



Servomotors Order Catalogue

LSN - Servomotors with stall torque 0.26 to 60 Nm

Servomotors Order Catalogue

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Subject to technical change without notice.

The content of our catalogue was compiled with the greatest care and attention, and based on the latest information available to us.

We should nevertheless point out that this document cannot always be updated simultaneously with the on-going technical development of our products.

Information and specifications may be subject to change at any time. For information on the latest version, please visit www.lti-motion.com.

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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 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 [kgcm²]

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 0.63×105 Kelvin overtemperature is reached.
Under load with peak current, the warm-up time is significantly shorter.

Rated speed n_n [min^{-1}]

The rated speed is the speed at which a servomotor outputs the rated power at the rated load.

1 Basic information on the servomotors from LTI Motion

Properties of LSN servomotors

You have selected a high quality synchronous servomotor.

The complete LSN servomotor product range from LTI Motion has high quality bearings, the same unchanged flange, the same insulation system and the same encoder system. In short, the mechanics are absolutely identical and of the highest quality! The winding construction is a compound-die pole winding. An optimised thermal design has increased the power density. As such the LSN servomotors are not only of high quality and extremely powerful with their power density and dynamic performance, they are high-end.

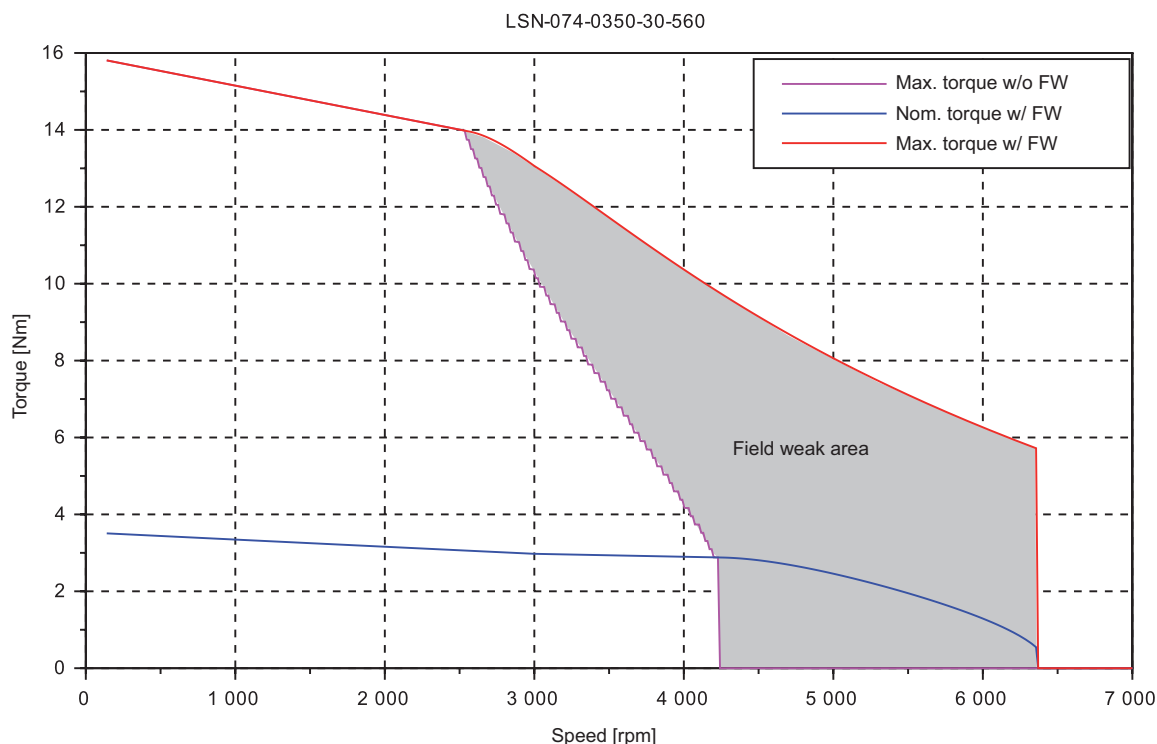
The properties at a glance:

	Preferred LSN motor types (depending on options)
Winding technology	As concentrated winding like product range H, however compound-die pole winding
Structure	10-pole rotor (Exception: LSN-050 = 6-pole)
Rated frequency	Up to 250 Hz at 3000 min ⁻¹ (Exception: LSH-050 up to 225 Hz at 4500 min ⁻¹)
Running behaviour	Good
Sizes	LSN-050 to LSN-190

Table 1.1 LSN servomotors

Typical torque against speed with field-weakening range characteristic for the LSN servomotors

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



NOTE:

Operation in the field-weakening range is dependent on the drive controller used. The design of the drive for the field-weakening range requires special knowledge of drive design and controller configuration. Talk to our technical support about this matter.

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 1.2 Explanation of terms for M-n characteristic for synchronous motors

Selection procedure

Basic information	To select the correct drive and motor, the specific speed and the load cycle for the drive task must be known.
 1.	 Define the protection: IP64, IP65
 2.	 Define the supply voltage: 230 V to +400 V
 3.	 Define the space envelope
 4.	 Define the maximum torque from the load cycle profile or by dimensioning using Servosoft
 5.	 Define the average (effective) torque
 6.	 Define the motor type required: LSN
 7.	 On the relevant data page, select the motor that meets the following criteria: synchronous servomotor: $n_{\max} \leq 1.1 \cdot n_{\text{nom}}$ $M_{\text{eff}} \leq M_{\text{nom}}$
 8.	 Define the encoder system required in relation to requirement: resolver, absolute value encoder, pulses per revolution.
 9.	 Complete motor designation with all necessary options (type code).
 10.	 Define the servocontroller
 11.	 Define the ready made encoder and power cables
 12.	 Select the inverter/servocontroller for the selected motor in the selection and ordering data based on the standard overload conditions. Select the inverter/servocontroller to suit the related motor stall current and motor rated current.



2 The LSN servomotor – compact and low-cost

Applications

The synchronous servomotors from LTI 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.

Please contact our drive specialists for details.

The LSN product range with stall torques (M_0) from 0.28 Nm to 60 Nm (externally cooled up to 78 Nm).

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

The winding construction is a compound-die pole winding. An optimised thermal design has increased the power density. 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
- Plug-in connections
- Good price/performance ratio
- Fully encapsulated winding
- UL acceptance

Declaration of conformity for LSN servomotors



EU-Konformitätserklärung

EU Declaration of Conformity

Der Hersteller
The manufacturer

LTI Motion GmbH
Gewerbestraße 5-9
35633 Lahnau
Deutschland

erklärt in alleiniger Verantwortung hiermit, dass die folgenden Produkte
declares under sole responsibility, that the following products

Produktbezeichnung:
Product designation: Synchron-Servomotor
Synchronous Servomotor

Produkttypen:
Product types: LST, LSN
LST, LSN

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

2014/35/EU
2014/35/EU Niederspannungsrichtlinie
Low Voltage Directive

und dass folgende angeführten Normen angewandt wurden:
and that the following standards have been applied:

EN 60034-1:2010	Drehende elektrische Maschinen - Teil 1: Bemessung und Betriebsverhalten <i>Rotating electrical machines – Part 1: Rating and performance</i>
EN 60034-5:2001+A1: 2007	Drehende elektrische Maschinen – Teil 5: Schutzarten aufgrund der Gesamtkonstruktion von drehenden elektrischen Maschinen (IP-Code) – Einteilung <i>Rotating electrical machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP-Code)</i>
EN 60034-6:1993:	Drehende elektrische Maschinen – Teil 6: Einteilung der Kühlverfahren (IC-Code) <i>Rotating electrical machines – Part 6: Methods of cooling (IC-Code)</i>
EN 60034-9:2005+A1:2007	Drehende elektrische Maschinen – Teil 9: Geräuschgrenzwerte <i>Rotating electrical machines – Part 9: Noise limits</i>

Unterzeichnet für und im Namen von LTI Motion, Lahnau

Unterschrift / signature

Name / name:

Stellung / position:

Datum / date:

Ort / place:

Dr. Josef Wiesing
Geschäftsführer / Managing Director
23.02.2018
Lahnau

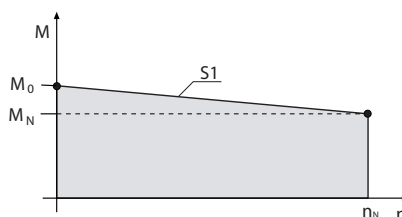
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Properties of LSN servomotors

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 and IP67 available as an option
Insulation class	Insulation class F according to VDE0530, winding overtemperature $\Delta t = 100\text{ }^{\circ}\text{C}$, ambient temperature $t_{\text{u}} = -20\text{ }^{\circ}\text{C}$ 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)
Protection	IP64, optionally IP65
Electrical connections	Intercontec connectors (2 pieces)
Thermal motor protection	PTC, PT1000
Rated data	According to EN 60034-1, $T_A = 40\text{ }^{\circ}\text{C}$, $T_{\text{over}} = 110\text{ K}$, flange temperature $\leq 65\text{ }^{\circ}\text{C}$
Servoamplifier	Stator windings for DC link voltage $U_{\text{dc}} = 320\text{ V}$ or 560 VDC
Flange/shaft	According to DIN 42955 N, optionally R

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 $65\text{ }^{\circ}\text{C}$ and an installation altitude of max. 1000 m above MSL.

Minimum fastening area: $2.5 \times$ 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 $50\text{ }^{\circ}\text{C}$. For undefined cooling conditions (for example gearbox attachment) please consult our Applications department.

Order codes, LTI 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 /					Options (if available, sequence varies)							
					T15	, B	, X	, K	, S4	, W	, G6.1S	
LTI synchronous motor product range N												
Edge dimensions in mm (not flange dimensions)					050							
					074							
					097							
					127							
					158							
190												
Stall torque					0.28 Nm	11.30 Nm	→	1130				
					→0028	12.00 Nm	→	1200				
					0.54 Nm	→0054	16.00 Nm	→	1600			
					0.75 Nm	→0075	18.00 Nm	→	1800			
					0.95 Nm	→0095	20.00 Nm	→	2000			
					1.15 Nm	→0115	24.00 Nm	→	2400			
					2.05 Nm	→0205	30.00 Nm	→	3000			
					3.50 Nm	→0350	38.00 Nm	→	3800			
					4.80 Nm	→0480	40.00 Nm	→	4000			
					5.10 Nm	→0510	44.00 Nm	→	4400			
					7.50 Nm	→0750	50.00 Nm	→	5000			
					9.60 Nm	→0960	60.00 Nm	→	6000			
Rated speed (x100) in min ⁻¹					30							
					45							
Controller DC link voltage (VDC)					320							
					560							
Options					(Replacement type for KTY84-30) PT1000 in the encoder connector	→	T15					
Thermal protection					(Replacement type for KTY84-30) PT1000 in the power connector	→	T15M					
Brake option					Holding brake 24 VDC	*						

2.1 Order code LSN servomotors

LSN - 074 - 0115 - 30 - 320 / T15 , B , P , X , K , S4 , W , G6.1S		Options (if available, sequence varies)	
Connection option (The D-end of the motor is the shaft)	Angled / rotating connector	*	
	From size LSN-127, angled, rotating connector with raised body, rotation angle 270°	S7	
Options Shaft seal	Protection IP65 with shaft seal (approx. 10 mm longer)	→	*W
	Protection IP65 without shaft seal	→	V
Options Encoder system	Resolver with 1 pole pair	→	*1R
	Resolver with 1 pole pair Safety	→	1RY
	Singleturn absolute value encoder SRS 50	→	G6.1S
	Multiturn absolute value encoder SRM 50	→	G6.1M
	Singleturn absolute value encoder SKS 36	→	G6.2S
	Singleturn absolute value encoder SKS 36 Safety	→	G6.2SY
	Multiturn absolute value encoder SKM 36	→	G6.2M
	Multiturn absolute value encoder SKM 36 Safety	→	G6.2MY
	Singleturn absolute value encoder SEK 37	→	G6.3S
	Multiturn absolute value encoder SEL 37	→	G6.3M
	Hiperface DSL singleturn EFS 50 (21 bits)	→	G7.1S
	Hiperface DSL multiturn EFM 50 (21/12 bits)	→	G7.1M
	Hiperface DSL singleturn EFS 50 safety (21 bits)	→	G7.1SY
	Hiperface DSL multiturn EFM 50 safety (21/12 bits)	→	G7.1MY
	Hiperface DSL singleturn EKS 36 (18 bits)	→	G7.2S
	Hiperface DSL multiturn EKM 36 safety (18/12 bits)	→	G7.2M
	Hiperface DSL singleturn EKS 36 safety (18 bits)	→	G7.2SY
	Hiperface DSL multiturn EKM 36 safety (18/12 bits)	→	G7.2MY
	Hiperface DSL singleturn EES 37 (15 bits)	→	G7.3S
	Hiperface DSL multiturn EEM 37 (15/12 bits)	→	G7.3M

2.2 Order code LSN servomotors

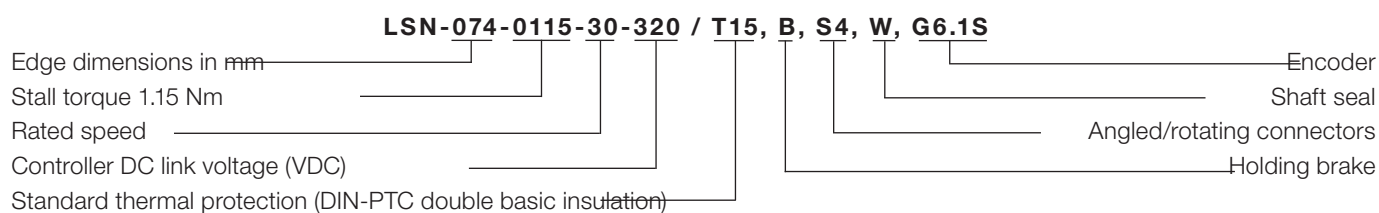
The order options marked with a  are preferred types and are available with short delivery times.

Features of the standard version

- Smooth motor shaft (no feather key)
- Resolver with 1 pole pair 1R
- IP64 according to DIN 40050 except flange
- Resolver connector straight
- Power connector straight
- Double basic insulation (winding) TxIP54 according to DIN VDE0530-5 and EN60034-5 (rotating machinery)

2.3 Definition of standard model

Ordering example LSN servomotors:



Ordering options

- Holding brake
- Various encoders

Space for notes

Accuracies and system characteristics, encoder types, LSN



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	Singleturn resolution	Multiturn-Resolution	Number of sin/cos per revolution	LSN, compatible with
*1R	Resolver with 1 pole pair	Analogue			1	All LSN
1RY ¹⁾	Resolver with 1 pole pair Safety	Analogue			1	All LSN
G6.1S	Singleturn absolute value encoder SRS 50	Hiperface and analogue	xx bits		1024	From LSN-074
G6.1M	Multiturn absolute value encoder SRM 50	Hiperface and analogue	xx bits	12 bits	1024	All LSN
G6.2S	Singleturn absolute value encoder SKS 36	Hiperface and analogue	xx bits		128	All LSN
G6.2SY ¹⁾	Singleturn absolute value encoder SKS 36 Safety	Hiperface and analogue	xx bits		128	All LSN
G6.2M	Multiturn absolute value encoder SKM 36	Hiperface and analogue	xx bits	12 bits	128	All LSN
G6.2MY ¹⁾	Multiturn absolute value encoder SKM 36 Safety	Hiperface and analogue	xx bits	12 bits	128	All LSN
G6.3S	Singleturn absolute value encoder SEK 37	Hiperface and analogue	xx bits		16	All LSN
G6.3M	Multiturn absolute value encoder SEL 37	Hiperface and analogue	xx bits	12 bits	16	From LSN-074
G7.1S	Singleturn absolute value encoder EFS 50	Hiperface DSL 2-wire	21 bits			From LSN-074
G7.1SY ¹⁾	Singleturn absolute value encoder EFS 50 Safety	Hiperface DSL 2-wire	21 bits			From LSN-074
G7.1M	Multiturn absolute value encoder EFM 50	Hiperface DSL 2-wire	21 bits	12 bits		From LSN-074
G7.1MY ¹⁾	Multiturn absolute value encoder EFM 50 Safety	Hiperface DSL 2-wire	21 bits	12 bits		All LSN
G7.2S	Singleturn absolute value encoder EKS 36	Hiperface DSL 2-wire	18 bits			All LSN
G7.2SY ¹⁾	Singleturn absolute value encoder EKS 36 Safety	Hiperface DSL 2-wire	18 bits			All LSN
G7.2M	Multiturn absolute value encoder EKM 36	Hiperface DSL 2-wire	18 bits	12 bits		All LSN
G7.2MY ¹⁾	Multiturn absolute value encoder EKM 36 Safety	Hiperface DSL 2-wire	18 bits	12 bits		All LSN
G7.3S	Singleturn absolute value encoder EES 37	Hiperface DSL 2-wire	15 bits			All LSN
G7.3M	Multiturn absolute value encoder EEM 37	Hiperface DSL 2-wire	15 bits	12 bits		All LSN

2.4 Encoder systems

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

Ordering options	Encoder property		System property					
	Typ. abs. accuracy ²⁾	Typ. abs. repetition accuracy ²⁾	S0 CM resolution for Speed control	Effective bits from AD conversion S0 CM	S0 resolution for. Speed control	Effective bits from AD conversion S0	C-line-CDE resolution for. Speed control	Effective bits from AD conversion C-line-CDE
*1R	± 10'	± 1'	16	14	14	12	12	10
1RY ¹⁾	± 10'	± 1'	16	14	14	12	12	10
G6.1S	± 45''	± 7''	23	11	23	11	21	9
G6.1M	± 45''	± 7''	23	11	23	11	21	9
G6.2S	± 80''	± 40''	21	12	20	11	18	9
G6.2SY ¹⁾	± 80''	± 40''	21	12	20	11	18	9
G6.2M	± 80''	± 40''	21	12	20	11	18	9
G6.2MY ¹⁾	± 80''	± 40''	21	12	20	11	18	9
G6.3S	± 288''	± 144''	18	12	17	11	15	9
G6.3M	± 288''	± 144''	18	12	17	11	15	9
G7.1S	± 45''	± 7''	21		21			
G7.1SY ¹⁾	± 45''	± 7''	21		21			
G7.1M	± 45''	± 7''	21		21			
G7.1MY ¹⁾	± 45''	± 7''	21		21			
G7.2S	± 80''	± 40''	18		18			
G7.2SY ¹⁾	± 80''	± 40''	18		18			
G7.2M	± 80''	± 40''	18		18			
G7.2MY ¹⁾	± 80''	± 40''	18		18			
G7.3S	± 288'	± 144''	15		15			
G7.3M	± 288'	± 144''	15		15			

2.5 Encoder and system characteristics

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

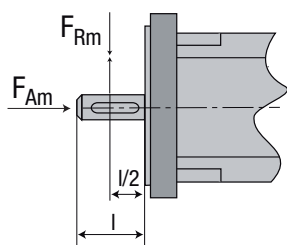
2) Data as per encoder manufacturer

Radial and axial force, servomotor without brake

Sizes	Radial force F_{Rm} [N] at rated speed n [min ⁻¹]					Axial force F_{Am} [N] at rated speed n [min ⁻¹]					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

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_{Rm}) 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.

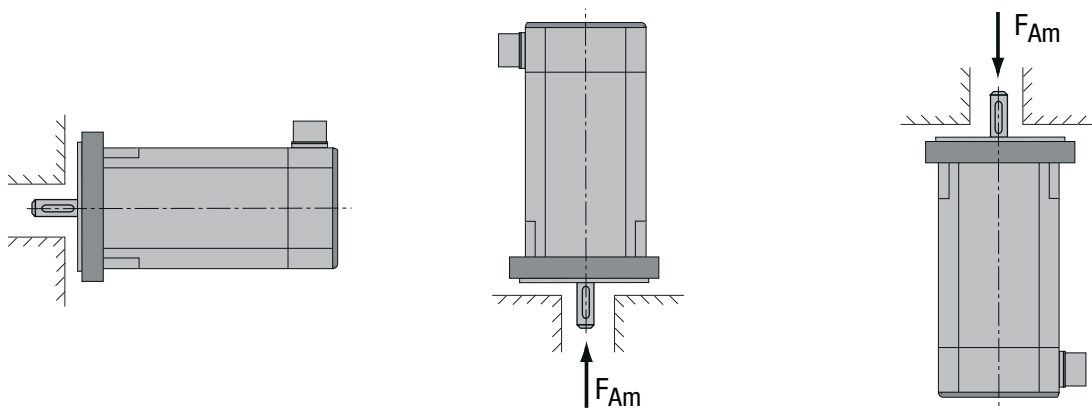
Either the permissible radial force or the axial force is allowed to act on the motor shaft!

