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July 1998

Series C Frame Sizes G through R

Moulded Case Circuit Breakers

16-2500 Amperes for IEC 947-2 Applications

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Standards

Series C Moulded Case Circuit Breakers are designed to conform with the following international standards:

- Australian Standard AS 2184 and AS 3947-2 Moulded Case Circuit Breakers.
- British Standards Institution Standard BS 4752:
 Part 1, Switchgear and Control Gear
 Part 1, Circuit Breakers.
- Japanese T-Mark Standard Moulded Case Circuit Breakers.
- National Electrical Manufacturers Association Standards Publication No. AB1-1975 Moulded Case Circuit Breakers.
- South African Bureau of Standards, Standard SABS 156, Standard Specification for Moulded Case Circuit Breakers.
- Swiss Electro-Technical Association Standard SEV 947.2, Safety Regulations for Circuit Breakers.
- Union Technique de l'Electricite Standard NF C 63-120, Low Voltage Switchgear and Control Gear Circuit Breaker Requirements.
- Verband Deutscher Elektrotechnike (Association of German Electrical Engineers) Standard VDE 0660, Low Voltage Switchgear and Control Gear, Circuit Breakers.

Moulded Case Circuit Breakers 16-2500 Amperes for IEC 947-2 Applications

Series C Frame Sizes G through R

General Information

Series C Moulded Case Circuit
Breakers provide increased performance in considerably less space than standard circuit breakers or comparable fusible devices. Reduced system costs can also be realized because Series C Circuit Breakers are used in series rated systems, allowing the use of lower interrupting circuit breakers downstream.

Series C Circuit Breakers meet applicable IEC 947-2 standards, have been assigned ultimate and service interrupting ratings per IEC 947-2, and employ adjustable thermal and adjustable magnetic trips.

The Series C family includes seven frame sizes in ratings from 100 to 2500 amperes. Each frame size offers a choice of several interrupting capacities up to 100 kA at 415 volts ac (200 kA at 240 volts ac). This provides greater design flexibility than ever before possible while also helping to save space.

Series C Circuit Breakers virtually eliminate the need for redesign and they can be used to replace older circuit breakers in the same panel-boards, feeder pillars, busbar trunking tap-offs, individual enclosures, machine tool control panels, and motor control centres. In most cases, the same connecting straps, studs, and handle mechanisms can be retained and used.

Standard calibration is 40°C. For applications in high ambient temperature conditions, 50°C factory calibration is available.

Series C Circuit Breakers are also provided for dc applications. Interrupting ratings of 35 kA for the 600 ampere frame have been achieved for three-pole breakers in series at 600 volts dc.

The Most Logically Designed Contact Assembly

The flexibility and outstanding performance characteristics of Series C Circuit Breakers are made possible by one of the most logically designed contact assemblies in circuit breaker history. Based on previously patented Westinghouse contact conductor designs, the Series C contact assembly creates a high-speed "blow-open" action when it confronts the electromechanical forces produced by high-level fault currents.

Series C Circuit Breakers are operated by a toggle-type handle that is mechanically trip-free from the handle so that the contacts cannot be held closed against short circuit currents. Tripping due to overload or short circuits is clearly indicated by the position on the handle. This remarkably fast and dependable contact action is designed to enhance safety.

Thorough In-Plant Testing

The quality, dependability, and reliability of every Series C Circuit Breaker is assured by a thorough program of in-plant testing. Two calibration tests are conducted on every pole of every circuit breaker to verify the trip mechanism, operating mechanism, continuity, and accuracy.

ISO Certification

Series C Circuit Breakers are manufactured in ISO certified facilities.

More Interrupting Capacity in Less Space

Series C Circuit Breakers are physically and electrically interchangeable with the "Classic" standard line of Westinghouse moulded case circuit breakers. This means Series C Breakers are ideal for upgrading equipment designs and retrofitting existing installations.

Current Limiting Characteristics

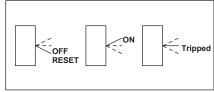
All Series C Circuit Breakers are current limiting because of their high repulsion contact arrangement and incorporation of state-of-the-art arc extinguishing technology.

Operating Mechanisms

Series C Circuit Breakers have, in their basic version, a toggle handle operating mechanism, which also serves as switching position indicator. As well as ON and OFF, the further position TRIPPED is possible.

The toggle handle snaps into the TRIPPED position if the breaker is tripped by one of its overcurrent, short circuit, shunt or undervoltage releases. Before the circuit breaker can be reclosed following a trip-out, the toggle handle must be brought beyond the OFF position (RESET). The circuit breaker can then be reclosed.

As an additional switching position indicator for F- to R-Frame circuit breakers, there are two windows on the right and on the left of the toggle handle, in which the switching state is indicated by means of the colours red, green and white corresponding to the ON, OFF and TRIPPED positions respectively.



Positions of the Toggle Handle Drive

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Series C Frame Sizes G through R

Panelboards

As both main and branch circuit protection devices (G-, F-, J-, K-, L- and N-Frames).

Feeder Pillars

In distribution systems to provide main and branch circuit protection (F-, J-, K-, L-, N- and R-Frames).

Switchgear

In distribution systems to provide main and branch circuit protection up to 2500 amperes (R-Frame).

Busbar Trunking Tap-Offs

In busbar trunking tap-offs to provide branch circuit protection (F-Frame); and to provide feeder or branch circuit protection (J-, K- and L-Frames).

Individual Enclosures

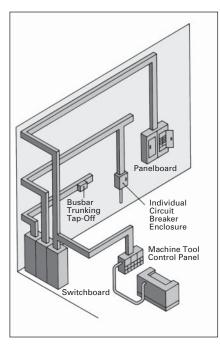
Completely assembled in enclosures to meet specific customer requirements (G-, F-, J-, K-, L-, N- and R-Frames).

Machine Tool Control Panels and Motor Control Centres

Applied for specific equipment requirements (G-, F-, J-, K-, and L-Frames).

Additional Applications

Special versions of each Series C frame are available to provide safe equipment control and protection in mining and other applications. Contact your Cutler-Hammer agent or distributor for additional information.



Typical Series C Applications

Frame	Continuous	Type of Trip Unit										
	Ampere Rating Range	Adjustable Thermal Fixed Magnetic	Fixed Thermal Fixed Magnetic	Adjustable Thermal Adjustable Magnetic	Adjustable Thermal Fixed Magnetic Earth Leakage	Digitrip RMS Electronic Trip Units	Case Switch					
G	16-100											
F	16-225											
J	125-250											
K	63-400											
L	315-800											
N	400-1250											
R	800-2500											

Series C Frame Sizes G through J

				G				F					J	
			G. G				e y manufacture de la company	Frec U.D.	o r				•:•:	
Maximum Rate	ed Current (Am	peres)	100		160	200			225			250		
Breaker Type			GWF	GWF	FWF	FW	HFW	FWC	FWF	HFWF	FWCF	JW	HJW	JWC
	city (kA rms)	AC 50-60 H	z									_		
IEC 947-2	220-240	I _{cu}	18	65	40	85	100	200	85	100	200	85	100	200
	VAC	I _{cs}	9	35	40	85	100	150	85	100	150	85	100	150
	380-415	I _{cu}		25		40	70	100	40	70	100	40	70	100
	VAC	I _{cs}		13		40	70	75	40	70	75	40	70	75
	660-690	I _{cu}				12	14	18	12	14	18	14	18	22
	VAC	I _{cs}				6	7	9	6	7	9	7	9	11
	250	I _{cu}		10		10	20	20	10	20	20	10	20	20
	VDC①	I _{cs}		5		5	10	10	5	10	10	5	10	10
NEMA	240 VAC		65	65	25②	65	100	200	65	100	200	65	100	200
	480 VAC			22		25	65	100	25	65	100	35	65	100
	600 VAC					18	25	35	18	25	35	18	25	35
Number of P	oles		1	2, 3	1			2,	, 3, 4		Į		2, 3, 4	
Ampere Ran	ge		16-	100A	16-160A		16-225@	i)		16-225	i34		125-250A	
Trip Units							Adjust	able Therma	I Magnetic				le Thermal	
	Interchang	eable												
	Built-in		I				•	•		•				
Thermal Magnetic	Fixed Therr									•		1		
iviagnetic	Adjustable	Thermal [®]		ked	Fixed									
	Magnetic		Fix	ked	Fixed	F	ixed, Opt	Adj.		Fixe	ed		Adjustabl	е
Solid State	LS													
rms	LSI													
	LSG													
	LSIG													_
Dimensions			Н	W	D	Н		W		D		Н	W	D
(mm)	1-Pole		123.8	254.4	66.7	15	52.4		35		86	_	_	_
	2-Pole			50.8					70	70	_	_	_	
	3-Pole			76.2]			105			254	105	103
	4-Pole		-	-	-				140				140	
Weight (appı	roximate) Kgs	S.	1-Pole	2-Pole	3-Pole	1-Pole	2-	Pole	3-Pole		4-Pole	3-Pole	4-F	Pole
д		0.4	0.7	1	0.7		1.8	2.4		3.1	5.2		7.0	

