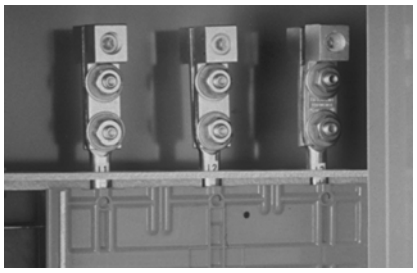
Main and Feeder Units

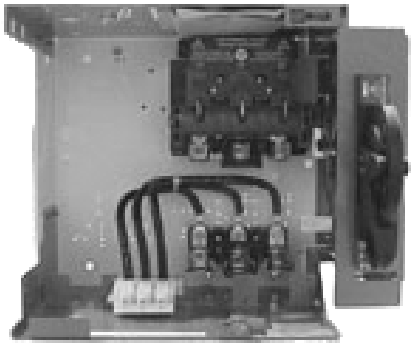


Bulletin 2191F and 2191M

Outgoing Feeder Lug Compartment (FLUG) and Incoming Main Lug Compartment (MLUG)

. 62

The Bulletin 2191M and 2191F are line lug compartments that provide a lug connection for incoming lines (2191M) to distribute power to the motor control center or for outgoing cables (2191F) to feed power from the MCC to an external load. These line lug compartments are available with ratings from 300 to 2000A. Optional mechanical or crimp lugs can be supplied with the lug compartments.

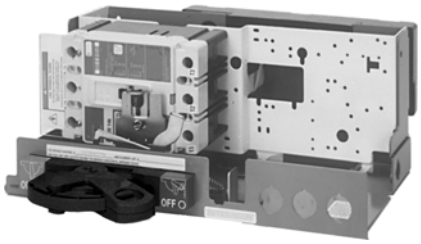


Bulletin 2192F and 2192M

Feeder and Main Fusible Disconnect Switch Units (FDS, MFDS)

. 69

Bulletin 2192M and 2192F are fusible disconnect switches. These switches are available with ratings from 30A to 2000A. The 2192F is a plug-in unit for ratings up to 200A and frame mounted for ratings 400A and above. The 2192M is frame mounted (rigidly mounted and hardwired) in the structure for all ratings. The bolted pressure switch design is used for 2192 units rated 600A through 2000A.



Bulletin 2193F and 2193M

Feeder and Main Circuit Breaker Units (FCB, MCB)

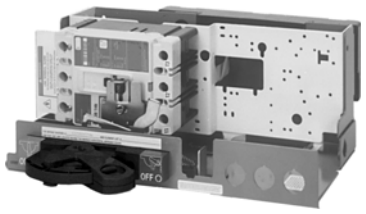
. 73

Bulletin 2193M and 2193F are circuit breaker units with trip ratings available from 15A to 2000A. These units are available with thermal magnetic trips up to 400A and electronic trips 600A and above. The 2193F is a plug-in unit for ratings up to 225A and is a frame mounted unit for ratings 400A and above. The 2193M is frame mounted for all ratings.

Catalog Number Explanation - Bulletin 2193F and 2193M

Circuit Breaker Feeders and Mains

- 150A and 250A Frame Feeders through 225A Trip are Plug-In Units
- 400-2000A Frame Feeders and all Mains are Frame Mounted
- Mains 600-2000A available with Built in Ground Fault Protection



91

2193F	T	-	B	K	C	-	30CB	-	**
Bulletin Number	*Mounting*		*Max Trip Rating*	*NEMA Enclosure Type*	*Line Voltage*		*Circuit Breaker Trip Size and Type*		*Options*

91A

Code	Type
2193F	Circuit Breaker Feeder (FCB)
2193M	Main Circuit Breaker (MCB)

91B

Code	Mounting
T [1]	Top
B [1]	Bottom
Z	0.5 Space Factor

[1] A "T" or "B" is required for all 2193M units and all 400A frame and larger Bulletin 2193F units.

91C

Code	Trip Rating
A	100A
B	150A
C	225A
D	400A
E	600A
F	800A
G	1200A
H	1600A
J	2000A

91D

Code	NEMA Enclosure Type
K	NEMA Type 1 or Type 1 with gasket
J	NEMA Type 12

91E

Code	Line Voltage
C	Up to 600V

91F

Code	Circuit Breaker Trip Size and Type
See table on page 76.	

91G

Code	Options
See Options section beginning on page 107.	

Bulletin 2193F

3-Pole Feeder Circuit Breaker (FCB)

- See page 61 for product description.
- See Appendix for circuit breaker characteristics.
- Continuous current rating based on 40° C ambient.
- Select circuit breaker frame and trip size based upon 125% of actual load amperes. Refer to NEC/CEC. Contact your local Rockwell Automation Sales Office if 100% rated circuit breakers are required.
- Two (2) circuit breakers with trip current up to 150 A can be dual mounted in one plug-in unit for I3C, I6C, and I0C 150A frames. I3C frame circuit breakers with current limiters also can be dual mounted but are limited to a 100A trip maximum on each circuit breaker. To specify dual mounted units, add two numbers from table on page 76 to base catalog number (e.g., 2193F-AJC-**3031**CB). Half space factor units cannot be dual-mounted.
  2193F—Plug-in unit, 15A-225A.
  2193FZ—Plug-in unit, 0.5 space factor, 15A-225A.
  2193FT—Top-mounted feeder, 400A are top-fed, connect load to bottom of switch.
  2193FT—Top-mounted feeder, 600A-1200A are reverse-fed, connect load to top of switch.
  2193FB—Bottom-mounted feeder, 400A-1200A are top-fed, connect load to bottom of switch.

