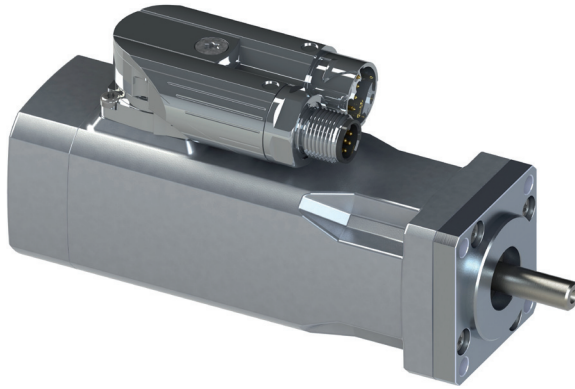


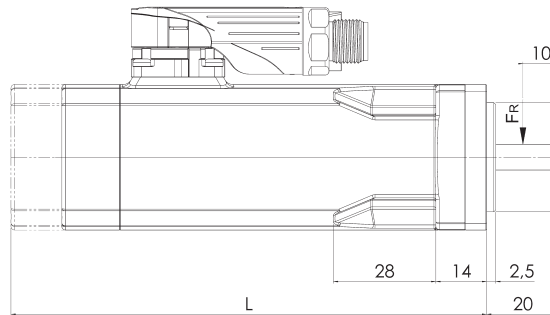
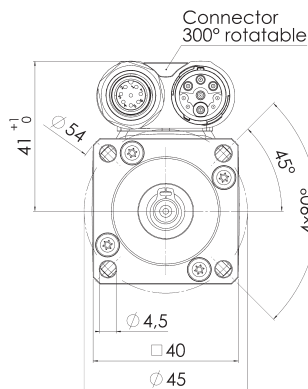
HBR 16

Synchronous Servo Motors

with permanent magnetic field



Motor series HBR 16
up to 155 Watts output power
with different angle encoder systems
with or without parking brake

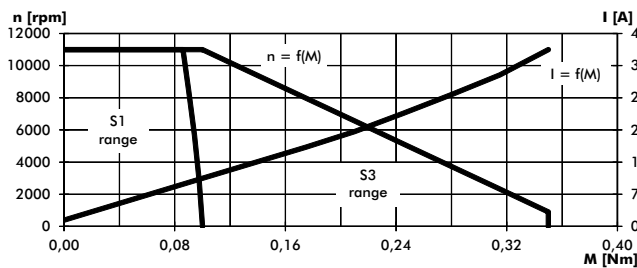


Motor type	Dimension L
HBR 1625-DS1	92
HBR 1625-DS1-B7.004	117
HBR 1650-DS1	117
HBR 1650-DS1-B7.004	142

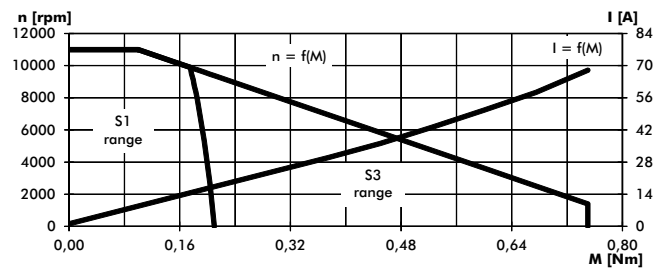
Operation characteristics:

Measured at servo-amplifier with 3-phase sinusoidal output

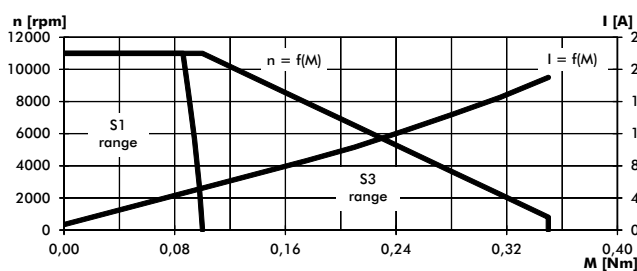
HBR 1625, 24V, 8500/11000rpm



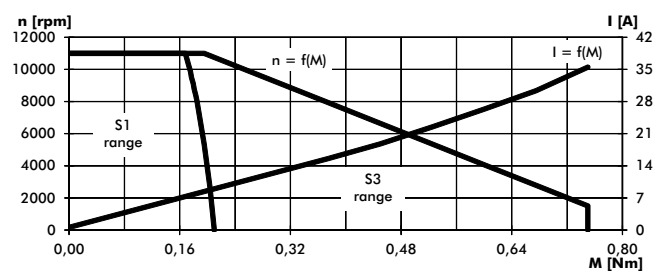
HBR 1650, 24V, 8000/11000rpm



HBR 1625, 48V, 8500/11000rpm



HBR 1650, 48V, 8000/11000rpm



Motor design:


The Synchronous Servo Motors of series HBR 16 are fitted with a 3-phase concentrated stator-winding system. The 4-pole rotor-magnet system is made of plastic-bonded Neodymium Iron Boron ring magnets.

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

As standard, a hall-based singleturn angle encoder system with 12Bit resolution and pure digital interface (BiSS) is integrated.

The motors are also available with brushless pancake-resolver (dimension L will be 14mm longer, motor weight increases by 0,05kg), with hall commutation sensor incl. incremental signals and/or with integrated parking brake (additional information see page 3).

