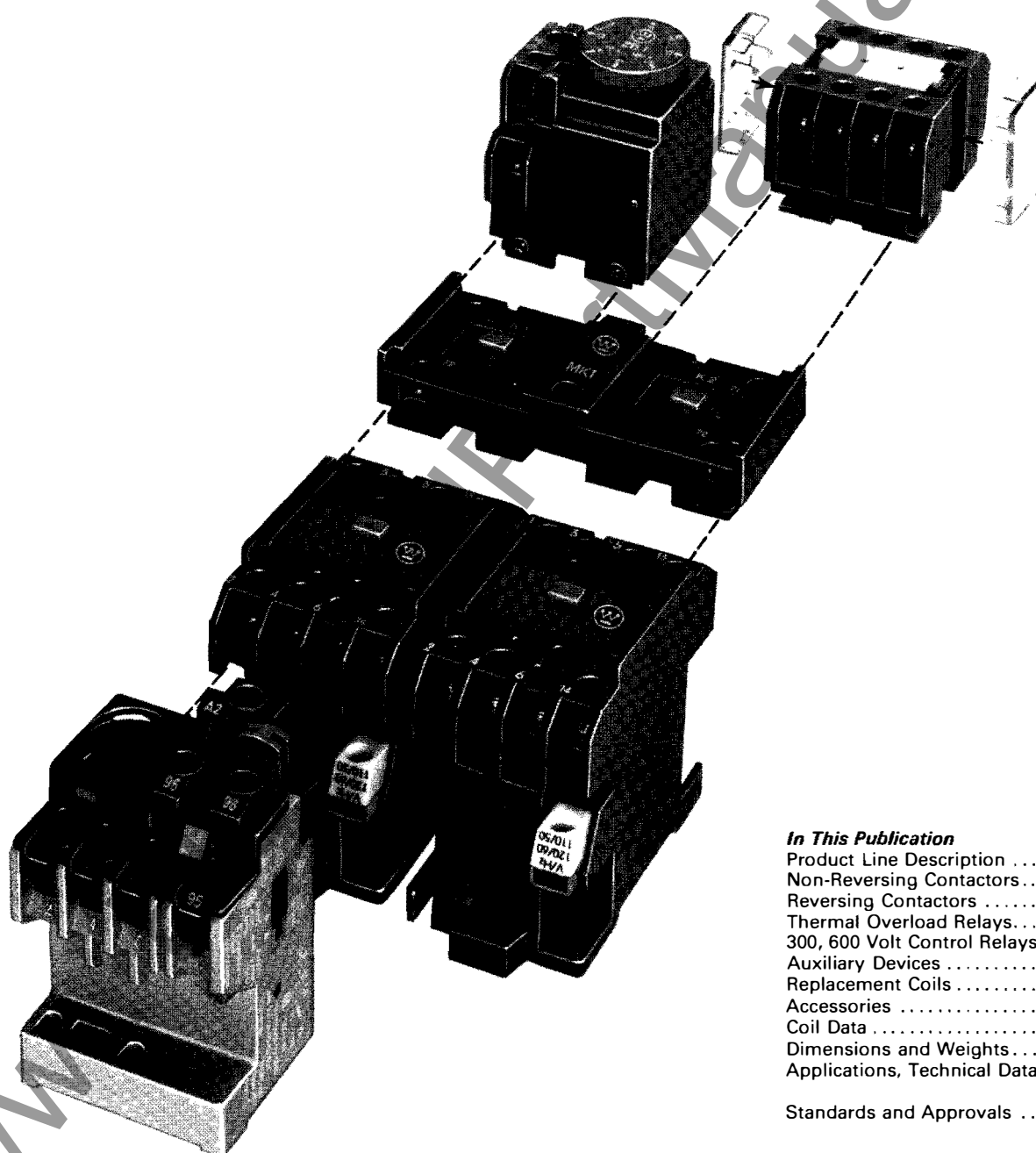




International Electrotechnical Commission Control

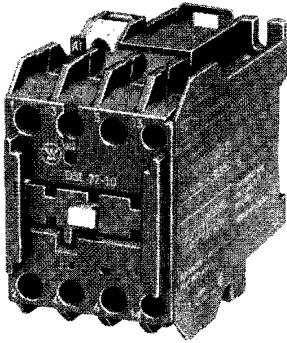


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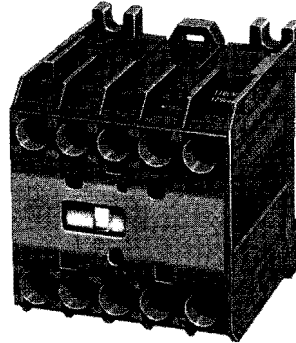
International Electrotechnical Commission Control

Non-Reversing, Reversing Contactors; Thermal Overload and Control Relays; Auxiliary Devices for Contactors

Non-Reversing and Reversing Contactors

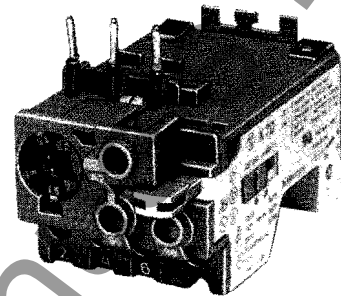


- Horsepower and kilowatt rated up to 150 Hp @ 575 volts Ac, and 110 kW @ 660 volts Ac.
- Up-front terminals – straight-through wiring.
- Slide-on auxiliary contact and timing blocks
- 35 mm DIN rail (up to DSL44) or screw mounting.
- DIN rail release located at top
- Coil terminals easily accessible – terminal extension supplied with overload.
- Quick, easy coil changes.
- Self-retaining terminal screws.
- Dead front design.



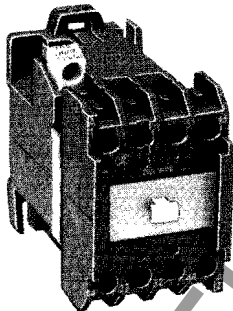
- Compact modular design
- Snap-on auxiliary contact blocks
- 35 mm DIN rail or screw mounting
- Horsepower and kilowatt rated
- Self retaining terminal screws

Thermal Overload Relays



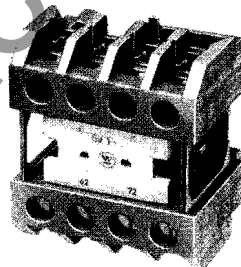
- Adjustable setting range; no heaters required.
- Directly heated bimetal current elements.
- Ambient compensated to +50°C (122°F)
- Selectable automatic or manual reset.
- Single phasing differential protection.
- Class 10 tripping characteristics.
- Contactor, panel or 35 mm DIN rail mounting.
- Current ranges up to 200 amperes.
- Bell alarm contact standard.
- Dead front design.
- Line terminal block for separate mounting.
- Functional test button standard.

Control Relays



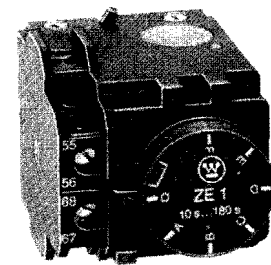
- Ac or Dc actuated operating coils
- Up-front terminals – straight through wiring
- Positive drive NO and NC contacts insure a non-overlap condition between NO and NC contacts
- Slide-on auxiliary contact and timing blocks
- 35 mm DIN rail or screw mounting
- Quick, easy coil changes
- Self-retaining terminal screws
- Dead front design
- A600 (Ac)/R300 (Dc) control circuit rating

Auxiliary Contact Blocks



- Two or four pole contact blocks in all contact configuration combinations
- SV1: four-pole with two convertible contacts
- Slide-on mounting on all contactors and 600 volt Ac control relays
- Up-front terminals
- Dead front design
- A600 (Ac)/R300 (Dc) control circuit rating

Pneumatic Timing Blocks



- On or off delay available.
- Two timing ranges: .1 to 30 seconds, 10 to 180 seconds
- Slide-on mounting on all contactors.
- Three timed contact combinations: 1NO; 1NC; 2NO; 2NC.
- Up-front terminals.
- Dead front design.
- C600 (Ac)/R300 (Dc) control circuit rating.