Radial and axial force, servomotor with brake

Sizes	Radial force F_{Rm} [N] at rated speed n [min ⁻¹]					Axial force F_{Am} [N] at rated speed n [min ⁻¹]					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

2.7 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.

Technical data, design



Design	B5/B14	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).

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 ⁻¹]
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

2.8 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 ⁻¹]
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

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

Space for notes

Motor type: LSN-050 ($U_{dc} = 320 + 560 \text{ VDC}$)



LSN-050 -0028
 -0054
 -0075
 -0095

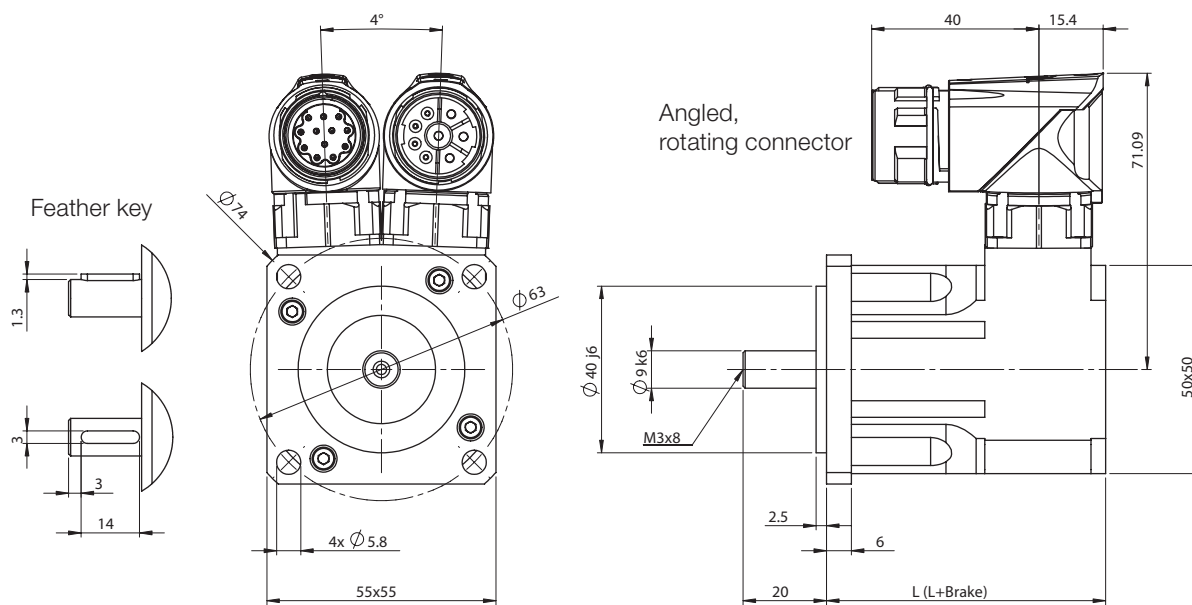
Technical data ¹⁾	Abbrev.	Unit	LSN-050-0028	LSN-050-0054	LSN-050-0075	LSN-050-0095
Rated speed	n_n	min^{-1}	4500			
Rated frequency	f_N	Hz	225			
DC link voltage (controller)	U_{dc}	V	320 / 560			
Rated voltage	U_n	V	114 / 118	166 / 207	167 / 301	172 / 274
Rated torque	M_n	Nm	0.25	0.48	0.68	0.85
Rated current	I_n	A	0.96 / 0.96	1.12 / 0.90	1.48 / 0.83	1.70 / 1.07
Power	P	kW	0.12	0.23	0.32	0.40
Stall torque	M_0	Nm	0.28	0.54	0.75	0.95
Stall current	I_0	A	0.97	1.17 / 0.93	1.54 / 0.86	1.82 / 1.15
Maximum permissible torque	M_{max}	Nm	1.1	2.2	3.0	3.8
Maximum permissible current	I_{max}	A	4.5	5.4 / 4.3	7.1 / 3.9	8.4 / 5.3
Maximum permissible speed	n_{max}	min^{-1}	12000			
EMF constant	K_E	$\text{V}/1000 \text{ min}^{-1}$	17.5	28.0 / 35.5	29.5 / 53	31.5 / 50
Torque constant	K_T	Nm/A	0.29	0.46 / 0.58	0.49 / 0.88	0.52 / 0.83
Winding resistance (2 phases)	R_{2ph}	Ω	28.30	25.90 / 42.10	17.00 / 54.00	13.10 / 23.60
Winding inductance (2 phases)	L_{2ph}	mH	28.40	32.30 / 51.00	22.70 / 72.00	19.00 / 48.50
No load speed	n_0	min^{-1}	12260 / 21170	7740 / 10710	7380 / 7100	6950 / 7560
Electrical time constant	T_{el}	ms	1.0	1.2	1.3	1.45
Thermal time constant	T_{th}	min	10	12	15	18
Moment of inertia of rotor	J	kgm^2	0.000005	0.000007	0.000009	0.000011
Mass	m	kg	0.76	0.93	1.1	1.27
Brake (optional)						
Rated voltage	U_N	V	$24 \pm 10 \%$			
Rated current at 20 °C for releasing	I_N	A	0.46			
Permissible maximum speed	n_{max}	min^{-1}	10,000			
Permissible friction work	W_R	Ws	0.41×10^6			
Moment of inertia	J_B	kgm^2	0.0000068			
Mass	m	kg	0.44			
Braking torque	M_H	Nm	2.00			

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

Dimensional sketch and technical data

Rotary encoder option	Length [mm]	LSN-050-0028	LSN-050-0054	LSN-050-0075	LSN-050-0095
xR	L (L + brake)	67 (105)	82 (120)	97 (135)	112 (150)
G6.2x + G7.2x	L (L + brake)	94 (128)	109 (143)	124 (158)	139 (173)
G6.3x	L (L + brake)	82 (127.5)	97 (142.5)	112 (157.5)	127 (172.5)
G7.3x	L (L + brake)	90 (127.5)	105 (142.5)	120 (157.5)	135 (172.5)
G12.2x	L (L + brake)	121 (159)	136 (174)	151 (189)	166 (204)

2.9 Overview of the motor lengths – for overview of the encoder types see chapter 5.1; all data in [mm]



Characteristics

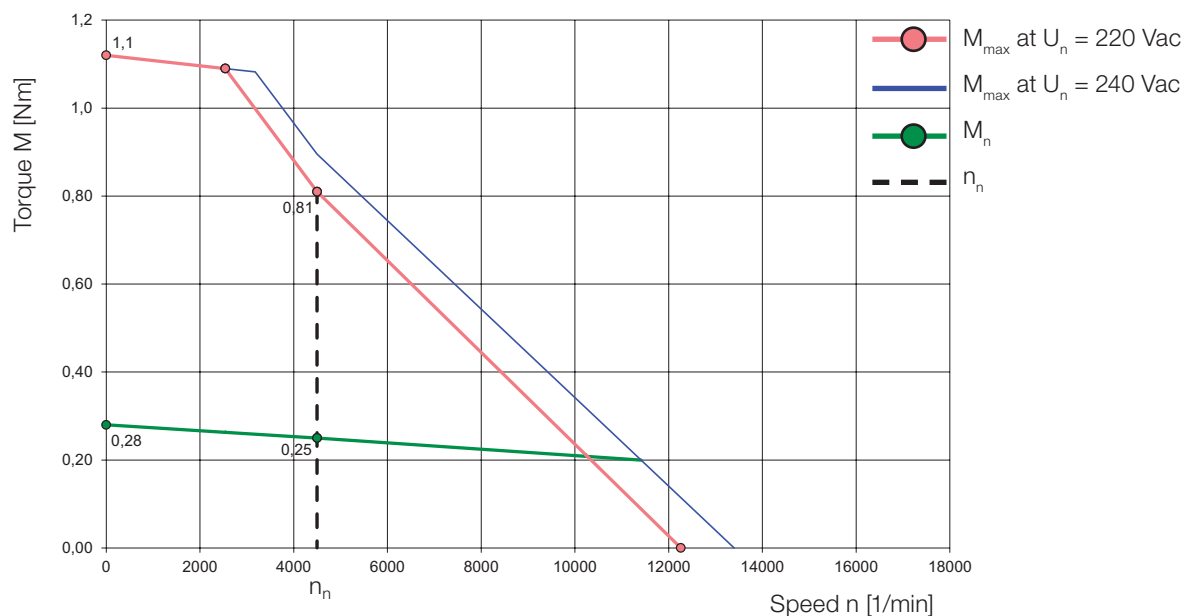
Explanations on the characteristics:

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

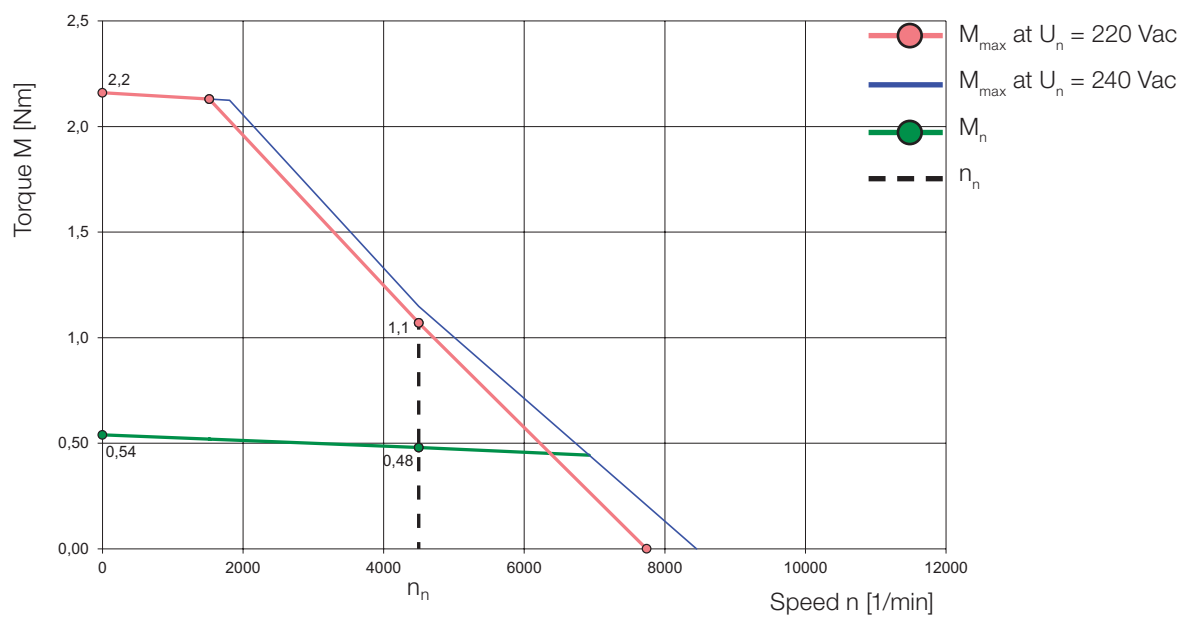
The characteristic M_n shows the thermally permissible rated torque.

