

# Branch Circuit Protection for ABB drives

Acceptable fuses, manual motor protectors and circuit breakers for ACS380, ACx580 and ACS880 drives

## **Purpose**

This document outlines alternative fuses, manual motor protectors and circuit breakers that can be used for branch circuit protection on ABB ACS380, ACx580 and ACS880 drives.

## **How to use this information**

The drive specific hardware manual includes fuse and sometimes circuit breaker recommendations for the drive. In addition to the branch circuit protection identified in the manuals, alternative fuses and circuit breakers can be used if they meet certain characteristics. The guidelines in this document describe which fuses, manual motor protectors and circuit breakers are acceptable alternatives.

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# ACS380 drives

## Purpose

This section outlines alternative branch circuit protection that may be used with ACS380-04 base drives R0 through R4 frame size.

## How to use this information

The drive hardware manual includes recommendations suitable branch circuit protection for the drives. In addition to the protection identified in the manual, alternative protective devices can be used if they meet certain characteristics. The guidelines in this document describe which protective devices are acceptable alternatives. This document is a supplement to the following drive hardware manuals:

- 3AXD50000029274 ACS380-04 drives

## Fuse Information

ACS380-04 drives are suitable for use on a circuit capable of delivering not more than 100 kA symmetrical amperes (RMS) at 240 and 480 V maximum, when protected by appropriate fuses.

The drives are tested in accordance with UL 61800-5-1 on a circuit having available system fault current of 100 kA maximum.

Hardware manuals for ACS380-04 drives recommend:

- Listed Class T (UL 248-15) fast acting fuses up to 100A.

ABB performed the fault testing with “umbrella fuses.” These fuses are calibrated to create worst case peak let-through current ( $I_{peak}$ ) and let-through energy ( $I^2t$ ) limits in accordance with the limits of the intended fuse class(es) and ratings. The umbrella fuse testing allows other listed fuses, which have let-through characteristics equal to or below these limits, to be used. Therefore, listed Class CC (UL 248-4) fuses (up to 30A) and listed (UL 248-8) Class J fast acting, time delay, and high speed fuses can also be used, since they provide equal or better protection. Likewise, listed (UL 248-17) Class CF fast acting and time delay cubed body fuses can be used as well.

In addition to the above guidelines, the following are additional rules that must be followed:

1. Fuses are required as part of the installation. Fuses are not included in the base drive configuration and must be provided by others.
2. The UL listed fuses in the hardware manual tables, or the tables in this document are the required branch circuit protection per NEC.
3. Recommended size or smaller UL 248 listed fast acting, time delay, or high speed fuses must be used to maintain the drive UL listing. Additional protection can be used. Refer to local codes and regulations.
4. UL 248 listed, fast acting, time delay, or high speed fuses from other manufacturers can be used if they meet the rating requirements specified in the rules above.
5. A fuse of a different class can be used at the high fault rating where the  $I_{peak}$  and  $I^2t$  of the new fuse is not greater than that of the specified fuse.
6. When installing a drive, always follow installation instructions and NEC requirements.

Alternate recommended fuses for some of the major fuse manufacturers can be found in tables on the following pages. Other manufacturers not found on the tables below may be used if they meet the fuse requirements stated above.

**ACS380-04, 200...240 V 1-phase fuses**

Frame Size	200...240 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses 300 V or 600 V				UL 248-8 Fast Acting Class J Fuses 600 V			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R0	02A4-1	5.0	10	300 or 600	JJN-10 or JJS-10	JLLN010 or JLLS010	A3T10 or A6T10	TJN10 or TJS10	JKS-10	JLS10	A4J10	JFL10
R0	03A7-1	7.8	10	300 or 600	JJN-10 or JJS-10	JLLN010 or JLLS010	A3T10 or A6T10	TJN10 or TJS10	JKS-10	JLS10	A4J10	JFL10
R1	04A8-1	10.1	20	300 or 600	JJN-20 or JJS-20	JLLN020 or JLLS020	A3T20 or A6T20	TJN20 or TJS20	JKS-20	JLS20	A4J20	JFL20
R1	06A9-1	14.5	20	300 or 600	JJN-20 or JJS-20	JLLN020 or JLLS020	A3T20 or A6T20	TJN20 or TJS20	JKS-20	JLS20	A4J20	JFL20
R1	07A8-1	16.4	25	300 or 600	JJN-25 or JJS-25	JLLN025 or JLLS025	A3T25 or A6T25	TJN25 or TJS25	JKS-25	JLS25	A4J25	JFL25
R2	09A8-1	20.6	25	300 or 600	JJN-25 or JJS-25	JLLN025 or JLLS025	A3T25 or A6T25	TJN25 or TJS25	JKS-25	JLS25	A4J25	JFL25
R2	12A2-1	25.6	35	300 or 600	JJN-35 or JJS-35	JLLN035 or JLLS035	A3T35 or A6T35	TJN35 or TJS35	JKS-35	JLS35	A4J35	JFL35

Frame Size	200...240 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses 600 V				UL 248-8 High Speed Class J Fuses 600 V			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R0	02A4-1	5.0	10	600	LPJ-10SP	JTD010	AJT10	JDL10	DFJ-10	LDJ010	HSJ10	JHL10
R0	03A7-1	7.8	10	600	LPJ-10SP	JTD010	AJT10	JDL10	DFJ-10	LDJ010	HSJ10	JHL10
R1	04A8-1	10.1	20	600	LPJ-20SP	JTD020	AJT20	JDL20	DFJ-20	LDJ020	HSJ20	JHL20
R1	06A9-1	14.5	20	600	LPJ-20SP	JTD020	AJT20	JDL20	DFJ-20	LDJ020	HSJ20	JHL20
R1	07A8-1	16.4	25	600	LPJ-25SP	JTD025	AJT25	JDL25	DFJ-25	LDJ025	HSJ25	JHL25
R2	09A8-1	20.6	25	600	LPJ-25SP	JTD025	AJT25	JDL25	DFJ-25	LDJ025	HSJ25	JHL25
R2	12A2-1	25.6	35	600	LPJ-35SP	JTD035	AJT35	JDL35	DFJ-35	LDJ035	HSJ35	JHL35

Frame Size	200...240 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses 600 V				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Bussmann	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R0	02A4-1	5.0	10	600	KTK-R-10	KLKR10	ATMR10	HCLR10	TCF10RN	FCF10RN
R0	03A7-1	7.8	10	600	KTK-R-10	KLKR10	ATMR10	HCLR10	TCF10RN	FCF10RN
R1	04A8-1	10.1	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R1	06A9-1	14.5	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R1	07A8-1	16.4	25	600	KTK-R-25	KLKR25	ATMR25	HCLR25	TCF25RN	FCF25RN
R2	09A8-1	20.6	25	600	KTK-R-25	KLKR25	ATMR25	HCLR25	TCF25RN	FCF25RN
R2	12A2-1	25.6	35	600	-	-	-	-	TCF35RN	FCF35RN

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ACS380-04, 200...240 V fuses

Frame Size	200...240 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R1	02A4-2	3.6	6	600	JJS-6	JLLS006	A6T6	TJS6	JKS-6	JLS6	A4J6	JFL6
R1	03A7-2	5.6	10	600	JJS-10	JLLS010	A6T10	TJS10	JKS-10	JLS10	A4J10	JFL10
R1	04A8-2	7.2	10	600	JJS-10	JLLS010	A6T10	TJS10	JKS-10	JLS10	A4J10	JFL10
R1	06A9-2	10.4	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R1	07A8-2	11.7	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R1	09A8-2	14.7	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R2	12A2-2	18.3	25	600	JJS-25	JLLS025	A6T25	TJS25	JKS-25	JLS25	A4J25	JFL25
R3	17A5-2	24.6	35	600	JJS-35	JLLS035	A6T35	TJS35	JKS-35	JLS35	A4J35	JFL35
R3	25A0-2	35.1	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R4	032A-2	45.0	60	600	JJS-60	JLLS060	A6T60	TJS60	JKS-60	JLS60	A4J60	JFL60
R4	048A-2	57.6	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4J100	JFL100
R4	055A-2	60.0	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4J100	JFL100

Frame Size	200...240 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R1	02A4-2	3.6	6	600	LPJ-6SP	JTD006	AJT6	JDL6	DFJ-6	LDFJ006	HSJ6	JHL6
R1	03A7-2	5.6	10	600	LPJ-10SP	JTD010	AJT10	JDL10	DFJ-10	LDFJ010	HSJ10	JHL10
R1	04A8-2	7.2	10	600	LPJ-10SP	JTD010	AJT10	JDL10	DFJ-10	LDFJ010	HSJ10	JHL10
R1	06A9-2	10.4	20	600	LPJ-20SP	JTD020	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R1	07A8-2	11.7	20	600	LPJ-20SP	JTD020	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R1	09A8-2	14.7	20	600	LPJ-20SP	JTD020	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R2	12A2-2	18.3	25	600	LPJ-25SP	JTD025	AJT25	JDL25	DFJ-25	LDFJ025	HSJ25	JHL25
R3	17A5-2	24.6	35	600	LPJ-35SP	JTD035	AJT35	JDL35	DFJ-35	LDFJ035	HSJ35	JHL35
R3	25A0-2	35.1	40	600	LPJ-40SP	JTD040	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R4	032A-2	45.0	60	600	LPJ-60SP	JTD060	AJT60	JDL60	DFJ-60	LDFJ060	HSJ60	JHL60
R4	048A-2	57.6	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R4	055A-2	60.0	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100

Frame Size	200...240 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R1	02A4-2	3.6	6	600	KTK-R-6	KLKR6	ATMR6	HCLR6	TCF6RN	FCF6RN
R1	03A7-2	5.6	10	600	KTK-R-10	KLKR10	ATMR10	HCLR10	TCF10RN	FCF10RN
R1	04A8-2	7.2	10	600	KTK-R-10	KLKR10	ATMR10	HCLR10	TCF10RN	FCF10RN
R1	06A9-2	10.4	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R1	07A8-2	11.7	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R1	09A8-2	14.7	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R2	12A2-2	18.3	25	600	KTK-R-25	KLKR25	ATMR25	HCLR25	TCF25RN	FCF25RN
R3	17A5-2	24.6	35	600	-	-	-	-	TCF35RN	FCF35RN
R3	25A0-2	35.1	40	600	-	-	-	-	TCF40RN	FCF40RN
R4	032A-2	45.0	60	600	-	-	-	-	TCF60RN	FCF60RN
R4	048A-2	57.6	100	600	-	-	-	-	TCF100RN	FCF100RN
R4	055A-2	60.0	100	600	-	-	-	-	TCF100RN	FCF100RN

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**ACS380-04, 380...480 V fuses**

Frame Size	380....480 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R0	01A8-4	2.9 / 2.6	6	600	JJS-6	JLLS006	A6T6	TJS6	JKS-6	JLS6	A4J6	JFL6
R1	02A6-4	4.2 / 3.4	6	600	JJS-6	JLLS006	A6T6	TJS6	JKS-6	JLS6	A4J6	JFL6
R1	03A3-4	5.3 / 4.8	6	600	JJS-6	JLLS006	A6T6	TJS6	JKS-6	JLS6	A4J6	JFL6
R1	04A0-4	6.4 / 5.4	10	600	JJS-10	JLLS010	A6T10	TJS10	JKS-10	JLS10	A4J10	JFL10
R1	05A6-4	9.0 / 7.7	10	600	JJS-10	JLLS010	A6T10	TJS10	JKS-10	JLS10	A4J10	JFL10
R1	07A2-4	11.5 / 9.6	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R1	09A4-4	15.0 / 12.2	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R2	12A6-4	20.2 / 17.6	25	600	JJS-25	JLLS025	A6T25	TJS25	JKS-25	JLS25	A4J25	JFL25
R3	17A0-4	27.2 / 22.4	35	600	JJS-35	JLLS035	A6T35	TJS35	JKS-35	JLS35	A4J35	JFL35
R3	25A0-4	40.0 / 33.6	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R4	032A-4	45.0 / 37.9	60	600	JJS-60	JLLS060	A6T60	TJS60	JKS-60	JLS60	A4J60	JFL60
R4	038A-4	50.0 / 44.7	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R4	045A-4	56.0 / 49.8	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4J100	JFL100
R4	050A-4	60.0 / 50.4	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4J100	JFL100