UL • VDE • IEC • CSA

**International Electrotechnical Commission Control
Non-Reversing Contactors****DSL Ac and DGSL Dc Non-Reversing Contactors**

Cont. Amps Open AC1	Maximum Horsepower Rating – UL						kW Rating, IEC		Coil Volts	3 Poles, Open	
	3 Phase AC3 Rating				1 Phase		AC3 380 Volts	AC3 660 Volts		Catalog Number	List Price
	200V	230V	460V	575V	115V	230V					
Type DSL – Ac Actuated 60/50 Hz											
10	2	3	1	1	1 f	1	4	4	120/110 208/- 240/220 480/440 600/550	DSL17-10A DSL17-10B DSL17-10W DSL17-10X DSL17-10E	\$ 30
20	3	3	5	7 1/2	1	2	4	5 1/2	120/110 208/- 240/220 480/440 600/550	DSL19-10A DSL19-10B DSL19-10W DSL19-10X DSL19-10E	72
25	5	5	7 f	10	1 1/2	3	5 1/2	7 1/2	120/110 208/- 240/220 480/440 600/550	DSL112-10A DSL112-10B DSL112-10W DSL112-10X DSL112-10E	92
30	7 f	7 1/2	10	15	2	3	7 1/2	11	120/110 208/- 240/220 480/440 600/550	DSL117-10A DSL17-10B DSL17-10W DSL17-10X DSL17-10E	104
40	7 1/2	10	15	20	2	5	11	15	120/110 208/- 240/220 480/440 600/550	DSL122-10A DSL122-10B DSL122-10W DSL122-10X DSL122-10E	116
75	10	15	25	30	3	7 1/2	15	22	120/110 208/- 240/220 480/440 600/550	DSL132-11A DSL132-11B DSL132-11W DSL132-11X DSL132-11E	142
85	15	20	30	40	5	10	22	30	120/110 208/- 240/220 480/440 600/550	DSL144-11A DSL144-11B DSL144-11W DSL44-11X DSL 4-11E	180
95	25	30	50	60	7 1/2	15	30	40	120/110 208/- 240/220 480/440 600/550	DSL61A DSL61B DSL61W DSL61X DSL61E	248
110	30	30	75	100	10	20	45	55	120/110 208/- 240/220 480/440 600/550	DSL96A DSL96B DSL96W DSL96X DSL96E	400
160	50	50	100	100	..	..	55	75	120/110 208/- 240/220 480/440 600/550	DSL111A DSL111B DSL111W DSL111X DSL111E	680
180	60	60	125	125	..	..	75	90	120/110 208/- 240/220 480/440 600/550	DSL156A DSL156B DSL156W DSL156X DSL156E	960
200	75	75	150	150	..	..	90	110	120/110 208/- 240/220 480/440 600/550	DSL181A DSL181B DSL181W DSL181X DSL181E	1128
Type DGSL – Dc Actuated											
20	3	3	5	7 1/2	1	2	4	4	12 24 48 125 250	DGSL9-10D DGSL9-10L DGSL9-10M DGSL9-10U DGSL9-10V	92
25	5	5	7 1/2	10	1 1/2	3	5 1/2	5 1/2	12 24 48 125 250	DGSL112-10D DGSL12-10L DGSL12-10M DGSL12-10U DGSL12-10V	112

For ratings other than AC1 and AC3, Refer to Westinghouse.

Other Available Coil Voltages

Type DSL Only	Volts	Hertz	Type DGSL Only	Volts
Suffix Letter			Suffix Letter	
Ac Voltages			Dc Voltages	
I	24	60	D	12
P	48	60	L	24
B	208	60	M	48
A	120/110	60/50	B	95
W	240/220	60/50	S	120
X	480/440	60/50	T	240
E	600/550	60/50	V	250
H	380	50	U	125

Substitute suffix letter for the last digit in the catalog number listed. Example: DSL9-10A as listed with 120/110 V, 60/50 Hz coil; DSL9-10P with 48 V, 60 Hz coil.

For other voltages not listed above, substitute suffix letter Z for the last digit in the catalog number and supply coil description.

Auxiliary Contacts

- DSL7 thru DSL22, DGSL9, DGSL12 contactors are supplied with 1 NO auxiliary contact. Up to 4 additional contacts can be added.
- DSL32 and DSL44 contactors are supplied with 1 NO, 1 NC auxiliary contacts. Up to four additional contacts can be added.
- DSL61 thru DSL181 contactors are supplied with 1 NO, 1NC convertible auxiliary contacts. Up to 2 additional convertible contacts can be added.

Terminals

- DSL61 and DSL96 are supplied with line side terminals only.
- DSL111 thru DSL181 are supplied without terminals
- If terminals are required, see page 8.

Ordering Information

Order by Catalog Number.

Further Information

Auxiliary Devices: Pages 7, 8
Dimensions: Pages 10, 11
Coil Data: Page 8
Replacement Coils: Page 8

Note: For photos of DSL contactors, see page 9.

International Electrotechnical Commission Control Reversing Contactors

UL • VDE • IEC • CSA

List Prices

DUSL AC Reversing Contactors

Cont. Amps Open AC1	Maximum Horsepower Rating – UL						kW Rating, IEC		Coil Volts	Open Type, Horizontal Only	
	3 Phase AC3 Ratings				1 Phase		AC3 380 Volts	AC3 660 Volts		Catalog Number	List Price
	200V	230V	460V	575V	115V	230V					
Type DUSL – Ac Actuated 60/50 Hz											
20	3	3	5	5	1	2	4	5½	120/110 208/- 240/220 480/440 600/550	DUSL209A DUSL209B DUSL209W DUSL209X DUSL209E	\$ 180
25	5	5	7½	7½	1½	3	5½	7½	120/110 208/- 240/220 480/440 600/550	DUSL212A DUSL212B DUSL212W DUSL212X DUSL212E	244
30	7½	7½	10	10	2	3	7½	11	120/110 208/- 240/220 480/440 600/550	DUSL217A DUSL217B DUSL217W DUSL217X DUSL217E	266
40	7½	10	15	15	2	5	11	15	120/110 208/- 240/220 480/440 600/550	DUSL222A DUSL222B DUSL222W DUSL222X DUSL222E	288
75	10	15	25	30	3	7½	15	22	120/110 208/- 240/220 480/440 600/550	DUSL232A DUSL232B DUSL232W DUSL232X DUSL232E	426
85	15	20	30	40	5	10	22	30	120/110 208/- 240/220 480/440 600/550	DUSL244A DUSL244B DUSL244W DUSL244X DUSL244E	460
95	25	30	50	60	7½	15	30	40	120/110 208/- 240/220 480/440 600/550	DUSL261A DUSL261B DUSL261W DUSL261X DUSL261E	644
110	30	30	75	100	10	20	45	55	120/110 208/- 240/220 480/440 600/550	DUSL296A DUSL296B DUSL296W DUSL296X DUSL296E	1036
160	50	50	100	100	..	..	55	75	120/110 208/- 240/220 480/440 600/550	DUSL2111A DUSL2111B DUSL2111W DUSL2111X DUSL2111E	2584
180	60	60	125	125	..	..	75	90	120/110 208/- 240/220 480/440 600/550	DUSL2156A DUSL2156B DUSL2156W DUSL2156X DUSL2156E	2797
200	75	75	150	150	..	..	90	110	120/110 208/- 240/220 480/440 600/550	DUSL2181A DUSL2181B DUSL2181W DUSL2181X DUSL2181E	2928

For ratings other than AC1 and AC3, Refer to Westinghouse.

Other Available Coil Voltages

Suffix Letter	Volts	Hertz
Ac Voltages		
I	24	60
P	48	60
B	208	60
A	120/110	60/50
W	240/220	60/50
X	480/440	60/50
E	600/550	60/50
H	380	50

Substitute suffix letter for the last digit in the catalog number listed. Example:
DUSL 209A as listed with 120/110 V, 60/50 Hz coil; DUSL 209P with 48 V, 60 Hz coil.