^{1 2} poles in series.

FWF 16-40A, 415 VAC maximum.
 FWC 200A and FWCF 175-225A rated 14/7 kA at 690 V.



② At 277 VAC.

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Series C Frame Sizes K and L

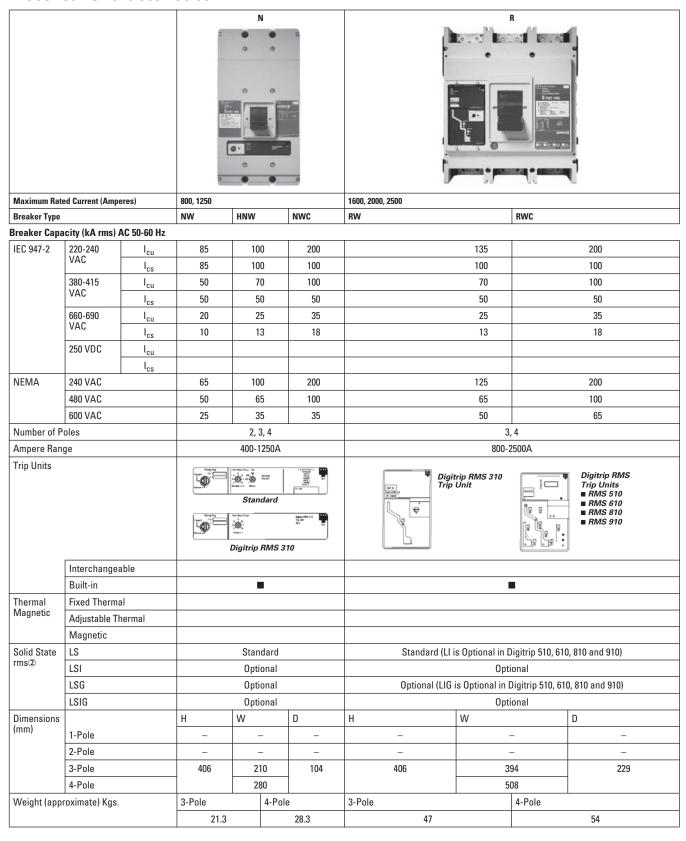
				K					L	
Maximum Rate	ed Current (Amp	eres)	400			630			800	
Breaker Type			KW	HKW	KWC	LW	HLW	LWC	LW	
reaker Capa	city (kA rms)	AC 50-60 Hz	•			•	•	•	•	
IEC 947-2	220-240	I _{cu}	85	100	200	85	100	200		65
	VAC	I _{cs}	85	100	150	85	100	150		33
	380-415	I _{cu}	45	70	100	45	70	100		50
	VAC	I _{cs}	45	70	75	45	70	75		25
	660-690	I _{cu}	20	25	35	20	25	35		20
	VAC	I _{cs}	10	13	18	10	13	18		10
	250 VDC①	I _{cu}	10	20	20	20	20	20		20
		I _{cs}	5	10	10	10	10	10		10
NEMA	240 VAC		65	100	200	65	100	200		100
	480 VAC		35	65	100	35	65	100		50
	600 VAC		25	35	50	25	35	50		25
Number of P	oles		2, 3, 4				2, 3, 4	•		3
Ampere Ran	ge			63-400	4		315-630A			700-800A
Trip Units			Specia Nation 20 Nation (Fig. 12) Nation		al Magnetic				premai Magnetic	
	Interchange	able								
	Built-in									•
Thermal	Fixed Therma	al								•
Magnetic	Adjustable Th	nermal@								
	Magnetic			Adjustal	ole		Adjustable			Adjustable
Solid State	LS			Standa	rd		Standard			Standard
rms2	LSI			Optiona			Optional			Optional
	LSG			Optiona			Optional			Optional
	LSIG			Optiona			Optional			Optional
Dimensions			Н	W	D	Н	•	W	1	D
(mm)	1-Pole		_	_	_	1	_		_	_
	2-Pole		_	_	_	+	_		_	_
	3-Pole		258	140	104	630	DA = 273		210	104
	4-Pole			183			0A = 275 0A = 406		280	-
Weight lann			3-Pole		Pole	_	o, t = +00		4-Pole	
Weight (approximate) Kgs.			3-Pole 4-Pole 3- 6.1 7.3		3-Pole 630A = 9.4/800A = 11.3		4-Pole 630A = 11.1/800A = 14.4			

^{1 2} poles in series.

For AC use only.
 4-pole ground fault not available.

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Series C Frame Sizes N and R





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Series C Frame Sizes G through R

