Allen-Bradley

Molded Case Circuit Breaker Selectivity Guide

Bulletins 140G, 140MG

Additional Resources

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

Resource	Description
Molded Case Circuit Breakers, Motor Protection Circuit Breakers, and Motor Circuit Protectors Technical Data, publication 140G-TD100	Provides specifications for Bul. 140G/140MG Molded Case Circuit Breakers, Motor Protection Circuit Breakers, and Motor Circuit Protectors.
Bulletin 140G/MG Molded Case Circuit Breaker Specifications, publication 140G-TD047	Provides information on trip curves and time-current curves for Bul. 140G/140MG Molded Case Circuit Breakers, Motor Protection Circuit Breakers, and Motor Circuit Protectors.
Miniature Circuit Breakers, Fuse Holders and Electronic Circuit Protectors Specifications Technical Data, publication 1492-TD014	Provides specifications for Bul. 1492 and Bul. 188 Miniature Circuit Breakers, Fuse Holders and Electronic Circuit Protectors
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, http://www.rockwellautomation.com/global/certification/overview.page	Provides declarations of conformity, certificates, and other certification details.

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

Introduction

This document assists the designer of a control system in choosing an Allen-Bradley Molded Case Circuit Breaker (MCCB) or Miniature Circuit Breaker (MCB) for proper coordination in main (primary) and branch circuits. You can choose either Selective Protection or Back-up Protection based on these tables in this publication. The values represent the maximum current [kA], and breaking capacity according to IEC 60947-2 applied for 400/415V AC systems. The 480V/600V table values are represented as Interrupting Ratings, which conform to UL 489/CSA22.2, No. 5 standards.

A proper selection of protection system helps to maintain safe and economical function of electrical installation and can reduce losses that are associated with unwanted service interruptions.

NEC (2014), Article 100 defines selective coordination as "Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the selection and installation of overcurrent protective devices and their ratings or settings for the full range of available overcurrents, from overload to the maximum available fault current, and for the full range of overcurrent protective device opening times associated with those overcurrents."

Trip selectivity (for overcurrent) is defined in EN/IEC 60947-1 (2.5.23) as coordination between the operating characteristics of two or more overcurrent protection devices, so that when an overcurrent within established limits occurs, the device destined to operate within those limits trips whereas the others do not trip.

Time/current characteristics of circuit breakers determine the time that it takes to clear the fault for a given value of fault current. Any fault on a branch circuit should open the branch-circuit breaker rather than the feeder overcurrent protection.

In an electrical system with selective coordination of protective devices, the fault is isolated and cleared by the nearest upstream breaker, while the rest of the system stays operational.

In a system with a back-up protection (series-rated), an upstream device in the series operates and limits the current to protect a downstream device.

Typical applications that require selective coordination could include emergency systems and standby backup, and critical manufacturing processes.

Selectivity

The definitions of total selectivity and partial selectivity are given in Part 2 of the same Standard: IEC 60947-2 "Low voltage Equipment - Part 2: Circuit-breakers".

Total selectivity is defined in EN/IEC 60947-1 (2.17.2) as "overcurrent selectivity where, in the presence of two protection devices against overcurrent in series, the load- side protection device carries out the protection without making the other device trip."

Partial selectivity is defined in EN/IEC 60947-1 (2.17.3) as "overcurrent selectivity where, in the presence of two protection devices against overcurrent in series, the load- side protection device carries out the protection up to a given level of overcurrent, without making the other device trip".

This overcurrent threshold is called the "Selectivity limit current I_s.

Selectivity limit current, I_s, is defined in EN/IEC 60947-1 (4.2) as "the current co-ordinate of the intersection between the total time-current characteristic of the protective device on the load side and the tripping time-current characteristic of the other protective device." The selectivity limit current is a limiting value of current.

- below which, in the presence of two overcurrent protective devices in series, the protective device on the load side completes its breaking operation in time to prevent the other protective device from starting its operation (selectivity is ensured);
- above which, in the presence of two overcurrent protective devices in series, the protective device on the load side may not complete its breaking operation in time to prevent the other protective device from starting its operation (selectivity is not ensured).

In other words, total selectivity is achieved when there is a selectivity at any possible value of overcurrent, up to the lowest I_{cu} of installed circuit breakers in a system.

A partial selectivity is achieved when circuit breakers are coordinated up to a certain I_s current value. When the current exceeds this value, selectivity between the two circuit breakers is no longer guaranteed. However, if the maximum prospective short-circuit current of the installation is lower than or equal to the I_s selectivity value, such system will have total selectivity.

Additional Current Definitions

Throughout this publication, we refer to a number of additional types of current. The following list explains these current ratings.

- I_s — selectivity limit current: the current co-ordinate of the intersection between the total time-current characteristic of the protective device on the load side and the tripping time-current characteristic of the other protective device.
- I_{cu} — ultimate breaking capacity: the maximum short-circuit current that a circuit breaker can break without damage.

- I_{cs} — service breaking capacity: expressed as a percentage ratio of I_{cu} and tells you the maximum short-circuit current if a circuit breaker can break three times and still resume normal service.
- I_n — rated current: the value of current that characterizes the protection release that is installed on board the circuit-breaker and determines, based on the settings available for the release, the protective characteristic of the circuit-breaker itself.

How to Interpret the Selectivity Tables

Example 1—Total Selectivity

For this example, we will consider a selectivity study between two circuit breakers: 140G-J, 90 A and 1492-SPM, 8 A (Figure 1).

Figure 1 - Selectivity Between Line Side 140G-J 90 A and Load Side 1492-SPM 8 A Circuit Breakers

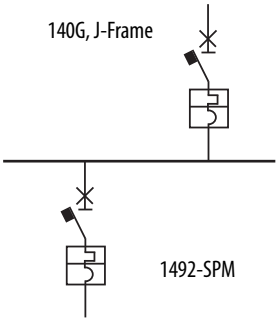

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming									
			Breaker Type: 140G J-Frame Molded Case Circuit Breaker									
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120									
			Thermal-magnetic Trip									
Load Side			Rated Current I_n [A]									
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	25	30	35	40	50	60	70	80	90	100
Bulletin 1492-SPM Miniature Circuit Breaker	15	0.5…4	T	T	T	T	T	T	T	T	T	T
		6	—	6	6	6	7.5	10	10	T	T	T
		8	—	—	—	6	7.5	10	10	T	T	T
		10	—	—	—	—	6.5	7.5	7.5	9	9	T
		13	—	—	—	—	—	—	7.5	8	8	T
		16	—	—	—	—	—	—	—	8	8	T

From the coordination tables, we can determine that there is total selectivity (T) between the two circuit breakers.

This means that there is selectivity up to 15 kA, the lower of the two I_{cu} values. The maximum possible short-circuit current at the point of installation of the 1492-SPM 8A circuit breaker will be less than or equal to 15 kA.

