

# **Bonfiglioli** **Riduttori**

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## **BSR series**

Synchronous Reluctance Motors



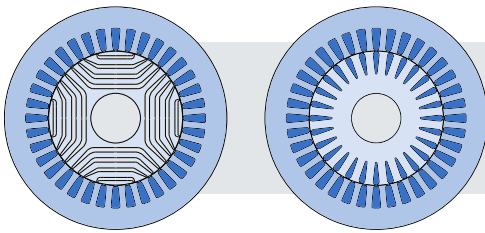
PRODUCT

 **Bonfiglioli**  
*Forever Forward*

# BSR series

## Synchronous Reluctance Technology

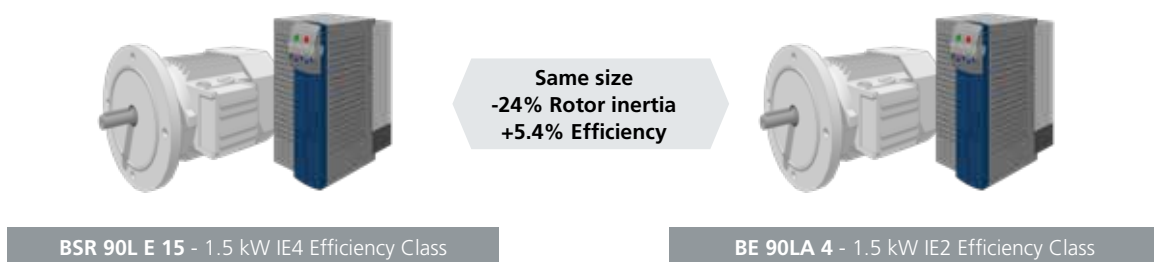
The Synchronous Reluctance Motor is an electric motor that combines a conventional three phase induction motor stator with an innovative rotor. The peculiarity of this rotor is the magnetic anisotropy obtained by means of suitably shaped holes. Thanks to the anisotropy, it is possible to exploit the reluctance principle for the electromagnetic energy conversion without using permanent magnets or rotor windings. The rotor design, thanks to the holes in the lamination, yields a lower inertia and better dynamics with respect to a same-size induction motor.



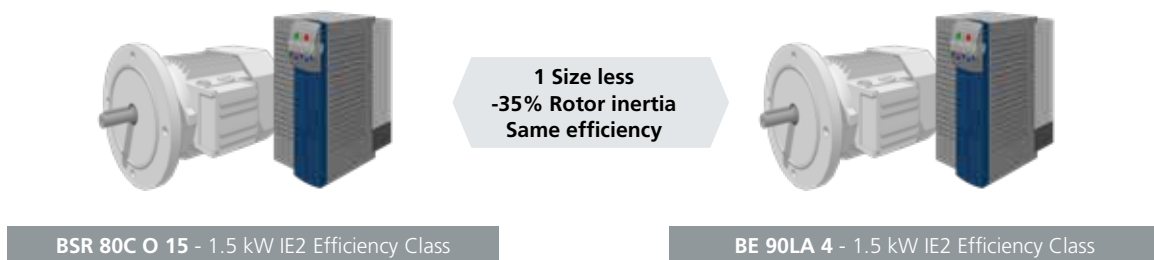
On the left, a section of Bonfiglioli Reluctance motor to compare with the Induction one on the right: it is possible to see the specific geometry.

The lack of rotor Joule losses allows an increase of motor ratings with respect to an induction motor in terms of both efficiency and power density. Taking the advantage of this essential feature, Bonfiglioli is able to offer two distinctive versions in their BSR Synchronous Reluctance motor series. The High Efficiency (E) version is characterized by a Super Premium IE4 Efficiency Class level at the rated operating point, but also especially in the partial load range. The High Output (O) version allows to reduce the motor size with respect to a same-size induction motor, maintaining an efficiency level equal or higher than the IE2 Efficiency Class. When compared to high efficiency induction motors, the dynamic is up to two times higher, thanks to the significantly lower rotor inertia. When comparing the Synchronous Reluctance motor technology and the Induction Motor technology, the main advantages, for variable speed converter fed applications, according to the two packages proposed by Bonfiglioli are:

- **High Efficiency Package:** better efficiency class, up to IE4, for same power and frame size of IM



- **High Output Package:** smaller frame for same output power and efficiency class of IM



This is why when efficiency or having one or two size less are a must, or ensuring the same output power is something relevant for your application, Bonfiglioli Synchronous Reluctance Motor is the best choice.