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

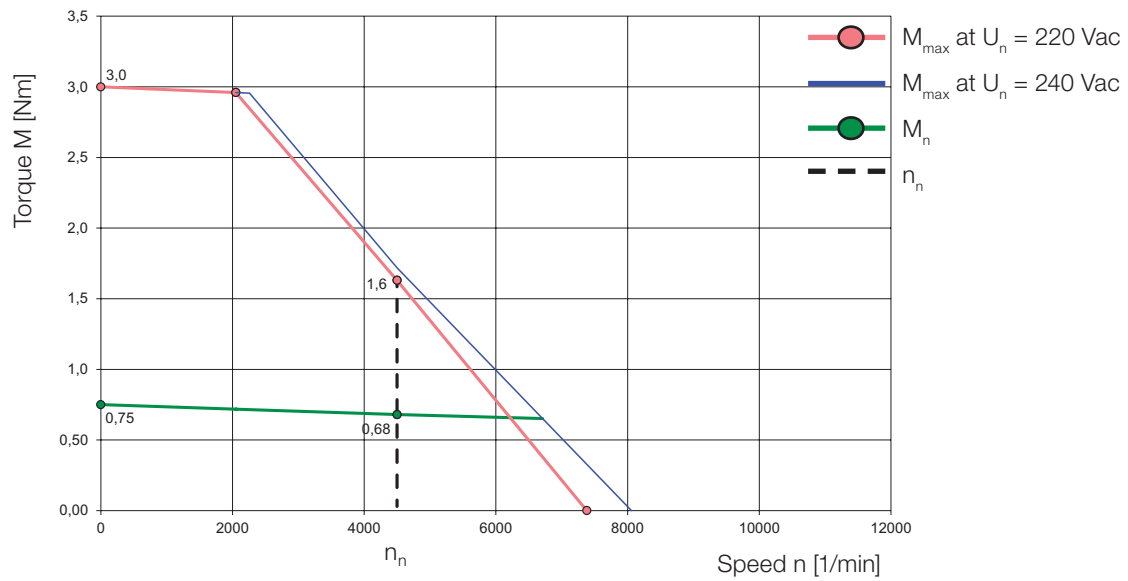
LSN-050-0028-45-320



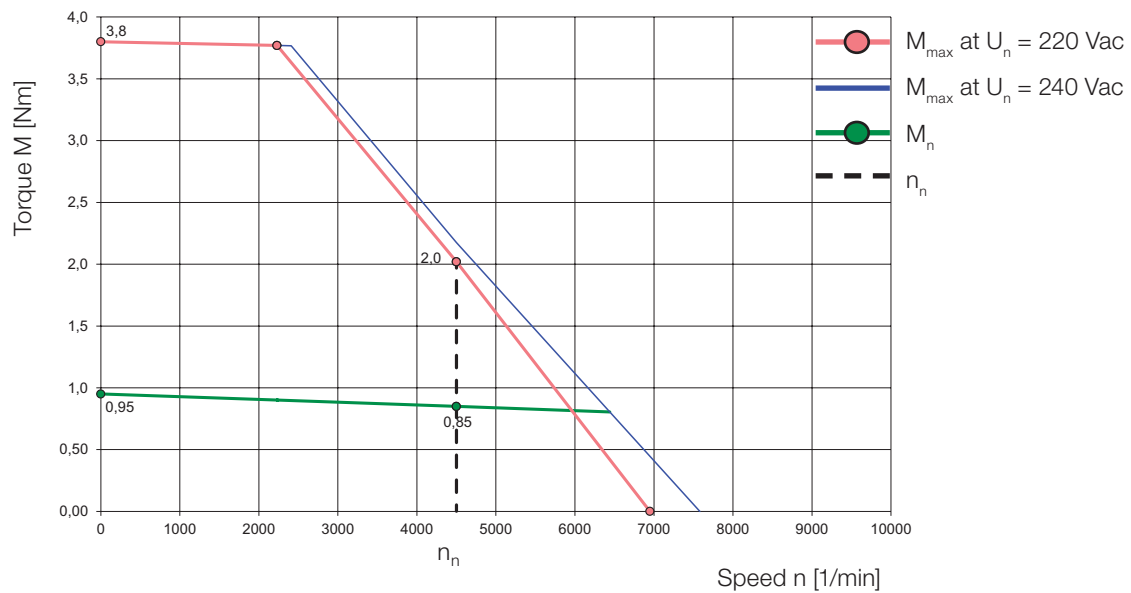
LSN-050-0054-45-320



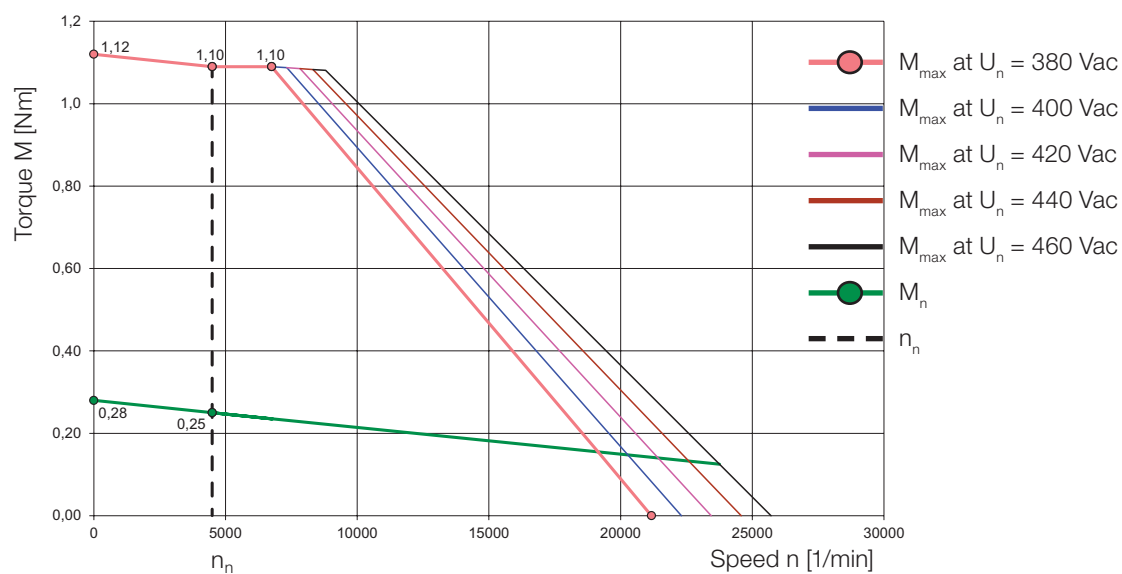
LSN-050-0075-45-320



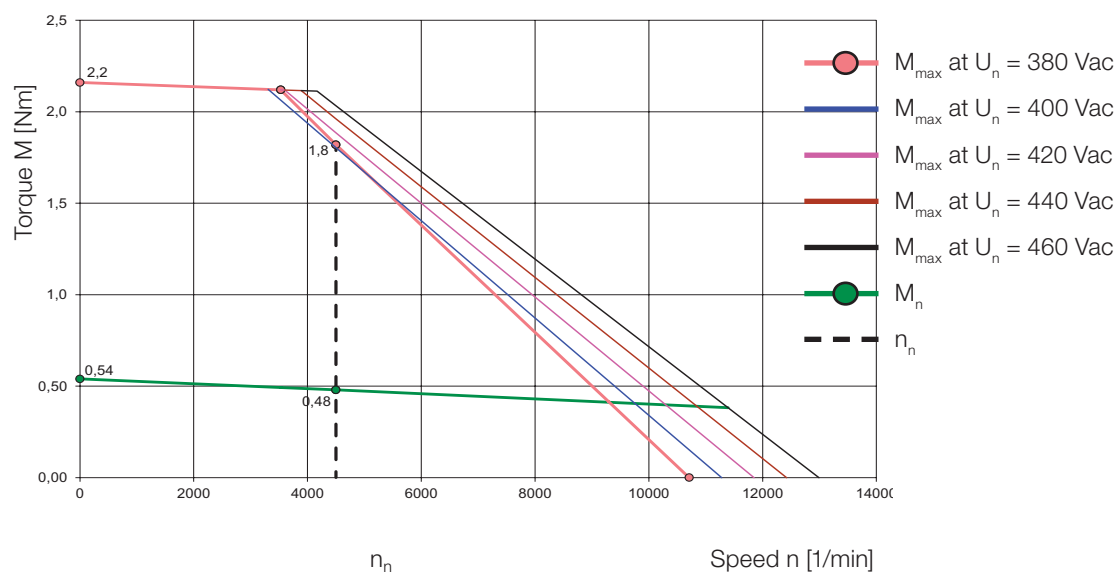
LSN-050-0095-45-320



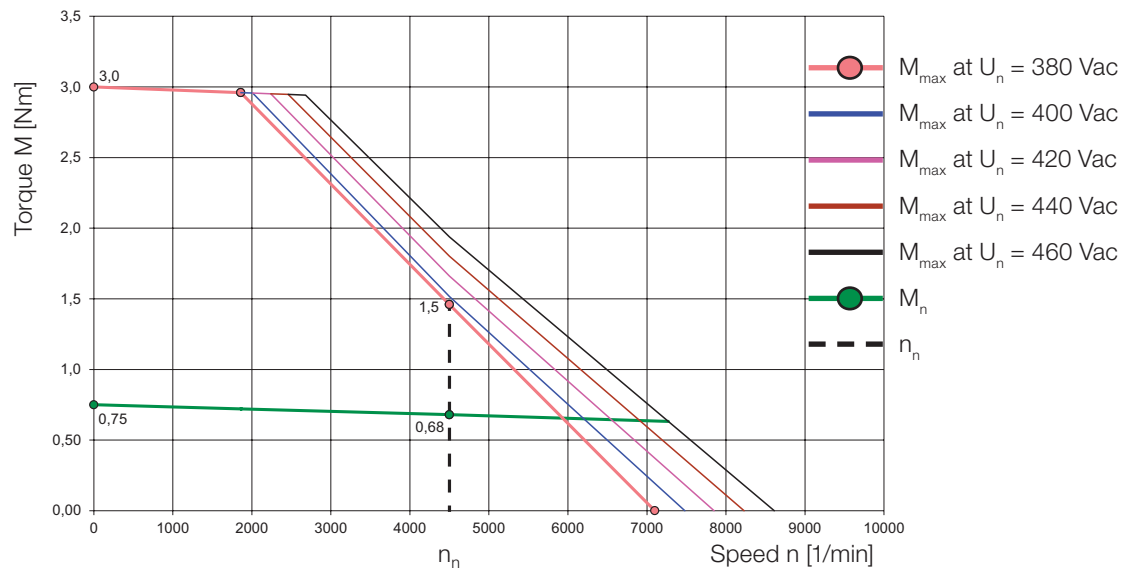
LSN-050-0028-45-560



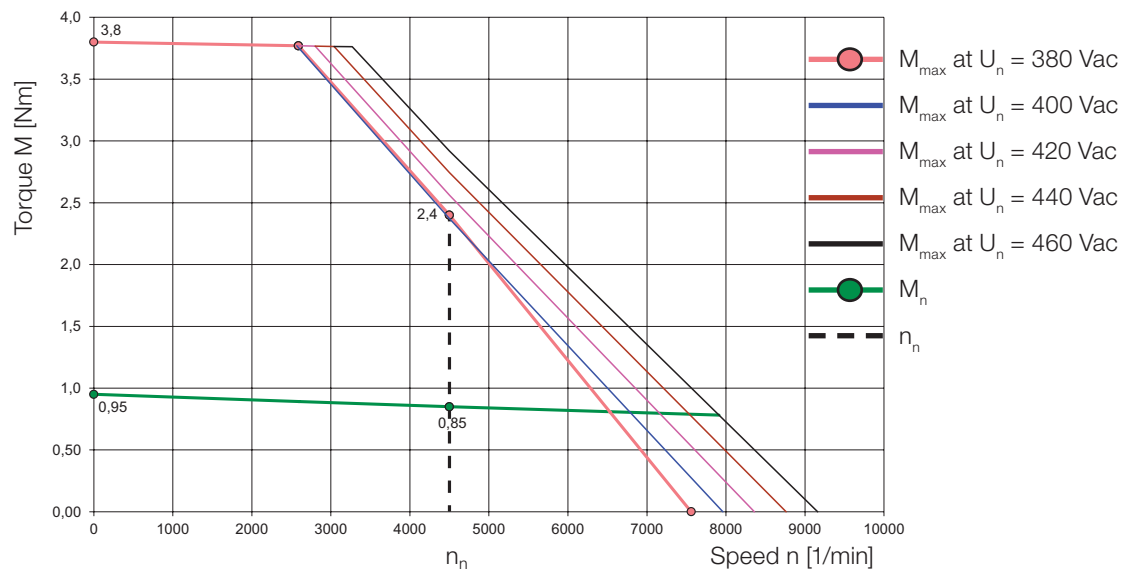
LSN-050-0054-45-560



LSN-050-0075-45-560



LSN-050-0095-45-560



Motor type: LSN-074 ($U_{dc} = 320 + 560 \text{ VDC}$)



LSN-074 -0115
 -0205
 -0350
 -0480

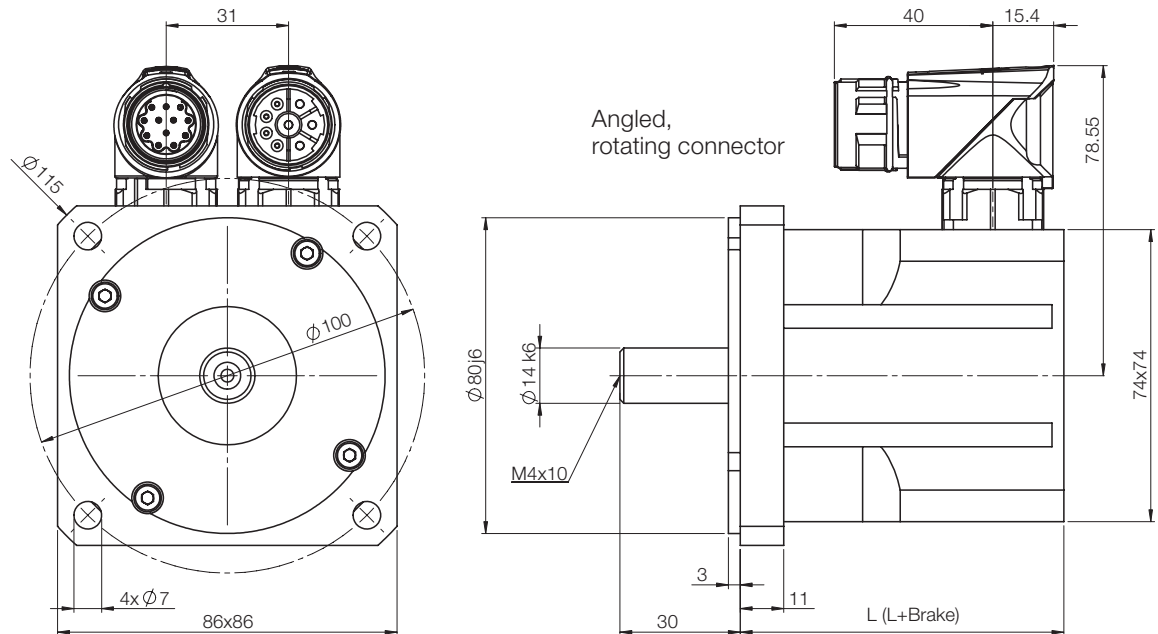
Technical data ¹⁾	Abbrev.	Unit	LSN-074-0115	LSN-074-0205	LSN-074-0350	LSN-074-0480
Rated speed	n_n	min^{-1}	3000			
Rated frequency	f_n	Hz	250			
DC link voltage (controller)	U_{dc}	V	320 / 560			
Rated voltage	U_n	V	136 / 248	153 / 273	156 / 278	180 / 310
Rated torque	M_n	Nm	1.13	1.90	3.00	3.70
Rated current	I_n	A	2.30 / 1.30	3.10 / 1.70	4.30 / 2.40	4.50 / 2.60
Power	P	kW	0.36	0.60	0.94	1.16
Stall torque	M_0	Nm	1.15	2.05	3.50	4.80
Stall current	I_0	A	2.00 / 1.10	2.80 / 1.60	4.20 / 2.40	4.80 / 2.80
Maximum permissible torque	M_{max}	Nm	3.50	6.20	10.50	14.40
Maximum permissible current	I_{max}	A	9.2 / 5.0	12.7 / 7.2	19.4 / 10.9	17.3 / 10.1
Maximum permissible speed	n_{max}	min^{-1}	12000			
EMF constant	K_E	V/1000 min^{-1}	34.5 / 63.0	44.5 / 79.0	50.0 / 89.0	60.0 / 103.0
Torque constant	K_T	Nm/A	0.57 / 104	0.74 / 1.31	0.83 / 1.47	0.99 / 1.70
Winding resistance (2 phases)	R_{2ph}	Ω	8.40 / 27.80	5.40 / 17.30	2.80 / 8.90	2.50 / 7.50
Winding inductance (2 phases)	L_{2ph}	mH	18.0 / 59.3	13.3 / 42.4	8.1 / 25.5	7.5 / 22.7
No load speed	n_0	min^{-1}	6320 / 5980	4920 / 4790	4390 / 4260	3660 / 3680
Electrical time constant	T_{el}	ms	2.1	2.5	2.9	3.0
Thermal time constant	T_{th}	min	21	23	27	30
Moment of inertia of rotor	J	kgm^2	0.000031	0.000055	0.000104	0.000152
Mass	m	kg	1.50	2.00	2.90	3.80
Brake (optional)						
Rated voltage	U_N	V	24 $\pm$ 10 %			
Rated current at 20 °C for releasing	I_N	A	0.50			
Permissible maximum speed	n_{max}	min^{-1}	10,000			
Permissible friction work	W_R	Ws	0.58 x 10 ⁶			
Moment of inertia	J_B	kgm^2	0.000018			
Mass	m	kg	0.5			
Braking torque	M_H	Nm	4.50			

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

Dimensional sketch and technical data

Rotary encoder option	Length [mm]	LSN-074-0115	LSN-074-0205	LSN-074-0350	LSN-074-0480
xR	L (L + brake)	82 (120)	100 (138)	136 (174)	172 (210)
G6.1x + G7.1x	L (L + brake)	101.5 (148)	119.5 (166)	155.5 (202)	191.5 (238)
G6.2x + G7.2x	L (L + brake)	99 (144)	117 (162)	153 (198)	189 (234)
G6.3x	L (L + brake)	82 (132)	100 (150)	136 (186)	172 (222)
G7.3x	L (L + brake)	96 (142)	114 (160)	150 (196)	186 (232)

2.10 Overview of the motor lengths – for overview of the encoder types see chapter 5.1; all data in [mm]



Characteristics

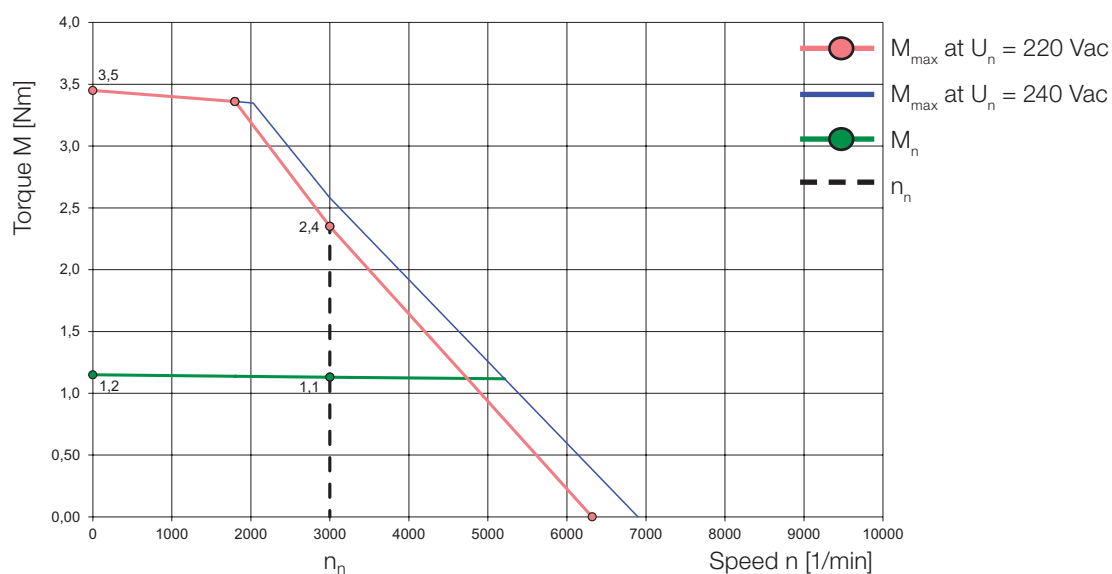
Explanations on the characteristics:

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

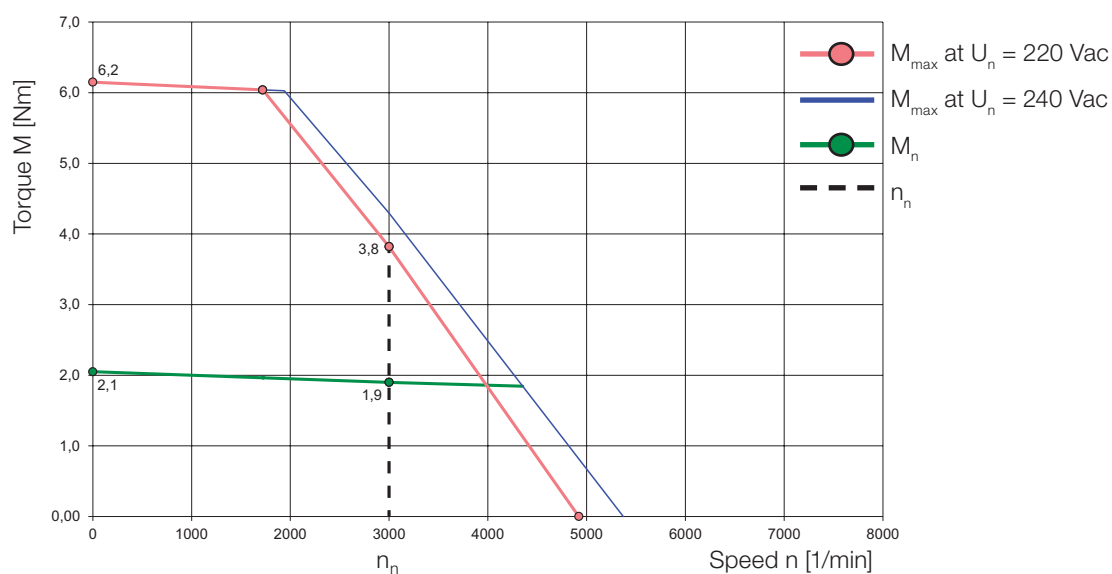
The characteristic M_n shows the thermally permissible rated torque.