For other voltages not listed above, substitute suffix letter Z for the last digit in the catalog number and supply coil description.

DUSL reversing contactors are comprised of 2 interlocked three-pole contactors; each supplied with auxiliary contacts.

Auxiliary Contacts

- DUSL209 thru DUSL222 contactors are supplied with 1 NO, 1NC auxiliary contacts per contactor. Up to four additional contacts can be added per contactor.
- DUSL232 and DUSL244 contactors are supplied with 1 NO, 1 NC auxiliary contacts per contactor. No additional contacts may be added.
- DUSL261 thru DUSL2181 contactors are supplied with 2 NO, 2 NC convertible auxiliary contacts per contactor. No additional contacts may be added.

Note: Reversing contactor types DUSL232 thru DUSL2181 do not include an electrical interlock.

Ordering Information

Order by Catalog Number.

Further Information

Auxiliary Devices: Pages 7, 8
Dimensions: Pages 10, 11
Coil Data: Page 8
Replacement Coils: Page 8



International Electrotechnical Commission Control Thermal Overload Relays

UL • VDE • IEC • CSA

Types K5D, K7D, K27D, K67D AND K187D

• Class 10 Trip Characteristics

Selection Criteria

Service Factor 1.0: The overload relay is to be set at 90% of the motor full load current and an overload with a setting range bracketing that value should be selected.

Service Factor 1.15: The overload relay is to be set at 100% of the motor full load current and an overload with a setting range bracketing that value should be selected.

K7D overload relays include kit for direct mounting to DSL9, 12, 17, 22; DGSL9, 12; and DUSL209, 212, 217, 222 contactors. K7D overload relays can be panel or DIN Rail mounted.

K27D overload relays include kit for direct mounting to DSL32, 44; DUSL232, 244. K27D overload relays can be panel mounted separately. Leads fit directly into contactor terminals.

K67D overload relays include kit for direct mounting to DSL61, 96, 111, 156 and 181 contactors. K67D relays can be separately mounted as supplied.

K187D overload relays include kit for direct mounting to DSL111, 156, and 181 contactors.

Auxiliary Contact Ratings

Ac Rating - C600

Volts	Continuous Current	Maximum Make	Maximum Break
24-120	2.5 A	15 A	1.5 A
120-600	2.5 A	1800 VA	180 VA

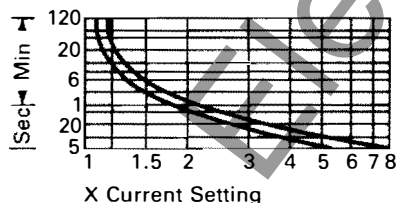
Dc Rating - R300

Volts	Cont. Current	Maximum Single Pole Make or Break	Maximum Per Pole Make or Break
125	1.0 A	0.22 A	28 VA
250	1.0 A	0.11 A	28 VA

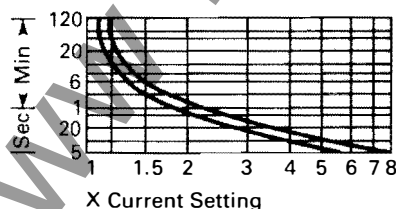
Overload Relay Trip Characteristics

Three-pole tripping from cold condition. Tripping values lie within the shaded band.

K5D, K7D



K27D



Ordering Information

Order by Style Number. Use Catalog Number as description.

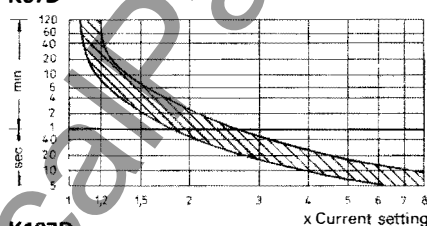
April, 1988

List Prices

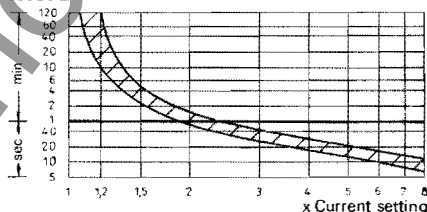
K7D, K27D, K67D, K187D Relays

Setting Range	Catalog Number	Style Number	List Price
Amperes			
0.2 - 0.32	K7D.32	6711C93G01	\$ 36
0.3 - 0.5	K7D.5	6711C93G02	36
0.45 - 0.75	K7D.75	6711C93G03	36
0.7 - 1.1	K7D1.1	6711C93G04	36
1.0 - 1.6	K7D1.6	6711C93G05	36
1.4 - 2.2	K7D2.2	6711C93G06	36
2.0 - 3.2	K7D3.2	6711C93G07	36
3.0 - 5.0	K7D5.0	6711C93G08	36
4.5 - 7.5	K7D7.5	6711C93G09	36
7.0 - 12.0	K7D12	6711C93G10	36
11.0 - 18.0	K7D18	6711C93G11	36
16.0 - 23.0	K7D23	6711C93G12	36
13.0 - 21.0	K27D21	6711C93G23	40
16.0 - 25.0	K27D25	6711C93G24	40
21.0 - 32.0	K27D32	6711C93G13	52
25.0 - 40.0	K27D40	6711C93G17	52
32.0 - 50.0	K27D50	6711C93G18	52
50.0 - 63.0	K27D63	6711C93G19	78
40.0 - 60.0	K67D60	6711C93G25	78
55.0 - 80.0	K67D80	6711C93G26	78
70.0 - 100.0	K67D100	6711C93G27	110
90.0 - 130.0	K67D130	6711C93G28	110
100.0 - 150.0	K187D150	6711C93G29	310
140.0 - 200.0	K187D200	6711C93G30	310

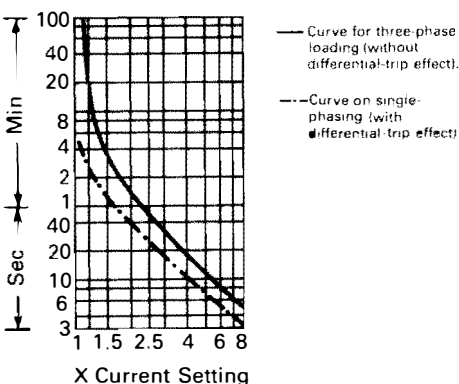
K67D



K187D



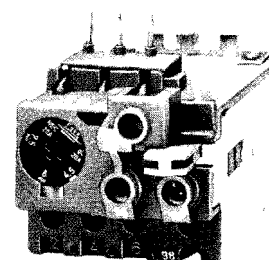
Example of Tripping-characteristics for K...D thermal overload relay with differential-tripping.



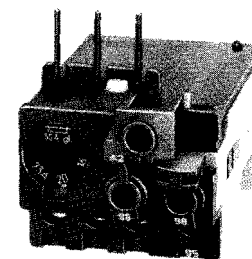
K5D Relays

Setting Range	Catalog Number	Style Number	List Price
Amperes			
0.2 - 0.32	K5D.32	6711C93G35	\$ 36
0.3 - 0.5	K5D.5	6711C93G36	36
0.45 - 0.75	K5D.75	6711C93G37	36
0.7 - 1.1	K5D1.1	6711C93G38	36
1.0 - 1.6	K5D1.6	6711C93G39	36
1.4 - 2.2	K5D2.2	6711C93G40	36
2.0 - 3.2	K5D3.2	6711C93G41	36
3.0 - 5.0	K5D5.0	6711C93G42	36
4.5 - 7.5	K5D7.5	6711C93G43	36
7.0 - 12.0	K5D12	6711C93G44	36

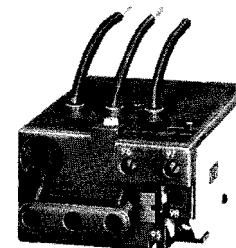
K5D overload relays include kit for direct mounting to DSL7.