92

Frame		Range of Available Trips (Amperes)	Interrupting Capacity Ratings (rms symmetrical amperes)			Space Factor	Catalog Number [1] Wiring Type A Only—Class I		Delivery Program
Rating (Amperes)	Type		208V 240V	380V 400V 415V 480V	600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
150 [2]	I3C	15-100	65k	35k	18k	0.5 [3]	2193FZ-AKC-_CB	2193FZ-AJC-_CB	SC
	I6C		100k	65k	25k		2193FZ-AKC-_CM	2193FZ-AJC-_CM	
	I0C	15-50	100k	100k	35k		2193FZ-AKC-_CX	2193FZ-AJC-_CX	
		60-100							
	I3C-CL	15-50	100k	100k	100k		2193FZ-AKC-_CD	2193FZ-AJC-_CD	
		60-100							
	I3C	125-150	65k	35k	18k		2193FZ-BKC-_CB	2193FZ-BJC-_CB	
	I6C		100k	65k	25k		2193FZ-BKC-_CM	2193FZ-BJC-_CM	
	I0C		100k	100k	35k		2193FZ-BKC-_CX	2193FZ-BJC-_CX	
	I3C-CL		100k	100k	100k		2193FZ-BKC-_CD	2193FZ-BJC-_CD	
	I3C	15-100	65k	35k	18k	1.0	2193F-AKC-_CB	2193F-AJC-_CB	
	I6C		100k	65k	25k		2193F-AKC-_CM	2193F-AJC-_CM	
	I0C	15-50	100k	100k	35k		2193F-AKC-_CX	2193F-AJC-_CX	
		60-100							
	I3C-CL	15-50	100k	100k	100k	1.0 [4]	2193F-AKC-_CD	2193F-AJC-_CD	
		60-100				1.5			
	I3C	125-150 [5]	65k	35k	18k	1.0	2193F-BKC-_CB	2193F-BJC-_CB	
	I6C		100k	65k	25k		2193F-BKC-_CM	2193F-BJC-_CM	
	I0C		100k	100k	35k		2193F-BKC-_CX	2193F-BJC-_CX	
	I3C-CL		100k	100k	100k	1.5	2193F-BKC-_CD	2193F-BJC-_CD	

[1] The catalog numbers listed are not complete:
- Select the trip current from table on page 76 (e.g., 2193F-AKC-**40**CB).
- If optional load lugs will be selected, select from table on page 76 (e.g., 2193F-AKC-40CB-**80A350**).

[2] Non-interchangeable trip breakers.
[3] These units have horizontal operating handles.
[4] When supplied with DSA (options 11DSA2 and 11DSA3), requires 1.5 space factor.
[5] When selecting a dual circuit breaker unit with one circuit breaker with 125A or 150A trip and the other circuit breaker with 15-100 A trip, use catalog number configuration 2193F-**B**_C-____ (e.g., 2193F-BKC-4130CB).

- See Appendix for circuit breaker characteristics.
- Continuous current rating based on 40° C ambient.
- For circuit breaker sizing, select circuit breaker frame and trip size based upon 125% of actual load amperes. Refer to NEC/CEC. Contact your local Rockwell Automation Sales Office if 100% rated circuit breakers are required.

93

Frame		Range of Available Trips (Amperes)	Interrupting Capacity Ratings (rms symmetrical amperes)			Space Factor	Catalog Number Wiring Type A Only—Class I		Delivery Program
Rating (Amperes)	Type		208V 240V	380V 400V 415V 480V	600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
225A [1]	JD3D [2]	70 90-225	65k	35k	18k	0.5 [3]	2193FZ-CKC-_CT	2193FZ-CJC-_CT	SC
	JD6D		100k	65k	25k		2193FZ-CKC-_CM	2193FZ-CJC-_CM	
	JD0D		100k	100k	35k		2193FZ-CKC-_CX	2193FZ-CJC-_CX	
	JD3D [2]		65k	35k	18k	1.5	2193F-CKC-_CT	2193F-CJC-_CT	
	JD6D		100k	65k	25k		2193F-CKC-_CM	2193F-CJC-_CM	
	JD0D		100k	100k	35k		2193F-CKC-_CX	2193F-CJC-_CX	
400 [4],[5]	K3D	125-400	65k	35k	25k	2.0	2193F_-DKC-_CT	2193F_-DJC-_CT	SC-II
	K6D		100k	65k	35k		2193F_-DKC-_CM	2193F_-DJC-_CM	
	K0D		100k	100k	65k		2193F_-DKC-_CX	2193F_-DJC-_CX	
600 [4],[5],[6]	LD	300-600	65k	35k	25k	2.0	2193F_-EKC-_CT	2193F_-EJC-_CT	
	HLD		100k	65k	35k		2193F_-EKC-_CM	2193F_-EJC-_CM	
	LDC		100k	100k	50k		2193F_-EKC-_CX	2193F_-EJC-_CX	
800 [4],[5],[6]	MDL	400-800	65k	50k	25k	2.5	2193F_-FKC-_CT	2193F_-FJC-_CT	
	HMDL		100k	65k	35k		2193F_-FKC-_CM	2193F_-FJC-_CM	
	NDC		100k	100k	65k		2193F_-FKC-_CX	2193F_-FJC-_CX	
1200 [4],[6],[7]	ND	600-1200	65k	50k	25k	3.5	2193F_-GKC-_CT	2193F_-GJC-_CT	
	HND		100k	65k	35k		2193F_-GKC-_CM	2193F_-GJC-_CM	
	NDC		100k	100k	65k		2193F_-GKC-_CX	2193F_-GJC-_CX	

