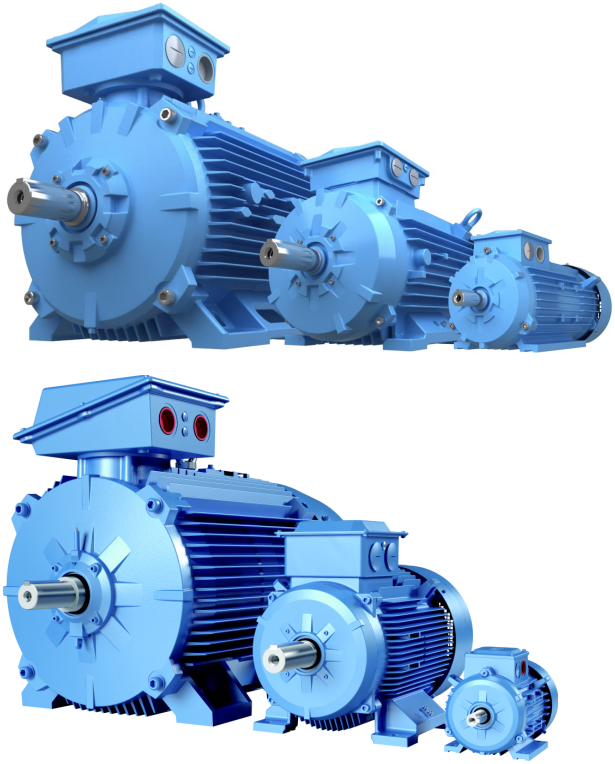
M2**系列三相异步电动机**
安装，操作，维护及安全手册

M2 series three-phase asynchronous motor
Installation, operation, maintenance and safety manual



EU Declaration of Conformity

The products: 3-phase electric motors of the series

M2BAX 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315 and 355

M3BP 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315, 355, 400 and 450

M3AA 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250 and 280

The Manufacturer:

ABB Shanghai Motors Co., Ltd.
No.88 Tianning Road,
Minhang(Economic & Technical Development Zone)
Shanghai 200245 P.R. of China

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration as listed above are in conformity with the relevant Union harmonization legislation:

Directive 2014/35/EU

The motors are in conformity with provisions of the harmonized standards which thus comply with Principal Elements of the Safety Objectives for Electrical Equipment stated in Annex I of said directive.

Directive 2009/125/EC

The motors that are marked as IE2, IE3 or IE4 are in conformity with the requirements set in the Commission Regulation (EC) No. 640/2009 and the amending Regulation (EU) No. 4/2014 until 30th of June 2021 and with the Regulation (EU) 2019/1781 and the amending Regulation (EU) 2021/341 from 1st of July 2021 and onwards.

Directive 2011/65/EU

Motors are in conformity with the Directive 2011/65/EU and the amending Annex II to this Directive of the Delegated Directive (EU) 2015/863 of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Technical documentation based on the harmonized standard EN IEC 63000:2018.

The following harmonized standards were applied in relation to which conformity is declared:
EN 60034-1:2010, EN 60034-2-1:2014, EN 60034-5:2001/A1:2007, EN 60034-6:1993, EN 60034- 7:1993/A1:2001, EN 60034-8:2007/A1:2014, EN 60034-9:2005/A1:2007, EN 60034-12:2002/A1:2007, EN 60034-14:2004:/A1:2007 and EN 60034-30-1:2014.

Notes:

When installing motors for converter supply applications, additional requirements must be respected regarding the motor as well as the installation, as described in installation manual delivered with converters.

The conformity of the incorporation into a **finished machine** according to the Directive 2006/42/EC shall be established by the commissioning party when motor is fitted to the machinery.

According to the Regulation (EU) 2019/1781 motors placed on the market before 1 July 2029 as substitutes for identical motors integrated in products placed on the market before 1 July 2021 for motors referred to in Annex I.1 (a), and before 1 July 2023 for motors referred to in Annex I.1 (b), and specifically marketed as such are exempt from the efficiency requirements.

Signed for and on behalf of: ABB Shanghai Motors Co.,LTD.
Place and date of issue: Shanghai, China, 2021-03-31

Signed by

Name: Robert Chin
Title: Global R&D Manager

Signed by

Name: Hui Luo
Title: China Local Division Manager

TELEPHONE
86 21 54723133

TELEFAX
86 21 54725009

安装、使用产品前，请阅读使用维护说明书
Before installation and use of the product, please read the maintenance manual

Declaration of Conformity

The products: 3-phase electric motors of the series

M2BAX 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315 and 355

M3BP 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315, 355, 400 and 450

M3AA 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250 and 280

The Manufacturer:

ABB Shanghai Motors Co., Ltd.
No.88 Tianning Road,
Minhang (Economic & Technical Development Zone)
Shanghai 200245 P.R. of China

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration as listed above are in conformity with the relevant **Statutory Instruments**:

UK Statutory Instruments 2012 No. 1101 'Electrical Equipment (Safety) Regulations 2016'

The motors are in conformity with provisions of the **designated** standards which thus comply with Principal Elements of the Safety Objectives for Electrical Equipment stated in **Schedule 1** of said Regulation.

UK Statutory Instruments 2021 No. 745 'The Ecodesign for Energy-Related Products and Energy Information Regulations 2021'

The motors marked as IE2, IE3 or IE4 are in conformity with the requirements set in the SI 745.

UK Statutory Instruments 2012 No. 3032 'The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012'

Motors are in conformity with the said Regulations on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Technical documentation based on the standard EN IEC 63000:2018.

The following designated standards were applied in relation to which conformity is declared:

EN 60034-1:2010, EN 60034-2-1:2014, EN 60034-5:2001/A1:2007, EN 60034-6:1993, EN 60034- 7:1993/A1:2001, EN 60034-8:2007/A1:2014, EN 60034-9:2005/A1:2007, EN 60034-12:2002/A1:2007, EN 60034-14:2004:/A1:2007 and EN 60034-30-1:2014.

Notes:

Additional requirements for the motor and converter installation, cabling and grounding as described in operating manuals delivered with motors and converters shall be followed and respected

The conformity of the incorporation into a finished **machine** according to the UK Statutory Instruments 2008 No. **1597** shall be established by the commissioning party when motor is fitted to the machinery.

According to the Regulation (EU) 2019/1781 motors placed on the market before 1 July 2029 as substitutes for identical motors integrated in products placed on the market before 1 July 2021 for motors referred to in Annex I.1 (a), and before 1 July 2023 for motors referred to in Annex I.1 (b), and specifically marketed as such are exempt from the efficiency requirements.

Signed for and on behalf of: ABB Shanghai motors, CO., LTD
Place and dateof issue: Shanghai, China, 2022-05-27

Signed by _____
Name: Robert Chin
Title: Global R&D Manager

Signed by _____
Name: Hui Luo
Title: China Local Division Manager

EU Declaration of Conformity

The products: 3-phase electric motors of the series

M2QA 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315 and 355

QABP 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315 and 355

The Manufacturer:

ABB Shanghai Motors Co., Ltd.
No.88 Tianning Road,
Minhang(Economic & Technical Development Zone)
Shanghai 200245 P.R. of China

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration as listed above are in conformity with the relevant Union harmonization legislation:

Directive 2014/35/EU

The motors are in conformity with provisions of the harmonized standards which thus comply with Principal Elements of the Safety Objectives for Electrical Equipment stated in Annex I of said directive.

Directive 2009/125/EC

The motors that are marked as IE2 (below 0.75 kW), IE3 or IE4 (2, 4 and 6 pole from 75kW up to 200 kW) are in conformity with the requirements set in the Commission Regulation (EU) 2019/1781.

Directive 2011/65/EU

Motors are in conformity with the Directive 2011/65/EU and the amending Annex II to this Directive of the Delegated Directive (EU) 2015/863 of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Technical documentation based on the harmonized standard EN IEC 63000:2018.

The following harmonized standards were applied in relation to which conformity is declared:

EN 60034-1:2010, EN 60034-2-1:2014, EN 60034-5:2001/A1:2007, EN 60034-6:1993, EN 60034-7:1993/A1:2001, EN 60034-8:2007/A1:2014, EN 60034-9:2005/A1:2007, EN 60034-12:2002/A1:2007, EN 60034-14:2004:/A1:2007 and EN 60034-30-1:2014.

Notes:

When installing motors for converter supply applications, additional requirements must be respected regarding the motor as well as the installation, as described in installation manual delivered with converters.

The conformity of the incorporation into a finished machine according to the Directive 2006/42/EC shall be established by the commissioning party when motor is fitted to the machinery.

According to the Regulation (EU) 2019/1781 motors placed on the market before 1 July 2029 as substitutes for identical motors integrated in products placed on the market before 1 July 2021 for motors referred to in Annex I.1 (a), and before 1 July 2023 for motors referred to in Annex I.1 (b), and specifically marketed as such are exempt from the efficiency requirements.

Signed for and on behalf of: ABB Shanghai Motors Co.,LTD.
Place and date of issue: Shanghai, China, 2024-11-12

Signed by

Name: Robert Chin
Title: Global R&D Manager

Signed by

Name: Hui Luo
Title: China Local Division Manager

TELEPHONE
86 21 54723133

TELEFAX
86 21 54725009

EU Declaration of Conformity

The products: 3-phase electric motors of the series

M3BP

Shaft heights: 71, 80, 90, 100, 112, 132, 160, 180
Fixing dimensions: M_, L_, SM_,ML_, LK_
Output power code: A, B, C, D, E, F, G, H, J
Pole numbers: 2, 4, 6
e.g. M3BP 100LKA 4

M3AA

Shaft heights: 56, 63, 71, 80, 90, 100, 112, 132, 160, 180
Fixing dimensions: S_, M_, L_, SM_, ML_
Output power code: A, B, C, D, E, F, G, H, J
Pole numbers: 2, 4, 6
e.g. M3AA 90LB 2

M2BAX

Shaft heights: 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315 and 355
Fixing dimensions: S_, M_, L_, SM_, SL_, ML_, LK_
Output power code: A, B, C, D, E, F, G, H, J, K
Pole numbers: 2, 4, 6
e.g. M2BAX 315SMA 2

The Importer:

ABB Sp. z o.o
27 Placydowska Str.
95-070 Aleksandrów Łódzki
POLAND

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration as listed above are in conformity with the following Union harmonization legislation:

Directive 2014/35/EU
and the Principal Elements of the Safety Objectives for Electrical Equipment stated in the Annex I.

Directive 2009/125/EC
and marked as IE2 (<0.75 kW), IE3 or IE4 (2, 4 and 6 pole from 75kW up to 200 kW) are in conformity with the requirements set in the Regulation (EU) 2019/1781.

Directive 2011/65/EU
and the amending Annex II in the (EU) 2015/863 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Technical documentation based on the harmonized standard EN IEC 63000:2018

The following standards are applied in relation to which conformity is declared:

EN 60034-1:2010, EN 60034-2-1:2014, EN 60034-5:2001/A1:2007, EN 60034-6:1993, EN 60034- 7:1993/A1:2001, EN 60034-8:2007/A1:2014, EN 60034-9:2005/A1:2007, EN 60034-12:2002/A1:2007, EN 60034-14:2004:/A1:2007, EN IEC 60204-1:2018 and EN 60034-30-1:2014.

Notes:

Additional requirements for the motor and converter installation, cabling and grounding as described in operating manuals delivered with motors and converters shall be followed and respected.

The conformity of the incorporation into a finished machine according to the Directive 2006/42/EC shall be established by the commissioning party when motor is assembled to the machinery.

According to the Regulation (EU) 2019/1781 motors placed on the market before 1 July 2029 as substitutes for identical motors integrated in products placed on the market before 1 July 2021 for motors referred to in Annex I.1 (a), and before 1 July 2023 for motors referred to in Annex I.1 (b), and specifically marketed as such are exempt from the efficiency requirements.

Signed for and on behalf of:	ABB Sp. z o.o.
Place and date of issue:	Aleksandrów Łódzki, Poland, 2025-02-03

Michał Lewiński

Michał Lewiński

Strategic Supply Unit Manager - IEC LV Motors

Strategic Supply Unit Manager
IEC LV Motors Poland
ABB Sp. z o.o.

Michał Lewiński

Declaration of Conformity

The products: 3-phase electric motors of the series

M3BP 71, 80, 90, 100, 112, 132, 160, 180

M3AA 56, 63, 71, 80, 90, 100, 112, 132, 160, 180

M2BAX 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315 and 355

The Importer:

ABB Limited, Daresbury Park, Daresbury,
Warrington, Cheshire, WA4 4BT

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The products of the declaration as listed above are in conformity with the following **UK Statutory Instruments**:

No. 1101 'Electrical Equipment (Safety) Regulations 2016

and the Principal Elements of the Safety Objectives for Electrical Equipment stated in the Schedule 1.

No. 745 'The Ecodesign for Energy-Related Products and Energy Information Regulations 2021'

Motors marked as IE2 (<0.75 kW), IE3 or IE4 (2, 4 and 6 pole 75kW up to 200 kW).

No. 3032 ''

and the said Regulations on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Technical documentation based on the standard EN IEC 63000:2018.

The following designated standards were applied in relation to which conformity is declared:

EN 60034-1:2010, EN 60034-2-1:2014, EN 60034-5:2001/A1:2007, EN 60034-6:1993, EN 60034- 7:1993/A1:2001, EN 60034-8:2007/A1:2014, EN 60034-9:2005/A1:2007, EN 60034-12:2002/A1:2007, EN 60034-14:2004:/A1:2007 and EN IEC 60034-30-1:2014.

Notes:

Additional requirements for the motor and converter installation, cabling and grounding as described in operating manuals delivered with motors and converters shall be followed and respected.

The conformity of the incorporation into a finished machine according to the UK Statutory Instruments 2008 No. 1597 shall be established by the commissioning party when motor is fitted to the machinery.

Motors placed on the market before 1 July 2029 as substitutes for identical motors integrated in products placed on the market before 1 July 2021 for motors referred to in Annex I.1 (a), and before 1 July 2023 for motors referred to in Annex I.1 (b), and specifically marketed as such are exempt from the efficiency requirements.

Signed for and on behalf of: ABB LIMITED

Place and date of issue: Warrington, Cheshire, WA4 4BT, UK 2025-01-dd

Liam Blackshaw
UK Product Manager

M2系列三相异步电动机

安装、操作、维护和安全手册

目录 **页码**

1. 一般说明

注意!
为确保安全、正确地安装、操作和维护机器，请务必遵守以下各项说明。安装、操作或维护机器或相关设备的人员应仔细阅读这些说明。本机器只能由熟悉健康和安全要求及国家法规的合格人员安装和使用。忽视这些说明会导致所有适用的担保失效。

1.1 符合性声明

当电机安装到机器时，负责调试的一方必须确保最终产品符合欧盟机械指令 2006/42 / EC 要求。

本公司符合 CEL 007《中小型三相异步电动机能源效率标识实施规则》范围的产品，已在中国能效标识网上备案，并按该规则在电机本体上标贴相应的能效标识，能效标识样式按该规则要求，能效等级及能效检测方法按 GB18613 要求，消费者可登陆中国能效标识网 www.energylabel.com.cn 查看详细备案信息。

1.2 有效性

这些说明对 ABB 以下类型产品的操作上，都是有效的。

M2系列三相异步电动机，机座尺寸 71 - 450。

对于用于危险区域的如防爆电动机，则有单独的使用手册“ 安装、操作与维护手册 ”（防爆电动机用低压电动机 / 手册）。

由于特殊应用和 / 或设计考虑的原因，某些类型电机需要提供附加信息。

下列电动机有附加信息：
- 排烟电动机（见附录 0.1）

2. 搬运

2.1 收货检查

收到货后，立即对电机进行检查，查看电机外部是否存在损坏（例如，轴端、法兰面和喷漆表面），如果发现损坏，请立刻通知转运代理商。

检查所有铭牌数据，特别是电压和绕组接线（星形或三角形）。所有电机的铭牌上都给出了轴承型号。

2.2 运输和存放

电机应始终在干燥（温度高于 - 20°C）、无振动和无尘的室内环境中存放。在运输期间，应避免出现撞击、掉落和受潮。若出现其他情况，请联系 ABB。

应对未加防护的机器加工表面（轴端和法兰面）进行防锈处理。

建议定期用手转动电机轴，以防润滑脂渗出。

如装有抗冷凝加热器，建议最好为其接通电源，避免在电机内出现冷凝。

电机在静止时不应受到任何外部震动，以避免损坏轴承。

在运输途中，必须为装有圆柱滚子轴承和 / 或角接触轴承的电机安装锁定装置。

2.3 起吊

重量超出 25 kg 的所有 ABB 电机都配有吊环或吊环螺栓。

电机只能用主吊环或吊环螺栓起吊。当电机固定在其它设备上时，不得用主吊环或吊环螺栓起吊。

不得使用辅助设备（例如，制动器、独立冷却风扇）或接线盒的吊环来起吊电机。

由于输出功率、安装方式和辅助设备的不同，相同机座号的电机的重心可能有所变化。

不得使用损坏的吊环。在起吊电机之前，请检查吊环螺栓或做成一体的吊环是否完好无损。

起重前，必须对吊环螺栓进行紧固。如有必要，还必须用合适的垫片调整吊环螺栓的位置。

确保使用正确的起重设备，吊钩尺寸也必须与吊环相匹配。

注意不要损坏连接至电机的辅助设备和电缆。

2.4 机器重量

对于机座号（中心高度）相同的电机，机器总重量可能会存在差异，具体取决于输出功率、安装方式和辅助设备。

下表列出了不同机座材料的电机基本型号的最大估计重量。

ABB 所有电机的铭牌上都注明了电机的实际重量。

机座号	电机 重量 kg	制动器的 额外重量 kg
71	15	5
80	25	8
90	40	10
100	60	16
112	66	20
132	110	30
160	229	30
180	283	45
200	381	55
225	502	75
250	613	75
280	890	-
315	1700	-
355	2700	-