Frame Size	380....480 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R0	01A8-4	2.9 / 2.6	6	600	LPJ-6SP	JTD006	AJT6	JDL6	DFJ-6	LDFJ006	HSJ6	JHL6
R1	02A6-4	4.2 / 3.4	6	600	LPJ-6SP	JTD006	AJT6	JDL6	DFJ-6	LDFJ006	HSJ6	JHL6
R1	03A3-4	5.3 / 4.8	6	600	LPJ-6SP	JTD006	AJT6	JDL6	DFJ-6	LDFJ006	HSJ6	JHL6
R1	04A0-4	6.4 / 5.4	10	600	LPJ-10SP	JTD010	AJT10	JDL10	DFJ-10	LDFJ010	HSJ10	JHL10
R1	05A6-4	9.0 / 7.7	10	600	LPJ-10SP	JTD010	AJT10	JDL10	DFJ-10	LDFJ010	HSJ10	JHL10
R1	07A2-4	11.5 / 9.6	20	600	LPJ-20SP	JTD020	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R1	09A4-4	15.0 / 12.2	20	600	LPJ-20SP	JTD020	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R2	12A6-4	20.2 / 17.6	25	600	LPJ-25SP	JTD025	AJT25	JDL25	DFJ-25	LDFJ025	HSJ25	JHL25
R3	17A0-4	27.2 / 22.4	35	600	LPJ-35SP	JTD035	AJT35	JDL35	DFJ-35	LDFJ035	HSJ35	JHL35
R3	25A0-4	40.0 / 33.6	40	600	LPJ-40SP	JTD040	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R4	032A-4	45.0 / 37.9	60	600	LPJ-60SP	JTD060	AJT60	JDL60	DFJ-60	LDFJ060	HSJ60	JHL60
R4	038A-4	50.0 / 44.7	80	600	LPJ-80SP	JTD080	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R4	045A-4	56.0 / 49.8	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R4	050A-4	60.0 / 50.4	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100

Frame Size	380....480 V ACS380-04	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R0	01A8-4	2.9 / 2.6	6	600	KTK-R-6	KLKR6	ATMR6	HCLR6	TCF6RN	FCF6RN
R1	02A6-4	4.2 / 3.4	6	600	KTK-R-6	KLKR6	ATMR6	HCLR6	TCF6RN	FCF6RN
R1	03A3-4	5.3 / 4.8	6	600	KTK-R-6	KLKR6	ATMR6	HCLR6	TCF6RN	FCF6RN
R1	04A0-4	6.4 / 5.4	10	600	KTK-R-10	KLKR10	ATMR10	HCLR10	TCF10RN	FCF10RN
R1	05A6-4	9.0 / 7.7	10	600	KTK-R-10	KLKR10	ATMR10	HCLR10	TCF10RN	FCF10RN
R1	07A2-4	11.5 / 9.6	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R1	09A4-4	15.0 / 12.2	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R2	12A6-4	20.2 / 17.6	25	600	KTK-R-25	KLKR25	ATMR25	HCLR25	TCF25RN	FCF25RN
R3	17A0-4	27.2 / 22.4	35	600	-	-	-	-	TCF35RN	FCF35RN
R3	25A0-4	40.0 / 33.6	40	600	-	-	-	-	TCF40RN	FCF40RN
R4	032A-4	45.0 / 37.9	60	600	-	-	-	-	TCF60RN	FCF60RN
R4	038A-4	50.0 / 44.7	80	600	-	-	-	-	TCF80RN	FCF80RN
R4	045A-4	56.0 / 49.8	100	600	-	-	-	-	TCF100RN	FCF100RN
R4	050A-4	60.0 / 50.4	100	600	-	-	-	-	TCF100RN	FCF100RN

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## Manual Motor Protector Information

ABB UL file E211945 Volume 15, Section 1 lists the ABB Type E manual motor protectors MS132 & S1-M3-25 and MS165 as an alternative to UL classified fuses as a means of branch circuit protection. This is in accordance with the National Electrical Code (NEC). When the correct ABB Type E manual motor protector is selected from the table and used for branch circuit protection the drive is suitable for use in a circuit capable of delivering not more than 65 kA RMS symmetrical amperes at the drive maximum rated voltage. See the following table for the ACS380 drive and MMP combinations listed below.

**Combinations of Type E MMP's and drives installed with UL Type 1 kits are NOT included in the listing.** Drive & MMP combinations must be assembled in an enclosure conforming to minimum enclosure volume.

### ACS380-04, 200...240 V 1-phase manual motor protectors

Frame Size	200...240 V ACS380-04	Input Amps	MMP Maximum Current (A)	MMP Voltage (V)	Enclosure Minimum Volume (in <sup>3</sup> ) <sup>5</sup>	MMP Type E <sup>1,2</sup>
R0	02A4-1	5.0	6.3	600	1850	MS132-6.3 & S1-M3-25 <sup>3</sup>
R0	03A7-1	7.8	10	600	1850	MS132-10 & S1-M3-25 <sup>3</sup>
R1	04A8-1	10.1	16	600	1850	MS165-16
R1	06A9-1	14.5	16	600	1850	MS165-16
R1	07A8-1	16.4	20	600	1850	MS165-20
R2	09A8-1	20.6	25	600	1850	MS165-25
R2	12A2-1	25.6	32	600	1850	MS165-32

### ACS380-04, 200...240 V manual motor protectors

Frame Size	200...240 V ACS380-040	Input Amps	MMP Maximum Current (A)	MMP Voltage (V)	Enclosure Minimum Volume (in <sup>3</sup> ) <sup>5</sup>	MMP Type E <sup>1,2</sup>
R1	02A4-2	3.6	9.6	600	1850	MS132-6.3 & S1-M3-25 <sup>3</sup>
R1	03A7-2	5.6	10	600	1850	MS132-10 & S1-M3-25 <sup>3</sup>
R1	04A8-2	7.2	10	600	1850	MS132-10 & S1-M3-25 <sup>3</sup>
R1	06A9-2	10.4	16	600	1850	MS165-16
R1	07A8-2	11.7	16	600	1850	MS165-16
R1	09A8-2	14.7	16	600	1850	MS165-16
R2	12A2-2	18.3	20	600	1850	MS165-20
R3	17A5-2	24.6	32	600	1850	MS165-32
R3	25A0-2	35.1	42	600	1850	MS165-42
R4	032A-2	45.0	54	600	4577	MS165-54
R4	048A-2	57.6	80	600	4577	MS165-80
R4	055A-2	60.0	80	600	4577	MS165-80

### ACS380-04, 380...480 V manual motor protectors

Frame Size	380...480 V <sup>4</sup> ACS380-040	Input Amps	MMP Maximum Current (A)	MMP Voltage (V)	Enclosure Minimum Volume (in <sup>3</sup> ) <sup>5</sup>	MMP Type E <sup>1,2</sup>
R0	01A8-4	2.9 / 2.6	4	600	1850	MS132-4.0 & S1-M3-25 <sup>3</sup>
R1	02A6-4	4.2 / 3.4	6.3	600	1850	MS132-6.3 & S1-M3-25 <sup>3</sup>
R1	03A3-4	5.3 / 4.8	6.3	600	1850	MS132-6.3 & S1-M3-25 <sup>3</sup>
R1	04A0-4	6.4 / 5.4	10	600	1850	MS132-10 & S1-M3-25 <sup>3</sup>
R1	05A6-4	9.0 / 7.7	10	600	1850	MS132-10 & S1-M3-25 <sup>3</sup>
R1	07A2-4	11.5 / 9.6	16	600	1850	MS165-16
R1	09A4-4	15.0 / 12.2	16	600	1850	MS165-16
R2	12A6-4	20.2 / 17.6	20	600	1850	MS165-20
R3	17A0-4	27.2 / 22.4	32	600	1850	MS165-32
R3	25A0-4	40.0 / 33.6	42	600	1850	MS165-42
R4	032A-4	45.0 / 37.9	54	600	4577	MS165-54
R4	038A-4	50.0 / 44.7	65	600	4577	MS165-65
R4	045A-4	56.0 / 49.8	73	600	4577	MS165-73
R4	050A-4	60.0 / 50.4	80	600	4577	MS165-80

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1. All manual motor protectors listed are Type E self-protected up to 65 kA. See ABB publication 2CDC131060M0202 - Manual Motor Starters Guide for complete technical data on the ABB Type E manual motor protectors. For these manual motor protectors to be used for branch circuit protection, they must be UL listed Type E manual motor protectors, otherwise they can be used only as an At Motor Disconnect. "At Motor Disconnect" is a disconnect just ahead of the motor on the load side of the panel.
2. Manual motor protectors may require adjusting the trip limit from the factory setting at or above the drive input Amps to avoid nuisance tripping. If the manual motor protector is set to the maximum current trip level and nuisance tripping is occurring, select the next size MMP. (MS132-10 is the highest size in the MS132 frame size to meet Type E at 65kA; next size up is MS165-16.)
3. Requires use of the S1-M3-25 line side feeder terminal with the manual motor protector to meet Type E self-protection class.
4. 480Y/277 V delta systems only: Short-circuit protective devices with slash voltage ratings (e.g. 480Y/277 V) can be applied only in solidly grounded networks where the voltage from line-to-ground does not exceed the lower of the two ratings (e.g. 277 V AC), and the voltage from line-to-line does not exceed the higher of the two ratings (e.g. 480 V AC). The lower rating represents the device's interrupting capability per pole.
5. For all drives, the enclosure must be sized to accommodate the specific thermal considerations of the application as well as provide free space for cooling. For UL compliance the minimum enclosure volume is specified in the UL listing when applied with the ABB Type E MMP shown in the table. See the applicable ABB HW Manual for free space requirements.



# ACH, ACQ, ACS580 drives

## Purpose

This section outlines branch circuit protection that may be used with ACH, ACQ, ACS580-01, -04, -31, -34 drives through the R11 frame size.

## How to use this information

The drive hardware manual includes recommendations for suitable branch circuit protection for the drive. In addition to the protection identified in the manual, alternative branch circuit protection devices can be used. The guidelines in this document describe which branch circuit protective devices are acceptable alternatives. This document is a supplement to the following drive hardware manuals:

- 3AXD50000044839 ACH580-01 drives
- 3AXD50000044862 ACQ580-01 drives
- 3AXD50000044794 ACS580-01 drives
- 3AXD50000037066 ACH580-31 drives
- 3AXD50000045935 ACQ580-31 drives
- 3AXD50000048685 ACH580-04 drives
- 3AXD50000015497 ACS580-04 drives
- 3AXD50000048677 ACQ580-04 drives
- 3AXD500000419708 ACH580-34 drives
- 3AXD500000420025 ACQ580-34 drives

## Fuse Information

ACH580-01, ACQ580-01 and ACS580-01 drives are suitable for use on a circuit capable of delivering not more than 100 kA symmetrical amperes (RMS) at 240, 480 and 600 V maximum, when protected by appropriate fuses.

ACx580-04, -31 and -34 drives are suitable for use on a circuit capable of delivering not more than 100 kA symmetrical amperes (RMS) at 480 V maximum, when protected by appropriate fuses.

The drives are tested in accordance with standard UL 61800-5-1 on a circuit having available system fault current of 100 kA maximum.

Hardware manuals for ACx580-01, -04, -31, -34 drives provide required fusing guidelines:

- Listed Class T (UL 248-15) fast acting fuses up to 600A
- Listed Class L (UL 248-15) fast acting fuses up to 1000A.

ABB performed the fault testing with “umbrella fuses.” These fuses are calibrated to create worst case peak let-through current ( $I_{peak}$ ) and let-through energy ( $I^2t$ ) in accordance with the limits of the intended fuse class(es) and ratings. The umbrella fuse testing allows other listed fuses, which have let-through characteristics equal to or below these limits, to be used. Therefore, listed (UL 248-8) Class J fast acting, time delay, and high speed fuses can also be used, since they provide equal or better protection. Likewise, listed (UL 248-17) Class CF fast acting and time delay cubed body fuses can be used as well.

**In addition to the above guidelines, the following additional rules must be followed. (Rules 2-5 do not apply for ACx580-04 where semiconductor fuses can be used as alternate and ACx580-34 drives which use strictly semiconductor fuses):**

1. Fuses are required as part of the installation. Fuses are not included in the base drive configuration and must be provided by others.
2. The UL listed fuses in the hardware manual tables, or the tables in this document are the required branch circuit protection per NEC.
3. Recommended size or smaller UL 248 listed fast acting, time delay, or high speed fuses must be used to maintain the drive UL listing. Additional protection can be used. Refer to local codes and regulations.
4. UL 248 listed, fast acting, time delay, or high speed fuses from other manufacturers can be used if they meet the rating requirements specified in the rules above.
5. A fuse of a different class can be used at the high fault rating where the  $I_{peak}$  and  $I^2t$  of the new fuse is not greater than that of the specified fuse.
6. When installing a drive, always follow installation instructions and NEC requirements.

Alternate recommended fuses for some of the major fuse manufacturers can be found in tables on the following pages. Other manufacturers not found on the tables below may be used if they meet the fuse requirements stated above.