[1] The catalog numbers listed are not complete:
- Select the trip current from table on page 76 (e.g., 2193F-CKC-**44**CT).
- If optional load lugs will be selected, select from table on page 76.
- Then add option number to the base catalog number (e.g., 2193F-CKC-44CT-**80A350**).

[2] Non-interchangeable trip breakers.

[3] These units have horizontal operating handles.

[4] The catalog numbers listed are not complete:
- Insert **T** for Top mounted or **B** for Bottom mounted (e.g., 2193**FT**- or 2193F**B**-).
- Select the trip current from table on page 76 (e.g., 2193FT-DKC-**50**CT).
- If optional load lugs will be selected, select from table on page 76.
- Then add option number to the base catalog number (e.g. 2193FT-EKC-44CT-**80A350**).

[5] Frame mounted unit. Must be located at top or bottom of section.

[6] Sealed breaker and Digitrip RMS 310 electronic trip with interchangeable trip plugs.

[7] Frame mounted unit, section does not have vertical wireway next to this unit. Must be located at top or bottom of section. May not be mounted in section containing other frame mounted units.

Bulletin 2193F

3-Pole Feeder Circuit Breaker (FCB), continued

- CENTERLINE 2100 motor control centers are rated for use with 75° C wires. Wire must be sized using the 75° C column in NEC Table 310-16. The actual temperature rating of the lug is not relevant.
- Refer to Appendix for wire size conversion table.

Trip Current

94

Trip Current (Amperes)	Number	Trip Current (Amperes)	Number
(No breaker)	00 [1]	175	43
15	30	200	44
20	31	225	45
30	32	250	46
40	34	300	48
50	35	350	49
60	36	400	50
70	37	500	51
80	38	600	52
90	39	700	53
100	40	800	54
125	41	1000	55
150	42	1200	56

[1] **Provision for Field Mounting**
Single or dual mounted plug-in feeder units may be selected without the circuit breaker in the 150A frame size only. Add the number 00 from Trip Current table above to the base catalog number (e.g., 2193F-AKC-35**00**CB or 2193F-BKC-41**00**CB). Mounting hardware, space, and operating mechanism will be provided for future mounting of circuit breaker(s). For a single mounted feeder without circuit breaker but field mounting selected instead, the unit cost is $310. For dual mounted units, add the $310 for any field mounting provisions selected (e.g., 2193F-AKC-00CM is $310; 2193F-AKC-3900CM is $1380; $310 + 1070 = $1380).

Standard Mechanical Lugs Supplied [1]

95

Frame Type	Rating	Trip Current (Amperes)	Cables/ Phase	Cable/Wire Size Range	Wire Type
I3C, I6C, I0C	150A	15-100	1	#14-#1/0 AWG	CU/AL
		125-150	1	#4-#4/0 AWG	CU
I3C-CL [2]	150A	15-70	1	#14-#2 AWG	CU/AL
		80-150	1	#1-#4/0 AWG	CU/AL
JD3D, JD6D, JD0D	225A	70-225	1	#4-350 kcmil	CU/AL
K3D, K6D, K0D	400A	125-225	1	#3-350 kcmil	CU
		250-350	1	250-500 kcmil	CU
		400	2	#3/0-250 kcmil	CU
LD, HLD, LDC	600A	300-600	2	250-350 kcmil	CU
MDL	800A	400-600	2	#2/0-500 kcmil	CU
HMDL		700-800	3	#3/0-300 kcmil	CU
NDC	800A	400-700	2	#2-500 kcmil	CU
		800	3	#3/0-500 kcmil	CU
ND, HND, NDC	1200A	600-700	2	#2/0-500 kcmil	CU
		800-1000	3	#3/0-500 kcmil	CU
		1100-1200	4	#4/0-400 kcmil	CU

[1] Lugs are designed for use with breaker frame. Standard crimp or mechanical lugs cannot be used without special lug pad assembly.
[2] No optional lugs available for I3C frame with current limiters.

