

PowerFlex 70 AC Drives, Frames A...E

**ATTENTION:**

Read this document and the documents listed in the Additional Resources section about installation, configuration and operation of this equipment before you install, configure, operate or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

注意:

在安装、配置、操作和维护本产品前，请阅读本文档以及“其他资源”部分列出的有关设备安装、配置和操作的相应文档。除了所有适用规范、法律和标准的相关要求之外，用户还必须熟悉安装和接线说明。

安装、调整、投运、使用、组装、拆卸和维护等各项操作必须由经过适当训练的专业人员按照适用的操作规范实施。

如果未按照制造商指定的方式使用该设备，则可能会损害设备提供的保护。

ATENCIÓN:

Antes de instalar, configurar, poner en funcionamiento o realizar el mantenimiento de este producto, lea este documento y los documentos listados en la sección Recursos adicionales acerca de la instalación, configuración y operación de este equipo. Los usuarios deben familiarizarse con las instrucciones de instalación y cableado y con los requisitos de todos los códigos, leyes y estándares vigentes.

El personal debidamente capacitado debe realizar las actividades relacionadas a la instalación, ajustes, puesta en servicio, uso, ensamblaje, desensamblaje y mantenimiento de conformidad con el código de práctica aplicable.

Si este equipo se usa de una manera no especificada por el fabricante, la protección provista por el equipo puede resultar afectada.

ATENÇÃO:

Leia este e os demais documentos sobre instalação, configuração e operação do equipamento que estão na seção Recursos adicionais antes de instalar, configurar, operar ou manter este produto. Os usuários devem se familiarizar com as instruções de instalação e fiação além das especificações para todos os códigos, leis e normas aplicáveis.

É necessário que as atividades, incluindo instalação, ajustes, colocação em serviço, utilização, montagem, desmontagem e manutenção sejam realizadas por pessoal qualificado e especializado, de acordo com o código de prática aplicável.

Caso este equipamento seja utilizado de maneira não estabelecida pelo fabricante, a proteção fornecida pelo equipamento pode ficar prejudicada.

ВНИМАНИЕ:

Перед тем как устанавливать, настраивать, эксплуатировать или обслуживать данное оборудование, прочитайте этот документ и документы, перечисленные в разделе «Дополнительные ресурсы». В этих документах изложены сведения об установке, настройке и эксплуатации данного оборудования. Пользователи обязаны ознакомиться с инструкциями по установке и прокладке соединений, а также с требованиями всех применимых норм, законов и стандартов.

Все действия, включая установку, наладку, ввод в эксплуатацию, использование, сборку, разборку и техническое обслуживание, должны выполняться обученным персоналом в соответствии с применимыми нормами и правилами.

Если оборудование используется не предусмотренным производителем образом, защита оборудования может быть нарушена.

注意:

本製品を設置、構成、稼動または保守する前に、本書および本機器の設置、設定、操作についての参考資料の該当箇所に記載されている文書に目を通してください。ユーザは、すべての該当する条例、法律、規格の要件に加えて、設置および配線の手順に習熟している必要があります。

設置調整、運転の開始、使用、組立て、解体、保守を含む諸作業は、該当する実施規則に従って訓練を受けた適切な作業員が実行する必要があります。

本機器が製造メーカーにより指定されていない方法で使用されている場合、機器により提供されている保護が損なわれる恐れがあります。

ACHTUNG:

Lesen Sie dieses Dokument und die im Abschnitt „Literaturverweise“ genannten Dokumente zur Installation, Konfiguration und Bedienung dieser Ausrüstung sorgfältig durch, bevor Sie dieses Produkt installieren, konfigurieren, bedienen oder instandsetzen. Benutzer müssen sich mit den Anweisungen zur Installation und Verdrahtung vertraut machen und müssen die Anforderungen aller geltenden Vorschriften, Gesetze und Normen kennen.

Aktivitäten wie Installation, Einstellung, Inbetriebnahme, Verwendung, Montage, Demontage und Instandsetzung müssen durch ausreichend geschultes Personal in Übereinstimmung mit den geltenden Durchführungsvorschriften ausgeführt werden.

Wenn diese Ausrüstung in einer Weise verwendet wird, die nicht vom Hersteller angegeben wurde, kann der von der Ausrüstung bereitgestellte Schutz beeinträchtigt sein.

ATTENTION :

Lisez ce document et les documents listés dans la section Ressources complémentaires relatifs à l'installation, la configuration et le fonctionnement de cet équipement avant d'installer, configurer, utiliser ou entretenir ce produit. Les utilisateurs doivent se familiariser avec les instructions d'installation et de câblage en plus des exigences relatives aux codes, lois et normes en vigueur.

Les activités relatives à l'installation, le réglage, la mise en service, l'utilisation, l'assemblage, le démontage et l'entretien doivent être réalisées par des personnes formées selon le code de pratique en vigueur.

Si cet équipement est utilisé d'une façon qui n'a pas été définie par le fabricant, la protection fournie par l'équipement peut être compromise.

ATTENTION :

Lisez ce document et les documents listés dans la section Ressources complémentaires relatifs à l'installation, la configuration et le fonctionnement de cet équipement avant d'installer, configurer, utiliser ou entretenir ce produit. Les utilisateurs doivent se familiariser avec les instructions d'installation et de câblage en plus des exigences relatives aux codes, lois et normes en vigueur.

