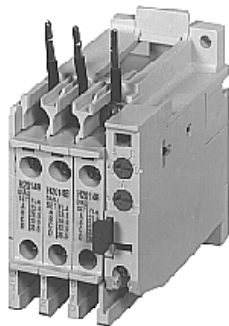


Contents

<i>Description</i>	<i>Page</i>
Thermal Overload Relays	
Product Description	33-113
Features	33-113
Operation	33-113
Technical Information	33-113
Technical Data	33-114
Factory Modifications	33-115
Accessories	33-115
Replacement Parts	33-115
Dimensions	33-116
Product Selection	33-117
Heater Pack Selection	33-117



32A Overload
Cat. No. C306DN3B

Product Description

C306 Overload Relays are designed for use with CE or CN non-reversing and reversing contactors. Four sizes are available for overload protection up to 144A.

Features

- Selectable Manual or Automatic Reset operation.
- Interchangeable Heater Packs adjustable $\pm 24\%$ to match motor FLA and calibrated for use with 1.0 and 1.15 service factor motors. Heater packs for 32A overload relay will mount in 75A overload relay — useful in derating applications such as jogging.
- Class 10 or 20 heater packs.
- Load lugs built into relay base.
- Bimetallic, ambient compensated operated. Trip free mechanism.
- Electrically isolated NO-NC contacts (pull RESET button to test). (Electrical Ratings see **Table 33-160** on **Page 33-114**).
- Overload trip indication.

- Shrouded or fingerproof terminals to reduce possibility of electrical shock.
- Meets UL 508 single-phasing requirements.
- UL listed, CSA certified, NEMA compliance and CE mark.

Operation

C306 Overload Relay Setting

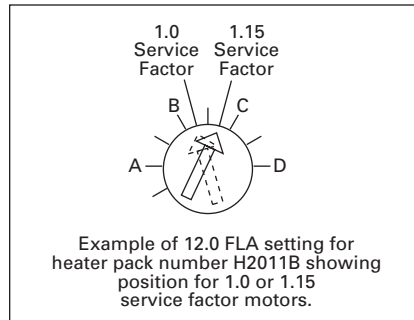


Figure 33-43. FLA Dial Adjustment

For motors having a 1.15 service factor, rotate the FLA adjustment dial to correspond to the motor's FLA rating.

Estimate the dial position when the motor FLA falls between two letter values as shown in the example.

For motors having a 1.0 service factor, rotate the FLA dial one-half position counterclockwise (CCW).

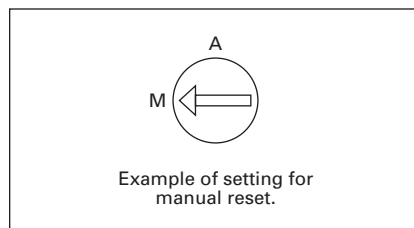


Figure 33-44. Manual/Automatic Reset

The overload relay is factory set at M for manual reset operation. For automatic reset operation, turn the reset adjustment dial to the A position as shown in the illustration.

Automatic reset is not intended for two-wire control devices.

Test for Trip Indication

To test overload relay for trip indication when in manual reset, pull out the blue reset button. An orange flag will appear indicating that the device has tripped. Push reset button in to reset.

Warning — To provide continued protection against fire or shock hazard, the complete overload relay must be replaced if burnout of the heater element occurs.

Technical Information

General

“Overload relays are provided to protect motors, motor control apparatus and motor-branch circuit conductors against excessive heating due to motor overloads and failure to start. This definition does not include: 1) motor circuits over 600V, 2) short circuits, 3) ground faults and 4) fire pump control.” (NEC Art. 430-31)

Time Current Characteristics

The time-current characteristics of an overload relay is an expression of performance which defines its operating time at various multiples of its current setting. Tests are run at Underwriters Laboratories (UL) in accordance with NEMA Standards and the NEC. UL requires:

- When tested at 100 percent of its current rating, the overload relay shall trip ultimately.
- When tested at 200 percent of its current rating, the overload relay shall trip in not more than 8 minutes.
- When tested at 600 percent of the current rating, the overload relay shall trip in not more than 10 or 20 seconds, depending on the Class of the relay.