Optional Mechanical Lugs [1]

96

Frame Type	Rating	Trip Current (Amperes)	Cables/ Phase	Cable/Wire Size Range	Wire Type	Option Number
I3C, I6C, I0C	150A	15-100	1	#4-#4/0 AWG	CU/AL	-80A4X0
JD3D, JD6D, JD0D	225A	70-225	1	#4-350 kcmil	CU/AL	-80A350
K3D, K6D, K0D	400A	125-225, 400	1	250-500 kcmil	CU	-81A500
		125-225	1	#3-350 kcmil	CU/AL	-80A350
		125-350	2	#3/0-250 kcmil	CU	-81B250
		125-400	1	250-500 kcmil	CU/AL	-80A500
			2	#3/0-250 kcmil		-80B250
LD, HLD, LDC	600A	300-600	2	#3/0-350 kcmil	CU/AL	-80B350
			2	400-500 kcmil		-80B500
MDL HMDL	800A	400-600	2	#1-500 kcmil	CU/AL	-80B500
			3	#3/0-300 kcmil	CU	-81C300
		400- 800	2 [2]	500-750 kcmil	CU/AL	-80B750
			3	#3/0-400 kcmil		-80C400
NDC	800A	400-700	2	#1-500 kcmil	CU/AL	-80B500
		400-800	3	#3/0-400 kcmil		-80C400
ND, HND, NDC	1200A	600-700	2	#1-500 kcmil	CU/AL	-80B500
		600-1000	3	#3/0-400 kcmil		-80C400
		600-1200	4	#4/0-500 kcmil		-80D500
			3	500-750 kcmil		-80C750

[1] Lugs are designed for use with breaker frame. Standard crimp or mechanical lugs cannot be used without special lug pad assembly.
[2] Requires top entry and pullbox for 600-750 kcmil cables in order to meet UL and NEC/UL/cUL wire bending requirements. Select pullbox on page 28.

- See page 61 for product description.
- See Appendix for circuit breaker characteristics.
- Select circuit breaker frame and trip size based upon 125% of actual load amperes. Continuous current rating based on 40° C ambient. Refer to NEC/CEC.
- Mains are suitable for use as service entrance per NEC (UL) and CEC (CSA). If application is a four-wire system, a neutral plate rated for 280A is available, refer to page 25, 105, 117 and 214. If a neutral greater then 280A is required, see page 25 or 117 or contact your local Rockwell Automation Sales Office. Mains rated 1000A and above may require ground fault protection. Refer to NEC/UL/cUL.
- Main Breakers supplied with internal ground fault protection (Breaker Code CTG, CMG or CXG) are supplied with a neutral CT for use on a 3 Phase, 4 Wire, Solidly Grounded "WYE" System. Circuit breakers with internal ground fault protection are not designed for use on a Delta System, Ungrounded "WYE" System or Impedance Grounded "WYE" System.
- Mains units are frame mounted. They must be located at the top or bottom of the section.
  2193MT—Top-mounted main, 150A-2000A are top-fed.
  2193MB—Bottom-mounted main, 150A-400A are top-fed.
  2193MB—Bottom-mounted main, 600A-2000A are reverse-fed.
- Top- and bottom-mounted mains are designed with adequate space to route cables to lugs. Special consideration may need to be given to the mounting of the CT's for a metering device. Addition of a pull box might be considered.
- Includes line terminal guard for JD, K, L, M, N, and R frame circuit breaker units.

97

Frame		Range of Available Trips (Amperes)	Interrupting Capacity Ratings (rms symmetrical amperes)			Space Factor	Catalog Number [1] Wiring Type A Only—Class I		Delivery Program
Rating (Ampere)	Type		208V/240V	380V/400V 415V/480V	600V		NEMA Type 1 and Type 1 w/ gasket	NEMA Type 12	
150A[2]	I3C	15-100	65k	35k	18k	1.5	2193M_-AKC-_CB	2193M_-AJC-_CB	SC-II
	I6C		100k	65k	25k		2193M_-AKC-_CM	2193M_-AJC-_CM	
	I0C	15-50	100k	100k	35k		2193M_-AKC-_CX	2193M_-AJC-_CX	
		60-100							
	I3C-CL	15-50	100k	100k	100k		2193M_-AKC-_CD	2193M_-AJC-_CD	
		60-100							
	I3C	125-150	65k	35k	18k		2193M_-BKC-_CB	2193M_-BJC-_CB	
	I6C		100k	65k	25k		2193M_-BKC-_CM	2193M_-BJC-_CM	
	I0C		100k	100k	35k		2193M_-BKC-_CX	2193M_-BJC-_CX	
	I3C-CL		100k	100k	100k		2193M_-BKC-_CD	2193M_-BJC-_CD	
225A	JD3D [2]	70, 90-225	65k	35k	18k		2193M_-CKC-_CT	2193M_-CJC-_CT	
	JD6D		100k	65k	25k		2193M_-CKC-_CM	2193M_-CJC-_CM	
	JD0D		100k	100k	35k		2193M_-CKC-_CX	2193M_-CJC-_CX	
400A	K3D	125- 400	65k	35k	25k	2.0	2193M_-DKC-_CT	2193M_-DJC-_CT	
	K6D		100k	65k	35k		2193M_-DKC-_CM	2193M_-DJC-_CM	
	K0D		100k	100k	65k		2193M_-DKC-_CX	2193M_-DJC-_CX	
600A	LD [3]	300-600 [4]	65k	35k	25k		2193M_-EKC-_CT	2193M_-EJC-_CT	
	LDG [3],[5]		65k	35k	25k		2193M_-EKC-_CTG	2193M_-EJC-_CTG	
	HLD [3]		100k	65k	35k		2193M_-EKC-_CM	2193M_-EJC-_CM	
	HLDG [3],[5]		100k	65k	35k		2193M_-EKC-_CMG	2193M_-EJC-_CMG	
	LDC [3]		100k	100k	50k		2193M_-EKC-_CX	2193M_-EJC-_CX	
	LDCG [3],[5]		100k	100k	50k		2193M_-EKC-_CXG	2193M_-EJC-_CXG	
	LD HI-MAG [6]	600	65k	35k	25k		2193M_-EKC-52CN	2193M_-EJC-52CN	