Example 2—Partial Selectivity

Figure 2 - Selectivity Between 140G-J 60 A and 1492-SPM 8 A Circuit Breakers

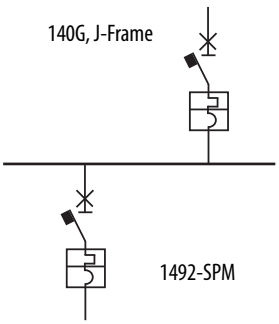

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming									
			Breaker Type: 140G J-Frame Molded Case Circuit Breaker									
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120									
			Thermal-magnetic Trip									
Load Side			Rated Current I_n [A]									
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	25	30	35	40	50	60	70	80	90	100
Bulletin 1492-SPM Miniature Circuit Breaker	15	0.5…4	T	T	T	T	T	T	T	T	T	T
		6	—	6	6	6	7.5	10	10	T	T	T
		8	—	—	—	6	7.5	10	10	T	T	T
		10	—	—	—	—	6.5	7.5	7.5	9	9	T
		13	—	—	—	—	—	—	7.5	8	8	T
		16	—	—	—	—	—	—	—	8	8	T
		20	—	—	—	—	—	—	—	—	—	T

In this example (Figure 2), we consider a 60 A 140G-J breaker. From the coordination table, the selectivity value, I_s, is 10 kA between the two circuit breakers. This means that if the maximum prospective short-circuit current on the load side of the 1492-SPM 8A circuit breaker is less than 10 kA, there will be total selectivity. If the short-circuit current has a value between 10 kA and 15 kA, there will be partial selectivity. This means that the supply breaker may trip.

Selectivity: Line Side 140G MCCBs with Load Side Bul. 188-J MCBs, Trip Curves B and C

Table 1 - Line Side 140G G-Frame MCCB, Load Side 188-J MCB (Trip Curve B and C)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming														
			Breaker Type: 140G G-Frame Molded Case Circuit Breaker														
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70														
			Thermal-magnetic Trip														
Load Side			Rated Current I_n [A]														
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	15	20	25	30	35	40	45	50	60	70	80	90	100	110	125	160
Bulletin 188-J Miniature Circuit Breaker, Trip Curve B & C	10	0.5…4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	3	3	3	5	5	6	6	6	T	T	T	T	T	T	T	T
		8	—	3	3	5	5	6	6	6	T	T	T	T	T	T	T	T
		10	—	—	3	3	3	3	3	4.5	7.5	7.5	7.5	7.5	T	T	T	T
		13	—	—	—	3	3	3	3	4.5	7.5	7.5	7.5	7.5	T	T	T	T
		16	—	—	—	—	—	3	3	4.5	5	5	7.5	7.5	T	T	T	T
		20	—	—	—	—	—	—	—	3	5	5	6	6	T	T	T	T
		25	—	—	—	—	—	—	—	—	5	5	6	6	6	6	T	T
		32	—	—	—	—	—	—	—	—	3	3	6	6	6	6	T	T
		40	—	—	—	—	—	—	—	—	—	—	—	—	6	6	T	T
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T

Table 2 - Line Side 140G H-Frame MCCB, Load Side 188-J MCB (Trip Curve B and C)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming																				
			Breaker Type: 140G H-Frame Molded Case Circuit Breaker																				
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120, 150																				
			Thermal-magnetic Trip																Electronic Trip				
Load Side			Rated Current I_n [A]																				
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	15	20	25	30	35	40	45	50	60	70	80	90	100	110	125	160	25	60	100	125	160
Bulletin 188-J Miniature Circuit Breaker, Trip Curve B & C	10	0.5…4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	—	—	—	—	—	—	—	—	T	T	T	T	T	T	T	T	T	T	T	T	T
		8	—	—	—	—	—	—	—	—	T	T	T	T	T	T	T	T	T	T	T	T	T
		10	—	—	—	—	—	—	—	—	7.5	7.5	7.5	7.5	T	T	T	T	T	T	T	T	T
		13	—	—	—	—	—	—	—	—	7.5	7.5	7.5	7.5	T	T	T	T	T	T	T	T	T
		16	—	—	—	—	—	—	—	—	5	5	7.5	7.5	T	T	T	T	—	T	T	T	T
		20	—	—	—	—	—	—	—	—	5	5	6	6	T	T	T	T	—	T	T	T	T
		25	—	—	—	—	—	—	—	—	5	5	6	6	T	T	T	T	—	T	T	T	T
		32	—	—	—	—	—	—	—	—	3	3	6	6	6	6	T	T	—	T	T	T	T
		40	—	—	—	—	—	—	—	—	—	—	—	—	6	6	T	T	—	—	T	T	T
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	3	T	T	—	—	T	T	T
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	3	T	T	—	—	—	6	6

Table 3 - Line Side 140G I-Frame MCCB, Load Side 188-J MCB (Trip Curve B and C)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming										
			Breaker Type: 140G I-Frame Molded Case Circuit Breaker										
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50										
			Thermal-magnetic Trip										
Load Side			Rated Current I_n [A]										
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	60	70	80	90	100	110	125	150	175	200	225
Bulletin 188-J Miniature Circuit Breaker, Trip Curve B & C	10	0.5…4	T	T	T	T	T	T	T	T	T	T	T
		6	T	T	T	T	T	T	T	T	T	T	T
		8	T	T	T	T	T	T	T	T	T	T	T
		10	7.5	7.5	7.5	7.5	T	T	T	T	T	T	T
		13	7.5	7.5	7.5	7.5	T	T	T	T	T	T	T
		16	5	5	7.5	7.5	T	T	T	T	T	T	T
		20	5	5	6	6	T	T	T	T	T	T	T
		25	5	5	6	6	6	6	T	T	T	T	T
		32	3	3	6	6	6	6	6	T	T	T	T
		40	—	—	—	—	6	6	6	T	T	T	T
		50	—	—	—	—	—	—	3	T	T	T	T
		63	—	—	—	—	—	—	3	T	T	T	T

Table 4 - Line Side 140G J-Frame MCCB, Load Side 188-J MCB (Trip Curve B and C)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming															
			Breaker Type: 140G J-Frame Molded Case Circuit Breaker															
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120															
			Thermal-magnetic Trip															
Load Side			Rated Current I_n [A]															
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	25	30	35	40	50	60	70	80	90	100	110	125	150	175	200	225	250
Bulletin 188-J Miniature Circuit Breaker, Trip Curve B & C	10	0.5…4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	6	6	6	6	7.5					T	T	T	T	T	T	T	T
		8	6	6	6	6	7.5					T	T	T	T	T	T	T	T
		10	3	4.5	4.5	5	6.5	7.5	7.5	9	9	T	T	T	T	T	T	T	T
		13	3	4.5	4.5	5	6.5	7.5	7.5	8	8	T	T	T	T	T	T	T	T
		16	3	4.5	4.5	5	6.5	5	5	8	8	T	T	T	T	T	T	T	T
		20	—	—	—	5	5	5	5	7.5	7.5	T	T	T	T	T	T	T	T
		25	—	—	—	—	5	5	5	7.5	7.5	T	T	T	T	T	T	T	T
		32	—	—	—	—	—	5	5	6	6	T	T	T	T	T	T	T	T
		40	—	—	—	—	—	—	—	5	5	T	T	T	T	T	T	T	T
		50	—	—	—	—	—	—	—	5	5	T	T	T	T	T	T	T	T
		63	—	—	—	—	—	—	—	—	—	—	—	—	T	T	T	T	T