Technical Data	G-Frame	F-Frame		J-Frame		K-Frame		L-Frame		N-Frame	R-Frame
Maximum Rated Current I _n Depending on the Version	100A	160/20	5/225A	200/2	250A	315/4	100A	500/630	D/800A	800/1250A	1600/2000/2500A
Rated Insulation Voltage U, According to IEC 947-2 Main Conducting Paths Auxiliary Circuits	750 VAC 690 VAC	750 \ 690 \		750 \ 690 \		750 \ 690 \		750 \ 690 \		750 VAC 690 VAC	750 VAC 690 VAC
Rated Impulse Withstand Voltage U _{imp} Main Conducting Paths Auxiliary Circuits	8 kV 4 kV	8 I 4 I		8 I 4 I		8 k 4 k		8 k 4 k		8 kV 4 kV	8 kV 4 kV
Rated Operational Voltage U _e IEC NEMA	440 VAC 480 VAC	690 V 600 V	/AC① /AC	690 \ 600 \		690 V		690 \ 600 \		690 VAC 600 VAC	690 VAC 600 VAC
Permissible Ambient Temperature	-20 to +70°C	-20 to	+70°C	-20 to	+70°C	-20 to	+70°C	-20 to	+70°C	-5 to +60°C	-5 to +60°C
Permissible Load for Various Ambient Temperatures Close to the Circuit Breaker, Related to the Rated Current of the Circuit Breaker ■ Circuit Breakers for Plant Protection — At 40°C — At 50°C — At 50°C — At 60°C — At 70°C		3 100% 96% 93% 91% 86%	① 100% 92% 87% 83% 73%	3 100% 96% 94% 92% 88%	400% 94% 90% 87% 80%	100% 100% 100% 1009 94% 96% 92% 969 90% 93% 87% 938 87% 90% 84% 909		3 100% 96% 93% 90% 84%	400% 91% 86% 82% 70%	- 100% 91% 85% 81%	
■ Circuit Breakers for Motor Protection - At 40°C - At 50°C - At 55°C - At 60°C - At 70°C	- - - - -	100 100 100	100% /96% /90% /86% /77%	- - - -		10 10 10	00% 00% 00% 00% 37%	10 10 10	00% 00% 00% 00% 00%	- - - - -	- - - - -
■ Circuit Breakers for Starter Combinations and Isolating Circuit Breakers — At 40°C — At 55°C — At 60°C — At 70°C	- - - - -	10	00% 00% 96% 91% 36%	10	00% 00% 06% 32% 88%	10	00% 00% 96% 90% 85%	10	00% 00% 95% 90% 34%	100% 91% 85% 81%	100% 100% 100% 100%
Rated Short Circuit Breaking Capacity (DC) Not for Circuit Breakers for Motor Protection (Time Constant $\tau=10$ rms) 1 Conducting 2 Conducting 3 Conducting Path Paths in Series For F to L up to: 250 VDC 440 VDC 660 VDC NEMA (Time Constant $\tau=8$ rms) 1 Conducting 2 Conducting Path Paths in Series	-	20 kA	Max.	20 kA	Max.	20 kA	Max.	20 kA	Max.	-2	-2
250 VDC – – 250 VDC	- 10 kA (5rms)	10 22		10 22		10 22		10 22		-2 -2	-2 -2
Main Switch Characteristics According to IEC 947-2 in Combination with Lockable Rotary Drives	-	Ye		Ye		Ye		Ye		Yes	Yes
Rated Short Circuit Breaking Capacity According to IEC 947-2 (at AC 50/60 Hz)				Rated Sho	ort Circuit l	Breaking C	apacity Se	e Table on	Pages 4-!	5-6	l
Endurance (Operating Cycles)	10,000	10,0	000	10,0	000	8,0	100	8,0	00	3,000	3,000
Maximum Switching Frequency	300 1/h	300	1/h	240	1/h	240	1/h	240	1/h	60 1/h	20 1/h
Conductor Cross Sections and Terminal Types for Main Conductors Solid or Stranded Finely Stranded with End Sleeve	Box Terminals 2.5 to 50 mm ²	Box Ter 2.5 to 70, 2.5 to 50,	/95 mm ²	Box Tel 50 to 15 35 to 12	i0 mm ²	95 to 24 70 to 15	10 mm ²	Flat Term -	inals	Flat Bar Terminals –	Flat Bar Terminals –
Busbar Tightening Torque for Box Terminals Tightening Torque for Busbar Connection Pieces	5.1 Nm	5/9 4.5/4.	- Nm	20 1	Nm	42 I 30 I	- Nm	008 1 16 1 6 N	٧m	Optional 31 Nm 50 Nm	Optional – 37 Nm
Conductor Cross Sections for Auxiliary Circuits with Terminal Connection or Terminal Strip Solid Finely Stranded with End Sleeve With Brought-out Cable Ends Tightening Torque for Fitting Screws	0.75 to 2.5 mm ² 0.75 to 2.5 mm ² -	0.75 to 2 0.75 to 2 0.82 (AWC 0.8 to 1	2.5 mm ² 2.5 mm ² G 18) mm ²	0.75 to 2 0.75 to 2 0.82 (AWC 0.8 to 1	.5 mm ² .5 mm ² 6 18) mm ²	0.75 to 2 0.75 to 2 0.82 (AWC 0.8 to 1	2.5 mm ² 2.5 mm ² G 18) mm ²	0.75 to 2 0.75 to 2 0.82 (AWC 0.8 to 1	2.5 mm ² 2.5 mm ² G 18) mm ²	Up to 2x4 mm ² Up to 2x2.5 mm ² 0.82 (AWG 18) mm ² 0.8 to 1.4 Nm	Up to 2x4 mm ² Up to 2x2.5 mm ² 0.82 (AWG 18) mm ² 0.8 to 1.4 Nm
Power Loss per Circuit Breaker at Maximum Rated Current I _n (The Power Losses of the Undervoltage Releases ("r" Releases) Must Be Observed if Necessary) at Three-Phase Symmetrical Load) For Plant Protection As Isolating Circuit Breaker For Starter Combinations For Motor Protection	- - - -	60 45 45 60	W W	75 75 45	W W	175 107 107 75	W	255 160 160 120	W W	87/210 W 87/210 W – –	220/270/400 W 220/270/400 W – –
Permissible Mounting Position			90		900			900		80	

Thermal overload release set to the lower value.



② Not suitable for DC switching.

③ Thermal overload release set to the upper value, resp. fixed-setting thermal overload releases.

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Series C Frame Sizes G through R

Technical Data	G-Frame	F-Frame	J-Frame	K-Frame	L-Frame	N-Frame	R-Frame
Auxiliary Switches							
Rated Thermal Current I _{th}	6A	6A	6A	6A	6A	6A	6A
Rated Making Capacity	10A	20A	20A	20A	20A	20A	20A
AC (AC-15) - Rated Operational Voltage - Rated Operational Current	240V	230/400/690V	230/400/690V	230/400/690V	230/400/690V	230/400/690V	230/400/690V
	6A	6/3/0.25A	6/3/0.25A	6/3/0.25A	6/3/0.25A	6/3/0.25A	6/3/0.25A
DC (DC-13) - Rated Operational Voltage - Rated Operational Current	24	24/125/240V	24/125/240V	24/125/240V	24/125/240V	24/125/240V	24/125/240V
	5	6/0.5/0.15A	6/0.5/0.15A	6/0.5/0.15A	6/0.5/0.15A	6/0.5/0.15A	6/0.5/0.15A
Back-up Fuse Miniature Circuit Breaker	6A 6A	4 6/4/4A 6/4A	4 6/4/4A 6/4A	4 6/4/4A 6/4A	4 6/4/4A 6/4A	4 6/4/4A 6/4A	4 6/4/4A 6/4A
Releases		•					
Undervoltage Releases ("r" Releases) Response Voltage: — Drop (Breaker Tripped) U _s — Pickup (Breaker May Be Switched on) U _s	35-70%	35-70%	35-70%	35-70%	35-70%	35-70%	35-70%
	85-110%	85-110%	85-110%	85-110%	85-110%	85-110%	85-110%
Power Consumption in Continuous Operation at: - AC 50/60 Hz 12V - AC 50/60 Hz 24V - AC 50/60 Hz 48-60V	_	2.5 VA	1.9 VA	1.9 VA	1.9 VA	1.9 VA	2.9 VA
	5.3 VA	1.4 VA	3.9 VA	3.9 VA	3.9 VA	2.4 VA	3.1 VA
	1.5 VA	1.2-1.9 VA	2.5-3.8 VA	2.5-3.8 VA	2.5-3.8 VA	2.3-4.1 VA	3.4-6.0 VA
 AC 50/60 Hz 110-127V AC 50/60 Hz 208-240V AC 50/60 Hz 380-500V 	1.8 VA	1.3 -1.7 VA	1.8 -2.4 VA	1.8 -2.4 VA	1.8-2.4 VA	3.4-4.2 VA	3.3-3.8 VA
	1.4 VA	2.2 -2.9 VA	2.7-3.8 VA	2.7-3.8 VA	2.7-3.8 VA	4.8-6.5 VA	4.2-7.2 VA
	4.8 VA	2.9 -5 VA	3.4-5.8 VA	3.4-5.8 VA	3.4-5.8 VA	6.8-12.0 VA	3.8 10.0 VA
- DC 12V	-	2.8 W	1.6 W	1.6 W	1.6 W	2.6 W	3.4 W
- DC 24V	-	1.6 W	3.1 W	3.1 W	3.1 W	3.6 W	4.3 W
- DC 48-60V	-	1.3-2.0 W	2.0-3.1 W	2.0-3.1 W	2.0-3.1 W	3.5 -5.5 W	4.8-7.2 W
- DC 110-125V		1.5-1.9 W	1.6-2.2 W	1.6-2.2 W	1.6-2.2 W	2.9-3.6 W	3.3-3.8 W
- DC 220-250V		2.6-3.4 W	3.1-4 W	3.1-4 W	3.1-4 W	4.8-6.3 W	6.6-7.5 W
Maximum Opening Time	50 ms	50 ms	50 ms	50 ms	50 ms	80 ms	80 ms
Shunt Trips		•					
Shunt Trips ("f" Releases) Response Voltage: — Pickup (Breaker Tripped) U _s	70-110%	70-110%	70-110%	70-110%	70-110%	70-110%	70-110%
Power Consumption in (Short Time) at: - AC 50/60 Hz 12-24V - AC 50/60 Hz 48-60V - AC 50/60 Hz 48-127V	-	40-300 VA	87-405 VA	87-405 VA	81-701 VA	86-631 VA	177-1207 VA
	-	-	710-1105 VA	710-1105 VA	58-90 VA	48-71 VA	443-731 VA
	-	92-640 VA	–	–	–	–	–
- AC 50/60 Hz 110-240V - AC 50/60 Hz 380-440V - AC 50/60 Hz 380-600V	135-500 VA - -	51-240 VA - 278-700 VA	66-432 VA 127-188 VA	66-432 VA 127-188 VA	118-665 VA 125-181 VA	81-505 VA 43-68 VA	323-1466 VA 1193-1641 VA
- AC 50/60 Hz 480-600V	_	- 270-700 VA	34-60 VA	34-60 VA	43-79 VA	41-69 VA	197-312 VA
- DC 12-24V	_	54-400 W	164-631 W	164-631 W	79-1000 W	46-405 W	289-865 W
- DC 48-60V	_	100-160 W	830-1580 W	830-1580 W	18-31 W	58-94 W	468-696 W
- DC 110-125V	_	55-71 W	112-150 W	112-150 W	112-150 W	74-98 W	363-473 W
- DC 220-250V	_	110-140 W	40-58 W	40-58 W	38-52 W	38-49 W	513-665 W
Maximum Load Duration		<u> </u>	Into	errupts Automatio	cally		
Maximum Opening Time	50 ms	50 ms	50 ms	50 ms	50 ms	62 ms	62 ms