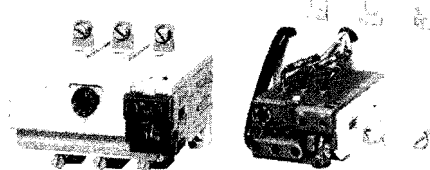
K5D



K7D



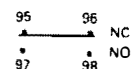
K27D



K67D

K187D

Auxiliary Contact Configurations

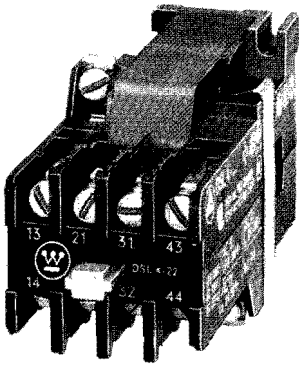


K5D, K7D
K27D, K67D
K187D

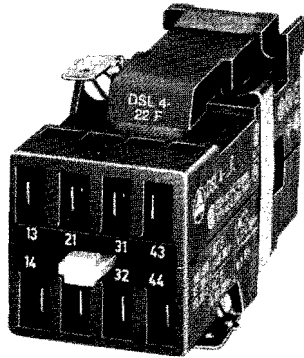
Discount C20-3

International Electrotechnical Commission Control Control Relays – 300 And 600 Volts

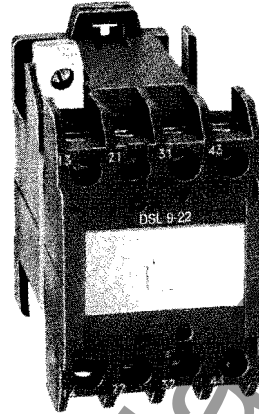
UL • VDE • IEC • CSA



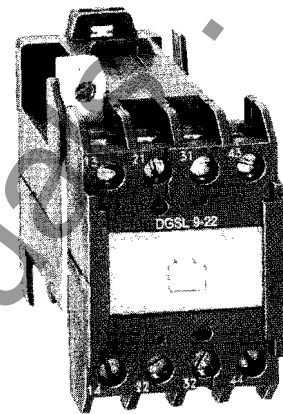
DSL4-22 (Screw Type Terminals)



DSL4-22F (Quick Connect Terminals)



DSL9



DGSL9

300 Volts

Description

Type DSL4 control relays are compact control relays ideally suited for applications where size is a factor. They are available with either screw terminals or quick connect 1/4" push on spade terminals. All terminals are accessible from the front and the screw terminals are positioned for straight through wiring. Relays mount conveniently on standard DIN 35mm mounting rails or may be panel mounted via integral mounting feet.

List Prices

Number of Poles	Contacts		Catalog Number	List Price
	NO	NC		
Type DSL4 – Screw Terminals 120/110, 60/50 Hz Coil				
4	4	0	DSL4-40A	
4	3	1	DSL4-31A	\$26
4	2	2	DSL4-22A	
Type DSL4 – Push-on Terminals 120/110, 60/50 Hz Coil				
4	4	0	DSL4-40FA	
4	3	1	DSL4-31FA	\$26
4	2	2	DSL4-22FA	

DSL4 Electrical Ratings

Ac Rating – A300

Volts	Continuous Current	Maximum Make	Break
24-120	10 A	60 A	6 A
120-300	10 A	7200 VA	720 VA

Hp Ratings (UL Listed)

Phase	Ac Volts	
1	115	230
3	1/2	1

Coil Data

(Dependent on contact arrangement)

Pick up time: 8-15 milliseconds

Drop out time: 5-10 milliseconds

Coil Power Consumption

Inrush: 27 VA (22 Watts)

Sealed: 5 VA (1.5 Watts)

Permissible Voltage Variation:

– 15%, + 10%

600 Volts

Description

Type DSL9 control relays are Ac-actuated, type DGSL9 Dc-actuated, control relays for applications up to 600 volts Ac or 300 volts Dc. Captive screw terminals are front accessible and positioned for straight through wiring. Relays mount on standard DIN 35mm mounting rails or may be panel mounted via integral mounting feet.

Complete system flexibility is achieved by the addition of 2 or 4-pole auxiliary contact blocks and pneumatic timing blocks. These auxiliaries simply slide on both DSL9 and DGSL9 control relays to provide 6 or 8-pole relay versions as well as on-delay or off-delay timing relays with timing ranges available from .1 to 180 seconds.

List Prices

Number of Poles	Contacts		Catalog Number	List Price
	NO	NC		
DSL9 120/110 V, 60/50 Hz Ac Coil				
4	4	0	DSL9-40A	\$56
	3	1	DSL9-31A	56
	2	2	DSL9-22A	56
DGSL9 125 Volt Dc Coil				
4	4	0	DGSL9-40U	\$84
	3	1	DGSL9-31U	84
	2	2	DGSL9-22U	84

DSL9/DGSL9 Electrical Ratings

Ac Rating – A600

Volts	Continuous Current	Maximum Make	Break
24-120	10 A	60 A	6 A
120-600	10 A	7200 VA	720 VA

Dc Rating – R300

Volts	Cont. Current	Max. Make or Break		
		Two Poles in Series	Single Pole	Per Pole
125	1.0 A	0.44 A	0.22 A	28 VA
250	1.0 A	0.22 A	0.11 A	28 VA

Coil Data

Pick-up time: 8-18 ms Ac, 40 ms Dc

Drop-out time: 5-17 ms Ac, 20 ms Dc

Coil Power Ac: 70 VA Inrush, 10 VA Sealed

Dc: 6W, 250 Volts Max.

Permissible Voltage Variation:

– 20%, + 10%

Other Available Coil Voltages

Type DSL Only	Volts	Hertz	Type DGSL Only	Volts
Suffix Letter			Suffix Letter	
Ac Voltages			Dc Voltages	
I	24	60	D	12
P	48	60	L	24
B	208	60	M	48
A	120/110	60/50	B	95
W	240/220	60/50	S	120
X	480/440	60/50	T	240
E	600/550	60/50	V	250
H	380	50	U	125

Substitute suffix letter for the last digit in the catalog number listed. Example: DSL9-40A as listed with 120/110 V, 60/50 Hz coil; DSL9-40P with 48 V, 60 Hz coil.

For other voltages not listed above, substitute suffix letter Z for the last digit in the catalog number and supply coil description.

Ordering Information

Order by Catalog Number.

Listed Ac-actuated relays supplied with 120/110 Volt, 60/50 Hz coils designated by suffix letter A. Listed Dc-actuated relays supplied with 125 Volt coil designated by suffix letter U. For other available coil voltages refer to coil voltage suffix table.

Further Information

Auxiliary Devices: Page 7

Ⓜ Not available with DSL4.



International Electrotechnical Commission Control Auxiliary Devices for Contactors

UL • VDE • IEC • CSA

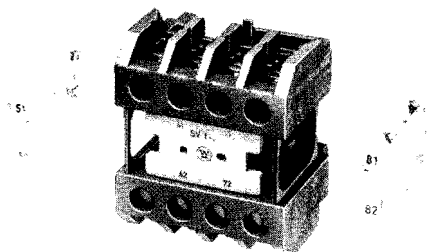
For Relays: DSL9, DGSL9

For Contactors: DSL9, 12, 17, 22, 32, 44; DGSL9, 12

For Reversing Contactors: DUSL209, 212, 217, 222

SF1, SV1

Auxiliary Contact Blocks



- Increases relay contact capacity from four to six or eight poles
- Increases contactor auxiliary contact capacity from one to three or five poles
- Simple slide-on mounting
- Will not interfere with wiring or testing
- SV1 supplied as 2 NO, 2 NC; is convertible to 1 NO, 3 NC or 4 NC
- SF1 has fixed contact arrangement

List Prices: Discount C20-2

Number of Poles	Contacts		Catalog Number	List Price
	NO	NC		
2	2	0	SF1-20	\$16
2	1	1	SF1-11	16
2	0	2	SF1-02	16
4	2	2	SV1-22 ●	32
4	1	3		
4	0	4	SV1-40 ②	32
4	2	2		
4	3	1		
4	4	0		

Contact Ratings

Ac Rating – A600

Volts	Continuous Current	Maximum	
		Make	Break
24-120	10 A	60 A	6 A
120-600	10 A	7200 VA	720 VA