			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120					
			Electronic Trip					
			Rated Current I_n [A]					
			40	60	100	150	225	250
Bulletin 188-J Miniature Circuit Breaker, Trip Curve B & C	10	0.5…4	T	T	T	T	T	T
		6	T	T	T	T	T	T
		8	T	T	T	T	T	T
		10	T	T	T	T	T	T
		13	T	T	T	T	T	T
		16	T	T	T	T	T	T
		20	T	T	T	T	T	T
		25	—	T	T	T	T	T
		32	—	T	T	T	T	T
		40	—	—	T	T	T	T
		50	—	—	T	T	T	T
		63	—	—	T	T	T	T

Selectivity: Line Side 140G MCCBs with Load Side Bul. 188-J MCBs, Trip Curve D

Table 5 - Line Side 140G G-Frame MCCB, Load Side 188-J MCB (Trip Curve D)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming															
			Breaker Type: 140G G-Frame Molded Case Circuit Breaker															
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70/															
			Thermal-magnetic Trip															
Load Side			Rated Current I_n [A]															
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	15	20	25	30	35	40	45	50	60	70	80	90	100	110	125	160
Bulletin 188-J Miniature Circuit Breaker, Trip Curve D	10	0.5…4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	2	2	2	5	5	5	5	5	T	T	T	T	T	T	T	T
		8	—	—	2	4.5	4.5	4.5	4.5	5	T	T	T	T	T	T	T	T
		10			—	2	2	3	3	3	5	5	7.5	7.5	T	T	T	T
		13	—	—	—	—	—	2	2	2	3	3	6	6	7.5	7.5	T	T
		16	—	—	—	—	—	2	2	2	3	3	6	6	7.5	7.5	T	T
		20	—	—	—	—	—	—	—	2	3	3	6	6	6	6	T	T
		25	—	—	—	—	—	—	—	—	3	3	6	6	6	6	T	T
		32	—	—	—	—	—	—	—	—	—	—	4	4	6	6	T	T
		40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T

Table 6 - Line Side 140G H-Frame MCCB, Load Side 188-J MCB (Trip Curve D)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming																				
			Breaker Type: 140G H-Frame Molded Case Circuit Breaker																				
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120, 150																				
			Thermal-magnetic Trip																Electronic Trip				
Load Side			Rated Current I_n [A]																				
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	15	20	25	30	35	40	45	50	60	70	80	90	100	110	125	160	25	60	100	125	160
Bulletin 188-J Miniature Circuit Breaker, Trip Curve D	10	0.5…4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	—	—	—	—	—	—	—	—	T	T	T	T	T	T	T	T	T	T	T	T	T
		8	—	—	—	—	—	—	—	—	T	T	T	T	T	T	T	T	T	T	T	T	T
		10	—	—	—	—	—	—	—	—	5	5	7.5	7.5	T	T	T	T	T	T	T	T	T
		13	—	—	—	—	—	—	—	—	3	3	6	6	7.5	T	T	T	—	T	T	T	T
		16	—	—	—	—	—	—	—	—	3	3	6	6	7.5	T	T	T	—	T	T	T	T
		20	—	—	—	—	—	—	—	—	3	3	6	6	6	T	T	T	—	T	T	T	T
		25	—	—	—	—	—	—	—	—	3	3	6	6	6	6	T	T	—	T	T	T	T
		32	—	—	—	—	—	—	—	—	—	—	4	4	6	6	T	T	—	T	T	T	T
		40	—	—	—	—	—	—	—	—	—	—	—	—	—	6	T	T	—	—	T	T	T
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	5	T	T	—	—	6	6	6
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T	—	—	—	3	3

Table 7 - Line Side 140G I-Frame MCCB, Load Side 188-J MCB (Trip Curve D)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming										
			Breaker Type: 140G I-Frame Molded Case Circuit Breaker										
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50										
			Thermal-magnetic Trip										
Load Side			Rated Current I_n [A]										
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	60	70	80	90	100	110	125	150	175	200	225
Bulletin 188-J Miniature Circuit Breaker, Trip Curve D	10	0.5…4	T	T	T	T	T	T	T	T	T	T	T
		6	T	T	T	T	T	T	T	T	T	T	T
		8	T	T	T	T	T	T	T	T	T	T	T
		10	5	5	7.5	7.5	T	T	T	T	T	T	T
		13	3	3	6	6	7.5	7.5	T	T	T	T	T
		16	3	3	6	6	7.5	7.5	T	T	T	T	T
		20	3	3	6	6	6	6	T	T	T	T	T
		25	3	3	6	6	6	6	T	T	T	T	T
		32	—	—	4	4	6	6	6	T	T	T	T
		40	—	—	—	—	—	—	6	T	T	T	T
		50	—	—	—	—	—	—	5	T	T	T	T
		63	—	—	—	—	—	—	—	T	T	T	T

Table 8 - Line Side 140G J-Frame MCCB, Load Side 188-J MCB (Trip Curve D)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming															
			Breaker Type: 140G J-Frame Molded Case Circuit Breaker															
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120															
			Thermal-magnetic Trip															
Load Side			Rated Current I_n [A]															
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	25	30	35	40	50	60	70	80	90	100	110	125	150	175	200	225	250
Bulletin 188-J Miniature Circuit Breaker, Trip Curve D	10	0.5…4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	6	6	6	6	7.5	T	T	T	T	T	T	T	T	T	T	T	T
		8	4.5	5	5	6	7.5	T	T	T	T	T	T	T	T	T	T	T	T
		10	3	4.5	4.5	5	6	6	6	9	9	T	T	T	T	T	T	T	T
		13	—	—	—	4.5	4.5	5	5	5.5	5.5	T	T	T	T	T	T	T	T
		16	—	—	—	—	—	5	5	5.5	5.5	T	T	T	T	T	T	T	T
		20	—	—	—	—	—	5	5	5	5	T	T	T	T	T	T	T	T
		25	—	—	—	—	—	—	—	5	5	T	T	T	T	T	T	T	T
		32	—	—	—	—	—	—	—	5	5	T	T	T	T	T	T	T	T
		40	—	—	—	—	—	—	—	5	5	T	T	T	T	T	T	T	T
		50	—	—	—	—	—	—	—	5	5	5	5	T	T	T	T	T	T
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T	T

