

IE5 Synchronous reluctance Increased Safety motors

Combining energy efficiency, safety and reliability



ABB IE5 SynRM Increased Safety motors enable you to save energy and cut emissions while keeping your people and equipment safe in hazardous areas. ABB is the first manufacturer in the world to offer the combination of IE5 ultra-premium efficiency and Increased safety.

IE5 efficiency for explosive atmospheres

These motors bring together two proven and successful ABB product lines. Our IE5 synchronous reluctance (SynRM) motors deliver extremely high efficiency and reliability in a range of applications, with 40% lower losses than IE3 motors. We are also a leading supplier of motors certified for explosive atmospheres that are trusted to maintain safety in some of the toughest industries.

Certified safety

At launch the motors are Ex certified according to IECEx and ATEX standards.

We offer the following Ex protection types:

- Increased safety Ex ec (for zone 2)
 - Increased safety Ex eb (for zone 1)
 - Dust ignition proof Ex t (for zones 21 and 22)
- Increased safety motors are based on an electrical design that eliminates hot surfaces and sparking during normal running, while Dust ignition proof motors have special seals that prevent dust from entering the enclosure.

The IE5 ultra-premium efficiency class is defined in IEC Technical Specification IEC TS 60034-30-2.

Sustainable and reliable

SynRM motors achieve high efficiency through a special rotor design that has practically no energy losses. SynRM combines the simplicity of an induction platform with the performance of permanent magnet (PM) technology. However, unlike PM these motors do not need magnets or rare earth metals which makes them an environmentally friendly choice.

Higher reliability results in fewer unplanned stoppages, extended service intervals, lower maintenance needs and longer lifetimes. Additionally, the magnet-free rotor boosts reliability and reduces the need for service.

Easy to use

IE5 SynRM Increased Safety motors are a simple drop-in replacement for induction motors. No mechanical modifications are needed as the motors are the same size and have the same output powers. This makes it easy to boost efficiency and reliability in pump, fan, compressor and other applications in a broad spectrum of industries where potentially explosive atmospheres could occur.

Why to invest in ABB IE5 SynRM Increased Safety motors?



SynRM motors provide a cost-effective solution and improving motor efficiency in various hazardous zone applications.

Zone 1 Application: SynRM motors provide a cooler running design, enabling the use of an increased safety motor in Zone 1 environments. Previously, a flameproof motor with a special enclosure was the conventional choice for Zone 1 applications.

Zone 2 Application: SynRM motors offer improved loadability, allowing more power to be delivered from the same motor size compared to induction motors. In Zone 2 environments, this enhanced loadability feature becomes crucial. By utilizing SynRM motors, the same duty requirements with a smaller motor is possible, leading to reduced costs.