3. 安装和调试

警告
在电机或从动设备上工作之前请断开电源并锁定。

3.1 概述

必须仔细检查所有铭牌数据，确保正确完成电机防护和接线。

警告
若在安装电机时，轴朝上安装，则水或液体可能沿着轴下流，用户必须考虑采取措施，防止出现此类情况。打开装运锁（若已使用）。用手转动电机轴，检查其是否能自由旋转。

配有滚柱轴承的电机：
在无径向力作用于电机轴的情况下运转电机可能会损坏滚柱轴承。

配有角接触轴承的电机：
在无正确方向轴向力作用于电机轴的情况下运转电机可能会损坏角接触轴承。

警告
对于装有角面接触轴承的电机，轴向力严禁更改方向。

铭牌上已指明轴承型号。

装有注油嘴的电机：
第一次启动电机或长期存放后启动电机时，请打入指定量的润滑脂。

有关详细信息，请参阅“ 6.2.2 带润滑轴承的电机 ”部分。

3.2 绝缘电阻检查

投入使用前或怀疑绕组受潮时，应对绝缘电阻进行测量。

警告
在电机或从动设备上工作之前，请断开电源并锁定。

在 25°C下测量的绝缘电阻应超过其参考值，即 10 MΩ（用 500 或 1000 V DC 高阻表测量）。环境温度每上升 20°C，绝缘电阻值即减小一半。

警告
电机机座必须接地，在每次测量后应马上将绕组通过机座放电，以免触电。

如果未达到参考电阻值，则说明绕组已经受潮，必须在烘箱炉内烘干绕组。绕组在烘箱炉温度为 90°C下烘 12 - 16 小时，然后在 105°C下烘 6 - 8 小时。

在加热时，如果安装了排水孔塞，则必须拔除，如果安装了隔断阀，则必须打开。加热后，必须重新塞入排水塞。即使安装了排水塞，仍建议在干燥过程中拆除端罩和接线盒盖。

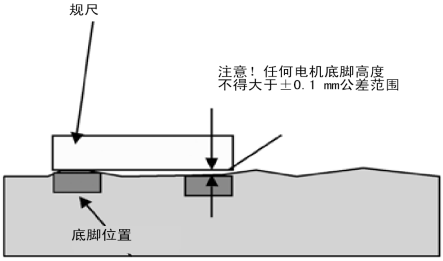
被海水打湿的绕组必须重新进行绕线。

3.3 底座

所有底座准备工作由终端用户承担。

金属底座应该涂漆，以防生锈。

底座必须平整（参见下图）、坚固、足以抵抗短路产生的冲击力。它们的设计和尺寸必须确保避免引起电机振动以及共振。



3.4 平衡和安装半联轴器和皮带轮

标准情况下，用半键来平衡电机。

当用全键平衡时，轴上贴有黄色胶带，并注明“ 用全键平衡 ”。

当进行无键平衡时，轴上贴有蓝色胶带，并注明‘ 无键平衡 ”。

半联轴节或皮带轮必须用加工后的键槽来进行平衡。必须根据电机指定的平衡方法来完成平衡。

必须用合适的设备和工具来安装半联轴节和皮带轮，以免损坏轴承和密封件。

安装半联轴节或皮带轮时不要将它们敲打入位，也不要用杠杆抵住机体拆下它们。

3.5 安装和校正电机

确保电机周围的空气流通充分。可以从产品目录或网址上（参见 www.abb.com/motors&generators）的尺寸图中获得电机风罩后侧的最小自由空间要求。

校正正确与否是避免轴承故障、振动和轴破损的关键所在。

使用合适的螺栓或双头螺栓将电机安装在底座上，并在底座和底脚之间放置薄垫板。

用合适的方法对准电机。

如适用，钻定位孔，然后将定位销固定就位。

半联轴节的安装精度：检查间隙 b，确保其小于 0.05 mm，a1 和 a2 之间的间隙也应小于 0.05 mm。请参阅图 3。

在紧固螺栓或双头螺栓后，请再检查一次对准情况。

不得超过产品目录中规定的轴承允许负载值。

3.6 滑轨和皮带传动

如图 2 所示，将电机固定到滑轨上。

水平放置滑轨，使其处于同一平面。

检查电机轴是否与主动轴平行。

必须根据从动设备供应商的说明张紧皮带。然而，不得超出相关产品目录中规定的最大皮带张力（即，径向轴承负载）。

警告
皮带过紧会损坏轴承，并有可能引起电机轴损坏。

3.7 带有冷凝排水塞的电机

检查排水孔和排水塞是否朝下。

电机在交付时，可密封塑料排水塞处于打开位置。在灰尘过多的环境中，应关闭所有排水孔。

3.8 电缆敷设和电气接线

标准单速电机上的接线盒通常包含六个绕组接线端子以及至少一个接地端子。

除主绕组和接地端子外，接线盒还包括用于热敏电阻、加热元件或其它辅助设备的接头。

连接所有主电缆时必须使用合适的电缆铜接头。辅助设备的电缆可连接至各自的接线板。

机器仅用于固定安装。如非特别指明，电缆入口采用公制螺纹。电缆密封管的 IP 等级必须至少与接线盒的 IP 等级相同。

未使用的电缆入口必须根据接线盒的 IP 等级用封堵件密封。

在与电缆接密封管相关的文档中指明防护等级和直径。

警告
根据电缆型号和直径，在电缆入口中使用合适的电缆密封管及其密封件。

有关适用于变速应用的电缆和接头的详细信息，请参阅第 5.5 节。

在将机器连接至电源之前，必须按当地规定进行接地。

应确保电机的防护与环境和天气条件相适应；例如，确保水不会进入电机或接线盒内。

必须在接线盒的密封槽中正确放置密封件，以确保提供正确的 IP 防护等级。

3.8.1 不同启动方法的接线

标准单速电机上的接线盒通常包含六个绕组接线端子以及至少一个接地端子。这允许使用 DOL- 或 Y/D- 启动。请参见图 1。

对于双速电机和特殊电机，必须按照接线盒或电机手册内的说明进行电源接线。

铭牌上印有电压和接线说明。

直接启动（DOL）：
可能需要采用 Y 或 D 绕组连接。

例如，690 VY，400 VD 表示 690 V 的 Y 接线和 400 V 的 D 接线。

星形 / 三角形启动（Y/D）：
当采用 D 接线启动时，电源电压必须与电机的额定电压相等。

拆除接线板上的所有接线片。

其它启动方法和严格的启动条件：
如果使用其它启动方法，例如软启动器，或启动条件很难实现，则请事先联系 ABB。

3.8.2 辅助设备接线

如果电机配有热敏电阻或其它电阻式温度检测器（Pt100、热敏继电器等）和辅助设备，则建议通过合适的方法对它们进行连接和使用。可以在接线盒内找到辅助元件和连接部件的接线图。

热敏电阻的最大测量电压为 2.5 V。Pt100 的最大测量电流为 5 mA。使用更高的测量电压或电流会导致读数误差或损坏系统。

绕组温度传感器采用基本绝缘类型。当将传感器连接至控制系统时，确保提供足够的绝缘或隔离，请参见 IEC 60664。

注意事项！
确保热敏电阻电路的绝缘等级或隔离符合 IEC 60664。

3.8.3 接线盒螺栓的紧固扭矩

以下扭矩表是拧紧扭矩的通用指南。在确定拧紧扭矩时， 必须考虑电机的框架材料和表面处理。

螺纹	螺栓等级				
	4.6	5.8	8.8	10.9	12.9
	紧固扭矩 Nm				
M4	0.8	2	3	4	4.3
M5	2	4	6	9	10
M6	3	6	10	15	17
M8	8	15	23	32	50
M10	19	32	46	62	80
M12	32	55	79	101	135

3.9 端子和旋转方向

当电源相序 L1、L2、L3 如图 1 所示连接到端子上后，面向电机驱动端看，轴的旋转方向为顺时针方向。

若要更改旋转方向，可交换电源电缆上的任意两根接线位置。

如果电机装有单向风扇，请确保旋转方向与电机上标示的箭头方向一致。

4. 操作

4.1 使用

除非铭牌上特别指明，否则电机设计在下列条件下使用。

- 环境温度的正常范围是 -20°C到 +40°C。
- 最高海拔高度为 1000 m。
- 根据 EN/IEC 60034-1（2004），电源电压公差为 ±5%，频率公差为 ±2%。

只能在满足上述条件的应用中使用电机。电机铭牌给出了额定值和工作条件。此外，必须遵守本手册和其它相关说明与标准中的所有要求。

如果超出这些限制条件，则必须检查电机数据和结构数据。更多详细信息，请联系 ABB 。

警告
忽视任何给定的说明或设备维护可能危及安全，所以必须阻止在这种情况下使用机器。

4.2 散热

检查电机内空气流通是否充分。确保电机不受附近设备热辐射或阳光直射的影响。

对于法兰安装型电机（例如，B5、B35、V1），确保电机结构允许法兰外表面有充分的空气流通。

4.3 安全事项

电机应由熟悉健康和安全要求及国家法规的合格人员安装和使用。

必须根据当地规定提供必要的安全设备，以防安装和操作现场发生事故。

警告
不得在接线电缆或附件，如变频器、启动器、制动器、热敏电阻电缆或加热元件通电时，在电机上工作。

注意事项

1. 不要踏在电机上。

2. 在正常操作过程中，尤其在停机后，电机外壳温度可能会很高，不能触摸。

3. 在某些特殊应用场合使用电机时需要参照特殊说明（例如，使用变频器电源）。

4. 小心电机的旋转部件。

5. 在通电时不得打开接线盒。

5. 变速操作中的低压电机

5.1 一般说明

本部分提供在变频器电源中使用的电机的附加说明。
必须遵守本手册及选定变频器的相关手册中给出的说明，以确保安全和电机的可用性。

ABB 可能要求提供更多信息来确定某些电机型号是否适合在特殊应用中使用或需要做特殊的设计修改。

5.2 绕组绝缘

与正弦电源相比，变速驱动器会在电机绕组上产生更高的电压应力，因此，必须根据下列说明确定电机绕组绝缘和变频器输出侧滤波器的规格。

5.2.1 相间电压

电机端子上所允许的最大相间电压峰值与脉冲的上升时间有关。

5.2.2 其它变频器的绕组绝缘选择

必须将电压应力限制到可接受的范围内。为确保应用的安全，请联系系统供应商。在确定电机规格时，必须考虑滤波器的可能影响。

5.3 热保护

本手册中涵盖的大部分电机都在定子绕组中装有 PTC 热敏电阻。建议通过合适的方式将这些热敏电阻连接至变频器。请参阅第 3.8.2 节。

5.4 轴承电流

必须根据下列说明选择使用绝缘轴承或轴承结构、共模滤波器和合适的电缆与接地方法：

5.4.1 消除 ABB变频器的轴承电流

当使用带有二极管电源装置的 ABB AC_8__ 和 AC_5__ 系列变频器，必须使用下列方法，避免在电机中出现有害的轴承电流：

额定功率（Pn）和/或机座号（IEC）	预防性措施
Pn < 100 kW	无需任何措施
Pn≥ 100 kW 或 IEC 315≤ 机座号 ≤ IEC 355	非驱动端采用绝缘轴承
Pn≥ 350 kW 或 IEC 400≤ 机座号 ≤ IEC 450	非驱动端采用绝缘轴承 和 变频器侧的共模滤波器

建议使用内孔或外孔具有氧化铝涂层或陶瓷滚动体的绝缘轴承。可使用密封剂对氧化铝涂层进行处理，防止灰尘和湿气进入多孔涂层。有关轴承绝缘的详细型号，请参见电机铭牌。未经 ABB 允许，不得更改轴承类型或绝缘方法。

5.4.2 消除所有其它变频器的轴承电流

用户负责保护电机和从动设备，防止它们受到有害轴承电流的影响。

可以参考第 5.4.1 节给出的说明，但不保证它们在所有情况下的有效性。

5.5 电缆敷设、接地和 EMC

为提供正确的接地以及确保满足现行的 EMC 要求，功率高于 30 kW 的电机必须使用屏蔽对称电缆和提供 360 ° 连接的 EMC 接头连接。对于较小的电机，强烈建议使用对称和屏蔽电缆。按接头说明中所述，在所有电缆入口处进行 360 ° 接地连接。将电缆屏蔽扭绞成束，然后连接至接线盒、变频器机柜内等最近的接地端子 / 母线。

注意事项！
必须在（如，电机、变频器、可能的安全开关等）所有端点处使用提供 360 ° 连接的正确电缆接头。

对于机座号为 IEC 280 及以上的电机，除非在一个公共的金属底座上安装，否则需要在电机机座和机器之间实现附加的电位均衡。当使用一个金属底座来实现电位均衡时，要检查此连接的高频导电性，例如通过测量部件之间的电势差。

有关变速驱动器接地和电缆敷设的更多信息，请参见手册 “ 驱动系统的接地和电缆敷设 ”（编号：3AFY 61201998）。

5.6 工作速度

当速度高于电机铭牌或相关产品目录中给出的标称速度时，务必确保不超出电机允许的最高转速或整个应用的临界速度。

5.7 变速应用试运行

必须根据变频器说明和当地法规执行变速应用试运行。此外，还必须考虑应用所规定的要求和限制。

必须从电机铭牌获取变频器设置所需的所有参数。最常使用的参数为：

- 电机标称电压
- 电机标称电流
- 电机标称频率
- 电机标称转速
- 电机标称功率

注意：当信息缺失或不准确时，在确保正确设置之前，不得操作电机！

ABB 建议使用由变频器提供的所有合适的防护特性来提高应用的安全性。变频器通常提供下列特性（特性的名称和可用性取决于变频器制造商和型号），例如：

- 最低转速
- 最高转速
- 加速和减速时间
- 最大电流
- 最大转矩
- 失速保护

5.8 电机变速应用

5.8.1 概述

使用 ABB 变频器时，电机可以使用ABB的DiveSize工具进行选型。该工具可以在ABB官网上下载(www.abb.com/motors&generators)。

对于其他变频器的应用，电机需要手动选型。欲了解更多信息，请联系ABB。

负载曲线（或负载能力曲线）基于额定电源电压。在欠压或者过压情况下运行，可能会影响应用的性能。

5.8.2 ABB AC_8_ _-系列变频器DTC控制时，电机的负载能力

图4a-4d的负载曲线适用于ABB AC_8_ _-系列变频器非调节直流电压和DTC控制的情况。图表显示电机的最大连续输出转矩随电源频率变化的近似曲线。输出转矩以电机额定转矩百分比的方式给出。这些值为指示性的，具体数值请咨询。

注意事项！
不得超过电机和应用的最大转速。

5.8.3. 使用ABB AC_5_ _-系列变频器时电机的负载能力

图5a-5d的负载曲线适用于ABB AC_5_ _-系列变频器情况。图表显示电机的最大连续输出转矩随电源频率变化的近似曲线。输出转矩以电机额定转矩百分比的方式给出。这些值为指示性的，具体数值请咨询。

注意事项!
不得超过电机和应用的最大转速。

5.8.4. 使用其他PWM变频器时电机的负载能力

对于其他变频器，使用非调节直流电压和最小开关频率3k Hz的情况，可以使用5.8.3的选型作为指导。不管怎样，实际的热负荷可以更低。请联系变频器或系统供应商。

注意事项!
电机的实际热负荷可能比指导曲线更低。

5.8.5. 短时过转矩

ABB电机通常可以短时过载，也可用于间歇工作制。对于此类应用，最方便的选型方式是使用DriveSize工具。

6. 维护

警告
停机时，在接线盒内可能接有供加热元件或加热绕组的电压。

警告
即使电机已经停止，但单相电机中的电容器仍可在电机端子间出现放电。

警告
即使电机已经停止，变频器电源供电的电机仍可带电。

6.1. 常规检查

1. 定期对电机进行检查，每年至少检查一次。检查的频率取决于如环境空气湿度等当地气候条件。刚开始时可通过多次实验确定检查频率，之后严格遵守。

2. 保持电机清洁，并确保空气自然流通。如果在灰尘过多的环境中使用电机，则必须定期检查和清洁通风系统。

3. 检查轴密封件（例如，V 形环或径向密封件）的情况，必要时更换密封件。

4. 检查连接件以及安装和组装螺栓的情况。

5. 通过监听是否存在不正常的噪音、振动测量、轴承温度测量，检查润滑脂的消耗量或 SPM 轴承监视来检查轴承情况。当即将达到计算的轴承额定寿命时，应尤其注意。

当出现磨损迹象时，拆卸电机，检查部件，必要时更换部件。在更换轴承时，备用轴承的型号必须与原安装的轴承型号完全相同，必须使用质量和特性均与原始密封件相同的密封件更换轴密封件。

