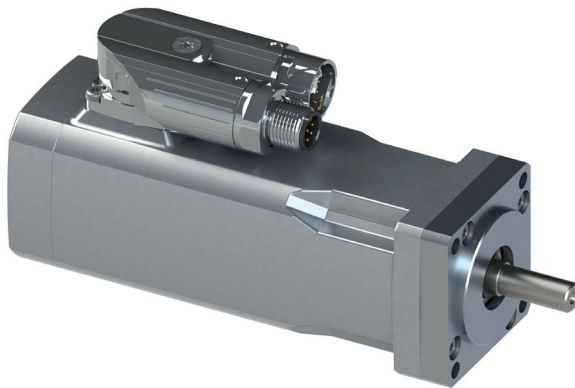


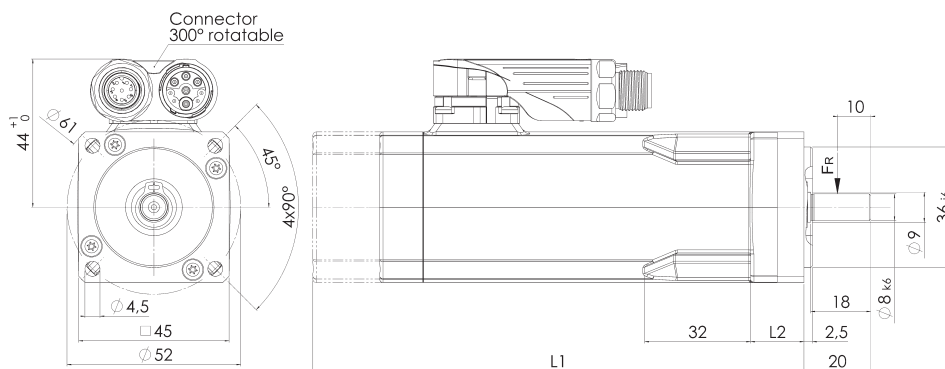
# HBR 22

## Synchronous Servo Motors

with permanent magnetic field



Motor series HBR 22  
up to 270 Watts output power  
with different angle encoder systems  
with or without parking brake

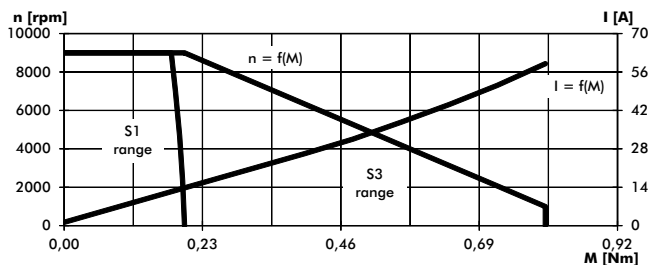


Motor type	Dimension	
	L1	L2
HBR 2230-DS1	97	16
HBR 2230-DS1-B7.01	129	18
HBR 2260-DS1	127	16
HBR 2260-DS1-B7.01	159	18

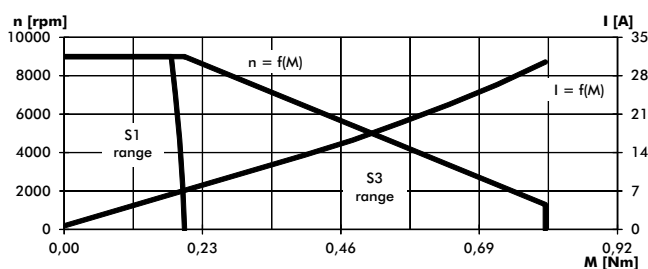
### Operation characteristics:

Measured at servo-amplifier with 3-phase sinusoidal output

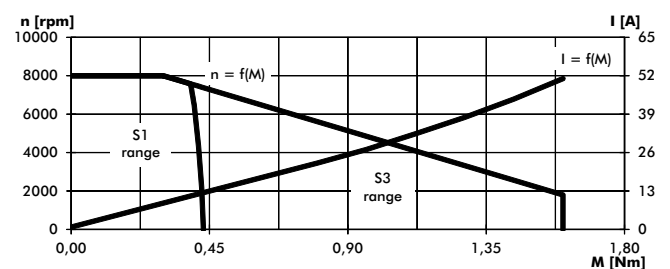
HBR 2230, 24V, 7000/9000rpm



HBR 2230, 48V, 7000/9000rpm



HBR 2260, 48V, 6500/8000rpm



### Motor design:


The Synchronous Servo Motors of series HBR 22 are fitted with a 3-phase concentrated stator-winding system. The 6-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 L1 will be 20mm longer, motor weight increases by 0,08kg), 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