“Current Rating” is defined as the minimum current at which the relay will trip. Per NEC, an overload must ultimately trip at 125% of FLA current (heater) setting for a 1.15 service factor motor and 115% FLA for a 1.0 service factor motor.

“Current Setting” is defined as the FLA (Full Load Amperes) of the motor and thus the overload heater pack setting.

Example: 600% of current rating is defined as 750% (600 x 1.25) of FLA current (heater) setting for a 1.15 service factor motor. A 10A heater setting must trip in 20 seconds or less at 75A motor current for a Class 20 relay.

Relays — Thermal Overload

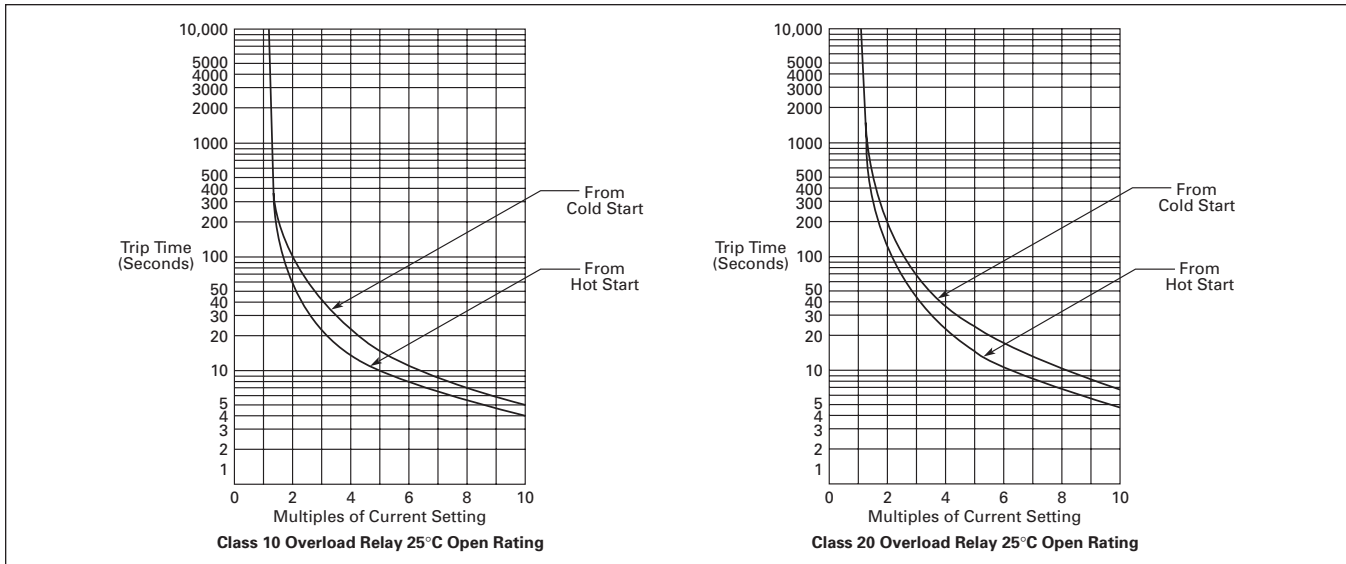


Figure 33-45. Class 10 and Class 20 Trip Curves

Technical Data

Table 33-156. Wire (75°C) Sizes — AWG or kcmil — NEMA Sizes 00 – 2, IEC A – K — Open

IEC Size	NEMA Size	Cu Only
Power Terminals — Line		
A, B, C	00	12 – 16 Stranded, 12 – 14 Solid
D, E, F	0	8 – 16 Stranded, 10 – 14 Solid
	1	8 – 14 Stranded or Solid
G, H, J, K	2	3 – 14 (Upper) and/or 6 – 14 (Lower) Stranded or Solid ①

Power Terminals — Load — Cu Only (Stranded or Solid)

Catalog Number	Terminal	Wire Size
C306DN3B	32A	14 – 6 AWG
C306GN3B	75A	14 – 2 AWG

Control Terminals — Cu Only

12 – 16 AWG Stranded, 12 – 14 AWG Solid

① Two compartment box lug.