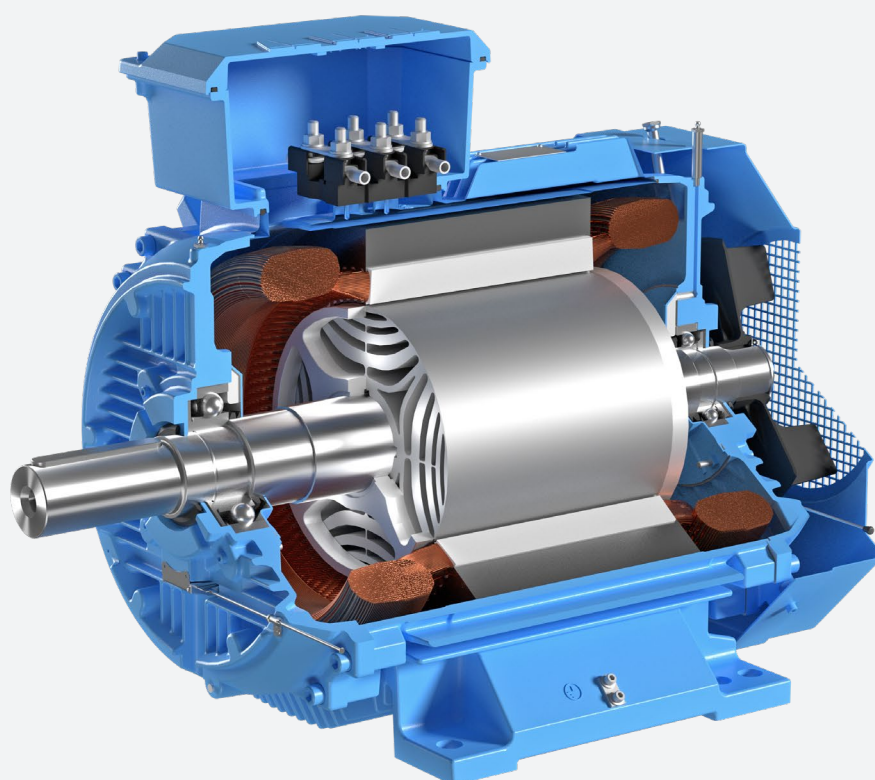
- Certified to Ex standards for safe and reliable operation in explosive atmospheres
- IE5 Ultra Premium Efficiency – reduces energy consumption and emissions
- Fast ROI - with 40 % lower energy losses than IE3 motors, the payback time even less than a year based on energy costs

Benefits beyond high efficiency

- Winding temperatures are up to 30% lower and bearing temperatures up to 15% lower than in regular motors. This is very significant because bearing failures cause around 70% of unplanned motor outages. It also reduces the need for cooling of workspaces
- Magnet free rotor increases reliability, delivery safety and customer's peace of mind. Additionally it reduces maintenance costs and need for service
- Quiet operation reduces noise in the plant for a better working environment
- IE5 SynRM motors boost sustainability and circularity with easy to recycle solutions – No rare earth magnets in motor design
- Drop-in replacement for retrofit induction motors, as no mechanical changes are needed
- IE5 SynRM and drive package enables higher quality production through accurate speed and torque control, even at partial loads

ABB digital services:

- **ABB Access** -scanning the QR code on the motor enables an easy access to up-to-date product online data, documentation and manuals
- **ABB Ability™ Digital Powertrain** for improved safety – a suite of digital solutions that enables you to remotely monitor the health and performance of electrical motor driven systems



Technical summary

IE5 SynRM Increased Safety motors

Frame material	Cast iron
Frame sizes	IEC 132-315
Output	from 5,5 to 315 kW
Motor type	M3GL, M3HL
Marking	Ex ec / Ex eb IIC T3 Gc and Ex t IIIC
Voltage & frequency	380-690 V & 50/60 Hz
Supply	VSD
Mounting	B3, B5, B14, B34, B35
Ambient temp.	-20 °C – +40 °C (std) -55 °C – +60 °C (on request)
Cooling	IC411 as standard
Cerfication	IECEX, ATEX