**ACH, ACQ, ACS580-01, 208/230 V fuses**

Frame Size	208/230 V ACH580-01 ACQ580-01 ACS580-01	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R1	04A6-2	4.6	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	06A6-2	6.6	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	07A5-2	7.5	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	10A6-2	10.6	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	017A-2	16.7	30	600	JJS-30	JLLS030	A6T30	TJS30	JKS-30	JLS30	A4J30	JFL30
R2	024A-2	24.2	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R2	031A-2	30.8	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R3	046A-2	46.2	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R3	059A-2	59.4	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R4	075A-2	74.8	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4J100	JFL100
R5	088A-2	88.0	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R5	114A-2	114	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R6	143A-2	143	200	600	JJS-200	JLLS200	A6T200	TJS200	JKS-200	JLS200	A4J200	JFL200
R7	169A-2	169	250	600	JJS-250	JLLS250	A6T250	TJS250	JKS-250	JLS250	A4T250	JFL250
R7	211A-2	211	300	600	JJS-300	JLLS300	A6T300	TJS300	JKS-300	JLS300	A4J300	JFL300
R8	273A-2	273	400	600	JJS-400	JLLS400	A6T400	TJS400	JKS-400	JLS400	A4J400	JFL400

Frame Size	208/230 V ACH580-01 ACQ580-01 ACS580-01	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R1	04A6-2	4.6	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	06A6-2	6.6	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	07A5-2	7.5	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	10A6-2	10.6	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	017A-2	16.7	30	600	LPJ-30SP	JTD30	AJT30	JDL30	DFJ-30	LDFJ030	HSJ30	JHL30
R2	024A-2	24.2	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R2	031A-2	30.8	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R3	046A-2	46.2	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R3	059A-2	59.4	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R4	075A-2	74.8	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R5	088A-2	88.0	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R5	114A-2	114	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R6	143A-2	143	200	600	LPJ-200SP	JTD200	AJT200	JDL200	DFJ-200	LDFJ200	HSJ200	JHL200
R7	169A-2	169	250	600	LPJ-250SP	JTD250	AJT250	JDL250	DFJ-250	LDFJ250	HSJ250	JHL250
R7	211A-2	211	300	600	LPJ-300SP	JTD300	AJT300	JDL300	DFJ-300	LDFJ300	HSJ300	JHL300
R8	273A-2	273	400	600	LPJ-400SP	JTD400	AJT400	JDL400	DFJ-400	LDFJ400	HSJ400	JHL400

Frame Size	208/230 V ACH580-01 ACQ580-01 ACS580-01	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Class CF Time Delay Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R1	04A6-2	4.6	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	06A6-2	6.6	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	07A5-2	7.5	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	10A6-2	10.6	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	017A-2	16.7	30	600	KTK-R-30	KLKR30	ATMR30	HCLR30	TCF30RN	FCF30RN
R2	024A-2	24.2	40	600	-	-	-	-	TCF40RN	FCF40RN
R2	031A-2	30.8	40	600	-	-	-	-	TCF40RN	FCF40RN
R3	046A-2	46.2	80	600	-	-	-	-	TCF80RN	FCF80RN
R3	059A-2	59.4	80	600	-	-	-	-	TCF80RN	FCF80RN
R4	075A-2	74.8	100	600	-	-	-	-	TCF100RN	FCF100RN
R5	088A-2	88.0	150	600	-	-	-	-	TCF150RN	-
R5	114A-2	114	150	600	-	-	-	-	TCF150RN	-
R6	143A-2	143	200	600	-	-	-	-	TCF200RN	-
R7	169A-2	169	250	600	-	-	-	-	TCF250RN	-
R7	211A-2	211	300	600	-	-	-	-	TCF300RN	-
R8	273A-2	273	400	600	-	-	-	-	TCF400RN	-

**ACH, ACQ, ACS580-01, 480 V fuses**

Frame Size	480 V ACH580-01- ACQ580-01- ACS580-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R1	02A1-4	2.1	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	03A0-4	3.0	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	03A5-4	3.5	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	04A8-4	4.8	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	07A6-4	7.6	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	012A-4	12.0	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R2	014A-4	14.0	30	600	JJS-30	JLLS030	A6T30	TJS30	JKS-30	JLS30	A4J30	JFL30
R2	023A-4	23.0	30	600	JJS-30	JLLS030	A6T30	TJS30	JKS-30	JLS30	A4J30	JFL30
R3	027A-4	27.0	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R3	034A-4	34.0	60	600	JJS-60	JLLS060	A6T60	TJS60	JKS-60	JLS60	A4J60	JFL60
R3	044A-4	44.0	60	600	JJS-60	JLLS060	A6T60	TJS60	JKS-60	JLS60	A4J60	JFL60
R4	052A-4	52	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R4	065A-4	65	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4J100	JFL100
R4	077A-4	77	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4T100	JFL100
R5	096A-4	96	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R6	124A-4	124	200	600	JJS-200	JLLS200	A6T200	TJS200	JKS-200	JLS200	A4J200	JFL200
R7	156A-4	156	225	600	JJS-225	JLLS225	A6T225	TJS225	JKS-225	JLS225	A4J225	JFL225
R7	180A-4	180	300	600	JJS-300	JLLS300	A6T300	TJS300	JKS-300	JLS300	A4J300	JFL300
R8	240A-4	240	350	600	JJS-350	JLLS350	A6T350	TJS350	JKS-350	JLS350	A4J350	JFL350
R8*	260A-4	240	400	600	JJS-400	JLLS400	A6T400	TJS400	JKS-400	JLS400	A4J400	JFL400
R9	302A-4	302	500	600	JJS-500	JLLS500	A6T500	TJS500	Pending			
R9	361A-4	361	500	600	JJS-500	JLLS500	A6T500	TJS500				
R9	414A-4	414	600	600	JJS-600	JLLS600	A6T600	TJS600				

Frame Size	480 V ACH580-01- ACQ580-01- ACS580-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R1	02A1-4	2.1	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	03A0-4	3.0	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	03A5-4	3.5	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	04A8-4	4.8	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	07A6-4	7.6	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	012A-4	12.0	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R2	014A-4	14.0	30	600	LPJ-30SP	JTD30	AJT30	JDL30	DFJ-30	LDFJ030	HSJ30	JHL30
R2	023A-4	23.0	30	600	LPJ-30SP	JTD30	AJT30	JDL30	DFJ-30	LDFJ030	HSJ30	JHL30
R3	027A-4	27.0	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R3	034A-4	34.0	60	600	LPJ-60SP	JTD60	AJT60	JDL60	DFJ-60	LDFJ060	HSJ60	JHL60
R3	044A-4	44.0	60	600	LPJ-60SP	JTD60	AJT60	JDL60	DFJ-60	LDFJ060	HSJ60	JHL60
R4	052A-4	52	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R4	065A-4	65	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R4	077A-4	77	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R5	096A-4	96	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R6	124A-4	124	200	600	LPJ-200SP	JTD200	AJT200	JDL200	DFJ-200	LDFJ200	HSJ200	JHL200
R7	156A-4	156	225	600	LPJ-225SP	JTD225	AJT225	JDL225	DFJ-225	LDFJ225	HSJ225	JHL225
R7	180A-4	180	300	600	LPJ-300SP	JTD300	AJT300	JDL300	DFJ-300	LDFJ300	HSJ300	JHL300
R8	240A-4	240	350	600	LPJ-350SP	JTD350	AJT350	JDL350	DFJ-350	LDFJ350	HSJ350	JHL350
R8*	260A-4	240	400	600	LPJ-400SP	JTD400	AJT400	JDL400	DFJ-400	LDFJ400	HSJ400	JHL400
R9	302A-4	302	500	600	Pending							
R9	361A-4	361	500	600								
R9	414A-4	414	600	600								

Frame Size	480 V ACH580-01- ACQ580-01- ACS580-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R1	02A1-4	2.1	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	03A0-4	3.0	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	03A5-4	3.5	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	04A8-4	4.8	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	07A6-4	7.6	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	012A-4	12.0	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R2	014A-4	14.0	30	600	KTK-R-30	KLKR30	ATMR30	HCLR30	TCF30RN	FCF30RN
R2	023A-4	23.0	30	600	KTK-R-30	KLKR30	ATMR30	HCLR30	TCF30RN	FCF30RN
R3	027A-4	27.0	40	600	-	-	-	-	TCF40RN	FCF40RN
R3	034A-4	34.0	60	600	-	-	-	-	TCF60RN	FCF60RN
R3	044A-4	44.0	60	600	-	-	-	-	TCF60RN	FCF60RN
R4	052A-4	52	80	600	-	-	-	-	TCF80RN	FCF80RN
R4	065A-4	65	100	600	-	-	-	-	TCF100RN	FCF100RN
R4	077A-4	77	100	600	-	-	-	-	TCF100RN	-
R5	096A-4	96	150	600	-	-	-	-	TCF150RN	-
R6	124A-4	124	200	600	-	-	-	-	TCF200RN	-
R7	156A-4	156	225	600	-	-	-	-	TCF225RN	-
R7	180A-4	180	300	600	-	-	-	-	TCF300RN	-
R8	240A-4	240	350	600	-	-	-	-	TCF350RN	-
R8*	260A-4	240	400	600	-	-	-	-	TCF400RN	-
R9	302A-4	302	500	600	Pending					
R9	361A-4	361	500	600						
R9	414A-4	414	600	600						

\*Not available in ACH580

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**ACH, ACQ, ACS580-01, 575 V fuses**

Frame Size	575 V ACH580-01- ACQ580-01- ACS580-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R2	02A7-6	2.7	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R2	03A9-6	3.9	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R2	06A1-6	6.1	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R2	09A0-6	9	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R2	011A-6	11	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R2	017A-6	17	30	600	JJS-30	JLLS030	A6T30	TJS30	JKS-30	JLS30	A4J30	JFL30
R3	022A-6	22	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R3	027A-6	27	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R3	032A-6	32	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R5	041A-6	41	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4T100	JFL100
R5	052A-6	52	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4T100	JFL100
R5	062A-6	62	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4T100	JFL100
R5	077A-6	77	100	600	JJS-100	JLLS100	A6T100	TJS100	JKS-100	JLS100	A4T100	JFL100
R7	099A-6	99	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R7	125A-6	125	200	600	JJS-200	JLLS200	A6T200	TJS200	JKS-200	JLS200	A4J200	JFL200
R8	144A-6	144	250	600	JJS-250	JLLS250	A6T250	TJS250	JKS-250	JLS250	A4J250	JFL250
R9	192A-6	192	300	600	JJS-300	JLLS300	A6T300	TJS300	Pending			
R9	242A-6	242	400	600	JJS-400	JLLS400	A6T400	TJS400				
R9	271A-6	271	400	600	JJS-400	JLLS400	A6T400	TJS400				

Frame Size	575 V ACH580-01- ACQ580-01- ACS580-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R2	02A7-6	2.7	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R2	03A9-6	3.9	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R2	06A1-6	6.1	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R2	09A0-6	9	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R2	011A-6	11	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R2	017A-6	17	30	600	LPJ-30SP	JTD30	AJT30	JDL30	DFJ-30	LDFJ030	HSJ30	JHL30
R3	022A-6	22	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R3	027A-6	27	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R3	032A-6	32	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R5	041A-6	41	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R5	052A-6	52	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R5	062A-6	62	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R5	077A-6	77	100	600	LPJ-100SP	JTD100	AJT100	JDL100	DFJ-100	LDFJ100	HSJ100	JHL100
R7	099A-6	99	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R7	125A-6	125	200	600	LPJ-200SP	JTD200	AJT200	JDL200	DFJ-200	LDFJ200	HSJ200	JHL200
R8	144A-6	144	250	600	LPJ-250SP	JTD250	AJT250	JDL250	DFJ-250	LDFJ250	HSJ250	JHL250
R9	192A-6	192	300	600	Pending							
R9	242A-6	242	400	600								
R9	271A-6	271	400	600								

Frame Size	575 V ACH580-01- ACQ580-01- ACS580-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R2	02A7-6	2.7	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R2	03A9-6	3.9	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R2	06A1-6	6.1	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R2	09A0-6	9	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R2	011A-6	11	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R2	017A-6	17	30	600	KTK-R-30	KLKR30	ATMR30	HCLR30	TCF30RN	FCF30RN
R3	022A-6	22	40	600	-	-	-	-	TCF40RN	FCF40RN
R3	027A-6	27	40	600	-	-	-	-	TCF40RN	FCF40RN
R3	032A-6	32	40	600	-	-	-	-	TCF40RN	FCF40RN
R5	041A-6	41	100	600	-	-	-	-	TCF100RN	FCF100RN
R5	052A-6	52	100	600	-	-	-	-	TCF100RN	FCF100RN
R5	062A-6	62	100	600	-	-	-	-	TCF100RN	FCF100RN
R5	077A-6	77	100	600	-	-	-	-	TCF100RN	FCF100RN
R7	099A-6	99	150	600	-	-	-	-	TCF150RN	-
R7	125A-6	125	200	600	-	-	-	-	TCF200RN	-
R8	144A-6	144	250	600	-	-	-	-	TCF250RN	-
R9	192A-6	192	300	600	Pending					
R9	242A-6	242	400	600						
R9	271A-6	271	400	600						