Table 33-157. Wire (75°C) Sizes — AWG or kcmil — NEMA Sizes 3 – 8, IEC L – N — Open

IEC Size	NEMA Size	Wire Size
Power Terminals — Line and Load		
L	3	1/0 – 14 Cu/Al
M	—	1/0 – 8 Cu/Al
N	—	3/0 – 8 Cu/Al
—	4	Open — 3/0 – 8 Cu Enclosed — 250 kcmil — 6 Cu/Al
—	5	750 kcmil — 2 or (2) 250 kcmil — 3/0 Cu/Al
	6 – 7	(2) 750 kcmil — 3/0 Cu/Al
	8	(2) 750 kcmil — 1/0 Cu/Al

Control Terminals — Cu Only

12 – 16 AWG Stranded, 12 – 14 AWG Solid

Table 33-158. Power Terminal Torque Line and Load Terminals

Terminal	Catalog Number	Torque in lb-in
32A	C306DT3B	20
75A	C306GT3B	35 (14 – 10 AWG) 40 (8 AWG) 45 (6 – 4 AWG) 50 (3 – 2 AWG)
105A	C306KN3 (Socket Head Screw)	120 (3/16) 200 (1/4) 250 (5/16)
144A	C306NN3 (Socket Head Screw)	120 (3/16) 200 (1/4) 250 (5/16)
	C306NN3 (Slotted Head Screw)	35 (14 – 10 AWG) 40 (8 AWG) 45 (6 – 4 AWG) 50 (3 – 1/0 AWG)

Table 33-159. Plugging and Jogging Service Horsepower Ratings ②

NEMA Size	200V	230V	460V	575V
00	—	1/2	1/2	1/2
0	1-1/2	1-1/2	2	2
1	3	3	5	5
2	7-1/2	10	15	15
3	15	20	30	30
4	25	30	60	60
5	60	75	150	150
6	125	150	300	300

② Maximum horsepower where operation is interrupted more than 5 times per minute or more than 10 times in a 10 minute period. NEMA standard ICS 2-1993 table 2-4-3.

Table 33-160. Overload Relay UL/CSA Contact Ratings Control Circuit ③

AC Volts	120V	240V	480V	600V
NC Contact B600				
Make and Break Amps	30	15	7.5	6
Break Amps	3	1.5	.75	.6
Continuous Amps	5	5	5	5
NO Contact C600				
Make and Break Amps	15	7.5	3.375	3
Break Amps	1.5	.75	.375	.3
Continuous Amps	2.5	2.5	2.5	2.5

③ DC ratings cover Freedom Series coils only.

Factory Modifications

C306 Thermal Overload Relays with Mounting Adapter

Consists of a thermal overload relay mounted to a terminal base adapter — permits fast and easy installation.

Table 33-161. Product Selection

Description	Catalog Number	Price U.S. \$
C306DN3B + C306TB1 C306GN3B + C306TB2B	C306DT3B C306GT3B	

Accessories

DIN Rail and Panel Mounting Adapter

These adapters are required when component overload relays are to be separately mounted. The terminal base adapter includes line terminals and connects with the overload relays on **Page 33-117**.



Cat. No. C306TB1

Table 33-162. Product Selection

Description	Catalog Number	Price U.S. \$
For 32A Overload Relay For 75A Overload Relay	C306TB1 C306TB2B ①	

① This Series B adapter will accept Series A or B overload relays (C306GN3 or C306GN3B), C306TB2 can only be used with C306GN3.

Locking Cover for Overload Relay — C306 Only

Snap-on transparent or opaque plastic panel for covering access port to the overload relay trip setting dial — helps prevent accidental or unauthorized changes to trip and reset setting.