Technical data for IE5 SynRM Increased safety Ex eb motors for Zone 1

IP 55 - IC 411 - Insulation class F, temperature rise class B

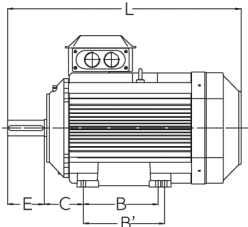
Output kW	Type designation	Product code	Speed at 100% of nominal power (M) (r/min)	IE class acc. to IEC TS 60034-30-2	Efficiency IEC 60034-2 - 1; 2014			Power factor $\cos\varphi$	Current I_N A	Torque T_N Nm	Rotor inertia 1/4GD2 (M) (kgm ²)	Weight kg	Temperature rise class (M)
					Full load 100%	3/4 load 75%	1/2 load 50%						
3000 r/min (100 Hz)			400 V network										
5.5	M3HL 132SMA 4	3GHL132217-...C	3000	IE5	92.8	91.9	89.5	0.73	12.1	17.5	0.0145	63	B
7.5	M3HL 132SMB 4	3GHL132227-...C	3000	IE5	93.1	92.5	90.6	0.74	16.5	23.9	0.0145	63	B
11	M3HL 132SMC 4	3GHL132237-...C	3000	IE5	94.0	93.1	90.9	0.72	24.5	35.0	0.0184	69	B
15	M3HL 132SMD 4	3GHL132247-...C	3000	IE5	94.1	93.6	92.0	0.73	32.9	47.8	0.0184	69	B
11	M3HL 160MLA 4	3GHL162417-...C	3000	IE5	93.6	93.2	91.8	0.72	25.6	35.0	0.0579	133	B
15	M3HL 160MLB 4	3GHL162427-...C	3000	IE5	95.1	94.9	93.8	0.73	34.6	48.0	0.0579	133	B
18.5	M3HL 160MLC 4	3GHL162437-...C	3000	IE5	94.6	94.4	93.4	0.70	43.3	59.0	0.0579	133	B
22	M3HL 180MLB 4	3GHL182427-...C	3000	IE5	95.5	95.5	95.3	0.70	50.5	70.0	0.116	190	B
30	M3HL 200MLC 4	3GHL202437-...C	3000	IE5	95.9	95.4	95.2	0.71	68.9	95.6	0.207	277	B
37	M3HL 200MLD 4	3GHL202447-...C	3000	IE5	96.1	95.7	95.0	0.71	84.5	118	0.207	277	B
45	M3HL 225SMB 4	3GHL222227-...C	3000	IE5	96.1	96.1	95.3	0.73	99.8	143	0.302	330	B
55	M3HL 250SMA 4	3GHL252217-...C	3000	IE5	96.4	96.0	95.2	0.73	123	175	0.499	396	B
75	M3HL 250SMB 4	3GHL252227-...C	3000	IE5	96.5	96.0	95.2	0.72	167	239	0.499	396	B
90	M3HL 250SMC 4	3GHL252237-...C	3000	IE5	96.4	95.9	95.0	0.74	198	286	0.632	454	B
1500 r/min (50 Hz)			400 V network										
5.5	M3HL 132SMA 4	3GHL132213-...C	1500	IE5	93.7	93.7	92.6	0.75	11.7	35.0	0.0277	85	B
7.5	M3HL 132SMB 4	3GHL132223-...C	1500	IE5	93.7	93.9	93.2	0.76	15.7	47.8	0.0277	85	B
11	M3HL 160MLA 4	3GHL162413-...C	1500	IE5	94.0	94.2	93.6	0.75	24.2	70.0	0.0702	160	B
15	M3HL 160MLB 4	3GHL162423-...C	1500	IE5	94.8	94.9	94.6	0.77	32.1	95.0	0.0864	177	B
18.5	M3HL 180MLB 4	3GHL182423-...C	1500	IE5	95.0	94.6	94.2	0.72	42.8	118	0.156	222	B
22	M3HL 180MLC 4	3GHL182433-...C	1500	IE5	95.4	95.3	95.0	0.72	49.4	140	0.156	222	B
30	M3HL 200MLB 4	3GHL202423-...C	1500	IE5	95.9	95.8	95.0	0.75	65.0	191	0.287	304	B