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Series C Frame Sizes F through L

Electrical Characteristics

DC Switching Duty

The F- to L-Frame circuit breakers are also suitable for switching dc currents.

The N- and R-Frame circuit breakers, FWMP, KWMP, and LWMP circuit breakers for motor protection are not suitable for dc currents due to the solid state overcurrent release system.

For switching dc currents, however, the maximum permissible dc voltage per conducting path has to be considered.

For voltages higher than 250 volts, the series connection of two or three conducting paths is required.

As the current has to flow through all conducting paths so as to maintain the thermal tripping characteristics, the following circuit arrangements are recommended. With dc, the trip values of the instantaneous short circuit release ("n" release) are increased by 30 to 40%.

For 3- and 4-Pole Circuit Breakers

Proposed Circuit	Maximum Permissible VDC U _e	Remarks
L+	250 VDC	Double-pole switching.
NSI-5178a M		If there is no risk of an earth fault, or if any earth fault which occurs is immediately eliminated (earth fault monitoring), the maximum permissible dc voltage can be 600 volts.
+	440 VDC	Double-pole switching (earth system).
NSI-5179a M		The earthed pole must always be assigned to the individual conducting path, so that two paths are always in series in the event of an earth fault.
+C C -	600 VDC	Single-pole switching (earthed system).
NSI-5180 M		Three conducting paths in series. The earthed pole must be assigned to the nonswitched conducting path.
	750 VDC	Single-pole switching (earthed system).
NSI-5181		Four conducting paths in series. The earthed pole must be assigned to the nonswitched conducting path.





Cutler-Hammer

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Moulded Case Circuit Breakers 16-2500 Amperes for IEC 947-2 Applications

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Series C Frame Size J, 100-250 Amperes

Selection Guide and Ordering Information

	of	Thermal Range	Magnetic Range	Standard Interrupt	ting Capacity	Current Limit		Ultra-High Interrupting Capacity Current Limiting		Thermal Magnetic		Metric Mounting	
Ampere Rating	Poles			U _e Max. 690 VAC		U _e Max. 690 VAC U _e Max. 690 VAC			Trip Unit Only	Only Catalogue	Hardware Catalogue		
at 40°C12				40 kA I _{cu} at 415 VA	C	70 kA I _{cu} at 415 VA	AC .	100 kA I _{cu} at 415 V	AC		Number	Number	
				Factory Assembled Circuit Breaker Consisting of Frame, Trip Unit, and Terminals	Frame Only	Factory Assembled Circuit Breaker Consisting of Frame, Trip Unit, and Terminals	Frame Only	Factory Assembled Circuit Breaker Consisting of Frame, Trip Unit, and Terminals	Frame Only	Standard or High or Ultra-High Interrogating Frame Adjustable Thermal			
				Catalogue Numbe	r					Adjustable Magnetic			

Adjustable Thermal Magnetic Circuit Breakers With Interchangeable Trip Units

				Type JW		Type HJW		Type JWC				
125 160 200 250	2-Pole	100-125 125-160 160-200 200-250	625-1250 800-1600 1000-2000 1250-2500	JW2125 JW2160 JW2200 JW2250	JW2250F	HJW2125 HJW2160 HJW2200 HJW2250	HJW2250F	JWC2125 JWC2160 JWC2200 JWC2250	JWC2250F	JT2125TA JT2160TA JT2200TA JT2250TA	TA250KB2 TA250KB2 TA250KB2 TA250KB2	
125 160 200 250	3-Pole	100-125 125-160 160-200 200-250	625-1250 800-1600 1000-2000 1250-2500	JW3125 JW3160 JW3200 JW3250	JW3250F	HJW3125 HJW3160 HJW3200 HJW3250	HJW3250F	JWC3125 JWC3160 JWC3200 JWC3250	JWC3250F	JT3125TA JT3160TA JT3200TA JT3250TA	TA250KB2 TA250KB2 TA250KB2 TA250KB1	
125 160 200	4-Pole	100-125 125-160 160-200	625-1250 800-1600 1000-2000	JW4125 JW4160 JW4200	JW4250F	HJW41250 HJW41600 HJW42000	HJW4250F	JWC41250 JWC41600 JWC42000	JWC4250F	JT4125TA JT4160TA JT4200TA	TA250KB2 TA250KB2 TA250KB2	BMH2M
250 200 250		200-250 160-200 200-250	1250-2500 1000-2000 1250-2500	JW4250 JW4200E③ JW4250E③		HJW42500 HJW42006 HJW42506		JWC42500 JWC42006 JWC42506		JT4250TA JT4200TEA③ JT4250TEA③	TA250KB2 TA250KB2 TA250KB2	BMH2M

Adjustable Thermal Magnetic Earth Leakage Circuit Breakers

With Line and Load Terminals Included

			Type ELJW (U _e Ma	x. 415 VAC)	Type ELHJW (U _e Max. 415 VAC)		Type ELJWC (U _e M	ax. 415 VAC)			
125 160 200 250		125-160 160-200	 ELJW3125 ELJW3160 ELJW3200 ELJW3250	-	ELHJW3125 ELHJW3160 ELHJW3200 ELHJW3250	_	ELJWC3125 ELJWC3160 ELJWC3200 ELJWC3250	-	-	TA250KB TA250KB TA250KB TA250KB	BMH2M BMH2M BMH2M BMH2M
125 160 200 250	4-Pole	125-160 160-200	 ELJW4125 ELJW4160 ELJW4200 ELJW4250	-	ELHJW4125 ELHJW4160 ELHJW4200 ELHJW4250	_	ELJWC4125 ELJWC4160 ELJWC4200 ELJWC4250	_	-	TA250KB TA250KB TA250KB TA250KB	BMH2M BMH2M BMH2M BMH2M

Moulded Case Switches

MCS Only without Line and Load Terminals

			Type JW (U _e Max. 690 V		Type JW (U _e Max. 690 VAC)		Type HJW (U _e Max. 690 VAC)					
250	2-Pole 3-Pole 4-Pole	_	_	JW2250KW JW3250KW JW4250KW	_	HJW2250KW HJW3250KW HJW4250KW	_	_	_	_	TA250KB2 TA250KB2 TA250KB2	BMH2M2

^{3 60%} protected neutral.