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Si cet équipement est utilisé d'une façon qui n'a pas été définie par le fabricant, la protection fournie par l'équipement peut être compromise.

주의:

본 제품 설치, 설정, 작동 또는 유지 보수하기 전에 본 문서를 포함하여 설치, 설정 및 작동에 관한 참고 자료 섹션의 문서들을 반드시 읽고 숙지하십시오. 사용자는 모든 관련 규정, 법규 및 표준에서 요구하는 사항에 대해 반드시 설치 및 배선 지침을 숙지해야 합니다.

설치, 조정, 가동, 사용, 조립, 분해, 유지보수 등 모든 작업은 관련 규정에 따라 적절한 교육을 받은 사용자를 통해서만 수행해야 합니다.

본 장비를 제조사가 명시하지 않은 방법으로 사용하면 장비의 보호 기능이 손상될 수 있습니다.

ATTENZIONE

Prima di installare, configurare ed utilizzare il prodotto, o effettuare interventi di manutenzione su di esso, leggere il presente documento ed i documenti elencati nella sezione "Altre risorse", riguardanti l'installazione, la configurazione ed il funzionamento dell'apparecchiatura. Gli utenti devono leggere e comprendere le istruzioni di installazione e cablaggio, oltre ai requisiti previsti dalle leggi, codici e standard applicabili.

Le attività come installazione, regolazioni, utilizzo, assemblaggio, disassemblaggio e manutenzione devono essere svolte da personale adeguatamente addestrato, nel rispetto delle procedure previste.

Qualora l'apparecchio venga utilizzato con modalità diverse da quanto previsto dal produttore, la sua funzione di protezione potrebbe venire compromessa.

**DIKKAT:**

Bu ürünün kurulumu, yapılandırılması, işletilmesi veya bakımı öncesinde bu dokümanı ve bu ekipmanın kurulumu, yapılandırılması ve işletimi ile ilgili İlave Kaynaklar bölümünde yer listelenmiş dokümanları okuyun. Kullanıcılar yürürlükteki tüm yönetmelikler, yasalar ve standartların gereksinimlerine ek olarak kurulum ve kablolama talimatlarını da öğrenmek zorundadır.

Kurulum, ayarlama, hizmete alma, kullanma, parçaları birleştirme, parçaları sökme ve bakım gibi aktiviteler sadece uygun eğitimleri almış kişiler tarafından yürürlükteki uygulama yönetmeliklerine uygun şekilde yapılabilir.

Bu ekipman üretici tarafından belirlenmiş amacın dışında kullanılırsa, ekipman tarafından sağlanan koruma bozulabilir.

注意事項:

在安裝、設定、操作或維護本產品前，請先閱讀此文件以及列於「其他資源」章節中有關安裝、設定與操作此設備的文件。使用者必須熟悉安裝和配線指示，並符合所有法規、法律和標準要求。

包括安裝、調整、交付使用、使用、組裝、拆卸和維護等動作都必須交由已經過適當訓練的人員進行，以符合適用的實作法規。

如果將設備用於非製造商指定的用途時，可能會造成設備所提供的保護功能受損。

POZOR:

Než začnete instalovat, konfigurovat či provozovat tento výrobek nebo provádět jeho údržbu, přečtěte si tento dokument a dokumenty uvedené v části Dodatečné zdroje ohledně instalace, konfigurace a provozu tohoto zařízení. Uživatelé se musejí vedle požadavků všech relevantních vyhlášek, zákonů a norem nutně seznámit také s pokyny pro instalaci a elektrické zapojení.

Činnosti zahrnující instalaci, nastavení, uvedení do provozu, užívání, montáž, demontáž a údržbu musí vykonávat vhodně proškolený personál v souladu s příslušnými prováděcími předpisy.

Pokud se toto zařízení používá způsobem neodpovídajícím specifikaci výrobce, může být narušena ochrana, kterou toto zařízení poskytuje.

UWAGA:

Przed instalacją, konfiguracją, użytkowaniem lub konserwacją tego produktu należy przeczytać niniejszy dokument oraz wszystkie dokumenty wymienione w sekcji Dodatkowe źródła omawiające instalację, konfigurację i procedury użytkowania tego urządzenia. Użytkownicy mają obowiązek zapoznać się z instrukcjami dotyczącymi instalacji oraz oprzewodowania, jak również z obowiązującymi kodeksami, prawem i normami.

Działania obejmujące instalację, regulację, przekazanie do użytkowania, użytkowanie, montaż, demontaż oraz konserwację muszą być wykonywane przez odpowiednio przeszkolony personel zgodnie z obowiązującym kodeksem postępowania.

Jeśli urządzenie jest używane w sposób inny niż określony przez producenta, zabezpieczenie zapewniane przez urządzenie może zostać ograniczone.

OBS!

Läs detta dokument samt dokumentet, som står listat i avsnittet Övriga resurser, om installation, konfigurering och drift av denna utrustning innan du installerar, konfigurerar eller börjar använda eller utföra underhållsarbete på produkten. Användare måste bekanta sig med instruktioner för installation och kabeldragning, förutom krav enligt gällande koder, lagar och standarder.

Åtgärder som installation, justering, service, användning, montering, demontering och underhållsarbete måste utföras av personal med lämplig utbildning enligt lämpligt bruk.

Om denna utrustning används på ett sätt som inte anges av tillverkaren kan det hända att utrustningens skyddsanordningar försätts ur funktion.