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

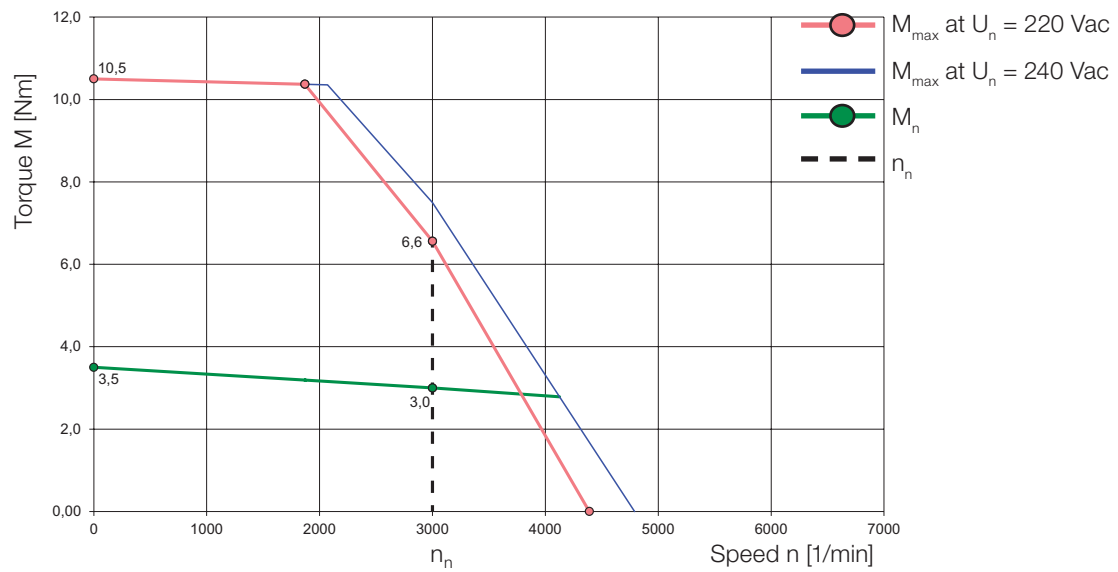
LSN-074-0115-30-320



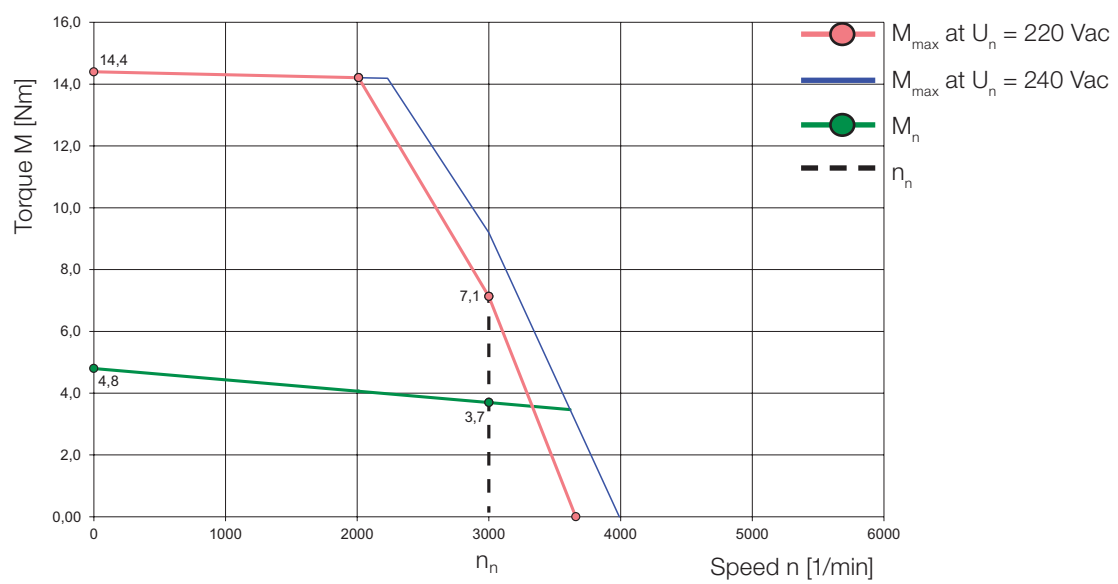
LSN-074-0205-30-320



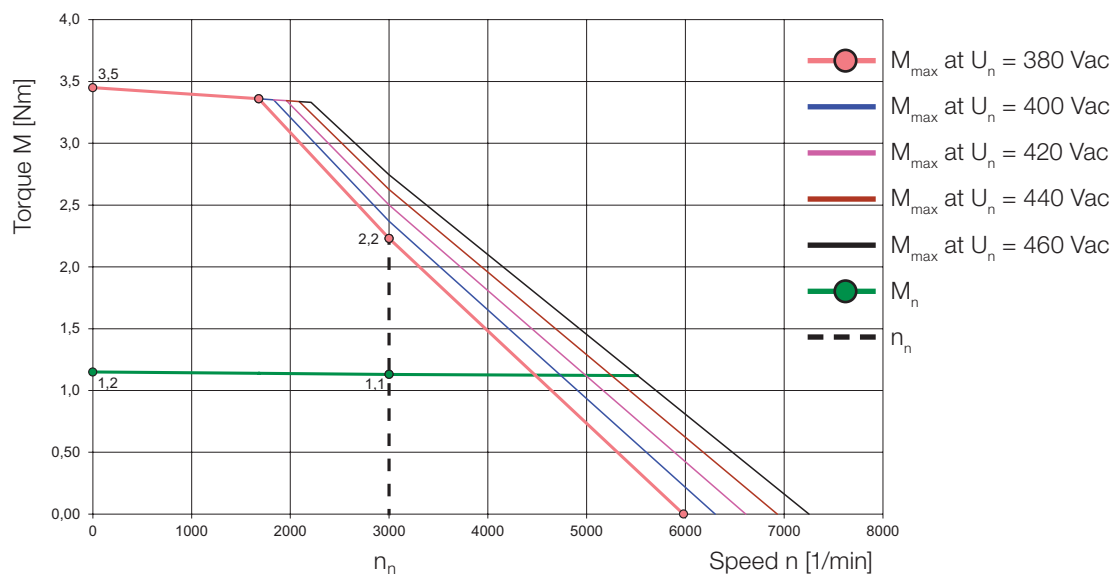
LSN-074-0350-30-320



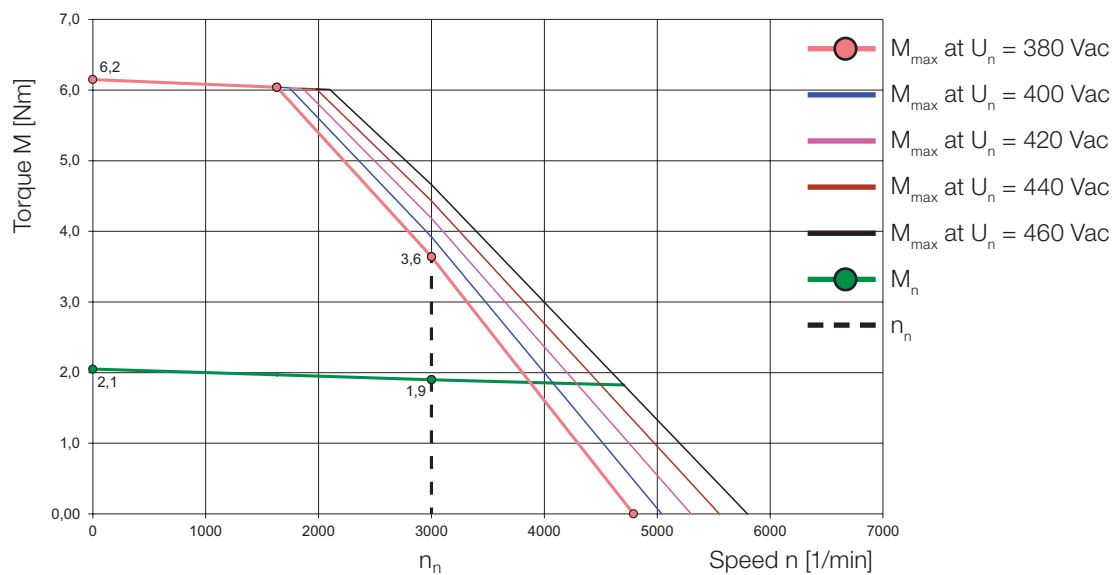
LSN-074-0480-30-320



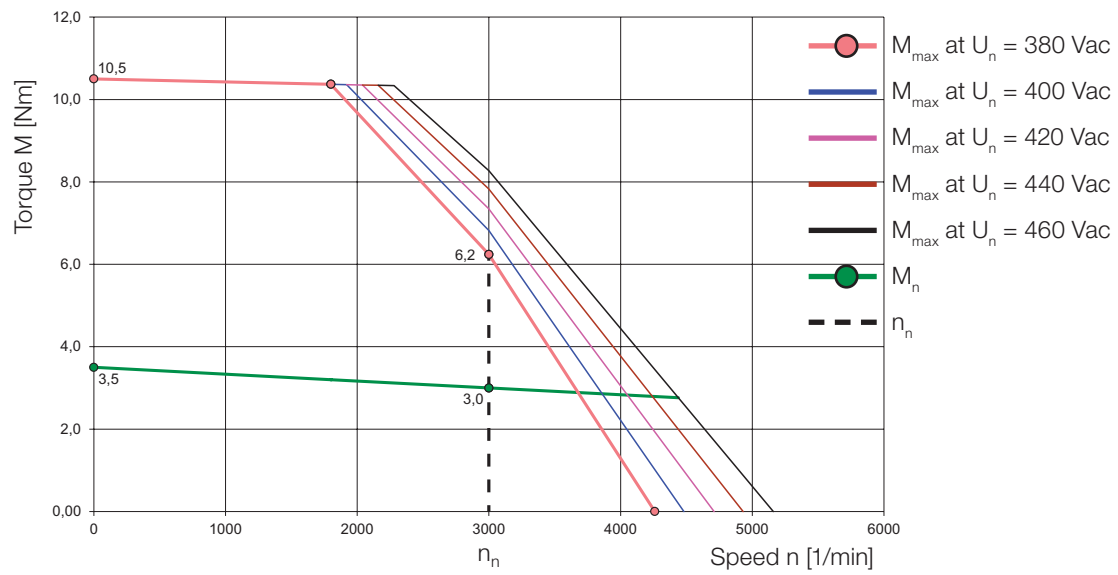
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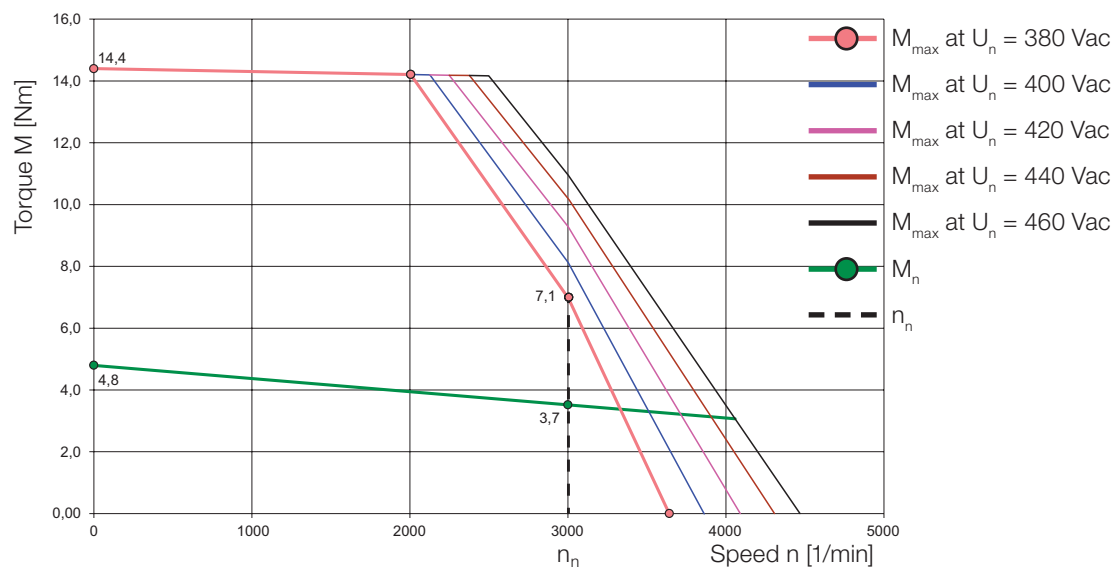
LSN-074-0205-30-560



LSN-074-0350-30-560



LSN-074-0480-30-560



Motor type: LSN-097 ($U_{dc} = 320 + 560 \text{ VDC}$)



LSN-097 -0510
-0750
-0960
-1130

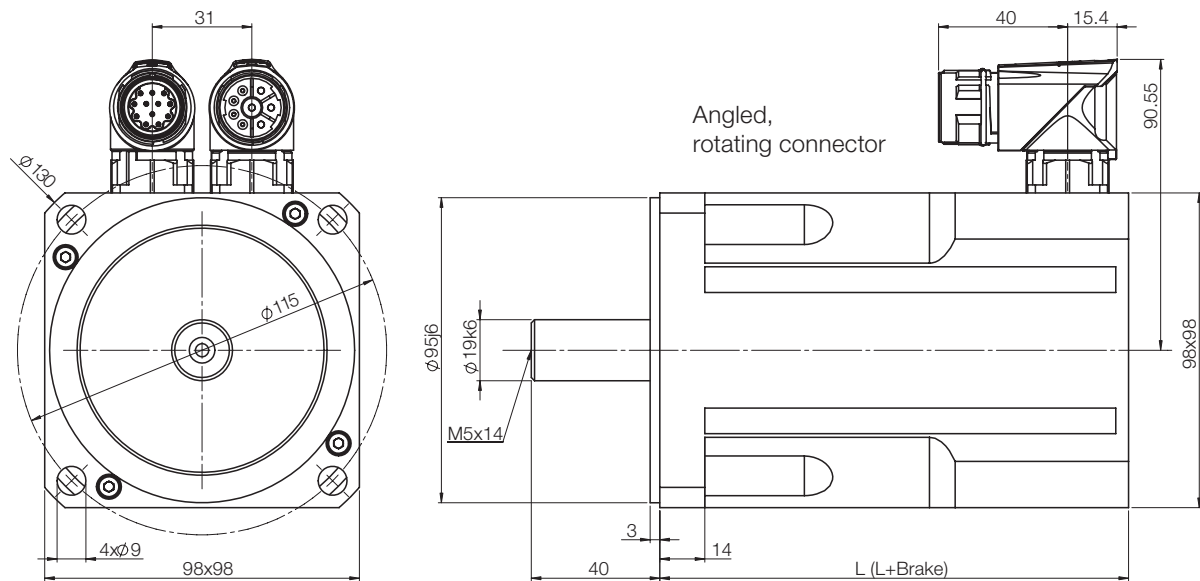
Technical data ¹⁾	Abbrev.	Unit	LSN-097-0510	LSN-097-0750	LSN-097-0960	LSN-097-1130
Rated speed	n_n	min^{-1}	3000			
Rated frequency	f_N	Hz	250			
DC link voltage (controller)	U_{dc}	V	320 / 560			
Rated voltage	U_n	V	155 / 276	162 / 277	161 / 289	172 / 266
Rated torque	M_n	Nm	4.20	6.10	7.70	8.80
Rated current	I_n	A	7.00 / 3.90	8.80 / 5.10	10.80 / 6.00	10.70 / 6.90
Power	P	kW	1.32	1.92	2.42	2.76
Stall torque	M_0	Nm	5.10	7.50	9.60	11.30
Stall current	I_0	A	6.8 / 3.8	8.9 / 5.2	10.7 / 6.0	11.0 / 7.1
Maximum permissible torque	M_{max}	Nm	15.3	22.5	28.8	34.0
Maximum permissible current	I_{max}	A	31.0 / 17.4	40.7 / 23.8	49.2 / 27.4	41.0 / 27.0
Maximum permissible speed	n_{max}	min^{-1}	9000	9000	9000	9000
EMF constant	K_E	$\text{V}/1000 \text{ min}^{-1}$	45.5 / 81.0	51.0 / 87.0	54.0 / 97.0	62.0 / 96.0
Torque constant	K_T	Nm/A	0.75 / 1.34	0.84 / 1.44	0.89 / 1.60	1.03 / 1.59
Winding resistance (2 phases)	R_{2ph}	Ω	1.24 / 4.00	0.79 / 2.29	0.62 / 2.00	0.61 / 1.49
Winding inductance (2 phases)	L_{2ph}	mH	6.8 / 21.7	4.8 / 13.5	3.6 / 11.9	3.8 / 9.1
No load speed	n_0	min^{-1}	4800 / 4650	4300 / 4350	4060 / 3910	3540 / 3950
Electrical time constant	T_{el}	ms	5.5	6.1 / 5.9	5.8 / 6.0	6.2 / 6.1
Thermal time constant	T_{th}	min	25	30	35	40
Moment of inertia of rotor	J	kgm^2	0.000204	0.000326	0.000449	0.000570
Mass	m	kg	3.80	5.10	6.40	7.70
Brake (optional)						
Rated voltage	U_N	V	$24 \pm 10 \%$			
Rated current at 20 °C for releasing	I_N	A	0.75			
Permissible maximum speed	n_{max}	min^{-1}	10,000			
Permissible friction work	W_R	Ws	0.89×10^6			
Moment of inertia	J_B	kgm^2	0.000054			
Mass	m	kg	0.82			
Braking torque	M_H	Nm	9.00			

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

Dimensional sketch and technical data

Rotary encoder option	Length [mm]	LSN-097-0510	LSN-097-0750	LSN-097-0960	LSN-097-1130
xR	L (L + brake)	113 (154)	143 (184)	173 (214)	203 (244)
G6.1x + G7.1x	L (L + brake)	135 (184)	165 (214)	195 (244)	225 (274)
G6.2x + G7.2x	L (L + brake)	132 (182.5)	162 (212.5)	192 (242.5)	222 (272.5)
G6.3x	L (L + brake)	113 (158)	143 (188)	173 (218)	203 (248)
G7.3x	L (L + brake)	128 (158)	158 (188)	188 (218)	218 (248)

2.11 Overview of the motor lengths – for overview of the encoder types see chapter 5.1; all data in [mm]



Characteristics

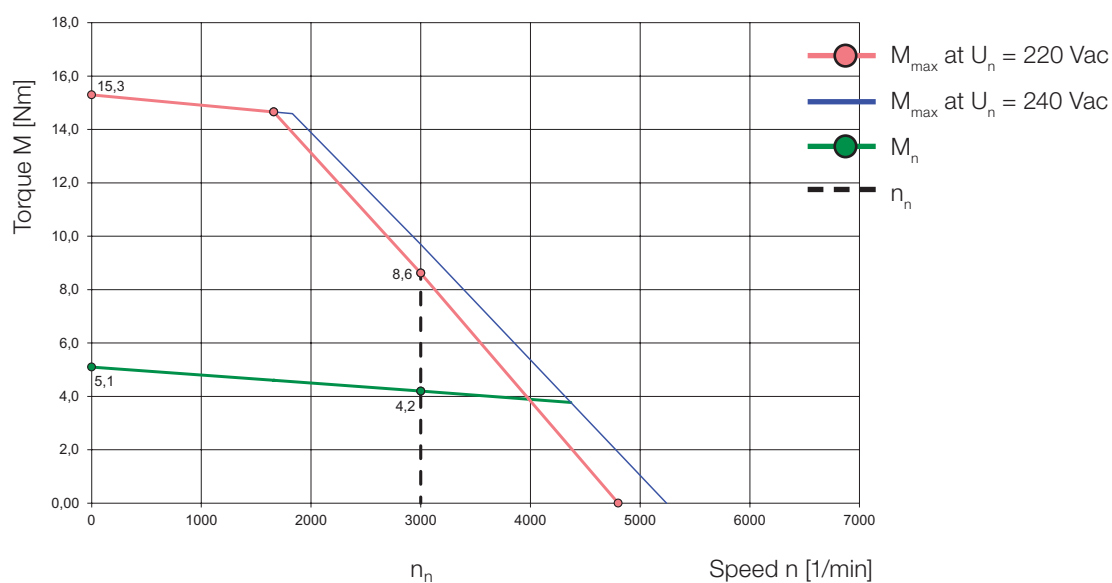
Explanations on the characteristics:

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

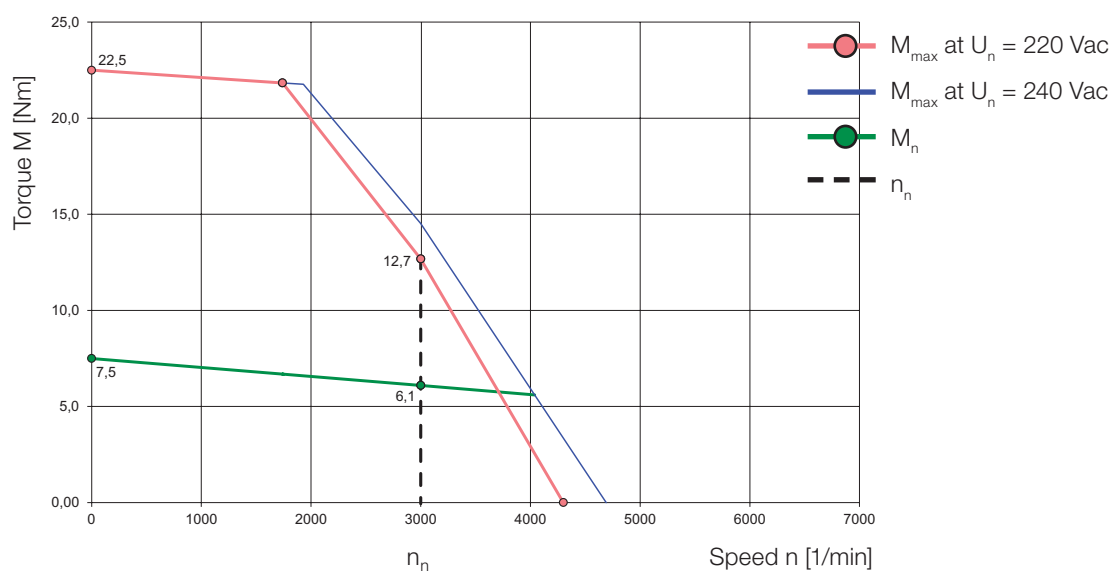
The characteristic M_n shows the thermally permissible rated torque.