Dc Rating – R300

Volts	Cont. Current	Maximum Make or Break		
		Two Poles in Series	Single Pole	Per Pole
125	1.0 A	0.44 A	0.22 A	28 VA
250	1.0 A	0.22 A	0.11 A	28 VA

Ordering Information

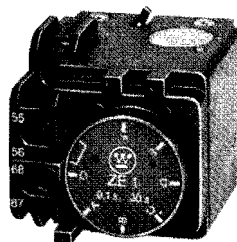
Order by catalog number

Further Information

Dimensions: Pages 10, 11

ZE1, ZA1

Pneumatic Timing Blocks



- Simple slide-on mounting
- Available in on-delay or off-delay
- Timed Contact Combinations:
1NO, 1NC; 2NO; or 2NC
- Timing Ranges: .1 to 30 seconds
10 to 180 seconds

List Prices: Discount C20-2

Delay	Timing Range, Seconds	Timed Contacts		Catalog Number	List Price
		NO	NC		
On	.1-30	1	1	ZE1-30	\$96
On	10-180	1	1	ZE1-180	96
Off	.1-30	1	1	ZA1-30	96
Off	10-180	1	1	ZA1-180	96
On	.1-30	2	0	ZE1-20-30	96
On	10-180	2	0	ZE1-20-180	96
Off	.1-30	2	0	ZA1-20-30	96
Off	10-180	2	0	ZA1-20-180	96
On	.1-30	0	2	ZE1-02-30	96
On	10-180	0	2	ZE1-02-180	96
Off	.1-30	0	2	ZA1-02-30	96
Off	10-180	0	2	ZA1-02-180	96

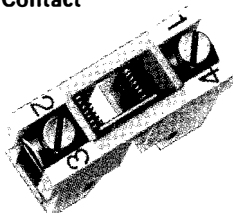
Contact Ratings

Ac Rating – C600

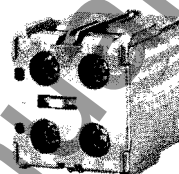
Volts	Continuous Current	Maximum	
		Make	Break
24-120	2.5 A	15 A	1.5 A
120-600	2.5 A	1800 VA	180 VA

Dc Rating – R300

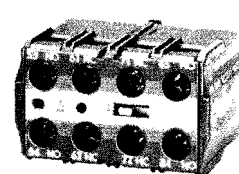
Volts	Cont. Current	Maximum Make or Break		
		Two Poles in Series	Single Pole	Per Pole
125	1.0 A	0.44 A	0.22 A	28 VA
250	1.0 A	0.22 A	0.11 A	28 VA

Auxiliary Contact

Contact Used On	Catalog Number	List Price
DSL61 to 181	SAC-1	\$6

For Contactor DSL7

SC2 Auxiliary contact block



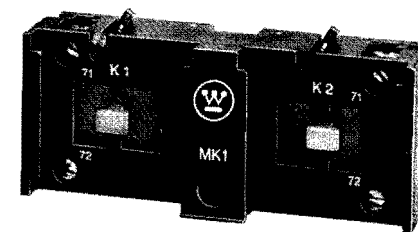
SC4 Auxiliary contact block

Discount Symbol C20-2

Number of Poles	Contacts		Catalog Number	List Price
	NO	NC		
2	0	2	SC2-02	\$10
2	1	1	SC2-11	10
4	2	2	SC4-22	20
4	3	1	SC4-31	20
4	4	0	SC4-40	20

MK1

Mechanical Interlock



- Prevents closing of one member of a reversing or multi-speed contactor until the opposite member is completely open
- Provides electrical interlocking with 2 NC auxiliary contacts
- Simple slide-on mounting on any two contactors or relays of the same frame size
- Auxiliaries SF1, SV1, ZE1 and ZA1 may be mounted on top of MK1 mechanical interlock

Catalog Number: MK1

List Price: \$24; Discount C20-1

Contact Ratings

Ac Rating – C600

Volts	Continuous Current	Maximum	
		Make	Break
24-120	2.5 A	15 A	1.5 A
120-600	2.5 A	1800 VA	180 VA

Dc Rating – R300

Volts	Cont. Current	Maximum Make or Break	
		Single Pole	Per Pole
125	1.0 A	0.22 A	28 VA
250	1.0 A	0.11 A	28 VA

International Electrotechnical Commission Control
Replacement Coils; Accessories; Coil Data**Replacement Coils****List Prices****Ac Operating Coils**

Voltage	Hertz	Catalog Number	List Price
---------	-------	----------------	------------

DSL4			
24	60	CC4-I	\$16
48	60	CC4-P	16
208	60	CC4-B	16
120/110	60/50	CC4-A	16
240/220	60/50	CC4-W	16
380	50	CC4-H	16

DSL9, 12			
24	60	CC9-I	20
48	60	CC9-P	20
208	60	CC9-B	20
120/110	60/50	CC9-A	20
240/220	60/50	CC9-W	20
480/440	60/50	CC9-X	20
600/550	60/50	CC9-E	20
380	50	CC9-H	20

DSL17, 22			
24	60	CC17-I	28
48	60	CC17-P	28
208	60	CC17-B	28
120/110	60/50	CC17-A	28
240/220	60/50	CC17-W	28
480/440	60/50	CC17-X	28
600/550	60/50	CC17-E	28
380	50	CC17-H	28

DSL32, 44			
24	60	CC32-I	28
48	60	CC32-P	28
208	60	CC32-B	28
120/110	60/50	CC32-A	28
240/220	60/50	CC32-W	28
480/440	60/50	CC32-X	28
600/550	60/50	CC32-E	28
380	50	CC32-H	28

DSL61, 96			
24	60	CC61-I	56
48	60	CC61-P	56
208	60	CC61-B	56
120/110	60/50	CC61-A	56
240/220	60/50	CC61-W	56
480/440	60/50	CC61-X	56
600/550	60/50	CC61-E	56
380	50	CC61-H	56

DSL111, 156, 181			
24	60	CC111-I	80
48	60	CC111-P	80
208	60	CC111-B	80
120/110	60/50	CC111-A	80
240/220	60/50	CC111-W	80
480/440	60/50	CC111-X	80
600/500	60/50	CC111-E	80
380	50	CC111-H	80

Dc Operating Coils

Dc coils can be used only with contactors or relays originally supplied with DC coils.

Volts	Catalog Number	List Price
-------	----------------	------------

DGSL9, 12		
12	CDC9-D	\$30
24	CDC9-L	30
48	CDC9-M	30
95	CDC9-B	30
120	CDC9-S	30
240	CDC9-T	30
250	CDC9-V	30
125	CDC9-U	30

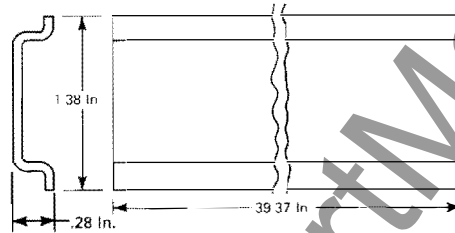
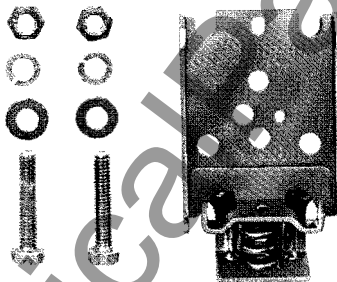
For other voltages not listed above substitute suffix letter Z for the last digit in the catalog number and supply coil description.

Accessories and Mounting Kits for Separately Mounting Overload Relays**DIN Rail 35mm****RAIL1M**

- For simple snap-on mounting of DSL relays and contactors.
- One meter length.

Catalog Number: RAIL1M

List Price: \$12; Discount C20-1

**RM1 Overload Relay Rail Mounting Kit**

- Attaches to K7D Thermal Overload Relay for snap-on mounting to 35mm DIN rail.