[1] The catalog numbers listed are not complete:
- Insert **T** for top mounted or **B** for bottom mounted (e.g., 2193M**T**- or 2193M**B**-).
- Select trip current from table on page 79 (e.g., 2193MB-AKC-**40CB**).
- If optional line lugs will be selected, select from Optional Mechanical and Crimp Lugs tables on page 80.
- Then add option number to base catalog number (e.g., 2193MB-AKC-40CB-**80A4X0**).

[2] Non-interchangeable trip breakers.
[3] Units having 100% rating are available for these circuit breakers for NEMA Type 1 and Type 1 with gasket only. See options on page 122 to select.
[4] Sealed breaker and Digitrip RMS 310 electronic trip with interchangeable trip plugs.
[5] Ground fault protection system is suited for solidly grounded system. Ground fault trip range is adjustable from 0.2 to 1 times the trip current rating of the circuit breaker rating plug. Time delay setting can be adjusted from 0.05 to 0.5 seconds. Neutral current transformer shipped loose except when option 88HN or 88FN is specified.
[6] NOT UL listed. Internal auxiliary contacts (98X, 99X) are not available on this breaker. Unit supplied with molded case switch with fixed high magnetic trip. Requires upstream current limiting branch protection. See molded case switch markings for proper selection of this protection. **Ratings listed are the maximum fault currents that can be applied to the devices.**

- CENTERLINE 2100 motor control centers are rated for use with 75°C wire. Wire must be sized using the 75°C column in NEC/UL/cUL. The actual temperature rating of the lug is not relevant.
- Top- and bottom-mounted mains are designed with adequate space to route cables to lugs. Special consideration may need to be given to the mounting of the CT's for a metering device. Addition of a pull box might be considered.
- Refer to Appendix for wire size conversion table.

Trip Current 99

Trip Current (Amperes)	Number	Trip Current (Amperes)	Number
15	30	225	45
20	31	250	46
30	32	300	48
40	34	350	49
50	35	400	50
60	36	500	51
70	37	600	52
80	38	700	53
90	39	800	54
100	40	1000	55
125	41	1200	56
150	42	1600	58
175	43	2000	60
200	44	—	—

Standard Mechanical Lugs Supplied [1] 100

Frame Type	Rating (Amperes)	Trip Current (Amperes)	Cables/ Phase [2]	Cable/Wire Size Range	Wire Type
I3C, I6C, I0C, I3C-CL	150 A	15-100 125-150	1 1	#14-#1/0 AWG #4- #4/0 AWG	CU/AL CU
JD3D, JD6D, JD0D	225 A	70-225	1	#4-350 kcmil	CU
K3D, K6D, K0D	400 A	125-225 250-350 400	1 1 2	#3-350 kcmil 250-500 kcmil #3/0-250 kcmil	CU CU CU
LD, HLD, LDC, LDG, HLDG, LDCG	600 A	300-600	2	250-350 kcmil	CU
LD HI-MAG	600 A	600	2	250-350 kcmil	CU
MDL, MDLG HMDL, HMDLG	800 A	400-600 700-800	2 3	#2/0-500 kcmil #3/0-300 kcmil	CU CU
MDL HI-MAG	800 A	800	3	#3/0-300 kcmil	CU
NDC, NDCG	800 A	400-700 800	2 3	#2/0-500 kcmil #3/0-500 kcmil	CU CU
ND HI-MAG	1200 A	1200	4	#3/0-400 kcmil	CU
ND, HND, NDC, NDG, HNDG, NDCG	1200 A	600-700 800-1000 1200	2 3 4	#2/0-500 kcmil #3/0-500 kcmil #3/0-400 kcmil	CU CU CU
ND, HND, NDC, NDG, HNDG, NDCG—100% rated	1200 A	600-1200	4	#4/0-600 kcmil	CU/AL
RD, RDG	2000 A	1200-1600 2000	4 6	#1-600 kcmil #2-600 kcmil	CU CU/AL
RD, RDG—100% rated	2000 A	1200-1600 2000	4 6	#2-600 kcmil #2-600 kcmil	CU/AL CU/AL

[1] Lugs are designed for use with breaker frame. See page 80 for additional lugs.
[2] If optional full-rated incoming neutral bus (see page 117) is specified, the quantity and size/type of the lug(s) on neutral lug pad will be the same as the 3-phase lugs. When optional half-rated incoming neutral bus (see page 117) is specified and (1) or (2) lugs per phase are specified, (1) lug will be provided on the half-rated neutral riser. When (3) or (4) lugs are specified, (2) lugs will be provided. When (5) or (6) lugs are specified, (3) lugs will be provided on half-rated neutral riser.