LET OP:

Lees dit document en de documenten die genoemd worden in de paragraaf Aanvullende informatie over de installatie, configuratie en bediening van deze apparatuur voordat u dit product installeert, configureert, bedient of onderhoudt. Gebruikers moeten zich vertrouwd maken met de installatie en de bedragsinstructies, naast de vereisten van alle toepasselijke regels, wetten en normen.

Activiteiten zoals het installeren, afstellen, in gebruik stellen, gebruiken, monteren, demonteren en het uitvoeren van onderhoud mogen uitsluitend worden uitgevoerd door hiervoor opgeleid personeel en in overeenstemming met de geldende praktijkregels.

Indien de apparatuur wordt gebruikt op een wijze die niet is gespecificeerd door de fabrikant, dan bestaat het gevaar dat de beveiliging van de apparatuur niet goed werkt.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
PowerFlex 70 AC Drives User Manual, publication 20A-UM001	Provides the basic information needed to install, start-up, and troubleshoot the PowerFlex 70 adjustable frequency AC drive.
PowerFlex 70 Technical Data, publication 20A-TD001	Provides technical data regarding the PowerFlex 70 adjustable frequency AC drives for a variety of industrial applications.
Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication DRIVES-IN001	Provides basic information needed to properly wire and ground PWM AC drives.
Industry Installation Guidelines for Pulse Width Modulated (PWM) AC Drives Application Technique, publication DRIVES-AT003	Provides basic information for different enclosure systems, and power and grounding considerations needed to properly install a PWM AC drive.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.rockwellautomation.com/products/certification	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/literature/>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.



ATTENTION: Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.



ATTENTION: An incorrectly applied or installed drive can result in component damage or a reduction in product life. Wiring or application errors such as under sizing the motor, incorrect or inadequate AC supply, or excessive surrounding air temperatures may result in malfunction of the system.



ATTENTION: Drive **must not** be installed in an area where the ambient atmosphere contains volatile or corrosive gas, vapors or dust. If the drive is not going to be installed for a period of time, it must be stored in an area where it will not be exposed to a corrosive atmosphere.

Maximum Surrounding Air Temperature

Enclosure Rating	Temperature Range
Open Type, IP 20, NEMA/UL Type 1 & Flange Mount	0...50 °C (32...122 °F)
IP54, IP 66 & NEMA/UL Type 4X/12	0...40 °C (32...104 °F)

Drive Weights

Frame	Weight ⁽¹⁾ kg (lb)
IP20, NEMA/UL Type 1	
A	2.71 (6.0)
B	3.60 (7.9)
C	6.89 (15.2)
D	9.25 (20.4)
E	18.60 (41.0)

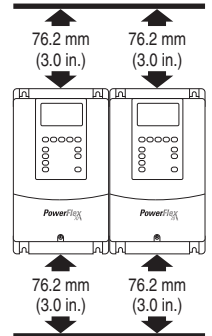
Frame	Weight ⁽¹⁾ kg (lb)
IP66, NEMA/UL Type 4X/12	
B	3.61 (8.0)
D	9.13 (20.1)
E	18.60 (41.0)

Frame	Weight ⁽¹⁾ kg (lb)
Flange Mount	
A	2.71 (6.0)
B	3.60 (7.9)
C	6.89 (15.2)
D	9.25 (20.4)
E	18.60 (41.0)

(1) Weights include HIM and Standard I/O.

Minimum Mounting Clearance

Specified vertical clearance requirements are intended to be from the drive to the closest object that can restrict airflow through the drive heat sink and chassis. The drive must be mounted in a vertical orientation as shown, and must make full contact with the mounting surface. Do not use standoffs or spacers. In addition, inlet air temperature must not exceed the product specification.



IMPORTANT

Some drives are equipped with an adhesive label on the top of the chassis. Removing the adhesive label from the drive changes the NEMA/UL enclosure rating from Type 1 Enclosed to Open Type.

Leakage Current

- PowerFlex 70 drives produce leakage current in the protective earthing conductor which exceeds 3.5 mA AC and/or 10 mA DC. The minimum size of the protective earthing (grounding) conductor used in the application must comply with local safety regulations for high protective earthing conductor current equipment.
- PowerFlex 70 drives produce DC current in the protective earthing conductor and may reduce the ability of a residual current device (RCD) or residual current monitor (RCM) of type A or AC to provide protection for the drive and other equipment in the installation.

Motor Overload Protection

Electronic Motor Overload Protection:	Class 10 motor overload protection according to NEC article 430 and motor over-temperature protection according to NEC article 430.126 (A)(2). UL 508C File E59272.
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Short Circuit Current Rating

Maximum Short Circuit Rating:	200,000 Amps symmetrical.
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Branch Circuit Short Circuit Protection

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electric Code (NEC) and any additional local codes, or the equivalent. The tables on the following pages provide drive ratings (including continuous, 1 minute and 3 second) and recommended AC line input fuse and circuit breaker information. Both types of short circuit protection are acceptable for UL and IEC requirements. Sizes listed are the recommended sizes based on 40 °C (104 °F) and the U.S. N.E.C. Other country, state or local codes may require different ratings.

Fuse and Circuit Breaker Ratings

The tables on the following pages provide recommended AC line input fuse and circuit breaker information. See Fusing and Circuit Breakers below for UL and IEC requirements. Sizes listed are the recommended sizes based on 40 °C (104 °F) and the U.S. NEC. Other country, state, or local codes can require different ratings.