# Designation

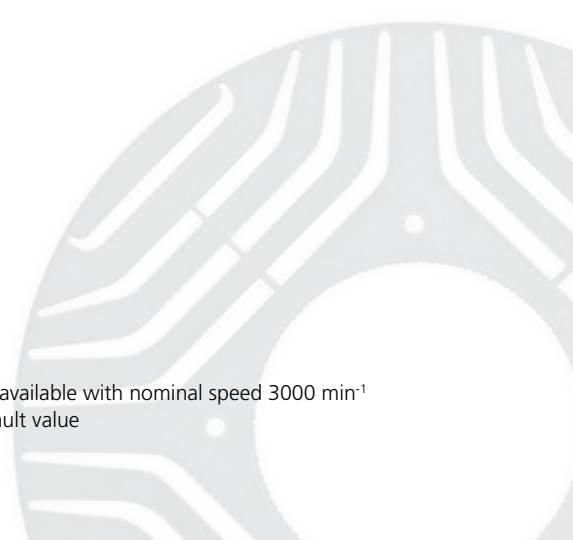
BSR	80B	E	15	40	55	F	B5	...																		
								<p><b>Options</b></p> <table border="1"> <tr> <td><b>K1</b></td> <td>Thermal protective devices</td> <td>Silicon sensor KTY 84-130 Thermistor PTC 150 Platinum sensor PT1000</td> </tr> <tr> <td><b>U1</b></td> <td>Forced ventilation</td> <td>Power supply 1~230V (71-100), 3~400V Y (112-132)</td> </tr> <tr> <td><b>H1</b></td> <td>Anti-condensate heaters</td> <td>Power supply 1~230V</td> </tr> <tr> <td><b>PS</b></td> <td>Double-extended shaft</td> <td>Not compatible with TC or U1 option</td> </tr> <tr> <td><b>TC</b></td> <td>External mechanical protection</td> <td>Not compatible with PS option</td> </tr> <tr> <td><b>RV</b></td> <td>Rotor balancing grade B</td> <td>-</td> </tr> </table> <p><b>Motor mounting</b>  <b>B3</b> = IM B3, IM B6, IM B7, IM B8, IM V5, IM V6  <b>B5</b> = IM B5, IM V1, IM V3  <b>B14</b> = IM B14, IM V18, IM V19</p> <p><b>Insulation class</b>  <b>F</b> = Class F<sup>(2)</sup>  <b>H</b> = Class H</p> <p><b>Degree of protection</b>  <b>55</b> = IP 55<sup>(2)</sup>  <b>56</b> = IP 56</p> <p><b>Nominal line voltage</b>  <b>40</b> = 400V (Y connection)</p> <p><b>Nominal speed</b>  <b>15</b> = 1500 min<sup>-1</sup>  <b>30</b> = 3000 min<sup>-1</sup></p> <p><b>Motor rating</b>  <b>E</b> = High Efficiency<sup>(1)</sup>  <b>O</b> = High Output</p> <p><b>Motor size</b>  <b>71C ... 132MB</b> (IEC Motor)</p>	<b>K1</b>	Thermal protective devices	Silicon sensor KTY 84-130 Thermistor PTC 150 Platinum sensor PT1000	<b>U1</b>	Forced ventilation	Power supply 1~230V (71-100), 3~400V Y (112-132)	<b>H1</b>	Anti-condensate heaters	Power supply 1~230V	<b>PS</b>	Double-extended shaft	Not compatible with TC or U1 option	<b>TC</b>	External mechanical protection	Not compatible with PS option	<b>RV</b>	Rotor balancing grade B	-
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**Motor type**

**BSR** = IEC 3-Phase Synchronous Reluctance Motor

**Notes**

- (1) Not available with nominal speed 3000 min<sup>-1</sup>
- (2) Default value



# Performance

Operation with ACU410 converter - rated voltage 400V - 1.5xM<sub>n</sub> overload at nominal speed (M<sub>ol</sub>) - 3xM<sub>n</sub> Peak overload (M<sub>p</sub>)

