



Short Form Catalog

A Guide for Product Selection

LEACH[®] INTERNATIONAL
NORTH AMERICA

Solutions for Power Switching and Control

Welcome to Leach International

Leach International, one of the advanced engineering companies of Leach Holding Corporation, introduced the world's first "break-in" relay in 1919. Since then, the company has applied its expertise to the design and manufacture of a series of innovations that includes "Balanced Armature" and "Balanced Force" relays, rotary solenoids, power contactors, and crystal can and time delay relays.

Today the company is an industry leader recognized for its design excellence and commitment to quality and reliability. Leach switching components, control devices and other equipment are used within the most severe environments in aerospace, military, rail and high-end industrial applications worldwide.

With its advanced design and engineering processes, extensive product line, more than 1,000 dedicated employees, and network of representatives in more than 20 countries worldwide, Leach International continues to maintain its hard-earned position of leadership.

Global Operations

Leach International is composed of Leach International North America, Leach International Europe and Leach International Asia-Pacific.



North America

located in Anaheim, Calif., and the facility in Tijuana, Mexico, houses a coil-winding/assembly operation. Leach International North America also has

Leach International North America has two production facilities in Southern California and one in Mexico. Buena Park, Calif., is home to three production lines including a state-of-the art hybrid facility that offers extensive design, assembly, manufacturing and testing capabilities. A header/plater facility is



Mexico



Europe

It has achieved both ISO 9001 and Mil Standard 790 certification, and the Niort facility offers a space-qualified Class 100 clean room.

Mil Standard 790 certification, Boeing DI-9000 approval and ISO 9001 certification.

Leach International Europe has production sites in Sarralbe and Niort, France.



Asia-Pacific

With a manufacturing facility in China, Leach International Asia-Pacific supplies the company's products to the Asian and Pacific regions and, strategically, to the European and American markets.

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Leach Product Types and Specifications

Product Types:

Subminiature Relays (*Low level to 75 Amps*)

For decades, Leach subminiature relays have set the industry standards for technology and reliability. With their proven high performance in the most demanding applications, they are ideal for critical subsea, shipboard, ground-based and aerospace applications.

Balanced Armature Relays (*10 Amps to 25 Amps*)

Leach balanced armature relays have been used in commercial and military aircraft, trucks, buses, ships, and tanks — applications that call for proven durability, high performance and long life. Several terminal mounting styles, dust-resistant, moisture-resistant and hermetically-sealed enclosures, and a variety of operating ratings and characteristics are available.

Power Contactors (*25 Amps to 1000 Amps*)

Leach power contactors are available with optional auxiliary contacts in sealed and unsealed models. “Smart” programmable contactors and special mounting styles also are available.

Time Delay Relays (*150 mAmps to 25 Amps*)

Leach time delay devices combine the proven capability of industry standard relays with highly reliable hybrid microelectronics timing circuits.

Power Monitors and Sensors (*up to 10 Amps*)

Designed to meet the requirements of MIL-R-28894, Leach power monitors and sensors constantly monitor and protect critical AC or DC circuits.

Solid-state Power Controllers (*1 Amp to 150 Amps*)

Solid-state power controllers are computer controllable, FET-based solid-state microelectronic power controllers that provide enabling technology for automated power systems.

Product Specifications:

MIL-PRF-39016

This specification covers relays rated from low level to 5 Amps used primarily in electronic and communication equipment. All relays are Established Reliability (ER), hermetically-sealed types.

MIL-PRF-6106

This specification primarily covers relays and power contactors rated 25 Amps and above. Leach balanced armature relays, rated from 5 Amps to 25 Amps, also are qualified to MIL-PRF-6106.

MIL-PRF-83536

This specification covers most 5- and 10-amp subminiature relays previously covered by MIL-PRF-6106. Under this specification, all relays are Established Reliability (ER) types, which are designed to operate from low level through rated load. A prerequisite to qualification is certification to the MIL-STD-790 Reliability Assurance Specification.

MIL-PRF-83726

This specification covers time delay relays rated from 250 mAmps to 10 Amps with timing ranges from 50 milliseconds to 500 seconds.

Other Products:

Leach's full range of products also includes:

Components

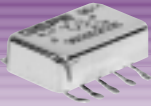
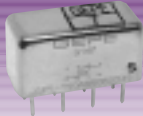
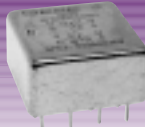
- Relay sockets
- Switchlights and indicators
- Toggle switches and limit switches
- Railway relays

Equipment, Relay Boxes and Assemblies

- Remote control circuit breakers
- Ground fault interrupt units
- Pulse lighting modules
- Windshield anti-ice controllers
- Thrust reverser control units
- Illuminated keyboards and control panels
- Relay panels
- Central warning panels
- Wiring integrated assemblies
- Primary power distribution assemblies
- Secondary power distribution assemblies
- Custom designed electronics

(Many of Leach's relays, contactors and control devices are available through its distributors and are available for overnight delivery. For your nearest Leach sales office or distributor, please refer to the back cover of this catalog.)

(0.5-4 Amps) **Subminiature Relays**

						
Leach Series:	065*D, 065*1	E, 134, D	GP5, GP2, GP2A, GP250	W250, W260, F250	GP52, GP4	U*D, U*I
Rating:	0.5 amp	1 amp	2 Amps	2 Amps	2 Amps	4 Amps
Contact configuration:	2 PDT	2 PDT	2 PDT	2 PDT	4 PDT	2 PDT
Style:	Non-latch and Latch	Non-latch and Latch	Non-latch and Latch	Non-latch	Non-latch and Latch	Non-latch and Latch
Designed to:	MIL-PRF-39016	MIL-PRF-39016	MIL-PRF-39016	MIL-PRF-39016	MIL-PRF-39016	MIL-PRF-5757
Qualified to:	CECC16101/025	SCC3601/012	SCC3601/003	M39016/6	CECC16101/033	
	CECC16101/026	SCC3602/019	SCC3602/003	CECC16101/014		
		CECC16101-023	SCC3602/010	CECC16101/021		
		CECC16101-024	CECC1610/014			

Electrical Data	065*D, 065*1	E, 134, D	GP5, GP2, GP2A, GP250	W250, W260, F250	GP52, GP4	U*D, U*I
Contact load rating (voltage):	28 VDC	28 VDC	28 VDC 115 VAC	28 VDC 115 VAC	28 VDC 115 VAC	28 VDC 115 VAC
Current (Amps)			60-400 Hz	400 Hz	60-400 Hz	400 Hz
Load type Resistive:	0.5	1	2 0.3	2 0.3	2 0.3	4 —
Inductive:	0.1	0.2	0.75 —	0.75 —	0.75 —	— —
Motor:	—	—	— —	— —	— —	— —
Lamp:	—	0.1	— —	0.4 —	— —	— —
Nominal coil voltage(s):	5-26.5 VDC	6-28 VDC	6-26 VDC	5-60 VDC	6-48 VDC	6-120 VDC
Coil Power						
Nominal:	0.22 W	0.5 W/0.25 W	1 W	1 W	2.2 W	1.4 W
At pick up:	0.06 W	0.13 W/0.06 W	0.28 W	0.28 W	0.56 W	0.28 W
Operate time, max. (ms):	6	5-6	4	4	6	5.5

Environmental Data	065*D, 065*1	E, 134, D	GP5, GP2, GP2A, GP250	W250, W260, F250	GP52, GP4	U*D, U*I
Sinusoidal vibration (G):	30 @ 70-3000 Hz	30 @ 70-3000 Hz 70 @ 70-2000 Hz	30 @ 70-3000 Hz 20 @ 70-3000 Hz	30 @ 70-3000 Hz 20 @ 70-3000 Hz	30 @ 75-2000 Hz	30 @ 75-3000 Hz
Shock (G):	100	75-100	100	50-100	100	100