Fusing

The recommend fuse types are listed below. If available current ratings do not match those listed in the tables provided, chose the next higher fuse rating.

- IEC – BS88 (British Standard) Parts 1 & 2, EN60269-1, Parts 1 & 2¹, type gG or equivalent should be used.
- UL - UL Class CC, T, RK1, or J should be used.

Circuit Breakers

The “non-fuse” listings in the following tables include inverse time circuit breakers, instantaneous trip circuit breakers (motor circuit protectors) and 140M self-protected combination motor controllers. If one of these is chosen as the desired protection method, the following requirements apply:

- IEC – Both types of circuit breakers and 140M self-protected combination motor controllers are acceptable for IEC installations.
- UL - Only inverse time circuit breakers and the specified 140M self-protected combination motor controllers are acceptable for UL installations.

¹ Typical designations include, but may not be limited to the following; Parts 1 & 2: AC, AD, BC, BD, CD, DD, ED, EFS, EF, FG, GF, GG, GH.

208/240 Volt AC Three-Phase Input Drive Ratings and Input Protection Devices (see page 6 for notes)

Drive Catalog Number	Frame (1)	HP Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (4)	Motor Circuit Protector (6)	140M Motor Protector with Adjustable Current Range (7) (8)			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min. (2)	Max. (3)	Min. (2)	Max. (3)	Max. (5)	Max. (5)	Available Catalog Numbers (9)		Minimum Enclosure Volume (in. 3)(10)	
208 Volt AC Input																		
20AB2P2	A	0.5	0.33	2.9	1.1	2.5	2.7	3.7	6	6	6	10	15	7	140M-C2E-B40	140M-D8E-B40	–	3441
20AB4P2	A	1	0.75	5.6	2	4.8	5.5	7.4	10	10	10	17.5	15	7	140M-C2E-B63	140M-D8E-B63	–	3441
20AB6P8	B	2	1.5	10	3.6	7.8	10.3	13.8	15	15	15	30	30	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	3441
20AB9P6	B	3	2	14	5.1	11	12.1	16.5	20	25	20	40	40	30	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AB015	C	5	3	16	5.8	17.5	19.2	26.6	20	35	20	70	70	30	140M-C2E-C20	140M-D8E-C20	140M-F8E-C20	3441
20AB022	D	7.5	5	23.3	8.3	25.3	27.8	37.9	30	50	30	100	100	30	–	140M-D8E-C25	140M-F8E-C25	5098
20AB028	D	10	7.5	29.8	10.7	32.2	37.9	50.6	40	70	40	125	125	50	–	–	140M-F8E-C32	5098
20AB042	D	15	10	39.8	14.3	43	55.5	74	60	100	60	175	175	70	–	–	140M-F8E-C45	5098
20AB054	E	20	15	57.5	20.7	62.1	72.4	96.6	80	125	80	200	200	100	–	–	–	–
20AB070	E	25	20	72.3	26.0	78.2	93.1	124	90	175	90	300	300	100	–	–	–	–
240 Volt AC Input																		
20AB2P2	A	0.5	0.33	2.5	1.1	2.2	2.4	3.3	3	4.5	3	8	15	3	140M-C2E-B25	140M-D8E-B25	–	3441
20AB4P2	A	1	0.75	4.8	2	4.2	4.8	6.4	6	9	6	15	15	7	140M-C2E-B63	140M-D8E-B63	–	3441
20AB6P8	B	2	1.5	8.7	3.6	6.8	9	12	15	15	15	25	25	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	3441
20AB9P6	B	3	2	12.2	5.1	9.6	10.6	14.4	20	20	20	35	35	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AB015	C	5	3	13.9	5.8	15.3	17.4	23.2	20	30	20	60	60	30	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AB022	D	7.5	5	19.9	8.3	22	24.4	33	25	45	25	80	80	30	–	140M-D8E-C25	140M-F8E-C25	5098
20AB028	D	10	7.5	25.7	10.7	28	33	44	35	60	35	110	110	50	–	–	140M-F8E-C32	5098
20AB042	D	15	10	38.7	16.1	42	46.2	63	50	90	50	150	150	50	–	–	140M-F8E-C45	5098
20AB054	E	20	15	49.8	20.7	54	63	84	60	100	60	200	200	100	–	–	–	–
20AB070	E	25	20	64.5	26.8	70	81	108	90	150	90	275	275	100	–	–	–	–

400/480 Volt AC Three-Phase Input Drive Ratings and Input Protection Devices (see page 6 for notes).