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**ACH, ACQ580-04, 480 V fuses**

Frame Size	480 V ACH580-04- ACQ580-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R10	505A-4	505	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R10	585A-4	585	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R10	650A-4	650	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R11	725A-4	725	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000
R11	820A-4	820	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000
R11	880A-4	880	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000

Frame Size	480 V ACH580-04- ACQ580-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-10 Time Delay Class L Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R10	505A-4	505	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R10	585A-4	585	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R10	650A-4	650	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R11	725A-4	725	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-
R11	820A-4	820	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-
R11	880A-4	880	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-

Frame Size	480 V ACH580-04- ACQ580-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R10	505A-4	505	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDFJ600	HSJ600	JHL600
R10	585A-4	585	800	600	-	-	-	-	-	-	-	-
R10	650A-4	650	800	600	-	-	-	-	-	-	-	-
R11	725A-4	725	1000	600	-	-	-	-	-	-	-	-
R11	820A-4	820	1000	600	-	-	-	-	-	-	-	-
R11	880A-4	880	1000	600	-	-	-	-	-	-	-	-

Frame Size	480 V ACH580-04- ACQ580-04-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
R10	505A-4	505	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
R10	585A-4	585	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
R10	650A-4	650	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
R11	725A-4	725	900	690	170M6413	170M6013	170M6613	170M6313	170M6813D
R11	820A-4	820	1000	690	170M6414	170M6014	170M6614	170M6314	170M6814D
R11	880A-4	880	1400	690	170M6417	170M6017	170M6617	170M6317	170M8555D

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**ACH, ACQ580-31, 480 V fuses**

Frame Size	480 V ACH580-31- ACQ580-31-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R3	07A6-4	7	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R3	012A-4	9	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R3	014A-4	12	25	600	JJS-25	JLLS025	A6T25	TJS25	JKS-25	JLS25	A4J25	JFL25
R3	023A-4	17	35	600	JJS-35	JLLS035	A6T35	TJS35	JKS-35	JLS35	A4J35	JFL35
R6	027A-4	24	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R6	034A-4	29	50	600	JJS-50	JLLS050	A6T50	TJS50	JKS-50	JLS50	A4J50	JFL50
R6	044A-4	34	60	600	JJS-60	JLLS060	A6T60	TJS60	JKS-60	JLS60	A4J60	JFL60
R6	052A-4	44	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R6	065A-4	54	90	600	JJS-90	JLLS090	A6T90	TJS90	JKS-90	JLS90	A4J90	JFL90
R6	077A-4	66	110	600	JJS-110	JLLS110	A6T110	TJS110	JKS-110	JLS110	A4J110	JFL110
R8	096A-4	82	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R8	124A-4	111	200	600	JJS-200	JLLS200	A6T200	TJS200	JKS-200	JLS200	A4J200	JFL200
R8	156A-4	134	225	600	JJS-225	JLLS225	A6T225	TJS225	JKS-225	JLS225	A4J225	JFL225
R8	180A-4	163	300	600	JJS-300	JLLS300	A6T300	TJS300	JKS-300	JLS300	A4T300	JFL300

Frame Size	480 V ACH580-31- ACQ580-31-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R3	07A6-4	7	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R3	012A-4	9	20	600	LPJ-20SP	JTD20	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R3	014A-4	12	25	600	LPJ-25SP	JTD25	AJT25	JDL25	DFJ-25	LDFJ025	HSJ25	JHL25
R3	023A-4	17	35	600	LPJ-35SP	JTD35	AJT35	JDL35	DFJ-35	LDFJ035	HSJ35	JHL35
R6	027A-4	24	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R6	034A-4	29	50	600	LPJ-50SP	JTD50	AJT50	JDL50	DFJ-50	LDFJ050	HSJ50	JHL50
R6	044A-4	34	60	600	LPJ-60SP	JTD60	AJT60	JDL60	DFJ-60	LDFJ060	HSJ60	JHL60
R6	052A-4	44	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R6	065A-4	54	90	600	LPJ-90SP	JTD90	AJT90	JDL90	DFJ-90	LDFJ090	HSJ90	JHL90
R6	077A-4	66	110	600	LPJ-110SP	JTD110	AJT110	JDL110	DFJ-110	LDFJ110	HSJ110	JHL110
R8	096A-4	82	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R8	124A-4	111	200	600	LPJ-200SP	JTD200	AJT200	JDL200	DFJ-200	LDFJ200	HSJ200	JHL200
R8	156A-4	134	225	600	LPJ-225SP	JTD225	AJT225	JDL225	DFJ-225	LDFJ225	HSJ225	JHL225
R8	180A-4	163	300	600	LPJ-300SP	JTD400	AJT300	JDL300	DFJ-300	LDFJ300	HSJ300	JHL300

Frame Size	480 V ACH580-31- ACQ580-31-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R3	07A6-4	7	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R3	012A-4	9	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R3	014A-4	12	25	600	KTK-R-25	KLKR25	ATMR25	HCLR25	TCF25RN	FCF25RN
R3	023A-4	17	35	600	-	-	-	-	TCF35RN	FCF35RN
R6	027A-4	24	40	600	-	-	-	-	TCF40RN	FCF40RN
R6	034A-4	29	50	600	-	-	-	-	TCF50RN	FCF50RN
R6	044A-4	34	60	600	-	-	-	-	TCF60RN	FCF60RN
R6	052A-4	44	80	600	-	-	-	-	TCF80RN	FCF80RN
R6	065A-4	54	90	600	-	-	-	-	TCF90RN	FCF90RN
R6	077A-4	66	110	600	-	-	-	-	TCF110RN	-
R8	096A-4	82	150	600	-	-	-	-	TCF150RN	-
R8	124A-4	111	200	600	-	-	-	-	TCF200RN	-
R8	156A-4	134	225	600	-	-	-	-	TCF225RN	-
R8	180A-4	163	300	600	-	-	-	-	TCF300RN	-

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**ACH, ACQ580-34, 480 V fuses**

Frame Size	480 V ACH580-34- ACQ580-34-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses			
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style
		A	A	V				
R11	240A-4	209	400	690	170M5408	170M5008	170M5608	170M5308
R11	302A-4	258	500	690	170M5410	170M5010	170M5610	170M5310
R11	361A-4	307	630	690	170M6410	170M6010	170M6610	170M6310
R11	414A-4	363	700	690	170M6411	170M6011	170M6611	170M6311
R11	477A-4	414	800	690	170M6412	170M6012	170M6612	170M6312

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## Circuit Breaker Information

ACX580-01 drives are suitable for use on a circuit capable of delivering not more than 65 kA symmetrical amperes (RMS) at 240 / 480 V maximum, when protected by appropriate circuit breakers in the tables below. Follow rules 1-8 below, and then depending upon the supply voltage, use either the rules 9 & 10 in the 240V paragraph below, or 11-14 in the 480V paragraph below that.

### Follow these rules for all voltages.

1. Drives that have an Enclosure Minimum Volume listed must be mounted in an enclosure  $\geq$  Enclosure Minimum Volume specified in the tables below.
2. When multiple drives that have an Enclosure Minimum Volume specified are installed in the same enclosure, minimum volume of the enclosure is determined by largest Enclosure Minimum Volume of the drives to be placed in the enclosure, plus the volume(s) of each additional drive. i.e. for the 480V R6 and R3 drive select enclosure with the volume  $\geq 53703+1152 = 54855 \text{ in}^3$ .
3. If a UL Type 1 or UL Type 12 drive that has an Enclosure Minimum Volume indicated with a ‡, no additional enclosure around the drive is required. For UL Type Open drives, no minimum enclosure size is required but the drive must be mounted in an enclosure.
4. If combining a drive with an Enclosure Minimum Volume specified and others with an Enclosure Minimum Volume indicated with ‡, start with the largest specified Enclosure Minimum Volume listed and add the drive volumes for the other drives.
5. If you are only mounting drives with no Enclosure Minimum Volume specified, you have no restrictions on the enclosure size, but follow air clearances specified in the drive HW manuals for sufficient ventilation around each drive.
6. Open Type, Type 1 and Type 12 drives can be used inside of the enclosure. Use drive volume for all three types listed in the table when installing multiple drives in the enclosure.
7. The ABB circuit breaker part number listed in the table is a base part number. The digits indicated with an “\*” represent trip units, numbers of poles, and accessories for the breakers. These have no impact on the performance or rating of the breakers.
8. Circuit breaker current ratings should be sized per NEC. Ratings in the tables are maximum for the given frame size.

**ACx580-01 230V** drives were tested with ABB inverse time circuit breakers rated at 65kA and 240V. When using circuit breakers to protect these drives follow these initial rules:

9. Other manufacturers' inverse time circuit breakers can be used if they are UL 489 listed, they are 240V or higher, they have a 65kA or higher interrupting capacity and they have the same or lower nominal current rating than ABB specified circuit breaker.
10. Current limiting inverse time circuit breakers must not be used.

**ACx580-01 460V** drives were tested with ABB current limiting inverse time circuit breakers rated at 65kA and 480V.

When using circuit breakers to protect these drives follow these initial rules:

11. When designing UL508A panels, Article SB 4.2.3 Exception No. 3 allows the use of other manufacturers' current limiting inverse time circuit breakers which have same voltage, current and interrupting rating, if  $I_{peak}$  and  $I^2t$  are the same or less than the ABB specified circuit breaker.
12. Non-current limiting inverse time circuit breakers must not be used.
13. Enclosures for frames R1, R3, and R9 must have a solid bottom directly below the drive. i.e. fans, filters or louvers cannot be mounted directly below the drive but can be mounted in adjacent areas on the bottom of the enclosure.
14. Only 480V R8 frame drives with serial numbers after 1204301926 when manufactured in Finland and 2205002140 when manufactured in the U.S. may be protected with circuit breakers listed in the tables below.

**ACH, ACQ, ACS580-01, 230 V circuit breakers**

Frame Size	230 V ACH580-01- ACQ580-01- ACS580-01-	Input Current (A)	CB Maximum Current (A)	CB Voltage (V)	Enclosure Minimum Volume (in <sup>3</sup> )	Drive Volume (in <sup>3</sup> )	Circuit Breaker (ABB) 65kA @ 240 V
R1	04A6-2	4.6	25	240	6480	506	XT2N**025*****
R1	06A6-2	6.6	25	240	6480	506	XT2N**025*****
R1	07A5-2	7.5	25	240	6480	506	XT2N**025*****
R1	10A6-2	10.6	25	240	6480	506	XT2N**025*****
R1	017A-2	16.7	25	240	6480	506	XT2N**025*****
R2	024A-2	24.2	40	240	6480	684	XT2N**040*****
R2	031A-2	30.8	40	240	6480	684	XT2N**040*****
R3	046A-2	46.2	100	240	6480	1011	XT2N**100*****
R3	059A-2	59.4	100	240	6480	1011	XT2N**100*****
R4	075A-2	74.8	100	240	6480	1669	XT2N**100*****
R5	088A-2	88.0	150	240	8100	2030	XT4N**150*****
R5	114A-2	114	150	240	8100	2030	XT4N**150*****
R6	143A-2	143	200	240	‡	2880	XT4N**200*****
R7	169A-2	169	300	240	‡	3369	XT4N**30A*****
R7	211A-2	211	300	240	‡	3369	XT4N**30A*****
R8	273A-2	273	400	240	‡	3858	XT5N**40A*****