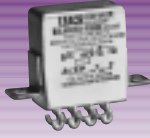
Mechanical Data	065*D, 065*1	E, 134, D	GP5, GP2, GP2A, GP250	W250, W260, F250	GP52, GP4	U*D, U*I
Weight, max. (oz./grams):	<0.64 oz. (2 g.)	<0.129 oz. (4 g.)	<0.354 oz. (11 g.)	<0.32 oz. (10 g.)	<0.56 oz. (16 g.)	<0.63 oz. (18 g.)
Dimensions, max. (in.): (L x W x H)	0.575 x 0.346 x 0.169	0.504 x 0.236 x 0.409	0.811 x 0.413 x 0.409	1.32 x 0.90 x 0.41	0.807 x 0.807 x 0.409	0.807 x 0.362 x 0.905
Sockets available:	—	—	SO508, SO510, S501	SF250-R4, HRCW, SO9005	S5216	SO808, 081A24
Mounting styles:	Surface	4	8	8	3	7
Terminal types:	2	4	3	3	3	4

* Terminal type

Subminiature Relays (Low level to 10 Amps)

					
Leach Series:	X, XL, XA	Y, YL, YA	XC, XCL	YC, YCL, YCA	F600, F601
Rating:	Low level to 5 Amps	Low level to 5 Amps	Low level to 10 Amps	Low level to 10 Amps	Low level to 10 Amps
Contact configuration:	2 PDT	4 PDT	1 PDT	3 PDT	6 PDT
Style:	Non-latch and Latch	Non-latch and Latch	Non-latch and Latch	Non-latch and Latch	Non-latch
Designed to:	XA, XL: MIL-PRF-6106 X: MIL-PRF-83536	YA, YL: MIL-PRF-6106 Y: MIL-PRF-83536	MIL-PRF-6106	YCL, YCA: MIL-PRF-6106 YC: MIL-PRF-83536	M83536/25, 26
Qualified to:	X: M83536/1, 2 XL: M6106/38	Y: M83536/5, 6 YL: M6106/39		YC: M83536/21, 22 YCL: M6106/40	CECC16101/020 CECC16303/806
Electrical Data	X, XL, XA	Y, YL, YA	XC, XCL	YC, YCL YCA	F600, F601
Contact rating (Amps) @ 28 VDC					
Resistive:	5	5	10	10	10
Inductive:	3	3	6	6	8
Motor:	2	2	4	4	4
Lamp:	1	1	2	2	2
@115/220 VAC, 400 Hz, 3Ø: (Case grounded)	Same as DC rating except inductive is 5 Amps and motor is 3 Amps	Same as DC rating except inductive is 5 Amps and motor is 3 Amps	Same as DC rating except inductive is 10 Amps	Same as DC rating except inductive is 8 Amps	Same as DC rating
Nominal coil voltage(s)					
DC Non-latch:	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28/48 VDC	12-110 VDC
DC Latch:	6/12/28 VDC	6/12/28 VDC	6/12/28 VDC	6/12/28 VDC	—
AC Coil:	28, 115/200 VAC 50-400 Hz	28, 115/200 VAC 50-400 Hz	— —	28, 115/200 VAC 50-400 Hz	28, 115 VAC 60-400 Hz
Coil resistance(s) (Ohms)					
DC Non-latch:	30/125/500/1600	25/100/400/1275	25/125/500/1600	25/100/400/1275	40-3200
DC Latch:	43/182/730	37/148/600	730	600	—
AC Coil, Current, I max.	.100/.040/.024	.120/.040/.028	—	.120/.040/.028	—
Operate time, max. (ms)					
DC Non-latch:	4	6	6	6	15
DC Latch:	4	6	6	15	—
AC Coil:	4	5	—	15	20
Release time, max. (ms)					
DC Non-latch:	4	6	6	6	10
AC Coil:	4	25	—	25	50
Bounce time, max. (ms):	1.0	1.0	1.0	1.0	1.0
Environmental Data	X, XL, XA	Y, YL, YA	XC, XCL	YC, YCL YCA	F600, F601
Sinusoidal vibration (G):	30 @ 70-3000 Hz	30 @ 70-3000 Hz	30 @ 70-3000 Hz	30 @ 70-3000 Hz	30 @ 75-3000 Hz
Shock (G):	200	200	200	200	50
Mechanical Data	X, XL, XA	Y, YL, YA	XC, XCL	YC, YCL YCA	F600, F601
Weight, max. (oz./grams):	.56 oz. (16 g.)	1.06 oz. (30 g.)	.56 oz. (16 g.)	1.09 oz. (31 g.)	<3.054 oz. (95 g.)
Dimensions, max. (in.): (L x W x H)	0.810 x 0.410 x 0.640	0.810 x 0.810 x 0.640	0.810 x 0.410 x 0.640	0.810 x 0.810 x 0.640	1.484 x 1.024 x 1.012
Sockets available					
Non-latch DC Coil:	SO-1064-001	SO-1066-001	SO-1064-10425	SO-1065-001	S600
Latch DC Coil:	SO-1064-003	SO-1066-003	SO-1064-10534	SO-1065-003	SF600
Non-latch AC Coil:	SO-1064-10444	SO-1066-10385	—	SO-1065-10392	S601
28 VAC Coil:	SO-1064-10445	SO-1066-10386	—	SO-1065-10393	S601
Mounting styles:	5	5	5	5	4
Terminal types:	4	3	4	3	4