Drive Catalog Number	Frame (1)	HP Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (4)	Motor Circuit Protector (6)	140M Motor Protector with Adjustable Current Range (7) (8)			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min. (2)	Max. (3)	Min. (2)	Max. (3)	Max. (5)	Max. (5)	Available Catalog Numbers (9)		Minimum Enclosure Volume (in. 3)(10)	
400 Volt AC Input																		
20AC1P3	A	0.37	0.25	1.6	1.1	1.3	1.4	1.9	3	3	3	5	15	3	140M-C2E-B16	–	–	3441
20AC2P1	A	0.75	0.55	2.5	1.8	2.1	2.4	3.2	4	6	4	8	15	7	140M-C2E-B25	140M-D8E-B25	–	3441
20AC3P5	A	1.5	1.1	4.3	3	3.5	4.5	6	6	6	6	12	15	7	140M-C2E-B63	140M-D8E-B63	–	3441
20AC5P0	B	2.2	1.5	6.5	4.5	5	5.5	7.5	10	10	10	20	20	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	3441
20AC8P7	B	4	3	11.3	7.8	8.7	9.9	13.2	15	17.5	15	30	30	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AC011	C	5.5	4	10.5	7.6	11.5	13	17.4	15	25	15	45	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AC015	C	7.5	5.5	15.1	10.4	15.4	17.2	23.1	20	30	20	60	60	20	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AC022	D	11	7.5	21.9	15.2	22	24.2	33	30	45	30	80	80	30	–	140M-D8E-C25	140M-F8E-C25	5098
20AC030	D	15	11	30.3	21	30	33	45	40	60	40	120	120	50	–	–	140M-F8E-C32	5098
20AC037	D	18.5	15	35	24.3	37	45	60	50	80	50	125	140	50	–	–	140M-F8E-C45	5098
20AC043	D	22	18.5	40.7	28.2	43	56	74	60	90	60	150	160	70	–	–	–	–
20AC060	E	30	22	56.8	39.3	60	66	90	80	125	80	225	240	80	–	–	–	–
20AC072	E	37	30	68.9	47.8	72	90	120	90	150	90	250	280	100	–	–	–	–
480 Volt AC Input																		
20AD1P1	A	0.5	0.33	1.3	1.1	1.1	1.2	1.6	3	3	3	4	15	3	140M-C2E-B16	–	–	3441
20AD2P1	A	1	0.75	2.4	2	2.1	2.4	3.2	3	6	3	8	15	3	140M-C2E-B25	140M-D8E-B25	–	3441
20AD3P4	A	2	1.5	3.8	3.2	3.4	4.5	6	6	6	6	12	15	7	140M-C2E-B40	140M-D8E-B40	–	3441
20AD5P0	B	3	2	5.6	4.7	5	5.5	7.5	10	10	10	20	20	15	140M-C2E-B63	140M-D8E-B63	–	3441
20AD8P0	B	5	3	9.8	8.4	8	8.8	12	15	15	15	30	30	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	3441
20AD011	C	7.5	5	9.4	7.9	11	12.1	16.5	15	20	15	40	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AD014	C	10	7.5	12.4	10.4	14	16.5	22	20	30	20	50	50	20	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AD022	D	15	10	19.9	16.6	22	24.2	33	25	45	25	80	80	30	–	140M-D8E-C25	140M-F8E-C25	5098
20AD027	D	20	15	24.8	20.6	27	33	44	35	60	35	100	100	50	–	–	140M-F8E-C32	5098
20AD034	D	25	20	31.2	25.9	34	40.5	54	40	70	40	125	125	50	–	–	140M-F8E-C45	5098
20AD040	D	30	25	36.7	30.5	40	51	68	50	90	50	150	150	50	–	–	140M-F8E-C45	5098
20AD052	E	40	30	47.7	39.7	52	60	80	60	110	60	200	200	70	–	–	–	–
20AD065	E	50	40	59.6	49.6	65	78	104	80	125	80	250	250	100	–	–	–	–

600 Volt AC Three-Phase Input Drive Ratings and Input Protection Devices (see page 6 for notes)

Drive Catalog Number	Frame (1)	HP Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (4)	Motor Circuit Protector (6)	140M Motor Protector with Adjustable Current Range (7) (8)			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min. (2)	Max. (3)	Min. (2)	Max. (3)	Max. (5)	Max. (5)	Available Catalog Numbers (9)		Minimum Enclosure Volume (in. 3)(10)	
600 Volt AC Input																		
20AE0P9	A	0.5	0.33	1.3	1.3	0.9	1.1	1.4	3	3	3	3.5	15	3	140M-C2E-B16	—	—	3441
20AE1P7	A	1	0.75	1.9	2	1.7	2	2.6	3	6	3	6	15	3	140M-C2E-B25	140M-D8E-B25	—	3441
20AE2P7	A	2	1.5	3	3.1	2.7	3.6	4.8	4	6	4	10	15	7	140M-C2E-B40	140M-D8E-B40	—	3441
20AE3P9	B	3	2	4.4	4.5	3.9	4.3	5.9	6	8	6	15	15	7	—	140M-D8E-B63	—	3441
20AE6P1	B	5	3	7.5	7.8	6.1	6.7	9.2	10	12	10	20	20	15	—	140M-D8E-C10	140M-F8E-C10	3441
20AE9P0	C	7.5	5	7.7	8	9	9.9	13.5	10	20	10	35	35	15	—	140M-D8E-C10	140M-F8E-C10	3441
20AE011	C	10	7.5	9.8	10.1	11	13.5	18	15	20	15	40	40	15	—	140M-D8E-C16	140M-F8E-C16	3441
20AE017	D	15	10	15.3	15.9	17	18.7	25.5	20	35	20	60	60	30	—	—	140M-F8E-C20	5098
20AE022	D	20	15	20	20.8	22	25.5	34	25	45	25	80	80	30	—	—	140M-F8E-C25	5098
20AE027	D	25	20	24.8	25.7	27	33	44	35	60	35	100	100	50	—	—	140M-F8E-C25	5098
20AE032	D	30	25	29.4	30.5	32	40.5	54	40	70	40	125	125	50	—	—	140M-F8E-C32	5098
20AE041	E	40	30	37.6	39.1	41	48	64	50	90	50	150	150	100	—	—	—	—
20AE052	E	50	40	47.7	49.6	52	61.5	82	60	110	60	200	200	100	—	—	—	—