 $[\]ensuremath{\mathbb{T}}$ Special 50°C rating available. Order by description.

² Individually packed.

Series C Frame Size J, 100-250 Amperes

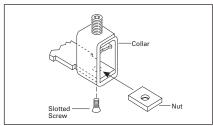
Selection Guide and Ordering Information

Line and Load Terminals

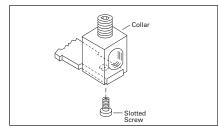
J-Frame circuit breakers include Cu/Al terminals as standard. When optional copper only terminals are required, order by catalogue number.

Maximum Breaker Amperes	Terminal Body Material	Wire Type	Metric Wire Range mm ²	AWG Wire Range/Number Conductors	Catalogue Number						
Standard Cu/AI	Standard Cu/Al Pressure Type Terminals										
250	250 Aluminium		25-185	#4-350 MCM	TA250KB						
250	Stainless Steel	Copper	25-185	#4-350 MCM	T250KB						

Catalogue Number



T250KB



TA250KB

Base Mounting Hardware

Base mounting hardware is included with a circuit breaker or moulded case switch.

Number of Poles	Description	Type of Mounting	Catalogue Number
Metric Tl	nread		
2, 3, 4	M6-0.7 x 70 mm Pan-Head Steel Screws and Lock- washers	Individual	4218B80G13
mperial	Thread		
2, 3, 4	0.250-20 x 2.75 Inch Pan-Head	Individual	4218B80G03

Handle Extension

washers

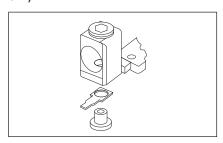
Steel Screws

Not included with breaker. Must be purchased separately.

Packaged Individually				
Catalogue Number – HEX3				

Control Wire Terminal Kit

For use with TA250KB terminals only.



Package of 12 – Priced Individually					
Catalogue Number – KCWTK					

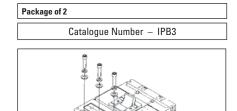
Terminal Shields

Terminal shields are available for line and load terminal areas in 2-, 3- and 4-pole circuit breakers. Terminal shields must be ordered in multiples of 10 (for each style number). (Field installation only.

Location	Number of Poles	Style Number Package of 10
Line End	2, 3 4	1266C07G01 6631C01G01
Load End	2, 3 4	6641C16G01 6641C16G02

Interphase Barriers

Field installation only.



KPEKM1 - Metric, KPEK1 - Imperial

Endcap kits are used on J-frame breaker line load to connect bus bar or similar electrical connections. Includes hardware.

Kit Catalogue Number

Metric	Imperial
KPEKM2	KPEK2



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Series C Frame Sizes G through R

Selection Guide and Ordering Information

Special Calibration

Special non-UL listed calibrations are available for certain ambient temperatures other than 40°C and for frequencies other than 50/60 Hz or dc. Reduced interrupting ratings will apply for 400 Hz applications.

50°C Calibration®

Add suffix "V" to catalogue number for complete breaker when ordering listed ampere ratings for breakers to be used in 50°C ambients.

Contact Cutler-Hammer for availability.

Moisture-Fungus Treatment

All Series C Circuit Breaker cases are moulded from glass-polyester which does not support the growth of fungus. Any parts which are susceptible to the growth of fungus will require special treatment.

Order by description.

Accessory	Frame						
	G	F	J	K	L	N	R
Special Calibration	✓	✓	✓	✓	✓	✓	✓
Moisture-Fungus Treatment	✓	✓	✓	✓	✓	✓	√

Accessory	Fit Type	Frame						
		G	F	J	K	L	N	R
xternal Accessory Catalogue N	umbers	•			•	•	•	•
Non-Padlockable Handle Block	Field Fitted	1294C01H01	LKD1	LKD3	LKD3	LKD4	LKD4	-
Padlockable	Field Fitted	-	_	_	-	-	_	_
Handle Block	Field Fitted	223C77G03	_	PHB3	PHB3	_	_	HLK6
Padlockable Handle Lock Hasp	Field Fitted	-	PHL1	PLK3	PLK3	HLK4	PLK5	-
Cylinder Lock	Factory Fitted			C	order by Descript	tion		
Key Interlock Kit (Provision Only)	Field Fitted	-	KYK1	KYK3	KYK3	KYK4	KYK4	KYK6
Slide Bar Interlock – Requires 2 Breakers	Field Fitted	-	SBK1	SBK2	SBK3	SBK4	SBK5	_
Walking Beam Interlock – Requires 2 Breakers	Factory Fitted	Order by Description						
Electrical Operator	120 VAC	-	E0P1P07	E0P2T07	E0P3T07	E0P4T07	E0P5T07	E0P6T08
	240 VAC	-	E0P1P11	E0P2T11	E0P3T11	E0P4T11	E0P5T11	E0P6T11
	120 VDC	-	E0P1P07DC	E0P2T07DC	E0P3T07DC	E0P4T26	_	_
	240 VDC	-	E0P1P11DC	E0P2T11DC	E0P3T11DC	-	_	_
	48 VDC	-	-	-	-	-	E0P5T22	E0P6T21
	125 VDC	-	_	_	-	E0P4T21	E0P5T26	_
Plug-In Adapters2	Field Fitted	-	✓	✓	✓	✓	✓	_
Rear Connecting Studs®	Field Fitted	-	✓	✓	✓	✓	✓	_
Handle Mechanism	Flex Shaft	-	✓	✓	✓	✓	✓	✓
Field Fitted Only@	Type SM	-	✓	✓	✓	✓	_	_
	Series C Rotary	✓	✓	✓	✓	✓	✓	_
	Type MC	-	✓	✓	✓	✓	_	_
	Slide Plate	-	✓	✓	✓	✓	✓	✓
est Kit								
Electronic Portable Test Kit (Digitrip 310 Only)		_	_	_	STK2	STK2	STK2	STK2

① K-, L-, N- and R-Frame breakers equipped with electronic trip units can operate reliably in ambient temperatures of 50°C.

② Contact Cutler-Hammer for catalogue numbers.