			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120					
			Electronic Trip					
			Rated Current I_n [A]					
			40	60	100	150	225	250
Bulletin 188-J Miniature Circuit Breaker, Trip Curve D	10	0.5…4	T	T	T	T	T	T
		6	T	T	T	T	T	T
		8	T	T	T	T	T	T
		10	T	T	T	T	T	T
		13	T	T	T	T	T	T
		16	T	T	T	T	T	T
		20	T	T	T	T	T	T
		25	—	T	T	T	T	T
		32	—	T	T	T	T	T
		40	—	—	T	T	T	T
		50	—	—	T	T	T	T
		63	—	—	T	T	T	T

Selectivity: Line Side 140G MCCBs with Load Side Bul. 1492-SPM MCBs, Trip Curves B and C

Table 9 - Line Side 140G G-Frame MCCB, Load Side 1492-SPM MCB (Trip Curve B and C)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming															
			Breaker Type: 140G G-Frame Molded Case Circuit Breaker															
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70															
			Thermal-magnetic Trip															
Load Side			Rated Current I_n [A]															
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	15	20	25	30	35	40	45	50	60	70	80	90	100	110	125	160
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve B & C	15	0.5…4	—	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	—	—	—	5	5	6	6	10	10	T	T	T	T	T	T	T
		8	—	—	—	—	—	6	6	6	10	10	T	T	T	T	T	T
		10	—	—	—	—	—	—	—	4.5	7.5	7.5	7.5	7.5	T	T	T	T
		13	—	—	—	—	—	—	—	—	—	7.5	7.5	7.5	12.5	12.5	T	T
		16	—	—	—	—	—	—	—	—	—	—	7.5	7.5	12.5	12.5	T	T
		20	—	—	—	—	—	—	—	—	—	—	—	—	10	10	10	10
		25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10	10
		32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 10 - Line Side 140G H-Frame MCCB, Load Side 1492-SPM MCB (Trip Curve B and C)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming																				
			Breaker Type: 140G H-Frame Molded Case Circuit Breaker																				
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120, 150																				
			Thermal-magnetic Trip																Electronic Trip				
Load Side			Rated Current I_n [A]																				
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	15	20	25	30	35	40	45	50	60	70	80	90	100	110	125	160	25	60	100	125	160
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve B & C	15	0.5…4	—	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	—	—	—	—	—	—	—	—	10	10	T	T	T	T	T	T	—	T	T	T	T
		8	—	—	—	—	—	—	—	—	10	10	T	T	T	T	T	T	—	T	T	T	T
		10	—	—	—	—	—	—	—	—	7.5	7.5	7.5	7.5	T	T	T	T	—	T	T	T	T
		13	—	—	—	—	—	—	—	—	—	7.5	7.5	7.5	12.5	T	T	T	—	—	T	T	T
		16	—	—	—	—	—	—	—	—	—	—	7.5	7.5	12.5	T	T	T	—	—	T	T	T
		20	—	—	—	—	—	—	—	—	—	—	—	—	10	10	10	10	—	—	T	T	T
		25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10	10	—	—	—	T	T
		32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 11 - Line Side 140G I-Frame MCCB, Load Side 1492-SPM MCB (Trip Curve B and C)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming										
			Breaker Type: 140G I-Frame Molded Case Circuit Breaker										
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50										
			Thermal-magnetic Trip										
Load Side			Rated Current I_n [A]										
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	60	70	80	90	100	110	125	150	175	200	225
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve B & C	15	0.5…4	T	T	T	T	T	T	T	T	T	T	T
		6	T	T	T	T	T	T	T	T	T	T	T
		8	T	T	T	T	T	T	T	T	T	T	T
		10	7.5	7.5	7.5	7.5	T	T	T	T	T	T	T
		13	—	7.5	7.5	7.5	12.5	12.5	T	T	T	T	T
		16	—	—	7.5	7.5	12.5	12.5	T	T	T	T	T
		20	—	—	—	—	10	10	T	T	T	T	T
		25	—	—	—	—	—	—	10	T	T	T	T
		32	—	—	—	—	—	—	—	—	T	T	T
		40	—	—	—	—	—	—	—	—	—	T	T
		50	—	—	—	—	—	—	—	—	—	—	—
		63	—	—	—	—	—	—	—	—	—	—	—

Table 12 - Line Side 140G J-Frame MCCB, Load Side 1492-SPM MCB (Trip Curve B and C)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming															
			Breaker Type: 140G J-Frame Molded Case Circuit Breaker															
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120															
			Thermal-magnetic Trip															
Load Side			Rated Current I_n [A]															
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	25	30	35	40	50	60	70	80	90	100	110	125	150	175	200	225	250
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve B & C	15	0.5…4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	—	6	6	6	7.5	10	10	T	T	T	T	T	T	T	T	T	T
		8	—	—	—	6	7.5	10	10	T	T	T	T	T	T	T	T	T	T
		10	—	—	—	—	6.5	7.5	7.5	9	9	T	T	T	T	T	T	T	T
		13	—	—	—	—	—	—	7.5	8	8	T	T	T	T	T	T	T	T
		16	—	—	—	—	—	—	—	8	8	T	T	T	T	T	T	T	T
		20	—	—	—	—	—	—	—	—	—	T	T	T	T	T	T	T	T
		25	—	—	—	—	—	—	—	—	—	—	—	T	T	T	T	T	T
		32	—	—	—	—	—	—	—	—	—	—	—	—	T	T	T	T	T
		40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T	T
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120					
			Electronic Trip					
			Rated Current I_n [A]					
			40	60	100	150	225	250
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve B & C	15	0.5…4	T	T	T	T	T	T
		6	T	T	T	T	T	T
		8	T	T	T	T	T	T
		10	—	T	T	T	T	T
		13	—	—	T	T	T	T
		16	—	—	T	T	T	T
		20	—	—	T	T	T	T
		25	—	—	—	T	T	T
		32	—	—	—	—	T	T
		40	—	—	—	—	T	T
		50	—	—	—	—	—	T
		63	—	—	—	—	—	—

Selectivity: Line Side 140G MCCBs with Load Side Bul. 1492-SPM MCBs, Trip Curve D

