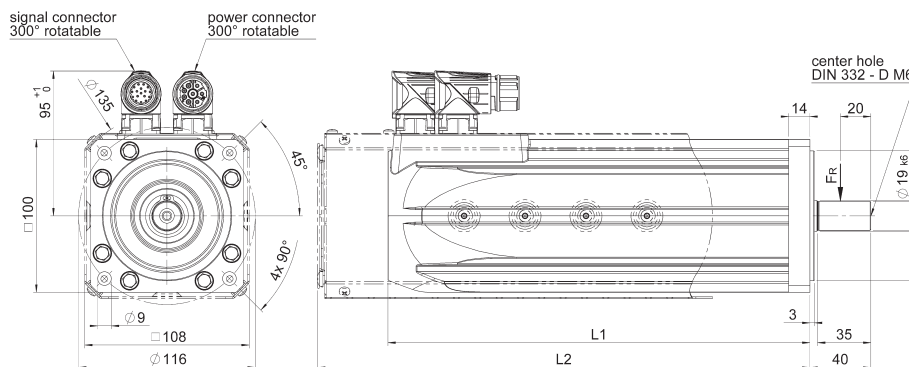
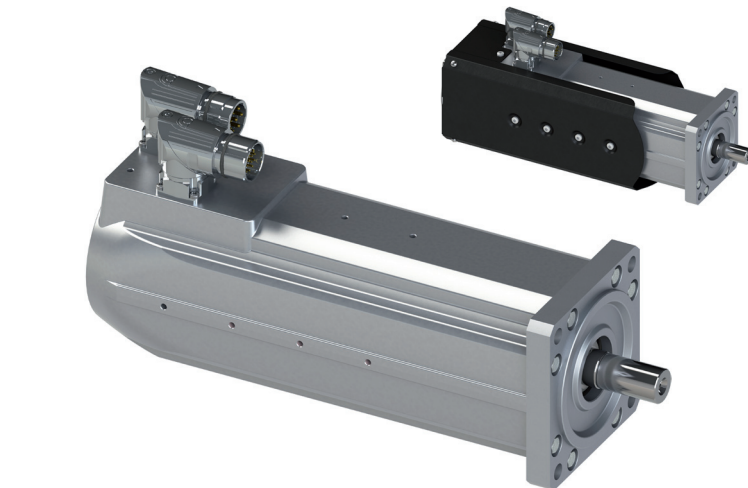


HBR 48

High-Power Synchronous Servo Motors

with permanent magnetic field

Motor series HBR 48
up to 3690 Watts output power
with different angle encoder systems
with or without parking brake
with or without forced ventilation

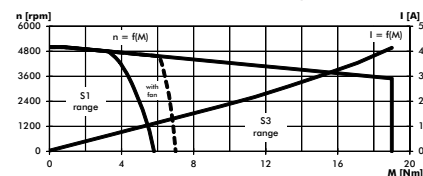


Motor type	Dimension	
	L1	L2
HBR 48100-R2	197	243
HBR 48100-R2-B7.09	237	283
HBR 48140-R2	237	283
HBR 48140-R2-B7.09	277	323
HBR 48180-R2	277	323

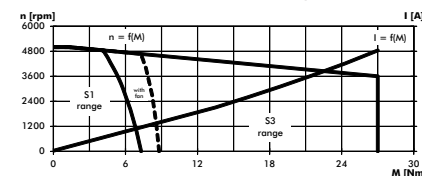
Operation characteristics:

Measured at servo-amplifier with 3-phase sinusoidal output

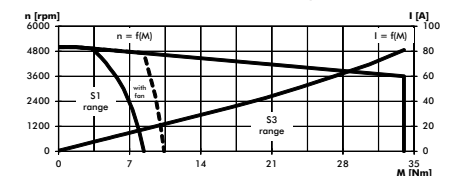
HBR 48100, 320V, 3000/4000/5000rpm



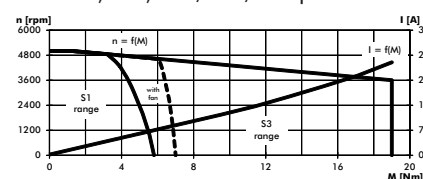
HBR 48140, 320V, 3000/4000/5000rpm



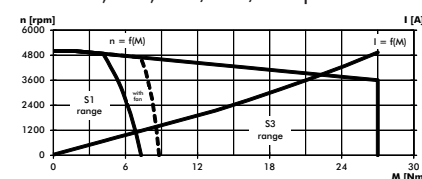
HBR 48180, 320V, 3000/4000/5000rpm



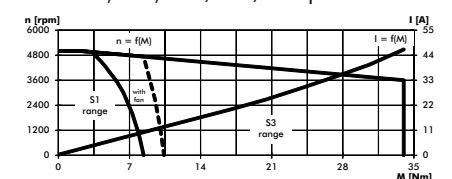
HBR 48100, 560V, 3000/4000/5000rpm



HBR 48140, 560V, 3000/4000/5000rpm



HBR 48180, 560V, 3000/4000/5000rpm



Motor design:

The High-Power Three-phase synchronous Motors of series HBR 48 are fitted with a 3-phase concentrated stator-winding system. The 8-pole rotor-magnet system is made of high-grade Neodymium Iron Boron.