4-pole

50 Hz

1500rpm

Y Connection

P<sub>n</sub> Size - Rating - Speed  $\eta_{4/4}$  M<sub>n</sub> I<sub>n</sub> I<sub>ol</sub> I<sub>p</sub> n<sub>max</sub> J<sub>m</sub> m<sub>IM BS</sub> Suggested ACU410 converter for no overload application

## High Efficiency (E) - S1 duty cycle

kW		%	Nm	A	A	A	min <sup>-1</sup>	kgm <sup>2</sup> x10 <sup>-4</sup>	kg			
0.37	BSR 71C E 15	81.1	2.4	1.2	1.6	3.1	2250	10	7.1	ACU	410	03
0.55	BSR 80B E 15	83.9	3.5	1.5	2.1	4.0	2250	17	9.5	ACU	410	03
0.75	BSR 80C E 15	85.7	4.8	2.2	3.0	5.5	2250	22	11.7	ACU	410	07
1.1	BSR 90S E 15	87.2	7.0	3.1	4.0	7.6	2250	22	13.1	ACU	410	09
1.5	BSR 90L E 15	88.2	9.5	4.1	5.2	10.2	2250	26	14.5	ACU	410	12
2.2	BSR 100LA E 15	89.5	14.0	5.6	8.4	14.3	2250	45	22	ACU	410	13
3	BSR 100LB E 15	90.4	19.1	7.6	10.6	19.8	2250	50	24	ACU	410	15
4	BSR 112M E 15	91.1	25	9.7	13.5	24.7	2250	82	31	ACU	410	19
5.5	BSR 132S E 15	91.9	35	13.5	18.8	36	2250	220	51	ACU	410	19
7.5	BSR 132MA E 15	92.6	48	17.8	25.5	52	2250	255	57	ACU	410	21
9.2	BSR 132MB E 15	92.9	59	21.6	32	64	2250	280	67	ACU	410	22

## High Output (O) - S1 duty cycle

kW		%	Nm	A	A	A	min <sup>-1</sup>	kgm <sup>2</sup> x10 <sup>-4</sup>	kg			
0.55	BSR 71C O 15	77.1	3.5	1.7	2.3	4.5	2250	10	7.1	ACU	410	05
0.75	BSR 80A O 15	79.6	4.8	2.2	3.2	5.9	2250	13	8.0	ACU	410	07
1.1	BSR 80B O 15	81.4	7.0	3.0	4.1	8.5	2250	17	9.5	ACU	410	09
1.5	BSR 80C O 15	82.8	9.5	4.0	6.1	11.3	2250	22	12.2	ACU	410	12
2.2	BSR 90S O 15	84.3	14.0	5.5	7.4	16.8	2250	22	13.1	ACU	410	13
3	BSR 90L O 15	85.5	19.1	7.5	11.4	24.0	2250	26	14.5	ACU	410	15
4	BSR 100LB O 15	88.6	25	10.4	14.9	30	2250	50	24	ACU	410	19
5.5	BSR 112M O 15	89.6	35	13.5	19.5	42	2250	82	31	ACU	410	19
7.5	BSR 132S O 15	90.4	48	18.4	25.3	52	2250	220	51	ACU	410	23
9.2	BSR 132MA O 15	91.0	59	22.0	33	66	2250	255	57	ACU	410	23
11	BSR 132MB O 15	91.4	70	24.7	32	77	2250	280	67	ACU	410	23

Operation with ACU410 converter - rated voltage 400V - 1.5xM<sub>n</sub> overload at nominal speed (M<sub>ol</sub>) - 3xM<sub>n</sub> Peak overload (M<sub>p</sub>)