Series C Frame Sizes G through R

Selection Guide and Ordering Information

Accessory		Pole	Frame						
		Location	G	F	J	К	L	N	R
Field Fit Kit Catalog	ue Numbers								
Alarm Lockout M	Make/Break	Left	_	A1L1LPK	A1L2LPK	A1L3LPK	A1L4LPK	A1L5LPK	-
Make _		Right	Factory Fit Only	A1L1RPK	A1L2RPK	A1L3RPK	A1L4RPK	A1L5RPK	A1L6RPK
Break 7	2 Make/2 Break	Left	_	A2L1LPK	-	A2L3LPK	A2L4LPK	A2L5LPK	-
Break 7		Right	_	A2L1RPK	-	A2L3RPK	A2L4RPK	A2L5RPK	A2L6RPK
Auxiliary Switch	1A, 1B	Left	-	A1X1PK	A1X2PK	A1X3PK	A1X4PK	A1X5LPK	-
		Right	Factory Fit Only	A1X1PK	A1X2PK	A1X3PK	A1X4PK	A1X5RP	-
a	2A, 2B	Left	_	A2X1LPK	A2X2PK	A2X3PK	A2X4PK	A2X5LPK	-
b #		Right	Factory Fit Only	A2X1RPK	A2X2PK	A2X3PK	A2X4PK	A2X5RPK	A2X6RPK
	3A, 3B	Left	_	-	-	A3X3LPK	A3X4PK	A3X5LPK	-
		Right	_	-	-	A3X3RPK	A3X4PK	A3X5RPK	-
Auxiliary Switch /		Left	_	AAL1LPK	AAL2LPK	AAL3LPK	AA114LPK	AA115LPK	-
Alarm Lockout		Right	-	AAL1RPK	AAL2RPK	AAL3RPK	AA114RPK	AA115RPK	-
Shunt Trip –	120 VAC	Left	Factory Fit Only	SNT1LP08K	SNT2P11K	SNT3P11K	SNT4LP11K	SNT5LP11K	-
Standard ①		Right	_	SNT1RP08K	SNT2P11K	SNT3P11K	SNT4RP11K	-	SNT6P11K
	240 VAC	Left	Factory Fit Only	SNT1LP12K	SNT2P11K	SNT3P11K	SNT4LP11K	SNT5LP11K	-
		Right	_	SNT1RP12K	SNT2P11K	SNT3P11K	SNT4RP11K	-	SNT6P11K
ST	24 VDC	Left	Factory Fit Only	SNT1LP03K	SNT2P04K	SNT3P04K	SNT4LP03K	SNT5LP03K	-
_ c		Right	-	SNT1RP03K	SNT2P04K	SNT3P04K	SNT4RP03K	-	SNT6P03K
	48 VDC	Left	_	SNT1LP08K	SNT2P06K	SNT3P06K	SNT4LP23K	SNT5LP23K	-
		Right	_	SNT1RP08K	SNT2P06K	SNT3P06K	SNT4RP23K	-	SNT6P23K
Shunt Trip –		Left	_	LST1LPK	LST2LPK	LST3LPK	LST4LPK	LST5LPK	-
Low Energy		Right	-	LST1RPK	LST2RPK	LST3RPK	LST4RPK	-	LST6RPK
Undervoltage	120 VAC	Left	Factory Fit Only	UVH1LP08K	UVH2LP08K	UVH3LP08K	UVH4LP08K	UVH5LP08K	-
Release Mechanism®		Right	-	UVH1RP08K	UVH2RP08K	UVH3RP08K	UVH4RP08K	-	UVH6RP08K
Woonamonio	240 VAC	Left	Factory Fit Only	UVH1LP11K	UVH2LP11K	UVH3LP11K	UVH4LP11K	UVH5LP11K	-
		Right	_	UVH1RP11K	UVH2RP11K	UVH3RP11K	UVH4RP11R	_	UVH6RP11K
(UV)	24 VDC	Left	_	UVH1LP21K	UVH2LP21K	UVH3LP21K	UVH4LP21K	UVH5LP21K	_
_		Right	-	UVH1RP21K	UVH2RP21K	UVH3RP21K	UVH4RP21K	-	UVH6RP21K
	48 VDC	Left	_	UVH1LP23K	UVH2LP23K	UVH3LP23K	UVH4LP23K	UVH5LP23K	_
		Right	_	UVH1RP23K	UVH2RP23K	UVH3RP23K	UVH4RP23K	_	UVH6RP23K

① Shunt trip and undervoltage release can only be mounted in left pole of K- and L-Frame breakers equipped with electronic trip units.

Series C Frame Sizes F through N

Selection Guide and Ordering Information

Series C Rotary Handle Mechanism





The Cutler-Hammer general purpose rotary handle mechanisms are suitable for use with NEMA 1, 3R, 4 and 12 fabricated enclosures. They are designed for use with Series C Circuit Breakers, Moulded Case Switches, and Motor Circuit Protectors (MCP).

Required for a standard application are the operating handle, shaft, and mechanism.

It may be mounted in either the horizontal or the vertical direction. The handle was ergonomically designed with extra clearance for "gloved hand" to operate. It may be padlocked in the OFF position utilizing three padlocks. The handle is cast metal only.

The standard label on the operating handle indicates ON/Tripped/OFF/Reset.

Flex Shaft™ Handle Mechanism





The Flex Shaft type handle mechanism is an extra heavy-duty handle mechanism designed for mounting in flange-type enclosures. An operating handle, flexible shaft, and mechanism are required for standard application.

The handle can be locked in the RESET position with up to three padlocks. The handle is suitable for NEMA 1, 3R, 4, 4X, and 12 fabricated enclosures. It is supplied for mounting in right-hand flange enclosures. The handle fits the industry standard cutout.

Eight lengths of shafts are available for use with the wide range of depths of various enclosures (3-feet through 10-feet). These choices enable this mechanism to be mounted in various depth, width, and height enclosures. Note: when selecting the length of shaft, ensure minimum bending radius of 4-inches is maintained to operate properly.

The standard method of shipment includes the mechanism preset at the factory; however, minor field adjustments may be required.

Refer to Cutler-Hammer for availability.

Series C Rotary Handle Mechanisms

Breaker Frame	Shaft Length (mm)	Complete Catalog Nur	Complete Catalog Number③		
		IEC IP65①②	IEC IP66①②		
Series C F-Frame	152.4	WHM1R06	WHM1R06X		
	304.8	WHM1R12	WHM1R12X		
	406.4	WHM1R16	WHM1R16X		
	609.6	WHM1R24	WHM1R24X		
Series C J-Frame	152.4	WHM2R06	WHM2R06X		
	304.8	WHM2R12	WHM2R12X		
	406.4	WHM2R16	WHM2R16X		
	609.6	WHM2R24	WHM2R24X		
Series C K-Frame	152.4	WHM3R06	WHM3R06X		
	304.8	WHM3R12	WHM3R12X		
	406.4	WHM3R16	WHM3R16X		
	609.6	WHM3R24	WHM3R24X		
Series C L-Frame	152.4	WHM4R06	WHM4R06X		
	304.8	WHM4R12	WHM4R12X		
	406.4	WHM4R16	WHM4R16X		
	609.6	WHM4R24	WHM4R24X		
Series C N-Frame	152.4	WHM5R06	WHM5R06X		
	304.8	WHM5R12	WHM5R12X		
	406.4	WHM5R16	WHM5R16X		
	609.6	WHM5R24	WHM5R24X		

Standard Label on the IEC operating handle indicates (I)/Tripped/(O)/Reset.



② IEC Handle Mechanism supplied with Metric thread mounting hardware.

³ Complete Catalog Number includes a handle, mechanism and shaft.

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Series C Frame Sizes G through R

Selection Guide and Ordering Information

Remote Controlled Operating Mechanisms

Series C Circuit Breakers (sizes 160 to 2000 amperes) can be equipped with motorized operating mechanisms for remote in-service closing and opening.

For normal remote opening, solenoid operating mechanisms F- and K-Frames are available for circuit breakers and motorized operating mechanisms for J to R (sizes 250 to 2500 amperes) solenoid operating mechanisms and motor operators are always supplied with a locking device for padlocks. This device can be used for electrical and mechanical blocking of the operating mechanism. All remote operating mechanisms are equipped with a manual actuator for local operation.

Alarm Lockout

The alarm switches operate when the circuit breaker is tripped by a short circuit or overcurrent, but also when it is tripped by a shunt trip or undervoltage release.

Auxiliary Switches

Auxiliary switches are used for signalling and control purposes. The various functions of the auxiliary switches (changeover) are shown in the top table to the right.

Shunt Trips

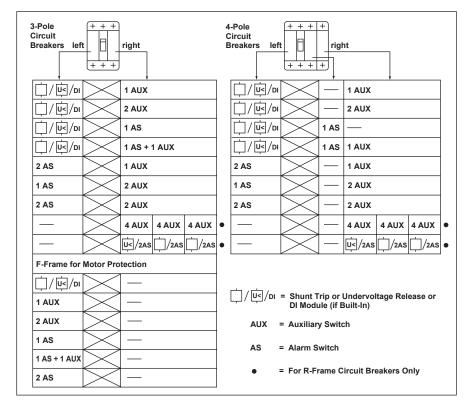
The shunt trip is used for remote tripping.

The coil of the shunt trip is rated only for short-time operation.

