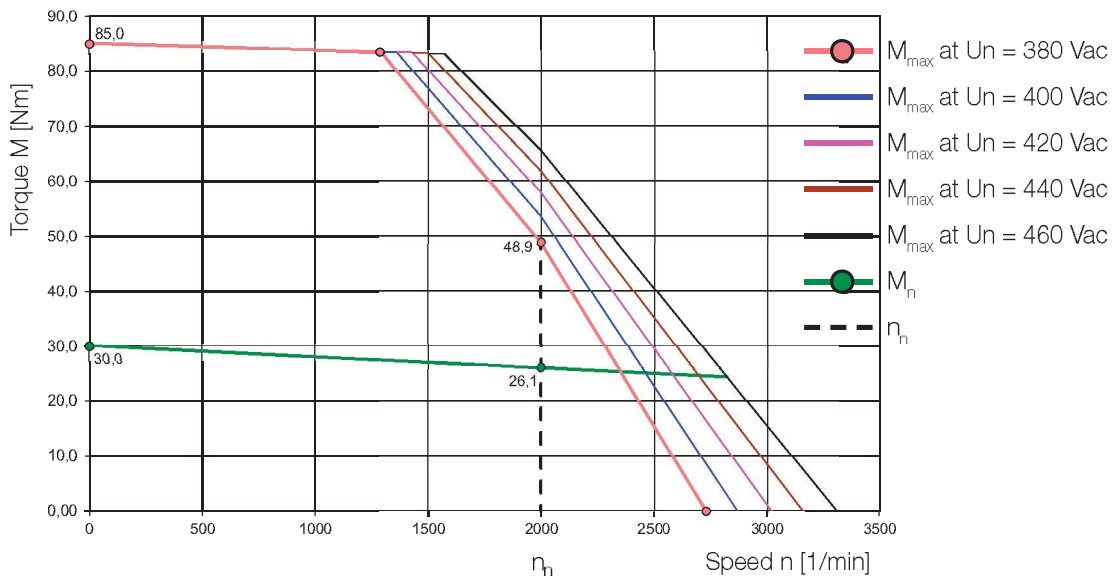
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

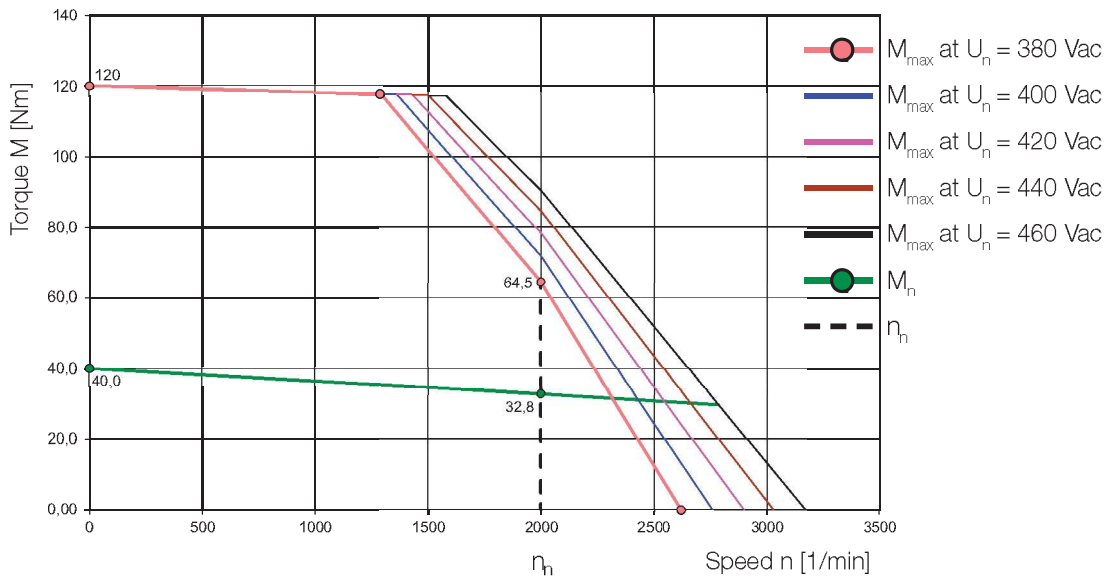
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{max}$  (for  $n_{max}$  see the table "Technical data").