Overload Relay Cover

Table 33-163. Product Selection

Description	Min. Order Qty. (Std. Pkg.)	Catalog Number	Price U.S. \$
Clear cover, no accessibility	50	C320PC3	
Gray cover, no accessibility w/Auto only nib	50	C320PC4	
Gray cover, no accessibility, w/Manual only nib	50	C320PC5	
Gray cover with FLA dial accessibility, A, B, C, D positions and Auto only nib	50	C320PC6	
Gray cover with FLA dial accessibility, A, B, C, D positions and Manual only nib	50	C320PC7	

Replacement Parts

Heater Pack Replacement

The heater pack series is determined by the 6th character of the Catalog Number. Series A or prior heater packs (identified by either "A" or "-" as the 6th character) have built-in load lugs. Series B or later heater packs do not (load lugs are on overload relay). Replacement of Series A or earlier heater packs with Series B or later heater packs, requires the one time addition of Lug Adapter Kit C3606KAL1-3B to the Series A1 overload relay.



Superseded Series A Heater Pack



Series B Heater Pack

Table 33-164. Heater Pack Replacement Requirements

Existing Heater Pack Catalog Numbers	Replacement Product Required
H2001-3 – H2013-3 H2001A-3 – H2013A-3	Lug Adapter Kit C3606KAL1-3B and Series B Heater Pack
H2001B-3 – H2013B-3	Series B Heater Pack
H2014-3 H2014A-3	When inventory is exhausted, replace with Lug Adapter Kit C3606KAL1-3B and Series B Heater Pack
H2014B-3	Series B Heater Pack
H2015-3 – H2017-3	When inventory is exhausted, replace with heater pack chosen from Table 33-165
H2015A-3 – H2017A-3	When inventory is exhausted, replace with Lug Adapter Kit C3606KAL1-3B and Series B Heater Pack
H2015B-3 – H2017B-3	Series B Heater Pack

Table 33-165. Heater Pack Ratings

Motor Full Load Ampere Rating				Order Heater Pack Catalog Number	Price U.S. \$
Dial Position					
A	B	C	D		
29.0	32.5	36.0	39.5	H2015B-3	
39.6	44.3	49.1	53.8	H2016B-3	
53.9	60.4	66.8	74.9	H2017B-3	

Relays — Thermal Overload

Overload Relay Lug Adapter Kit



Cat. No. C306KAL1-3
Overload Relay
Lug Adapter Kit

These kits are used in conjunction with Catalog Numbers H2001B – H2014B or H2101B – H2114B heater packs as a means of utilizing these Series B heater packs in Catalog Numbers C306DN3 and C306GN3 Series AI overload relays. The kit consists of 3 lug adapters and installation instructions. When installing Series B heater packs plus lug adapters in Series A overload relays, refer to heater pack FLA adjustment tables originally supplied with equipment (also supplied with kit).

Table 33-166. Product Selection — Overload Relay Lug

Description	Catalog Number	Price U.S. \$
Series AI Overload Relay Lug Adapter Kit	C306KAL1-3B	



Superseded 32A Series A
Overload Relay
Cat. No. C306DN3



Superseded 75A Series A
Overload Relay
Cat. No. C306GN3

Overload Relay Replacement — Series A Only

When replacing a Catalog Number C306DN3 (Part No. 10-6044) or C306GN3 (10-6319) Series A overload relay on a starter, order a Series B overload relay and Series B heater packs.

Dimensions

Table 33-167. Stand-Alone Overload Relays — Approximate Dimensions and Shipping Weight

Ampere Size	Dimensions in Inches (mm)							Ship. Wt. Lbs. (kg)
	Wide A	High B	Deep C	Mounting				
				D	E	F (Slot)	G (Hole)	
32A	1.77 (45.0)	4.13 (104.9)	3.69 (93.7)	1.36 (34.5)	3.74 (95.0)	.18 x .30 (4.6 x 7.6)	.18 (4.6) Dia.	.8 (.4)
75A	2.54 (64.5)	4.69 (119.1)	3.74 (95.0)	2.00 (50.8)	3.45 (87.6)	.22 x .26 (5.6 x 6.6)	.21 (5.3) Dia.	1.4 (.6)
105 & 144A	4.00 (101.6)	7.17 (182.1)	4.91 (124.7)	3.00 (76.2)	6.62 (168.1)	—	—	4.0 (1.8)