Table 13 - Line Side 140G G-Frame MCCB, Load Side 1492-SPM MCB (Trip Curve D)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming															
			Breaker Type: 140G G-Frame Molded Case Circuit Breaker															
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70															
			Thermal-magnetic Trip															
Load Side			Rated Current I_n [A]															
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	15	20	25	30	35	40	45	50	60	70	80	90	100	110	125	160
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve D	15	0.5…4	—	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	—	—	—	5	5	5	5	5	10	10	T	T	T	T	T	T
		8	—	—	—	—	—	4.5	4.5	5	10	10	10	10	T	T	T	T
		10	—	—	—	—	—	—	—	3	5	5	7.5	7.5	T	T	T	T
		13	—	—	—	—	—	—	—	—	—	3	6	6	7.5	7.5	T	T
		16	—	—	—	—	—	—	—	—	—	—	6	6	7.5	7.5	12.5	12.5
		20	—	—	—	—	—	—	—	—	—	—	—	—	6	6	10	10
		25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6
		32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 14 - Line Side 140G H-Frame MCCB, Load Side 1492-SPM MCB (Trip Curve D)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming																				
			Breaker Type: 140G H-Frame Molded Case Circuit Breaker																				
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120, 150/ Rated Uninterrupted Current I_u [A] = 125																				
			Thermal-magnetic Trip																Electronic Trip				
Load Side			Rated Current I_n [A]																				
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	15	20	25	30	35	40	45	50	60	70	80	90	100	110	125	160	25	60	100	125	160
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve D	15	0.5…4	—	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	—	—	—	—	—	—	—	—	10	T	T	T	T	T	T	T	—	T	T	T	T
		8	—	—	—	—	—	—	—	—	10	10	T	T	T	T	T	T	—	T	T	T	T
		10	—	—	—	—	—	—	—	—	5	5	7.5	7.5	T	T	T	T	—	T	T	T	T
		13	—	—	—	—	—	—	—	—	—	3	6	6	7.5	12.5	T	T	—	—	T	T	T
		16	—	—	—	—	—	—	—	—	—	—	6	6	7.5	12.5	T	T	—	—	T	T	T
		20	—	—	—	—	—	—	—	—	—	—	—	—	6	10	10	10	—	—	T	T	T
		25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	6	—	—	—	T	T
		32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 15 - Line Side 140G I-Frame MCCB, Load Side 1492-SPM MCB (Trip Curve D)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming										
			Breaker Type: 140G I-Frame Molded Case Circuit Breaker										
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50										
			Thermal-magnetic Trip										
Load Side			Rated Current I_n [A]										
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	60	70	80	90	100	110	125	150	175	200	225
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve D	15	0.5…4	T	T	T	T	T	T	T	T	T	T	T
		6	T	T	T	T	T	T	T	T	T	T	T
		8	T	T	T	T	T	T	T	T	T	T	T
		10	5	5	7.5	7.5	T	T	T	T	T	T	T
		13	—	3	6	6	7.5	7.5	T	T	T	T	T
		16	—	—	6	6	7.5	7.5	T	T	T	T	T
		20	—	—	—	—	6	6	T	T	T	T	T
		25	—	—	—	—	—	—	T	T	T	T	T
		32	—	—	—	—	—	—	—	—	T	T	T
		40	—	—	—	—	—	—	—	—	—	T	T
		50	—	—	—	—	—	—	—	—	—	—	—
		63	—	—	—	—	—	—	—	—	—	—	—

Table 16 - Line Side 140G J-Frame MCCB, Load Side 1492-SPM MCB (Trip Curve D)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)			Line Side - 415V Incoming																
			Breaker Type: 140G J-Frame Molded Case Circuit Breaker																
			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120																
			Thermal-magnetic Trip																
Load Side			Rated Current I_n [A]																
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	25	30	35	40	50	60	70	80	90	100	110	125	150	175	200	225	250
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve D	15	0.5…4	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T
		6	—	6	6	6	7.5	10	10	T	T	T	T	T	T	T	T	T	T
		8	—	—	—	6	7.5	10	10	T	T	T	T	T	T	T	T	T	T
		10	—	—	—	—	6	6	6	9	9	T	T	T	T	T	T	T	T
		13	—	—	—	—	—	—	5	5.5	5.5	T	T	T	T	T	T	T	T
		16	—	—	—	—	—	—	—	5.5	5.5	T	T	T	T	T	T	T	T
		20	—	—	—	—	—	—	—	—	—	T	T	T	T	T	T	T	T
		25	—	—	—	—	—	—	—	—	—	—	—	T	T	T	T	T	T
		32	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T	T	T
		40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T	T	T
		50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	T
		63	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

			Ultimate Breaking Capacity I_{cu} [kA] = 36, 50, 70, 120					
			Electronic Trip					
			Rated Current I_n [A]					
			40	60	100	150	225	250
Bulletin 1492-SPM Miniature Circuit Breaker, Trip Curve D	15	0.5…4	T	T	T	T	T	T
		6	T	T	T	T	T	T
		8	T	T	T	T	T	T
		10	—	T	T	T	T	T
		13	—	—	T	T	T	T
		16	—	—	T	T	T	T
		20	—	—	T	T	T	T
		25	—	—	—	T	T	T
		32	—	—	—	—	T	T
		40	—	—	—	—	T	T
		50	—	—	—	—	—	T
		63	—	—	—	—	—	—

Selectivity: Line Side 140G MCCBs with Load Side 140G G-Frame MCCBs

Table 17 - Line Side 140G G-, H-, and I-Frame MCCBs, Load Side 140G G-Frame MCCB (415V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 415V Incoming			
				140G I-Frame MCCB			
				Ultimate Breaking Capacity I_{cu} [kA] = 36, 50			
				Thermal-magnetic/ Magnetic Only Trip			
Load Side				Rated Current I_n [A]			
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Trip Unit	Rated Current I_n [A]	150	175	200	225
Bulletin 140G G-Frame MCCB, 160 A	36, 50,70	Thermal-magnetic	15	3	3	4	4
			20	3	3	4	4
			25	3	3	4	4
			30	3	3	4	4
			35	3	3	4	4
			40	3	3	4	4
			45	3	3	4	4
			50	3	3	4	4
			60	3	3	4	4
			70	—	—	4	4
			80	—	—	4	4
			90	—	—	—	4
			100	—	—	—	—
			110	—	—	—	—
			125	—	—	—	—
			160	—	—	—	—

Table 18 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G G-Frame MCCB (415V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 415V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120, 200				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 100				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G G-Frame MCCB, 160 A	36, 50,70	Thermal-magnetic	15	10	10	10	10	T	T	T	T	T	T	T
			20	10	10	10	10	T	T	T	T	T	T	T
			25	10	10	10	10	T	T	T	T	T	T	T
			30	10	10	10	10	T	T	T	T	T	T	T
			35	10	10	10	10	T	T	T	T	T	T	T
			40	10	10	10	10	T	T	T	T	T	T	T
			45	10	10	10	10	T	T	T	T	T	T	T
			50	10	10	10	10	T	T	T	T	T	T	T
			60	10	10	10	10	T	T	T	T	T	T	T
			70	10	10	10	10	T	T	T	T	T	T	T
			80	10	10	10	10	T	T	T	T	T	T	T
			90	10	10	10	10	T	T	T	T	T	T	T
			100	10	10	10	10	T	T	T	T	T	T	T
			110	10	10	10	10	T	T	T	T	T	T	T
			125	10	10	10	10	T	T	T	T	T	T	T
			160	10	10	10	10	T	T	T	T	T	T	T