(Low level to 75 Amps) **Subminiature Relays**

						
Leach Series:	J, JA, JL	K, KA, KL	JC, JCA, JCL, JS, JSA	KC, KCA, KCL	KD, KDA, KDL	KM, KX, KXD, KXL
Rating:	Low level to 12 Amps [†]	Low level to 12 Amps [†]	Low level to 25 Amps	Low level to 25 Amps	Low level to 25 Amps	50-75 Amps
Contact configuration:	2 PDT	4 PDT	1 PDT	3 PDT	3 PST/NO, 2 Amps 1 PDT Aux.	1 PST/DM or DB, 2 Amps 1 PST-DB
Style:	Non-latch and Latch	Non-latch and Latch	Non-latch and Latch	Non-latch and Latch	Non-latch and Latch [†]	Non-latch and Latch
Designed to:	MIL-PRF-83536	MIL-PRF-83536	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106
Qualified to:	M83536/9, 10, 11, 12, 13	M83536/15, 16, 17, 18, 19	JC, JS: M6106/19 JCL: M6106/20	KC: M83536/32/33 KCL: MS27742	KD, KDA: M6106/13 KDL: M6106/12	
Electrical Data	J, JA, JL	K, KA, KL	JC, JCA, JCL* JS, JSA**	KC, KCA, KCL	KD, KDA, KDL	KM KX, KXD, KXL
Contact rating (Amps) @ 28 VDC						
Resistive:	12	12	25 10	25	25	50 75
Inductive:	8	8	12 10	12	12	15 20
Motor:	4	4	10 4	10	10	30 20
Lamp:	2	2	5 4	5	5	15 10-16
@ 115/220 VAC, 400 Hz, 3Ø: (Case grounded)	Same as DC rating except resistive is 10 Amps	Same as DC rating except resistive is 10 Amps	Same as DC rating n/a See note**	Same as DC rating except inductive is 15 Amps	Same as DC rating except inductive is 15 Amps	See note ^{††} n/a
Nominal coil voltage(s)						
DC Non-latch:	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28 VDC 28 VDC
DC Latch:	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28/48 VDC	6/12/28 VDC 28 VDC
AC Coil:	28, 115/200 VAC 50-400 Hz	28, 115/200 VAC 50-400 Hz	28, 115/200 VAC 50-400 Hz	28, 115/200 VAC 50-400 Hz	28, 115/200 VAC 50-400 Hz	— —
Coil resistance(s) (Ohms)						
DC Non-latch:	20/80/320/1000	18/70/290/890	20/80/320/1000	18/70/290/890	18/70/290/890	18/70/290 290
DC Latch:	38/150/600/1600	28/112/450/1500	38/150/600/1600	28/112/450/1500	28/112/450/1500	28/112/450 450
AC Coil, Current, I max.:	.240/.040/.024	.120/.040/.028	.100/.040/.024	.120/.040/.028	.120/.040/.028	— 120
Operate time, max. (ms)						
DC Non-latch:	10	15	10	15	15	15
DC Latch:	10	15	10	15	15	15
AC Coil:	15	20	15	20	20	—
Release time, max. (ms)						
DC Non-latch:	10	15	10	15	15	15
AC Coil:	50	50	50	50	50	—
Bounce time, max. (ms):	1.0	1.0	1.0	1.0	1.0 (Aux. 4)	1.0 1.0 (Aux. 4)
Environmental Data	J, JA, JL	K, KA, KL	JC, JCA, JCL, JS, JSA	KC, KCA, KCL	KD, KDA, KDL	KM KX, KXD, KXL
Sinusoidal vibration (G):	30 @ 70-3000 Hz	30 @ 70-3000 Hz	30 @ 70-3000 Hz	30 @ 70-3000 Hz	30 @ 70-3000 Hz	30 @ 70-3000Hz 20 @ 57-2000 Hz
Shock (G):	200	200	200	200	200	50
Mechanical Data	J, JA, JL	K, KA, KL	JC, JCA, JCL, JS, JSA	KC, KCA, KCL	KD, KDA, KDL	KM, KX, KXD, KXL
Weight, max. (oz./grams):	1.40 oz. (40 g.)	DC: 2.5 oz. (71 g.) AC: 2.7 oz. (77 g.)	1.6 oz. (45 g.)	3.0 oz. (85 g.)	3.0 oz. (85 g.)	3.0 oz. (85 g.)
Dimensions, max. (in.): (L x W x H)	DC:1.025 x 0.525 x 1.010 AC:1.025 x 0.525 x 1.125	1.025 x 0.025 x 1.010	DC:1.015 x 0.515 x 1.000 AC:1.015 x 0.515 x 1.125	1.025 x 1.025 x 1.010	1.025 x 1.025 x 1.010	1.025 x 1.025 x 1.70
Sockets available						
Non-latch DC Coil:	SO-1049-8309	SO-1048-8308	SO-1063-9033	SO-1057-8912	SO-1059-8914	—
Latch DC Coil:	SO-1055-8690	SO-1056-8691	SO-1063-9036	SO-1058-8913	SO-1060-8915	—
Non-latch AC Coil:	SO-1049-8772	SO-1048-8776	SO-1063-9034	SO-1062-8917	SO-1061-8916	—
28 VAC Coil:	SO-1055-8774	SO-1048-8779	—	—	—	—
Mounting styles:	5	5	4	5	5	—
Terminal types:	4	3	4	3	3	—

* JC, JCA & JCL @ 50 ADC & 80 Amp 400 Hz overload. ** JS/JSA only designed to switch 115 VAC, 60 Hz case grounded; JS has 20 amp overload capabilities. [†] Same design as KC series with added auxiliary pole.

^{††} Special models available; contact factory for auxiliary contacts and additional information. [‡] MIL-PRF-83536 rated at 10 Amps.

Balanced Armature Relays (10-25 Amps)

					
Leach Series:	9330	9274	9324	9325	9339
Rating:	10 Amps	15 Amps	25 Amps	25 Amps	25 Amps
Contact configuration:	2 PDT	4 PDT	3 PST/NO	3 PST-CO/NO	3 PST/NO w/ 2 Amps, 1 PDT Aux.
Designed to:	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106
Qualified to:	MS24149	MS24568	MS27418	MS27706	MS6106/41
Electrical Data	9330	9274	9324	9325	9339
Contact rating (Amps)					
@ 28 VDC					
Resistive:	10	10	25 †	25**	25
Inductive:	10	10	15 †	15	15
Motor:	6	6	20 †	20	20
Lamp:	2	3	10 †	10**	10
@115 VAC, 400 Hz, 3Ø					
Resistive:	10	15	25 †	25**	25
Inductive:	10	10	25 †	25**	25
Motor:	6	8**	20 †	20	20
Lamp:	2	4**	10 †	10 ††	10 ††
@115 VAC, 50/60 Hz, 3Ø					
Resistive:	6	10	25 †	25**	25
Inductive:	4	6	25 †	25**	25
Motor:	3	4	12 †	12	12
Lamp:	1.5	2	10 †	10**	10
Nominal coil voltage(s):	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz*	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz
Resistance, Ohms ±10% @ 25° C for 28 VDC	160Ω	92Ω	160Ω	160Ω (each coil)	160Ω
Operate time, max. (ms)					
DC Coil:	20	25	20	20	20
AC Coil:	20	25	20	20	25
Release time, max. (ms)					
DC Coil:	20	20	10	10	10
AC Coil:	50	50	50	50	50
Bounce time, max. (ms):	2	N/O 3, N/C 5	2	5	2 Aux. 4
Environmental Data	9330	9274	9324	9325	9339
Sinusoidal vibration (G):	10 @ 15-1500 Hz	10 @ 1000-2000 Hz	10 @ 55-1500 Hz	10 @ 55-1500 Hz	10 @ 55-1500 Hz
Shock (G):	25	50	50	25	50
Mechanical Data	9330	9274	9324	9325	9339
Weight, max. (oz.):	7.04 oz.	12.80 oz.	10.56 oz.	22.7 oz.	7.04 oz.
Dimensions, max. (in.): (L x W x H)	2.50 x 1.625 x 2.60	2.062 x 2.062 x 1.807	1.531 x 1.531 x 1.680	3.54 x 3.00 x 3.20	1.531 x 1.531 x 1.680
Option(s) available:	Suppressed DC coil	Suppressed DC coil	Suppressed DC coil	Suppressed DC coil	Suppressed DC coil

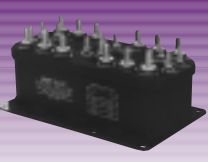
* Max. temp. limited to +85° C.

** Value exceeds Mil-Spec.

† 440 VAC 60 Hz delta rating, 3.5 amp resistive.

†† 25 amp resistive load transfer rating.

‡ Aux. ratings 2 amp resistive, lamp inductive, 0.5 amp lamp.