当使用防护等级为 IP 的电机，且电机在交付时已插入排水塞，则建议定期打开排水塞，以确保冷凝水通路不被堵塞，可以从电机中流出。必须在电机处于静止状态、可以安全工作时执行此操作。

6.2 润滑

警告
请留意所有转动部件！

警告
润滑脂可能会引发皮炎和眼炎。请遵守制造商规定的所有安全预防措施。

在相关的产品目录以及所有电机（除较小机座号的电机外）的铭牌上指明轴承型号。

可靠性是轴承润滑间隔时间的关键考虑因素。ABB 主要使用 L_1 原则（即 99% 的电机必须达到工作寿命）来进行润滑。

6.2.1 装有永久润滑轴承的机器

轴承通常采用 1Z、2Z、2RS 或同类永久润滑轴承。

按照 L_{10} 对机座号为 250 及以下的电机进行足够润滑，可以达到如下工作时间。

在环境温度为 25°C和 40°C时，永久润滑轴承的工作时间为：

根据 L_{10} 原则的润滑间隔时间

机座号	极数	25℃时的工作时间	40℃时的工作时间
71	2	40 000	40 000
71	4-8	40 000	40 000
80-90	2	40 000	40 000
80-90	4-8	40 000	40 000
100-112	2	40 000	32 000
100-112	4-8	40 000	40 000
132	2	40 000	27 000
132	4-8	40 000	40 000
160	2	40 000	36 000
160	4-8	40 000	40 000
180	2	38 000	38 000
180	4-8	40 000	40 000
200	2	27 000	27 000
200	4-8	40 000	40 000
225	2	23 000	18 000
225	4-8	40 000	40 000
250	2	16 000	13 000
250	4-8	40 000	39 000

数据在 50 Hz 时有效，在 60 Hz 时，数值减少 20%。

这些数值对产品目录中给出的允许负载值有效。有关应用和负载条件的信息，请参见适用的产品目录或联系 ABB。

立式电机的运行时间为以上数值的一半。

6.2.2 装有开启式可润滑轴承的电机

润滑信息铭牌和常规润滑建议
如果机器装有润滑信息铭牌，请遵守给出的数据。

润滑信息铭牌给出了润滑间隔时间与安装、环境温度和转速之间的关系。

第一次使用或轴承润滑后，可能会导致温度短时升高持续 10 到 20 小时左右。

一些电机可能配有陈油收集器。请遵守设备的专门说明。

A. 手动润滑

在电机运转时润滑
- 拔除放油口塞或打开隔离阀（若已安装）。
- 确保润滑通道已打开。
- 将指定量的润滑脂注入轴承。
- 让电机运行 1-2 小时，以将所有多余的润滑脂甩出轴承。关闭放油口塞或关闭隔离阀（若已安装）。

电机停机时润滑
如果不能在电机运行时润滑轴承，则可在机器停机时进行润滑。

- 在这种情况下，请使用一半的润滑脂量，然后让电机全速运转几分钟。
- 电机停止后，将指定量的剩余油量注入轴承。
- 运转 1-2 小时后，关闭放油口塞或关闭隔离阀（若已安装）。

B. 自动润滑

如采用自动润滑，则必须永久性地卸下放油口塞或打开隔离阀（若已安装）。

ABB 建议仅使用机电系统。

如果使用自动润滑系统，表中给出的每次润滑间

隔时间的润滑脂量应为表中数值的四倍。

如果对 2 极电机进行自动润滑，应遵守“ 润滑剂 ”一章中关于 2 极电机润滑建议的注意事项。

6.2.3 润滑间隔时间和润滑脂量

根据 L_1，对装有润滑轴承的电机进行充分润滑，可达到下列工作时间。对于较高环境温度下的工作时间，请联系 ABB。L_1 值与 L_{10} 值之间的关系可用下式估算：$L_{10}=2.7\times L_{10}$。

立式机器的润滑间隔时间为下表所示数值的一半。

润滑间隔时间基于环境温度 +25°C。环境温度升高会相应提高轴承温度。当温度升高 15°C时，数值减半，而当温度下降 15°C，数值增加一倍。

在变速运行中（即，变频器供电），必须在整个负载范围内测量轴承温度，若轴承温度超出 80°C，则轴承温度每上升 15°C，润滑间隔时间减半。如果电机高速运转，则还可使用高速润滑脂，请参见第 6.2.4 节。

警告
不得超出润滑脂和轴承的最高工作温度（+110°C）。
不得超出电机设计的最高转速。

根据 L_1 原则的润滑间隔时间

机座号	润滑脂量 g/D 轴承	润滑脂量 g/N 轴承	3600 r/min	3000 r/min	1800 r/min	1500 r/min	1200 r/min	1000 r/min	500-900 r/min
	球轴承								
	工作期内的润滑间隔时间（小时）								
80,90	5	5	14300	16200	21600	23400	25600	27400	28400
100,112	10	10	10500	12500	17900	19800	22100	23900	25000
132	10	10	9200	11100	16600	18500	20800	22700	23700
160	15	15	7100	8900	14300	16200	18600	20500	21600
180	15	15	6000	7800	13100	15000	17400	19400	20400
200	25	25	4200	5900	11000	13000	15400	17200	18400
225	25	25	3600	5100	10100	12000	14400	16400	17400
250	30	30	2400	3700	8400	10400	12700	14600	15800
280	35	35	1900	3200	—	—	—	—	—
280	70	70	—	—	7800	9600	—	13900	15000
315	35	35	1900	3200	-	-	-	-	-
315 [1)]	90	70	-	-	5900	7600	-	11800	12900
315 [2)]	90	90	-	-	5900	7600	-	11800	12900
355 [1)]	35	35	1900	3200	-	-	-	-	-
355 [2)]	45	45	800	1800	-	-	-	-	-
355	120	70	-	-	4000	5600	-		
	滚柱轴承								
	工作期内的润滑间隔时间（小时）								
71,80,90	5	5	7200	8100	10800	11700	12800	13700	14200
100,112	10	10	5300	6300	9000	9900	11100	12000	12500
132	10	10	4600	5600	8300	9300	10400	11400	11900
160	15	15	3600	4500	7200	8100	9300	10300	10800
180	15	15	3000	3900	6600	7500	8700	9700	10200
200	25	25	2100	3000	5500	6500	7700	8600	9200
225	25	25	1800	2600	5100	6000	7200	8200	8700
250	30	30	1200	1900	4200	5200	6400	7300	7900
280	35	35	950	1600	—	—	—	—	—
280	70	70	—	—	3900	4800	—	6950	7500
315	35	35	950	1600	-	-	-	-	-
315 [1)]	90	70	-	-	2950	3800	-	5900	6450
315 [2)]	90	90	-	-	2950	3800	-	5900	6450
355 [1)]	35	35	950	1600	-	-	-	-	-
355 [2)]	45	45	400	900	-	-	-	-	-
355	120	70	-	-	4000	5600	-		

1）除注2）之外的产品。
2）仅适用IE4 M2QA/GB1 M2QA系列产品。

6.2.4 润滑脂

警告
不同型号的润滑脂不要混合在一起。
性质不兼容的润滑脂会引起轴承损坏。

当加润滑脂时，只能使用具有以下特性的球轴承润滑脂：

- 含有锂复合基以及矿物油或 PAO 油的优质润滑油
- 40°C 下的基油粘度为 100 - 160 cST
- 稠度为 NLGI 级 1.5 - 3 *
- 温度范围保持在 -30°C - +120°C 之间。

*) 对于垂直安装的电动机或处于高温环境条件下，建议以较高值为准。

如果环境温度高于 -30°C或低于 +55°C，且轴承温度低于 110°C，则上述润滑脂规范适用；其它情况请联系 ABB，咨询应采用何种润滑脂。

具有适当特性的润滑脂各大润滑脂制造商均有出售。

建议使用混合剂，但必须向润滑剂制造商索取书面保证，即在操作温度范围内混合剂不会损坏轴承或降低润滑剂的性能，这一点对 EP 混合剂来说尤其重要。

警告
不推荐在机座尺寸 280 到 450 中的高轴承温度情况下使用含有 EP 添加剂的润滑脂。

可以使用下列高性能的润滑脂：

-Esso	Unirex N2 或 N3（锂复合基）
-Mobil	Mobilith SHC 100（锂复合基）
-Shell	Gadus S5 V 100 2（锂复合基）
-Klüber	Klüberplex BEM 41-132（专用锂基）
-FAG	Arcanol TEMP110（锂复合基）
-Lubcon	Turmogrease L 802 EP PLUS（专用锂基）
-Total	Multiplex S 2A（锂复合基）

注意事项!
对于高速 2 极电机应始终使用高速润滑脂，因为它们的速度系数高于 480,000（以 Dm×n 计算，其中 Dm = 轴承平均直径，mm；n= 转速，r/min）。

下列润滑脂可用于高速铸铁电机，但不能与锂复合润滑脂混合使用：

-Klüber	Klüber Quiet BQH 72-102 （聚脲脂基）
-Lubcon	Turmo 油脂 PU703（聚脲基）

如果使用其它油脂；

请咨询制造商，了解其质量是否达到上述润滑剂的水平；使用其它油箱可能会减少润滑间隔，如果对润滑剂的相容性存在疑问，请联系当地的 ABB 营业部。

7. 售后支持

7.1 备件

订购备件时，必须指明电机序列号、完整的型号名称和产品代码，如铭牌所示。

有关更多信息，请访问网站：
www.abb.com/partsonline。

7.2 绕组重绕

应由合格的修理厂进行重绕绕组。

如需对烟道电机和其它专用电机进行重绕绕组，请事先联系 ABB 公司。

7.3 轴承

拆装轴承时必须特别小心。轴承必须用起拔器拆卸，安装时必须预热或使用专用工具。

轴承的更换方法在单独的说明书中有详细说明，该说明书可向 ABB 销售处索取。

8. 环境要求

8.1 噪音等级

在 50 Hz 时，ABB 大多数电机的噪音等级均低于 82 dB（A）。

可以在相关产品目录中找到特定机器的数据。在 60 Hz 正弦电源下，其数值比产品目录中 50 Hz 时的数值大约高 4 dB（A）。

有关变频器供电时的噪音等级，请联系 ABB。

9. 故障检修

这些说明并不涉及设备的所有细节或变动，也未规定安装、操作或保养时应当满足的所有可能条件。如需了解其他信息，请联系附近的 ABB 营业部。

电动机故障检修图表

必须请合格人员用合适的工具和设备进行电机维修和故障排除。

故障	产生原因	补救措施
电动机不能启动	保险丝烧断	更换保险丝，保险丝的型号和额定值应正确无误。
	过载跳闸	检查启动器中的过载并复位。
	电源不正确	查看电源是否符合电机铭牌上的说明和负荷系数。
	线路连接不正确	对照与电动机一起提供的接线图检查连接。
	绕组或控制开关断路	当开关闭合时电动机发出嗡嗡叫的声音。检查绕组接线头有无松动。确认所有控制触点是闭合的。
	机械故障	检查察看电动机与传动装置转动是否灵活。检查轴承与润滑情况。
	定子短路 定子线圈连接不良	显示保险丝烧断。电动机必须重绕。拆除端盖，定位故障。
	转子有缺陷	查看断条或端环。
	电动机可能过载	减少负载。
电动机停转	可能发生断相	检查断相线路。
	应用错误	改变型号或尺寸。向制造商咨询。
	过载	减少负载。
	电压过低	确保维持铭牌规定的电压。检查连接情况。
	断路	保险丝烧断，检查过载继电器、定子与按钮。
电动机运行，然后逐渐停下	电源故障	检查与线路、保险丝和控制器的连接有无松动。
电动机不能到达转速	应用不当	咨询设备供应商正确型号是否。
	因线路电压降低而导致电机接线端子电压过低。	使用电压更高的电源或变压器终端，也可以减小负载。 检查接线情况。 检查导线尺寸是否正确。
	启动负载过高	检查电动机的启动负载。
	转子断条或转子松动	检查端环附近有无裂缝。可能需要更换转子，因为维修通常只能暂时解决问题。
	主电路开路	用测试装置定位断路位置，并进行修理。

故障	产生原因	补救措施
电动机加速时间太长且拉高电流	负载过高	减少负载。
	启动期间电压过低	检查电阻是否过高。确保电缆规格使用正确。
	鼠笼式转子有缺陷	更换新转子。
	施加的电压太低	校正电源。
转向错误	相序错误	对调电机或配电盘上的接线头。
电动机运行期间过热	过载	减少负载。
	机架或通风口被污垢堵塞，防碍了电动机通风	疏通通风孔并检查是否有气流从电机内持续送出。
	电动机可能有一相开路	检查以确保所有导线良好连接。
	线圈接地	重绕绕组。
	终端电压不平衡	检查导线、接头与变压器有无故障。
电动机振动	电动机不对中	重新对中。
	支承不稳	加固基座。
	联轴器不平衡	重新平衡联轴器。
	传动设备不平衡	重新平衡传动设备。
	轴承缺陷	更换轴承。
	轴承未对中	修理电动机。
	平衡块移动	重新平衡电动机。
	电动机与联轴器间平衡错位（半键——全键）	重新平衡联轴器或电动机。
	多相电动机以单相运行	检查有无断路。
	轴向间隙过大	调节轴承或增加薄垫片。
刮擦噪音	风扇摩擦端盖或风罩	校正风扇安装。
	电动机在台板上松动	拧紧紧固螺栓。
运行嘈杂	气隙不均匀	检查并校正端盖连接或轴承。
	转子不平衡	重新平衡转子。
轴承发热	轴弯曲或扭曲	矫正或更换轴。
	皮带拉力过大	减小皮带张力。
	皮带轮离开轴肩太远	移动皮带轮，使其更接近电动机轴承。
	皮带轮直径太小	使用较大的皮带轮。
	不对中	通过重新对中传动装置来纠正。
	油脂不足	给轴承添加适量的润滑脂。
	油脂变质或润滑脂受到污染	去除旧油脂，用煤油彻底清洗轴承并更换新油脂。
	润滑脂过量	减少油脂量，轴承内油量不应超过 1/2。
	轴承过载	检查对中，侧推力与端面推力。
	滚珠损坏或底圈凹凸不平	更换轴承，首先彻底清洁轴承座。

10. 附录

10.1 低压烟道电机附加说明书

电机在以下工作温度下的最短运行时间：200℃，120min；300℃，60min；250℃，120min。

注意!
本文件是标准低压电机使用维护说明书的补充。同一事项在两份文件中同时出现，请以本文为准。

10.1.1 有效性

本指导适用以下 ABB 电机型号

• 电机系列 M2SE
M2SE 系列电机可以提供日常通风，以及火灾下的排烟。如果紧急情况发生，电机必须能有效地在接近地板处建立无烟层，使得逃生、拯救人和动物和生命财产，并在初期战胜火灾成为可能。这套系统也可以在火灾初期帮助消除燃烧产生的炙热气体。

由于电机运作对于紧急情况下非常重要，ABB 建议对电机进行额外的检查和维护，以保证它们在需要安全保障时的完美运作。

M2SE 烟道电机可在不高于环境温度 40℃下由变频器驱动。作为选项，M2SE 可以被设计为适用于更高的环境温度。

当紧急状况发生时，M2SE 电机应由工频正弦电网驱动。

10.1.2 维护检查

10.1.2.1 日常通风工作制

重要!
轴承服务寿命 L10 必须超过 20 000 小时以确保紧急状况下的可靠使用。

ABB 建议每 12 个月检查一次安装。润滑铭牌上的润滑间隔必须被遵守。润滑间隔可能少于 12 个月。
以下要点需要检测中被检查：
• 环境温度
• 清洁情况（散热筋和风罩等）
• 安装螺栓
• 排水孔
• 终端接线
• 润滑间隔
• 运转小时数
• 轴承和绕组温度
• 振动等级
• 轴封状况

重要!
在电机服役期间或最近一次更换轴承后，轴承不应必须超过 20 000 小时累积运行时间。

10.1.2.2 仅在高温排烟工况下紧急通风工作制

ABB 建议每三个月检查一次安装。检查过程中的以下要点和步骤需要被遵守。
• 环境温度
• 清洁情况（散热筋和风罩等）
• 安装螺栓
• 排水孔
• 终端接线
• 加热带需要在检查前启动
• 测量绝缘电阻
• 旋转轴，保证转轴能正常旋转
• 运转小时数
• 轴承和绕组温度
• 轴封状况
当以上要点被按顺序检查和确认以后，启动电机，润滑轴承，让它运转数分钟，测量振动等级。
绕组的绝缘电阻在 25℃，用 500V 直流电阻测量仪下应高于 10MΩ。（否则，绕组必须按照主说明书烘干。）
为了在紧急情况下保证装置的可靠性。ABB 建议 10 年过后更换整个电机。

10.1.3 额外指导

烟道电机绕组不允许重绕。

重要!
任何事件后必须检查电机状况，无论该事件是在电机运行或者静止状况下发生。非正常的振动、过载、电网的内在失效 - 诸如下降、暂开、微小中断、谐波等 - 必须考虑在内。外在可能对电机造成损害的现象 - 洪水或极端潮湿、低环境温度、灰尘环境、径向和轴向压力作用在转轴上等 - 必须考虑在内，哪怕仅出现了短暂的时间。因此强烈建议电机参数，如电流、噪音、振动等需要被检查以及跟踪，与初始状态比较以提供进一步的耗损警告或可能的故障。