## LSN-190-3000-20-560

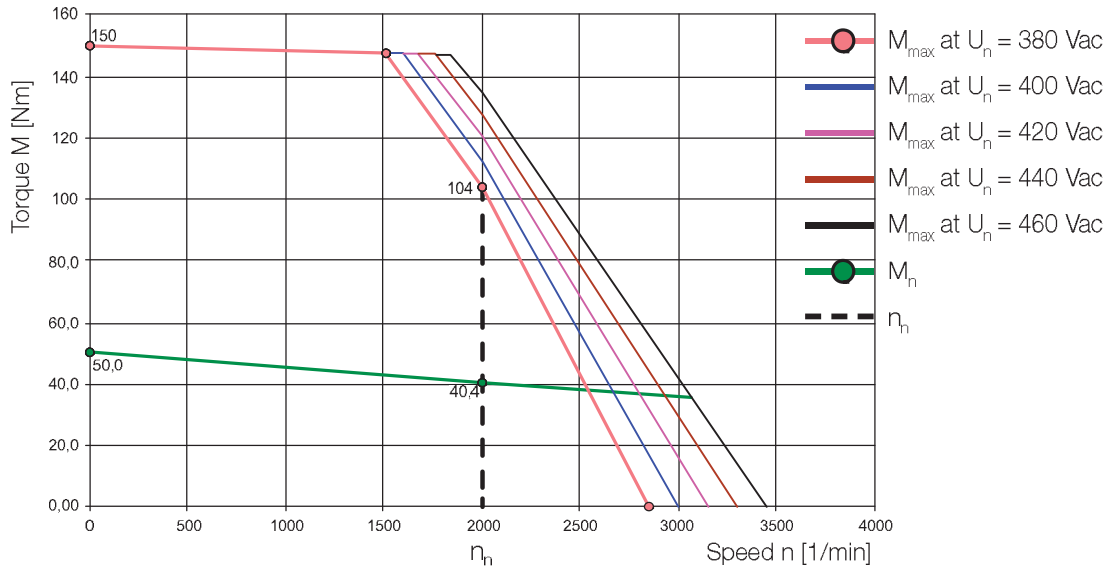


## LSN-190-4000-20-560

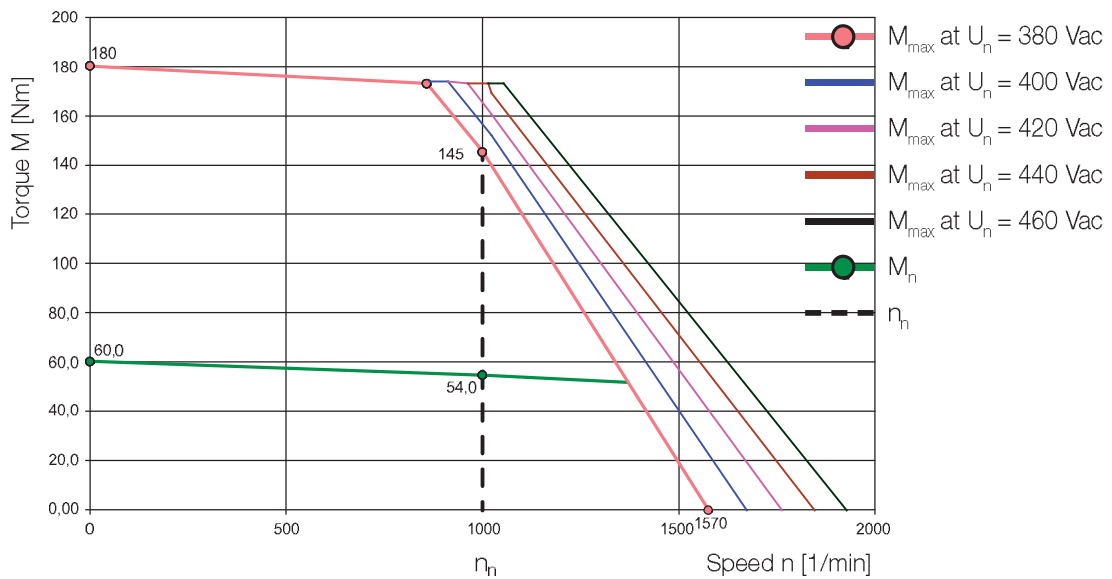




# LSN-190-5000-20-560



# LSN-190-6000-10-560

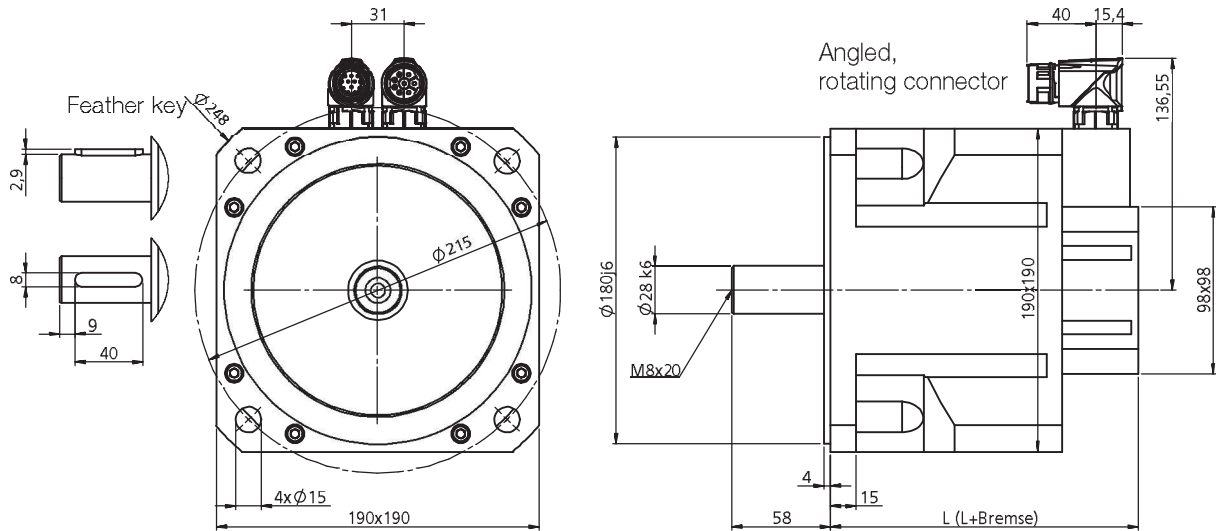


2

Motor type: LSN-190 ( $U_{dc} = 560 \text{ V}$ ,  $n_n = 3000 \text{ min}^{-1}/2500 \text{ min}^{-1}$ )



Dimensional sketch and technical data



Motor type	L with resolver xR [mm]	L+brake with resolver xR [mm]	L with opt. encoder G12.xy [mm]	L+brake with opt. encoder G12.xy [mm]
LSN-190-3000	181	240	In preparation	In preparation
LSN-190-4000	211	270	In preparation	In preparation
LSN-190-5000	241	300	In preparation	In preparation
LSN-190-6000	271	330	In preparation	In preparation

Motor type	L with opt. encoder G6.1x [mm]	L+brake with opt. encoder G6.1x [mm]	L with opt. encoder G6.2x [mm]	L+brake with opt. encoder G6.2x [mm]	L with opt. encoder G6.3x [mm]	L+brake with opt. encoder G6.3x [mm]
LSN-190-3000	In preparation	In preparation	In preparation	In preparation	In preparation	In preparation
LSN-190-4000	In preparation	In preparation	In preparation	In preparation	In preparation	In preparation
LSN-190-5000	In preparation	In preparation	In preparation	In preparation	In preparation	In preparation
LSN-190-6000	In preparation	In preparation	In preparation	In preparation	In preparation	In preparation

Table 2.22 Overview of the motor lengths – for overview of the encoder types see chapter 5.1