Bulletin 2193M

3-Pole Main Circuit Breaker (MCB), continued

Optional Mechanical and Crimp Lugs

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Frame Type	Rating (Amperes)	Trip Current (Amperes)	Cables/ Phase	Cable/Wire Size Range	Wire Type	Option Number [2]
MECHANICAL LUGS [1]						
I3C, I6C, I0C	150A	15-100	1	#4-#4/0 AWG	CU/AL	80A4X0
JD3D, JD6D, JD0D	225A	70-225	1	#4-350 kcmil	CU/AL	80A350
K3D, K6D, K0D	400A	125-225, 400	1	250-500 kcmil	CU	81A500
		125-225	1	#3-350 kcmil	CU/AL	80A350
		125-350	2	#3-250 kcmil	CU	81B250
		125-400	1	250-500 kcmil	CU/AL	80A500
			2	#3/0-250 kcmil		80B250
LD, HLD, LDC LDG, HLDG, LDCG	600A	300-600	2	#3/0-350 kcmil	CU/AL	80B350
				400-500 kcmil		80B500
MDL, MDLG HMDL, HMDLG	800A	400-600	2 [3]	#1-500 kcmil	CU/AL	80B500
			3 [3]	#3/0-300 kcmil	CU	81C300
		400-800 [4]	2	500-750 kcmil	CU/AL	80B750
		400-800	3	#3/0-400 kcmil		80C400
NDC, NDCG	800A	400-700	2	#1-500 kcmil	CU/AL	80B500
		400-800	3	#3/0-400 kcmil		80C400
ND, HND, NDC, NDG, HNDG, NDCG	1200A	600-700	2 [3]	#1-500 kcmil	CU/AL	80B500 [5]
		600-1000	3 [3]	#3/0-400 kcmil		80C400 [5]
		600-1200	4	#4/0-500 kcmil		80D500 [5]
			3	500-750 kcmil		80C750 [5]
ND, HND, NDC, NDG, HNDG, NDCG—(with option -755, 100% rated only)	1200A	600-1200	3 [6]	350-800 kcmil	CU/AL	80C800
RD, RDG	2000A	1200-1600	4	500-1000 kcmil	CU/AL	80D01K [5]
			6	#2-600 kcmil		80F600
CRIMP LUGS [7]						
K3D, K6D, K0D [8]	400A	125-400	2	250 kcmil	CU [9]	82B250
		125-400	1	500 kcmil	CU [9]	82A500
		125-400	2	250 kcmil	CU/AL [9]	83B250
		125-400	1	500 kcmil	CU/AL [9]	83A500
LD, HLD, LDC LDG, HLDG, LDCG [8]	600A	300-600	2	500 kcmil	CU [9]	82B500
			2		CU/AL [9]	83B500
MDL, MDLG HMDL, HMDLG [8]	800A	400-800	3		CU [9]	82C500
			3		CU/AL [9]	83C500
NDC, NDCG [8]	800A	400-800	3		CU [9]	82C500
			3		CU/AL [9]	83C500
ND, HND, NDC, NDG, HNDG, NDCG	1200A	600-1200	4		CU [9]	82D500
			4		CU/AL [9]	83D500
RD, RDG	2000A	1200-2000	6		CU [9]	82F500
			6		CU/AL [9]	83F500

[1] Lugs are designed for use with breaker frame. Standard crimp or mechanical lugs cannot be used without optional lug pad assembly.
[2] If optional full-rated incoming neutral bus (see page 117) is specified, the quantity and size/type of the lug(s) on neutral lug pad will be the same as the 3-phase lugs. When optional half-rated incoming neutral bus (see page 117) is specified and (1) or (2) lugs per phase are specified, (1) lug will be provided on the half-rated neutral riser. When (3) or (4) lugs are specified, (2) lugs will be provided. When (5) or (6) lugs are specified, (3) lugs will be provided on half-rated neutral riser.
[3] Cannot be used on the HI-MAG frames.
[4] Requires top entry and pullbox for 600-750 kcmil cables in order to meet UL and NEC/UL/cUL wire bending requirements. Select on page 28.
[5] Not available with 2193M units with option -755 (100% rated)
[6] For top entry of incoming cables only. Requires pullbox for 750-800 kcmil cables in order to meet UL and NEC/UL/cUL cable bending requirements. Select on page 28.
[7] Breaker supplied with a lug pad assembly, reference page 215 for additional lugs.
[8] For top entry of incoming cables only. Requires pullbox. Select on page 28.
[9] CU crimp lugs are Panduit type LCC Series. CU/AL crimp lugs are Burndy YA-A Series.