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

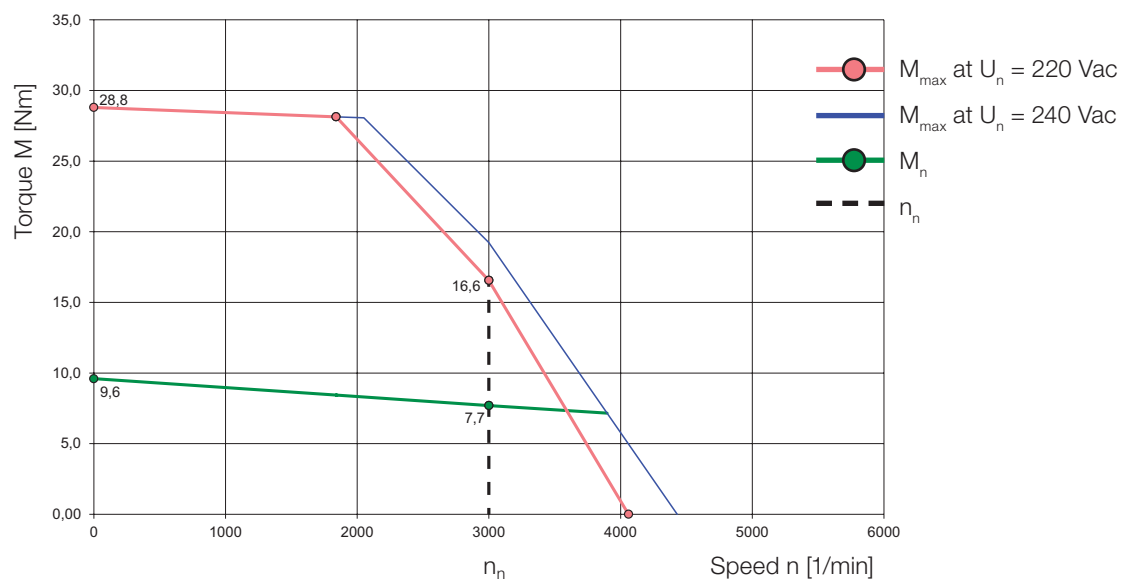
LSN-097-0510-30-320



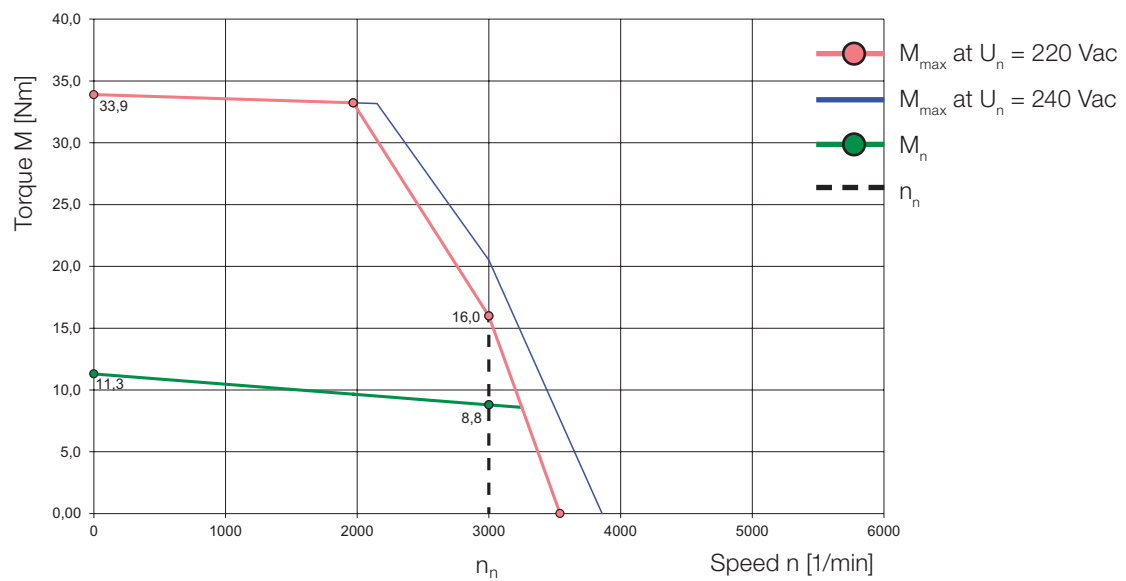
LSN-097-0750-30-320



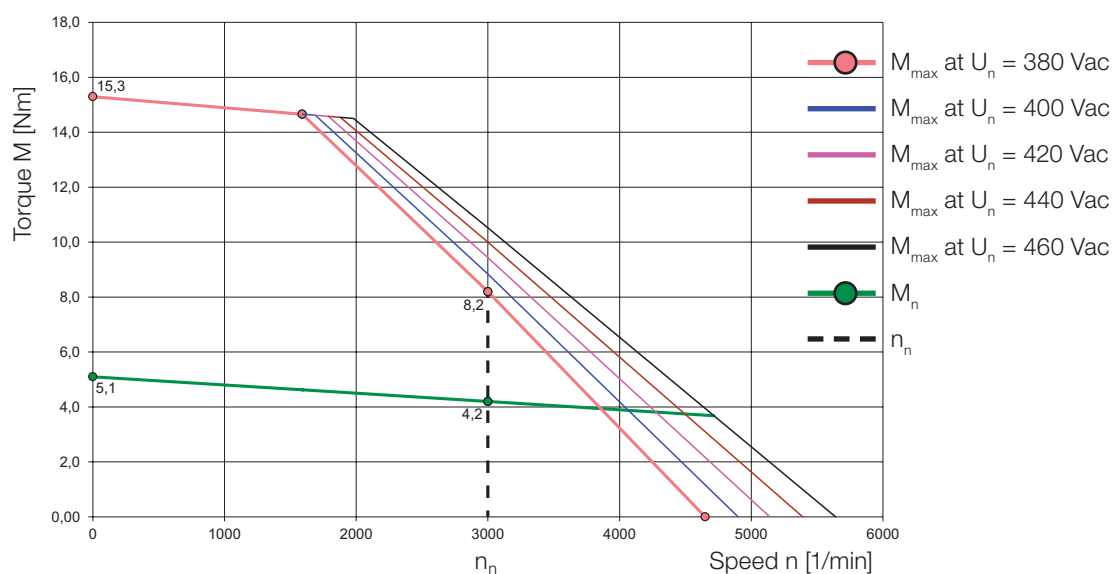
LSN-097-0960-30-320



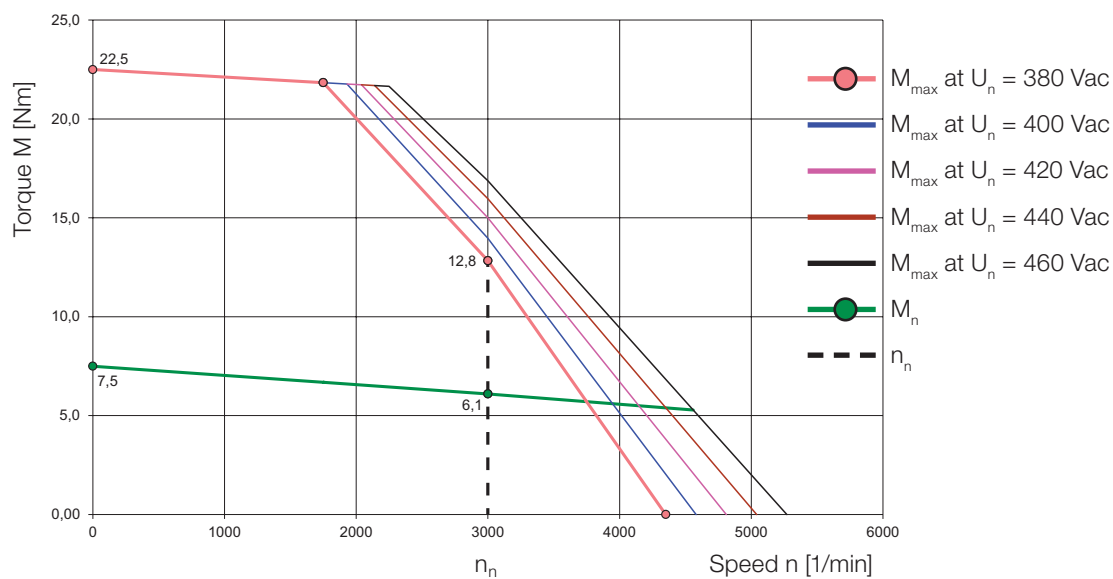
LSN-097-1130-30-320



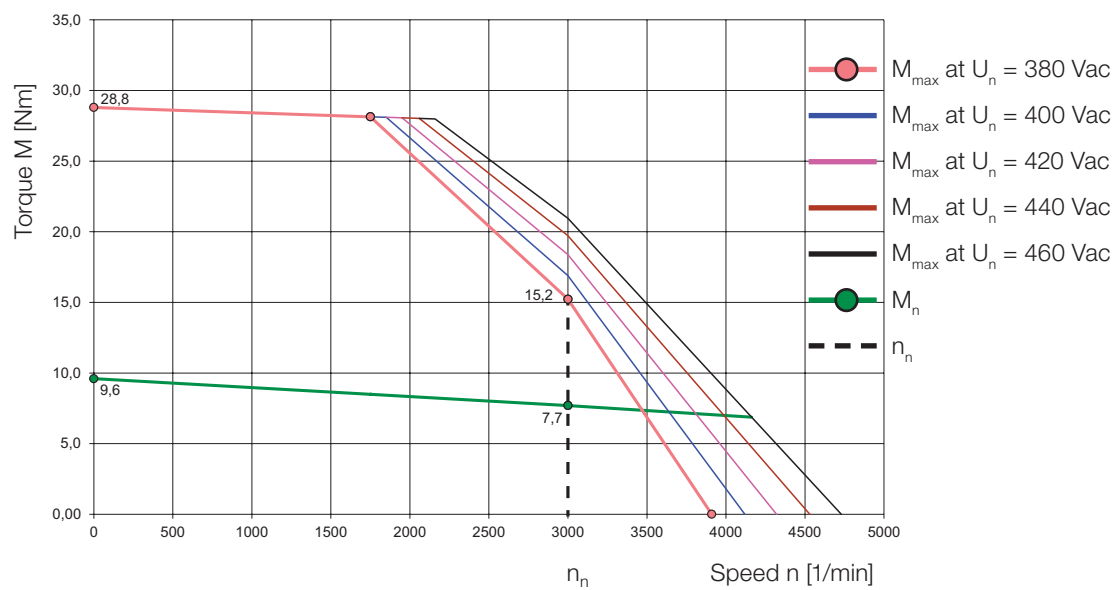
LSN-097-0510-30-560



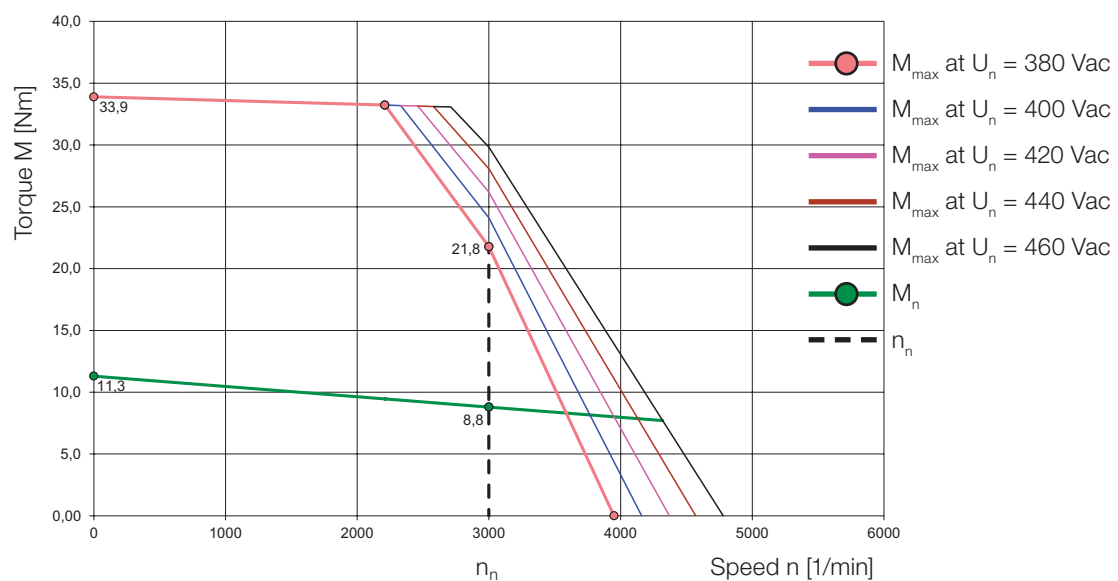
LSN-097-0750-30-560



LSN-097-0960-30-560



LSN-097-1130-30-560



Motor type: LSN-127 ($U_{dc} = 560$ VDC)



LSN-127 -1200
-1600
-2000
-2400

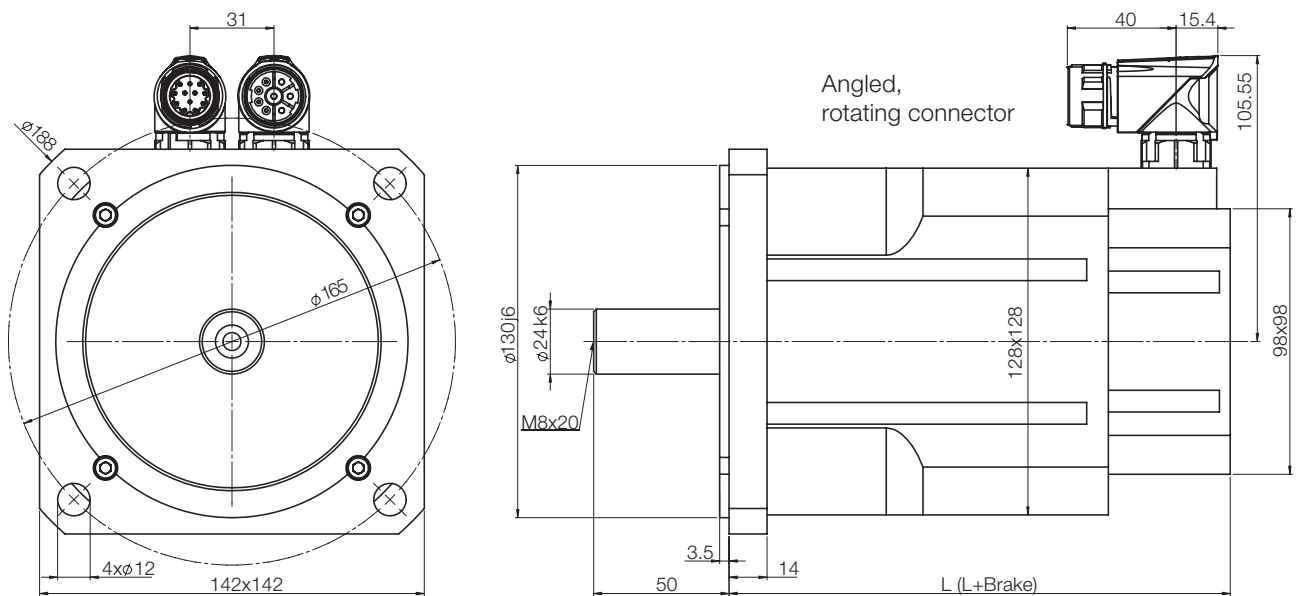
Technical data ¹⁾	Abbrev.	Unit	LSN-127-1200	LSN-127-1600	LSN-127-2000	LSN-127-2400
Rated speed	n_n	min^{-1}	3000			
Rated frequency	f_N	Hz	250			
DC link voltage (controller)	U_{dc}	V	560			
Rated voltage	U_n	V	291	296	297	296
Rated torque	M_n	Nm	10.50	13.80	16.00	20.00
Rated current	I_n	A	8.30	9.90	11.50	14.10
Power	P	kW	3.30	4.33	5.03	6.28
Stall torque	M_0	Nm	12.0	16.0	20.0	24.0
Stall current	I_0	A	8.0	10.1	11.6	13.8
Maximum permissible torque	M_{max}	Nm	36.0	48.0	60.0	72.0
Maximum permissible current	I_{max}	A	29.0	36.0	40.0	47.0
Maximum permissible speed	n_{max}	min^{-1}	9000			
EMF constant	K_E	$\text{V}/1000 \text{ min}^{-1}$	91.0	96.0	104.0	105.0
Torque constant	K_T	Nm/A	1.51	1.59	1.72	1.74
Winding resistance (2 phases)	R_{2ph}	Ω	1.33	0.88	0.72	0.56
Winding inductance (2 phases)	L_{2ph}	mH	10.9	7.5	6.3	4.9
No load speed	n_0	min^{-1}	4170	3950	3650	3650
Electrical time constant	T_{el}	ms	8.2	8.5	8.8	8.8
Thermal time constant	T_{th}	min	45	55	65	75
Moment of inertia of rotor	J	kgm^2	0.00096	0.00133	0.00171	0.00208
Mass	m	kg	7.50	9.50	11.5	13.5
Brake (optional)						
Rated voltage	U_N	V	$24 \pm 10 \%$			
Rated current at 20 °C for releasing	I_N	A	1.00			
Permissible maximum speed	n_{max}	min^{-1}	10,000			
Permissible friction work	W_R	Ws	1.29×10^6			
Moment of inertia	J_B	kgm^2	0.000166			
Mass	m	kg	1.1			
Braking torque	M_H	Nm	18.00			

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

Dimensional sketch and technical data

Rotary encoder option	Connector	Length [mm]	LSN-127-1200	LSN-127-1600	LSN-127-2000	LSN-127-2400
xR	M23	L (L + brake)	145 (181)	175 (211)	205 (241)	235 (271)
xR (S7)	M23	L (L + brake)	157 (193)	187 (223)	217 (253)	247 (283)
G6.1x + G7.1x	M23	L (L + brake)	160 (209)	190 (239)	220 (269)	250 (299)
G6.2x + G7.2x	M23	L (L + brake)	157 (260)	187 (236)	217 (266)	247 (296)
G6.3x	M23	L (L + brake)	145 (181)	175 (211)	205 (241)	235 (271)
G7.3x	M23	L (L + brake)	157 (197)	187 (227)	217 (257)	247 (287)
G6.3x + G7.3x (S7)	M23	L (L + brake)	157 (193)	187 (223)	217 (253)	247 (283)

2.12 Overview of the motor lengths – for overview of the encoder types see chapter 5.1; all data in [mm]



Characteristics

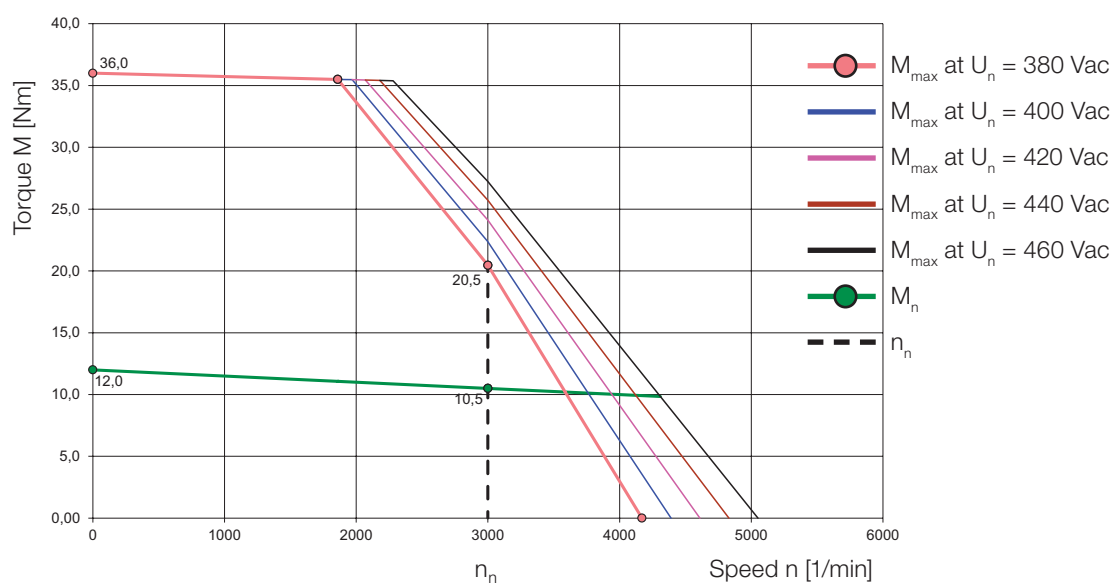
Explanations on the characteristics:

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

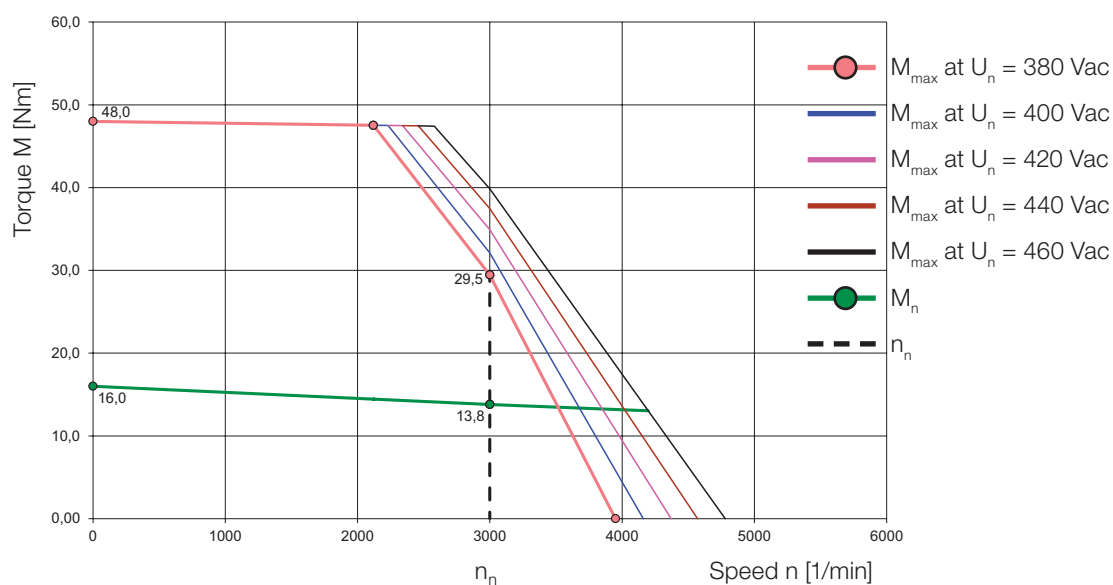
The characteristic M_n shows the thermally permissible rated torque.