					
Leach Series:	9123	9213	9207	9124	9125
Rating:	25 Amps	25-100 Amps	25-100 Amps	50 Amps	50 Amps
Contact configuration:	3 PST/NO DM	3 PST/NO, 4 PST/NO 2 P/NO, 2 P/NC DB-DM	3 PST/NO DM, 2P/NO, 2P/NC DB-DM	3 PST/NO DB	3 PDT-CO DB 6 PST/NO DB
Designed to:	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106
Qualified to:	MS27997		DESC Spec 84192	MS27222	
Electrical Data	9123	9213	9207	9124	9125
Contact rating (Amps)					
@ 28 VDC					
Resistive:	25	25-100*	25-100*	50	50
Inductive:	25	25-100*	25-100*	50	50
Motor:	25	25-100*	25-100*	50	50
Lamp:	—	—	—	—	—
@115 VAC, 400 Hz, 3Ø					
Resistive:	25	25-100*	25-100*	50	50
Inductive:	25	25-100*	25-100*	50	50
Motor:	25	25-100*	25-100*	50	50
Lamp:	—	—	—	—	—
@115 VAC, 50/60 Hz, 3Ø					
Resistive:	15	50*	50*	30	30
Inductive:	15	50*	50*	30	30
Motor:	7	50*	50*	15	15
Lamp:	—	—	—	—	—
Nominal coil voltage(s):	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz
Resistance, Ohms ± 10% @ 25° C for 28 VDC	50Ω	44.5Ω	44.5Ω	50Ω	50Ω
Operate time, max. (ms)					
DC Coil:	25	30	30	25	25
AC Coil:	30	40	40	30	30
Release time, max. (ms)					
DC Coil:	10	20	20	10	10
AC Coil:	50	60	50	50	50
Bounce time, max. (ms):	2	10	10	2	2
Environmental Data	9123	9213	9207	9124	9125
Sinusoidal vibration (G):	15 @ 55-1500 Hz	10 @ 55-1500 Hz	10 @ 55-500 Hz	15 @ 55-1500 Hz	15 @ 70-1500 Hz
Shock (G):	50	50	50	50	50
Mechanical Data	9123	9213	9207	9124	9125
Weight, max. (oz./grams.):	20 oz.	44.8 oz.	28 oz.	20 oz.	46.4 oz.
Dimensions, max. (in.): (L x W x H)	3.73 x 3.305 x 2.50	4.22 x 4.23 x 4.53	3.63 x 3.62 x 2.875	3.73 x 3.305 x 2.50	6.21 x 3.80 x 2.70
Option(s) available:	Auxiliary 5 Amp contacts 440 VAC 60 Hz delta rating	Auxiliary 5-25 Amp contacts	Auxiliary 5-25 Amp contacts	Auxiliary 5 Amp contacts 440 VAC 60 Hz delta ratings	Auxiliary 5 Amp contacts 440 VAC 60 Hz delta ratings

* 440 VAC 60 Hz wye/delta rated. Sealed rotary, 1, 2, 3, and 4 pole.

Power Contactors (50-400 Amps)

				
Leach Series:	HC, Center-off	7064, 7264, 7401	H, HT ^{††}	HL, HLT [‡]
Rating:	50 Amps	50-400 Amps	60 Amps	60 Amps
Contact configuration:	3 PST-NO 1 PST-NO DM	1 PST/NO	3 PST, 3 PDT, 1 PDT-DB-DM	3 PST, 3 PDT, 1 PDT-DB-DM
Style:			Magnetic latch	Magnetic latch
Designed to:	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106
Qualified to:	MS27750	MS24166 MS24171/72 MS24178/79 MS24185	MS27751 M6106/26 and 43	MS27749
Electrical Data	HC, Center-off	7064, 7264, 7401	H, HT	HL, HLT
Contact rating (Amps)				
@ 28 VDC				
Resistive:	25	50-400	50	50
Inductive:	15	50-100	20	20
Motor:	15	50-400	20	20
Lamp:	10	—	10	10
@115 VAC, 400 Hz, 3Ø				
Resistive:	50	—	60	60
Inductive:	50**	—	60	60
Motor:	30	—	40	40
Lamp:	15	—	15	15
@115 VAC, 50/60 Hz, 3Ø				
Resistive:	30	—	30	30
Inductive:	30	—	30	30
Motor:	30	—	30	30
Lamp:	—	—	—	—
Nominal coil voltage(s):	6, 12, 28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC	6, 12, 28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	6, 12, 28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz
Resistance, Ohms ± 10% @ 25° C for 28 VDC:	6 VDC, 12Ω; 12 VDC, 50Ω; 28 VDC, 200Ω [†] 115 VAC, .100 Amp	75-100Ω	6 VDC, 12Ω; 12 VDC, 50Ω; 28 VDC, 200Ω; 115 VAC, .090 Amp	6 VDC, 12Ω; 12 VDC, 50Ω; 28 VDC, 200Ω
Operate time, max. (ms)				
DC Coil:	35	—	50	35
AC Coil:	35	40	50	35
Release time, max. (ms)				
DC Coil:	25	—	25	—
AC Coil:	80	15	80	—
Bounce time, max. (ms):	3	—	3	3
Environmental Data	HC, Center-off	7064, 7264, 7401	H, HT	HL, HLT
Sinusoidal vibration (G):	10 @ 70-1000 Hz	2 @ 55-500 Hz	10 @ 70-1000 Hz	10 @ 70-1000 Hz
Shock (G):	50	25	50	50
Mechanical Data	HC, Center-off	7064, 7264, 7401	H, HT	HL, HLT
Weight, max. (oz., lbs.):	15 oz.	.59-2.6 lbs.	14 oz.	15 oz.
Dimensions, max. (in.):	2.50 diameter x 3.13 (L x W x H) 4.41 x 2.0 x 3.75	2.76 x 2.1 x 2.56	2.50 diameter x 3.13	2.50 diameter x 3.13
Option(s) available:	Gasket sealed models	Special units upon request	Auxiliary 5 Amp contacts Gasket sealed models Bus bar mount, GFI (H)	Auxiliary 5 Amp contacts Gasket sealed models

**30 Amps for AC coil † ±20% @ 25°C †† HT (power transfer model) ‡ HLT (power transfer model)

					
Leach Series:	79, 109, 209, 309, 509*	ZC, Center-off	Z, ZG, ZJ	ZL	CC020*, CC040*†
Rating:	80-500 Amps	100 Amps	Up to 120 Amps	Up to 120 Amps	200-400 Amps
Contact configuration:	1 PST/NO DM	3 PDT-NO, 1 PDT/NO DM-DB	3 PDT, 3 PST/NO, SPDT-DB-DM	3 PST, 3PDT, 1PDT-DB-DM (latch)	1 PST/NO DM
Style:	Permanent duty		SPST/NO-DM, SPST/NC-DB		Permanent duty bus bar mounting
Designed to:	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106
Qualified to:	AIR 7304 AIR 8456 B				AIR 7304 AIR 8456 B
Electrical Data	79, 109, 209, 309, 509	ZC, Center-off	Z, ZG, ZJ	ZL	CC020, CC040
Contact rating (Amps)					
@ 28 VDC					
Resistive:	80-500	50	50	50	200-400
Inductive:	—	30	30	30	125-200
Motor:	40-250	30	30	30	125-200
Lamp:	—	—	—	—	—
@115 VAC, 400 Hz, 3Ø					
Resistive:	—	100	120-180	120	—
Inductive:	—	100	120-180	120	—
Motor:	—	60	80-120	80	—
Lamp:	—	—	—	—	—
@115 VAC, 50/60 Hz, 3Ø					
Resistive:	—	60	60	60	—
Inductive:	—	60	60	60	—
Motor:	—	40	60	60	—
Lamp:	—	—	—	—	—
Nominal coil voltage(s):	28 VDC	6, 12, 28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	6, 12, 28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	6, 12, 28 VDC 115 VAC, 400 Hz 115 VAC, 60 Hz	28 VDC
Resistance, Ohms ± 10% @ 25° C for 28 VDC:	7.2/280 to 5/200	6 VDC, 9.3Ω; 12 VDC, 38Ω; 28 VDC, 150Ω**; 115 VAC, 0.9 Amp	6 VDC, 7Ω; 12 VDC, 28Ω; 28 VDC, 113Ω; 115 VAC, .12 Amp	6 VDC, 10Ω; 12 VDC, 40Ω; 28 VDC, 163Ω**	7.2/200, 4.4/152
Operate time, max. (ms)					
DC Coil:	30	60	60	60	30
AC Coil:	—	60	60	60	—
Release time, max. (ms)					
DC Coil:	20	40	40	—	20
AC Coil:	—	80	40	—	—
Bounce time, max. (ms):	—	4	4	4	—
Environmental Data	79, 109, 209, 309, 509	ZC, Center-off	Z, ZG, ZJ	ZL	CC020, CC040
Sinusoidal vibration (G):	10 @ 5-2000 Hz	5 @ 70-500 Hz	10 @ 70-1000 Hz	10 @ 55-500 Hz	10 @ 5-2000 Hz
Shock (G):	30	15	50	15	30
Mechanical Data	79, 109, 209, 309, 509	ZC, Center-off	Z, ZG, ZJ	ZL	CC020, CC040
Weight, max. (oz./lbs.):	7.2-38 oz.	32-43.2 oz.	32-43.2 oz.	2.0-2.75 lbs.	9 oz.
Dimensions, max. (in.): (L x W x H)	3.26 x 1.9 x 1.42 to 4.76 x 2.75 x 2.46	3.65 diameter x 4.28	3.65 diameter x 4.28	3.65 diameter x 4.28	3.1 x 1.42 x 3.13
Option(s) available:	Auxiliary 5 Amp contacts Dust proof enclosure	Gasket sealed models Magnetically latched models	Auxiliary 5 Amp contacts, GFI (Z) Gasket sealed models	Auxiliary 5 Amp contacts	Auxiliary 2 Amp contacts Low level contacts Dust proof enclosure