Table 19 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G G-Frame MCCB (480V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 480V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Interrupting Rating [kA] = 35, 65, 100, 150				Interrupting Rating [kA] = 50, 65, 100				Interrupting Rating [kA] = 50, 65, 100		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Interrupting Rating [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G G-Frame MCCB	25, 35, 65	Thermal-magnetic	15	5	5	5	5	18	18	18	18	T	T	T
			20	5	5	5	5	18	18	18	18	T	T	T
			25	5	5	5	5	18	18	18	18	T	T	T
			30	5	5	5	5	18	18	18	18	T	T	T
			35	5	5	5	5	18	18	18	18	T	T	T
			40	5	5	5	5	18	18	18	18	T	T	T
			45	5	5	5	5	18	18	18	18	T	T	T
			50	5	5	5	5	18	18	18	18	T	T	T
			60	5	5	5	5	18	18	18	18	T	T	T
			70	5	5	5	5	18	18	18	18	T	T	T
			80	5	5	5	5	18	18	18	18	T	T	T
			90	5	5	5	5	18	18	18	18	T	T	T
			100	5	5	5	5	18	18	18	18	T	T	T
			110	5	5	5	5	18	18	18	18	T	T	T
			125	5	5	5	5	18	18	18	18	T	T	T

Selectivity: Line Side 140G MCCBs with Load Side 140G H-Frame MCCBs

Table 20 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G H-Frame MCCB (415V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 415V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120, 200				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 100				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G H-Frame MCCB, 160 A	36, 50,70, 120, 150	Thermal-magnetic	15	20	20	20	20	T	T	T	T	T	T	T
			20	20	20	20	20	T	T	T	T	T	T	T
			25	20	20	20	20	T	T	T	T	T	T	T
			30	20	20	20	20	T	T	T	T	T	T	T
			35	20	20	20	20	T	T	T	T	T	T	T
			40	20	20	20	20	T	T	T	T	T	T	T
			50	20	20	20	20	T	T	T	T	T	T	T
			60	20	20	20	20	T	T	T	T	T	T	T
			70	20	20	20	20	T	T	T	T	T	T	T
			80	20	20	20	20	T	T	T	T	T	T	T
			90	20	20	20	20	T	T	T	T	T	T	T
			100	20	20	20	20	T	T	T	T	T	T	T
			110	20	20	20	20	T	T	T	T	T	T	T
			125	20	20	20	20	T	T	T	T	T	T	T
			160	20	20	20	20	T	T	T	T	T	T	T
		Electronic	25	20	20	20	20	T	T	T	T	T	T	T
			60	20	20	20	20	T	T	T	T	T	T	T
			100	20	20	20	20	T	T	T	T	T	T	T
			125	20	20	20	20	T	T	T	T	T	T	T
			160	20	20	20	20	T	T	T	T	T	T	T

Table 21 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G H-Frame MCCB (480V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 480V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Interrupting Rating [kA] = 35, 65, 100, 150				Interrupting Rating [kA] = 50, 65, 100				Interrupting Rating [kA] = 50, 65, 100		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Interrupting Rating [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G H-Frame MCCB	25, 35, 65, 100, 150	Thermal-magnetic	15	20	20	20	20	42	42	42	42	65	65	65
			20	20	20	20	20	42	42	42	42	65	65	65
			25	20	20	20	20	42	42	42	42	65	65	65
			30	20	20	20	20	42	42	42	42	65	65	65
			35	20	20	20	20	42	42	42	42	65	65	65
			40	20	20	20	20	42	42	42	42	65	65	65
			50	20	20	20	20	42	42	42	42	65	65	65
			60	20	20	20	20	42	42	42	42	65	65	65
			70	20	20	20	20	42	42	42	42	65	65	65
			80	20	20	20	20	42	42	42	42	65	65	65
			90	20	20	20	20	42	42	42	42	65	65	65
			100	20	20	20	20	42	42	42	42	65	65	65
			110	20	20	20	20	42	42	42	42	65	65	65
			125	20	20	20	20	42	42	42	42	65	65	65
		Electronic	25	20	20	20	20	42	42	42	42	65	65	65
			60	20	20	20	20	42	42	42	42	65	65	65
			100	20	20	20	20	42	42	42	42	65	65	65
			125	20	20	20	20	42	42	42	42	65	65	65

Table 22 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G H-Frame MCCB (600V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 600V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Interrupting Rating [kA] = 25, 35, 65, 100				Interrupting Rating [kA] = 25, 35, 42				Interrupting Rating [kA] = 25, 35, 42		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Interrupting Rating [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G H-Frame MCCB	14, 18, 25, 35, 42	Thermal-magnetic	15	10	10	10	10	T	T	T	T	T	T	T
			20	10	10	10	10	T	T	T	T	T	T	T
			25	10	10	10	10	T	T	T	T	T	T	T
			30	10	10	10	10	T	T	T	T	T	T	T
			35	10	10	10	10	T	T	T	T	T	T	T
			40	10	10	10	10	T	T	T	T	T	T	T
			50	10	10	10	10	T	T	T	T	T	T	T
			60	10	10	10	10	T	T	T	T	T	T	T
			70	10	10	10	10	T	T	T	T	T	T	T
			80	10	10	10	10	T	T	T	T	T	T	T
			90	10	10	10	10	T	T	T	T	T	T	T
			100	10	10	10	10	T	T	T	T	T	T	T
			110	10	10	10	10	T	T	T	T	T	T	T
			125	10	10	10	10	T	T	T	T	T	T	T
		Electronic	25	10	10	10	10	T	T	T	T	T	T	T
			60	10	10	10	10	T	T	T	T	T	T	T
			100	10	10	10	10	T	T	T	T	T	T	T
			125	10	10	10	10	T	T	T	T	T	T	T

Selectivity: Line Side 140G MCCBs with Load Side 140G I-Frame MCCBs

Table 23 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G I-Frame MCCB (415V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 415V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120, 200				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 100				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G I-Frame MCCB, 225 A	36, 50	Thermal-magnetic	60	5	5	5	5	15	15	15	15	T	T	T
			70	5	5	5	5	15	15	15	15	T	T	T
			80	5	5	5	5	15	15	15	15	T	T	T
			90	5	5	5	5	15	15	15	15	T	T	T
			100	5	5	5	5	15	15	15	15	T	T	T
			110	5	5	5	5	15	15	15	15	T	T	T
			125	5	5	5	5	15	15	15	15	T	T	T
			150	5	5	5	5	15	15	15	15	T	T	T
			175	5	5	5	5	15	15	15	15	T	T	T
			200	5	5	5	5	15	15	15	15	T	T	T
			225	5	5	5	5	15	15	15	15	T	T	T