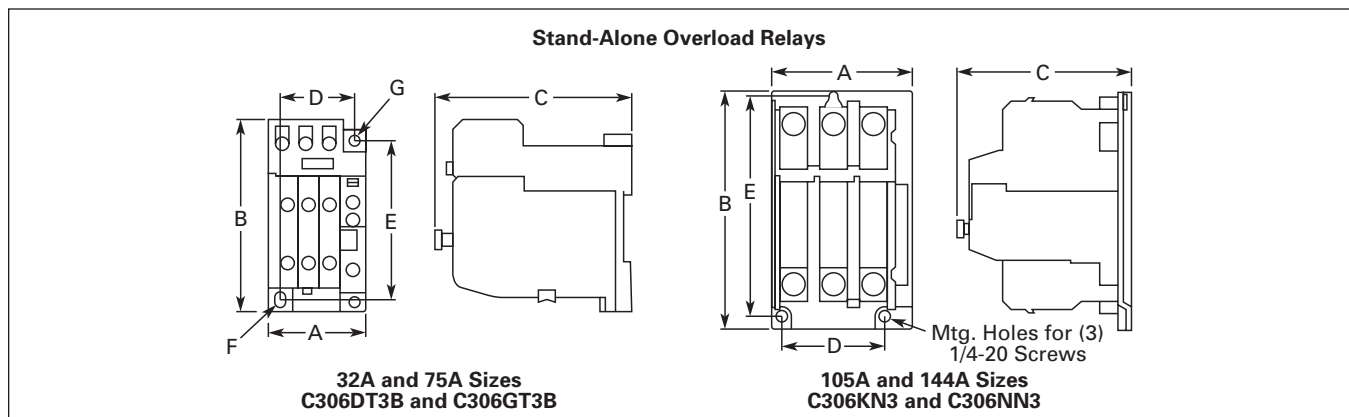
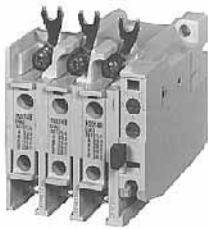


Figure 33-46. Approximate Dimensions — Stand-Alone Overload Relays

Discount Symbol 1CD1C

Product Selection



75A Overload
Cat. No. C306GN3B



75A Overload
Cat. No. C306GT3B



32A Overload
Cat. No. C306DT3B



32A Overload
Cat. No. C306DN3B

Table 33-168. C306 Thermal Overload Relays

For Use with Freedom Series Contactors NEMA Size	Maximum Ampere Rating	Number of Poles	Open Type		NEMA 1 Enclosed	
			Catalog Number	Price U.S. \$	Catalog Number	Price U.S. \$
00, 0	32 ②	3	C306DN3B		C306DG3B	
1, 2	75 ②	3	C306GN3B		C306GG3B	
3	105 ③	3	C306KN3		—	
4	144 ③	3	C306NN3			
5 – 8 ①	—	—	—			

- ① NEMA Sizes 5 – 8 use the 32A overload in conjunction with CTs.
- ② Series B overload relays have load lugs built into relay base and will only accept Series B heater packs. These relays can be directly attached to contactor or they can be DIN rail or panel mounted using adapter on **Page 33-115**.
- ③ These relays can be panel mounted only.

Table 33-169. C306 Thermal Overload Relays

For Stand-Alone Applications NEMA Size	Maximum Ampere Rating	Number of Poles	Open Type	
			Catalog Number	Price U.S. \$
00, 0, 1 ④	32	3	C306DT3B	
1 ④	75	3	C306GT3B	
3 ⑤	105	3	C306KN3	
4 ⑤	144	3	C306NN3	
5 – 8 ⑥	—	—	—	

- ④ Overload relay assembled with mounting adapter for DIN rail or panel mount.
- ⑤ Panel mount only.
- ⑥ NEMA Sizes 5 – 8 use the 32A overload in conjunction with CTs.