* 1NO + 1NC auxiliary contact ** ± 20% @ 25°C † 2PDT auxiliary contact. May be associated with a Hall current sensor

Power Contactors (250-1000 Amps)

				Smart and Plug-in Series	
					
Leach Series:	W, WC, WL	A, AJ	M1009-1	Smart Contactor [†] REHL Series	Plug-in Series
Rating:	250-275 Amps	300-400 Amps	1000 Amps	25-305 Amps	60-385 Amps
Contact configuration:	1 PDT-DM-DB, 3 PST/NO 1 PST/NO-DM, 1 PST/NC-DB	1 PST/NO DM	1 PST/NO DM	1 PST-DB, 3 PST, 3 PDT	3 PST, 3 PDT
Style:	Intermittent duty starter contactor				Latch, non-latch
Designed to:	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106	MIL-PRF-6106/MIL-C-83883	MIL-PRF-6106
Qualified to:		M6106/33			
Electrical Data	W, WC, WL	A, AJ	M1009-1	Smart Contactor REHL Series	Plug-in Series
Contact rating (Amps)					
@ 28 VDC					
Resistive:	125	300/400	1000 ^{††}	15-50	—
Inductive:	75	100/150	—	12-50	—
Motor:	75	250/250	500	5-20	—
Lamp:	—	—	—	—	—
@ 115 VAC, 400 Hz, 3Ø					
Resistive:	275	—	—	15-65	60-385
Inductive:	275	—	—	15-60	60-385
Motor:	175	—	—	15-40	38-245
Lamp:	—	—	—	—	—
@ 115 VAC, 50/60 Hz, Δ					
Resistive:	—	—	—	30	—
Inductive:	—	—	—	30	—
Motor:	—	—	—	30	—
Lamp:	—	—	—	—	—
Nominal coil voltage(s):	28 VDC 115 VAC, 400 Hz (W/WC) 28 VDC Suppressed (W/WC)	6, 12, 28 VDC	28 VDC	28 VAC 115 VAC, 400 Hz	28 VAC 115-200 VAC, 400 Hz
Resistance, Ohms ± 10%:	(W) 90Ω; (WL) 9.8Ω (WC) 100Ω*	6 VDC, 4Ω; 12 VDC, 15Ω; 28 VDC, 60Ω	8	—	—
@ 25° C for 28 VDC:					
Operate time, max. (ms)					
DC Coil:	60	35	30	—	—
AC Coil:	60	—	—	—	—
Release time, max. (ms)					
DC Coil:	40	15	20	—	—
AC Coil:	125	—	—	—	—
Bounce time, max. (ms):	4	4	—	4	3
Environmental Data	W, WC, WL	A, AJ	M1009-1	Smart Contactor REHL Series	Plug-in Series
Sinusoidal vibration (G):	10 @ 60-2000 Hz	10 @ 70-500 Hz 5 @ 500-2000 Hz	10 @ 5-2000 Hz	10 @ 55-2000 Hz	—
Shock (G):	20	25	30	25	30
Mechanical Data	W, WC, WL	A, AJ	M1009-1	Smart Contactor REHL Series	Plug-in Series
Weight, max. (oz./lbs.):	4.5 lbs.	1.75 lbs.	49 oz.	2.0 lbs.	4.37 lbs.
Dimensions, max. (in.):	4.625 x 5.56 x 4.10	3.90 x 3.64 x 2.80	5.28 x 3.15 x 2.45	3.69 x 3.25 x 4.26	4.43 x 4.43 x 5.0
(L x W x H)					
Option(s) available:	Auxiliary 8 Amp contacts Magnetic latch** Center-off versions [†] , GFI (W)	Auxiliary 5 Amp contacts	1NO + 1NC Auxiliary 5 Amp contacts Dust proof enclosure	Auxiliary 5 Amp contacts	Auxiliary 5 Amp contacts Smart electronics, Center-off version ^{††}

*±20% @ 25°C **WL model [†]WC model ^{††}Z model [‡]Current sensing with remote control capability [§]Short-time rated for starting loads

Specifying a Fixed Time Delay Period

Leach and the military identify the time delay period in the same manner. A four-digit dash number specifies the delay period in milliseconds. The first three numbers are significant figures while the fourth indicates the number of zeros to follow the first three.

Examples: -1001 = 1,000 milliseconds (1 second)
 -2502 = 25,000 milliseconds (25 seconds)
 -5000 = 500 milliseconds (0.5 second)

In the case of a repeat cycle timer (flasher), a similar method is used. The dash number indicates the length of each cycle. (Note: each cycle is 50% on, 50% off).

Examples: -2500 = 250 milliseconds cycle or 4 cycles/sec.
 -1001 = 1,000 milliseconds cycle or 1 cycle/sec.
 -6002 = 60,000 milliseconds cycle or 1 cycle/min.

Use and Selection of Adjustable Timers

Adjustable timers are useful in system prototyping or breadboard circuits where the precise time delay period is unknown. By the use of an external resistor, these devices are adjustable over a specific "decade range." Although any decade range within the overall timing range can be supplied, the following ranges are offered as standards:

0.1 to 1 second (Specify -1001)
 1.0 to 10 seconds (Specify -1002)
 5 to 50 seconds (Specify -5002)
 50 to 500 seconds (Specify -5003)

Note from above that in specifying a decade range, the four-digit dash number indicates the high or upper limit of the desired decade range. The formula below provides the proper resistance value to achieve the desired time delay:

$$R_{\text{ext}} = \left(T_1 \frac{1}{T_0} - 1 \right) 100,000 \text{ Ohms}$$

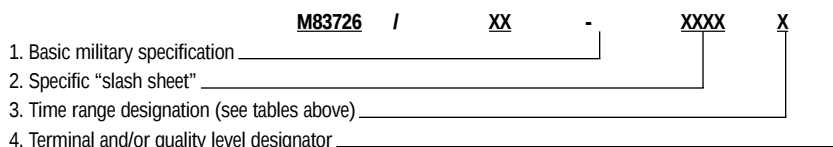
Where: R_{ext} = External resistance value (Ohms)
 T_1 = Desired time in seconds
 T_0 = Minimum time (low end of the decade range) in seconds

For example, if a 30-second delay is desired and a 5- to 50-second adjustable timer is being used, the calculation is:

$$R_{\text{ext}} = \left(\frac{30}{5} - 1 \right) 100,000 \text{ or } R_{\text{ext}} = 500 \text{ K Ohms}$$

Recommended resistors IAW MIL-R-55182 ½ WATT, 1% (RNC60HXXXFS).