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

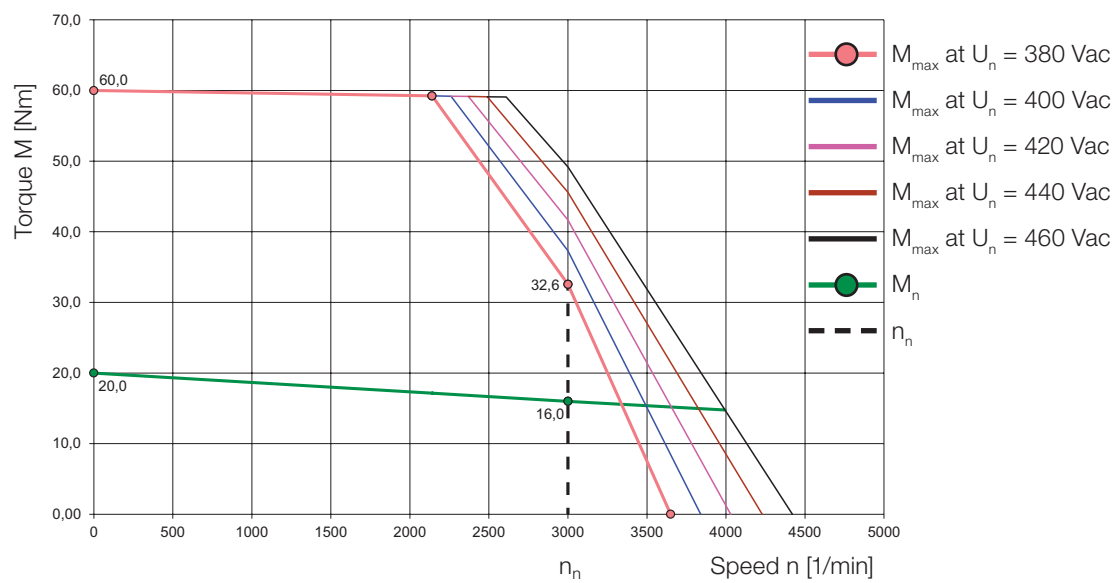
LSN-127-1200-30-560



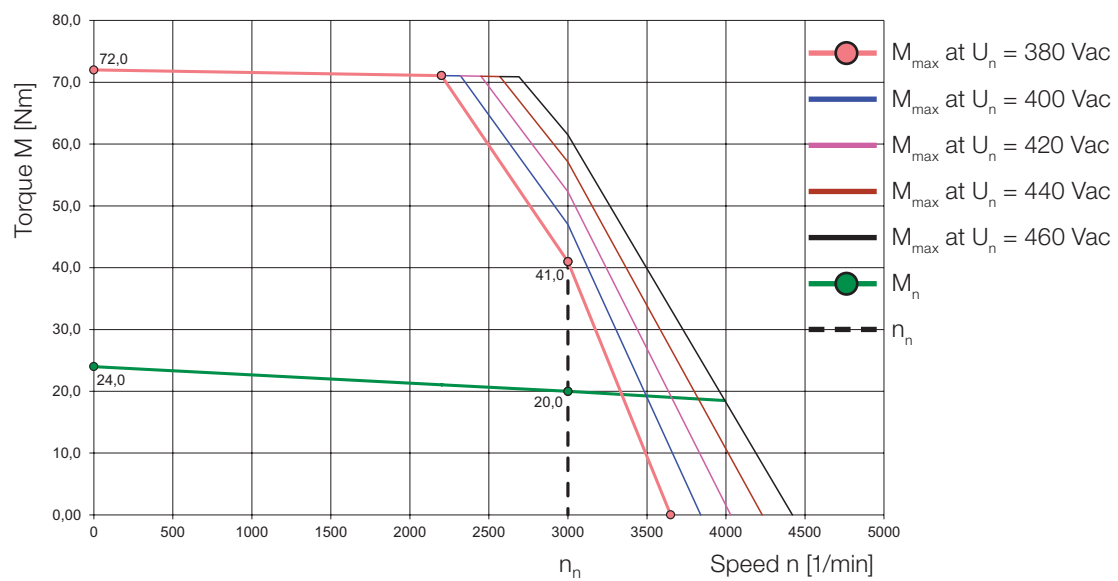
LSN-127-1600-30-560



LSN-127-2000-30-560



LSN-127-2400-30-560



Motor type: LSN-158 ($U_{dc} = 560 \text{ VDC}$)



LSN-158 -1800
-2400
-3000
-4400

Technical data ¹⁾	Abbrev.	Unit	LSN-158-1800	LSN-158-2400	LSN-158-3000	LSN-158-3800	LSN-158-4400
Rated speed	n_n	min^{-1}	2000 / 3000				
Rated frequency	f_N	Hz	166.67 / 250				
DC link voltage (controller)	U_{dc}	V	560				
Rated voltage	U_n	V	269 / 274	274 / 269	288 / 284	284 / 277	308 / 267
Rated torque	M_n	Nm	14.80 / 13.00	20.00 / 17.00	25.30 / 21.00	29.00 / 25.00	36.50 / 30.00
Rated current	I_n	A	8.60 / 11.00	10.70 / 13.80	12.90 / 16.20	15.00 / 19.70	17.30 / 24.40
Power	P	kW	3.01 / 4.08	4.19 / 5.34	5.30 / 6.60	6.07 / 7.85	7.64 / 9.42
Stall torque	M_0	Nm	18.0	24.0	30.0	38.0	44.0
Stall current	I_0	A	8.9 / 12.2	10.8 / 15.3	12.8 / 17.8	16.7 / 23.9	17.7 / 28.3
Maximum permissible torque	M_{max}	Nm	51.0	72.0	90.0	114.0	132.0
Maximum permissible current	I_{max}	A	33.0 / 45.0	42.0 / 60.0	46.0 / 64.0	64.0 / 93.0	64.0 / 102.0
Maximum permissible speed	n_{max}	min^{-1}	6000				
EMF constant	K_E	V/1000 min^{-1}	123.0 / 89.0	134.0 / 95.0	142.0 / 102.0	138.0 / 96.0	150.0 / 94.0
Torque constant	K_T	Nm/A	2.00 / 1.47	2.20 / 1.57	2.40 / 1.69	2.30 / 1.59	2.50 / 1.55
Winding resistance (2 phases)	R_{2ph}	Ω	1.19 / 0.62	0.81 / 0.41	0.63 / 0.33	0.52 / 0.25	0.49 / 0.19
Winding inductance (2 phases)	L_{2ph}	mH	13.7 / 7.2	10.8 / 5.5	9.2 / 4.7	7.2 / 3.5	7.0 / 2.8
No load speed	n_0	min^{-1}	3090 / 4260	2830 / 4000	5130 / 3720	2750 / 3950	2750 / 4040
Electrical time constant	T_{el}	ms	11.5 / 11.6	13.3 / 13.4	14.5 / 14.2	13.8 / 14.0	14.4 / 14.5
Thermal time constant	T_{th}	min	42	47	52	57	62
Moment of inertia of rotor	J	kgm^2	0.00185	0.00256	0.00327	0.00399	0.00470
Mass	m	kg	10.1	12.8	15.5	18.3	21.0

Brake (optional)

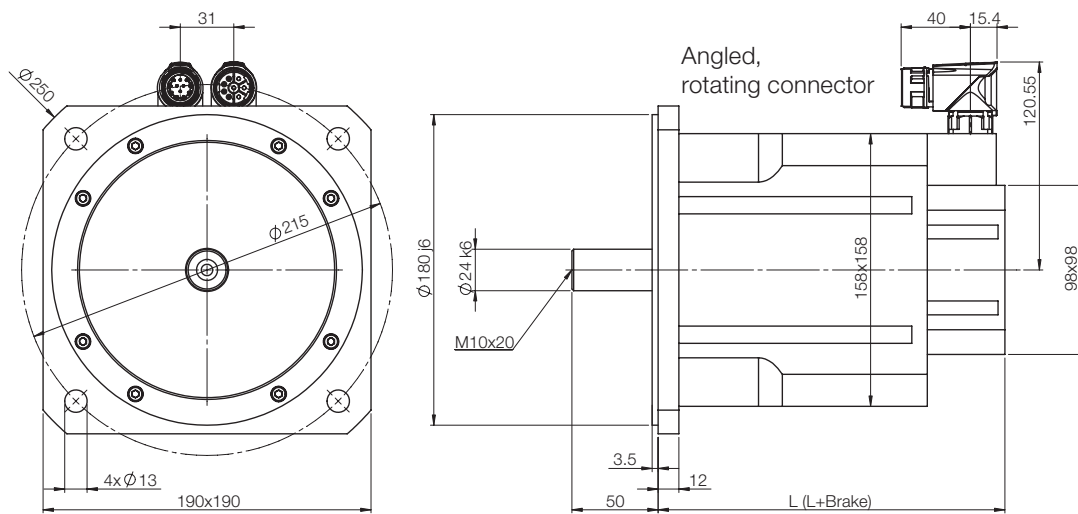
Rated voltage	U_N	V	$24 \pm 10 \%$				
Rated current at 20 °C for releasing	I_N	A	1.10				
Permissible maximum speed	n_{max}	min^{-1}	10,000				
Permissible friction work	W_R	Ws	2.90×10^6				
Moment of inertia	J_B	kgm^2	0.000556				
Mass	m	kg	3.1				
Braking torque	M_H	Nm	36.00				

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

Dimensional sketch and technical data

Rotary encoder Option	Connector	Length [mm]	LSN-158-1800	LSN-158-2400	LSN-158-3000	LSN-158-3800	LSN-158-4400
xR	M23/M40	L (L + brake)	158 (222) / 165 (229)	183 (247) / 190 (254)	208 (272) / 215 (279)	233(297) / 240(304)	258 (322) / 265 (329)
G6.1x + G7.1x	M23/M40	L (L + brake)	161 (225) / 168 (232)	186 (250) / 193 (257)	211 (275) / 218 (282)	236 (300) / 243 (307)	261 (325) / 268 (332)
G6.2x + G7.2x	M23/M40	L (L + brake)	158 (222) / 165 (229)	183 (247) / 190 (254)	208 (272) / 215 (279)	233 (297) / 240 (304)	258 (322) / 265 (329)
G6.3x + G7.3x	M23/M40	L (L + brake)	158 (222) / 165 (229)	183 (247) / 190 (254)	208 (272) / 215 (279)	233 (297) / 240 (304)	258 (322) / 265 (329)

2.13 Overview of the motor lengths – for overview of the encoder types see chapter 5.1; all data in [mm]



Characteristics

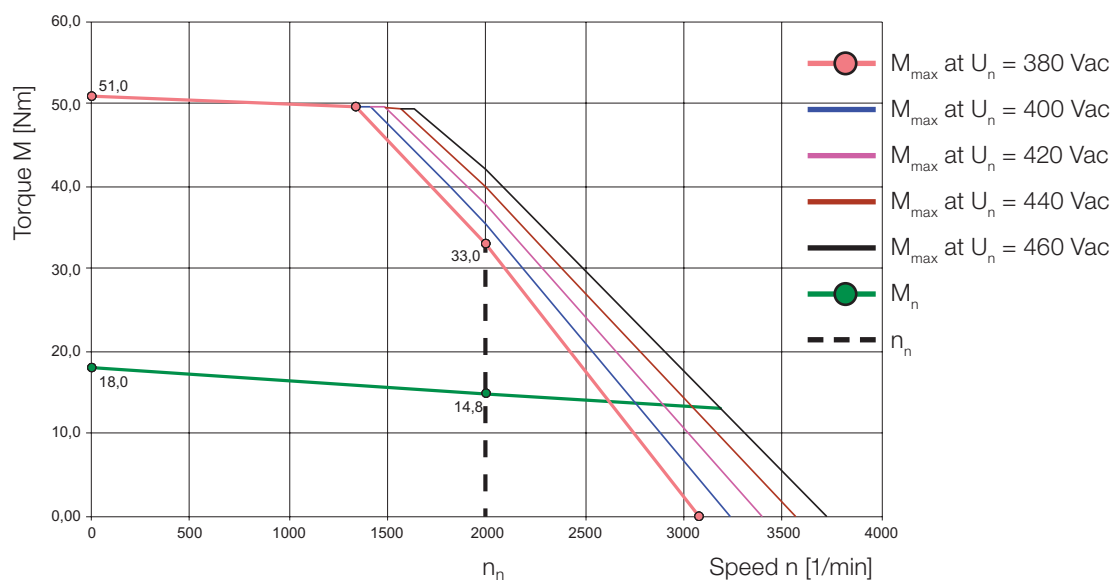
Explanations on the characteristics:

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

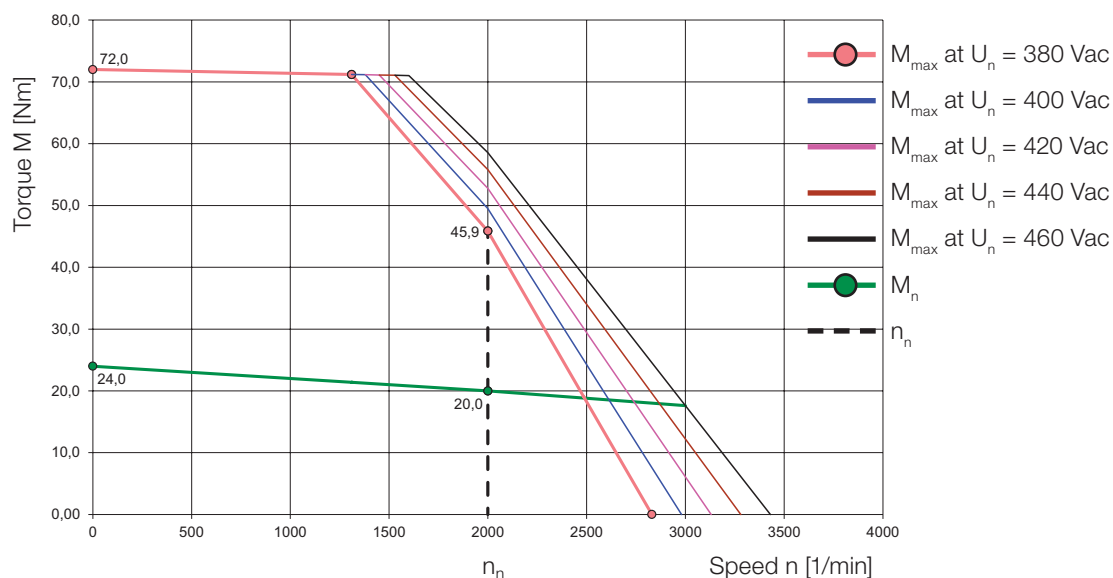
The characteristic M_n shows the thermally permissible rated torque.