‡ Minimum Enclosure Volume is not applicable

**ACH, ACQ, ACS580-01, 480 V circuit breakers**

Frame Size	480 V ACH580-01- ACQ580-01- ACS580-01-	Input Current (A)	CB Maximum Current (A)	CB Voltage (V)	Enclosure Minimum Volume (in <sup>3</sup> )	Drive Volume (in <sup>3</sup> )	Circuit Breaker (ABB) 65kA @ 480V	Circuit Breaker (Rockwell) 65kA @ 480 V	Maximum I <sup>2</sup> t (A <sup>2</sup> s)	Maximum Ipeak (kA)
R1	02A1-4	2.1	20	480	6480	506	XT2H**020*****	140G-HC6C3-C20	0.512x10 <sup>6</sup>	23.2
R1	03A0-4	3.0	20	480	6480	506	XT2H**020*****	140G-HC6C3-C20	0.512x10 <sup>6</sup>	23.2
R1	03A5-4	3.5	20	480	6480	506	XT2H**020*****	140G-HC6C3-C20	0.512x10 <sup>6</sup>	23.2
R1	04A8-4	4.8	20	480	6480	506	XT2H**020*****	140G-HC6C3-C20	0.512x10 <sup>6</sup>	23.2
R1	07A6-4	7.6	20	480	6480	506	XT2H**020*****	140G-HC6C3-C20	0.512x10 <sup>6</sup>	23.2
R1	012A-4	12.0	20	480	6480	506	XT2H**020*****	140G-HC6C3-C20	0.512x10 <sup>6</sup>	23.2
R2	014A-4	14.0	35	480	16200	684	XT2H**035*****	140G-HC6C3-C35	0.512x10 <sup>6</sup>	23.2
R2	023A-4	23.0	35	480	16200	684	XT2H**035*****	140G-HC6C3-C35	0.512x10 <sup>6</sup>	23.2
R3	027A-4	27.0	70	480	27720	1011	XT2H**070*****	140G-HC6C3-C70	0.512x10 <sup>6</sup>	23.2
R3	034A-4	34.0	70	480	27720	1011	XT2H**070*****	140G-HC6C3-C70	0.512x10 <sup>6</sup>	23.2
R3	044A-4	44.0	70	480	27720	1011	XT2H**070*****	140G-HC6C3-C70	0.512x10 <sup>6</sup>	23.2
R4	052A-4	52	125	480	30240	1669	XT2H**125*****	140G-HC6H3-D12	0.512x10 <sup>6</sup>	23.2
R4	065A-4	65	125	480	30240	1669	XT2H**125*****	140G-HC6H3-D12	0.512x10 <sup>6</sup>	23.2
R4	077A-4	77	125	480	30240	1669	XT2H**125*****	140G-HC6H3-D12	0.512x10 <sup>6</sup>	23.2
R5	096A-4	96	150	480	30240	2030	XT4H**150*****	140G-HC6H3-D15	0.98x10 <sup>6</sup>	30
R6	124A-4	124	225	480	53703	2880	XT4H**225*****	140G-JC6H3-D25	0.98x10 <sup>6</sup>	30
R7	156A-4	156	250	480	53703	3369	XT4H**250*****	140G-JC6H3-D25	0.98x10 <sup>6</sup>	30
R7	180A-4	180	250	480	53703	3369	XT4H**250*****	140G-JC6H3-D25	0.98x10 <sup>6</sup>	30
R8**	240A-4	240	400	480	53703	3858	XT5H**40A*****	140G-KC6H3-D40	4.2x10 <sup>6</sup>	47.9
R8**	260A-4	240	400	480	53703	3858	XT5H**40A*****	140G-KC6H3-D40	4.2x10 <sup>6</sup>	47.9
R9	302A-4	302	600	480						
R9	361A-4	361	600	480						
R9	414A-4	414	600	480						

Pending

\*\* Follow Rule 14 above

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# ACS880 drives

## Purpose

This section outlines branch circuit protection that may be used with ACS880-01, -04, 04XT, -04F, 04FXT, -11, -14, -31, -34 drives.

## How to use this information

The drive hardware manual includes branch circuit protection recommendations for the drive. In addition to the branch circuit protection identified in the manual, alternative devices can be used if they meet certain characteristics. The guidelines in this document describe which fuses and circuit breakers are an acceptable alternative. This document is a supplement to the following drive hardware manuals:

- 3AUA0000078093 ACS880-01 drives
- 3AUA0000128301 ACS880-04 drives
- 3AXD500000025169 ACS880-04XT drives
- 3AXD50000034664 ACS880-04F drives
- 3AXD50000274444 ACS880-04FXT drives
- 3AXD50000045932 ACS880-11 drives
- 3AXD50000035160 ACS880-14 drives
- 3AXD50000045933 ACS880-31 drives
- 3AXD50000035191 ACS880-34 drives

## Fuse Information

ACS880-01 drives are suitable for use on a circuit capable of delivering not more than 100 kA symmetrical amperes (RMS) at 240, 480 and 600 V maximum, when protected by appropriate fuses.

ACS880-11 and -31 drives are suitable for use on a circuit capable of delivering not more than 100 kA symmetrical amperes (RMS) at 480 V maximum when protected by appropriate fuses.

ACS880-04, -04F, -04XT, -04FXT, -14 and -34 drives are suitable for use on a circuit capable of delivering not more than 100 kA symmetrical amperes (RMS) at 480 and 600 V maximum when protected by appropriate fuses.

The drives are tested in accordance with standard UL 61800-5-1 on a circuit having available system fault current of 100 kA maximum.

Hardware manuals for ACS880-01, -04, -11, -14, -31, and -34 drives provided fusing guidelines:

- Listed Class T (UL 248-15) fast acting fuses up to 600A
- Listed Class L (UL 248-15) fast acting fuses up to 1000A.

ABB performed the fault testing with “umbrella fuses.” These fuses are calibrated to create worst case peak let-through current ( $I_{peak}$ ) and let-through energy ( $I^2t$ ) in accordance with the limits of the intended fuse class(es) and ratings. The umbrella fuse testing allows other Listed fuses, which have let-through characteristics equal to or below these limits, to be used. Therefore, listed (UL 248-8) Class J fast acting, time delay, and high speed fuses can also be used, since they provide equal or better protection. Likewise, listed (UL 248-17) Class CF fast acting and time delay cubed body fuses can be used as well.

**In addition to the above guidelines, the following rules must be followed. (These rules do not apply for the ACS880-04 drives where semiconductor fuses can be used as alternate and ACS880-14 and -34 drives which use strictly semiconductor fuses):**

1. Fuses are required as part of the installation. Fuses are not included in the base drive configuration and must be provided by others.
2. The UL listed fuses in the hardware manual tables, or the tables in this document are the required branch circuit protection per NEC.
3. Recommended size or smaller UL 248 listed fast acting, time delay, or high speed fuses must be used to maintain the drive UL listing. Additional protection can be used. Refer to local codes and regulations.
4. UL 248 listed, fast acting, time delay, or high speed fuses from other manufacturers can be used if they meet the rating requirements specified in the rules above.
5. A fuse of a different class can be used at the high fault rating where the  $I_{peak}$  and  $I^2t$  of the new fuse is not greater than that of the specified fuse.
6. When installing a drive, always follow installation instructions and NEC requirements.

Alternate recommended fuses for some of the major fuse manufacturers can be found in tables on the following pages. Other manufacturers not found on the tables below may be used if they meet the fuse requirements stated above.

**ACS880-01, 230 V fuses**

Frame Size	230 V ACS880-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R1	04A6-2	4.4	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	06A6-2	6.3	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	07A5-2	7.1	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	10A6-2	10.1	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R2	16A8-2	16.0	25	600	JJS-25	JLLS025	A6T25	TJS25	JKS-25	JLS25	A4J25	JFL25
R2	24A3-2	23.1	35	600	JJS-35	JLLS035	A6T35	TJS35	JKS-35	JLS35	A4J35	JFL35
R3	031A-2	29.3	50	600	JJS-50	JLLS050	A6T50	TJS50	JKS-50	JLS50	A4J50	JFL50
R4	046A-2	44.0	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R4	061A-2	58.0	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R5	075A-2	71.0	110	600	JJS-110	JLLS110	A6T110	TJS110	JKS-110	JLS110	A4J110	JFL110
R5	087A-2	83.0	110	600	JJS-110	JLLS110	A6T110	TJS110	JKS-110	JLS110	A4J110	JFL110
R6	115A-2	109	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R6	145A-2	138	200	600	JJS-200	JLLS200	A6T200	TJS200	JKS-200	JLS200	A4J200	JFL200
R7	170A-2	162	250	600	JJS-250	JLLS250	A6T250	TJS250	JKS-250	JLS250	A4T250	JFL250
R7	206A-2	196	300	600	JJS-300	JLLS300	A6T300	TJS300	JKS-300	JLS300	A4J300	JFL300
R8	274A-2	260	400	600	JJS-400	JLLS400	A6T400	TJS400	JKS-400	JLS400	A4J400	JFL400

Frame Size	230 V ACS880-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R1	04A6-2	4.4	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	06A6-2	6.3	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	07A5-2	7.1	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	10A6-2	10.1	20	600	LPJ-20SP	JTD20	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R2	16A8-2	16.0	25	600	LPJ-25SP	JTD25	AJT25	JDL25	DFJ-25	LDFJ025	HSJ25	JHL25
R2	24A3-2	23.1	35	600	LPJ-35SP	JTD35	AJT35	JDL35	DFJ-35	LDFJ035	HSJ35	JHL35
R3	031A-2	29.3	50	600	LPJ-50SP	JTD50	AJT50	JDL50	DFJ-50	LDFJ050	HSJ50	JHL50
R4	046A-2	44.0	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R4	061A-2	58.0	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R5	075A-2	71.0	110	600	LPJ-110SP	JTD110	AJT110	JDL110	DFJ-110	LDFJ110	HSJ110	JHL110
R5	087A-2	83.0	110	600	LPJ-110SP	JTD110	AJT110	JDL110	DFJ-110	LDFJ110	HSJ110	JHL110
R6	115A-2	109	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R6	145A-2	138	200	600	LPJ-200SP	JTD200	AJT200	JDL200	DFJ-200	LDFJ200	HSJ200	JHL200
R7	170A-2	162	250	600	LPJ-250SP	JTD250	AJT250	JDL250	DFJ-250	LDFJ250	HSJ250	JHL250
R7	206A-2	196	300	600	LPJ-300SP	JTD300	AJT300	JDL300	DFJ-300	LDFJ300	HSJ300	JHL300
R8	274A-2	260	400	600	LPJ-400SP	JTD400	AJT400	JDL400	DFJ-400	LDFJ400	HSJ400	JHL400

Frame Size	230 V ACS880-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R1	04A6-2	4.4	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	06A6-2	6.3	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	07A5-2	7.1	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R1	10A6-2	10.1	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R2	16A8-2	16.0	25	600	KTK-R-25	KLKR25	ATMR25	HCLR25	TCF25RN	FCF25RN
R2	24A3-2	23.1	35	600	-	-	-	-	TCF35RN	FCF35RN
R3	031A-2	29.3	50	600	-	-	-	-	TCF50RN	FCF50RN
R4	046A-2	44.0	80	600	-	-	-	-	TCF80RN	FCF80RN
R4	061A-2	58.0	80	600	-	-	-	-	TCF80RN	FCF80RN
R5	075A-2	71.0	110	600	-	-	-	-	TCF110RN	-
R5	087A-2	83.0	110	600	-	-	-	-	TCF110RN	-
R6	115A-2	109	150	600	-	-	-	-	TCF150RN	-
R6	145A-2	138	200	600	-	-	-	-	TCF200RN	-
R7	170A-2	162	250	600	-	-	-	-	TCF250RN	-
R7	206A-2	196	300	600	-	-	-	-	TCF300RN	-
R8	274A-2	260	400	600	-	-	-	-	TCF400RN	-

**ACS880-01, 480 V fuses**

Frame Size	480 V ACS880-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R1	02A1-5	2.1	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	03A0-5	3.0	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	03A4-5	3.4	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	04A8-5	4.8	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	05A2-5	5.2	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	07A6-5	7.6	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R1	11A0-5	11	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R2	014A-5	14	25	600	JJS-25	JLLS025	A6T25	TJS25	JKS-25	JLS25	A4J25	JFL25
R2	021A-5	21	35	600	JJS-35	JLLS035	A6T35	TJS35	JKS-35	JLS35	A4J35	JFL35
R3	027A-5	27	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R3	034A-5	34	50	600	JJS-50	JLLS050	A6T50	TJS50	JKS-50	JLS50	A4J50	JFL50
R4	040A-5	40	60	600	JJS-60	JLLS060	A6T60	TJS60	JKS-60	JLS60	A4J60	JFL60
R4	052A-5	52	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R5	065A-5	65	90	600	JJS-90	JLLS090	A6T90	TJS90	JKS-90	JLS90	A4T90	JFL90
R5	077A-5	77	110	600	JJS-110	JLLS110	A6T110	TJS110	JKS-110	JLS110	A4J110	JFL110
R6	096A-5	96	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R6	124A-5	124	200	600	JJS-200	JLLS200	A6T200	TJS200	JKS-200	JLS200	A4J200	JFL200
R7	156A-5	156	225	600	JJS-225	JLLS225	A6T225	TJS225	JKS-225	JLS225	A4J225	JFL225
R7	180A-5	180	300	600	JJS-300	JLLS300	A6T300	TJS300	JKS-300	JLS300	A4J300	JFL300
R8	240A-5	240	350	600	JJS-350	JLLS350	A6T350	TJS350	JKS-350	JLS350	A4J350	JFL350
R8	260A-5	260	400	600	JJS-400	JLLS400	A6T400	TJS400	JKS-400	JLS400	A4J400	JFL400
R9	302A-5	302	400	600	JJS-400	JLLS400	A6T400	TJS400	Pending			
R9	361A-5	361	500	600	JJS-500	JLLS500	A6T500	TJS500				
R9	414A-5	414	600	600	JJS-600	JLLS600	A6T600	TJS600				