Military Part Numbering Method



QPL Cross Reference - Military Part Number to Leach Part Number

Military Part Number	Leach Part Number	Operation Mode	Output	Time Range (seconds)
M83726/3*	TD-1150/1151	Delay on operate - fixed time	10A, 2PDT	0.1-300
M83726/4*	TD-1160/1161	Delay on release - fixed time	10A, 2PDT	0.1-300
M83726/12	TD-1369	Delay on release - fixed time	10A, 4PDT	0.1-300
M83726/14	TD-1370	Delay on operate - fixed time	10A, 4PDT	0.1-300
M83726/20	TD-1435	Delay on operate - fixed time	250MA, SPST	0.05-500
M83726/21	TD-1436	Delay on operate - adjustable**	250MA, SPST	0.05-500
M83726/22	TD-1412	Repeat cycle timer (flasher)	250MA, SPST	1-600 cycles/min.**
M83726/23	TD-1505	"True" delay on release - fixed †	10A, 4PDT	0.1-75
M83726/24	TDH-1609	Delay on operate - fixed time	150MA, SPST	0.05-500
M83726/25	TDH-1610	Delay on release - fixed time	150MA, SPST	0.05-500
M83726/28	TDH-8050/8051	Delay on operate - fixed time	10A, 2PDT	0.1-600 ‡
M83726/29	TDH-8070/8071	Delay on release - fixed time	10A, 2PDT	0.1-600 ‡
M83726/30	TDH-8060/8061	Delay on operate - adjustable	10A, 2PDT	0.1-600 ‡
M83726/31	TDH-8080/8081	Delay on release - adjustable	10A, 2PDT	0.1-600 ‡

* Slash sheets 1, 2, 3 and 4 to MIL-PRF-83726 have officially been canceled. DLA specified replacements: /28 replaces /1 and /3, and /29 replaces /2 and /4.

Replacement units are smaller and lighter but are electrically and physically compatible with inactivated units.

** All adjustable timers use external resistor (not supplied) to adjust timing range.

† "True" time delay on release requires no external power during timing period.

†† Each cycle is 50% on, 50% off.

‡ Timing ranges above 500 seconds are not MIL qualified.

Time Delay Relays (10-25 Amps)

					
Leach Series:	TDH-60X0, TDH-60X1	TDH-80X0, TDH-80X1	TD-1505[‡]	TDH-70X0, TDH-70X1	T531
On operate, fixed time:	TDH-6050/51	TDH-8050/51	—	TDH-7050/51	T531
On operate, adjustable:	TDH-6060/61	TDH-8060/61	—	TDH-7060/61	T531
On release, fixed time:	TDH-6070/71	TDH-8070/71	TD-1505	TDH-7070/71	T531
On release, adjustable:	—	TDH-8080/81	—	—	T531
Repeat cycle timer (flasher):	—	—	—	—	—
Designed to:	—	MIL-PRF-83726	—	MIL-PRF-83726	—
Qualified to:	—	M83726/28, 29, 30, 31	—	—	—
Electrical Data	TDH-60X0, TDH-60X1	TDH-80X0, TDH-80X1	TD-1505	TDH-70X0, TDH-70X1	T531
Contact rating (resistive):	10 Amps	10 Amps	10 Amps	10 Amps	25 Amps
Contact form:	2 PDT	2 PDT	4 PDT	4 PDT	3 PDT
Timing range (seconds):	0.1-600	0.1-600	0.1-75	0.1-600	0.1-1000
Accuracy (percentage)*:	±10	±10	±10	±10	±3 to ±10
Recycle time, max. (ms)**:	50	50	100	50	≤ 50
Input & control voltage:	20-30 VDC	20-30 VDC	20-32 VDC	20-30 VDC	18-32 VDC
Operating current, max.:	150 mAmps	150 mAmps	2.5 Amps	150 mAmps	—
Control current, max.:	—	—	—	—	—
EMI per MIL-STD-461 [†]:	Class 1D	Class 1D	Class 1D	Class 1D	—
Dielectric strength, Vrms					
Sea level:	1000/60 Hz	1000/60 Hz	1000/60 Hz	1000/60 Hz	500/50 Hz
80,000 ft.:	350/60 Hz	350/60 Hz	350/60 Hz	350/60 Hz	250/50 Hz
Insulation resistance megohms:	1000 @ 500 VDC [‡]	1000 @ 500 VDC [‡]	1000 @ 500 VDC [‡]	1000 @ 500 VDC [‡]	≥ 500 @ 500 VDC
Environmental Data	TDH-60X0, TDH-60X1	TDH-80X0, TDH-80X1	TD-1505	TDH-70X0, TDH-70X1	T531
Operating temperature (°C):	-55 to +125	-55 to +125	-55 to +100	-55 to +125	-55 to +125
Vibration					
Sine (G):	20	30	20	20	20/10-2000 Hz
Random (G ² /Hz):	0.2	0.4	0.4	0.2	—
Shock (G):	100	100	50	100	100/6 ms
Acceleration (G):	20	15	20	20	—
Seal:	Hermetic	Hermetic	Potted	Hermetic	Hermetic
Mechanical Data	TDH-60X0, TDH-60X1	TDH-80X0, TDH-80X1	TD-1505	TDH-70X0, TDH-70X1	T531
Weight, max. (oz./g.):	1.9 oz. (54 g.)	2.5 oz. (71 g.)	12.0 oz. (340 g.)	3.0 oz. (85 g.)	4.233 oz. (120 g.)
Dimensions, max. (in.): (L x W x H)	1.025 x 5.25 x 1.520	1.025 x 1.025 x 1.010	2.062 x 2.062 x 1.810	1.025 x 1.025 x 1.50	1.73 x 1.54 x 1.02
Mating socket P/N:	SO-1055-8690	SO-1048-8308	—	SO-1056-8691	S502, SF502
Terminal types ^{††}:	TDH-60X0=PI TDH-60X1=SH	TDH-80X0=PI TDH-80X1=SH	SH	TDH-70X0=PI TDH-70X1=SH	PI, SH

* The accuracy specification applies to any combination of temperature and voltage. For units with a timing range less than 1 second, add ±10 milliseconds to the ±10% tolerance.

** Recycle time is that action which must occur to assure a new timing cycle can be completed within tolerance:

- A. TD on operate—Remove power from input terminals for the period specified.
- B. TD on release—Apply power to the control terminal for the period specified.
- C. "True" TD on release—Apply power to the input terminals for the period specified.

[†] EMI test limits will not be exceeded during the timing interval or when continuously energized under steady state conditions, per paragraph 3.23, MIL-PRF-83726A.

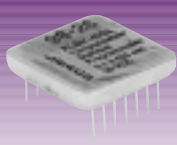
^{††} Definition of terminal type codes:

- PI = Plug-in type for use with mating relay socket.
- SH = Tinned solder hook terminals for direct hard wiring.
- PC = Tinned straight pins for printed circuit board insertion.
- TM = Compatible with M12883/52 socket module and M12883/53 mounting track.

[‡] Terminals X1 and X2 must be connected together during the test. Dielectric withstanding voltage and insulation resistance are measured between all mutually insulated terminals and between all terminals and case.

^{‡‡} Not available for new design; commercially available.