37	M3HL 225SMB 4	3GHL222223-...C	1500	IE5	96.3	96.3	96.1	0.76	79.3	236	0.38	385	B
45	M3HL 225SMC 4	3GHL222233-...C	1500	IE5	96.3	96.3	96.0	0.74	98.5	286	0.38	350	B
55	M3HL 250SMB 4	3GHL252223-...C	1500	IE5	96.5	95.8	95.0	0.76	117	350	0.632	454	B
75	M3HL 280SMA 4	3GHL282213-...C	1500	IE5	96.2	95.7	94.6	0.73	166	478	1	639	B
90	M3HL 280SMB 4	3GHL282223-...C	1500	IE5	96.5	96.2	95.2	0.73	199	573	1	639	B
110	M3HL 280SMC 4	3GHL282233-...C	1500	IE5	96.7	96.4	95.4	0.74	241	699	1.21	697	B
110	M3HL 315SMA 4	3GHL312213-...C	1500	IE5	96.8	96.4	95.2	0.73	243	702	1.64	873	B
132	M3HL 315SMB 4	3GHL312223-...C	1500	IE5	96.8	96.4	95.3	0.73	290	842	1.87	925	B
160	M3HL 315SMC 4	3GHL312233-...C	1500	IE5	97.1	96.8	96.0	0.75	343	1018	2.04	965	B
200	M3HL 315MLA 4	3GHL312413-...C	1500	IE5	97.2	97.0	96.2	0.75	428	1272	2.45	1116	B
250	M3HL 315LKA 4	3GHL312813-...C	1500	IE5	97.1	96.7	95.7	0.73	552	1591	3.04	1357	B
315	M3HL 315LKC 4	3GHL312833-...C	1500	IE5	97.2	97.0	96.2	0.76	662	2006	3.77	1533	F
1000 r/min (33.3 Hz)			400 V network										
7.5	M3HL 160MLA 4	3GHL162412-...C	1000	IE5	93.1	93.5	93.1	0.76	16.5	72.0	0.0702	160	B
11	M3HL 160MLB 4	3GHL162422-...C	1000	IE5	93.7	94.0	93.7	0.76	24.1	105	0.0864	177	B
15	M3HL 180MLC 4	3GHL182432-...C	1000	IE5	94.2	94.2	93.8	0.73	34.1	143	0.156	216	B
18.5	M3HL 200MLA 4	3GHL202412-...C	1000	IE5	95.2	95.3	94.9	0.76	39.9	177	0.287	304	B
22	M3HL 200MLB 4	3GHL202422-...C	1000	IE5	95.0	95.2	94.9	0.77	47.0	210	0.287	304	B
30	M3HL 225SMB 4	3GHL222222-...C	1000	IE5	95.5	95.5	94.3	0.76	64.7	287	0.38	348	B
37	M3HL 250SMA 4	3GHL252212-...C	1000	IE5	95.6	95.7	95.4	0.75	80.5	353	0.575	428	B
45	M3HL 280SMA 4	3GHL282212-...C	1000	IE5	96.2	96.0	95.2	0.74	98.6	430	1	639	B
55	M3HL 280SMB 4	3GHL282222-...C	1000	IE5	96.0	95.9	95.3	0.75	119	526	1	639	B
75	M3HL 280SMC 4	3GHL282232-...C	1000	IE5	96.2	96.2	95.7	0.76	160	715	1.21	697	B
75	M3HL 315SMA 4	3GHL312212-...C	1000	IE5	96.5	96.4	95.6	0.74	164	717	1.64	873	B
90	M3HL 315SMB 4	3GHL312222-...C	1000	IE5	96.8	96.7	96.0	0.73	199	859	1.87	925	B
110	M3HL 315SMC 4	3GHL312232-...C	1000	IE5	96.8	96.7	96.1	0.74	241	1051	2.04	965	B
132	M3HL 315MLA 4	3GHL312412-...C	1000	IE5	97.1	97.1	96.7	0.76	278	1261	2.45	1116	B
160	M3HL 315LKA 4	3GHL312812-...C	1000	IE5	97.1	97.0	96.4	0.75	341	1527	3.04	1357	B
200	M3HL 315LKC 4	3GHL312832-...C	1000	IE5	97.3	97.2	96.7	0.77	416	1910	3.77	1533	B