警告！
当电机在紧急高温下运行后，不能再保持安全运作，必须被另一台同特性的电机替换。

10.1.3.1 变速运行下的烟道电机

变速运行下的烟道电机必须被特殊设计。请见主说明书中关于变速运行的章节。

10.2 附图

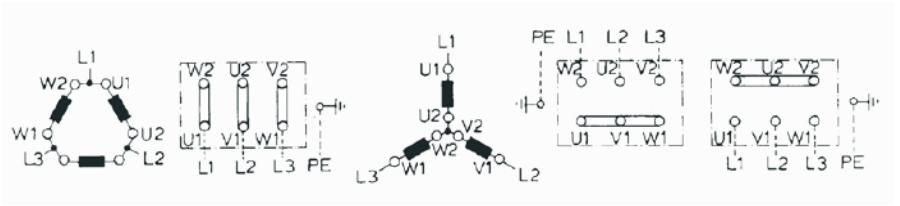


图 1 接线图

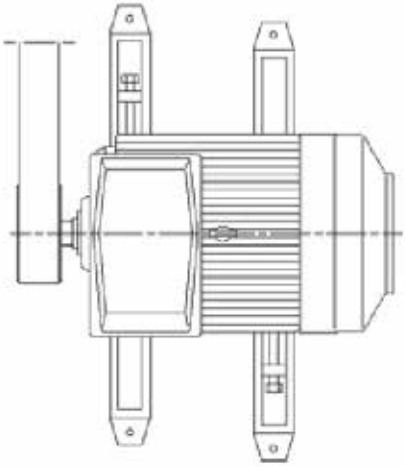


图 2 皮带传动

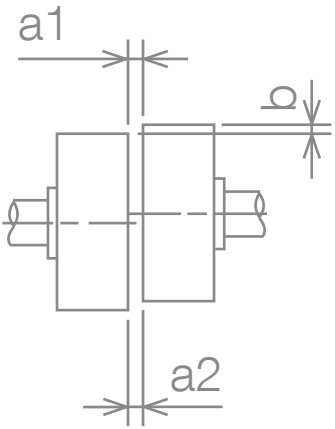
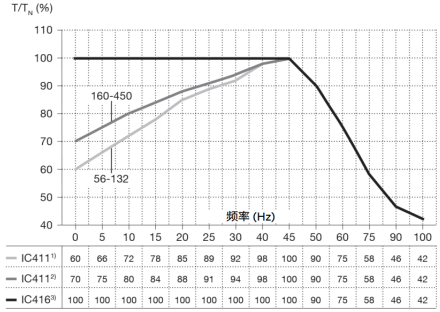


图 3 半联轴器或皮带轮的安装

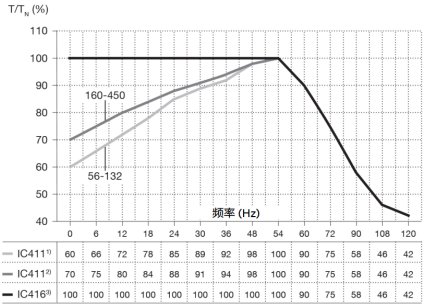
带 DTC 控制的变频器电机的负载能力曲线



频率 (Hz)	0	5	10	15	20	25	30	40	45	50	60	75	90	100
IC411[1]	60	66	72	78	85	89	92	98	100	90	75	58	46	42
IC411[2]	70	75	80	84	88	91	94	98	100	90	75	58	46	42
IC416[3]	100	100	100	100	100	100	100	100	100	90	75	58	46	42

1）自扇冷，IEC 机座号 56- 132
2）自扇冷，IEC 机座号 160- 450
3）分体式风机冷却（强迫风冷）

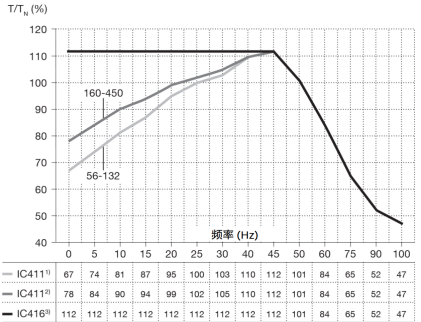
图4a 变频器DTC控制 50 Hz B级温升



频率 (Hz)	0	6	12	18	24	30	36	48	54	60	72	90	108	120
IC411[1]	60	66	72	78	85	89	92	98	100	90	75	58	46	42
IC411[2]	70	75	80	84	88	91	94	98	100	90	75	58	46	42
IC416[3]	100	100	100	100	100	100	100	100	100	90	75	58	46	42

1）自扇冷，IEC 机座号 56- 132
2）自扇冷，IEC 机座号 160- 450
3）分体式风机冷却（强迫风冷）

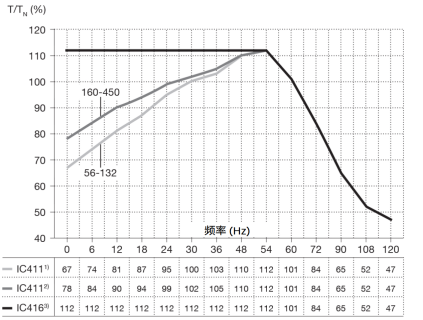
图4b 变频器DTC控制 60 Hz B级温升



频率 (Hz)	0	5	10	15	20	25	30	40	45	50	60	75	90	100
IC411[1]	67	74	81	87	95	100	103	110	112	101	84	65	52	47
IC411[2]	78	84	90	94	99	102	105	110	112	101	84	65	52	47
IC416[3]	112	112	112	112	112	112	112	112	112	101	84	65	52	47

1）自扇冷，IEC 机座号 56- 132
2）自扇冷，IEC 机座号 160- 450
3）分体式风机冷却（强迫风冷）

图4c 变频器DTC控制 50 Hz F级温升

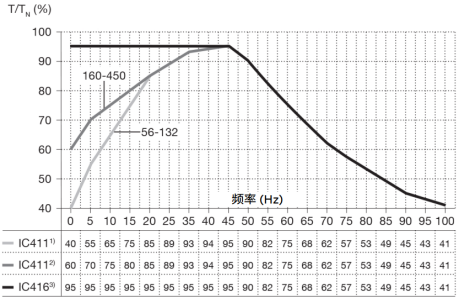


频率 (Hz)	0	6	12	18	24	30	36	48	54	60	72	90	108	120
IC411[1]	67	74	81	87	95	100	103	110	112	101	84	65	52	47
IC411[2]	78	84	90	94	99	102	105	110	112	101	84	65	52	47
IC416[3]	112	112	112	112	112	112	112	112	112	101	84	65	52	47

1）自扇冷，IEC 机座号 56- 132
2）自扇冷，IEC 机座号 160- 450
3）分体式风机冷却（强迫风冷）

图4d 变频器DTC控制 60 Hz F级温升

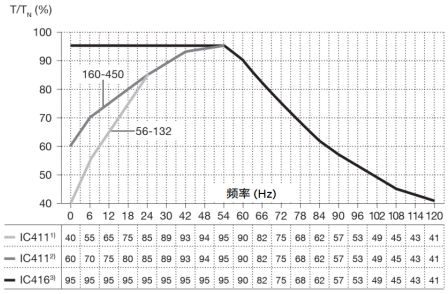
带PWM型变频器电机的负载能力曲线



0	5	10	15	20	25	35	40	45	50	55	60	65	70	75	80	85	90	95	100
IC411[1]	40	55	65	75	85	89	93	94	95	90	82	75	68	62	57	53	49	45	43	41
IC411[2]	60	70	75	80	85	89	93	94	95	90	82	75	68	62	57	53	49	45	43	41
IC416[3]	95	95	95	95	95	95	95	95	95	90	82	75	68	62	57	53	49	45	43	41

1）自扇冷，IEC 机座号 56- 132
2）自扇冷，IEC 机座号 160- 450
3）分体式风机冷却（强迫风冷）

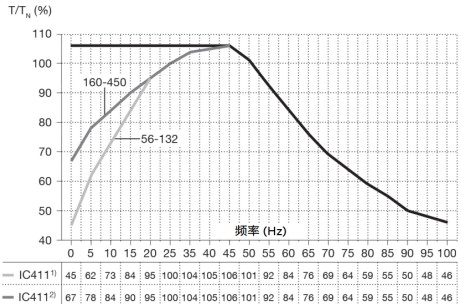
图5a PWM型变频器 50 Hz B级温升



0	6	12	18	24	30	42	48	54	60	66	72	78	84	90	96	102	108	114	120
IC411[1]	40	55	65	75	85	89	93	94	95	90	82	75	68	62	57	53	49	45	43	41
IC411[2]	60	70	75	80	85	89	93	94	95	90	82	75	68	62	57	53	49	45	43	41
IC416[3]	95	95	95	95	95	95	95	95	95	90	82	75	68	62	57	53	49	45	43	41

1）自扇冷，IEC 机座号 56- 132
2）自扇冷，IEC 机座号 160- 450
3）分体式风机冷却（强迫风冷）

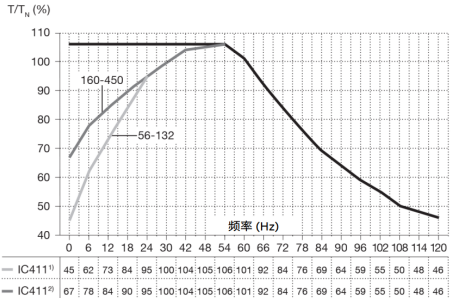
图5b PWM型变频器 60 Hz B级温升



0	5	10	15	20	25	35	40	45	50	55	60	65	70	75	80	85	90	95	100
IC411[1]	45	62	73	84	95	100	104	105	106	101	92	84	76	69	64	59	55	50	48	46
IC411[2]	67	78	84	90	95	100	104	105	106	101	92	84	76	69	64	59	55	50	48	46
IC416[3]	106	106	106	106	106	106	106	106	106	101	92	84	76	69	64	59	55	50	48	46

1）自扇冷，IEC 机座号 56- 132
2）自扇冷，IEC 机座号 160- 450
3）分体式风机冷却（强迫风冷）

图5c PWM型变频器 50 Hz F级温升



0	6	12	18	24	30	42	48	54	60	66	72	78	84	90	96	102	108	114	120
IC411[1]	45	62	73	84	95	100	104	105	106	101	92	84	76	69	64	59	55	50	48	46
IC411[2]	67	78	84	90	95	100	104	105	106	101	92	84	76	69	64	59	55	50	48	46
IC416[3]	106	106	106	106	106	106	106	106	106	101	92	84	76	69	64	59	55	50	48	46

1）自扇冷，IEC 机座号 56- 132
2）自扇冷，IEC 机座号 160- 450
3）分体式风机冷却（强迫风冷）

图5d PWM型变频器 60 Hz F级温升

10.3 吊装指导手册

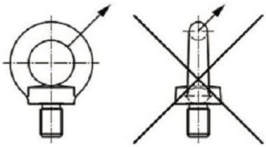
注意！参见低压电机手册操作章节 .

警告！
电机吊装处理不当可能会造成严重的人员伤亡或财产损失。只有具备相关资质的人员才能进行吊装及安装电机等操作。
吊装前：检查起吊设备并注意重量！表1显示了最大标准电机的重量。电机实际重量显示在铭牌上。

表1

机座号 / Frame size	重量 / Weight
80ML	25kg
90	40kg
100	60kg
112	66kg
132	110kg
160	229kg
180	283kg
200	381kg
225	502kg
250	613kg
280	890kg
315	1700kg
355	2700kg
400	3500kg
450	4800kg

产品 / Product	机座号 / Frame size	图号 / Picture No.
M3BP	90-250	1
	280-450	3
M3AA	90-250	1
	280	3
M2BAX/M2BJX /M2QA	80-250	1
	280-450	2



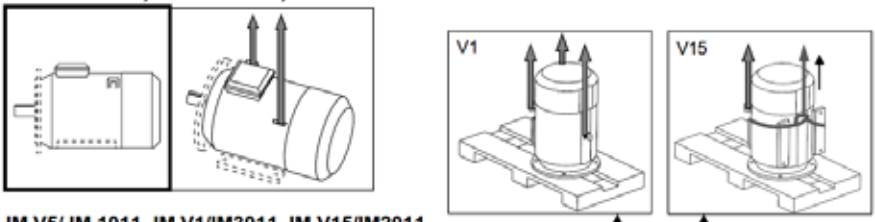
DIN580-2010

Low voltage motors / Hoisting Instructions
M3BP 90-450
M3AA 90-280
M2BAX/M2BJX/M2QA 80-450
3GZC503900-338 04-2024

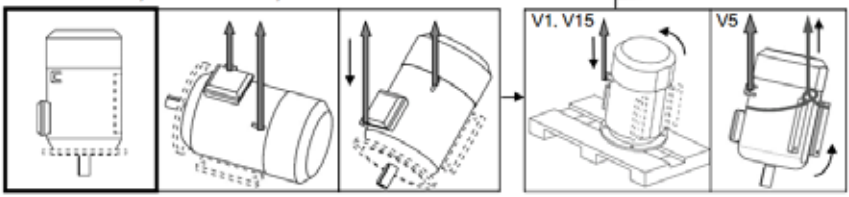
www.abb.com/motors&generators
online.abb.com/bol

图 1

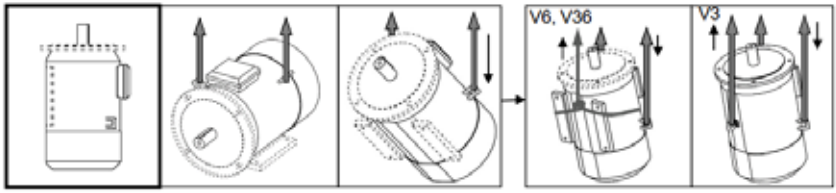
IM B3/ IM 1001, IM B5/IM3001, IM B35/IM2001



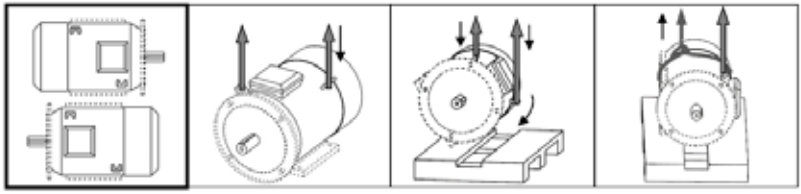
IM V5/ IM 1011, IM V1/IM3011, IM V15/IM2011



IM V6/ IM 1031, IM V3/IM3031, IM V36/IM2031



IM B6/ IM 1051, IM B7/1061, IM 3051, IM3061, IM2051, IM2061



IM B8/ IM 1071, IM3071, IM2071

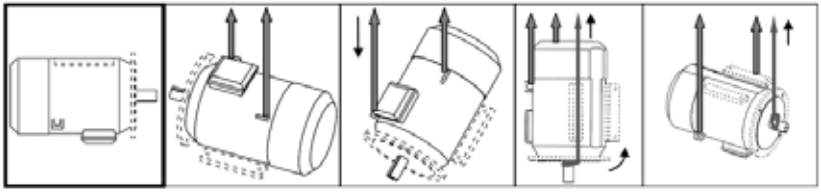
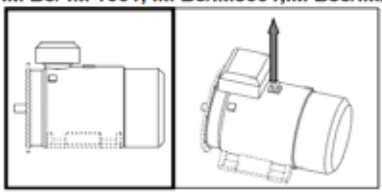
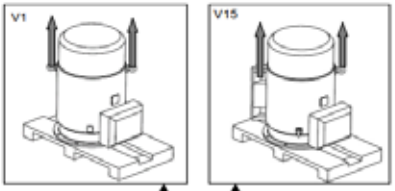


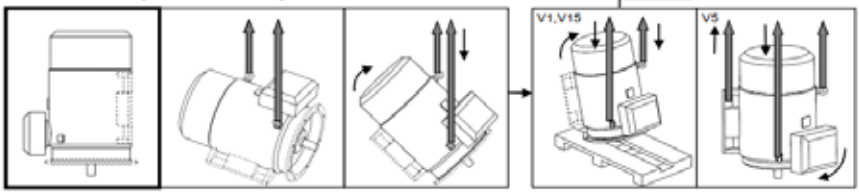
图 2

IM B3/ IM 1001, IM B5/IM3001,IM B35/IM2001

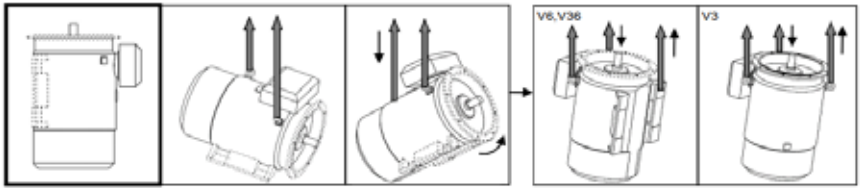




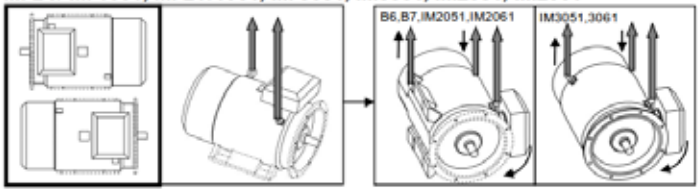
IM V5/ IM 1011, IM V1/IM3011, IM V15/IM2011