Factory-Installed Options, Modifications, Accessories for Contactors and Starters, Metering, Mains and Feeders, Lighting and Power Panels, Transformer and Miscellaneous Units

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

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Option	Option Number	Description		FVC 2102L 2103L	FVR 2106 2107	FVNR 2112 2113	TS1W TS2W 2122 2123	TSR1W TSR2W 2126E 2127E 2126F 2127F	TSR1W TSR2W 2126J 2127J 2126K 2127K	Feeder/ Main 2192 2193	Delivery Program
Overload Relay Auxiliary Contact (Eutectic Alloy) (one contact per overload relay) [1]	-9	Normally Open	Type A Wiring		✓	✓					SC
							✓	✓	✓		
			Type B Wiring		✓	✓					
							✓	✓	✓		
	-9A	Normally Closed	Type A Wiring		✓	✓					
							✓	✓	✓		
			Type B Wiring		✓	✓					
							✓	✓	✓		
DeviceNet Starter Auxiliary (DSA) [2],[3]	-11DSA2	For use with contactors and starters to provide DeviceNet inputs and outputs. **(4) 120V** inputs and (2) 120V outputs. Available for 110V-120V control only.		✓	✓	✓	✓			✓ [4],[5],[6]	
	-11DSA3	For use with contactors and starters to provide DeviceNet inputs and outputs. **(4) 24VDC** inputs and (2) 240VAC (max), 30VDC (max) outputs. Available for 110V-120VAC or 220V-240VAC control voltage.		✓	✓	✓	✓			✓ [5],[6]	
Additional Unit Space	-15	Adds 0.5 space factor unit space to Bulletin 2112 and 2113 size 1, 2 and 3 units. **Note:** Bulletin 2112 and 2113, sizes 1 and 2, cannot be increased from 1.5 to 2.0 space factors by selecting option 15, nor can size 1 increase from 0.5 to 1.0 space factor by using option 15.				✓					
Filters for Door Vents	-16A	Filters for door vents on NEMA Type 1 and NEMA Type 1 with gasket Bulletin 2195, 2196 and 2197 units		Available on NEMA Type 1 and NEMA Type 1 with gasket Bulletins 2195, 2196 and 2197 only							
Surge Suppressor [7]	-17 [8]	On coil, one per contactor, for starters and contactors, not available on vacuum type, selection of this option requires the selection of -17R if an option relay (89__) is also selected.		✓		✓					SC
					✓		✓				
								✓	✓		
	-17R	For units with interposing relays (89CB and 89CBL) and unwired control relays (89CF and 89P), may only be used if option relay (89__) is selected. Selection of this option requires selection of option -17. Except when 89CBL or Common Control is selected.		✓		✓					
					✓		✓				
								✓	✓		
O/L Contact on Left Side of Circuit	-18 [9]	Moves overload trip contact from right (grounded) side of the control circuit to left (power input) side of control circuit.			✓	✓	✓				
Omit Wiring	-19	Omission of control wiring[10]		✓	✓	✓	✓	✓	✓		
Control Circuit Fuse	-21	One (1) control circuit fuse for separate control or line to neutral control		✓	✓	✓	✓	✓	✓		
	-22	Two (2) control circuit fuses for common control		✓	✓	✓	✓	✓	✓		PE

[1] Options 9 and 9A are mutually exclusive and not available with optional overload relays (-7F_ _ _).
[2] Not available for dual 2103L or dual 2113 units. Not available for 0.5 space factor 2103L units. Not available for 0.5 space factor 2112 or 0.5 space factor 2113 units with E1 Plus with ground fault/jam protection (option 7FEE_G) or E1 Plus with jam protection (option 7FEE_J). Not allowed for 0.5 space factor 2113 units with eutectic overload relay. Mutually exclusive with 89_ relay and 87 timer options. Not available with push buttons or selector switches, except options 3 and 1F are allowed for Bulletin 2102L, 2103L, 2112 and 2113.
[3] DeviceNet options 11DSA2 and 11DSA3 are mutually exclusive. Not available with 7FEE_D. Not available for 2193F single or dual mounted when one or both trip code '00' is used. Mutually exclusive with E3 overload relays, option 7FEC_.
[4] A 120/240VAC source must be provided.
[5] Bulletins 2192F and 2192M require option 98 (external N.O. auxiliary contact). Bulletins 2193F and 2193M require option 98 (N.O. external auxiliary contact) or 98X (N.O. internal auxiliary contact).
[6] Not available with dual 2192F units.
[7] Available for 110-240V control voltage. SC delivery for 110-120V control voltage. PE delivery for 220-240V control voltage. Not available for common control.
[8] Options 17 and 89CBL are mutually exclusive.
[9] Not available with option -7FEC_ _.
[10] Except primary wiring to control transformers. On units where the control transformer is inaccessible (e.g. installed under a mounting bracket), the transformer secondary 'x1' will be wired to the transformer secondary fuse and the transformer secondary 'x2' will be grounded and wired to the coil on Bulletin 2102 or 2103 units, to the coil on the starter units when option -18 is selected, to the normally closed overload relay auxiliary contact on the starter units when option -18 is not selected.