Table 24 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G I-Frame MCCB (480V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 480V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Interrupting Rating [kA] = 35, 65, 100, 150				Interrupting Rating [kA] = 50, 65, 100				Interrupting Rating [kA] = 50,65, 100		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Interrupting Rating [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G I-Frame MCCB	25, 35	Thermal-magnetic	60	5	5	5	5	10	10	10	10	T	T	T
			70	5	5	5	5	10	10	10	10	T	T	T
			80	5	5	5	5	10	10	10	10	T	T	T
			90	5	5	5	5	10	10	10	10	T	T	T
			100	5	5	5	5	10	10	10	10	T	T	T
			110	5	5	5	5	10	10	10	10	T	T	T
			125	5	5	5	5	10	10	10	10	T	T	T
			150	5	5	5	5	10	10	10	10	T	T	T
			175	5	5	5	5	10	10	10	10	T	T	T
			200	5	5	5	5	10	10	10	10	T	T	T
			225	5	5	5	5	10	10	10	10	T	T	T

Selectivity: Line Side 140G MCCBs with Load Side 140G J-Frame MCCBs

Table 25 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G J-Frame MCCB (415V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 415V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120, 200				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 100				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G J-Frame MCCB, 250 A	36, 50,70, 120	Thermal-magnetic	25	5	5	5	5	50	50	50	50	85	T	T
			30	5	5	5	5	50	50	50	50	85	T	T
			35	5	5	5	5	50	50	50	50	85	T	T
			40	5	5	5	5	50	50	50	50	85	T	T
			50	5	5	5	5	50	50	50	50	85	T	T
			60	5	5	5	5	50	50	50	50	85	T	T
			70	5	5	5	5	50	50	50	50	85	T	T
			80	5	5	5	5	50	50	50	50	85	T	T
			90	5	5	5	5	50	50	50	50	85	T	T
			100	5	5	5	5	50	50	50	50	85	T	T
			110	5	5	5	5	50	50	50	50	85	T	T
			125	5	5	5	5	50	50	50	50	85	T	T
			150	5	5	5	5	50	50	50	50	85	T	T
			175	5	5	5	5	50	50	50	50	85	T	T
			200	5	5	5	5	50	50	50	50	85	T	T
			225	5	5	5	5	50	50	50	50	85	T	T
			250	5	5	5	5	50	50	50	50	85	T	T
		Electronic	40	5	5	5	5	50	50	50	50	85	T	T
			60	5	5	5	5	50	50	50	50	85	T	T
			100	5	5	5	5	50	50	50	50	85	T	T
			150	5	5	5	5	50	50	50	50	85	T	T
			225	5	5	5	5	50	50	50	50	85	T	T
			250	5	5	5	5	50	50	50	50	85	T	T

Table 26 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G J-Frame MCCB (480V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 480V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Interrupting Rating [kA] = 35, 65, 100, 150				Interrupting Rating [kA] = 50, 65, 100				Interrupting Rating [kA] = 50, 65, 100		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Interrupting Rating [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G J-Frame MCCB	25, 35, 65, 100	Thermal-magnetic	25	5	5	5	5	42	42	42	42	65	65	65
			30	5	5	5	5	42	42	42	42	65	65	65
			35	5	5	5	5	42	42	42	42	65	65	65
			40	5	5	5	5	42	42	42	42	65	65	65
			50	5	5	5	5	42	42	42	42	65	65	65
			60	5	5	5	5	42	42	42	42	65	65	65
			70	5	5	5	5	42	42	42	42	65	65	65
			80	5	5	5	5	42	42	42	42	65	65	65
			90	5	5	5	5	42	42	42	42	65	65	65
			100	5	5	5	5	42	42	42	42	65	65	65
			110	5	5	5	5	42	42	42	42	65	65	65
			125	5	5	5	5	42	42	42	42	65	65	65
			150	5	5	5	5	42	42	42	42	65	65	65
			175	5	5	5	5	42	42	42	42	65	65	65
			200	5	5	5	5	42	42	42	42	65	65	65
			225	5	5	5	5	42	42	42	42	65	65	65
			250	5	5	5	5	42	42	42	42	65	65	65
		Electronic	40	5	5	5	5	42	42	42	42	65	65	65
			60	5	5	5	5	42	42	42	42	65	65	65
			100	5	5	5	5	42	42	42	42	65	65	65
			150	5	5	5	5	42	42	42	42	65	65	65
			225	5	5	5	5	42	42	42	42	65	65	65
			250	5	5	5	5	42	42	42	42	65	65	65

Table 27 - Line Side 140G K-, M-, and N-Frame MCCBs, Load Side 140G J-Frame MCCB (600V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 600V Incoming										
				140G K-Frame MCCB				140G M-Frame MCCB				140G N-Frame MCCB		
				Interrupting Rating [kA] = 25, 35, 65, 100				Interrupting Rating [kA] = 25, 35, 42				Interrupting Rating [kA] = 25, 35, 42		
				Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Thermal-magnetic/ Magnetic Only Trip		Electronic Trip		Electronic Trip		
Load Side				Rated Current I_n [A]										
Breaker Type	Interrupting Rating [kA]	Trip Unit	Rated Current I_n [A]	300	400	300	400	600/630	800	600/630	800	800	1000	1200
Bulletin 140G J-Frame MCCB	14, 18, 25, 35, 42[1]	Thermal-magnetic	25	5	5	5	5	T	T	T	T	T	T	T
			30	5	5	5	5	T	T	T	T	T	T	T
			35	5	5	5	5	T	T	T	T	T	T	T
			40	5	5	5	5	T	T	T	T	T	T	T
			50	5	5	5	5	T	T	T	T	T	T	T
			60	5	5	5	5	T	T	T	T	T	T	T
			70	5	5	5	5	T	T	T	T	T	T	T
			80	5	5	5	5	T	T	T	T	T	T	T
			90	5	5	5	5	T	T	T	T	T	T	T
			100	5	5	5	5	T	T	T	T	T	T	T
			110	5	5	5	5	T	T	T	T	T	T	T
			125	5	5	5	5	T	T	T	T	T	T	T
			150	5	5	5	5	T	T	T	T	T	T	T
			175	5	5	5	5	T	T	T	T	T	T	T
			200	5	5	5	5	T	T	T	T	T	T	T
			225	5	5	5	5	T	T	T	T	T	T	T
			250	5	5	5	5	T	T	T	T	T	T	T
		Electronic	40	5	5	5	5	T	T	T	T	T	T	T
			60	5	5	5	5	T	T	T	T	T	T	T
			100	5	5	5	5	T	T	T	T	T	T	T
			150	5	5	5	5	T	T	T	T	T	T	T
			225	5	5	5	5	T	T	T	T	T	T	T
			250	5	5	5	5	T	T	T	T	T	T	T

