



**Type B27T
FOR CONTACTOR
ATTACHMENT**

**Type B77S
FOR INDIVIDUAL
MOUNTING**



**Type B177S
TO 180 AMPS**

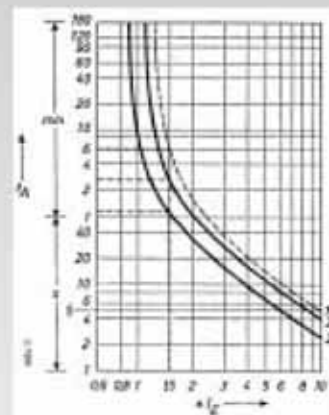
RELIABLE MOTOR PROTECTION WITH THESE FEATURES:

- ✓ Differential single-phasing protection
- ✓ Consistent operation with direct heated bimetals
- ✓ Precise factory set and tested heaters
- ✓ Protected heaters (not as open to dust and contamination)
- ✓ Ambient compensated overloads from -4°F to +140°F, permitting no false tripping
- ✓ Sealable setting overloads with epoxy or paint for critical applications
- ✓ NEMA Class 10 design for "T" Frame motors
- ✓ Both N.O. ("alarm") and N.C. ("trip") contacts
- ✓ Plug-on / bolt on to contactor design
- ✓ Optional high inertia start overloads

STOP COSTLY DOWNTIME

Old fashioned O.L. heaters cause user problems, resulting in costly downtime. They also require field heater installation, resulting on these problems:

- ✓ Trip point varies due to (1) screw tightness (2) heater position in relation to bimetal and (3) open design, with dust and contamination problems.
 - ✓ No single phasing protection.
- EE Controls Overload Relays eliminate these problems.



Tripping characteristic curve of three-pole thermal overload relays.

- 1: two-pole characteristic, relay without single phasing feature
- 2: two-pole characteristic, relay with single phasing feature
- 3: three-pole characteristic

THERMAL OVERLOAD RELAYS

*SINGLE PHASE PROTECTION
TEMPERATURE COMPENSATED*

AEG

Cal-Centron Wholesale Co

3225 Tomahawk Dr.
Stockton, CA 95205

Phone: 800.252.2094 / 209.942.2094
Fax: 209.942.2163

Thermal overload relays with standard trip characteristic

For individual mounting



Contactor attached (either plug-in, or by separate connectors)



B27T



B 77S



B 177S



B 375K

Type	B 27T	B 77S	B 177S	B 375K
Relay settings:				
Low range, from/toA	0.12/0.18	11/17	55/80	175/280
High range, from/toA	15/23	63/80	150/180	430/700
Single phasing prevention				
X-yes	X	X	X	X
Temperature compensation				
Effective from/to deg. C	-25/+60	-20/+60	-20/+60	-25/+60
Attachable to contactor Type				
plug-in, or	LS4, 7, 17, 27, 37	LS27, 37	LS87*, 107	
bus connectors	SP4, 17, 27, 37	LS 47, 57, 77, 87	LS 107, 177	
	OR Type K Contactors	OR Type K Contactors	OR Type K Contactors	
Standard Contacts, Isolated	NO/NC	NO/NC	NO/NC	
			* To 80 Amp	

D.C. Type B overloads can be used in D.C. systems with 3 poles in series.



TYPE B 27T Plug-On Mount

(For Plug-On to Contactors LS4, 7, 17, 27, 37, LS4K, 5K, 7K, 11K, 15K, 18K)

TYPE B 27T Separate Mount

(Overload & Separate Mount Adapter as an Assembly)



O.L., Relay Setting Range (Amps)	Catalog No. Suffix	List	Catalog No.	List
0.12-0.18	B27T-A	\$55.00	B 27T-AS	\$67.00
0.18-0.28	B27T-B	\$55.00	B 27T-BS	\$67.00
0.28-0.4	B27T-C	\$55.00	B 27T-CS	\$67.00
0.4-0.6	B27T-D	\$55.00	B 27T-DS	\$67.00
0.56-0.8	B27T-E	\$55.00	B 27T-ES	\$67.00
0.8-1.2	B27T-F	\$55.00	B 27T-FS	\$67.00
1.2-1.8	B27T-G	\$55.00	B 27T-GS	\$67.00
1.8-2.8	B27T-H	\$55.00	B 27T-HS	\$67.00
2.8-4	B27T-I	\$55.00	B 27T-IS	\$67.00
4-6	B27T-K	\$55.00	B 27T-KS	\$67.00
5.6-8	B27T-L	\$55.00	B 27T-LS	\$67.00
8-12	B27T-M	\$55.00	B 27T-MS	\$67.00
11-17	B27T-N	\$55.00	B 27T-NS	\$67.00
15-23	B27T-O	\$65.00	B 27T-OS	\$71.00
20-32	B77S-P-32A	\$67.00	B 77-PS	\$81.00

Adaptors to Separate Mount B27T Overloads
Catalog No.