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

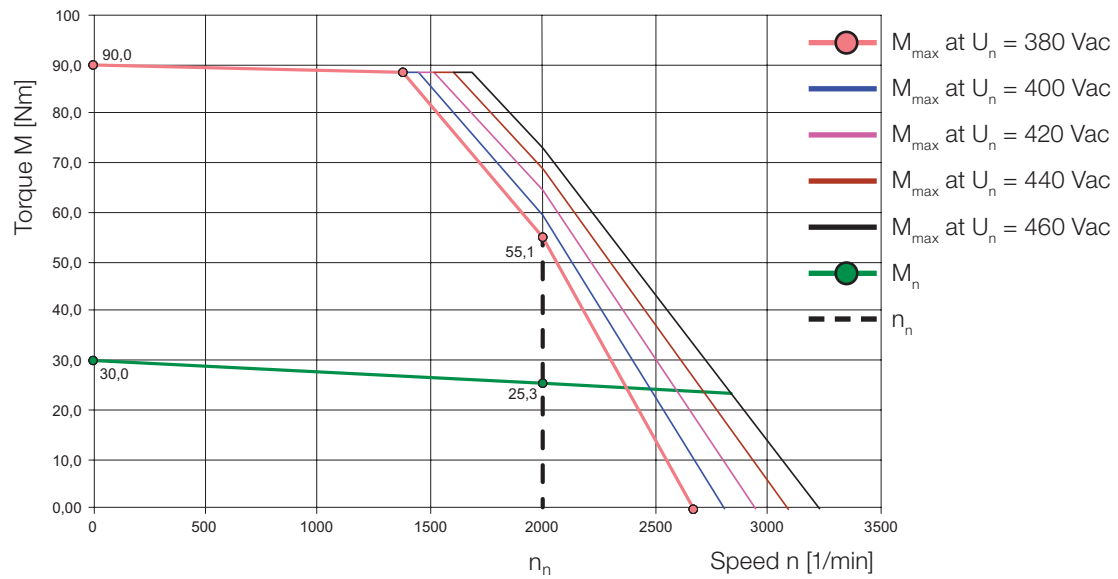
LSN-158-1800-20-560



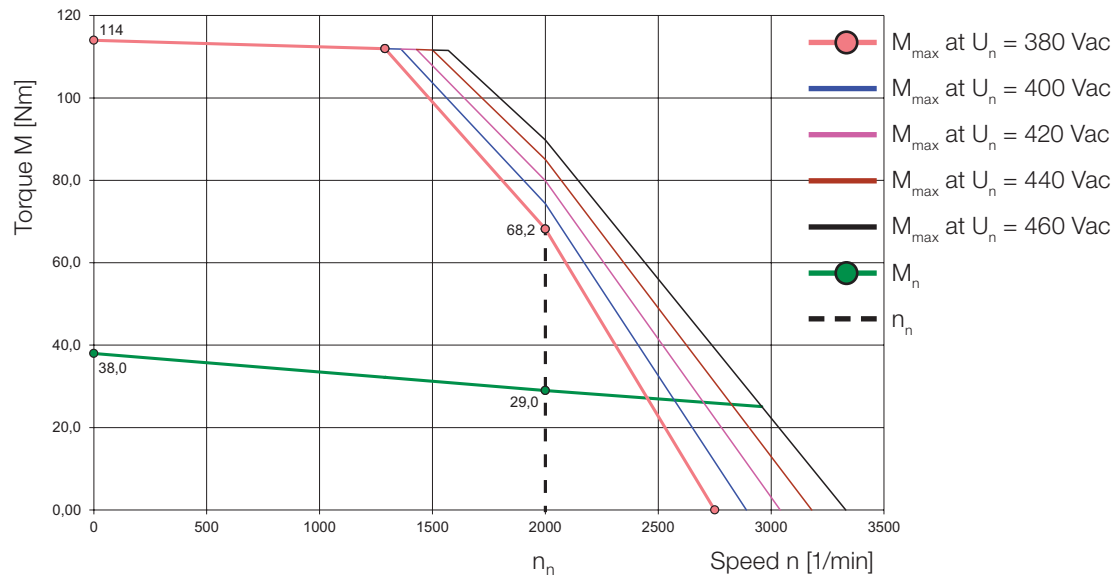
LSN-158-2400-20-560



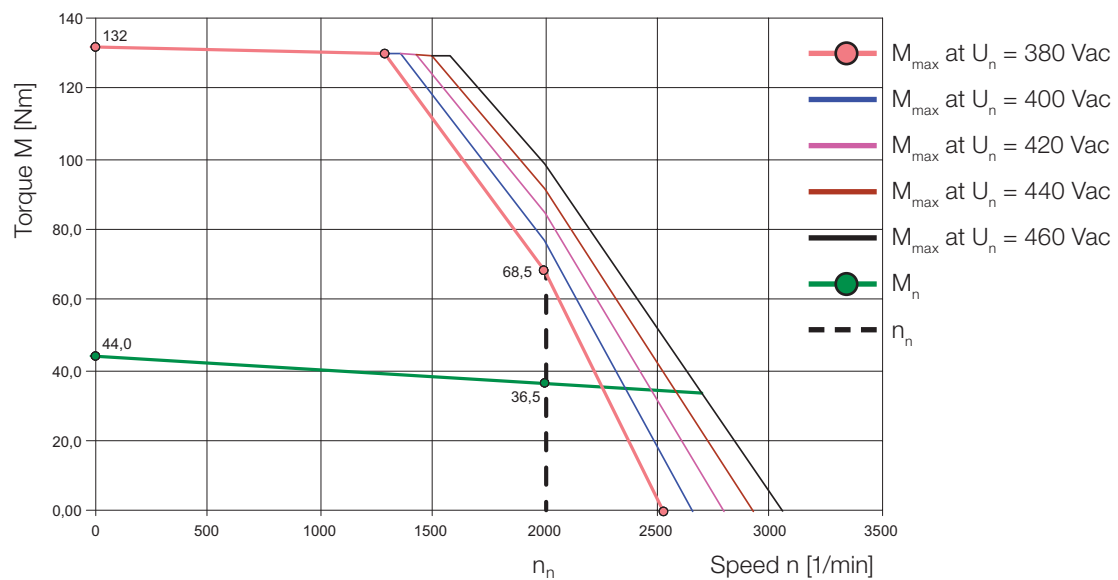
LSN-158-3000-20-560



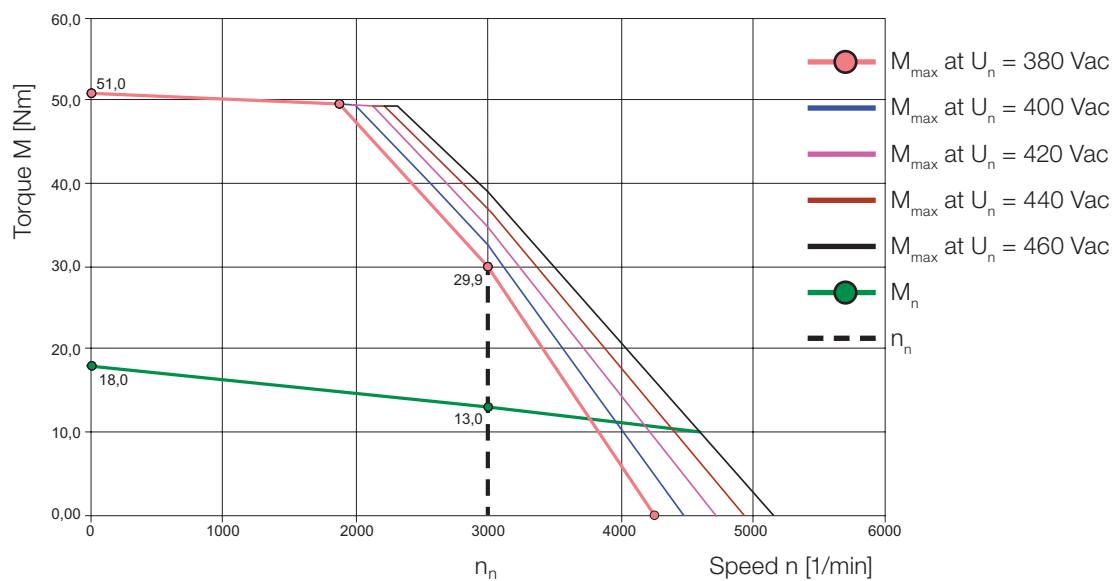
LSN-158-3800-20-560



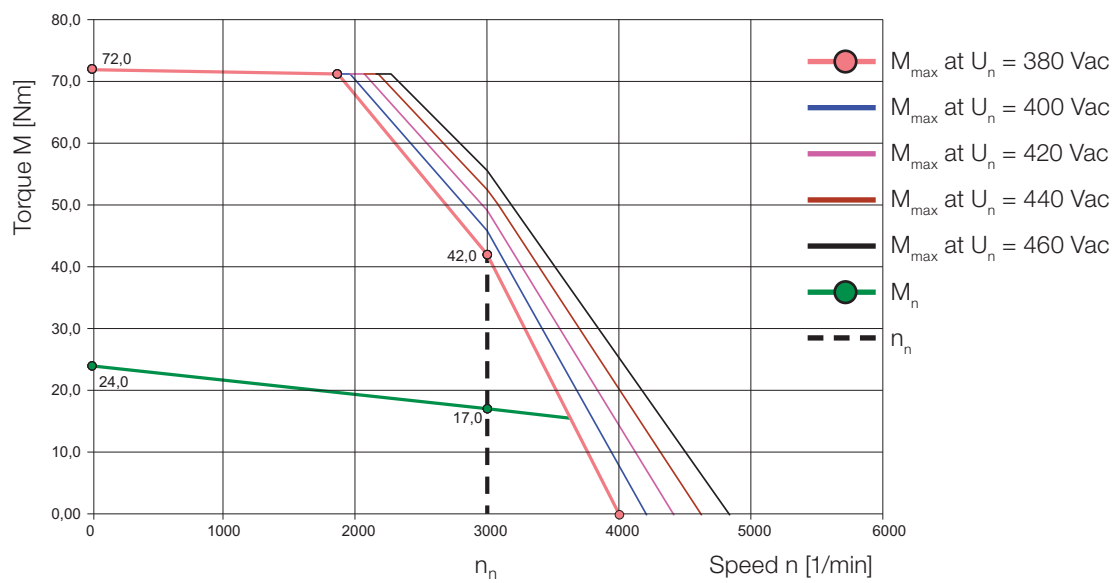
LSN-158-4400-20-560



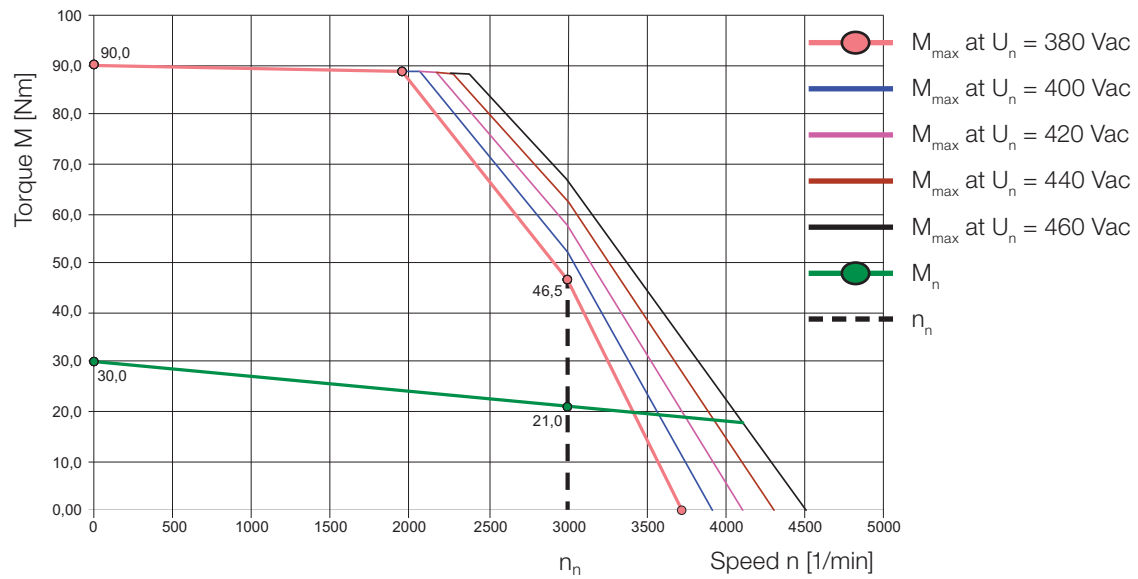
LSN-158-1800-30-560



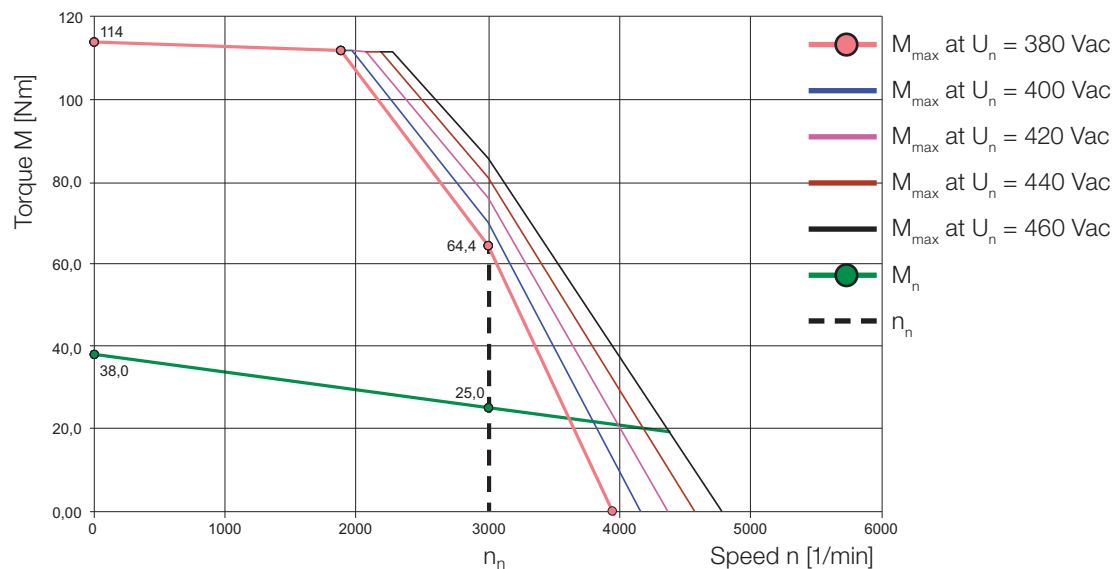
LSN-158-2400-30-560



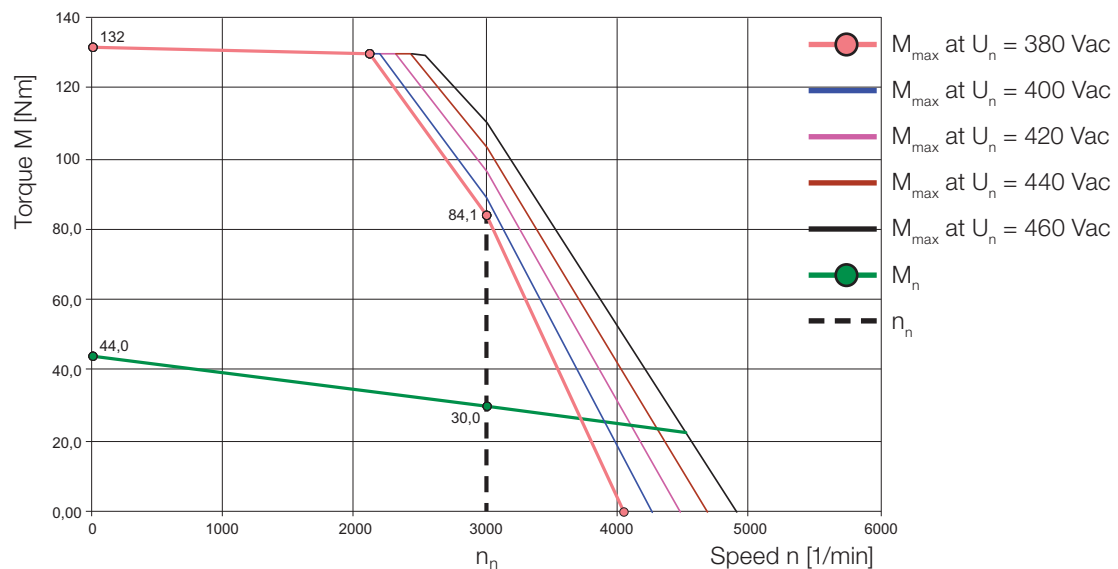
LSN-158-3000-30-560



LSN-158-3800-30-560



LSN-158-4400-30-560



Motor type: LSN-190 ($U_{dc} = 560$ VDC)



LSN-190 -3000
-4000
-5000
-6000

Technical data ¹⁾	Abbrev.	Unit	LSN-190-3000	LSN-190-4000	LSN-190-5000	LSN-190-6000
Rated speed	n_n	min^{-1}	2000 / 3000			1000 / 2500
Rated frequency	f_N	Hz	166.67 / 250			83.33 / 208.33
DC link voltage (controller)	U_{dc}	V	560			
Rated voltage	U_n	V	297 / 333	311 / 257	269 / 265	282 / 349
Rated torque	M_n	Nm	26.10 / 23.00	32.80 / 25.00	40.40 / 30.00	54.00 / 36.20
Rated current	I_n	A	13.20 / 15.50	15.40 / 20.10	21.80 / 24.40	14.60 / 20.70
Power	P	kW	5.47 / 7.23	6.87 / 7.85	8.46 / 9.42	5.65 / 9.48
Stall torque	M_0	Nm	30.0	40.0	50.0	60.0
Stall current	I_0	A	13.0 / 16.3	16.7 / 26.3	22.7 / 31.5	15.8 / 30.0
Maximum permissible torque	M_{max}	Nm	85.0	120.0	150.0	180.0
Maximum permissible current	I_{max}	A	46.0 / 58.0	59.0 / 90.0	79.0 / 109.0	51.0 / 102.0
Maximum permissible speed	n_{max}	min^{-1}	6000			
EMF constant	K_E	$\text{V}/1000 \text{ min}^{-1}$	139.0 / 111.0	145.0 / 92.0	133.0 / 96.0	241.0 / 121.0
Torque constant	K_T	Nm/A	2.30 / 1.84	2.40 / 1.52	2.20 / 1.59	4.00 / 2.00
Winding resistance (2 phases)	R_{2ph}	Ω	0.64 / 0.41	0.43 / 0.17	0.25 / 0.13	0.62 / 0.16
Winding inductance (2 phases)	L_{2ph}	mH	10.1 / 6.4	7.8 / 3.1	4.9 / 2.6	13.0 / 3.3
No load speed	n_0	min^{-1}	2730 / 3420	2620 / 4130	2850 / 3950	1570 / 3140
Electrical time constant	T_{el}	ms	15.8 / 15.6	18.1 / 18.2	19.6 / 20.0	21.0 / 21.0
Thermal time constant	T_{th}	min	80	90	100	108
Moment of inertia of rotor	J	kgm^2	0.00495	0.0069	0.0088	0.0107
Mass	m	kg	16.50	21.50	26.5	31.5

Brake (optional)

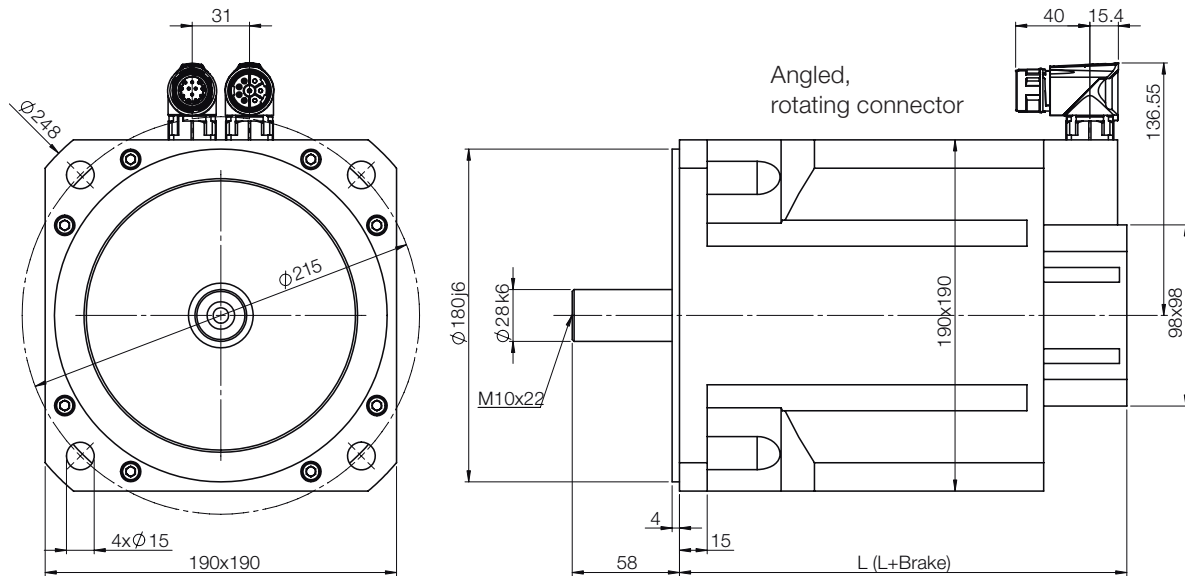
Rated voltage	U_N	V	$24 \pm 10 \%$			
Rated current at 20 °C for releasing	I_N	A	1.10			
Permissible maximum speed	n_{max}	min^{-1}	8,000			
Permissible friction work	W_R	Ws	6.20×10^6			
Moment of inertia	J_B	kgm^2	0.0016			
Mass	m	kg	3.6			
Braking torque	M_H	Nm	36.00 Nm			

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

Dimensional sketch and technical data

Rotary encoder option	Connector	Length [mm]	LSN-190-3000	LSN-190-4000	LSN-190-5000	LSN-190-6000
xR	M23/M40	L (L + brake)	181 (240) / 188 (247)	211 (270) / 218 (277)	241 (300) / 248 (307)	271 (330) / 278 (337)
G6.1x + G7.1x	M23/M40	L (L + brake)	184 / 191	214 / 221	244 / 251	274 / 281
G6.2x + G7.2x	M23/M40	L (L + brake)	181 (240) / 188 (247)	211 (270) / 218 (277)	241 (300) / 248 (307)	271 (330) / 278 (337)
G6.3x + G7.3x	M23/M40	L (L + brake)	181 (240) / 188 (247)	211 (270) / 218 (272)	241 (300) / 248 (307)	271 (330) / 278 (337)

2.14 Overview of the motor lengths – for overview of the encoder types see chapter 5.1; all data in [mm]



Characteristics

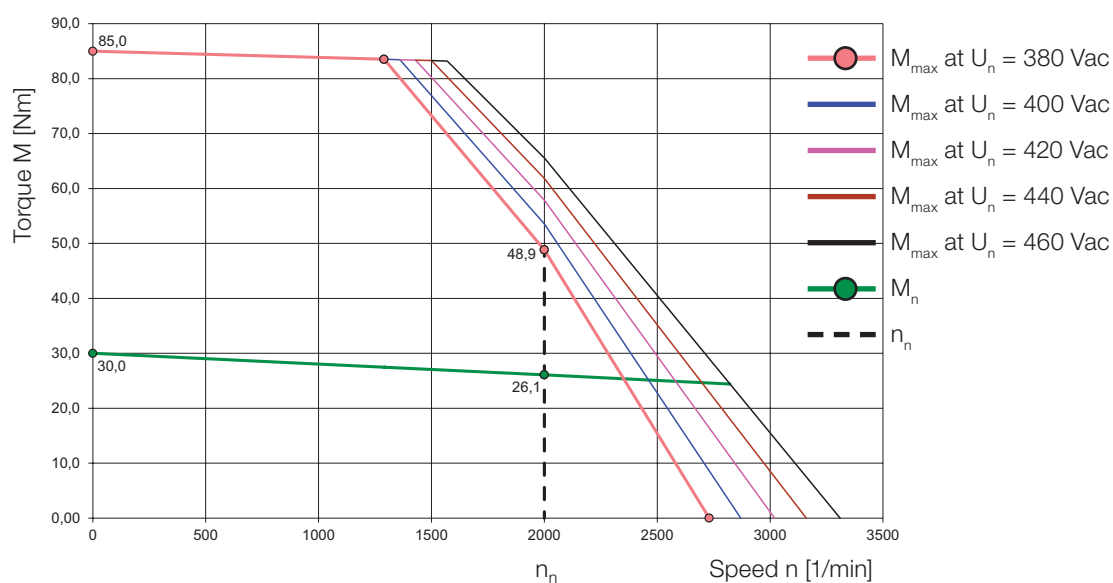
Explanations on the characteristics:

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

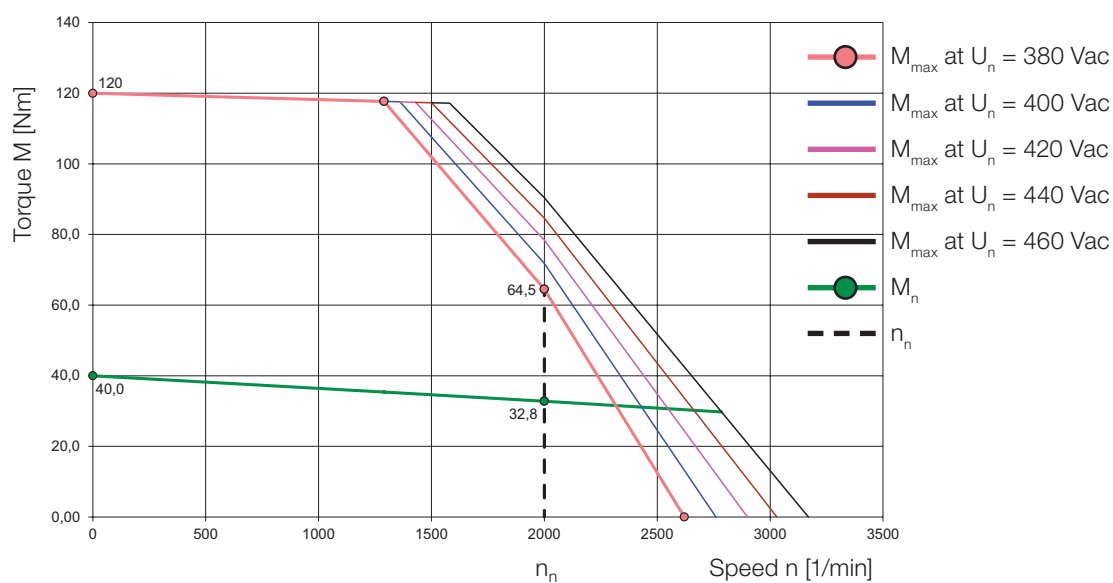
The characteristic M_n shows the thermally permissible rated torque.