The motors have a sinusoidal Back EMF. To avoid thermal overload a PTC resistor is embedded in the stator winding.

As standard, a brushless pancake-resolver is integrated. Optionally, also a hall-based singleturn angle encoder (BiSS interface) or a hall commutation sensor incl. incremental signals are available (additional information see page 3).

All motors can be equipped with optional forced ventilation for increased performance.

Types HBR 48100 and HBR 48140 are also available with integrated parking brake.

Features:

- High acceleration because of small moments of inertia
- Large peak torques because of high allowable pulse currents
- Maintenance-free operation due to brushless design - mechanical life cycle only depends on bearing and its lubrication
- High overload range due to good dissipation of the power-losses occurred in the stator
- The very compact design allowing high power output in a very small volume
- Robust mechanical structure with aluminium cast housing
-  UL approval as „recognized component“
- Optional forced ventilation kit with axial fan and air guide hood

edition 05.18

type series		HBR 48100				HBR 48140				HBR 48180			
cooling		without	fan	without	fan	without	fan	without	fan	without	fan	without	fan
max. speed	rpm	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
bus voltage	V	320	320	560	560	320	320	560	560	320	320	560	560
nominal speed	rpm	3000	4000	3000	4000	3000	4000	3000	4000	3000	4000	3000	4000
nominal current ^{1) **)}	A	10	13,4	5,7	7,7	12,3	16,3	7,1	9,4	13,6	18,7	8,2	10,7
nominal current, rms	A	7	9,5	4	5,4	8,7	11,6	5	6,6	9,6	13,2	5,8	7,6
nominal power ²⁾	W	1480	2640	1480	2640	1825	3225	1825	3225	2015	3690	2015	3690
operation acc. to standards VDE 0530		S1				S1				S1			
protection acc. to standards VDE 0530		IP 54				IP 54				IP 54			
rotating direction		reversible				reversible				reversible			
structural shape acc. standards VDE 0530		IM B5 - with end plate centering				IM B5 - with end plate centering				IM B5 - with end plate centering			
kind of connection		connectors (see below)				connectors (see below)				connectors (see below)			
mechanical data:													
moment of inertia motor	kgm ²	0,24*10 ⁻³				0,34*10 ⁻³				0,42*10 ⁻³			
nominal torque ²⁾	Nm	4,7	6,3	4,7	6,3	5,8	7,7	5,8	7,7	6,4	8,8	6,4	8,8
max. continous torque at stall ²⁾	Nm	5,8	7	5,8	7	7,3	8,8	7,3	8,8	8,4	10,4	8,4	10,4
peak torque	Nm	19		19		27		27		34		34	
speed regulation constant	N ⁻¹ cm ⁻¹ rpm	0,31		0,31		0,21		0,21		0,16		0,16	
mechanical time constant	ms	0,91		0,89		0,86		0,85		0,81		0,81	
friction torque	Nm	0,16	0,2	0,16	0,2	0,2	0,25	0,2	0,25	0,24	0,3	0,24	0,3
rotor weight motor	kg	1,45				1,85				2,3			
motor weight incl. resolver	kg	6	7	6	7	7,5	8,5	7,5	8,5	9,9	10,8	9,9	10,8
ball bearings	A/B-side	6204/6203				6204/6203				6204/6203			
F _R (allowable radial shaft load) ³⁾	N	350				350				350			
F _A (allowable axial shaft load)	N	140				140				140			
electrical data:													
number of phases		3				3				3			
number of poles		8				8				8			
terminal resistance ⁴⁾	Ω	0,9		2,7		0,6		1,8		0,46		1,4	
inductance ⁴⁾	mH	4,2		13,1		2,9		8,8		2,2		6,8	
voltage constant ^{1) *)}	V/1000 rpm	59		103		59		103		59		103	
torque constant ^{1) *)}	Nm/A	0,488		0,852		0,488		0,852		0,488		0,852	
continous current at stall ^{1) **)}	A	11,9	14,4	6,8	8,2	15	18	8,6	10,3	17,2	21,3	9,9	12,2
current at peak torque ^{1) **)}	A	45,5		26		64,5		37		81		46,5	
max. peak current ^{1) 5)}	A	56,5		32		80,5		46		101		58	
electrical time constant	ms	4,7		4,9		4,8		4,9		4,8		4,9	
thermal data:													
max. ambient temperature	°C	40				40				40			
isolation acc. to standards VDE 0530		F				F				F			
thermal time constant	min	40	12	40	12	43	15	43	15	45	18	45	18
temperature-rise without/with cooling	K/W	0,5	0,31	0,5	0,31	0,47	0,29	0,47	0,29	0,45	0,27	0,45	0,27
parking brake:													
type		B 7.09				B 7.09				-			
nominal voltage	V=	24				24				-			
nominal current	A	0,8				0,8				-			
static brake torque	Nm	9				9				-			
mass moment of inertia	kgm ²	0,053*10 ⁻³				0,053*10 ⁻³				-			
motor weightincl. resolver and parking brake	kg	7	8	7	8	8,6	9,6	8,6	9,6	-			
connectors:													
motor flange socket		series 923 speedtec-ready (INTERCONTEC)											
resolver flange socket		series 623 speedtec-ready (INTERCONTEC)											

*) Tolerance - 10 %

**) Tolerance + 10 %

¹⁾ Sinusoidal-peak

²⁾ Values are for motor-assembling on a locating face of aluminium of at least 0,15 m² at a thickness of 10 mm or similar metal face.