Technical data for IE5 SynRM Increased safety Ex ec motors for Zones 2 and Ex t motors for Zones 21 & 22

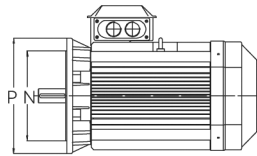
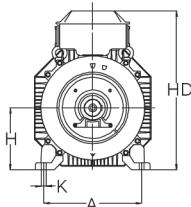
IP 55 - IC 411 - Insulation class F, temperature rise class B

Output kW	Type designation	Product code	Speed at 100% of nominal power (M) (r/min)	IE class acc. to IEC TS 60034-30-2	Efficiency IEC 60034-2 - 1; 2014			Power factor Cos ϕ	Current I _N A	Torque T _N Nm	Rotor inertia 1/4GD2 (M) (kgm ²)	Weight kg	Temperature rise class (M)
					Full load 100%	3/4 load 75%	1/2 load 50%						
3000 r/min (100 Hz)			400 V network										
5.5	M3GL 132SMA 4	3GGL132217-...C	3000	IE5	92.8	91.9	89.5	0.73	12.1	17.5	0.0145	63	B
7.5	M3GL 132SMB 4	3GGL132227-...C	3000	IE5	93.1	92.5	90.6	0.74	16.5	23.9	0.0145	63	B
11	M3GL 132SMC 4	3GGL132237-...C	3000	IE5	94.0	93.1	90.9	0.72	24.5	35.0	0.0184	69	B
15	M3GL 132SMD 4	3GGL132247-...C	3000	IE5	94.1	93.6	92.0	0.73	32.9	47.8	0.0184	69	B
11	M3GL 160MLA 4	3GGL162417-...C	3000	IE5	93.6	93.2	91.8	0.72	25.6	35.0	0.0579	133	B
15	M3GL 160MLB 4	3GGL162427-...C	3000	IE5	95.1	94.9	93.8	0.73	34.6	48.0	0.0579	133	B
18.5	M3GL 160MLC 4	3GGL162437-...C	3000	IE5	94.6	94.4	93.4	0.70	43.3	59.0	0.0579	133	B
22	M3GL 180MLB 4	3GGL182427-...C	3000	IE5	95.5	95.5	95.3	0.70	50.5	70.0	0.116	190	B
30	M3GL 200MLC 4	3GGL202437-...C	3000	IE5	95.9	95.4	95.2	0.71	68.9	95.6	0.207	277	B
37	M3GL 200MLD 4	3GGL202447-...C	3000	IE5	96.1	95.7	95.0	0.71	84.5	118	0.207	277	B
45	M3GL 225SMB 4	3GGL222227-...C	3000	IE5	96.1	96.1	95.3	0.73	99.8	143	0.302	330	B
55	M3GL 250SMA 4	3GGL252217-...C	3000	IE5	96.4	96.0	95.2	0.73	123	175	0.499	396	B
75	M3GL 250SMB 4	3GGL252227-...C	3000	IE5	96.5	96.0	95.2	0.72	167	239	0.499	396	B
90	M3GL 250SMC 4	3GGL252237-...C	3000	IE5	96.4	95.9	95.0	0.74	198	286	0.632	454	B
1500 r/min (50 Hz)			400 V network										
5.5	M3GL 132SMA 4	3GGL132213-...C	1500	IE5	93.7	93.7	92.6	0.75	11.7	35.0	0.0277	85	B
7.5	M3GL 132SMB 4	3GGL132223-...C	1500	IE5	93.7	93.9	93.2	0.76	15.7	47.8	0.0277	85	B
11	M3GL 160MLA 4	3GGL162413-...C	1500	IE5	94.0	94.2	93.6	0.75	24.2	70.0	0.0702	160	B
15	M3GL 160MLB 4	3GGL162423-...C	1500	IE5	94.8	94.9	94.6	0.77	32.1	95.0	0.0864	177	B
18.5	M3GL 180MLB 4	3GGL182423-...C	1500	IE5	95.0	94.6	94.2	0.72	42.8	118	0.156	222	B
22	M3GL 180MLC 4	3GGL182433-...C	1500	IE5	95.4	95.3	95.0	0.72	49.4	140	0.156	222	B
30	M3GL 200MLB 4	3GGL202423-...C	1500	IE5	95.9	95.8	95.0	0.75	65.0	191	0.287	304	B