(150-250 Amps) Solid-state Time Delay Relays

				Programmable Model
				
Leach Series:	TDH-1609, TDH-1610	TD-1435, TD-1436	TD-1412^{***}	FLSH402
On operate, fixed time:	TDH-1609	TD-1435	—	FLSH402
On operate, adjustable:	—	TD-1436	—	FLSH402
On release, fixed time:	TDH-1610	—	—	FLSH402
On release, adjustable:	—	—	—	FLSH402
Repeat cycle timer (flasher):	—	—	TD-1412	FLSH402
Designed to:	MIL-PRF-83726	MIL-PRF-83726	MIL-PRF-83726	—
Qualified to:	M83726/24, 25	M83726/20, 21	M83726/22	—
Electrical Data	TDH-1609, TDH-1610	TD-1435, TD-1436	TD-1412	FLSH402
Contact rating (resistive):	150 mAmps	250 mAmps	250 mAmps ^{††}	250 mAmps
Contact form:	SPST	SPST	SPST	2 SSO
Timing range (seconds):	0.05-500	0.05-500	1 cycle/min. to 10 cycles/second	0.1-625
Accuracy (percentage)*:	±10	±10	±10	±3 to ±10
Recycle time, max. (ms)**:	10	10	10	≤ 20
Input & control voltage:	20-32 VDC	18-32 VDC	18-32 VDC	18-32 VDC
Operating current, max.:	10 mAmps	5 mAmps + load	5 mAmps + load	—
Control current, max.:	—	—	—	5 mAmps @ 28VDC
EMI per MIL-STD-461 [†]:	Class 1D	Class 1D	Class 1D	—
Dielectric strength, Vrms				
Sea level:	1000/60 Hz	1000/60 Hz	1000/60 Hz	750/50 Hz
80,000 ft.:	—	350/60 Hz	350/60 Hz	—
Insulation resistance megohms:	1000 @ 500 VDC [†]	1000 @ 500 VDC [†]	1000 @ 500 VDC [†]	≥ 100 @ 100 VDC
Environmental Data	TDH-1609, TDH-1610	TD-1435, TD-1436	TD-1412	FLSH402
Operating temperature (°C):	-55 to +125	-55 to +125	-55 to +125	-55 to +125
Vibration				
Sine (G):	20	30	30	30/70-2000 Hz
Random (G ² /Hz):	—	—	—	—
Shock (G):	1100	1100	1100	50/11 ms
Acceleration (G):	100	100	100	—
Seal:	Hermetic	Hermetic	Hermetic	Hermetic
Mechanical Data	TDH-1609, TDH-1610	TD-1435, TD-1436	TD-1412	FLSH402
Weight, max. (oz./g.):	.56 oz. (16g.)	0.5 oz. (14 g.)	0.5 oz. (14 g.)	0.353 oz. (10 g.)
Dimensions, max. (in.): (L x W x H)	.810 x .410 x .640	.810 x .410 x .310	.810 x .410 x .310	0.91 x 0.91 x 0.24
Mating socket P/N:	See note ^{††}	—	—	—
Terminal types ^{††}:	TM	SH, PC	SH, PC	PI

* The accuracy specification applies to any combination of temperature and voltage. For units with a timing range less than 1 second, add ±10 milliseconds to the ±10% tolerance.

** Recycle time is that action which must occur to assure a new timing cycle can be completed within tolerance:

- A. TD on operate—Remove power from input terminals for the period specified.
- B. TD on release—Apply power to the control terminal for the period specified.
- C. "True" TD on release—Apply power to the input terminals for the period specified.

[†] EMI test limits will not be exceeded during the timing interval or when continuously energized under steady state conditions, per paragraph 3.23, MIL-PRF-83726A.

^{††} Definition of terminal type codes:

PI = Plug-in type for use with mating relay socket.

SH = Tinned solder hook terminals for direct hard wiring.

PC = Tinned straight pins for printed circuit board insertion.

TM = Compatible with M12883/52 socket module and M12883/53 mounting track.

[†] Terminals X1 and X2 must be connected together during the test. Dielectric withstanding voltage and insulation resistance are measured between all mutually insulated terminals and between all terminals and case.

^{††} Output rating equivalent of two MS25237-387 I Amps in parallel.

^{***} Not available for new design; commercially available.

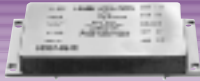
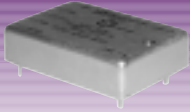
Power Monitors and Voltage-, Current-, Frequency- and Phase-sensing Relays (2-10 Amps)

						
Leach Series:	V 610	V 110	V 210, V 310	F410	P510	CS 400, CS 500
Description:	AC Power Monitor	DC Voltage Sensor	AC Under or Over Voltage Sensor	Frequency Sensor	Phase Sequence Sensor	Current Sensing Relay
Operational Data	V 610	V 110	V 210, V 310	F410	P510	CS 400, CS 500
Input Supply:	90-150 VRMS 180-240 VRMS 44-450 Hz, 3Ø, 4 wire	19.5-30 VDC	90-150 VRMS 180-240 VRMS 50-450 Hz, 3Ø, 4 wire	80-150 VRMS 160-240 VRMS 40-480 Hz, 3Ø, 4 wire	80-150 VRMS 160-240 VRMS 40-450 Hz, 3Ø, 4 wire	18-32 VDC
Sensed voltage:	—	1-50 VDC	—	—	—	—
Sensing functions:	Trip point ranges Under voltage: 90-130 VRMS, ±2% 180-220 VRMS, ±2% Over voltage: 110-150 VRMS, ±2% 200-240 VRMS, ±2% Under frequency: 44-58 Hz, ±2% 350-390 Hz, ±2% Over frequency: 55-62 Hz, ±2% 410-450 Hz, ±2% Phase rotation ABC Time delay: .05-10 sec., ±10%	Energize above, de-energize below selected trip point: 1-50 VDC, ±2%	Selected trip point within: 90-130 VRMS or 180-230 VRMS, ±2%	Energize above, de-energize below selected trip point: 320-480 Hz, ±2% Senses any one line to neutral	Energize when phase sequence is ABC. De-energize for all other sequences, open neutral or loss of voltage	Sensing range: 0.8-49 Amps Min. pickup: — Max. pickup: 5.5-49 Amps Min. dropout: 0.08-.8 Amps Min. delta: 0.16-1.6 Amps Max. delta: 4-31 Amps
Output contacts:*	2 PDT, 10 Amps or 3 PDT, 10 Amps	10 Amps 2 PDT or 4 PDT	10 Amps 2 PDT or 4 PDT	10 Amps 2 PDT or 4 PDT	10 Amps 2 PDT or 4 PDT	2 Amps 2 PDT
Environmental Data	V 610	V 110	V 210, V 310	F410	P510	CS 400, CS 500
Operating temperature (°C):	-55 to +125	-55 to +125	-55 to +125	-55 to +125	-55 to +125	-55 to +85
Thermal shock (MIL-STD-202):	Method 107	Method 107	Method 107	Method 107	Method 107	—
Vibration (MIL-STD-202): Random :	Method 204** Method 214 †	Method 204** Method 214 †	Method 204** Method 214 †	Method 204** Method 214 †	Method 204** Method 214 †	15 g./70-3000 Hz —
Shock (MIL-STD-202):	Method 213 ††	Method 213 ††	Method 213 ††	Method 213 ††	Method 213 ††	50G/11 ms
Acceleration (MIL-STD-202):	Method 212	Method 212	Method 212	Method 212	Method 212	—
Seal:	Hermetic (potted)	Potted	Potted	Potted	Potted	Hermetic
Mechanical Data	V 610	V 110	V 210, V 310	F410	P510	CS 400, CS 500
Weight, max. (oz./g.):	27 oz. (767 g.)	10 oz. (284 g.)	10 oz. (284 g.)	10 oz. (284 g.)	10 oz. (284 g.)	2.469 oz. (70 g.)
Dimensions, max. (in.): (L x W x H)	2.31 x 2.18 x 3.2 ‡	1.531 x 1.531 x 2.34	1.531 x 1.531 x 2.34	1.531 x 1.531 x 2.34	1.531 x 1.531 x 2.34	1.73 x 1.01 x 1.02
Finish:	Electro tin, type 1‡‡	Electro tin, type 1‡‡	Electro tin, type 1‡‡	Electro tin, type 1‡‡	Electro tin, type 1‡‡	Corrosion resistant
Engineering Data	V 610	V 110	V 210, V 310	F410	P510	CS 400, CS 500
Insulation resistance:	100 M Ohms *	100 M Ohms *	100 M Ohms *	100 M Ohms *	100 M Ohms *	≥100 M Ohms @ 50 VDC
Dielectric strength (MIL-STD-202):	Method 301	Method 301	Method 301	Method 301	Method 301	1000 VRMS/50 Hz.
Voltage strength (MIL-STD-202):	Method 301	Method 301	Method 301	Method 301	Method 301	—
Voltage transients (MIL-STD-704):	Category B	Category B	Category B	Category B	Category B	—
Operating current						
AC sensors, max. (mAmps):	75 per phase	75 per phase	75 per phase	75 per phase	75 per phase	—
DC sensors, max. (mAmps):	175	175	175	175	175	—
EMI (MIL-STD-461):	Class 1D	Class 1D	Class 1D	Class 1D	Class 1D	—
Life test						
High level (cycles, min.):	100,000	100,000	100,000	100,000	100,000	—
Low level (cycles, min.):	100,000 **	100,000 **	100,000 **	100,000 **	100,000 **	—