208/240 Volt AC Single-Phase Input Drive Ratings and Input Protection Devices (see page 6 for notes)

Drive Catalog Number	Frame (1)	HP Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (4)	Motor Circuit Protector (6)	140M Motor Protector with Adjustable Current Range (7) (8)			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min. (2)	Max. (3)	Min. (2)	Max. (3)	Max. (5)	Max. (5)	Available Catalog Numbers (9)		Minimum Enclosure Volume (in. 3)(10)	
208 Volt AC Input																		
20AB2P2	A	0.5	0.33	2.9	0.6	1.3	1.6	1.9	6	6	6	10	15	7	140M-C2E-B40	140M-D8E-B40	—	3441
20AB4P2	A	1	0.75	5.6	1	2.4	2.8	3.7	10	10	10	17.5	15	7	140M-C2E-B63	140M-D8E-B63	—	3441
20AB6P8	B	2	1.5	10	1.8	3.9	5.2	6.9	15	15	15	30	30	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	3441
20AB9P6	B	3	2	14	2.6	5.5	6.1	8.3	20	25	20	40	40	30	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AB015	C	5	3	16	2.9	8.6	9.6	13.3	20	35	20	70	70	30	140M-C2E-C20	140M-D8E-C20	140M-F8E-C20	3441
20AB022	D	7.5	5	23.3	4.2	12.7	13.9	19.0	30	50	30	100	100	30	—	140M-D8E-C25	140M-F8E-C25	5098
20AB028	D	10	7.5	29.8	5.4	16.1	19	25.3	40	70	40	125	125	50	—	—	140M-F8E-C32	5098
20AB042	D	15	10	39.8	7.2	21.5	27.8	37	60	100	60	175	175	70	—	—	140M-F8E-C45	5098
20AB054	E	20	15	57.5	10.4	31.1	36.2	48.3	80	125	80	200	200	100	—	—	—	—
20AB070	E	25	20	72.3	13.0	39.1	46.6	62	90	175	90	300	300	100	—	—	—	—
240 Volt AC Input																		
20AB2P2	A	0.5	0.33	2.5	0.6	1.1	1.2	1.7	3	4.5	3	8	15	3	140M-C2E-B25	140M-D8E-B25	—	3441
20AB4P2	A	1	0.75	4.8	1	2.1	2.4	3.2	6	9	6	15	15	7	140M-C2E-B63	140M-D8E-B63	—	3441
20AB6P8	B	2	1.5	8.7	1.8	3.4	4.5	6	15	15	15	25	25	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	3441
20AB9P6	B	3	2	12.2	2.6	4.8	5.3	7.2	20	20	20	35	35	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AB015	C	5	3	13.9	2.9	7.7	8.7	11.6	20	30	20	60	60	30	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AB022	D	7.5	5	19.9	4.2	11	12.2	16.5	25	45	25	80	80	30	—	140M-D8E-C25	140M-F8E-C25	5098
20AB028	D	10	7.5	25.7	5.4	14	16.5	22	35	60	35	110	110	50	—	—	140M-F8E-C32	5098
20AB042	D	15	10	38.7	8.1	21	23.1	31.5	50	90	50	150	150	50	—	—	140M-F8E-C45	5098
20AB054	E	20	15	49.8	10.4	27	31.5	42	60	100	60	200	200	100	—	—	—	—
20AB070	E	25	20	64.5	13.4	35	40.5	54	90	150	90	275	275	100	—	—	—	—

400 Volt AC Single-Phase Input Drive Ratings and Input Protection Devices (see page 6 for notes).

Drive Catalog Number	Frame (1)	HP Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (4)	Motor Circuit Protector (6)	140M Motor Protector with Adjustable Current Range (7) (8)			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min. (2)	Max. (3)	Min. (2)	Max. (3)	Max. (5)	Max. (5)	Available Catalog Numbers (9)		Minimum Enclosure Volume (in. 3)(10)	
400 Volt AC Input																		
20AC1P3	A	0.37	0.25	1.6	0.6	0.7	0.7	1.0	3	3	3	5	15	3	140M-C2E-B16	—	—	3441
20AC2P1	A	0.75	0.55	2.5	0.9	1.1	1.2	1.6	4	6	4	8	15	7	140M-C2E-B25	140M-D8E-B25	—	3441
20AC3P5	A	1.5	1.1	4.3	1.5	1.8	2.3	3	6	6	6	12	15	7	140M-C2E-B63	140M-D8E-B63	—	3441
20AC5P0	B	2.2	1.5	6.5	2.3	2.5	2.8	3.8	10	10	10	20	20	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	3441
20AC8P7	B	4	3	11.3	3.9	4.4	5.0	6.6	15	17.5	15	30	30	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AC011	C	5.5	4	11	3.8	5.8	6.5	8.7	15	25	15	45	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AC015	C	7.5	5.5	15.1	5.2	7.7	8.6	11.6	20	30	20	60	60	20	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AC022	D	11	7.5	21.9	7.6	11	12.1	16.5	30	45	30	80	80	30	—	140M-D8E-C25	140M-F8E-C25	5098