Frame Size	480 V ACS880-01	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R1	02A1-5	2.1	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	03A0-5	3.0	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	03A4-5	3.4	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	04A8-5	4.8	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	05A2-5	5.2	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	07A6-5	7.6	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R1	11A0-5	11	20	600	LPJ-20SP	JTD20	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R2	014A-5	14	25	600	LPJ-25SP	JTD25	AJT25	JDL25	DFJ-25	LDFJ025	HSJ25	JHL25
R2	021A-5	21	35	600	LPJ-35SP	JTD35	AJT35	JDL35	DFJ-35	LDFJ035	HSJ35	JHL35
R3	027A-5	27	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R3	034A-5	34	50	600	LPJ-50SP	JTD50	AJT50	JDL50	DFJ-50	LDFJ050	HSJ50	JHL50
R4	040A-5	40	60	600	LPJ-60SP	JTD60	AJT60	JDL60	DFJ-60	LDFJ060	HSJ60	JHL60
R4	052A-5	52	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R5	065A-5	65	90	600	LPJ-90SP	JTD90	AJT90	JDL90	DFJ-90	LDFJ090	HSJ90	JHL90
R5	077A-5	77	110	600	LPJ-110SP	JTD110	AJT110	JDL110	DFJ-110	LDFJ110	HSJ110	JHL110
R6	096A-5	96	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R6	124A-5	124	200	600	LPJ-200SP	JTD200	AJT200	JDL200	DFJ-200	LDFJ200	HSJ200	JHL200
R7	156A-5	156	225	600	LPJ-225SP	JTD225	AJT225	JDL225	DFJ-225	LDFJ225	HSJ225	JHL225
R7	180A-5	180	300	600	LPJ-300SP	JTD300	AJT300	JDL300	DFJ-300	LDFJ300	HSJ300	JHL300
R8	240A-5	240	350	600	LPJ-350SP	JTD350	AJT350	JDL350	DFJ-350	LDFJ350	HSJ350	JHL350
R8	260A-5	260	400	600	LPJ-400SP	JTD400	AJT400	JDL400	DFJ-400	LDFJ400	HSJ400	JHL400
R9	302A-5	302	400	600	Pending							
R9	361A-5	361	500	600								
R9	414A-5	414	600	600								

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Frame Size	480 V ACS880-01	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses		
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Bussmann		
			A	V								
R1	02A1-5	2.1	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN		
R1	03A0-5	3.0	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN		
R1	03A4-5	3.4	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN		
R1	04A8-5	4.8	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN		
R1	05A2-5	5.2	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN		
R1	07A6-5	7.6	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN		
R1	11A0-5	11	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN		
R2	014A-5	14	25	600	KTK-R-25	KLKR25	ATMR25	HCLR25	TCF25RN	FCF25RN		
R2	021A-5	21	35	600	-	-	-	-	TCF35RN	FCF35RN		
R3	027A-5	27	40	600	-	-	-	-	TCF40RN	FCF40RN		
R3	034A-5	34	50	600	-	-	-	-	TCF50RN	FCF50RN		
R4	040A-5	40	60	600	-	-	-	-	TCF60RN	FCF60RN		
R4	052A-5	52	80	600	-	-	-	-	TCF80RN	FCF80RN		
R5	065A-5	65	90	600	-	-	-	-	TCF90RN	FCF90RN		
R5	077A-5	77	110	600	-	-	-	-	TCF110RN	-		
R6	096A-5	96	150	600	-	-	-	-	TCF150RN	-		
R6	124A-5	124	200	600	-	-	-	-	TCF200RN	-		
R7	156A-5	156	225	600	-	-	-	-	TCF225RN	-		
R7	180A-5	180	300	600	-	-	-	-	TCF300RN	-		
R8	240A-5	240	350	600	-	-	-	-	TCF350RN	-		
R8	260A-5	260	400	600	-	-	-	-	TCF400RN	-		
R9	302A-5	302	400	600	Pending							
R9	361A-5	361	500	600								
R9	414A-5	414	600	600								

**ACS880-01, 575 V fuses**

Frame Size	575 V ACS880-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R3	07A4-7	7	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R3	09A9-7	9.4	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R3	14A3-7	13.6	30	600	JJS-30	JLLS030	A6T30	TJS30	JKS-30	JLS30	A4J30	JFL30
R3	019A-7	18	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R3	023A-7	22	50	600	JJS-50	JLLS050	A6T50	TJS50	JKS-50	JLS50	A4J50	JFL50
R3	027A-7	27	50	600	JJS-50	JLLS050	A6T50	TJS50	JKS-50	JLS50	A4J50	JFL50
R5	035A-7	41	60	600	JJS-60	JLLS060	A6T60	TJS60	JKS-60	JLS60	A4T60	JFL60
R5	042A-7	52	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4T80	JFL80
R5	049A-7	52	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4T80	JFL80
R6	061A-7	62	110	600	JJS-110	JLLS110	A6T110	TJS110	JKS-110	JLS110	A4J110	JFL110
R6	084A-7	77	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R7	098A-7	99	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R7	119A-7	125	200	600	JJS-200	JLLS200	A6T200	TJS200	JKS-200	JLS200	A4J200	JFL200
R8	142A-7	144	250	600	JJS-250	JLLS250	A6T250	TJS250	JKS-250	JLS250	A4J250	JFL250
R8	174A-7	180	300	600	JJS-300	JLLS300	A6T300	TJS300	JKS-300	JLS300	A4J300	JFL300
R9	210A-7	242	400	600	JJS-400	JLLS400	A6T400	TJS400	Pending			
R9	271A-7	271	400	600	JJS-400	JLLS400	A6T400	TJS400				

Frame Size	575 V ACS880-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R3	07A4-7	7	15	600	LPJ-15SP	JTD15	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R3	09A9-7	9.4	20	600	LPJ-20SP	JTD20	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R3	14A3-7	13.6	30	600	LPJ-30SP	JTD30	AJT30	JDL30	DFJ-30	LDFJ030	HSJ30	JHL30
R3	019A-7	18	40	600	LPJ-40SP	JTD40	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R3	023A-7	22	50	600	LPJ-50SP	JTD50	AJT50	JDL50	DFJ-50	LDFJ050	HSJ50	JHL50
R3	027A-7	27	50	600	LPJ-50SP	JTD50	AJT50	JDL50	DFJ-50	LDFJ050	HSJ50	JHL50
R5	035A-7	41	60	600	LPJ-60SP	JTD60	AJT60	JDL60	DFJ-60	LDFJ060	HSJ60	JHL60
R5	042A-7	52	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R5	049A-7	52	80	600	LPJ-80SP	JTD80	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R6	061A-7	62	110	600	LPJ-110SP	JTD110	AJT110	JDL110	DFJ-110	LDFJ110	HSJ110	JHL110
R6	084A-7	77	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R7	098A-7	99	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R7	119A-7	125	200	600	LPJ-200SP	JTD200	AJT200	JDL200	DFJ-200	LDFJ200	HSJ200	JHL200
R8	142A-7	144	250	600	LPJ-250SP	JTD250	AJT250	JDL250	DFJ-250	LDFJ250	HSJ250	JHL250
R8	174A-7	180	300	600	LPJ-300SP	JTD300	AJT300	JDL300	DFJ-300	LDFJ300	HSJ300	JHL300
R9	210A-7	242	400	600	Pending							
R9	271A-7	271	400	600								

Frame Size	575 V ACS880-01-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R3	07A4-7	7	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	TCF15RN	FCF15RN
R3	09A9-7	9.4	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	TCF20RN	FCF20RN
R3	14A3-7	13.6	30	600	KTK-R-30	KLKR30	ATMR30	HCLR30	TCF30RN	FCF30RN
R3	019A-7	18	40	600	-	-	-	-	TCF40RN	FCF40RN
R3	023A-7	22	50	600	-	-	-	-	TCF50RN	FCF50RN
R3	027A-7	27	50	600	-	-	-	-	TCF50RN	FCF50RN
R5	035A-7	41	60	600	-	-	-	-	TCF60RN	FCF60RN
R5	042A-7	52	80	600	-	-	-	-	TCF80RN	FCF80RN
R5	049A-7	52	80	600	-	-	-	-	TCF80RN	FCF80RN
R6	061A-7	62	110	600	-	-	-	-	TCF110RN	-
R6	084A-7	77	150	600	-	-	-	-	TCF150RN	-
R7	098A-7	99	150	600	-	-	-	-	TCF150RN	-
R7	119A-7	125	200	600	-	-	-	-	TCF200RN	-
R8	142A-7	144	250	600	-	-	-	-	TCF250RN	-
R8	174A-7	180	300	600	-	-	-	-	TCF300RN	-
R9	210A-7	242	400	600	Pending					
R9	271A-7	271	400	600						

ACS880-04, 480 V fuses

Frame Size	480 V ACS880-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R10	460A-5	460	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R10	503A-5	505	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R10	583A-5	585	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R10	635A-5	650	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R11	715A-5	725	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000
R11	820A-5	820	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000
R11	880A-5	880	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000

Frame Size	480 V ACS880-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-10 Time Delay Class L Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R10	460A-5	460	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R10	503A-5	505	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R10	583A-5	585	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R10	635A-5	650	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R11	715A-5	725	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-
R11	820A-5	820	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-
R11	880A-5	880	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-

Frame Size	480 V ACS880-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R10	460A-5	460	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
R10	503A-5	505	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
R10	583A-5	585	800	600	-	-	-	-	-	-	-	-
R10	635A-5	650	800	600	-	-	-	-	-	-	-	-
R11	715A-5	725	1000	600	-	-	-	-	-	-	-	-
R11	820A-5	820	1000	600	-	-	-	-	-	-	-	-
R11	880A-5	880	1000	600	-	-	-	-	-	-	-	-

Frame Size	480 V ACS880-04-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
R10	460A-5	460	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
R10	503A-5	505	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
R10	583A-5	585	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
R10	635A-5	650	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
R11	715A-5	725	900	690	170M6413	170M6013	170M6613	170M6313	170M6813D
R11	820A-5	820	1000	690	170M6414	170M6014	170M6614	170M6314	170M6814D
R11	880A-5	880	1400	690	170M6417	170M6017	170M6617	170M6317	170M8555D

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**ACS880-04, 575 V fuses**

Frame Size	575 V ACS880-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R10	330A-7	330	500	600	JJS-500	JLLS500	A6T500	TJS500	-	-	-	-
R10	370A-7	370	500	600	JJS-500	JLLS500	A6T500	TJS500	-	-	-	-
R10	430A-7	430	500	600	JJS-500	JLLS500	A6T500	TJS500	-	-	-	-
R11	470A-7	470	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R11	522A-7	522	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R11	590A-7	590	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R11	650A-7	650	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R11	721A-7	721	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800

Frame Size	575 V ACS880-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-10 Time Delay Class L Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R10	330A-7	330	500	600	-	-	-	-	JKS-500	JLS500	A4J500	JFL500
R10	370A-7	370	500	600	-	-	-	-	JKS-500	JLS500	A4J500	JFL500
R10	430A-7	430	500	600	-	-	-	-	JKS-500	JLS500	A4J500	JFL500
R11	470A-7	470	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R11	522A-7	522	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R11	590A-7	590	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R11	650A-7	650	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R11	721A-7	721	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-

Frame Size	575 V ACS880-04-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R10	330A-7	330	500	600	LPJ-500SP	JTD500	AJT500	JDL500	DFJ-500	LDJ500	HSJ500	JHL500
R10	370A-7	370	500	600	LPJ-500SP	JTD500	AJT500	JDL500	DFJ-500	LDJ500	HSJ500	JHL500
R10	430A-7	430	500	600	LPJ-500SP	JTD500	AJT500	JDL500	DFJ-500	LDJ500	HSJ500	JHL500
R11	470A-7	470	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
R11	522A-7	522	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
R11	590A-7	590	800	600	-	-	-	-	-	-	-	-
R11	650A-7	650	800	600	-	-	-	-	-	-	-	-
R11	721A-7	721	800	600	-	-	-	-	-	-	-	-

Frame Size	575 V ACS880-04-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
R10	330A-7	330	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
R10	370A-7	370	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
R10	430A-7	430	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
R11	470A-7	470	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
R11	522A-7	522	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
R11	590A-7	590	900	690	170M6413	170M6013	170M6613	170M6313	170M6813D
R11	650A-7	650	1000	690	170M6414	170M6014	170M6614	170M6314	170M6814D
R11	721A-7	721	1250	600	170M6416	170M6016	170M6616	170M6316	170M8554D

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**ACS880-04XT, 480 V fuses**

Frame Size	480 V ACS880-04XT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
(2) R10	1010A-5	1010	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
(2) R10	1160A-5	1160	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
(2) R11	1310A-5	1310	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
(2) R11	1610A-5	1610	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000