It is not permissible with the circuit breaker open to apply a continuous opening command to the shunt trip in order to prevent the breaker from closing.

This means that interlocking circuits with continuous commands may not be set up with shunt trips.

Possible Equipment of F- and L-Frame Circuit Breakers with Auxiliary and Alarm Switches



Undervoltage Releases

The circuit breaker cannot be closed until the undervoltage release is energized. If the release is not energized, the circuit breaker can only perform an idle switching operation.

Frequent idle switching actions should be avoided as they shorten the endurance of the circuit breaker.

Contact making by the auxiliary and alarm switches as a function of the switching position of the circuit breaker

Position of the Toggle Handle Drive (Equivalently Applicable for Rotary Drives)	Position of the Auxiliary Switch	Position of the Alarm Switch
OFF		
ON		
Tripped		

PG.29B.01.T.U



Series C Frame Sizes G through K

Time-Current Curves

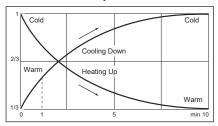
Tripping Characteristics

The operating values specified for the inverse time overcurrent releases (thermal overload releases, "a" releases) are mean values of the scatter bands of all setting ranges from the cold state and with uniform current loading of the conducting paths.

The tripping characteristics of the instantaneous (electromagnetic) short circuit releases ("n" releases) are based on the rated phase current I_n which in the case of circuit breakers with adjustable thermal overload releases is also the upper value of the setting range. With a lower setting current, a correspondingly higher multiple is obtained for the operating current of the "n" release.

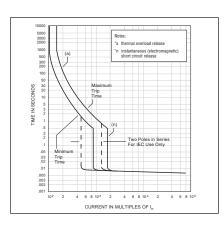
Individual time-current curves K- and L-Frame Digitrip 310 Electronic Trip Curves are available upon request.

Tripping time characteristics (Thermal Memory)



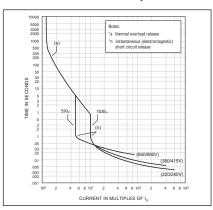
Type GWF

Tripping characteristics of GWF circuit breakers for plant protection, $I_{cu} = 25$ kA, "n" release fixed setting n = 500-1300 for breaker 16-63A; 1300-1800 for breaker 70-100A



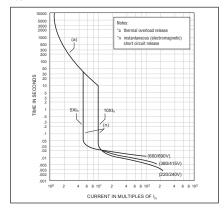
Type FW

Tripping characteristics of FW circuit breakers for plant protection, I_{cu} = 40/70 kA, "n" release adjustable



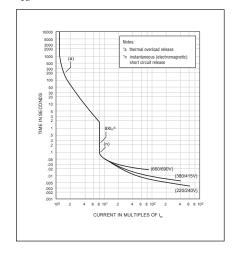
Type KW

Tripping characteristics of KW circuit breakers for plant protection, $I_{\rm cu} = 45/70$ kA, "n" release adjustable



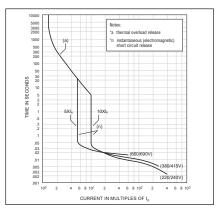
Type FWF

Tripping characteristics of FWF circuit breakers for plant protection, $I_{\text{cu}} = 40/70 \text{ kA}$, "n" release fixed setting



Type JW

Tripping characteristics of JW circuit breakers for plant protection, l_{cu} = 40/70 kA, "n" release adjustable



Series C Frame Sizes F through L

Time-Current Curves

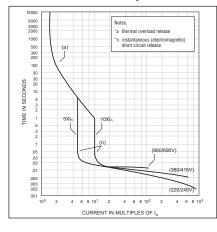
Tripping Characteristics

The operating values specified for the inverse time overcurrent releases (thermal overload releases, "a" releases) are mean values of the scatter bands of all setting ranges from the cold state and with uniform current loading of the conducting paths.

The tripping characteristics of the instantaneous (electromagnetic) short circuit releases ("n" releases) are based on the rated phase current I_n which in the case of circuit breakers with adjustable thermal overload releases is also the upper value of the setting range. With a lower setting current, a correspondingly higher multiple is obtained for the operating current of the "n" release.

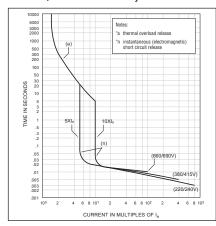
Type FW

Tripping characteristics of FW circuit breakers for plant protection, $I_{cu} = 100 \text{ kA}$, "n" release adjustable



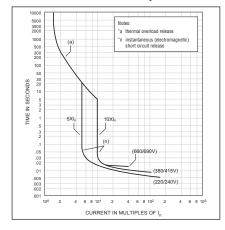
Type JW

Tripping characteristics of JW circuit breakers for plant protection, l_{cu} = 100 kA, "n" release adjustable



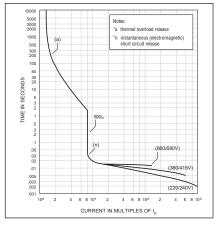
Type LW

Tripping characteristics of LW circuit breakers for plant protection, I_{cu} = 45/70 kA, "n" release adjustable



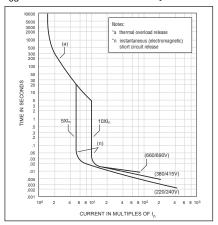
Type FWF

Tripping characteristics of FWF circuit breakers for plant protection, $I_{cu} = 100 \text{ kA}$, "n" release fixed setting



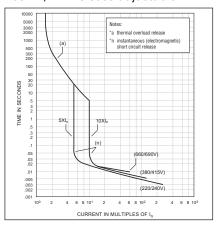
Type KW

Tripping characteristics of KW circuit breakers for plant protection, $I_{\text{CII}} = 100 \text{ kA}$, "n" release adjustable



Type LW

Tripping characteristics of LW circuit breakers for plant protection, I_{cu} = 100 kA, "n" release adjustable



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Series C Frame Sizes F through L

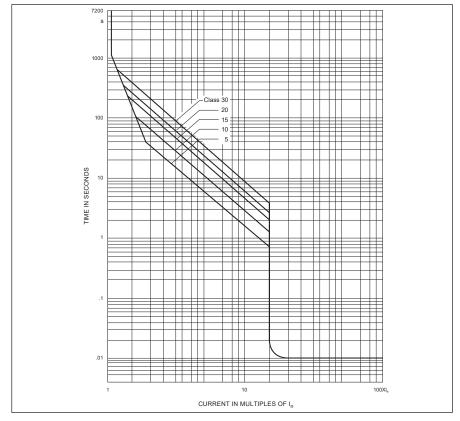
Time-Current Curves

Characteristics of the FWMP, KWMP, and LWMP Circuit Breakers for Motor Protection with Solid State Overcurrent Releases

The tripping times of the inversetime delayed overcurrent releases are only valid for the not preloaded (cold) state. At operating temperature (after load with rated current), the tripping times are reduced to approximately 33%. After an overcurrent trip, the tripping times are reduced according to the tripping time characteristics (see figure below) so that cooling down for some minutes is required before restarting the motor. During the first minute after tripping, reclosing of the circuit breaker is blocked.