Catalog Number: RM1

List Price: \$10 Discount C20-3

Main Contact Kits (Sets)

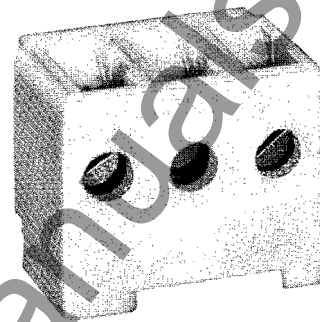
Contactors	Catalog Number	List Price
DSL32	SMC32	\$113
DSL44	SMC44	135
DSL61	SMC61	135
DSL96	SMC96	210
DSL111	SMC111	264
DSL156	SMC156	306
DSL181	SMC181	342

Coil Data

Contactors	Pick-up Time (ms)	Drop-out Time (ms)	Coil Burden (VA)	
			Inrush	Sealed
DSL9, 12; DUSL209, 212	8-18	5-17	70	10
DSL17, 22; DUSL217, 222	8-18	5-17	70	10
DSL32, 44; DUSL232, 244	25-35	12-20	130	10
DSL61, 96; DUSL261, 296	20-35	15-20	380	30
DSL111, 156, 181; DUSL2111, 2156, 2181	15-35	10-25	900	50
DGSL9, 12	40	20	6 Watts	6 Watts

Permissible Voltage Variation

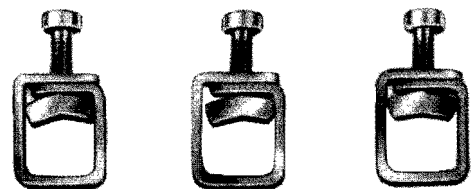
Ac Contactors: -15%, +10%
Dc Contactors: -20%, +10%

TM1 Overload Relay Line Terminal Block

- K7D Thermal Overload Relay line terminal block for applications where the overload relay is mounted separately from the contactor, i.e., DIN rail or panel mounting.

Catalog Number: TM1

List Price: \$4; Discount C20-3

Terminal Kits

Description	Catalog Number	List Price
Three (3) terminals for DSL61/96	TM96	\$6
Three (3) terminals for DSL111/156/181	TM181	8

RSK-KD

- Reset extension rod for oil relays. (10 per pack)

Catalog Number: RSK-KD

List Price: \$10



International Electrotechnical Commission Control Dimensions and Weights

Dimensions (In Inches) and Weights (In Lbs.)

Not to be used for construction purposes unless approved.

Description	Dimension Fig. No.	Weight, Lbs.
Non-Reversing Contactors		
DSL9, 12	1	0.77
DSL17, 22	2	0.99
DSL32, 44	3	3.00
DGSL9, 12	4	1.34
Reversing Contactors		
DUSL209, 212	5	1.74
DUSL217, 222	6	2.18
DUSL232, 244	7	4.93
Thermal Overload Relays		
K7D	8	0.35
K27D	9	0.66
K67D	10	2.40
K187D	11	6.56
Other		
DSL9, 12 + K7D	12	1.12
DSL17, 22 + K7D	13	1.34
DSL32, 44 + K27D	14	3.66

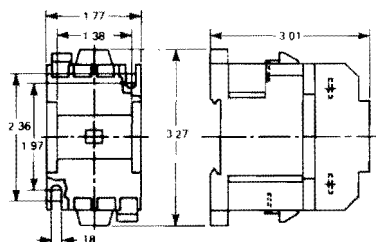


Fig. 1 DSL9, 12

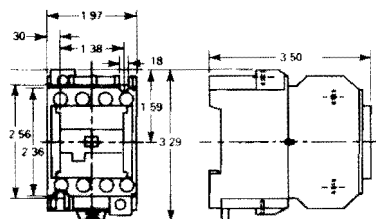


Fig. 2 DSL17, 22

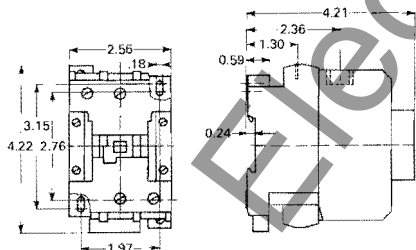


Fig. 3 DSL32, 44

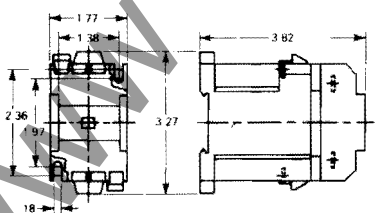


Fig. 4 DGSL9, 12

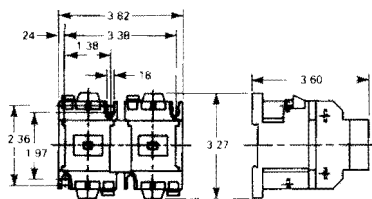


Fig. 5 DUSL209, 212

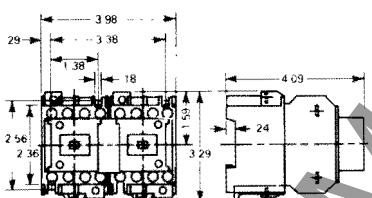


Fig. 6 DUSL217, 222

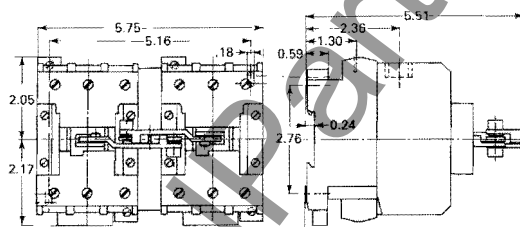


Fig. 7 DUSL232, 244

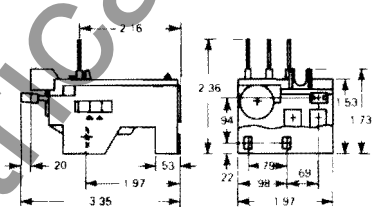


Fig. 8 K7D

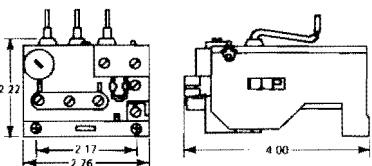


Fig. 9 K27D

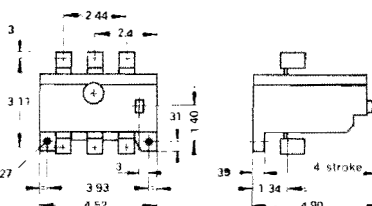


Fig. 10 K67D

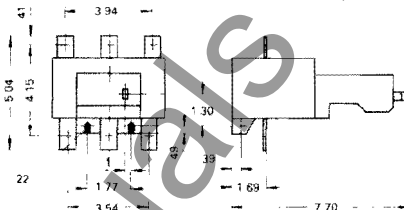


Fig. 11 K187D

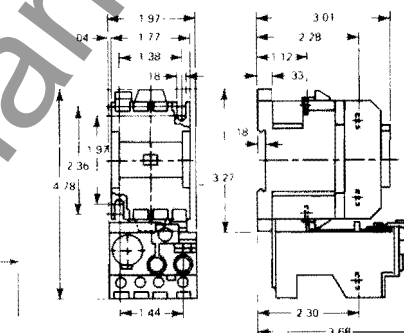


Fig. 12 DSL9, 12 + K7D

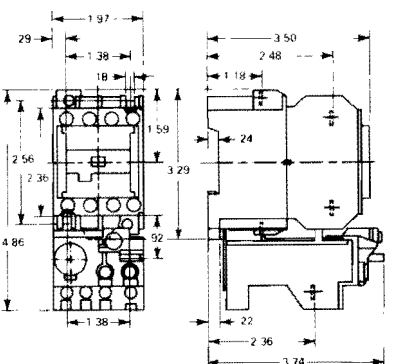


Fig. 13 DSL17, 22 + K7D

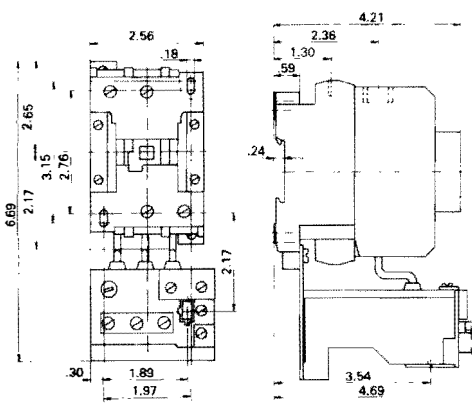


Fig. 14 DSL32, 44 + K27D



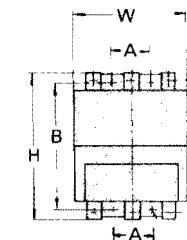
International Electrotechnical Commission Control Dimensions and Weights

Dimensions (In Inches) and Weights (In Lbs.)