type		<b>HBR 2230</b>		<b>HBR 2260</b>
series		-		-
max. speed	rpm	9000	9000	8000
bus voltage	V	24	48	48
nominal speed	rpm	7000	7000	6500
nominal current <sup>1) **)</sup>	A	13	6,7	11,6
nominal current, rms	A	9,1	4,7	8,2
nominal power <sup>2)</sup>	W	135	135	270
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)
<b>mechanical data:</b>				
moment of inertia motor	kgm <sup>2</sup>	0,007*10 <sup>-3</sup>		0,011*10 <sup>-3</sup>
nominal torque <sup>2)</sup>	Nm	0,185	0,185	0,4
max. continous torque at stall <sup>2)</sup>	Nm	0,2	0,2	0,43
peak torque	Nm	0,8	0,8	1,6
speed regulation constant	N <sup>-1</sup> cm <sup>-1</sup> rpm	66	66	24
mechanical time constant	ms	5,5	5,5	3,2
friction torque	Nm	0,02		0,03
rotor weight motor	kg	0,16		0,23
motor weight incl. singleturn angle encoder	kg	0,7		0,98
ball bearings	A/B-side	609/608		609/608
F <sub>R</sub> (allowable radial shaft load) <sup>3)</sup>	N	50		50
F <sub>A</sub> (allowable axial shaft load)	N	20		20
<b>electrical data:</b>				
number of phases		3		3
number of poles		6		6
terminal resistance <sup>4)</sup>	Ω	0,2	0,75	0,4
inductance <sup>4)</sup>	mH	0,1	0,36	0,25
voltage constant <sup>1) *)</sup>	V/1000 rpm	1,9	3,7	4,5
torque constant <sup>1) *)</sup>	Nm/A	0,016	0,031	0,037
current at peak torque <sup>1) **)</sup>	A	59	30,5	51
max. peak current <sup>1) 5)</sup>	A	73	38	65
electrical time constant	ms	0,5	0,5	0,63
<b>thermal data:</b>				
max. ambient temperature	°C	40		40
isolation acc. to standards VDE 0530		F		F
thermal time constant	min	10		13
temperature-rise n.v.	K/W	1,8		1,1
<b>parking brake:</b>				
type		<b>B 7.01</b>		<b>B 7.01</b>
nominal voltage	V=	24		24
nominal current	A	0,45		0,45
static brake torque	Nm	1		1
mass moment of inertia	kgm <sup>2</sup>	0,0021*10 <sup>-3</sup>		0,0021*10 <sup>-3</sup>
motor weight incl. encoder + parking brake	kg	0,95		1,25
<b>connectors:</b>				
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 m<sup>2</sup> 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 22

## 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<sub>T(MA)</sub> = 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 <sup>6)</sup> / 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



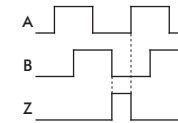
connecting side  
 of connector

pin assignment

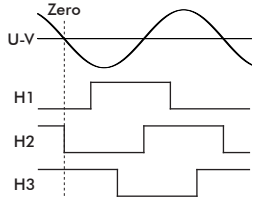
- 1 - V+
- 2 - Ch A
- 3 - Ch A invers
- 4 - Ch B
- 5 - Ch B invers
- 6 - Ch Z
- 7 - Ch Z invers
- 8 - free
- 9 - Hall 1
- 10 - Hall 2
- 11 - Hall 3
- 12 - GND
- A - Thermo+
- B - free
- C - Thermo-

signal assignment

incremental  
 (complementary signals  
 NOT shown)



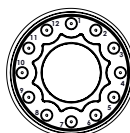
commutation (rotation CW)



### RL4.2 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



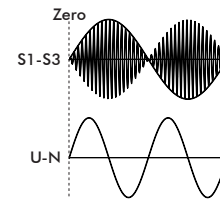
connecting side  
 of connector

pin assignment

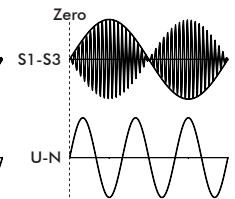
- 1 - S1
- 2 - S3
- 3 - S2
- 4 - S4
- 5 - R1
- 6 - R2
- 7 - Thermo+
- 8 - Thermo-
- 9 - free
- 10 - free
- 11 - free
- 12 - free

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

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