Heater Pack
H2001B – H2017B



Heater Pack
H2101B – H2117B



Heater Pack
H2018 – H2024

Heater Pack Selection

Heater packs H2001B to H2017B and H2101B to H2117B are to be used only with Series B overload relays Catalog Numbers C306DN3B (Part No. 10-7016) and C306GN3B (Part No. 10-7020). The load lugs are built into the overload relay base to allow load wiring prior to heater pack installation. The previous heater design had integral load lugs. The Series B heater packs are electrically equivalent to the previous heater design. Heaters H2018-3 to H2024-3 have not changed.

Table 33-170. Starters with Series B Overload Relays

NEMA — AN Type		IEC — AE Type	
Size	Series	Size	Series
00 – 0	C	A – F	C
1 – 2	B	G – K	B
5	B		
6	C		
7 – 8	B		

Note: The series of a starter is the last digit of the listed Catalog Number. EXAMPLE: AN16DN0AB.

Technical Data **Page 33-114**
 Dimensions **Page 33-116**
 Replacement Parts **Pages 33-115 – 33-116**
 Discount Symbol **1CD1C**

Relays — Thermal Overload

33

Table 33-171. Standard Trip — Class 20 Heater Selection

Overload Relay Size	Motor Full Load Ampere Rating				Catalog Number (Includes 3 Heater Packs) ①	Price U.S. \$
	Dial Position					
	A	B	C	D		

For Use with NEMA Sizes 00 – 0 Series C, NEMA Sizes 1 – 2 Series B; IEC Sizes A – F Series C, IEC Sizes G – K Series B

32A or 75A	.254	.306	.359	.411	H2001B-3	
	.375	.452	.530	.607	H2002B-3	
	.560	.676	.791	.907	H2003B-3	
	.814	.983	1.15	1.32	H2004B-3	
	1.20	1.45	1.71	1.96	H2005B-3	
	1.79	2.16	2.53	2.90	H2006B-3	
	2.15	2.60	3.04	3.49	H2007B-3	
	3.23	3.90	4.56	5.23	H2008B-3	
	4.55	5.50	6.45	7.40	H2009B-3	
	6.75	8.17	9.58	11.0	H2010B-3	
9.14	10.8	12.4	14.0	H2011B-3		
14.0	16.9	19.9	22.8	H2012B-3		
18.7	22.7	26.7	30.7	H2013B-3		
23.5	28.5	33.5	38.5	H2014B-3		

For Use with NEMA Size 2, IEC Sizes G – K Only — Series B

75A	29.0	34.0	39.1	44.1	H2015B-3	
	39.6	45.5	51.5	57.4	H2016B-3	
	53.9	60.9	67.9	74.9	H2017B-3	

For Use with NEMA Sizes 3 – 4, IEC Sizes L – N Only — Series A

105A or 144A	8.0	9.2	10.3	11.5	H2025-3	
	11.4	12.8	14.3	15.7	H2026-3	
	14.3	15.7	17.4	19.0	H2027-3	
	18.0	20.2	22.3	24.5	H2018-3	
	24.6	27.6	30.5	33.4	H2019-3	
	33.5	37.5	41.5	45.6	H2020-3	
	45.7	51.2	56.7	62.1	H2021-3	
	62.2	69.7	77.1	84.6	H2022-3	
	84.7	95.0	105.0	115.0	H2023-3	
	106.0	118.0	131.0	144.0	H2024-3	

For Use with Size 5 Starters — Series B and IEC P, R and S with 300/5 CT

32A ②	49	59	69	79	H2004B-3	
	72	87	103	118	H2005B-3	
	107	130	152	174	H2006B-3	
	129	156	182	209	H2007B-3	
	194	234	274	—	H2008B-3	