Frame Size	480 V ACS880-04XT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL248-10 Time Delay Fuses Class L			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V				
(2) R10	1010A-5	1010	700	690	KLU-800	KLPC800	A4BT800	LCL800
(2) R10	1160A-5	1160	800	690	KLU-800	KLPC800	A4BT800	LCL800
(2) R11	1310A-5	1310	800	690	KLU-1000	KLPC1000	A4BT1000	LCL1000
(2) R11	1610A-5	1610	1000	690	KLU-1000	KLPC1000	A4BT1000	LCL1000

Frame Size	480 V ACS880-04XT-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
(2) R10	1010A-5	1010	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
(2) R10	1160A-5	1160	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
(2) R11	1310A-5	1310	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
(2) R11	1610A-5	1610	1000	690	170M6414	170M6014	170M6614	170M6314	170M6814D

Six fuses required per installation

**ACS880-04XT, 575 V fuses**

Frame Size	575 V ACS880-04XT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
(2) R10	0810A-7	810	500	600	JJS-500	JLLS500	A6T500	TJS500	-	-	-	-
(2) R11	0960A-7	960	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
(2) R11	1080A-7	1080	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
(2) R11	1320A-7	1320	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800

Frame Size	575 V ACS880-04XT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-10 Time Delay Class L Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
(2) R10	0810A-7	810	500	600	-	-	-	-	JKS-500	JLS500	A4J500	JFL500
(2) R11	0960A-7	960	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
(2) R11	1080A-7	1080	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
(2) R11	1320A-7	1320	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-

Frame Size	575 V ACS880-04XT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
(2) R10	0810A-7	810	500	600	LPJ-500SP	JTD500	AJT500	JDL500	DFJ-500	LDJ500	HSJ500	JHL500
(2) R11	0960A-7	960	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
(2) R11	1080A-7	1080	800	600	-	-	-	-	-	-	-	-
(2) R11	1320A-7	1320	800	600	-	-	-	-	-	-	-	-

Frame Size	575 V ACS880-04XT-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
(2) R10	0810A-7	810	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
(2) R11	0960A-7	960	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
(2) R11	1080A-7	1080	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
(2) R11	1320A-7	1320	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D

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Six fuses required per installation  
(2) = two modules per drive

**ACS880-04F, 480 V fuses**

Frame Size	480 V ACS880-04F-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R11	459A-5	459	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R11	502A-5	502	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R11	582A-5	582	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R11	634A-5	634	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R11	715A-5	715	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000
R11	820A-5	820	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000
R11	880A-5	880	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000

Frame Size	480 V ACS880-04F-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-10 Time Delay Class L Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R11	459A-5	459	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R11	502A-5	502	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R11	582A-5	582	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R11	634A-5	634	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R11	715A-5	715	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-
R11	820A-5	820	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-
R11	880A-5	880	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000	-	-	-	-

Frame Size	480 V ACS880-04F-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R11	459A-5	459	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
R11	502A-5	502	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
R11	582A-5	582	800	600	-	-	-	-	-	-	-	-
R11	634A-5	634	800	600	-	-	-	-	-	-	-	-
R11	715A-5	715	1000	600	-	-	-	-	-	-	-	-
R11	820A-5	820	1000	600	-	-	-	-	-	-	-	-
R11	880A-5	880	1000	600	-	-	-	-	-	-	-	-

Frame Size	480 V ACS880-04F-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
R11	459A-5	459	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
R11	502A-5	502	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
R11	582A-5	582	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
R11	634A-5	634	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
R11	715A-5	715	900	690	170M6413	170M6013	170M6613	170M6313	170M6813D
R11	820A-5	820	1000	690	170M6414	170M6014	170M6614	170M6314	170M6814D
R11	880A-5	880	1400	690	170M6417	170M6017	170M6617	170M6317	170M8555D

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**ACS880-04F, 575 V fuses**

Frame Size	575 V ACS880-04F-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R11	329A-7	329	500	600	JJS-500	JLLS500	A6T500	TJS500	-	-	-	-
R11	369A-7	369	500	500	JJS-500	JLLS500	A6T500	TJS500	-	-	-	-
R11	429A-7	429	500	500	JJS-500	JLLS500	A6T500	TJS500	-	-	-	-
R11	470A-7	470	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R11	522A-7	522	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
R11	590A-7	590	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R11	650A-7	650	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
R11	721A-7	721	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800

Frame Size	575 V ACS880-04F-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-10 Time Delay Class L Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R11	329A-7	329	500	600	-	-	-	-	JKS-500	JLS500	A4J500	JFL500
R11	369A-7	369	500	500	-	-	-	-	JKS-500	JLS500	A4J500	JFL500
R11	429A-7	429	500	500	-	-	-	-	JKS-500	JLS500	A4J500	JFL500
R11	470A-7	470	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R11	522A-7	522	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
R11	590A-7	590	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R11	650A-7	650	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
R11	721A-7	721	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-

Frame Size	575 V ACS880-04F-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
R11	329A-7	329	500	600	LPJ-500SP	JTD500	AJT500	JDL500	DFJ-500	LDJ500	HSJ500	JHL500
R11	369A-7	369	500	500	LPJ-500SP	JTD500	AJT500	JDL500	DFJ-500	LDJ500	HSJ500	JHL500
R11	429A-7	429	500	500	LPJ-500SP	JTD500	AJT500	JDL500	DFJ-500	LDJ500	HSJ500	JHL500
R11	470A-7	470	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
R11	522A-7	522	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
R11	590A-7	590	800	600	-	-	-	-	-	-	-	-
R11	650A-7	650	800	600	-	-	-	-	-	-	-	-
R11	721A-7	721	800	600	-	-	-	-	-	-	-	-

Frame Size	575 V ACS880-04F-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
R11	329A-7	329	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
R11	369A-7	369	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
R11	429A-7	429	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
R11	470A-7	470	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
R11	522A-7	522	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
R11	590A-7	590	900	690	170M6413	170M6013	170M6613	170M6313	170M6813D
R11	650A-7	650	1000	690	170M6414	170M6014	170M6614	170M6314	170M6814D
R11	721A-7	721	1250	690	170M6416	170M6016	170M6616	170M6316	170M8554D

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**ACS880-04FXT, 480 V fuses**

Frame Size	480 V ACS880-04FXT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
(2) R11	1008A-5	1008	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
(2) R11	1158A-5	1158	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
(2) R11	1310A-5	1310	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
(2) R11	1610A-5	1610	1000	600	-	JLLS1000	-	-	KTU-1000	LDC1000	A4BY1000	LCU1000

Frame Size	480 V ACS880-04FXT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-10 Time Delay Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V				
(2) R11	1008A-5	1008	800	600	KLU-800	KLPC800	A4BT800	LCL800
(2) R11	1158A-5	1158	800	600	KLU-800	KLPC800	A4BT800	LCL800
(2) R11	1310A-5	1310	800	600	KLU-1000	KLPC1000	A4BT1000	LCL1000
(2) R11	1610A-5	1610	1000	600	KLU-1000	KLPC1000	A4BT1000	LCL1000

Frame Size	480 V ACS880-04FXT-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
(2) R11	1008A-5	1008	700	690	170M6411	170M6011	170M6611	170M6311	170M6811D
(2) R11	1158A-5	1158	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
(2) R11	1310A-5	1310	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
(2) R11	1610A-5	1610	1000	690	170M6414	170M6014	170M6614	170M6314	170M6814D

Six fuses required per installation  
(2) = two modules per drive

**ACS880-04FXT, 575 V fuses**

Frame Size	575 V ACS880-04FXT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-10 Fast Acting Class L Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
(2) R11	0808A-7	808	500	600	JJS-500	JLLS500	A6T500	TJS500	-	-	-	-
(2) R11	0960A-7	960	600	600	JJS-600	JLLS600	A6T600	TJS600	-	-	-	-
(2) R11	1080A-7	1080	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800
(2) R11	1320A-7	1320	800	600	JJS-800	JLLS800	A6T800	TJS800	KTU-800	LDC800	A4BY800	LCU800

Frame Size	575 V ACS880-04FXT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-10 Time Delay Class L Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
(2) R11	0808A-7	808	500	600	-	-	-	-	JKS-500	JLS500	A4J500	JFL500
(2) R11	0960A-7	960	600	600	-	-	-	-	JKS-600	JLS600	A4J600	JFL600
(2) R11	1080A-7	1080	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-
(2) R11	1320A-7	1320	800	600	KLU-800	KLPC800	A4BT800	LCL800	-	-	-	-

Frame Size	575 V ACS880-04FXT-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/ Ferraz Shawmut	Edison
			A	V								
(2) R11	0808A-7	808	500	600	LPJ-500SP	JTD500	AJT500	JDL500	DFJ-500	LDJ500	HSJ500	JHL500
(2) R11	0960A-7	960	600	600	LPJ-600SP	JTD600	AJT600	JDL600	DFJ-600	LDJ600	HSJ600	JHL600
(2) R11	1080A-7	1080	800	600	-	-	-	-	-	-	-	-
(2) R11	1320A-7	1320	800	600	-	-	-	-	-	-	-	-

Frame Size	575 V ACS880-04FXT-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses				
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style	Type DIN 43620
			A	V					
(2) R11	0808A-7	808	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
(2) R11	0960A-7	960	630	690	170M6410	170M6010	170M6610	170M6310	170M6810D
(2) R11	1080A-7	1080	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D
(2) R11	1320A-7	1320	800	690	170M6412	170M6012	170M6612	170M6312	170M6812D

Six fuses required per installation  
(2) = two modules per drive

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**ACS880-11, -31, 480 V fuses**

Frame Size	480 V ACS880-11-ACS880-31-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-15 Fast Acting Class T Fuses				UL 248-8 Fast Acting Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R3	07A6-5	5.8	15	600	JJS-15	JLLS015	A6T15	TJS15	JKS-15	JLS15	A4J15	JFL15
R3	11A0-5	7.8	20	600	JJS-20	JLLS020	A6T20	TJS20	JKS-20	JLS20	A4J20	JFL20
R3	01A4-5	10.6	25	600	JJS-25	JLLS025	A6T25	TJS25	JKS-25	JLS25	A4J25	JFL25
R3	021A-5	15.6	35	600	JJS-35	JLLS035	A6T35	TJS35	JKS-35	JLS35	A4J35	JFL35
R6	027A-5	21.3	40	600	JJS-40	JLLS040	A6T40	TJS40	JKS-40	JLS40	A4J40	JFL40
R6	034A-5	26.2	50	600	JJS-50	JLLS050	A6T50	TJS50	JKS-50	JLS50	A4J50	JFL50
R6	040A-5	31.2	60	600	JJS-60	JLLS060	A6T60	TJS60	JKS-60	JLS60	A4J60	JFL60
R6	052A-5	40.1	80	600	JJS-80	JLLS080	A6T80	TJS80	JKS-80	JLS80	A4J80	JFL80
R6	065A-5	49.5	90	600	JJS-90	JLLS090	A6T90	TJS90	JKS-90	JLS90	A4J90	JFL90
R6	077A-5	60.2	110	600	JJS-110	JLLS110	A6T110	TJS110	JKS-110	JLS110	A4J110	JFL110
R8	101A-5	74	150	600	JJS-150	JLLS150	A6T150	TJS150	JKS-150	JLS150	A4J150	JFL150
R8	124A-5	100	200	600	JJS-200	JLLS200	A6T200	TJS200	JKS-200	JLS200	A4J200	JFL200
R8	156A-5	120	225	600	JJS-225	JLLS225	A6T225	TJS225	JKS-225	JLS225	A4J225	JFL225
R8	180A-5	147	300	600	JJS-300	JLLS300	A6T300	TJS300	JKS-300	JLS300	A4T300	JFL300

Frame Size	480 V ACS880-11-ACS880-31-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-8 Time Delay Class J Fuses				UL 248-8 High Speed Class J Fuses			
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison
			A	V								
R3	07A6-5	5.8	15	600	LPJ-15SP	JTD015	AJT15	JDL15	DFJ-15	LDFJ015	HSJ15	JHL15
R3	11A0-5	7.8	20	600	LPJ-20SP	JTD020	AJT20	JDL20	DFJ-20	LDFJ020	HSJ20	JHL20
R3	01A4-5	10.6	25	600	LPJ-25SP	JTD025	AJT25	JDL25	DFJ-25	LDFJ025	HSJ25	JHL25
R3	021A-5	15.6	35	600	LPJ-35SP	JTD035	AJT35	JDL35	DFJ-35	LDFJ035	HSJ35	JHL35
R6	027A-5	21.3	40	600	LPJ-40SP	JTD040	AJT40	JDL40	DFJ-40	LDFJ040	HSJ40	JHL40
R6	034A-5	26.2	50	600	LPJ-50SP	JTD050	AJT50	JDL50	DFJ-50	LDFJ050	HSJ50	JHL50
R6	040A-5	31.2	60	600	LPJ-60SP	JTD060	AJT60	JDL60	DFJ-60	LDFJ060	HSJ60	JHL60
R6	052A-5	40.1	80	600	LPJ-80SP	JTD080	AJT80	JDL80	DFJ-80	LDFJ080	HSJ80	JHL80
R6	065A-5	49.5	90	600	LPJ-90SP	JTD090	AJT90	JDL90	DFJ-90	LDFJ090	HSJ90	JHL90
R6	077A-5	60.2	110	600	LPJ-110SP	JTD110	AJT110	JDL110	DFJ-110	LDFJ110	HSJ110	JHL110
R8	101A-5	74	150	600	LPJ-150SP	JTD150	AJT150	JDL150	DFJ-150	LDFJ150	HSJ150	JHL150
R8	124A-5	100	200	600	LPJ-200SP	JTD200	AJT200	JDL200	DFJ-200	LDFJ200	HSJ200	JHL200
R8	156A-5	120	225	600	LPJ-225SP	JTD225	AJT225	JDL225	DFJ-225	LDFJ225	HSJ225	JHL225
R8	180A-5	147	300	600	LPJ-300SP	JTD300	AJT300	JDL300	DFJ-300	LDFJ300	HSJ300	JHL300