Drive Catalog Number	Frame (1)	HP Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (4)	Motor Circuit Protector (6)	140M Motor Protector with Adjustable Current Range (7) (8)			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min. (2)	Max. (3)	Min. (2)	Max. (3)	Max. (5)	Max. (5)	Available Catalog Numbers (9)		Minimum Enclosure Volume (in. 3) (10)	
20AC030	D	15	11	30.3	10.5	15	16.5	22.5	40	60	40	120	120	50	—	—	140M-F8E-C32	5098
20AC037	D	18.5	15	35	12.2	18.5	22.5	30	50	80	50	125	140	50	—	—	140M-F8E-C45	5098
20AC043	D	22	18.5	40.7	14.1	21.5	28	37	60	90	60	150	160	70	—	—	—	—
20AC060	E	30	22	56.8	19.7	30	33	45	80	125	80	225	240	80	—	—	—	—
20AC072	E	37	30	68.9	23.9	36	45	60	90	150	90	250	280	100	—	—	—	—

480 Volt AC Single-Phase Input Drive Ratings and Input Protection Devices (see page 6 for notes).

Drive Catalog Number	Frame (1)	HP Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (4)	Motor Circuit Protector (6)	140M Motor Protector with Adjustable Current Range (7) (8)			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min. (2)	Max. (3)	Min. (2)	Max. (3)	Max. (5)	Max. (5)	Available Catalog Numbers (9)		Minimum Enclosure Volume (in. 3) (10)	
480 Volt AC Input																		
20AD1P1	A	0.5	0.33	1.3	0.6	0.6	0.6	0.8	3	3	3	4	15	3	140M-C2E-B16	—	—	3441
20AD2P1	A	1	0.75	2.4	1	1.1	1.2	1.6	3	6	3	8	15	3	140M-C2E-B25	140M-D8E-B25	—	3441
20AD3P4	A	2	1.5	3.8	1.6	1.7	2.3	3	6	6	6	12	15	7	140M-C2E-B40	140M-D8E-B40	—	3441
20AD5P0	B	3	2	5.6	2.4	2.5	2.6	3.8	10	10	10	20	20	15	140M-C2E-B63	140M-D8E-B63	—	3441
20AD8P0	B	5	3	9.8	4.2	4	4.4	6	15	15	15	30	30	15	140M-C2E-C10	140M-D8E-C10	140M-F8E-C10	3441
20AD011	C	7.5	5	9.5	4	5.5	6.1	8.3	15	20	15	40	40	15	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AD014	C	10	7.5	12.5	5.2	7	8.3	11	20	30	20	50	50	20	140M-C2E-C16	140M-D8E-C16	140M-F8E-C16	3441
20AD022	D	15	10	19.9	8.3	11	12.1	16.5	25	45	25	80	80	30	—	140M-D8E-C25	140M-F8E-C25	5098
20AD027	D	20	15	24.8	10.3	13.5	16.5	22	35	60	35	100	100	50	—	—	140M-F8E-C32	5098
20AD034	D	25	20	31.2	13	17	20.3	27	40	70	40	125	125	50	—	—	140M-F8E-C45	5098
20AD040	D	30	25	36.7	19.9	20	25.5	34	50	90	50	150	150	50	—	—	140M-F8E-C45	5098
20AD052	E	40	30	47.7	12.8	26	30	40	60	110	60	200	200	70	—	—	—	—
20AD065	E	50	40	59.6	24.8	32.5	39	52	80	125	80	250	250	100	—	—	—	—

600 Volt AC Single-Phase Input Drive Ratings and Input Protection Devices

Drive Catalog Number	Frame (1)	HP Rating		Input Ratings		Output Amps			Dual Element Time Delay Fuse		Non-Time Delay Fuse		Circuit Breaker (4)	Motor Circuit Protector (6)	140M Motor Protector with Adjustable Current Range (7) (8)			
		ND	HD	Amps	kVA	Cont.	1 Min.	3 Sec.	Min. (2)	Max. (3)	Min. (2)	Max. (3)	Max. (5)	Max. (5)	Available Catalog Numbers (9)		Minimum Enclosure Volume (in. 3) (10)	
600 Volt AC Input																		
20AE0P9	A	0.5	0.33	1.3	0.7	0.5	0.6	0.7	3	3	3	3.5	15	3	140M-C2E-B16	—	—	3441
20AE1P7	A	1	0.75	1.9	1	0.9	1	1.3	3	6	3	6	15	3	140M-C2E-B25	140M-D8E-B25	—	3441
20AE2P7	A	2	1.5	3	1.6	1.4	1.8	2.4	4	6	4	10	15	7	140M-C2E-B40	140M-D8E-B40	—	3441
20AE3P9	B	3	2	4.4	2.3	2	2.2	3	6	8	6	15	15	7	—	140M-D8E-B63	—	3441
20AE6P1	B	5	3	7.5	3.9	3.1	3.4	4.6	10	12	10	20	20	15	—	140M-D8E-C10	140M-F8E-C10	3441
20AE9P0	C	7.5	5	7.7	4	4.5	5	6.8	10	20	10	35	35	15	—	140M-D8E-C10	140M-F8E-C10	3441
20AE011	C	10	7.5	9.8	5.1	5.5	6.8	9	15	20	15	40	40	15	—	140M-D8E-C16	140M-F8E-C16	3441
20AE017	D	15	10	15.3	8	8.5	9.4	12.8	20	35	20	60	60	30	—	—	140M-F8E-C20	5098
20AE022	D	20	15	20	10.4	11	12.8	17	25	45	25	80	80	30	—	—	140M-F8E-C25	5098
20AE027	D	25	20	24.8	12.9	13.5	16.5	22	35	60	35	100	100	50	—	—	140M-F8E-C25	5098
20AE032	D	30	25	29.4	15.3	16	20.3	27	40	70	40	125	125	50	—	—	140M-F8E-C32	5098
20AE041	E	40	30	37.6	19.6	20.5	24	32	50	90	50	150	150	100	—	—	—	—
20AE052	E	50	40	47.7	24.8	26	30.8	41	60	110	60	200	200	100	—	—	—	—