IM V6/ IM 1031, IM V3/IM3031, IM V36/IM2031



IM B6/ IM 1051, IM B7/1061, IM 3051, IM3061, IM2051, IM2061



IM B8/ IM 1071, IM3071, IM2071

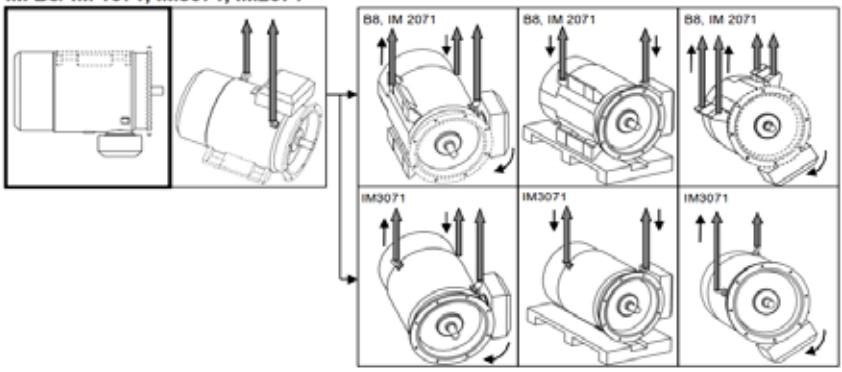
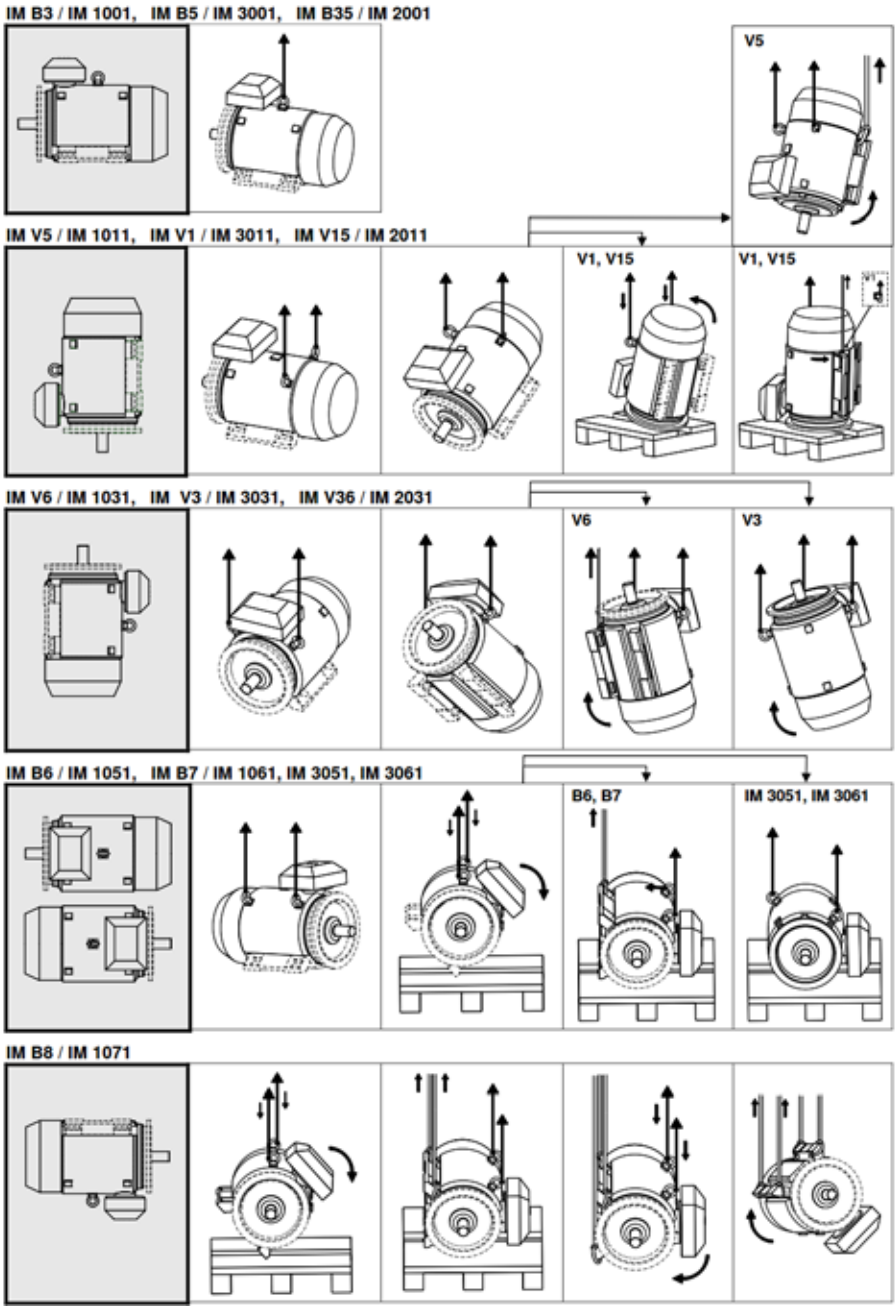


图 3


IM B3 / IM 1001, IM B5 / IM 3001, IM B35 / IM 2001
V5
IM V5 / IM 1011, IM V1 / IM 3011, IM V15 / IM 2011
V1, V15
V1, V15
IM V6 / IM 1031, IM V3 / IM 3031, IM V36 / IM 2031
V6
V3
IM B6 / IM 1051, IM B7 / IM 1061, IM 3051, IM 3061
B6, B7
IM 3051, IM 3061
IM B8 / IM 1071

M2 series three-phase asynchronous motor

Installation, operation, maintenance and safety manual

List of Contents Page

1. Introduction

NOTE!
These instructions must be followed to ensure safe and proper installation, operation and maintenance of the machine. They should be brought to the attention of anyone who installs, operates or maintains the machine or associated equipment. The machine is intended for installation and use by qualified personnel, familiar with health and safety requirements and national legislation. Ignoring these instructions may invalidate all applicable warranties.

1.1 Declaration of Conformity

The conformity of the end product according to Directive 2006/42/EC (Machinery) has to be established by the commissioning party when the motor is fitted to the machinery.

Products in consistence with the regulation of Small and Medium Three-Phase Asynchronous Motor Energy Efficiency Label in our company have been registered in the official website of China Energy Label, and CEL (China Energy Label) is stuck on the motor body per the regulation. Energy efficiency label pattern comply with the requirements of the regulation, Energy efficiency grade and energy efficiency testing mothed conform to the requirements of GB18613. For detail registration information, please visit the official website www.energylabel.com.cn

1.2 Validity

The instructions are valid for the following ABB Motor product type.

M2 series three-phase asynchronous motor in frame sizes 71-450.

There is a separate manual for e.g. Ex motors ‘Low voltage motors for hazardous areas: Installation, operation and maintenance Manual’ (Low Voltage Motors/Manual for Ex-motors).

Additional information is required for some machine types due to special application and/or design considerations.

Additional information is available for the following motors:
– Smoke extraction motors (Refer to appendix 10.1)

2. Handling

2.1 Reception check

Immediately upon receipt check the motor for external damage (e.g. shaft-ends and flanges and painted surfaces) and if found, inform the forwarding agent without delay.

Check all rating plate data, especially voltage and winding connection (star or delta). The type of bearing is specified on the rating plate of all motors.

2.2 Transportation and storage

The motor should always be stored indoors (above –20°C), in dry, vibration free and dust free conditions.

During transportation, shocks, falls and humidity should be avoided. In other conditions, please contact ABB.

Unprotected machined surfaces (shaft-ends and flanges) should be treated against corrosion.

It is recommended that shafts are rotated periodically by hand to prevent grease migration.

Anti-condensation heaters, if fitted, are recommended to be used to avoid water condensing in the motor.

The motor must not be subject to any external vibrations at standstill so as to avoid causing damage to the bearings.

Motors fitted with cylindrical-roller and/or angular contact bearings must be fitted with locking devices during transport.

2.3 Lifting

All ABB motors above 25 kg are equipped with lifting lugs or eyebolts.

Only the main lifting lugs or eyebolts of the motor should be used for lifting the motor. They must not be used to lift the motor when it is attached to other equipment.

Lifting lugs for auxiliaries (e.g. brakes, separate cooling fans) or terminal boxes must not be used for lifting the motor.

Motors with the same frame may have a different center of gravity because of different output, mounting arrangements and auxiliary equipment.

Damaged lifting lugs must not be used. Check that eyebolts or integrated lifting lugs are undamaged before lifting.

Lifting eyebolts must be tightened before lifting. If needed, the position of the eyebolt can be adjusted using suitable washers as spacers.

Ensure that proper lifting equipment is used and that the sizes of the hooks are suitable for the lifting lugs.

Care must be taken not to damage auxiliary equipment and cables connected to the motor.

2.4 Machine weight

The total machine weight can vary within the same frame size (center height) depending on different output, mounting arrangement and auxiliaries.

The following table shows estimated maximum weights for machines in their basic versions as a function of frame material.

The actual weight of all ABB's motors is shown on the rating plate.

Frame Size	Motor Weight kg	Add for Brake kg
71	15	5
80	25	8
90	40	10
100	60	16
112	66	20
132	110	30
160	229	30
180	283	45
200	381	55
225	502	75
250	613	75
280	890	-
315	1700	-
355	2700	-

3. Installation and commissioning

WARNING
Disconnect and lock out before working on the motor or the driven equipment.

3.1 General

All rating plate values must be carefully checked to ensure that the motor protection and connection will be properly done.

WARNING
In case of motors mounted with the shaft upwards and water or liquids are expected to go down along the shaft, the user must take in account to mount some means capable of reventing it.

Remove transport locking if employed. Turn shaft by hand to check free rotation if possible.

Motors equipped with roller bearings:
Running the motor with no radial force applied to the shaft may damage the roller bearing.

Motors equipped with angular contact bearing:
Running the motor with no axial force applied in the right direction in relation to the shaft may damage the angular contact bearing.

WARNING
For machines with angular contact bearings the axial force must not by any means change direction.

The type of bearing is specified on the rating plate.

Motors equipped with regreasing nipples:
When starting the motor for the first time, or after long storage, apply the specified quantity of grease.

For details, see section “6.2.2 Motors with regreasable bearings”.

3.2 Insulation resistance check

Measure insulation resistance before commissioning and when winding dampness is suspected.

WARNING
Disconnect and lock out before working on the motor or the driven equipment.

Insulation resistance, corrected to 25°C, must exceed the reference value, i.e. 10 MΩ (measured with 500 or 1000 V DC). The insulation resistance value is halved for each 20°C rise in ambient temperature.

WARNING
The motor frame must be grounded and the windings should be discharged against the frame immediately after each measurement to avoid risk of electrical shock.

If the reference resistance value is not attained, the winding is too damp and must be oven dried. The oven temperature should be 90°C for 12-16 hours followed by 105°C for 6-8 hours.

Drain hole plugs, if fitted, must be removed and closing valves, if fitted, must be opened during heating. After heating, make sure the plugs are refitted. Even if the drain plugs are fitted, it is recommended to disassemble the end shields and terminal box covers for the drying process.

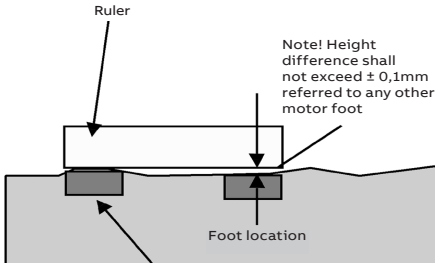
Windings drenched in seawater normally need to be rewound.

3.3 Foundation

The end user has full responsibility for preparation of the foundation.

Metal foundations should be painted to avoid corrosion.

Foundations must be even, see figure below, and sufficiently rigid to withstand possible short circuit forces.They must be designed and dimensioned to avoid the transfer of vibration to the motor and vibration caused by resonance.



3.4 Balancing and fitting coupling halves and pulleys

As standard, balancing of the motor has been carried out using half key

When balancing with full key, the shaft is marked with YELLOW tape, with the text “Balanced with full key”.

In case of balancing without key, the shaft is marked with BLUE tape, with the text “Balanced without key”.

Coupling halves or pulleys must be balanced after machining the keyways. Balancing must be done in accordance with the balancing method specified for the motor.

Coupling halves and pulleys must be fitted on the shaft by using suitable equipment and tools which do not damage the bearings and seals.

Never fit a coupling half or pulley by hammering or by removing it using a lever pressed against the body of the motor.

3.5 Mounting and alignment of the motor

Ensure that there is enough space for free airflow around the motor. Minimum requirements for free space behind the motor fan cover can be found from the product catalog or from the dimension drawings available from the web: see www.abb.com/motors&generators.

Correct alignment is essential to avoid bearing, vibration and possible shaft failures.

Mount the motor on the foundation using the appropriate bolts or studs and place shim plates between the foundation and the feet.

Align the motor using appropriate methods.

If applicable, drill locating holes and fix the locating pins into position.

Mounting accuracy of coupling half: check that clearance b is less than 0.05 mm and that the difference a1 to a2 is also less than 0.05 mm. See Figure 3.

Re-check the alignment after final tightening of the bolts or studs.

Do not exceed permissible loading values for bearings as stated in the product catalogues.

3.6 Slide rails and belt drives

Fasten the motor to the slide rails as shown in Figure 2.

Place the slide rails horizontally on the same level. Check that the motor shaft is parallel with the drive shaft.

Belts must be tensioned according to the instructions of the supplier of the driven equipment. However, do not exceed the maximum belt forces (i.e. radial bearing loading) stated in the relevant product catalogues.

WARNING
Excessive belt tension will damage bearings and can cause shaft damage.

3.7 Machines with drain plugs for condensation

Check that drain holes and plugs face downwards.

Machines with sealable plastic drain plugs are delivered in open position. In very dusty environments, all drain holes should be closed.

3.8 Cabling and electrical connections

The terminal box on standard single speed motors normally contains six winding terminals and at least one earth terminal.

In addition to the main winding and earthing terminals, the terminal box can also contain connections for thermistors, heating elements or other auxiliary devices.

Suitable cable lugs must be used for the connection of all main cables. Cables for auxiliaries can be connected into their terminal blocks as such.

Machines are intended for fixed installation only. If not otherwise specified, cable entry threads are metric. The IP-class of the cable gland must be at least the same as those of the terminal boxes.

Unused cable entries must be closed with blanking elements according to the IP class of the terminal box.

The degree of protection and diameter are specified in the documents relating to the cable gland.

WARNING
Use appropriate cable glands and seals in the cable entries according to the type and diameter of the cable.

Additional information on cables and glands suitable for variable speed applications can be found from chapter 5.5.

Earthing must be carried out according to local regulations before the machine is connected to the supply voltage.

Ensure that the motor protection corresponds to the environment and weather conditions; for example, make sure that water cannot enter the motor or the terminal boxes.

The seals of terminal boxes must be placed correctly in the slots provided, to ensure the correct IP class.

3.8.1 Connections for different starting methods

The terminal box on standard single speed motors normally contains six winding terminals and at least one earth terminal. This enables the use of DOL- or Y/D –starting.
See Figure 1.

For two-speed and special motors, the supply connection must follow the instructions inside the terminal box or in the motor manual.

The voltage and connection are stamped on the rating plate.

Direct-on-line starting (DOL):
Y or D winding connections may be used.

For example, 690 VY, 400 VD indicates Y-connection for 690 V and D-connection for 400 V.

Star/Delta starting (Y/D):
The supply voltage must be equal to the rated voltage of the motor when using a D-connection.

Remove all connection links from the terminal block.

Other starting methods and severe starting conditions:
In case other starting methods are used, such as a soft starter, or if starting conditions are particularly difficult, please consult ABB first.

3.8.2 Connections of auxiliaries

If a motor is equipped with thermistors or other RTDs (Pt100, thermal relays, etc.) and auxiliary devices, it is recommended they be used and connected by appropriate means. Connection diagrams for auxiliary elements and connection parts can be found inside the terminal box.

Maximum measuring voltage for the thermistors is 2.5 V. Maximum measuring current for Pt100 is 5 mA. Using a higher measuring voltage or current may cause errors in readings or damage the system.

The insulations of the winding thermal sensors is of basic type. While connecting the sensors to control systems etc, ensure adequate insulation or isolation, see IEC 60664.

NOTE!
Ensure the insulation level or isolation of thermistor circuit, see IEC 60664.

3.8.3 Tightening torque of terminal box bolts

The following torque table is a generic guideline for tightening torques. The motor's frame material and surface treatment must be taken into account when determining the tightening torque.

Thread	Bolt grade				
	4.6	5.8	8.8	10.9	12.9
	Tightening torque Nm				
M4	0.8	2	3	4	4.3
M5	2	4	6	9	10
M6	3	6	10	15	17
M8	8	15	23	32	50
M10	19	32	46	62	80
M12	32	55	79	101	135

3.9 Terminals and direction of rotation

The shaft rotates clockwise when viewing the shaft face at the motor drive end, and the line phase sequence - L1, L2, L3 - is connected to the terminals as shown in Figure 1.