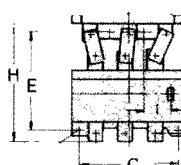
Not to be used for construction purposes unless approved.

Non-Reversing Contactors – Types DSL61, 96, 111, 156, 181 plus Overload Relay

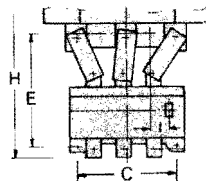
Description	Contactor/Starter Outside Dims.			Mounting Dimensions				Weight, Lbs.
	H	W	D	Contactor		O.L. Relay		
				A	B	C	E	
DSL61	5.91	4.53	5.24	1.57	5.12	...	...	5.47
DSL61 + K67D	9.84	4.53	5.24	1.57	5.12	3.94	3.94	7.88
DSL96	5.91	4.53	5.24	1.57	5.12	...	...	5.47
DSL96 + K67D	9.84	4.53	5.24	1.57	5.12	3.94	3.94	7.88
DSL111	7.48	6.50	6.81	1.97	5.91	...	...	12.03
DSL111 + K67D	11.61	6.50	6.81	1.97	5.91	3.94	4.53	14.44
DSL111 + K187D	11.65	6.50	7.70	1.97	5.91	1.77	3.94	18.59
DSL156	7.48	6.50	6.81	1.97	5.91	...	...	12.03
DSL156 + K67D	11.61	6.50	6.81	1.97	5.91	3.94	4.53	14.44
DSL156 + K187D	11.65	6.50	7.70	1.97	5.91	1.77	3.94	18.59
DSL181	7.48	6.50	6.81	1.97	5.91	...	...	12.03
DSL181 + K67D	11.61	6.50	6.81	1.97	5.91	3.94	4.53	14.44
DSL181 + K187D	11.65	6.50	7.70	1.97	5.91	1.77	3.94	18.59



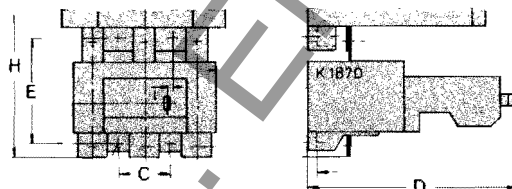
Contactor Only



DSL61, 96 Contactor With K67D Overload



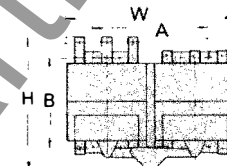
DSL111, 156, 181 Contactor With K67D Overload



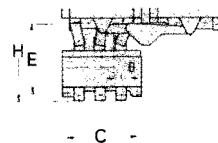
DSL111, 156, 181 Contactor With K187D Overload

Reversing Contactors – Types DUSL261, 296, 2111, 2156, 2181 plus Overload Relay

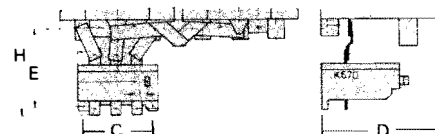
Description	Contactor/Starter Outside Dims.			Mounting Dimensions				Weight, Lbs.
	H	W	D	Contactor		O.L. Relay		
				A	B	C	E	
DUSL261	7.64	9.45	5.24	4.92	5.12	...	...	12.03
DUSL261 + K67D	10.71	9.45	5.24	4.92	5.12	3.94	3.94	14.44
DUSL296	7.64	9.45	5.24	4.92	5.12	...	...	12.03
DUSL296 + K67D	10.71	9.45	5.24	4.92	5.12	3.94	3.94	14.44
DUSL2111	9.92	13.58	6.81	9.06	5.91	...	...	27.34
DUSL2111 + K67D	12.83	13.58	6.81	9.06	5.91	4.53	3.94	29.75
DUSL2111 + K187D	14.04	13.58	7.70	9.06	5.91	...	...	33.91
DUSL2156	9.92	13.58	6.81	9.06	5.91	...	...	27.34
DUSL2156 + K67D	12.83	13.58	6.81	9.06	5.91	4.53	3.94	29.75
DUSL2156 + K187D	14.09	13.58	7.70	9.06	5.91	5.16	1.77	33.91
DUSL2181	9.92	13.58	6.81	9.06	5.91	...	...	27.34
DUSL2181 + K67D	12.83	13.58	6.81	9.06	5.91	4.53	3.94	29.75
DUSL2181 + K187D	14.09	13.58	7.70	9.06	5.91	5.16	1.77	33.91



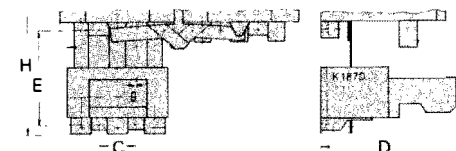
Contactor Only



DUSL261, 296 Contactor With K67D Overload



DUSL2111, 2156, 2181 Contactor With K67D Overload



DUSL2111, 2156, 2181 Contactor With K187D Overload



International Electrotechnical Commission Control Application and Technical Data

Utilization Categories

The applications and duty cycles of contactors are indicated by utilization categories together with details of rated operating current or motor rating and rated voltage. Utilization categories are listed in the table below. To classify the contactor, the operating conditions must be known. The table then assists in practical contactor selection.

All Westinghouse IEC contactors are tested for the most severe switching conditions of utilization category AC-4. The rated making and breaking capacities lie above those shown in the table for "Occasional duty".

Utilization Categories for Load ^① and Motor Switching (Excerpt from VDE0660 Part 1, Section 14, Table 2)

Key to Symbols Used Under Testing Parameters

I = Test Current
 I_e = Rated Operational Current; e.g. motor full load current
 U = Test Voltage
 U_e = Rated Voltage
 P.F. = Test Current Power Factor

Utilization Category	Examples of Application	Testing Parameters											
		Normal Duty						Occasional Duty					
		Making			Breaking			Making			Breaking		
		I_e	U_e	$\cos \varphi$ or P.F.	I_e	U_e	$\cos \varphi$ or P.F.	I_e	U_e	$\cos \varphi$ or P.F.	I_e	U_e	$\cos \varphi$ or P.F.
Alternating Current													
AC-1	Non-inductive or slightly-inductive loads, electric-resistance ovens	1	1	0.95	1	1	0.95	1.5	1.1	0.95	1.5	1.1	0.95
AC-3	Starting squirrel-cage motors, switching off motors while running at rated speed.	$I_e \leq 16 \text{ A}$			6			10			8		
		$I_e > 16 \text{ A up to } 100 \text{ A}$			6			10			8		
AC-4	Starting squirrel-cage motors, inching, reverse-power braking, plugging, switching off motors while running at less than rated speed.	$I_e \leq 16 \text{ A}$			6			12			10		
		$I_e > 16 \text{ A up to } 100 \text{ A}$			6			12			10		

Contact Life for Contactors

The following data is needed for proper selection of a contactor:

Load rating
 Service and control voltage, frequency
 Utilization category
 Switching frequency per hour
 Required contact life

In practice, contactors are used for various utilization categories (see table below). This leads to varying wear of the silver present on the contacts when switching. Contactors of modern design have a contact life which is generally sufficient for the application. If a rough check of the contact life to be expected is necessary for particular applications, the following tables and curves show the typical and characteristic data for the contactors to utilization categories AC-1, AC-3 and AC-4.

Contact Life for Utilization Category AC-1

Purely-resistive or slightly-inductive loads fall into this Utilization Category.

Typical applications are: Electric space heating, dryers, water heaters, warm-beverage vending machines, cleaning apparatus, industrial ironing appliances, etc.