- (1) For IP 66 (NEMA/UL Type 4X/12) enclosures, drives listed as Frame A increase to Frame B and drives listed as Frame C increase to Frame D.
- (2) Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.
- (3) Maximum protection device size is the highest rated device that supplies drive protection. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum.
- (4) Circuit Breaker - inverse time breaker. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum.
- (5) Maximum allowable rating by US NEC. Exact size must be chosen for each installation.
- (6) Motor Circuit Protector - instantaneous trip circuit breaker. For US NEC, minimum size is 125% of motor FLA. Ratings shown are maximum.
- (7) Bulletin 140M with adjustable current range should have the current trip set to the minimum range that the device will not trip.
- (8) Manual Self-Protected (Type E) Combination Motor Controller, UL listed for 208 Wye or Delta, 240 Wye or Delta, 480Y/277 or 600Y/347. Not UL listed for use on 480V or 600V Delta/Delta, corner ground, or high-resistance ground systems.
- (9) The AIC ratings of the Bulletin 140M Motor Protector Circuit Breakers may vary. See [Bulletin 140M Motor Protection Circuit Breakers Application Ratings](#).
- (10) When using a Manual Self-Protected (Type E) Combination Motor Controller, the drive must be installed in a ventilated or non-ventilated enclosure with the minimum volume specified in this column. Application specific thermal considerations may require a larger enclosure.

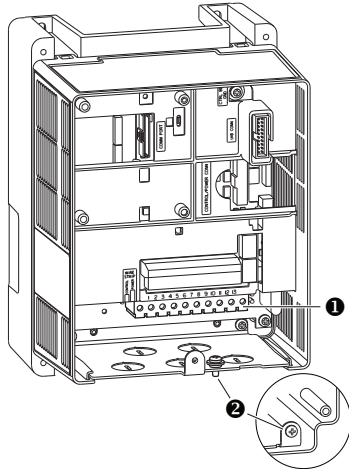
Wire and Terminal Blocks

Wire Recommendations

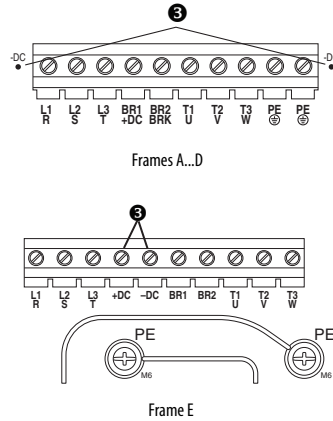
Type	Wire Type(s)	Description
Power (1)(2)	600V, 90 °C (194 °F) XHHW2/RHW-2 Anixter B209500-B209507, Belden 29501-29507, or equivalent	Four tinned copper conductors with XLPE insulation. Copper braid/aluminum foil combination shield and tinned copper drain wire. PVC jacket.

- (1) Control and signal wires should be separated from power wires by at least 0.3 meters (1 foot).
 (2) The use of shielded wire for AC input power may not be necessary but is always recommended.

Typical Terminal Block Location



Power Terminal Blocks



Terminal Block Specifications

No.	Name	Description	Frame	Wire Size Range ⁽¹⁾		Torque	
				Maximum	Minimum	Maximum	Recommended
1	Power Terminal Block	Input power, motor connections, and PE	A, B, & C	3.5 mm ² (12 AWG)	0.3 mm ² (22 AWG)	0.66 N·m (5.5 lb-in)	0.6 N·m (5 lb-in)
			D	8.4 mm ² (8 AWG)	0.8 mm ² (18 AWG)	1.7 N·m (15 lb-in)	1.4 N·m (12 lb-in)
			E	25.0 mm ² (3 AWG)	2.5 mm ² (14 AWG)	2.71 N·m (24 lb-in)	2.71 N·m (24 lb-in)
2	SHLD terminal	Terminating point for wiring shields	All	—	—	1.6 N·m (14 lb-in)	1.6 N·m (14 lb-in)

(1) Maximum/minimum sizes that the terminal block will accept - these are not recommendations.

Terminal	Description	Notes
BR1	DC Brake (+)	DB Resistor Connection - Important: Do not connect both an internal and external DB resistor at the same time. This may violate the minimum allowed DB resistance and cause drive damage.
BR2	DC Brake (-)	
+DC	DC Bus (+)	③ Test point on Frames A...D located to the left or right of the Power Terminal Block. Frame E has dedicated terminals.
-DC	DC Bus (-)	
PE	PE Ground	
U, V, W	U (T1), V (T2), W (T3)	To Motor
R, S, T	R (L1), S (L2), T (L3)	AC Line Input Power

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At <http://www.rockwellautomation.com/support/>, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration, and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit <http://www.rockwellautomation.com/support/>.

Installation Assistance

If you experience a problem within the first 24 hours of installation, review the information that is contained in the installation instructions. You can contact Customer Support for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html , or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

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Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

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