Technical data <sup>1)</sup>	Abbreviation	LSN-190-3000-30	LSN-190-4000-30	LSN-190-5000-30	LSN-190-6000-25
Rated speed	$n_n$	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	3000 min <sup>-1</sup>	2500 min <sup>-1</sup>
Rated frequency	$f_N$	250 Hz	250 Hz	250 Hz	208.33 Hz
DC link voltage (controller)	$U_{dc}$	560 V	560 V	560 V	560 V
Rated voltage	$U_n$	380 V	380 V	380 V	380 V
Rated torque	$M_n$	23.00 Nm	25.00 Nm	30.00 Nm	36.20 Nm
Rated current	$I_n$	15.50 A	20.10 A	24.40 A	20.70 A
Power	P	7.23 kW	7.85 kW	9.42 kW	9.48 kW
Stall torque	$M_0$	30.0 Nm	40.0 Nm	50.0 Nm	60.0 Nm
Stall current	$I_0$	16.3 A	26.3 A	31.5 A	30.0 A
Maximum permissible torque	$M_{max}$	85.0 Nm	120.0 Nm	150.0 Nm	180.0 Nm
Maximum permissible current	$I_{max}$	58.0 A	90.0 A	109.0 A	102.0 A
Maximum permissible speed	$n_{max}$	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>	6000 min <sup>-1</sup>
EMF constant	$K_E$	111.0 V/1000 min <sup>-1</sup>	92.0 V/1000 min <sup>-1</sup>	96.0 V/1000 min <sup>-1</sup>	121.0 V/1000 min <sup>-1</sup>
Torque constant	$K_T$	1.84 Nm/A	1.52 Nm/A	1.59 Nm/A	2.00 Nm/A
Winding resistance (2 phases)	$R_{2ph}$	0.41 $\Omega$	0.17 $\Omega$	0.13 $\Omega$	0.16 $\Omega$
Winding inductance (2 phases)	$L_{2ph}$	6.4 mH	3.1 mH	2.6 mH	3.3 mH
No load speed	$n_0$	3420 min <sup>-1</sup>	4130 min <sup>-1</sup>	3950 min <sup>-1</sup>	3140 min <sup>-1</sup>
Electrical time constant	$T_{el}$	15.6 ms	18.2 ms	20.0 ms	21.0 ms
Thermal time constant	$T_{th}$	80 min.	90 min.	100 min.	108 min.
Moment of inertia of rotor	J	0.00495 kgm <sup>2</sup>	0.0069 kgm <sup>2</sup>	0.0088 kgm <sup>2</sup>	0.0107 kgm <sup>2</sup>
Mass	m	16.50 kg	21.50 kg	26.5 kg	31.5 kg
<b>Brake (optional)</b>					
Rated voltage	$U_N$	24 V $\pm$ 10 %			
Rated current at 20 °C for releasing	$I_N$	1.10 A			
Permissible maximum speed	$n_{max}$	8,000 min <sup>-1</sup>			
Permissible friction work	$W_R$	6.20 x 10 <sup>6</sup> Js			
Moment of inertia	$J_B$	0.0016 kgm <sup>2</sup>			
Mass	m	3.25 kg			
Braking torque	$M_H$	36.00 Nm			
<b>Further characteristic technical data</b>					
Protection	IP64, optionally IP65 or IP67				
Electrical connections	Intercontec connectors (2 pieces)				
Thermal motor protection	PTC, optional thermal switch 140 °C, KTY or NTC				
Rated data	According to EN 60034-1; $T_A = 40$ °C, $T_{over} = 110$ K, flange temperature $\leq 65$ °C				
Servoamplifier	Stator windings for DC link voltage $U_{dc} = 320$ V or 560 VDC, other voltages optional				
Flange/shaft	According to DIN 42955 N, optionally R				

1) All figures with a tolerance of  $\pm 10\%$ . Other windings/rated speeds possible. Subject to technical change without notice.

# Characteristics

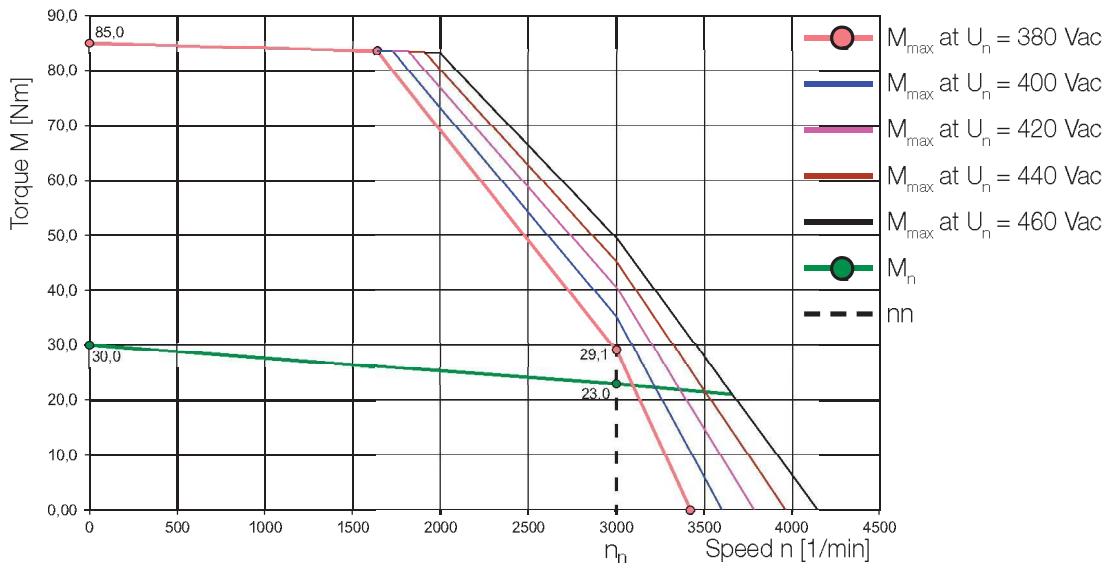
Explanations on the characteristics:

The characteristic  $M_{max}$  describes the maximum torque possible for a short time at the related speed. It is important for dynamic processes.