Frame Size	480 V ACS880-11-ACS880-31-	Input Current	UL Fuse Size (A) and Voltage (V)		UL 248-4 Fast Acting Class CC Fuses				UL 248-17 Time Delay Class CF Cube Fuses	UL 248-17 Fast Acting Class CF Cube Fuses
			Maximum Current	Voltage Rating	Bussmann	Littelfuse	Mersen/Ferraz Shawmut	Edison	Bussmann	Bussmann
			A	V						
R3	07A6-5	5.8	15	600	KTK-R-15	KLKR15	ATMR15	HCLR15	FCF15RN	FCF15RN
R3	11A0-5	7.8	20	600	KTK-R-20	KLKR20	ATMR20	HCLR20	FCF20RN	FCF20RN
R3	01A4-5	10.6	25	600	KTK-R-25	KLKR25	ATMR25	HCLR25	FCF25RN	FCF25RN
R3	021A-5	15.6	35	600	-	-	-	-	FCF35RN	FCF35RN
R6	027A-5	21.3	40	600	-	-	-	-	FCF40RN	FCF40RN
R6	034A-5	26.2	50	600	-	-	-	-	FCF50RN	FCF50RN
R6	040A-5	31.2	60	600	-	-	-	-	FCF60RN	FCF60RN
R6	052A-5	40.1	80	600	-	-	-	-	FCF80RN	FCF80RN
R6	065A-5	49.5	90	600	-	-	-	-	FCF90RN	FCF90RN
R6	077A-5	60.2	110	600	-	-	-	-	FCF110RN	-
R8	101A-5	74	150	600	-	-	-	-	FCF150RN	-
R8	124A-5	100	200	600	-	-	-	-	FCF200RN	-
R8	156A-5	120	225	600	-	-	-	-	FCF225RN	-
R8	180A-5	147	300	600	-	-	-	-	FCF300RN	-

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**ACS880-14, -34, 480 V fuses**

Frame Size	480 V ACS880-14- ACS880-34-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses			
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style
		A	A	V				
R11	240A-5	169	315	690	170M4410	170M4010	170M4610	170M4310
R11	260A-5	205	400	690	170M5408	170M5008	170M5608	170M5308
R11	302A-5	239	500	690	170M5410	170M5010	170M5610	170M5310
R11	361A-5	257	630	690	170M6410	170M6010	170M6610	170M6310
R11	414A-5	321	700	690	170M6411	170M6011	170M6611	170M6311
R11	460A-5	404	700	690	170M6411	170M6011	170M6611	170M6311
R11	503A-5	455	800	690	170M6412	170M6012	170M6612	170M6312

**ACS880-14, -34, 575 V fuses**

Frame Size	575 V ACS880-14- ACS880-34-	Input Current	UL Fuse Size (A) and Voltage (V)		Bussmann Semiconductor Fuses UL 248-13 Recognized Fuses			
			Maximum Current	Voltage Rating	Type Flush End	Type DIN 43463	Type US Style	Type French Style
		A	A	V				
R11	142A-7	125	250	690	170M4409	170M4009	170M4609	170M4309
R11	174A-7	146	315	690	170M4410	170M4010	170M4610	170M4310
R11	210A-7	166	400	690	170M5408	170M5008	170M5608	170M5308
R11	271A-7	208	500	690	170M5410	170M5010	170M5610	170M5310
R11	330A-7	250	630	690	170M6410	170M6010	170M6610	170M6310
R11	370A-7	291	700	690	170M6411	170M6011	170M6611	170M6311
R11	430A-7	375	700	690	170M6411	170M6011	170M6611	170M6311

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## Circuit Breaker Information

ACS880-01 drives are suitable for use on a circuit capable of delivering not more than 65 kA symmetrical amperes (RMS) at 240 / 480 V maximum, when protected by appropriate circuit breakers in the tables below. Follow rules 1-8 below, and then depending upon the supply voltage, use either the rules 9 & 10 in the 240V paragraph below, or 11-14 in the 480V paragraph below that.

### Follow these rules for all voltages.

1. Drives that have an Enclosure Minimum Volume listed must be mounted in an enclosure  $\geq$  Enclosure Minimum Volume specified in the tables below.
2. When multiple drives that have an Enclosure Minimum Volume specified are installed in the same enclosure, minimum volume of the enclosure is determined by largest Enclosure Minimum Volume of the drives to be placed in the enclosure, plus the volume(s) of each additional drive. i.e. for the 480V R6 and R3 drive select enclosure with the volume  $\geq 53703+1101 = 54804 \text{ in}^3$ .
3. If a UL Type 1 or UL Type 12 drive that has an Enclosure Minimum Volume indicated with a ‡, no additional enclosure around the drive is required. For UL Type Open drives, no minimum enclosure size is required but the drive must be mounted in an enclosure.
4. If combining a drive with an Enclosure Minimum Volume specified and others with an Enclosure Minimum Volume indicated with ‡, start with the largest specified Enclosure Minimum Volume listed and add the drive volumes for the other drives.
5. If you are only mounting drives with no Enclosure Minimum Volume specified, you have no restrictions on the enclosure size, but follow air clearances specified in the drive HW manuals for sufficient ventilation around each drive.
6. Open Type, Type 1 and Type 12 drives can be used inside of the enclosure. Use drive volume for all three types listed in the table when installing multiple drives in the enclosure.
7. The ABB circuit breaker part number listed in the table is a base part number. The digits indicated with an “\*” represent trip units, numbers of poles, and accessories for the breakers. These have no impact on the performance or rating of the breakers.
8. Circuit breaker current ratings should be sized per NEC. Ratings in the tables are maximum for the given frame size.

**ACS880-01 230V** drives were tested with ABB inverse time circuit breakers rated at 65kA and 240V. When using circuit breakers to protect these drives follow these initial rules:

9. Other manufacturers' inverse time circuit breakers can be used if they are UL 489 listed, they are 240V or higher, they have a 65kA or higher interrupting capacity and they have the same or lower nominal current rating than ABB specified circuit breaker.
10. Current limiting inverse time circuit breakers must not be used.

**ACS880-01 460V** drives were tested with ABB current limiting inverse time circuit breakers rated at 65kA and 480V. When using circuit breakers to protect these drives follow these initial rules:

11. When designing UL508A panels, Article SB 4.2.3 Exception No. 3 allows the use of other manufacturers' current limiting inverse time circuit breakers which have same voltage, current and interrupting rating, if  $I_{peak}$  and  $I^2t$  are the same or less than the ABB specified circuit breaker.
12. Non-current limiting inverse time circuit breakers must not be used.
13. Enclosures for frames R1 and R9 must have a solid bottom directly below the drive. i.e. fans, filters or louvers cannot be mounted directly below the drive but can be mounted in adjacent areas on the bottom of the enclosure.
14. Only 480V R8 frame drives with serial numbers after 1204301926 when manufactured in Finland and 2205002140 when manufactured in the U.S. may be protected with circuit breakers listed in the tables below.

**ACS880-01, 230 V circuit breakers**

Frame Size	230 V ACS880-01-	Input Current (A)	CB Maximum Current (A)	CB Voltage (V)	Enclosure Minimum Volume (in <sup>3</sup> )	Drive Volume (in <sup>3</sup> )	Circuit Breaker (ABB) 65kA @ 240 V
R1	04A6-2	4.4		240		681	
R1	06A6-2	6.3		240		681	
R1	07A5-2	7.1		240		681	
R1	10A6-2	10.1		240		681	
R2	16A8-2	16.0		240		750	
R2	24A3-2	23.1		240		750	
R3	031A-2	29.3		240		1011	
R4	046A-2	44		240		1669	
R4	061A-2	58		240		1669	
R5	075A-2	72		240		2030	
R5	087A-2	83		240		2030	
R6	115A-2	109	200	240	‡	2880	XT4N**200*****
R6	145A-2	138	200	240	‡	2880	XT4N**200*****
R7	170A-2	162	300	240	‡	3369	XT4N**30A*****
R7	206A-2	196	300	240	‡	3369	XT4N**30A*****
R8	274A-2	260	400	240	‡	3858	XT5N**40A*****

‡ Minimum Enclosure Volume is not applicable

**ACS880-01, 480 V circuit breakers**

Frame Size	480 V ACS880-01-	Input Current (A)	CB Maximum Current (A)	CB Voltage (V)	Enclosure Minimum Volume (in <sup>3</sup> )	Drive Volume (in <sup>3</sup> )	Circuit Breaker (ABB) 65kA @ 480 V	Circuit Breaker (Rockwell) 65kA @ 480 V	Maximum I <sup>2</sup> t (A <sup>2</sup> s)	Maximum Ipeak (kA)
R1	02A1-5	2.1	15	480	8100	681	XT2H**015*****	140G-HC6C3-C15	0.512x10 <sup>6</sup>	23.2
R1	03A0-5	3.0	15	480	8100	681	XT2H**015*****	140G-HC6C3-C15	0.512x10 <sup>6</sup>	23.2
R1	03A4-5	3.4	15	480	8100	681	XT2H**015*****	140G-HC6C3-C15	0.512x10 <sup>6</sup>	23.2
R1	04A8-5	4.8	15	480	8100	681	XT2H**015*****	140G-HC6C3-C15	0.512x10 <sup>6</sup>	23.2
R1	05A2-5	5.2	15	480	8100	681	XT2H**015*****	140G-HC6C3-C15	0.512x10 <sup>6</sup>	23.2
R1	07A6-5	7.6	15	480	8100	681	XT2H**015*****	140G-HC6C3-C15	0.512x10 <sup>6</sup>	23.2
R1	11A0-5	11	15	480	8100	681	XT2H**015*****	140G-HC6C3-C15	0.512x10 <sup>6</sup>	23.2
R2	014A-5	14	30	480	27720	750	XT2H**030*****	140G-HC6C3-C30	0.512x10 <sup>6</sup>	23.2
R2	021A-5	21	30	480	27720	750	XT2H**030*****	140G-HC6C3-C30	0.512x10 <sup>6</sup>	23.2
R3	027A-5	27	50	480	27720	1011	XT2H**050*****	140G-HC6C3-C50	0.512x10 <sup>6</sup>	23.2
R3	034A-5	34	50	480	27720	1011	XT2H**050*****	140G-HC6C3-C50	0.512x10 <sup>6</sup>	23.2
R4	040A-5	40	70	480	30240	1669	XT2H**070*****	140G-HC6C3-C70	0.512x10 <sup>6</sup>	23.2
R4	052A-5	52	70	480	30240	1669	XT2H**070*****	140G-HC6C3-C70	0.512x10 <sup>6</sup>	23.2
R5	065A-5	65	125	480	30240	2030	XT2H**125*****	140G-HC6H3-D12	0.98x10 <sup>6</sup>	30
R5	077A-5	77	125	480	30240	2030	XT2H**125*****	140G-HC6H3-D12	0.98x10 <sup>6</sup>	30
R6	096A-5	96	225	480	53703	2880	XT4H**225*****	140G-JC6H3-D25	0.98x10 <sup>6</sup>	30
R6	124A-5	124	225	480	53703	2880	XT4H**250*****	140G-JC6H3-D25	0.98x10 <sup>6</sup>	30
R7	156A-5	156	250	480	53703	3369	XT4H**250*****	140G-JC6H3-D25	0.98x10 <sup>6</sup>	30
R7	180A-5	180	250	480	53703	3369	XT5H**40A*****	140G-JC6H3-D25	0.98x10 <sup>6</sup>	30
R8**	240A-5	240	400	480	53703	3858	XT5H**40A*****	140G-KC6H3-D40	4.2x10 <sup>6</sup>	47.9
R8**	260A-5	260	400	480	53703	3858	XT5H**40A*****	140G-KC6H3-D40	4.2x10 <sup>6</sup>	47.9
R9	302A-5	302	600	480						
R9	361A-5	361	600	480						
R9	414A-5	414	600	480						

Pending

\*\* Review Rule 14 above

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