Multiple option numbers are separated by a dash and added to the base catalog number in ascending order.

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Option	Option Number	Description	NEMA Size	Wiring Type	Misc. Units		FVC [1]		FVR		FVNR [1]		TS1W TS2W		TSR1W TSR2W		FDS		CB		Xfmr		Delivery Program
					2100D	2100M	2102L	2103L	2106	2107	2112	2113	2122	2123	2126	2127	2192F	2192M	2193F	2193M	2196	2197	
Auxiliary Contacts[2]	-90	NORMALLY OPEN One (1) N.O. auxiliary contact mounted on each contactor or starter	1-6	A			✓	✓			✓	✓											SC
									✓	✓			✓	✓									
															✓	✓							
				B [3]			✓	✓			✓	✓											
									✓	✓			✓	✓									
															✓	✓							
	-91	NORMALLY CLOSED One (1) N.C. auxiliary contact mounted on each contactor or starter	1-6	A			✓	✓			✓	✓											
									✓	✓			✓	✓									
															✓	✓							
				B [3]			✓	✓			✓	✓											
									✓	✓			✓	✓									
															✓	✓							
	-98 [4]	NORMALLY OPEN One (1) N.O. auxiliary contact (operates with movement of external handle only)	1-5	A or B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓[5]	✓	✓	✓	✓	
			6								✓	✓											
	-98X [6]	NORMALLY OPEN One (1) N.O. auxiliary contact mounted internally in circuit breaker	1-6	A or B		✓		✓		✓		✓		✓		✓			✓	✓		✓	
	-99 [4]	NORMALLY CLOSED One (1) N.C. auxiliary contact (operates with movement of external handle only)	1-5	A or B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓[5]	✓	✓	✓	✓	
			6								✓	✓											
	-99X [6]	NORMALLY CLOSED One (1) N.C. auxiliary contact mounted internally in circuit breaker	1-6	A or B		✓		✓		✓		✓		✓		✓			✓	✓		✓	

[1] For vacuum contactor starters only option -91 or -900111 is allowed.

[2] Multiple auxiliary contacts must be group coded by adding the second and third digit of the special feature number to the base digit "9" (e.g., 90-91-98X-99, when group coded, reads **9018X9**).

[3] Type B auxiliary contacts are wired to terminal blocks. If the number of auxiliary contact wiring points required exceeds the number of terminals available in the unit, remaining auxiliary contacts will be unwired. Refer to wiring diagram.

[4] The maximum number of auxiliary contacts that can be supplied is two (2), in any combination. Contacts actuate with movement of unit handle to ON or OFF position only. Contacts are not designed to actuate as the result of a circuit breaker trip. For such applications, auxiliary contacts mounted internally (98X or 99X) must be selected. Auxiliary contacts are supplied unwired. Not available on dual 2192F units or 1600A and 2000A 2193M units.

[5] For 1600A and 2000A 2192M, the maximum number of auxiliary contacts is four (4). The following contact arrangements are allowed.
- -98, -99, or -989 two contacts, (1) N.O/N.C. Form-C contacts
- -988, -999 four contacts, two (1) N.O/N.C. Form-C contacts

The auxiliary contacts are mounted external to the switch and are actuated by the movement of the operating handle. Auxiliary contacts are supplied unwired.

[6] The maximum number of auxiliary contacts that can be supplied internally is (2) N.O. and (2) N.C. With a shunt trip, the maximum is (1) N.O. and (1) N.C.. Not available for 2193F single or dual mounted when one or both trip codes are '00'.

Maximum Number of Additional Auxiliary Contacts Per Starter/Contactor

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Bulletin Number [1]	NEMA		
	Size 1-2	Size 3-5	Size 6
2102L, 2103L [2]	6	6	—
2112/2113 [2]			4
2103L/2113 Dual		—	—
2106/2107	4	4	—
2122/2123			
2102L/2103L/2112/2113 0.5SF	3	—	—
2126/2127	4	—	—

[1] Units selected with OFF pilot light will use one of these contacts. Bulletins 2126 and 2127 will use two of these contacts.

[2] When Bulletin 596 timers are selected on 30-300A contactors or size 1-5 starters, auxiliary mounting positions (P3 and P4) are used, limiting the maximum number of starter auxiliaries to two (2). When 89CB, 89CBL, 89CF, 89P, 700TC_, 11DSA2 or 11DSA3 with NEMA Type B wiring is present with transformer control in 1.0 space factor units, the number of starter auxiliary contacts is limited to four (4). When 89CBL is present with separate control and control circuit fuse (21) in 1.0 space factor units, the number of starter auxiliary contacts is limited to four (4) for units with 7FEC_ _. In E3 overloads, the number of starter auxiliary contacts is limited to five (5). For size 2 units with 7FEEE_ or 7FEE_D, E1 Plus Overload, the number of auxiliary contacts is limited to five (5)