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

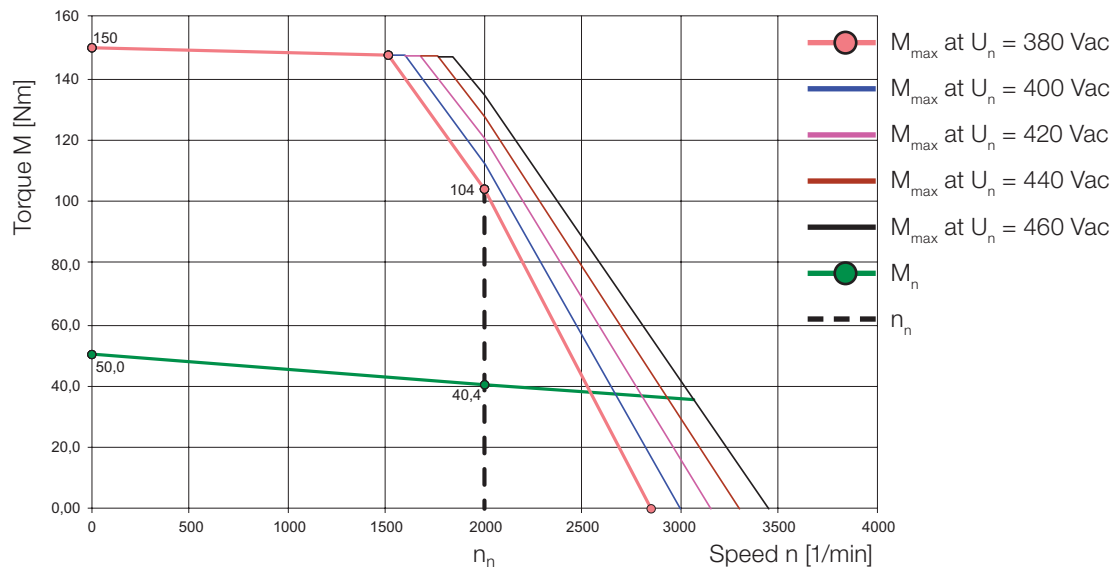
LSN-190-3000-20-560



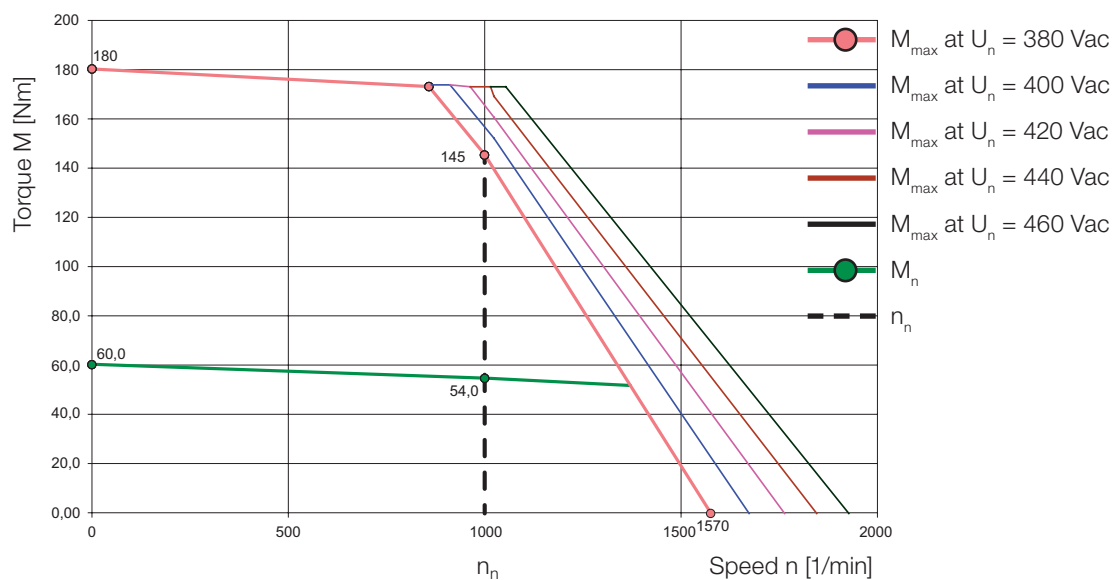
LSN-190-4000-20-560



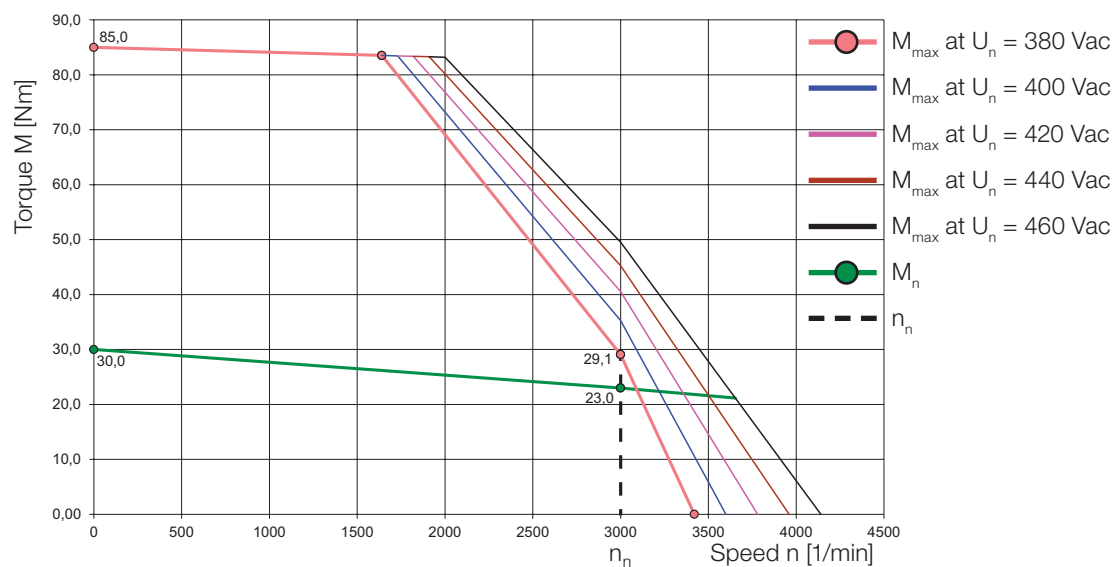
LSN-190-5000-20-560



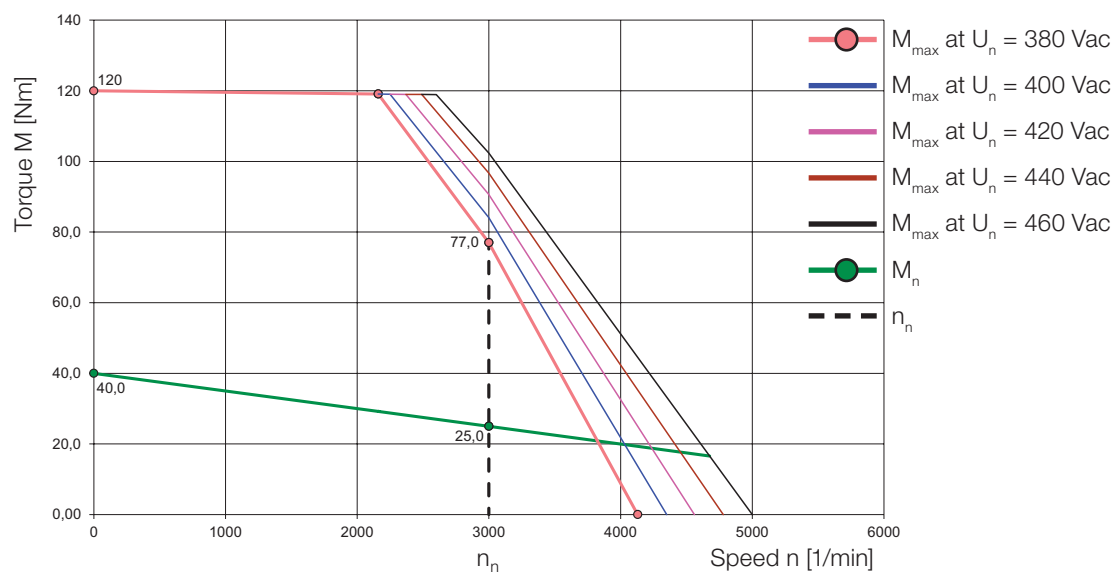
LSN-190-6000-10-560



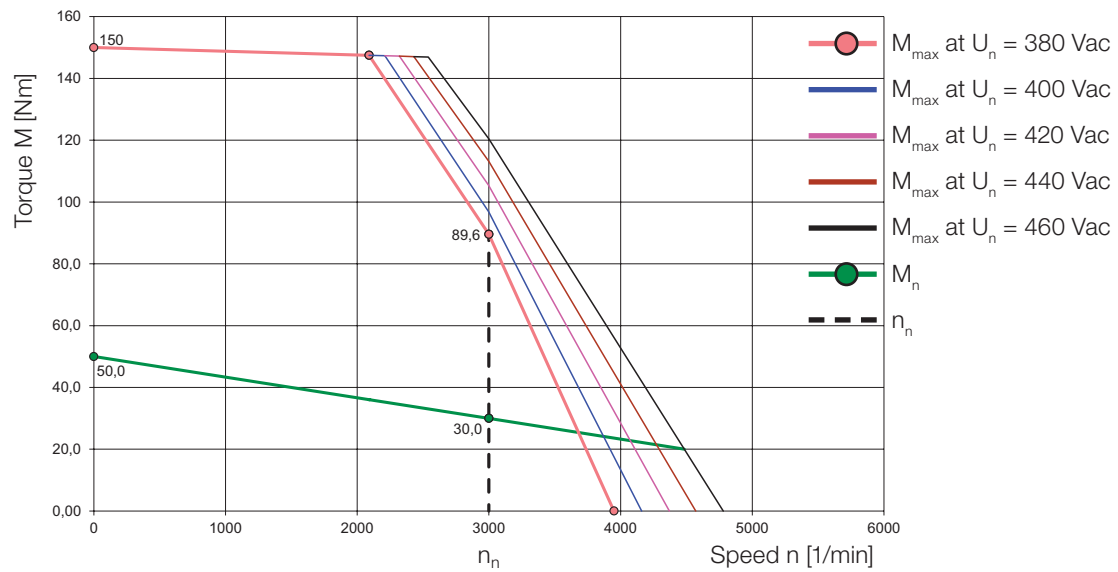
LSN-190-3000-30-560



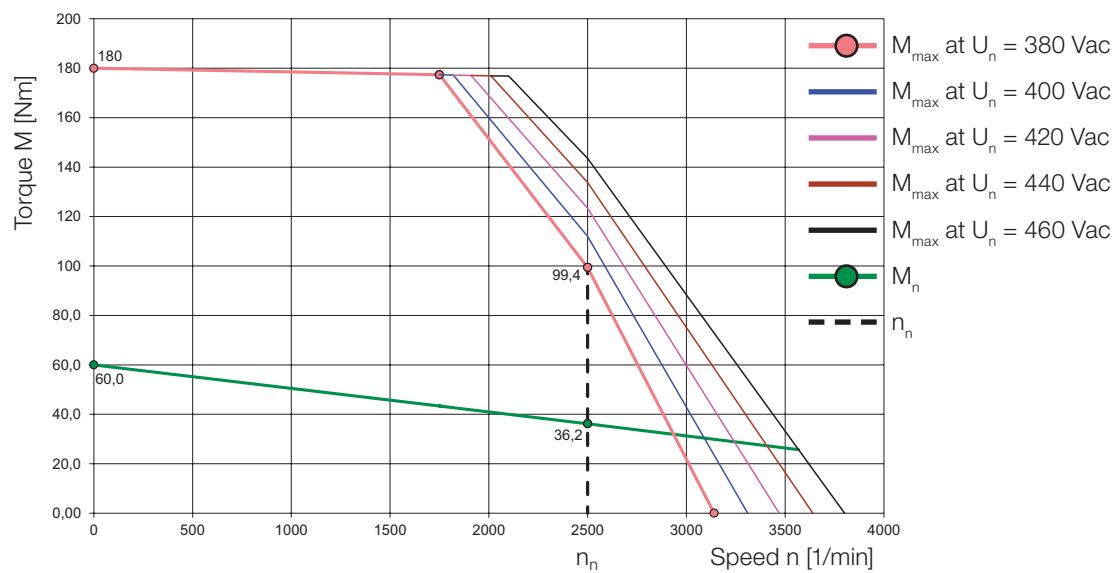
LSN-190-4000-30-560



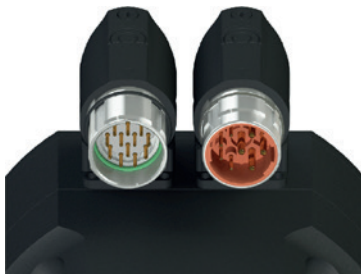
LSN-190-5000-30-560



LSN-190-6000-25-560



4 Connection system



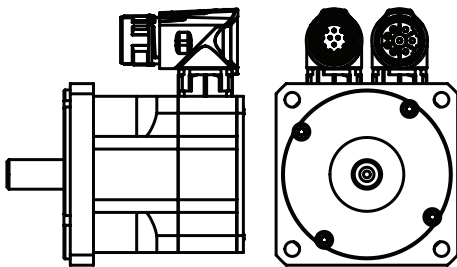
Example:

LSN-097-0510-30-560/T15,S4,G6.3S

Connector alignment

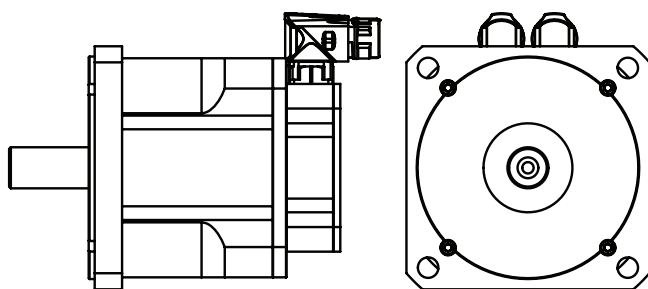
Encoder system option

S4 model



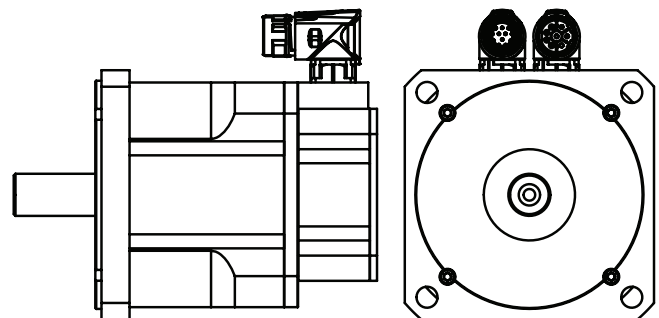
Connector, angled / rotating

S4 model



Connector, angled / rotating (limited by mechanical aspects)

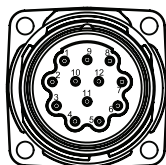
S7 model



Connector, angled / rotating (with raised body)

Encoder connections

Encoder connection M23 (resolver)

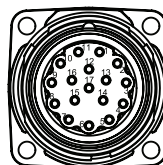


12-pin socket
contacts Ø 1 mm

Pin	Ident.	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

4.1 Encoder connection M23 (resolver)

Encoder connection M23 (optical encoder)



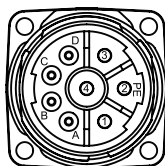
17-pin socket
contacts Ø 1 mm

Pin	Ident. G3, G5, G12.x	Ident. G6.x
1	A+	A+
2	A-	A-
3	B+	B+
4	B-	B-
7	GND / 0V	GND / 0V
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.

4.2 Encoder connection M23 (optical encoder)

Power connections

Power connection M23



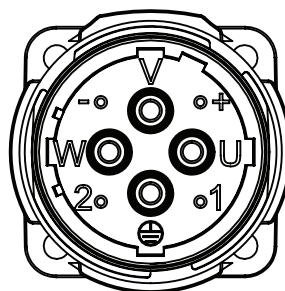
8-pin socket
contacts
for pin 1 ... 4 Ø 2 mm
for pin A ... D Ø 1 mm

Pin	Designation
1	U
2	PE
3	W
4	V
A	Brake +
B	Brake -
C	Hiperface DSL + / Temp +
D	Hiperface DSL - / Temp -

¹⁾ On motors with resolver, not used

4.3 Power connection M23

Power connection M40



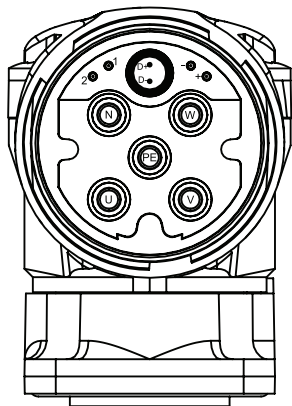
7-pin socket
contacts
for contact: 1, 2 Ø 1 mm
for contact: U, V, W +, - Ø
x mm
for contact: +, - Ø x mm

Pin	Designation
U	Phase U
V	Phase V
W	Phase W
PE	Protective earth conductor/earth
1	Temp +
2	Temp -
+	Brake +
-	Brake -

4.4 Power connection M40

Hybrid connections (power and encoder)

Hybrid connection I40



9-pin socket contacts
for contact 1, 2 $\varnothing$ 2 mm
for contact N ... W $\varnothing$ x mm

Pin	Ident.
U	Phase U
V	Phase V
W	Phase W
PE	Protective earth conductor
D+	Hiperface DSL + / Temp +
D-	Hiperface DSL - / Temp -
+	Brake +
-	Brake -
N, 1, 2	n.c.

4.5 Hybrid connection I40 Hiperface DSL

Hybrid connection I17



9-pin socket contacts
for contact: 1 ... 5 $\varnothing$ 1 mm
for contact: PE $\varnothing$ x mm
for contact: A ... C $\varnothing$ x mm

Pin	Ident.
A	Phase U
B	Phase V
C	Phase W
PE	Protective earth conductor
1	Hiperface DSL + / Temp +
2	Hiperface DSL - / Temp -
3	Brake +
4	Brake -
5	n.c.

4.6 Hybrid connection I17 Hiperface DSL

Space for notes

5 Servomotor accessories

**NOTE:**

For data on the encoder and motor cables, refer to the cable catalogue ID no. 0966.04B.0-00.

6 Appendix

Holding brake

The backlash-free, permanently excited, single-face holding brake operates based on the closed circuit principle; this means that power needs to be applied to the brake to release it.

For optimal holding torque and the lowest possible torsional backlash, the holding brake on all LSx motors is attached directly behind the flange (on the D-end).

The holding brake is, in principle, switched on and off at standstill. On the usage of the holding brake as an emergency stop brake, attention must be paid to the maximum permissible friction work (W_R).

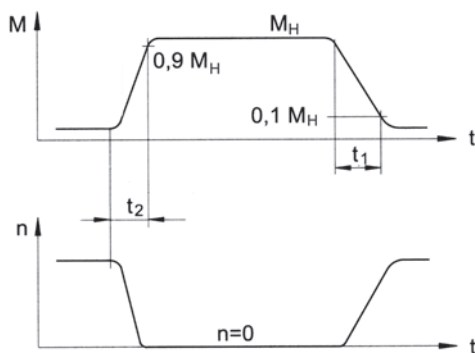


NOTE: On the operation of the brake as an emergency stop brake, the braking torque can be significantly lower than the holding torque.

Response times of holding brakes

Extremely short overrun is achieved with switching on the DC-side between the rectifier and coil.

For drives that require precise braking, in particular drives for hoists, DC-side switching of the brake is necessary.



Letter	Meaning
M	Braking torque
M_H	Holding torque of the spring-operated brake
N	Speed
t	Time
t_1	Switch-on time
t_2	Switch-off time

Technical data for holding brake

Letter	Meaning
t_1	Switch-on time
t_2	Switch-off time
M_H	Holding torque or also friction torque of the spring-operated brake (break-away torque)
I_N	Excitation current at 20 °C for releasing
U_N	DC voltage for releasing

Letter	Meaning
$n_{\max}$	Maximum speed (unbraked)
m	Mass (weight)
W_R	Permissible friction work up to 0.1 mm abrasion (for emergency stop)
J_B	Moment of inertia of the holding brake

Size	t_1 [ms]	t_2 [ms]	M_H [Nm]	I_N [A] at 24 V	U_N [V]	$n_{\max}$ [min ⁻¹]	m [kg]	W_R [10 ⁶ Ws]	J_B [kgcm ²]
LSN-050	6	25	2.0	0.46	24 V ± 10 %	10,000	0.15	0.41	0.07
LSN-074	7	35	4.5	0.5	24 V ± 10 %	10,000	0.3	0.58	0.18
LSN-097	7	40	9.0	0.75	24 V ± 10 %	10,000	0.82	0.89	0.54
LSN-127	10	50	18.0	1.0	24 V ± 10 %	10,000	1.8	1.29	1.66
LSN-158	22	90	36	1.1	24 V ± 10 %	10,000	2.85	2.90	5.56
LSN-190	22	90	36	1.1	24 V ± 10 %	8,000	3.25	2.9	6.2

6.7 Technical data for holding brake

**NOTE:**

The values **m** and **J_B** are purely brake data. The mass and moment of inertia of the motor shaft are not taken into account.

Subject to technical change without notice.

The content of our order catalogue was compiled with the greatest care and attention, and based on the latest information available to us.

We should nevertheless point out that this document cannot always be updated simultaneously with the on-going technical development of our products.

Information and specifications may be subject to change at any time. For information on the latest version please visit www.lti-motion.com.

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