Contactor	DSL...	4	7	9	12	17	22	32	44	61	96	111	156	181
Rated operational current I_e AC-1	Open	A	12	10	20	25	30	40	75	85	95	110	160	200
Contact life at I_e AC-1 open	Approx. ... $\times 10^6$ switching cycles	0.2		0.2	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3

^① Load switching applies only to category AC-1.

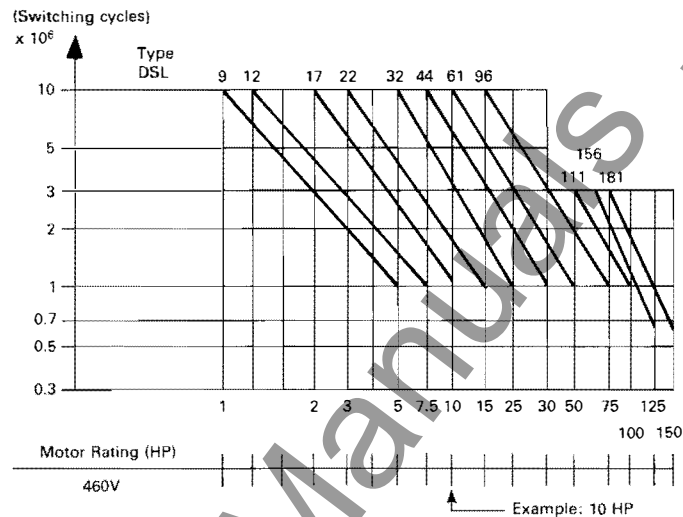
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Contact Life for Contactors, *Continued*

Contact Life for Utilization Category AC-3

For motors operated per utilization category AC-3, contactors are usually selected from motor rating and service voltage. The contact life is determined by the volume of silver on the contacts and lies in the region of **1 million switching cycles** for contactors switching motors at 460 V in AC-3 service. This number of switching operations is only reached after 10 years, when switching 50 times per hour for 8 hours per day, 21 working days per month.

The following selection curves show the relationships between motor ratings and contact life for Westinghouse IEC motor contactors in AC-3 operation at 460 V service voltage.



Example

Assume a contactor is required to control a 10 HP motor at 460 volts in AC-3. Several options are available. If one million operations is sufficient, a DSL9 contactor will suffice. However, if longer contact life is needed, the curves predict contact life controlling a 10 HP motor as follows:

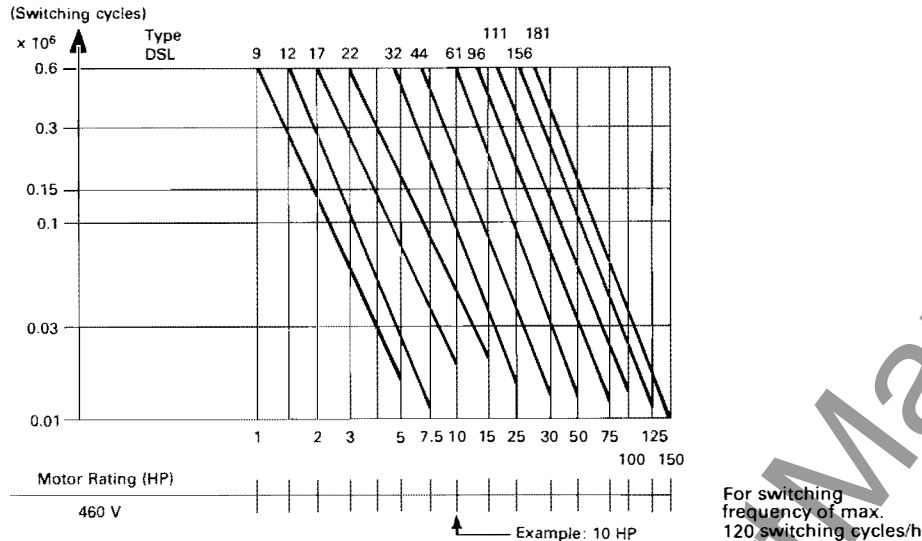
DSL 9 can be switched 1,000,000 times,
 DSL 12 can be switched 1,200,000 times,
 DSL 17 can be switched 3,000,000 times,
 DSL 22 can be switched 6,000,000 times.

It is not appropriate to extrapolate the curves to values less than 1 million operations to obtain higher HP ratings with lesser contact life. No contactor should be applied above its kW rating, because the locked rotor and thermal capability of the contactor must be considered, and there may be problems of attaching the larger conductors required for a higher rating.



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Contact Life for Contactors, Continued



Example

The selection curves for utilization category AC-4 leads to these results:

Contactor DSL 32 with contact life 100,000 switching cycles.

Contactor DSL 44 with contact life of about 270,000 switching cycles.

Contact Life for Mixed AC-3/AC-4 Applications

Almost all applications for motor contactors do not fall completely into utilization category AC-3 or AC-4 but are a mixture of AC-3 and AC-4 operations.

This includes, for example, the use of contactors to jog manufacturing and processing machinery, electric hoists, winders, mixers, cranes, conveyors during machine-setup as well as occasional plugging-operations.

An approximation for contact life can be obtained using the formula:

$$M = \frac{A \cdot [\text{Switching cycles}]}{1 - \left(\frac{C}{100}\right) + \left[\left(\frac{C}{100}\right) \cdot \left(\frac{A}{B}\right)\right]}$$

M = Contact life on mixed operation in switching cycles.

A = Contact life on AC-3 operation in switching cycles.

B = Contact life on AC-4 operation in switching cycles.

C = Proportion of AC-4 operations as percentage of total operations for the application.

How to Determine Number of Switching Cycles

Selection Criteria

Switching cycles per hour	15	50	150	500	1500	3000
Hours operation per day	8 16 24	8 16 24	8 16 24	8 16 24	8 16 24	8 16 24
Total Operations in Millions						
Switching cycles required for 10 years working-days per month, over:	10 years → 0.3 0.6 0.9	1 2 3	3 6 9	10 20 30	30 60 90	60 120 180
5 years →	0.15 0.3 0.45	0.5 1 1.5	1.5 3 4.5	5 10 15	15 30 45	30 60 90
3 years →	0.09 0.18 0.27	0.3 0.6 0.9	0.9 1.8 2.7	3 6 9	9 18 27	18 36 54
1 year →	0.03 0.06 0.09	0.1 0.2 0.3	0.3 0.6 0.9	1 2 3	3 6 9	6 12 18

Contact Life for Utilization Category AC-4

Applications: Motors on manufacturing and processing machines where inching or plugging is needed, as in printing and drawing machinery or tapping operations. Pure AC-4 operation is seldom encountered. In most cases, there is a mixture of AC-3/AC-4 operation. The contact life for mixed operation can be calculated using the formula at the bottom of this page.

Example

A 10 HP, 460 V, 60 Hz motor is switched by a reversing contactor. The operating conditions fall into utilization category AC-4 because the fast change in direction of rotation means that currents greater than the motor-starting current must be switched off. Which contactor is suitable?

Solution

The selection curves for utilization category AC-4 lead to these results:

- Contactor DSL 32 with contact life 100,000 switching cycles.
- Contactor DSL 44 with contact life of about 270,000 switching cycles.

It can be decided from the "Table to determine number of switching cycles" below whether or not the contact life of the type DSL 9 is sufficient for the application.

Each reversing contactor combination consists of two identical DSL... contactors.



International Electrotechnical Commission Control Standards and Approval

Westinghouse International Electrotechnical Commission Control is manufactured and tested to meet I.E.C., B.S. (British Standards) and V.D.E. (Society of German Electrical Engineers) standards as well as U.L., Inc. (Underwriters' Laboratories) listing and recognition requirements.

In addition, the necessary tests have been undertaken and approvals received, for countries with special national standards, such as Canada, Finland and Switzerland, as well as for special applications such as use on sea going vessels.

Consult Westinghouse Electric Corporation for specific information regarding international standards and approvals of the products covered by this publication.

Approvals



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Standards

VDE 0660

BS 5424-1
BS 4941-1
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NOTES

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