Type FWMP, KWMP, and LWMP

Tripping characteristics for FWMP, KWMP, and LWMP circuit breakers for motor protection with solid state overcurrent releases



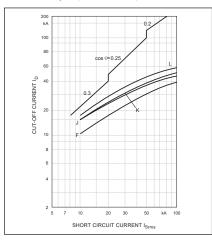


Series C Frame Sizes F through R Current Limiting Curves

Current Limiting Characteristics and Maximum I²t Values

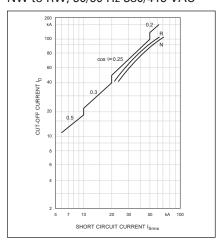
Type FW/LW

Current limiting characteristics for FW to LW, 50/60 Hz 380/415 VAC



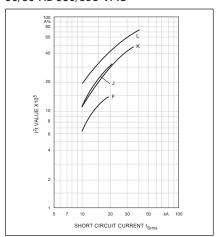
Type NW/RW

Current limiting characteristics for NW to RW, 50/60 Hz 380/415 VAC



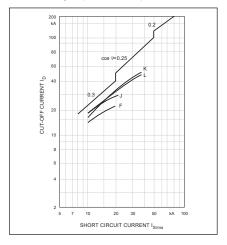
Type FW/LW

Maximum I^2t values for FW to LW, 50/60 Hz 660/695 VAC



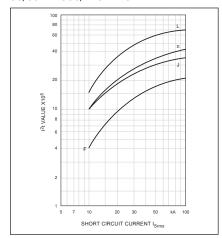
Type FW/LW

Current limiting characteristics for FW to LW, 50/60 Hz 660/690 VAC



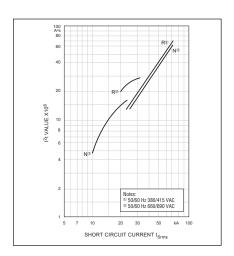
Type FW/LW

Maximum I²t values for FW to LW, 50/60 Hz 380/415 VAC



Type NW/RW

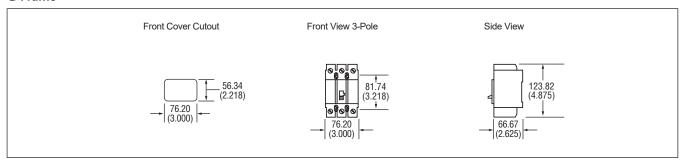
Maximum I2t values for NW to RW



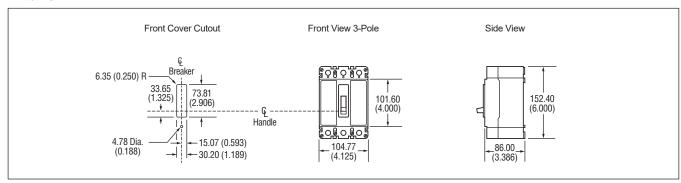
Series C Frame Sizes G through K

Dimensions, mm (inches)

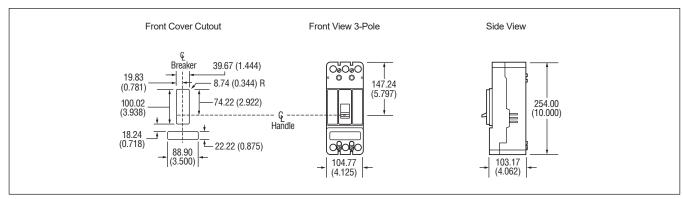
G-Frame



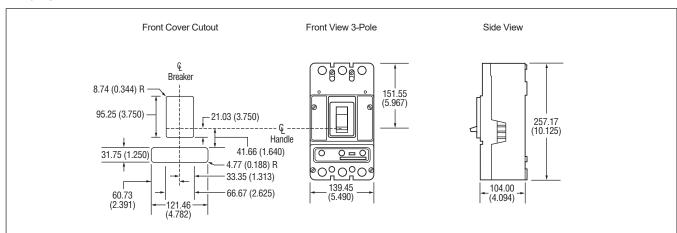
F-Frame



J-Frame



K-Frame



Dimensions in parentheses in inches.

Typical Specifications for Series C[®] Moulded Case Circuit Breakers

The circuit breakers shall meet or exceed all standards as defined in IEC 947-2. Electrical circuits shall be protected by Series C World Moulded Case Circuit Breakers as manufactured by Cutler-Hammer.

Each pole of the one-, two-, and three-pole circuit breakers shall provide complete circuit overcurrent protection by having inverse time and instantaneous tripping characteristics and, where applicable, be current limiting.

The circuit breaker shall be available in interrupting families that provide 35-65-100 kA at 380-415 volts AC.

The circuit breakers shall be operated by a toggle-type handle and have a quick-make, quick-break, over-centre switching mechanism that is mechanically trip-free from the handle so that the contacts cannot be closed against short circuit currents. Tripping due to overload or short circuits shall be clearly indicated by the position of the handle. The ON and OFF positions shall be clearly marked on the cover of the circuit breaker along with the international symbols I for ON and O for OFF on the handle, providing positive indication of the circuit breaker contact position. Additionally, a colour-coded indication of the circuit breaker contact position shall be provided: red for ON, green for OFF, and white for TRIPPED. An easily accessible Push-To-Trip button for mechanically exercising the trip unit shall be provided on the cover of each circuit breaker. All poles of a multi-pole circuit breaker shall be so constructed as to ensure simultaneous open, close, and trip operations.

Circuit breakers shall be completely enclosed in a high strength glass-polyester case.

Noninterchangeable trip circuit breakers shall be factory sealed; interchangeable trip circuit breakers shall have the trip unit sealed to prevent tampering. Ampere ratings shall be clearly visible from the front of the circuit breaker. Contacts shall be nonwelding silver alloy. Arc extinction shall be accomplished by means of DE-ION® arc extinguishers consisting of metal grids mounted in an insulating support.

The minimum interrupting ratings of the circuit breakers shall be at least equal to the available short circuit current at the line terminals.

The circuit breakers can be applied in series rated applications and subject to test data verification.

Circuit breakers in frame sizes 100 amperes through 250 amperes shall be equipped with thermal-magnetic trip units. Circuit breakers 400 amperes through 2500 ampere frame sizes shall be equipped with electronic trip units that are insensitive to changes in ambient temperature within the normal operating temperature range of the circuit breaker. The 400 ampere and 630 ampere frame sizes shall be designed to accept either thermal-magnetic or electronic interchangeable trip units.

Electronic trip units shall be rms sensing type and have unpowered thermal memory.

Circuit breaker ratings and modifications shall be indicated on the drawings.

Circuit breakers shall be of the inverse time and instantaneous trip type as provided by thermal-magnetic or electronic trip elements with either standard interrupting, high interrupting, or current limiting characteristics as required.

Moulded case circuit interrupters (motor circuit protectors) shall be of the instantaneous (magnetic) only type, providing instantaneous short circuit protection by means of a front adjustable trip unit.

Moulded case switches shall be of the same construction as the related listed circuit breaker and equipped with a factory sealed, nonadjustable, high instantaneous only short circuit protection.

Moulded case switches shall have no overload or low level fault protection provided and shall be marked with a maximum withstand rating denoting the type and level of upstream protection required. Moulded case switches shall be listed per IEC 947-2.

Internally mounted accessories including alarm (signal)/ lockout switches, auxiliary switches, shunt trips, and undervoltage released mechanisms shall be of the plug-in type and shall be listed for field fitting in circuit breakers which are not factory sealed.

Electrical operators for circuit breakers of the 400 ampere frame size and below shall be of the solenoid type with maximum five-cycle closing characteristics. Electrical operators for circuit breaker frame sizes 630 amperes through 2500 amperes shall be of the motor driven type. All electrical operators shall be cover mounted. All electrical operators shall be listed for field installation per IEC 947-2.

Electrical characteristics of accessories shall be as indicated on the drawings.

Circuit breakers in the 160 amperes rating shall be supplied in one-, two-, three-, and four-pole models, as specified on the drawings. Circuit breakers in ratings of 225 amperes through 1250 amperes shall be supplied in two-, three-, or four-pole models. The 2500 ampere circuit breaker is available in three- and four-pole models as specified on the drawings.

Accessory wiring shall be brought out through the side or rear of the circuit breaker, or be connected to a terminal block mounted on the side of the circuit breaker, as specified. The ability to route accessory wiring to the opposite side of the circuit breaker through a trough in the base shall be provided.

Circuit breakers shall be provided with uniformly designed nameplates to clearly indicate the type, rating, listing/recognition/certification marks, accessory details, and other information defined in IEC 947-2.