For Use with Size 6 Starters Only — Series B and IEC T – V with 600/5 CT

32A ②	144	174	205	235	H2005B-3	
	215	259	304	348	H2006B-3	
	258	312	365	419	H2007B-3	
	388	468	547	627	H2008B-3	

For Use with Size 7 Starters Only — Series B and IEC W – X with 1000/5 CT

32A ②	163	197	230	264	H2004B-3	
	240	290	342	392	H2005B-3	
	358	432	506	580	H2006B-3	
	430	520	608	698	H2007B-3	
	646	780	912	—	H2008B-3	

For Use with Size 8 Starters Only — Series B and IEC Z with 1500/5 CT

32A ②	244	295	345	396	H2004B-3	
	360	435	513	588	H2005B-3	
	537	648	759	870	H2006B-3	
	645	780	912	1047	H2007B-3	
	969	1170	1368	—	H2008B-3	

① Heater packs are shipped 3 to a carton. Catalog Numbers are for 3 heater packs.

② Sizes 5 – 8 and IEC P – Z use the 32A overload relay with current transformers.

Table 33-172. Fast Trip — Class 10 Heater Selection

Overload Relay Size	Motor Full Load Ampere Rating				Catalog Number (Includes 3 Heater Packs) ③	Price U.S. \$
	Dial Position					
	A	B	C	D		

For Use with NEMA Sizes 00 – 0 Series C, NEMA Sizes 1 – 2 Series B; IEC Sizes A – F Series C, IEC Sizes G – K Series B

32A or 75A	.260	.313	.367	.420	H2101B-3	
	.384	.464	.543	.623	H2102B-3	
	.570	.688	.806	.924	H2103B-3	
	.846	1.02	1.20	1.37	H2104B-3	
	1.28	1.55	1.83	2.10	H2105B-3	
	1.92	2.33	2.74	3.15	H2106B-3	
	2.30	2.79	3.28	3.77	H2107B-3	
	3.38	4.10	4.82	5.54	H2108B-3	
	4.96	6.03	7.09	8.16	H2109B-3	
	7.07	8.58	10.1	11.6	H2110B-3	
9.60	11.2	12.8	14.4	H2111B-3		
14.4	17.5	20.7	23.8	H2112B-3		
18.7	21.8	25.0	28.1	H2113B-3		
23.5	27.3	31.0	34.8	H2114B-3		

For Use with NEMA Size 2, IEC Sizes G – K Only — Series B

75A	28.3	32.6	37.0	41.3	H2115B-3	
	36.6	42.3	48.1	53.8	H2116B-3	
	53.8	60.8	67.9	74.9	H2117B-3	

For Use with Size 5 Starters Only — Series B and IEC P, R and S with 300/5 CT

32A ④	51	61	72	82	H2104B-3	
	77	93	110	126	H2105B-3	
	115	140	164	189	H2106B-3	
	138	167	197	226	H2107B-3	
	203	246	289	—	H2108B-3	

For Use with Size 6 Starters Only — Series B and IEC T – V with 600/5 CT

32A ④	154	186	220	252	H2105B-3	
	230	280	329	378	H2106B-3	
	276	335	394	452	H2107B-3	
	406	492	578	—	H2108B-3	

For Use with Size 7 Starters Only — Series B and IEC W – X with 1000/5 CT

32A ④	169	204	240	274	H2104B-3	
	256	310	366	420	H2105B-3	
	384	466	543	630	H2106B-3	
	460	558	656	754	H2107B-3	
	676	820	—	—	H2108B-3	

For Use with Size 8 Starters Only — Series B and IEC Z with 1500/5 CT

32A ④	254	306	360	411	H2104B-3	
	384	465	549	630	H2105B-3	
	576	699	822	945	H2106B-3	
	690	837	984	1131	H2107B-3	
	1014	1230	—	—	H2108B-3	

③ Heater packs are shipped 3 to a carton. Catalog Numbers are for 3 heater packs.

④ Sizes 5 – 8 and IEC P – Z use the 32A overload relay with current transformers.