³⁾ Middle of the shaft-extension.

⁴⁾ Measured between two phases.

⁵⁾ The mentioned values are valid for operation in temperature-ranges from 0 up to +40 °C and it is not allowed to excess them, not even for a short-time, to avoid magnet-weakening.

design-changes reserved

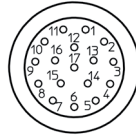
HBR 48

options for angle encoder systems

R2.4 resolver (standard encoder):

technology: pancake resolver
 measuring range: 360°, 2 pole, singleturn
 transformation ratio: 0,5 ± 5 %
 electrical error: max. ± 10' el
 supply: 7 Veff 10 kHz / max. 65 mA
 connector: connector 17-pol., series 623

connector series 623
 17-pol., 0 coded

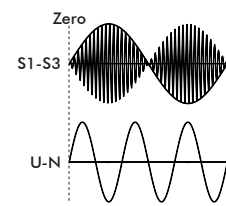


connecting side
 of connector

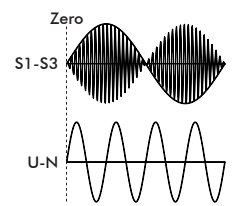
pin assignment
 1 - S1
 2 - S3
 3 - S2
 4 - S4
 5 - Thermo
 6 - R1
 7 - R2
 8 - Thermo
 9 - free
 10 - free
 11 - free
 12 - free
 13 - free
 14 - free
 15 - free
 16 - free
 17 - free

signal assignment (rotation CW)

6-pole motor



8-pole motor



DS1 singleturn angle encoder:

technology: linear hall system, digitized
 measuring range: 360° singleturn
 resolution: 12 bit (4096 steps) ± 0,088°
 nonlinearity: max. 0,6°
 supply: V+ = 5,5 ... 12 VDC / max. 120 mA
 interface: BiSS, binary coded
 12 bit data, 2 bit status, 6 bit CRC
 RS422, R_{T(MA)} = 100 Ohm
 connector: M12 connector 8-pol., A coded

M12 connector
 8-pol., A coded



connecting side
 of connector

pin assignment
 1 - V+
 2 - V-
 3 - Thermo+
 4 - MA-
 5 - SL+
 6 - MA+
 7 - Thermo-
 8 - SL-

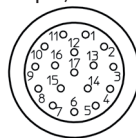
recommended cable type: Cat.5e, SF/UTP, AWG24

cable length	max. MA frequency without ⁶⁾ / with line delay compensation
2 m	2,5 MHz / 10 MHz
5 m	2,2 MHz / 10 MHz
10 m	1,7 MHz / 10 MHz
25 m	1,0 MHz / 10 MHz

RL6 commutation sensor with incremental signals:

technology: hall system
 measuring range: 360° singleturn
 resolution: 12 bit
 nonlinearity: max. 0,6°
 supply: V+ = 4,5 ... 12 VDC / max. 150 mA
 interface: open collector - H1, H2, H3 120° el
 (mac. 10 mA, max. 24 V)
 RS422 - channel A, B, Z
 connector: connector 17-pol., series 623

connector series 623
 17-pol., 0 coded

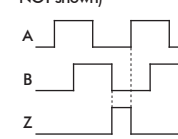


connecting side
 of connector

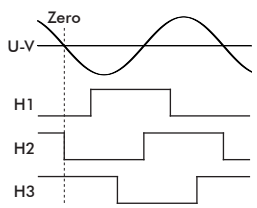
pin assignment
 1 - Hall 1
 2 - Hall 2
 3 - Hall 3
 4 - V+
 5 - Thermo
 6 - GND
 7 - free
 8 - Thermo
 9 - 11 - free
 12 - Ch A
 13 - Ch A invers
 14 - Ch B
 15 - Ch B invers
 16 - Ch Z
 17 - Ch Z invers

signal assignment

incremental
 (complementary signals
 NOT shown)

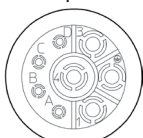


commutation (rotation CW)



pin assignment power connector

connector series 923
 8-pol.



connecting side
 of connector

pin assignment
 1 - U
 3 - W
 4 - V
 PE
 A - Brake +
 B - Brake -
 C - Fan +
 D - Fan -

⁶⁾ Condition: Total propagation delay in the BiSS master device $t_{d(MA)} + t_{d(SL)} \leq 25 \text{ ns}$.