4-pole

100 Hz

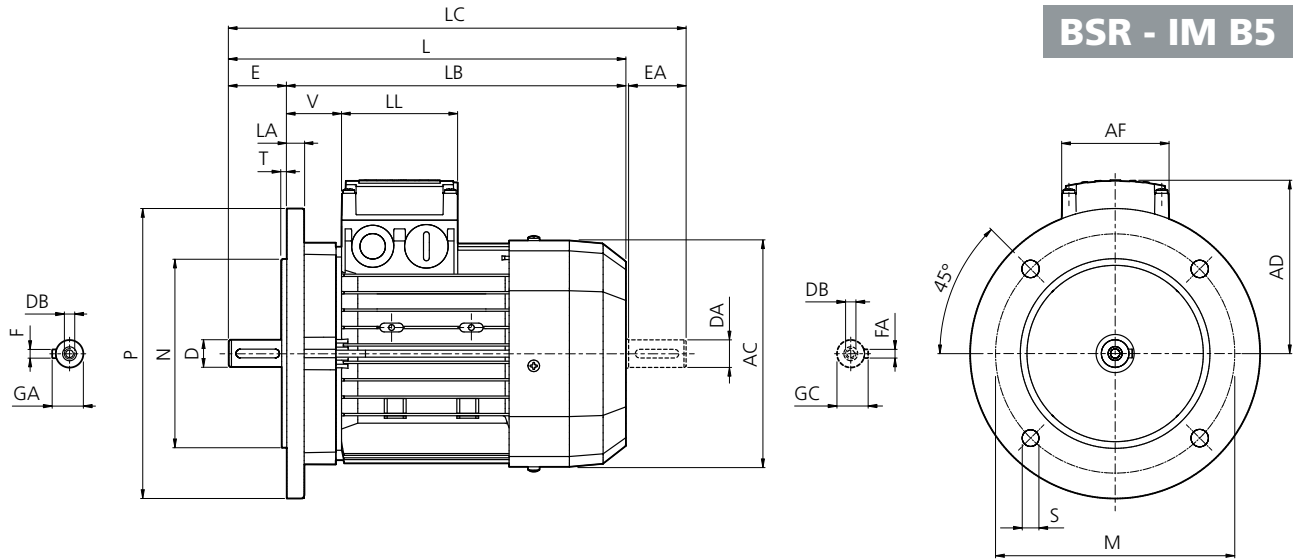
3000rpm

Y Connection

## High Output (O) - S1 duty cycle

kW		%	Nm	A	A	A	min <sup>-1</sup>	kgm <sup>2</sup> x10 <sup>-4</sup>	kg			
1.1	BSR 71C O 30	82.7	3.5	3.2	4.8	8.7	4500	10	7.1	ACU	410	09
1.5	BSR 80A O 30	84.2	4.8	3.9	5.5	11.2	4500	13	8.0	ACU	410	12
2.2	BSR 80B O 30	85.9	7.0	5.6	7.8	16.0	4500	17	9.5	ACU	410	13
3	BSR 80C O 30	87.1	9.5	7.7	11.6	21.5	4500	22	12.2	ACU	410	15
4	BSR 90S O 30	88.1	12.7	9.8	14.0	30	4500	22	13.1	ACU	410	19
5.5	BSR 90L O 30	89.2	17.5	13.5	19.5	43	4500	26	14.5	ACU	410	19
7.5	BSR 100LB O 30	90.1	24	19.3	27.8	56	4500	50	24	ACU	410	23
11	BSR 112M O 30	91.2	35	24.5	36	77	4500	82	31	ACU	410	23
15	BSR 132S O 30	91.9	48	36	53	107	4500	220	51	ACU	410	27
18.5	BSR 132MA O 30	92.4	59	43	62	126	4500	255	57	ACU	410	150

# Dimensions



## Flange B5

	M	N	P	S	T	LA
BSR 71	130	110	160	9.5	3.5	10
BSR 80	165	130	200	11.5		11.5
BSR 90						
BSR 100	215	180	250	14	4	14
BSR 112						15
BSR 132						20