37	M3GL 225SMB 4	3GGL222223-...C	1500	IE5	96.3	96.3	96.1	0.76	79.3	236	0.38	385	B
45	M3GL 225SMC 4	3GGL222233-...C	1500	IE5	96.3	96.3	96.0	0.74	98.5	286	0.38	350	B
55	M3GL 250SMB 4	3GGL252223-...C	1500	IE5	96.5	95.8	95.0	0.76	117	350	0.632	454	B
75	M3GL 280SMA 4	3GGL282213-...C	1500	IE5	96.2	95.7	94.6	0.73	166	478	1	639	B
90	M3GL 280SMB 4	3GGL282223-...C	1500	IE5	96.5	96.2	95.2	0.73	199	573	1	639	B
110	M3GL 280SMC 4	3GGL282233-...C	1500	IE5	96.7	96.4	95.4	0.74	241	699	1.21	697	B
110	M3GL 315SMA 4	3GGL312213-...C	1500	IE5	96.8	96.4	95.2	0.73	243	702	1.64	873	B
132	M3GL 315SMB 4	3GGL312223-...C	1500	IE5	96.8	96.4	95.3	0.73	290	842	1.87	925	B
160	M3GL 315SMC 4	3GGL312233-...C	1500	IE5	97.1	96.8	96.0	0.75	343	1018	2.04	965	B
200	M3GL 315MLA 4	3GGL312413-...C	1500	IE5	97.2	97.0	96.2	0.75	428	1272	2.45	1116	B
250	M3GL 315LKA 4	3GGL312813-...C	1500	IE5	97.1	96.7	95.7	0.73	552	1591	3.04	1357	B
315	M3GL 315LKC 4	3GGL312833-...C	1500	IE5	97.2	97.0	96.2	0.76	662	2006	3.77	1533	F
1000 r/min (33.3 Hz)			400 V network										
7.5	M3GL 160MLA 4	3GGL162412-...C	1000	IE5	93.1	93.5	93.1	0.76	16.5	72.0	0.0702	160	B
11	M3GL 160MLB 4	3GGL162422-...C	1000	IE5	93.7	94.0	93.7	0.76	24.1	105	0.0864	177	B
15	M3GL 180MLC 4	3GGL182432-...C	1000	IE5	94.2	94.2	93.8	0.73	34.1	143	0.156	216	B
18.5	M3GL 200MLA 4	3GGL202412-...C	1000	IE5	95.2	95.3	94.9	0.76	39.9	177	0.287	304	B
22	M3GL 200MLB 4	3GGL202422-...C	1000	IE5	95.0	95.2	94.9	0.77	47.0	210	0.287	304	B
30	M3GL 225SMB 4	3GGL222222-...C	1000	IE5	95.5	95.5	94.3	0.76	64.7	287	0.38	348	B
37	M3GL 250SMA 4	3GGL252212-...C	1000	IE5	95.6	95.7	95.4	0.75	80.5	353	0.575	428	B
45	M3GL 280SMA 4	3GGL282212-...C	1000	IE5	96.2	96.0	95.2	0.74	98.6	430	1	639	B
55	M3GL 280SMB 4	3GGL282222-...C	1000	IE5	96.0	95.9	95.3	0.75	119	526	1	639	B
75	M3GL 280SMC 4	3GGL282232-...C	1000	IE5	96.2	96.2	95.7	0.76	160	715	1.21	697	B
75	M3GL 315SMA 4	3GGL312212-...C	1000	IE5	96.5	96.4	95.6	0.74	164	717	1.64	873	B
90	M3GL 315SMB 4	3GGL312222-...C	1000	IE5	96.8	96.7	96.0	0.73	199	859	1.87	925	B
110	M3GL 315SMC 4	3GGL312232-...C	1000	IE5	96.8	96.7	96.1	0.74	241	1051	2.04	965	B
132	M3GL 315MLA 4	3GGL312412-...C	1000	IE5	97.1	97.1	96.7	0.76	278	1261	2.45	1116	B
160	M3GL 315LKA 4	3GGL312812-...C	1000	IE5	97.1	97.0	96.4	0.75	341	1527	3.04	1357	B
200	M3GL 315LKC 4	3GGL312832-...C	1000	IE5	97.3	97.2	96.7	0.77	416	1910	3.77	1533	B