Features:

- High efficiency through concentrated winding technology
- Cost-efficient design
- Constant torque development and lowest reluctance effects for best control properties
- The compact design allowing high power output out of small volume
- Robust mechanical structure with modern aluminium cast housing
- Versions for 320V bus voltage on request
-  Versions with UL approval as „recognized component“ available
- Customized versions on request

edition 05.18

type series		HBR 1625		HBR 1650	
max. speed rpm		11000	11000	11000	11000
bus voltage	V	24	48	24	48
nominal speed	rpm	8500	8500	8000	8000
nominal current ^{1) **)}	A	9,5	4,8	15,4	8
nominal current, rms	A	6,7	3,4	10,9	5,7
nominal power ²⁾	W	80	80	155	155
operation acc. to standards VDE 0530		S1		S1	
protection acc. to standards VDE 0530		IP 54		IP 54	
rotating direction		reversible		reversible	
structural shape acc. standards VDE 0530		IM B5 - with end plate centering		IM B5 - with end plate centering	
kind of connection		connectors (see below)		connectors (see below)	
mechanical data:					
moment of inertia motor	kgm ²	0,0013*10 ⁻³		0,0021*10 ⁻³	
nominal torque ²⁾	Nm	0,09	0,09	0,185	0,185
max. continous torque at stall ²⁾	Nm	0,1	0,1	0,21	0,21
peak torque	Nm	0,35	0,35	0,75	0,75
speed regulation constant	N ⁻¹ cm ⁻¹ rpm	215	219	82	87
mechanical time constant	ms	3,4	3,5	2,2	2,2
friction torque	Nm	0,015		0,015	
rotor weight motor	kg	0,065		0,095	
motor weight incl. singleturn angle encoder	kg	0,5		0,67	
ball bearings	A/B-side	607/608		607/608	
F _R (allowable radial shaft load) ³⁾	N	20		20	
F _A (allowable axial shaft load)	N	8		8	
electrical data:					
number of phases		3		3	
number of poles		4		4	
terminal resistance ⁴⁾	Ω	0,32	1,3	0,16	0,65
inductance ⁴⁾	mH	0,25	1	0,17	0,6
voltage constant ^{1) *)}	V/1000 rpm	1,35	2,7	1,6	3
torque constant ^{1) *)}	Nm/A	0,011	0,022	0,013	0,025
current at peak torque ^{1) **)}	A	38,5	19	68	35,5
max. peak current ^{1) 5)}	A	47	23,5	85	44
electrical time constant	ms	0,8	0,8	0,92	0,92
thermal data:					
max. ambient temperature	°C	40		40	
isolation acc. to standards VDE 0530		F		F	
thermal time constant	min	6		10	
temperature-rise n.v.	K/W	2,0		1,4	
parking brake:					
type		B 7.004		B 7.004	
nominal voltage	V=	24		24	
nominal current	A	0,35		0,35	
static brake torque	Nm	0,4		0,4	
mass moment of inertia	kgm ²	0,0013*10 ⁻³		0,0013*10 ⁻³	
motor weight incl. encoder + parking brake	kg	0,7		0,9	
connectors:					
angled connector, rotatable 300°		series 915/615 ytec (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 exceed them, not even for a short-time, to avoid magnet-weakening.

design-changes reserved

HBR 16

options for angle encoder systems

DS1 singleturn angle encoder (standard encoder):

technology: linear hall system, digitized
 measuring range: 360° singleturn
 resolution: 12 bit (4096 steps) \triangleq 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 15-pol., series 915

connector 15-pol.
 series 915



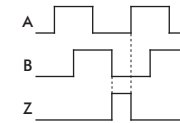
connecting side
 of connector

pin assignment

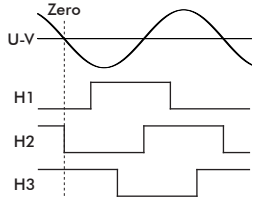
- 1 - V+
- 2 - Ch A
- 3 - Ch A invers
- 4 - Ch B
- 5 - Ch B invers
- 6 - Ch Z
- 7 - Ch Z invers
- 8 - free
- 9 - Hall 1
- 10 - Hall 2
- 11 - Hall 3
- 12 - GND
- A - Thermo+
- B - free
- C - Thermo-

signal assignment

incremental
 (complementary signals
 NOT shown)



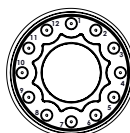
commutation (rotation CW)



R5.2 resolver:

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. 50 mA
 connector: connector 12-pol., series 615

connector 12-pol.
 series 615



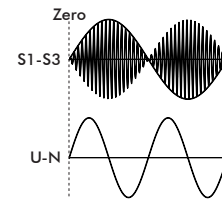
connecting side
 of connector

pin assignment

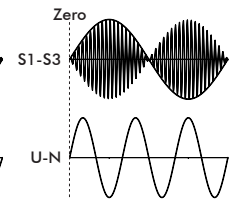
- 1 - S1
- 2 - S3
- 3 - S2
- 4 - S4
- 5 - R1
- 6 - R2
- 7 - Thermo+
- 8 - Thermo-
- 9 - free
- 10 - free
- 11 - free
- 12 - free

signal assignment (rotation CW)

4-pole motor



6-pole motor



pin assignment power connector

connector 9-pol.
 series 915



connecting side
 of connector

pin assignment

- A - U
- B - V
- C - W
- ⊕ - PE
- 1 - Brake+
- 2 - Brake-
- 3 - free
- 4 - free
- 5 - free

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