To alter the direction of rotation, interchange any two connections on the supply cables.

If the motor has a unidirectional fan, ensure that it rotates in the same direction as the arrow marked on the motor.

4. Operation

4.1 Use

The motors are designed for the following conditions unless otherwise stated on the rating plate.

- Normal ambient temperature limits are -20°C to +40°C.
- Maximum altitude 1000 m above sea level.
- Tolerance for supply voltage is ±5% and for frequency ±2% according to EN/IEC 60034-1 (2004).

The motor can only be used in applications it is intended for. The rated nominal values and operational conditions are shown on the motor rating plates. In addition, all requirements of this manual and other related instructions and standards must be followed.

If these limits are exceeded, motor data and construction data must be checked. Please contact ABB for further information.

WARNING
Ignoring any of given instructions or maintenance of the apparatus may jeopardize the safety and thus prevents the use of the machine.

4.2 Cooling

Check that the motor has sufficient airflow. Ensure that nonearby objects or direct sunshine radiate additional heat tothe motor.

For flange mounted motors (e.g. B5, B35, V1), make sure that the construction allows sufficient air flow on the outer surface of the flange.

4.3 Safety considerations

The machine is intended for installation and use by qualified personnel, familiar with health and safety requirements and national legislation.

Safety equipment necessary for the prevention of accidents at the installation and operating site must be provided in accordance with local regulations.

WARNING
Do not carry out work on motor, connection cables or accessories such as frequency converters,starters, brakes, thermistor cables or heating elements when voltage is applied.

Points to observe

1. Do not step on the motor.
2. The temperature of the outer casing of the motor may be too hot to touch during normal operation and especially after shut-down.
3. Some special motor applications require special instructions (e.g. using frequency converter supplies).
4. Be aware of rotating parts of the motor.
5. Do not open terminal boxes while energized.

5. Low voltage motors in variable speed operation

5.1 Introduction

This part of the manual provides additional instructions for motors used in frequency converter supply. Instructions provided in this and respective manuals of selected frequency converter must be followed to ensure safety and availability of the motor. Additional information may be required by ABB to decide on the suitability for some machine types used in special applications or with special design modifications.

5.2 Winding insulation

Variable speed drives cause higher voltage stresses than the sinusoidal supply on the winding of the motor and therefore the winding insulation of the motor as well as the filter at the converter output must be dimensioned according following instructions.

5.2.1 Phase to phase voltages

The maximum allowed phase to phase voltage peaks at the motor terminal as a function of the rise time of the pulse.

5.2.2 Selection of winding insulation with all other converters

The voltage stresses must be limited below accepted limits. Please contact the system supplier to ensure the safety of the application. The influence of possible filters must be taken into account while dimensioning the motor.

5.3 Thermal protection

Most of the motors covered by this manual are equipped with PTC thermistors in the stator windings. It is recommended to connect those to the frequency converter by appropriate means. See also chapter 3.8.2.

5.4 Bearing currents

Insulated bearings or bearing constructions, common mode filters and suitable cabling and grounding methods must be used according to the following instructions:

5.4.1 Elimination of bearing currents with ABB converters

In the case of the ABB AC_8__- and AC_5__-series frequency converter with a diode supply unit, the following methods must be used to avoid harmful bearing currents in the motors:

	Preventive measures
Pn < 100 kW	No actions needed
Pn≥ 100 kW OR IEC 315≤ Frame size ≤ IEC 355	Insulated non-drive end bearing
Pn≥ 350 kW OR IEC 400≤ Frame size ≤ IEC 450	Insulated non-drive end bearing AND Common mode filter at the converter

Insulated bearings which have aluminum oxide coated inner and/or outer bores or ceramic rolling elements, are recommended. Aluminum oxide coatings shall also be treated with a sealant to prevent dirt and humidity penetrating into the porous coating. For the exact type of bearing insulation, see the motor's rating plate. Changing the bearing type or insulation method without ABB's permission is prohibited.

5.4.2 Elimination of bearing currents with all other converters

The user is responsible for protecting the motor and driven equipment from harmful bearing currents. Instructions described in Chapter 5.4.1 can be used as guideline, but their effectiveness cannot be guaranteed in all cases.

5.5 Cabling, grounding and EMC

To provide proper grounding and to ensure compliance with any applicable EMC requirements, motors above 30 kW shall be cabled by shielded symmetrical cables and EMC glands, i.e. cable glands providing 360° bonding.

Also for smaller motors symmetrical and shielded cables are highly recommended. Make the 360° grounding arrangement at all the cable entries as described in the instructions for the glands. Twist the cable shields into bundles and connect to the nearest ground terminal/bus bar inside the terminal box, converter cabinet, etc.

NOTE!
Proper cable glands providing 360° bonding must be used at all termination points, e.g. at motor, converter, possible safety switch, etc.

For motors of frame size IEC 280 and upward, additional potential equalization between the motor frame and the driven equipment is needed, unless both are mounted on a common steel base. In this case, the high frequency conductivity of the connection provided by the steel base should be checked by, for example, measuring the potential difference between the components.

More information about grounding and cabling of variable speed drives can be found in the manual "Grounding and cabling of the drive system" (Code: 3AFY 61201998).

5.6 Operating speed

For speeds higher than the nominal speed stated on the motor's rating plate or in the respective product catalogue, ensure that either the highest permissible rotational speed of the motor or the critical speed of the whole application is not exceeded.

5.7 Commissioning the variable speed application

The commissioning of the variable speed application must be done according to the instructions of the frequency converter and local laws and regulations. The requirements and limitations set by the application must also be taken into account.

All parameters needed for setting the converter must be taken from the motor rating plates. The most often needed parameters are:

- Motor nominal voltage
- Motor nominal current
- Motor nominal frequency
- Motor nominal speed
- Motor nominal power

Note: In case of missing or inaccurate information, do not operate the motor before ensuring correct settings!

ABB recommends using all the suitable protective features provided by the converter to improve the safety of the application. Converters usually provide features such as (names and availability of features depend on manufacturer and model of the converter):

- Minimum speed
- Maximum speed
- Acceleration and deceleration times
- Maximum current
- Maximum Torque
- Stall protection

5.8 Motors in variable speed applications

5.8.1. General

With ABB's frequency converters, the motors can be dimensioned by using ABB's DriveSize dimensioning program. The tool is downloadable from the ABB website (www.abb.com/motors&generators).

For application supplied by other converters, the motors must be dimensioned manually. For more information, please contact ABB.

The loadability curves (or load capacity curves) are based on nominal supply voltage. Operation in under or over voltage conditions may influence on the performance of the application.

5.8.2. Motor loadability with AC_8_ _ – series of converters with DTC control

The loadability curves presented in Figures 4a-4d are valid for ABB AC_8_ _-series converters with uncontrolled DC-voltage and DTC-control. The figures show the approximate maximum continuous output torque of the motors as a function of supply frequency. The output torque is given as a percentage of the nominal torque of the motor. The values are indicative and exact values are available on request.

NOTE!

The maximum speed of the motor and application may not be exceeded!

5.8.3. Motor loadability with AC_5_ _ – series of converter

The loadability curves presented in Figures 5a-5d are valid for AC_5_ _ -series converters. The figures show the approximate maximum continuous output torque of the motors as a function of supply frequency. The output torque is given as a percentage of the nominal torque of the motor. The values are indicative and exact values are available on request.

NOTE!

The maximum speed of the motor and application may not be exceeded!

5.8.4 Motor loadability with other voltage source PWM-type converters

For other converters, with uncontrolled DC voltage and minimum switching frequency of 3 kHz (200…500 V), the dimensioning instructions as mentioned in chapter 5.8.3 can be used as guidelines. However, it shall be noted that the actual thermal loadability can also be lower. Please contact the manufacturer of the converter or the system supplier.

NOTE!

The actual thermal loadability of a motor may be lower than shown by guideline curves.

5.8.5 Short time overloads

ABB motors can usually be temporarily overloaded as well as used in intermittent duties. The most convenient method to dimension such applications is to use the DriveSize tool.

6. Maintenance

WARNING

Voltage may be connected at standstill inside the terminal box for heating elements or direct winding heating.

WARNING

The capacitor in single-phase motors can retain a charge that appears across the motor terminals, even when the motor has reached standstill.

WARNING

A motor with frequency converter supply may energize even if the motor is at standstill.

6.1 General inspection

1. Inspect the motor at regular intervals, at least once a year. The frequency of checks depends on, for example, the humidity level of the ambient air and on the local weather conditions. This can initially be determined experimentally and must then be strictly adhered to.
2. Keep the motor clean and ensure free ventilation airflow. If the motor is used in a dusty environment, the ventilation system must be regularly checked and cleaned.
3. Check the condition of shaft seals (e.g. V-ring or radial seal) and replace if necessary.
4. Check the condition of connections and mounting and assembly bolts.
5. Check the bearing condition by listening for any unusual noise, vibration measurement, bearing temperature, inspection of spent grease or SPM bearing monitoring. Pay special attention to bearings when their calculated rated life time is coming to an end.

When signs of wear are noticed, dismantle the motor, check the parts and replace if necessary. When bearings are changed, replacement bearings must be of the same type as those originally fitted. The shaft seals have to be replaced with seals of the same quality and characteristics as the originals when changing bearings.

In the case of the IP 55 motor and when the motor has been delivered with a plug closed, it is advisable to periodically open the drain plugs in order to ensure that the way out for condensation is not blocked and allows condensation to escape from the motor. This operation must be done when the motor is at a standstill and has been made safe to work on.

6.2 Lubrication

WARNING
Beware of all rotating parts!

WARNING
Grease can cause skin irritation and eye inflammation. Follow all safety precautions specified by the manufacturer.

Bearing types are specified in the respective product catalogs and on the rating plate of all motors except smaller frame sizes.

Reliability is a vital issue for bearing lubrication intervals.

ABB uses mainly the L_1-principle (i.e. that 99% of the motors are certain to make the life time) for lubrication.

6.2.1 Machines with permanently greased bearings

Bearings are usually permanently greased bearings of 1Z, 2Z, 2RS or equivalent types.

As a guide, adequate lubrication for sizes up to 250 can be achieved for the following duration, according to L_{10}.

Duty hours for permanently greased bearings at ambient temperatures of 25 and 40° C are:

Lubrication intervals according to L_{10} principle

	Poles	Duty hours at 25° C	Duty hours at 40° C
71	2	40 000	40 000
71	4-8	40 000	40 000
80-90	2	40 000	40 000
80-90	4-8	40 000	40 000
100-112	2	40 000	32 000
100-112	4-8	40 000	40 000
132	2	40 000	27 000
132	4-8	40 000	40 000
160	2	40 000	36 000
160	4-8	40 000	40 000
180	2	38 000	38 000
180	4-8	40 000	40 000
200	2	27 000	27 000
200	4-8	40 000	40 000
225	2	23 000	18 000
225	4-8	40 000	40 000
250	2	16 000	13 000
250	4-8	40 000	39 000

Data valid at 50 Hz, for 60 Hz reduce values for 20 %.

These values are valid for permitted load values given in the product catalog. Depending on application and load conditions, see the applicable product catalog or contact ABB.

Operation hours for vertical motors are half of the above values.

6.2.2 Motors with regreasable bearings Lubrication information plate and general lubrication advice

If the machine is equipped with a lubrication information plate, follow the given values.

On the lubrication information plate, greasing intervals regarding mounting, ambient temperature and rotational speed are defined.

During the first start or after a bearing lubrication a temporary temperature rise may appear, approximately 10 to 20 hours.

Some motors may be equipped with a collector for old grease. Follow the special instructions given for the equipment.

A. Manual lubrication

Regreasing while the motor is running

– Remove grease outlet plug or open closing valve if fitted.
– Be sure that the lubrication channel is open
– Inject the specified amount of grease into the bearing.
– Let the motor run for 1-2 hours to ensure that all excess grease is forced out of the bearing. Close the grease outlet plug or closing valve if fitted.

Regreasing while the motor is at a standstill

If it is not possible to regrease the bearings while the motors are running, lubrication can be carried out while the machine is at a standstill.
– In this case use only half the quantity of grease and then run the motor for a few minutes at full speed.
– When the motor has stopped, apply the rest of the specified amount of grease to the bearing.
– After 1-2 running hours close the grease outlet plug or closing valve if fitted.

B. Automatic lubrication

The grease outlet plug must be removed permanently with automatic lubrication or open closing valve if fitted.

ABB recommends only the use of electromechanical systems.

The amount of grease per lubrication interval stated in the table should be multiplied by four if an automatic regreasing system is used.

When 2-pole motors are automatically regreased, the note concerning lubricant recommendations for 2-pole motors in the Lubricants chapter should be followed.

6.2.3 Lubrication intervals and amounts

As a guide, adequate lubrication for motors with regreasable bearings can be achieved for the following duration, according to L_1. For duties with higher ambient temperatures please contact ABB. The formula to change the L_1 values roughly to L_{10} values: $L_{10} = 2.7 \times L_1$.

Lubrication intervals for vertical machines are half of the values shown in the table below.

The lubrication intervals are based on an ambient temperature +25°C. An increase in the ambient temperature raises the temperature of the bearings correspondingly. The values should be halved for a 15°C increase and may be doubled for a 15°C decrease.

In variable speed operation (i.e. frequency converter supply) it is necessary to measure the bearing temperature for the whole duty range and if exceeds 80°C, the lubrication intervals should be halved for a 15°C increase in bearing temperature. If the motor is operated at high speeds, it is also possible to utilize so called high speed greases, see chapter 6.2.4.

WARNING
The maximum operating temperature of the grease and bearings, +110°C, must not be exceeded.
The designed maximum speed of the motor must not be exceeded.

Lubrication intervals according to L1

Frame size	Amount of grease g/ D-bearing	Amount of grease g/ N-bearing	3600 r/min	3000 r/min	1800 r/min	1500 r/min	1200 r/min	1000 r/min	500-900 r/min
	Ball bearings								
	Lubrication intervals in duty hours								
80,90	5	5	14300	16200	21600	23400	25600	27400	28400
100,112	10	10	10500	12500	17900	19800	22100	23900	25000
132	10	10	9200	11100	16600	18500	20800	22700	23700
160	15	15	7100	8900	14300	16200	18600	20500	21600
180	15	15	6000	7800	13100	15000	17400	19400	20400
200	25	25	4200	5900	11000	13000	15400	17200	18400
225	25	25	3600	5100	10100	12000	14400	16400	17400
250	30	30	2400	3700	8400	10400	12700	14600	15800
280	35	35	1900	3200	—	—	—	—	—
280	70	70	—	—	7800	9600	—	13900	15000
315	35	35	1900	3200	-	-	-	-	-
315 [1)]	90	70	-	-	5900	7600	-	11800	12900
315 [2)]	90	90	-	-	5900	7600	-	11800	12900
355 [1)]	35	35	1900	3200	-	-	-	-	-
355 [2)]	45	45	800	1800	-	-	-	-	-
355	120	70	-	-	4000	5600	-		
	Roller bearings								
	Lubrication intervals in duty hours								
71,80,90	5	5	7200	8100	10800	11700	12800	13700	14200
100,112	10	10	5300	6300	9000	9900	11100	12000	12500
132	10	10	4600	5600	8300	9300	10400	11400	11900
160	15	15	3600	4500	7200	8100	9300	10300	10800
180	15	15	3000	3900	6600	7500	8700	9700	10200
200	25	25	2100	3000	5500	6500	7700	8600	9200
225	25	25	1800	2600	5100	6000	7200	8200	8700
250	30	30	1200	1900	4200	5200	6400	7300	7900
280	35	35	950	1600	—	—	—	—	—
280	70	70	—	—	3900	4800	—	6950	7500
315	35	35	950	1600	-	-	-	-	-
315 [1)]	90	70	-	-	2950	3800	-	5900	6450
315 [2)]	90	90	-	-	2950	3800	-	5900	6450
355 [1)]	35	35	950	1600	-	-	-	-	-
355 [2)]	45	45	400	900	-	-	-	-	-
355	120	70	-	-	4000	5600	-		

1) Products other than note 2）.
2) Only applicable to IE4 M2QA/GB1 M2QA series products.

6.2.4 Lubricants

WARNING
Do not mix different types of grease.
Incompatible lubricants may cause bearing damage.

When regreasing, use only special ball bearing grease with the following properties:

– good quality grease with lithium complex soap and with mineral- or PAO-oil
– base oil viscosity 100-160 cST at 40°C
– consistency NLGI grade 1.5 - 3 *)
– temperature range -30°C - +120°C, continuously.

*) For vertical mounted motors or in hot conditions a stiffer end of scale is recommended.

The above mentioned grease specification is valid if the ambient temperature is above -30°C or below +55°C, and the bearing temperature is below 110°C; otherwise consult ABB regarding

suitable grease.

Grease with the correct properties is available from all the major lubricant manufacturers.

Admixtures are recommended, but a written guarantee must be obtained from the lubricant manufacturer,especially concerning EP admixtures, that admixtures do not damage bearings or the properties of lubricants at the operating temperature range.

WARNING
Lubricants containing EP admixtures are not recommended in high bearing temperatures in frame sizes 280 to 450.