(1) Cat. No. 140G-J15 Low-voltage motor control centers only

Selectivity: Line Side 140G MCCBs with Load Side 140G K-Frame MCCBs

Table 28 - Line Side 140G N-Frame MCCB, Load Side 140G K-Frame MCCB (415V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 415V Incoming		
				140G N-Frame MCCB		
				Ultimate Breaking Capacity I_{cu} [kA] = 50, 70, 120		
				Electronic Trip		
Load Side				Rated Current I_n [A]		
Breaker Type	Ultimate Breaking Capacity I_{cu} [kA]	Trip Unit	Rated Current I_n [A]	800	1000	1200
Bulletin 140G K-Frame MCCB, 400 A	36, 50,70, 120, 150	Thermal-magnetic	300	36	T	T
			400	36	T	T
		Electronic	300	36	T	T
			400	36	T	T

Table 29 - Line Side 140G N-Frame MCCB, Load Side 140G K-Frame MCCB (480V)

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 480V Incoming		
				140G N-Frame MCCB		
				Interrupting Rating [kA] = 50, 65,100		
				Electronic Trip		
Load Side				Rated Current I_n [A]		
Breaker Type	Interrupting Rating [kA]	Trip Unit	Rated Current I_n [A]	800	1000	1200
Bulletin 140G K-Frame MCCB	35, 65, 100, 150	Thermal-magnetic	300	65	65	65
			400	36	65	65
		Electronic	300	36	65	65
			400	36	65	65

Back-up Protection

Back-up protection is defined in EN/IEC60947-1, 2.5.24 as "Over-current coordination of two overcurrent protective devices in series where the protective device, generally but not necessarily on the supply side, effects the overcurrent protection with or without the assistance of the other protective device and prevents any excessive stress on the latter."

In a system with a back-up protection (series-rated), an upstream device in the series will operate and limit the current to protect a downstream device. The supply side circuit breaker will limit the current (and total energy) to allow load side devices to interrupt short-circuit currents beyond their breaking capacity. In this case both devices (placed in series) may open simultaneously, alternatively, or just the supply side circuit breaker. Our tables are derived from tests based on appendix A of the IEC60947-2 Standard.

How to Interpret the Back-up Protection Tables

You should interpret the back-up protection in the same way as you interpret selectivity tables.

Example 3
Figure 3 - Two 140G Molded Case Circuit Breakers Installed in Series

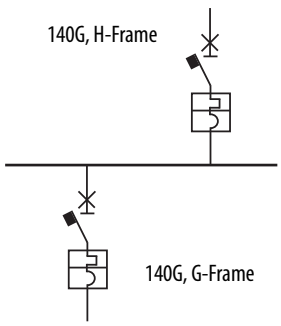

Table 30 - Line Side 140G MCCB, Load Side, Load Side 140G MCCB

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)		Line Side - 415V Incoming												
		Ultimate Breaking Capacity I_{cu} [kA]												
		50							70					
Load Side		Bul. 140G MCCB Frame Size												
Ultimate Breaking Capacity I_{cu} [kA]	Bul. 140G MCCB Frame Size	G	H	I	J	K	M	N	G	H	J	K	M	N
50	G	—	—	—	—	—	—	—	70	70	70	70	70	70
	H	—	—	—	—	—	—	—	—	—	70	70	70	70
	I	—	—	—	—	—	—	—	—	—	70	70	70	—
	J	—	—	—	—	—	—	—	—	—	70	70	70	70
	K	—	—	—	—	—	—	—	—	—	—	70	70	70

In this example, (Figure 3), two 140G MCCBs are installed in series. The 140G-G circuit breaker has an I_{cu} rating of 50 kA and the 140G-H breaker has an I_{cu} of 70 kA, so this complete installation is rated up to 70 kA @ 415V.

Back-up Protection: Line Side 140G MCCBs with Load Side MCBs or MCCBs

Table 31 - Line Side 140G MCCB, Load Side 188-J or 1492-SPM MCB

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)				Line Side - 415V Incoming																			
				Ultimate Breaking Capacity I_{cu} [kA]																			
				36					50					70				120			150		
Load Side				Bul. 140G MCCB Frame Size																			
Breaker Type	Trip Curve	Ultimate Breaking Capacity I_{cu} [kA]	Rated Current I_n [A]	G	H	I	J	K	G	H	I	J	K	G	H	J	K	H	J	K	H	K
Bul. 188-J MCB	B, C	10	0.5…10	30	36	36	36	20	30	36	40	40	20	30	40	40	20	40	40	20	40	20
			13…63			16					16											
Bul. 1492-SPM MCB	B, C, D	15	0.5…10	30	36	36	36	20	30	36	40	40	20	30	40	40	20	40	40	20	40	20
			13…63			25					25											

Table 32 - Line Side 140G MCCB, Load Side, Load Side 140G MCCB

Table Legend: Numerical Values = Selectivity Limit [kA] T= Total Selectivity (for definitions, see page 2)		Line Side - 415V Incoming																				
		Ultimate Breaking Capacity I_{cu} [kA]																				
		50							70						120			100		150	200	
Load Side		Bul. 140G MCCB Frame Size																				
Ultimate Breaking Capacity I_{cu} [kA]	Bul. 140G MCCB Frame Size	G	H	I	J	K	M	N	G	H	J	K	M	N	H	J	K	M	N	H	K	
36	G	50	50	50	50	50	50	50	65	70	65	65	65	50	70	70	70	70	70	70	70	
	H	—	50	50	50	50	50	50	—	70	65	65	65	65	100	100	100	85	85	120	120	
	I	—	—	50	50	50	50	50	—	—	65	65	65	50	—	100	100	50	50	—	65	
	J	—	—	—	50	50	50	40	—	—	65	65	65	50	—	100	100	70	65	—	120	
	K	—	—	—	—	50	50	50	—	—	—	65	65	50	—	—	100	85	65	—	120	
	M	—	—	—	—	—	50	40	—	—	—	—	65	40	—	—	—	70	50	—	—	
50	G	—	—	—	—	—	—	—	70	70	70	70	70	70	70	70	70	70	70	70	70	
	H	—	—	—	—	—	—	—	—	—	70	70	70	70	100	100	100	85	85	150	130	
	I	—	—	—	—	—	—	—	—	—	70	70	70	—	—	100	100	—	—	—	70	
	J	—	—	—	—	—	—	—	—	—	70	70	70	70	—	100	100	85	85	—	150	
	K	—	—	—	—	—	—	—	—	—	—	70	70	70	—	—	100	85	85	—	150	
	M	—	—	—	—	—	—	—	—	—	—	—	70	—	—	—	—	85	85	—	—	
70	G	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	H	—	—	—	—	—	—	—	—	—	—	—	—	—	120	120	120	85	100	150	150	
	J	—	—	—	—	—	—	—	—	—	—	—	—	—	—	120	120	100	100	—	150	
	K	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	100	100	—	180	
	M	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	100	85	—	—	
120	J	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	150	
	K	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	200	

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