B27T-AD (910-391-281) **\$12 List**

Adapter to Separate Mount B77S Overloads

B77-AD (910-391-268) **\$20 List**

Type
B 77S
11-80A



B177S
55-180A



B 375
175-700A



Catalog No.	Relay Setting range (Amps)	Max. Back-up fuse rating (A delayed)	List
B77S For separate mounting and for mounting on contactors LS37-77 & LS22K-37K Bus Links are included with overload. See below for BUS LINKS to bus connect special combination overloads to contactors.			
B 77S-17A	11-17A		\$67.00
B 77S-25A	16-25A	50	67.00
B 77S-32A	20-32A	63	67.00
B 77S-50A	32-50A	100	103.00
B 77S-63A	50-63A	100	103.00
B 77S-80A	63-80A	125	117.00
B 77-AD Adapter to Separate Mount B 77S Overload			20.00
B177S For separate mounting and for mounting on contactors Types LS 87*, LS 107, LS 177, LS 247			
B 177S-80A*	55-80	125	\$117.00
B 177S-110A	80-110	200	117.00
B 177S-135A	110-135	315	145.00
B 177S-160A	135-160	315	185.00
B 177S-180A	150-180	315	185.00
NO extra bus links are required to connect to LS 107, 177.			
*Only useable to 80 Amp with LS 87			
B 375K-280A ▲	175-280	Buss Links	\$420.00
B 375K-400A ▲	250-400	Sold Separately	\$540.00
B 375K-500A ▲	315-500	See Below	\$540.00
B 375K-700A ▲	430-700		\$540.00

▲ B375K Buss includes brackets to direct mount to contactor. B375K Buss Link must be ordered separately (see below).

LED TRIP INDICATOR for visual indication of O.L. contact trip. Cat. No. LS-B-LA2 \$13.00

Overloads-Connections Overload Relay Combinations with Contactors

OL Type	Adjustment Range on Overload	Contactor	Catalog No. Bus Link (set of 3)	(Supplied as standard)	List
B05	0-14	LS07(mini), LS05	*		
B27T	0-23A	LS4, 7, 17, 27 SP4, 7, 17, 27 LS4K - LS18K	*		
B77S-P-32A		LS, SP27	BL-269	**	\$ 8
B77S	11-32A	LS37, SP37 ★	BL-271	**	8
	32-50-80A ▲ old ▲ new	LS47, 57, 77, SP47, 57, 77, 87	BL-270	**	10
			BL-273	**	10
	ALL	LS15K, 18K	BL-284		10
	ALL	LS22K, 30K, 37K	BL-283		10
B177S	55-80A	LS87	BL-274		10
	80-180A	LS107, 177	BL-275	*	10
		LS45K, 55K	BL-285		10
		LS75K, 90K	*		
B375K	175-700A	LS110K-LS160K, LS247, LS220K, LS280K, LS375K	hard wired BL-280 BL-375	65 65	Must order separately

B Type overloads can be mounted to type LSK series contactors as well. Refer to page 51.



BL-271



BL-274



BL-275



BL-375

*Direct Connect Overload to Contactors Listed. No extra parts needed.

** BL-271 is included with B77S from 11-32 Amps. BL-270 use in contactors without Finger Touch Guards, 32-80A BL-269 is included with B77S-P-32A.

** BL-273 is included with B77S from 32-80 Amps. New contactors, LS47,57,77,87 with Finger Touch Guards require BL-273 for Bus Connection to O.L.

** B177S Overload. No extra Bus Links are required to connect B177 to Contactors LS107, 177.

** BL-283 is required to mount B77S to LS22K - LS37K

Note: For other Contactor/Overload Connections, overload must be separate wired to contactors.

★ B77S-32A-63A Overloads can be used with SP37 contactor. However, bus link "BL-271" must be requested.

▲ Old - Designed pre 1993

▲ New - 1993 to present

Design and function of thermal overload relays

AEG thermal overload relays have three bimetal strips combined with a snap-action operating mechanism enclosed with a moulded plastic casing. As an overload current develops, the direct-heated strips heat up and deflect. At a present current marked on the relay setting scale, the snap-action mechanism releases, and actuates a change-over contact.

Tripping characteristics

Thermal relays always release with a certain delay period, t_A . This latter period varies inversely with the load current. The trip characteristic curves apply to overload tripping from the cold motor state. When warmed up to the final selected-current temperature, tripping already occurs with some 25% to 30% of the diagram-listed values.

The lowest reponse current starts with the cold-state figure, $1.05 \times I_E$, and should not initiate tripping in less than two hours. After warming up, the current setting, $1.2 \times I_E$ must have caused tripping within two hours while in operation.

Tripping delay from "cold" for a $6 \times I_E$ reponse value serves to define relay differentials in regard to diverse tripping characteristics.

Characteristic T II = trips after 5 s
for $6 \times I_E$

When a relay responds much later than 5 seconds, its delay period is added to the designation T II e.g. TII/30 s = trips within 30 seconds for $6 \times I_E$ full-load current.

The majority of all thermal relays work to grade T II for all practical purposes. Standard drive motors are thereby afforded a good measure of protection during a safe run-up.