The following high performance greases can be used:

- Esso Unirex N2 or N3 (lithium complex base)
- Mobil Mobilith SHC 100 (lithium complex base)
- Shell Gadus S5 V 100 2 (lithium complex base)
- Klüber Klüberplex BEM 41-132 (special lithium base)
- FAG Arcanol TEMP110 (lithium complex base)
- Lubcon Turmogrease L 802 EP PLUS (special lithium base)
- Total Multiplex S 2 A (lithium complex base)

NOTE!
Always use high speed grease for high speed 2-pole machines where the speed factor is higher than 480,000 (calculated as Dm x n where Dm = average bearing diameter, mm; n = rotational speed, r/min).

The following greases can be used for high speed cast iron motors but not mixed with lithium complex greases:

- Klüber Klüber Quiet BQH 72-102 (polyurea base)
- Lubcon Turmogrease PU703 (polyurea base)

If other lubricants are used;

Check with the manufacturer that the qualities correspond to those of the above mentioned lubricants. The lubrication interval are based on the listed high performance greases above. Using other greases can reduce the interval.

If the compatibility of the lubricant is uncertain, contact ABB.

7. After Sales Support

7.1 Spare parts

When ordering spare parts, the motor serial number, full type designation and product code, as stated on the rating plate, must be specified.

For more information, please visit our web site www.abb.com/partsonline.

7.2 Rewinding

Rewinding should always be carried out by qualified repair shops.

Smoke extraction and other special motors should not be rewound without first contacting ABB.

7.3 Bearings

Special care should be taken with the bearings. These must be removed using pullers and fitted by heating or using special tools for the purpose.

Bearing replacement is described in detail in a separate instruction leaflet available from the ABB Sales Office.

8. Environmental requirements

8.1 Noise levels

Most of ABB's motors have a sound pressure level not exceeding 82 dB(A) at 50 Hz .

Values for specific machines can be found in the relevant product catalogues. At 60 Hz sinusoidal supply the values are approximately 4 dB(A) higher compared to 50 Hz values in product catalogues.

For sound pressure levels at frequency converter supply, please contact ABB.

9. Troubleshooting

These instructions do not cover all details or variations in equipment nor provide for every possible condition to be met in connection with installation, operation or maintenance. Should additional information required, please contact the nearest ABB Sales Office.

Motor troubleshooting chart

Your motor service and any troubleshooting must be handled by qualified persons who have proper tools and equipment.

	CAUSE	WHAT TO DO
Motor fails to start	Blown fuses	Replace fuses with proper type and rating.
	Overload trips	Check and reset overload in starter.
	Improper power supply	Check to see that power supplied agrees with motor rating plate and load factor.
	Improper line connections	Check connections against diagram supplied with motor.
	Open circuit in winding or control switch	Indicated by humming sound when switch is closed. Check for loosewiring connections.Also ensure that all control contacts are closing.
	Mechanical failure	Check to see if motor and drive turn freely. Check bearings and lubrication.
	Short circuited stator Poor stator coil connection	Indicated by blown fuses. Motor must be rewound. Remove endshields, locate fault.
	Rotor defective	Look for broken bars or end rings.
	Motor may be overloaded	Reduce load.
Motor stalls	One phase may be open	Check lines for open phase.
	Wrong application	Change type or size. Consult equipment supplier.
	Overload	Reduce load.
	Low voltage	Ensure the rating plate voltage is maintained. Check connection.
	Open circuit	Fuses blown, check overload relay, stator and push buttons.
Motor runs and then dies down	Power failure	Check for loose connections to line, to fuses and to control.
Motor does not come up to nominal speed	Not applied properly	Consult equipment supplier for proper type.
	Voltage too low at motor terminals because of line drop	Use higher voltage or transformer terminals or reduce load. Check connections. Check conductors for proper size.
	Starting load too high	Check the start load of the motor.
	Broken rotor bars or loose rotor	Look for cracks near the rings. A new rotor may be required, as repairs are usually temporary.
	Open primary circuit	Locate fault with testing device and repair.

	CAUSE	WHAT TO DO
Motor takes too long to accelerate and/or draws high current	Excessive load	Reduce load.
	Low voltage during start	Check for high resistance. Make sure that adequate cable size is used.
	Defective squirrel cage rotor	Replace with new rotor.
	Applied voltage too low	Correct power supply.
Wrong rotation direction	Wrong sequence of phases	Reverse connections at motor or at switchboard.
Motor overheats while running	Overload	Reduce load.
	Frame or ventilation openings may be full of dirt and prevent proper ventilation of motor	Open vent holes and check for a continuous stream of air from the motor.
	Motor may have one phase open	Check to make sure that all leads are well connected.
	Grounded coil	Motor must be rewound
	Unbalanced terminal voltage	Check for faulty leads, connections and transformers.
Motor vibrates	Motor misaligned	Realign.
	Weak support	Strengthen base.
	Coupling out of balance	Balance coupling.
	Driven equipment unbalanced	Rebalance driven equipment.
	Defective bearings	Replace bearings.
	Bearings not in line	Repair motor.
	Balancing weights shifted	Rebalance motor.
	Contradiction between balancing of rotor and coupling (half key - full key)	Rebalance coupling or motor.
	Polyphase motor running single phase	Check for open circuit.
	Excessive end play	Adjust bearing or add shim.
Scraping noise	Fan rubbing end shield or fan cover	Correct fan mounting.
	Loose on bedplate	Tighten holding bolts.
Noisy operation	Air gap not uniform	Check and correct end shield fits or bearing fits.
	Rotor unbalance	Rebalance rotor.
Hot bearings	Bent or sprung shaft	Straighten or replace shaft.
	Excessive belt pull	Decrease belt tension.
	Pulleys too far away from shaft shoulder	Move pulley closer to motor bearing.
	Pulley diameter too small	Use larger pulleys.
	Misalignment	Correct by realignment of the drive.
	Insufficient grease	Maintain proper quality and amount of grease in bearing.
	Deterioration of grease or lubricant contaminated	Remove old grease, wash bearings thoroughly in kerosene and replace with new grease.
	Excess lubricant	Reduce quantity of grease, bearing should not be more than half full.
	Overloaded bearing	Check alignment, side and end thrust.
	Broken ball or rough races	Replace bearing, clean housing thoroughly first.

10. Appendix

10.1 Additional manual for Smoke extraction motors

Motors are operating the following temperature class and mini-mum functioning period:
300°C, 60min / 250°C, 120min

NOTE!
This document is supplementary to the manual for standard low voltage motors (ABB / Low Voltage Motors / Manual) provided with the motor. When the same issues are addressed in both documents, instructions given in this document should take priority.

10.1.1 Validity

These instructions apply to the following ABB electric motor types:
• Motors series M2SE

Motors manufactured according to this standard are capable of providing daily comfort ventilation, as well as smoke extraction in the event of fire. In both applications, if an emergency situation occurs, the motors must be effective in creating a smoke-free layer near the floor allowing possible evacuation and rescue of people and animals, as well as the protection of property, and in allowing fires to be fought in their initial stages. These systems also help eliminate hot gases produced by combustion in the first stages of a fire.

Since their operation will be vital in the event of an emergency, ABB recommends that additional inspection and maintenance operations are performed in order to ensure their perfect operation when the safety function is required.

Motors can be energized by frequency converters up to a maximum ambient temperature of 40°C. As an option, M2SE can be designed for higher temperatures.
In the event of an accident with increased ambient temperature the motors should be energized by an industrial sinusoidal network. M2SE motors are equipped with a fan as standard. As an option they can also be delivered without a fan. In this case the motors should not be installed away from the airflow produced by the ventilators they drive.

10.1.2 Maintenance inspection

10.1.2.1 Normal ventilation only

IMPORTANT!
Bearing service lifetime L10h must exceed 20 000 hours to ensure reliable operation in case of an emergency.

ABB recommends inspecting the installation at least every 12 months. Regreasing intervals are indicated on the grease plate on the motor and must be followed. The regreasing intervals may be shorter than 12 months.
The following points should be checked during the inspection:
• Ambient temperature
• Cleanness (ribs, fan cover, etc.)
• Mounting bolts
• Drain holes
• Terminal connections
• Lubrication intervals
• Running hours
• Bearing and winding temperatures
• Vibration levels
• Condition of shaft seals

IMPORTANT!
The bearings should not exceed 20 000 ACCUMULATED RUNNING HOURS in th period between the motor commissioning, or the last bearing replacement.

10.1.2.2 Emergecy ventilation only

ABB recommends inspecting the installation at least every three months. During the inspection the following points should be checked / steps should be performed:

• Ambient temperature
• Cleanness (ribs, fan cover, etc.)
• Mounting bolts
• Drain holes

• Terminal connections
• Heating elements should be switched on before inspection
• Measure the insulation resistance
• Rotate the shaft to ensure free rotation
• Running hours
• Bearing and winding temperatures
• Condition of shaft seals

When the above points have been checked and confirmed to be in order, start the motor, lubricate the bearings and let it run for few minutes. Measure vibration levels.

The insulation resistance of the winding must be higher than 10 MΩ when measured at 25°C with a 500 V DC insulation resistance meter (otherwise, the winding of the stator must be dried in accordance with the instructions provided in the main 'ABB / Low Voltage Motors / Manual').

To ensure the reliability of the installation in case of an emergency, ABB recommends replacing the whole motor when 10 years has elapsed.

10.1.3 Additional instructions

Rewinding of smoke extraction motors is not allowed.

IMPORTANT!
Motor condition must be checked after any incident, regardless of whether the incident occurred whilethe motor was operating or at a standstill. The occurrence of abnormal vibrations, overloads, failures intrinsic to the electrical network – such as sags, swells, micro-interruptions, harmonics, etc. – must be taken into account. External phenomena that might damage the motor – flood or extreme humidity, low ambient temperature, dusty condi- tions, radial or axial stress on the shaft, etc. – must also be taken into account, even if present for only short periods of time. Therefore, it is strongly recom- mended that the motor parameters, such as ab-sorbed current, noise, vibrations, etc., are checked and followed up since a comparison with the initial parameters can provide advance warning of wear or potential malfunctioning.

CAUTION!
After an emergency in which the motor is subjected to high temperatures, it is not able to perform its safety function, and will have to be replaced by another motor with the same features.

10.1.3.1 Smoke extraction motors in variable speed operation

Smoke extraction motors must be specially designed for variable speed operation. Please see the chapter about variable speed operation in the main motor manual.

10.2 Figure

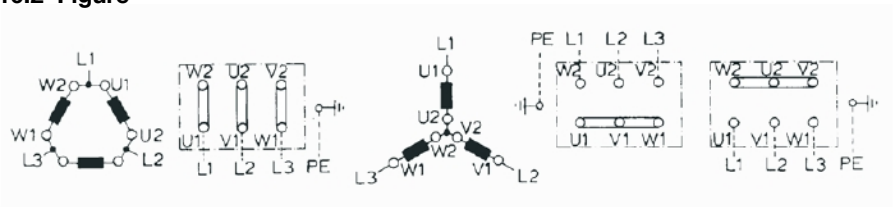


Figure 1. Connection diagram

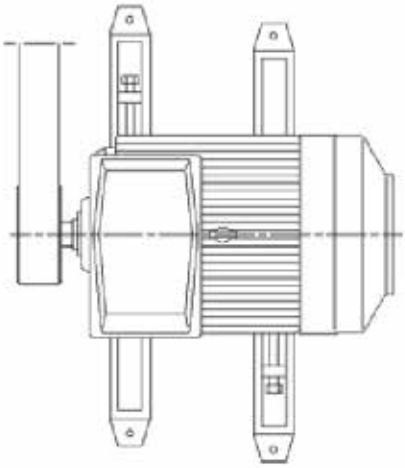


Figure 2. Belt drive

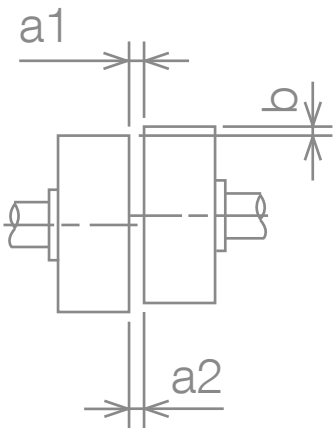
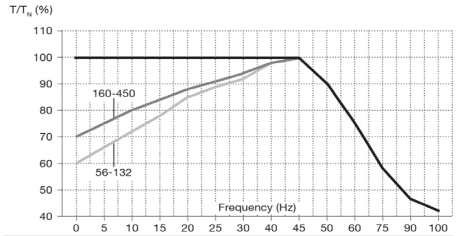


Figure 3. Mounting of half-coupling or pulley

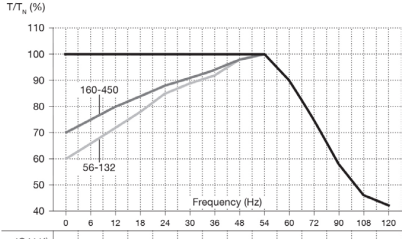
Loadability curves with converters with DTC control



	0	5	10	15	20	25	30	40	45	50	60	75	90	100
IC411[1]	60	66	72	78	85	89	92	98	100	90	75	58	46	42
IC411[2]	70	75	80	84	88	91	94	98	100	90	75	58	46	42
IC416[3]	100	100	100	100	100	100	100	100	100	90	75	58	46	42

[1] Self ventilated, IEC frame sizes 56-132
[2] Self ventilated, IEC frame sizes 160-450
[3] Separate motor cooling (force ventilated)

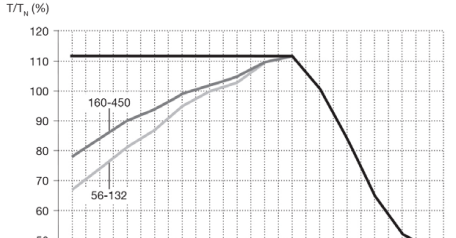
Figure 4a. Conventer with DTC control, 50 Hz, temperature rise B



	0	6	12	18	24	30	36	48	54	60	72	90	108	120
IC411[1]	60	66	72	78	85	89	92	98	100	90	75	58	46	42
IC411[2]	70	75	80	84	88	91	94	98	100	90	75	58	46	42
IC416[3]	100	100	100	100	100	100	100	100	100	90	75	58	46	42

[1] Self ventilated, IEC frame sizes 56-132
[2] Self ventilated, IEC frame sizes 160-450
[3] Separate motor cooling (force ventilated)

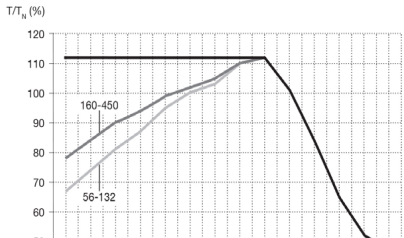
Figure 4b. Conventer with DTC control, 60 Hz, temperature rise B



	0	5	10	15	20	25	30	40	45	50	60	75	90	100
IC411[1]	67	74	81	87	95	100	103	110	112	101	84	65	52	47
IC411[2]	78	84	90	94	99	102	105	110	112	101	84	65	52	47
IC416[3]	112	112	112	112	112	112	112	112	112	101	84	65	52	47

[1] Self ventilated, IEC frame sizes 56-132
[2] Self ventilated, IEC frame sizes 160-450
[3] Separate motor cooling (force ventilated)

Figure 4c. Conventer with DTC control, 50 Hz, temperature rise F

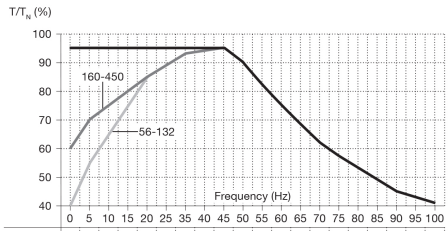


	0	6	12	18	24	30	36	48	54	60	72	90	108	120
IC411[1]	67	74	81	87	95	100	103	110	112	101	84	65	52	47
IC411[2]	78	84	90	94	99	102	105	110	112	101	84	65	52	47
IC416[3]	112	112	112	112	112	112	112	112	112	101	84	65	52	47

[1] Self ventilated, IEC frame sizes 56-132
[2] Self ventilated, IEC frame sizes 160-450
[3] Separate motor cooling (force ventilated)

Figure 4d. Conventer with DTC control, 60 Hz, temperature rise F

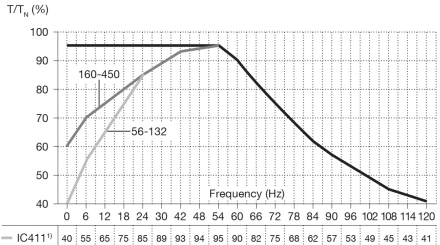
Loadability curves with other voltage source PWM type converter



	0	5	10	15	20	25	35	40	45	50	55	60	65	70	75	80	85	90	95	100
IC411[1]	40	55	65	75	85	89	93	94	95	90	82	75	68	62	57	53	49	45	43	41
IC411[2]	60	70	75	80	85	89	93	94	95	90	82	75	68	62	57	53	49	45	43	41
IC416[3]	95	95	95	95	95	95	95	95	95	90	82	75	68	62	57	53	49	45	43	41

[1] Self ventilated, IEC frame sizes 56-132
[2] Self ventilated, IEC frame sizes 160-450
[3] Separate motor cooling (force ventilated)