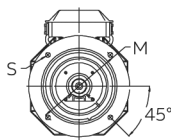
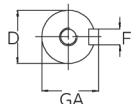
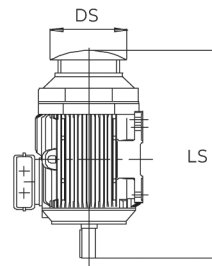
Dimensions



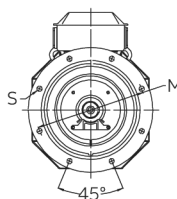
Foot-mounted motor IM 1001, IM B3



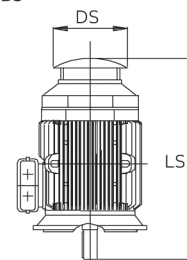
Flange-mounted motor IM 3001, IM B5



Sizes 132 to 200



Sizes 225 to 315



Protective roof, variant code 005

Motor size	Speed r/min	IM1001, IM B3 and IM3001, IM B5					IM1001, IMB3					IM3001, IM B5					IM3601, IM B14					Protective roof			
		D	GA	F	E	L	A	B	B'	C	H	HD	K	M	N	P	S	T	M	N	P	S	T	DS	LS
132 SM_	3000	38	41	10	80	624	216	140	178	89	132	321	12	265	230	300	14.5	4	165	130	200	10	3.5	-	590
160 ML_	3000	42	45	12	110	584	254	210	254	108	160	421	14.5	300	250	350	19	5	300	250	350	19	5	328	756
160 ML_	1500-1000	42	45	12	110	681	254	210	254	108	160	421	14.5	300	250	350	19	5	300	250	350	19	5	328	756
180 ML_	3000	48	51.5	14	110	726	279	241	279	121	180	461	14.5	300	250	350	19	5	300	250	350	19	5	359	756
180 ML_	1500-1000	48	51.5	14	110	766	279	241	279	121	180	461	14.5	300	250	350	19	5	300	250	350	19	5	359	756
200 ML_	3000-1000	55	59	16	110	821	318	267	305	133	200	528	18.5	350	300	400	19	5	350	300	400	19	5	414	844
225 SM_	3000	55	59	16	110	849	356	286	311	149	225	573	18.5	400	350	450	19	5	400	350	450	19	5	462	951
225 SM_	1500-1000	60	64	18	140	879	356	286	311	149	225	573	18.5	400	350	450	19	5	400	350	450	19	5	462	951
250SM_	3000	60	64	18	140	884	406	311	349	168	250	626	24	500	450	550	19	5	500	450	550	19	5	506	965
250 SM_	1500-1000	65	69	18	140	884	406	311	349	168	250	626	24	500	450	550	19	5	500	450	550	19	5	506	965
280	1500-1000	75	79.5	20	140	1088	457	368	419	190	280	762	24	500	450	550	23	5	500	450	550	23	5	555	1190
315 SM_	1500-1000	80	85	22	170	1204	508	406	457	216	315	852	28	600	550	660	23	6	600	550	660	23	6	624	1420
315 ML_	1500-1000	90	95	25	170	1315	508	457	508	216	315	852	28	600	550	660	23	6	600	550	660	23	6	624	1431
315 LK_	1500-1000	90	95	25	170	1521	508	508	560	216	315	880	28	600	550	660	23	6	600	550	660	23	6	624	1431

The table gives the main dimension in mm.

For detailed drawings please see our web pages: <https://new.abb.com/motors-generators>

The perfect match with ABB drives

ABB IE5 SynRM and drive package is perfectly matched, enabling you to get everything you need from a single supplier. Choose these motors for new projects or use them as a drop-in replacement for older, less efficient motors.