## Motor

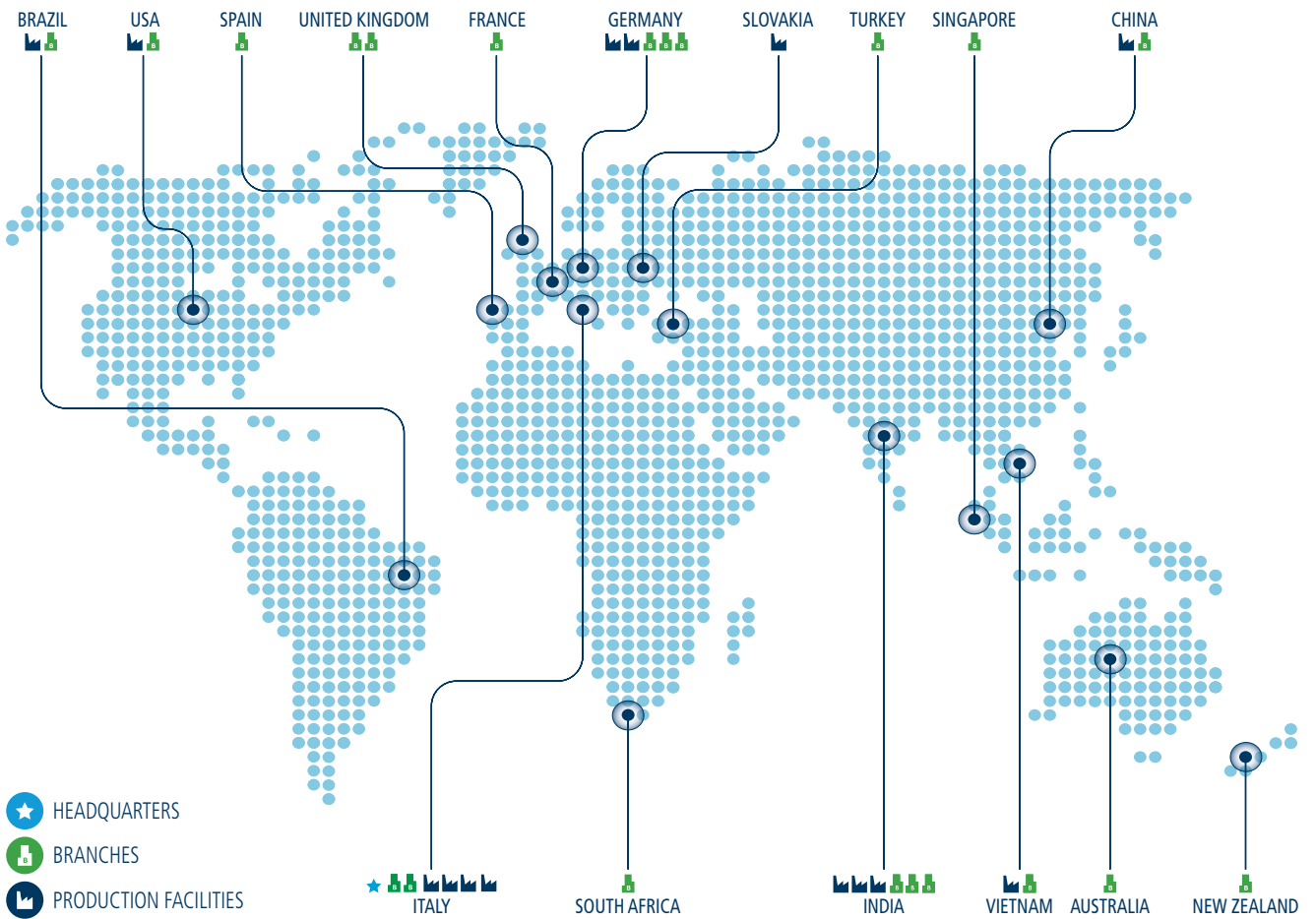
	AC	L	LB	LC	AD	AF	LL	V
BSR 71	138	249	219	281	108	74	80	37
BSR 80	156	274	234	315	119			38
BSR 90	176	326	276	378	133			44
BSR 100	195	367	307	429	142	98	98	50
BSR 112	219	385	325	448	157			52
BSR 132	258	493	413	576	193			58

## Shaft

	D DA	E EA	DB	GA GC	F FA
BSR 71	14	30	M5	16	5
BSR 80	19	40	M6	21.5	6
BSR 90	24	50	M8	27	8
BSR 100	28	60	M10	31	
BSR 112					
BSR 132	38	80	M12	41	10

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