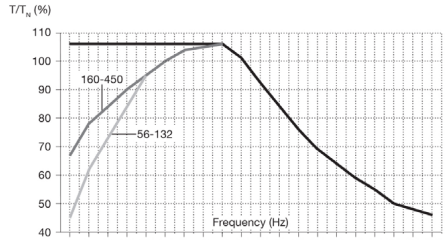
Figure 5a. Other voltage source PWM type converter, 50 Hz, temperature rise B



	0	6	12	18	24	30	42	48	54	60	66	72	78	84	90	96	102	108	114	120
IC411[1]	40	55	65	75	85	89	93	94	95	90	82	75	68	62	57	53	49	45	43	41
IC411[2]	60	70	75	80	85	89	93	94	95	90	82	75	68	62	57	53	49	45	43	41
IC416[3]	95	95	95	95	95	95	95	95	95	90	82	75	68	62	57	53	49	45	43	41

[1] Self ventilated, IEC frame sizes 56-132
[2] Self ventilated, IEC frame sizes 160-450
[3] Separate motor cooling (force ventilated)

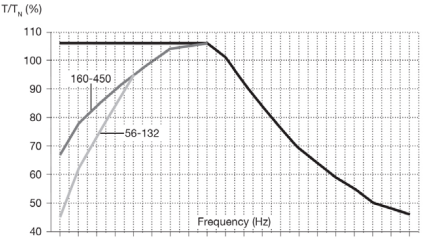
Figure 5b. Other voltage source PWM type converter, 60 Hz, temperature rise B



	0	5	10	15	20	25	35	40	45	50	55	60	65	70	75	80	85	90	95	100
IC411[1]	45	62	73	84	95	100	104	105	106	101	92	84	76	69	64	59	55	50	48	46
IC411[2]	67	78	84	90	95	100	104	105	106	101	92	84	76	69	64	59	55	50	48	46
IC416[3]	106	106	106	106	106	106	106	106	106	101	92	84	76	69	64	59	55	50	48	46

[1] Self ventilated, IEC frame sizes 56-132
[2] Self ventilated, IEC frame sizes 160-450
[3] Separate cooling (force ventilated)

Figure 5c. Other voltage source PWM type converter, 50 Hz, temperature rise F



	0	6	12	18	24	30	42	48	54	60	66	72	78	84	90	96	102	108	114	120
IC411[1]	45	62	73	84	95	100	104	105	106	101	92	84	76	69	64	59	55	50	48	46
IC411[2]	67	78	84	90	95	100	104	105	106	101	92	84	76	69	64	59	55	50	48	46
IC416[3]	106	106	106	106	106	106	106	106	106	101	92	84	76	69	64	59	55	50	48	46

[1] Self ventilated, IEC frame sizes 56-132
[2] Self ventilated, IEC frame sizes 160-450
[3] Separate motor cooling (force ventilated)

Figure 5d. Other voltage source PWM type converter, 60 Hz, temperature rise F

10.3 Additional manual for Hoisting Instructions

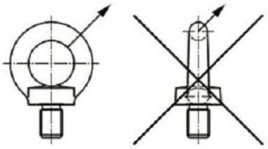
Note! See also manual for Low Voltage Motors chapter Handling.

WARNING !
Improper handling and lifting of motor may cause death, serious injury or property damage. Only skilled personnel shall be used for lifting and installing the motor.
Before lifting: Check lifting devices and note weight ! Table 1. shows the maximum standard motor weights. The actual weight is stated on the rating plate of the motor.

Table 1.

Frame size	Weight
80ML	25kg
90	40kg
100	60kg
112	66kg
132	110kg
160	229kg
180	283kg
200	381kg
225	502kg
250	613kg
280	890kg
315	1700kg
355	2700kg
400	3500kg
450	4800kg

Product	Frame size	Picture No.
M3BP	90-250	1
	280-450	3
M3AA	90-250	1
	280	3
M2BAX/M2BJX /M2QA	80-250	1
	280-450	2



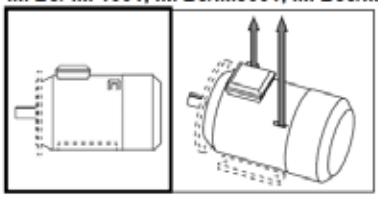
DIN580-2010

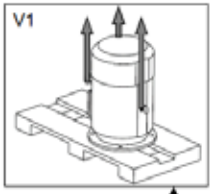
www.abb.com/motors&generators
online.abb.com/bol

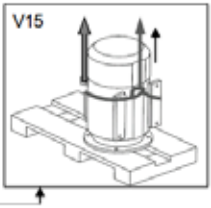
Low voltage motors / Hoisting Instructions
M3BP 90-450
M3AA 90-280
M2BAX/M2BJX/M2QA 80-450
3GZC503900-338 04-2024

Picture 1.

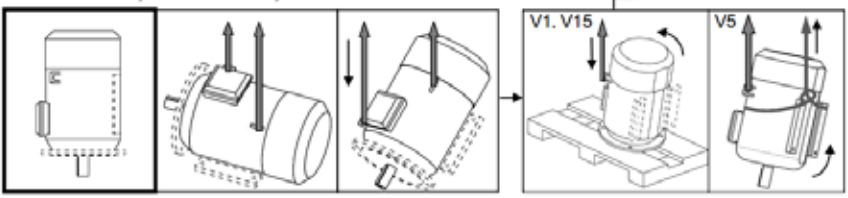
IM B3/ IM 1001, IM B5/IM3001, IM B35/IM2001



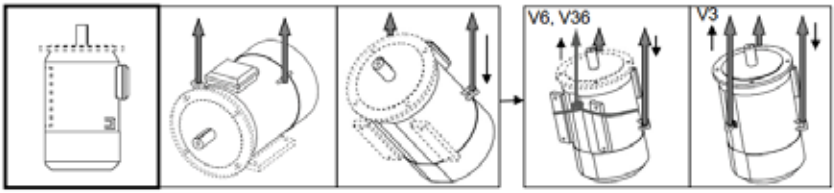




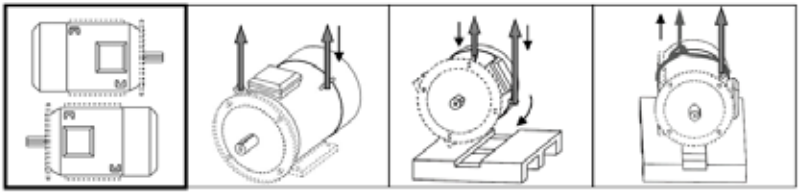
IM V5/ IM 1011, IM V1/IM3011, IM V15/IM2011



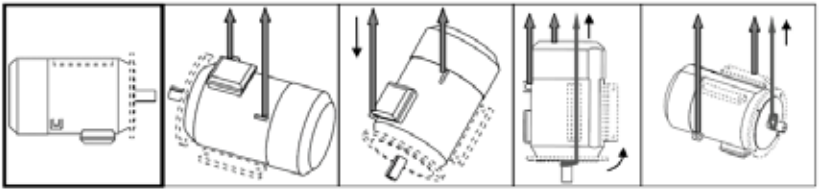
IM V6/ IM 1031, IM V3/IM3031, IM V36/IM2031



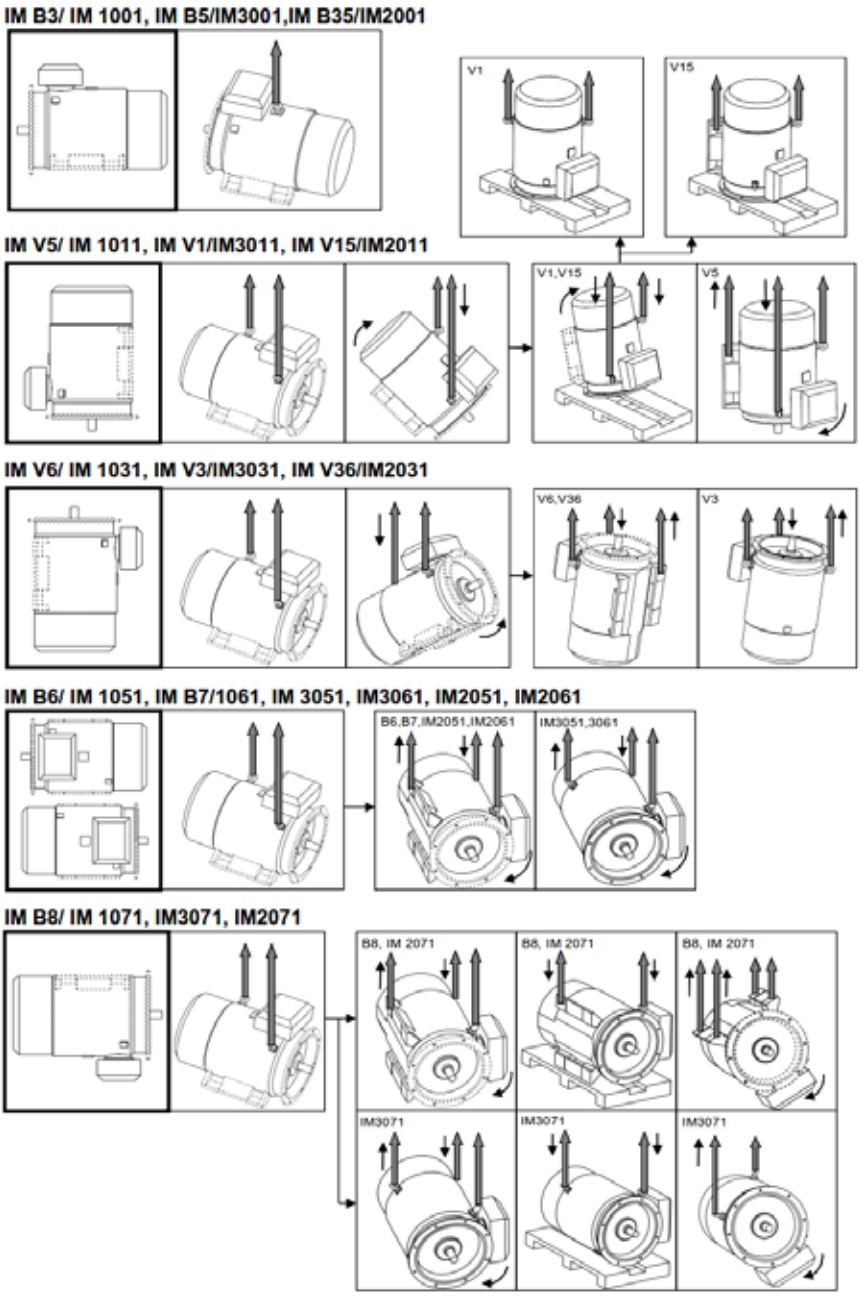
IM B6/ IM 1051, IM B7/1061, IM 3051, IM3061, IM2051, IM2061



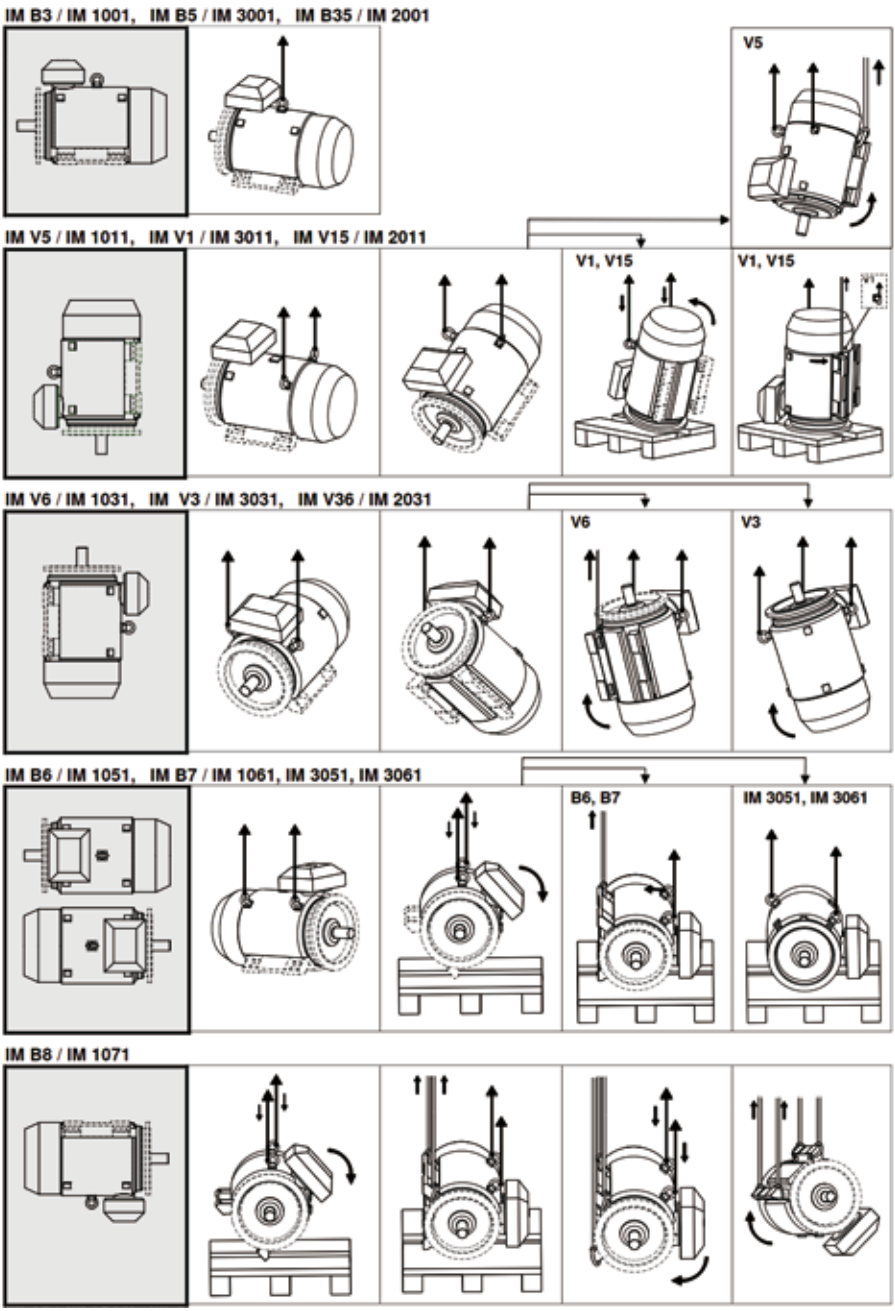
IM B8/ IM 1071, IM3071, IM2071



Picture 2.


IM B3/ IM 1001, IM B5/IM3001,IM B35/IM2001
V1
V15
IM V5/ IM 1011, IM V1/IM3011, IM V15/IM2011
V1,V15
V5
IM V6/ IM 1031, IM V3/IM3031, IM V36/IM2031
V6,V36
V3
IM B6/ IM 1051, IM B7/1061, IM 3051, IM3061, IM2051, IM2061
B6,B7,IM2051,IM2061
IM3051,3061
IM B8/ IM 1071, IM3071, IM2071
B8, IM 2071
B8, IM 2071
B8, IM 2071
IM3071
IM3071
IM3071

Picture 3.


IM B3 / IM 1001, IM B5 / IM 3001, IM B35 / IM 2001
V5
IM V5 / IM 1011, IM V1 / IM 3011, IM V15 / IM 2011
V1, V15
V1, V15
IM V6 / IM 1031, IM V3 / IM 3031, IM V36 / IM 2031
V6
V3
IM B6 / IM 1051, IM B7 / IM 1061, IM 3051, IM 3061
B6, B7
IM 3051, IM 3061
IM B8 / IM 1071

10.4 Information for users, waste treatment facilities and marking

This document is prepared according to EU Directive 2012/19/EU (WEEE) to give end-users the necessary information on how to treat and dispose of EEE (Electrical and Electronic Equipment) waste after it has been removed from service and is to be recycled.

Marking of the products

Products that are marked with the crossed-out wheeled bin symbol as below and/or the symbol is in-cluded in its documentation shall be handled in the following way:

For private households

The crossed–out wheeled bin symbol on the product(s) and / or accompanying documents means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste. For proper treatment, recovery and recycling, please take this product(s) to designated collection points where it will be accepted free of charge.

Alternatively, in some countries, you may be able to return your products to your local retailer upon pur-chase of an equivalent new product.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which might otherwise arise from inappropriate waste handling.

Please contact your local authority for further details of your nearest designated collection point.

Depending on your national legislation, incorrect disposal of this waste may incur a penalty in your coun-try.For professional users in the European Union

The crossed –out wheeled bin symbol on the product(s) and / or accompanying documents means that used electrical and electronic equipment (WEEE) should not be mixed with general household waste.

If you wish to dispose of electrical and electronic equipment (EEE), please contact your dealer or sup-plier for further information.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

For disposal in countries outside the European Union

The crossed–out wheeled bin symbol is only valid in the European Union (EU) and means that used elec-trical and electronic equipment (WEEE) should not be mixed with general household waste.

If you wish to dispose of this product, please contact your local authorities or dealer for the correct method of disposal.

Disposing of this product correctly will help save valuable resources and prevent any potential negative effects on human health and the environment, which could otherwise arise from inappropriate waste handling.

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