*Ratings shown are resistive loads @ 28 VDC, 115 VAC 400 Hz and 115/200 VAC 400 Hz. **Condition D, except 5-2000 Hz frequency. †Test condition IG; 15 min./plane. †† Test condition A (50G)

‡ Solder hook or circular MIL connector. ‡‡ Per MIL-T-10727. *Minimum initial test; 50 M Ohms after test. **Plus 400,000 cycles mechanical life.

(1-150 Amps) Solid-state Power Controllers

					
Leach Series:	P110	P160	P152	P140	P170
Rating:	2 Amps	2.5 Amps	2 to 7.5 Amps	1, 2, 4, 5, 7.5 and 10 Amps	2, 7, 10 and 15 Amps
Style/Voltage:	PCB Mounted/28 VDC	PCB Mounted/28 VDC	PCB Mounted/270 VDC	PCB Mounted/28 VDC	PCB Mounted/28 VDC
Designed to:	MIL-P-81653**	MIL-P-81653**	MIL-P-81653**	MIL-P-81653**	MIL-P-81653**
Electrical Data	P110	P160	P152	P140	P170
Bias on (voltage):	—	—	4.5-5.5	4.5-5.5 or 18-32	4.5-5.5
Control on (voltage):	4.5-32	3.8-32	2.4 min. (TTL)	2.4-32	2.4 min. (TTL)
Status Output Type:	—	—	Load Current + Trip	Load Current, Voltage	Load Current + Trip
Typical Operate Time (ms):	0.15	0.2	0.5	0.1	0.15
Full Load Voltage Drop	150	150	400	100	100
Environmental Data	P110	P160	P152	P140	P170
Operating temperature (°C):	-55 to +110 (Derated from +105)	-55 to +125 (Derated from +90)	-55 to +100 (Derated from +90)	-55 to +125*	-55 to +125 (Derated from +105)
Vibration (G):	20 (20-2000 Hz)	20 (20-2000 Hz)	20	20 (96-2000 Hz)	20
Shock (G):	1500	1500	1500	1500	1500
Acceleration (G):	5000	5000	5000	5000	5000
Seal:	Hermetic	Hermetic	Hermetic	Hermetic	Hermetic
Mechanical Data	P110	P160	P152	P140	P170
Weight, max. (grams):	5	10	65	20	65
Dimensions, max. (mm): (L x W x H)	20.6 x 10.4 x 6.35	25.4 x 12.7 x 6.5	69.6 x 34 x 9.7	25.7 x 25.7 x 9.5	38 x 27.3 x 9.5

					
Leach Series:	P111	P150	P600-Air	P600-Ground	P700
Rating:	25 Amps	2, 7, 10, 15, 20, 25 and 30 Amps	80 Amps	80 Amps	150 Amps
Style/Voltage:	PC Mounted/AC	PCB Mounted/28 VDC	Stand Alone/28 VDC	Stand Alone/28 VDC	Stand Alone/28 VDC
Designed to:	MIL-R-28750	MIL-P-81653**	MIL-P-81653**	MIL-P-81653**	MIL-P-81653**
Electrical Data	P111	P150	P600-Air	P600-Ground	P700
Bias on (voltage):	32	4.5-5.5	4.5-5.5 or 16-33.5	4.5-5.5	16-33.5
Control on (voltage):	2.4 min. (TTL)	2.4 min. (TTL)	16-32	TTL/CMOS	16-32
Status Output Type:	—	Load Current + Trip	Load Current + Trip + RCCB	Load Current + Trip	Load Current + Trip + RCCB
Typical Operate Time (ms):	Zero Voltage	0.2	1	1	1
Full Load Voltage Drop	1000	100	100	100	100
Environmental Data	P111	P150	P600-Air	P600-Ground	P700
Operating temperature (°C):	-25 to +70 *	-55 to +125*(Derated from +105)	-40 to +70	-31 to +71	-55 to +90*
Vibration (G):	—	20	5 (5-500 Hz)	5 (5-500 Hz)	4.12 (10-2000 Hz)
Shock (G):	1500	1500	30	30	12
Acceleration (G):	5000	5000	10	10	10
Seal:	Hermetic	Hermetic	Hermetic	Hermetic (Internal module)	Hermetic (Internal module)
Mechanical Data	P111	P150	P600-Air	P600-Ground	P700
Weight, max. (grams):	75	65	500	454	500
Dimensions, max. (mm): (L x W x H)	69.8 x 34.1 x 10.2	69.6 x 34 x 9.7	95 x 84.5 x 75	95 x 79.5 x 76.2	96 x 80 x 36

* Derated according to rating from 70°C at full load. ** MIL-P-81653 was cancelled in 1997.

This guide lists specific requirements you should consider when selecting the proper device for your application. Either check the appropriate box or fill in the value as applicable. Refer to the data pages for comparison or consult the detailed engineering data sheets in the *Leach Product Catalog* or Leach Web site (www.leachintl.com). For additional information or unusual application problems, contact the factory or local Leach sales office.

☐ Electromechanical ☐ Solid-state ☐ Time Delay ☐ Power Monitor ☐ Voltage Sensor
☐ Latching ☐ Non-latching ☐ Hybrid ☐ Other (specify) _____

_____ Amps @ _____ volts
☐ DC ☐ AC _____ Hz

☐ Single phase ☐ Unsynchronized power ☐ Inductive ☐ Lamp ☐ Resistive
☐ Three phase ☐ Capacitive ☐ Other ☐ Motor (_____ HP, _____ Inrush)

☐ Single throw normally open ☐ Single throw normally closed ☐ Double throw ☐ Other (specify) _____

_____ Minimum _____ Maximum _____ Nominal _____
 _____ VDC _____ VAC _____ Hz
☐ Single (side stable) ☐ Latching ☐ Center-off

☐ Pull in ☐ Operating current ☐ Contact voltage drop ☐ Leakage current ☐ Life
☐ Bounce ☐ Other (specify) _____

_____ Minimum _____ Maximum _____ Nominal

Maximum size _____ x _____ x _____
 L W H

Maximum weight _____

☐ None ☐ Bracket (specify) _____ ☐ Track mount ☐ Threaded studs ☐ Other (specify) _____

☐ PC ☐ Wire leads ☐ Solder hook ☐ Screw terminals ☐ Connector (specify)

☐ Plug in ☐ Threaded studs ☐ Other (specify) _____

☐ Hermetic ☐ Environmental ☐ None

☐ None ☐ Mil-Spec (specify) _____ ☐ CSA ☐ UL ☐ Other (specify) _____

☐ MISS test ☐ Shock ☐ Hi-low temp ☐ PIND test ☐ Intermittent coil

☐ Vibration ☐ Other (specify) _____

☐ No ☐ Yes (specify) _____

Is delay on ☐ operate or ☐ release? ☐ Adjustable or ☐ fixed delay?

Delay requirement: _____ seconds or _____ minutes

☐ Over voltage/current trip point: _____
If delay required, specify _____

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