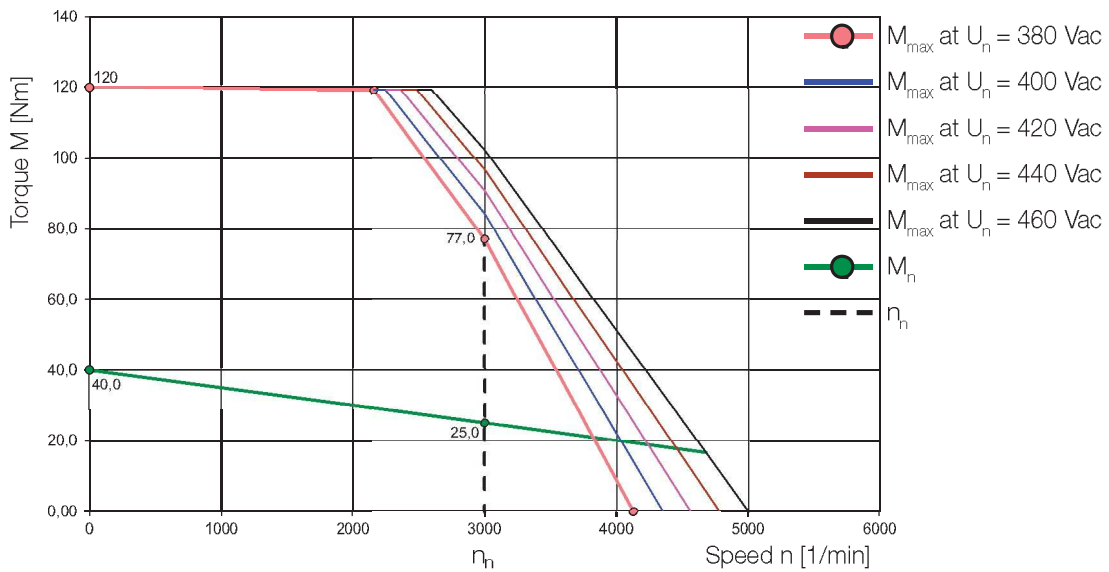
The characteristic  $M_n$  shows the thermally permissible rated torque.

The characteristics are limited by the related permissible speed  $n_{n_{max}}$  (for  $n_{n_{max}}$  see the table "Technical data").

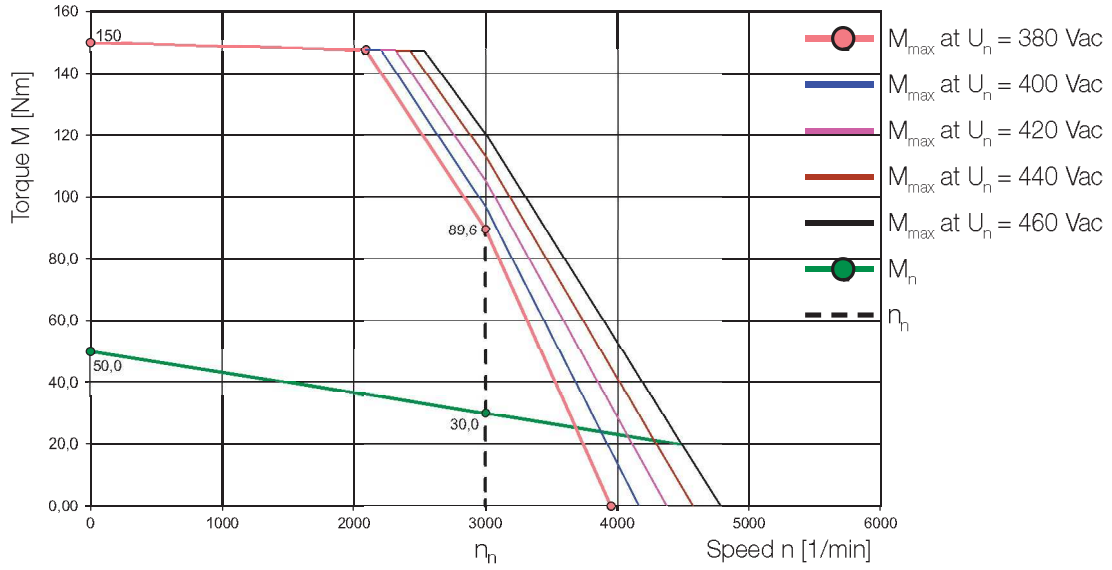
## LSN-190-3000-30-560



## LSN-190-4000-30-560



# LSN-190-5000-30-560



2

# LSN-190-6000-25-560