Temperature compensation

Variations of ambient temperature over the range from -20°C to $+60^\circ\text{C}$ (with types b 05, b 27, b 77 and b 177: -20°C to $+60^\circ\text{C}$) do not effect the release timing because of the inbuilt temperature compensating feature provided with all thermal overload relays. The prevailing ambient temperature is that measured close to the contactor.

Note: In position A or H the auxiliary contact 95-96 cannot inadvertently be opened.

Single Phasing Mode of Operation

A three-phase bimetal overload relay having no loss-of-phase protection is equipped with only one slide #1 (as in Fig. 1). This slide component lies **ahead** of the bimetal strips and transmits their deflection onto the trip mechanism. The thermal relays equipped with **single-phasing protection** are fitted with a second similar slide #2 (as in Fig. 1) set **behind** the bimetal strips. This is linked with a two-armed trip lever #3.

Given a three-pole overload trip (as under Fig. 1(b)), all three bent strips will have shifted from their "cold state" setting k , to the "three-pole warm" position, w_3 . This motion makes slide #2 give way to the bimetal strips right-handed motion, and the hinged lever #3 is shifted accordingly. The resulting travel s_2 of lever #3 and of slides #1 and #2 equals in this case the bimetal travelled distance s_1 , and so effects tripping on reaching point S.

Given a two-pole trip operation however (as illustrated in Fig. 1 (c)), the one unheated bimetal strip in the middle blocks any movement of slide #2. However, the lever-arm ratio of u enlarges the distance s_1 so travelled by the two bending bimetal strips to their "two-pole warm" end position w_2 , changing into s_2 as traveled by two armed lever #3. In other words, the two-pole overload makes for quicker tripping of a thermal relay with single phasing protection as compared to a regular three-phase state of overloading.

Should the loss of a single phase happen to a so far three-phase loaded drive relay system with a single phasing protection, then the affected bimetal strip will cool down. In doing so, it straightens and returns the bottom slide #2 to its cold-starting position. In this case, also, the overload trips more quickly.

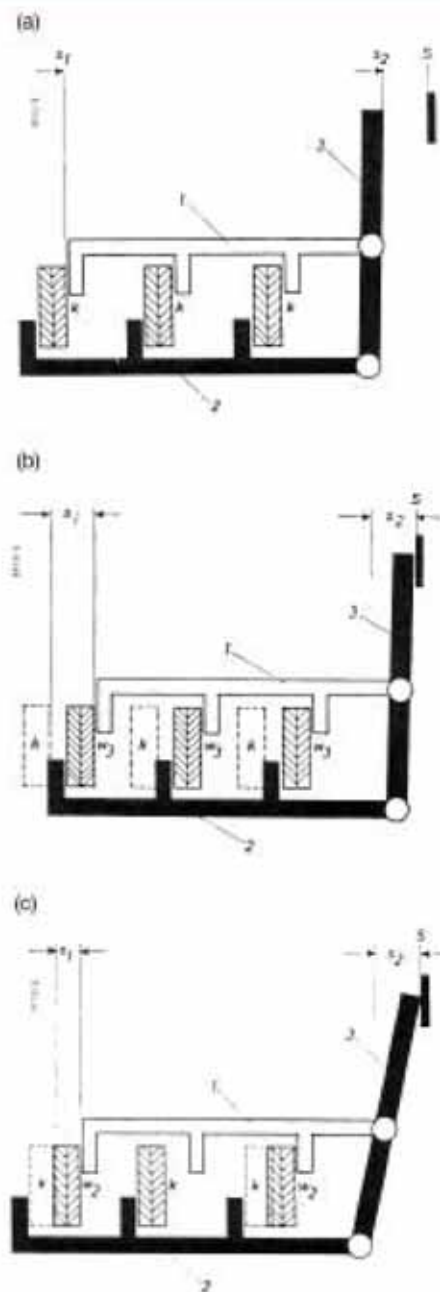


Fig. 1: Mode of operation of thermal overload relay fitted with single-phasing protection.

- (a) **Unexcited**
bimetal strips cold:
 $s_2 = s_1 = 0$
(b) **Three-phase tripping**
3 strips warm:
 $s_2 = s_1$
(c) **Two-phase excited**
midway strip cold,
outer strips warm:
 $s_2 = u \cdot s_1$

where:

k = bimetal "cold" position
 w_3 = bimetal "warm, 3-pole" position
 w_2 = bimetal "warm, 2-pole" position
1 = top slide
2 = bottom slide
3 = two-armed lever
S = tripping point
 s_1 = bimetal travel to trip
 s_2 = lever 3 travels to trip
 u = two-armed lever ratio

TYPE 027T	MULTIFUNCTION BUTTON - R			
	FUNCTION POSITION			
Effect of operating button	OFF	HAND	AUTO	A
Resetting the overload relay	•	•		
Closing auxiliary contact 95-96		•	•	
Closing auxiliary contact 95-97		•	•	
	Hand reset		Auto reset	
Adjustment ramp for the function selector switch	•	•	•	•