TELEDYNE RELAYS
A Teledyne Technologies Company

NEW Series DHR

Output to 32A, 600 Vac
(slimpac) Solid-State Relays

FEATURES/BENEFITS

- New High Efficiency Back-to-Back Thyristors for long lifetime expectancy
- Zero-cross models designed for resistive loads
- Input protection and control LED standard
- IP20 protective plastic covers
- Designed in conformity with EN60947-4-3 (IEC947-4-3) and EN60950/VDE0805 (Reinforced Insulation)

CE

Part No.	Load Voltage	Load Current	Control Voltage	Switch Type
DHR24D12	12-280 Vac	12A	3-32 Vdc	Zero Cross
DHR24D23	12-280 Vac	23A	3-32 Vdc	Zero Cross
DHR48D32	24-600 Vac	32A	3.5-32 Vdc	Zero Cross

NOTES

1) Line Voltage (nominal): 24 = 240 Vac; 48 = 480 Vac

2) Switch Type: D = Zero-cross turn-on

ELECTRICAL SPECIFICATIONS

(+25°C ambient temperature unless otherwise specified)

INPUT (CONTROL) SPECIFICATIONS

	Min	Max	Units
Input Voltage Range			
DHR24	3	32	Vdc
DHR48	3.5	32	Vdc
Input Current Range			
All Relays		14	mA
Must Turn-Off Voltage	2.0		Vdc
Reverse Voltage Protection (D)		32	V
Clamping Voltage (D)		36	V
Input Immunity (EN61000-4-4)		2	kV
Input Immunity (EN61000-4-5)		2	kV

CONTROL CHARACTERISTICS

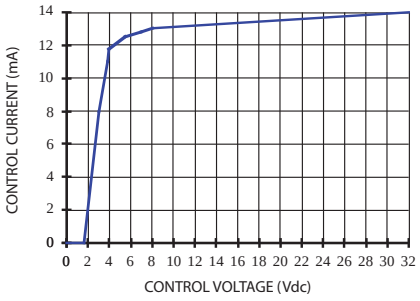
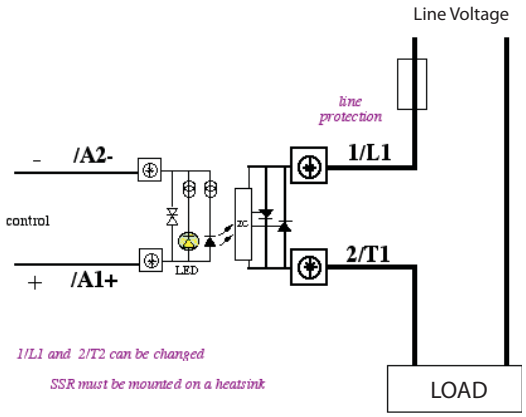


Figure 1

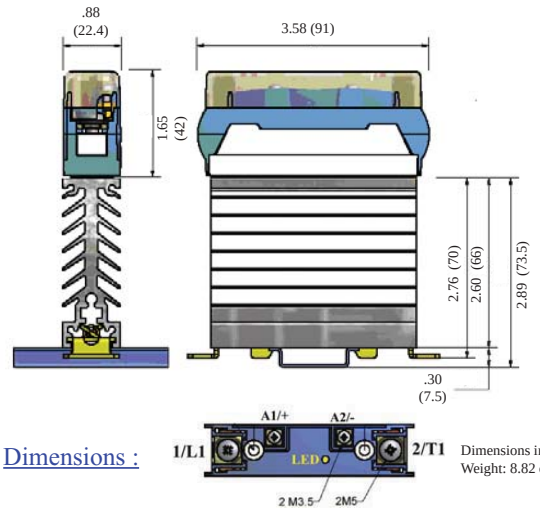
TYPICAL APPLICATION



Typical application: 2kW resistor (AC-51 load) on 200/230 VAC

Figure 2

MECHANICAL SPECIFICATION



Dimensions in inches (mm)
Weight: 8.82 oz. (250 g)

Figure 3

ELECTRICAL SPECIFICATIONS
(+25°C ambient temperature unless otherwise specified)

OUTPUT (LOAD) SPECIFICATIONS

	Min	Max	Units
Operating Range			
DHR24	12	280	Vac
DHR48	12	600	Vac
Peak Voltage (VDR Clamping)			
DHR24		600	Vpeak
DHR48		1200	Vpeak
Load Currrent Range (Resistive)(See Derating Curves)			
12 output current	.005	12	Arms
23 output current	.005	23	Arms
32 output current	.005	32	Arms
Maximum Surge Current Rating (Non-Repetitive)			
12 output current		120	A
23 output current		250	A
32 output current		580	A
On-State Voltage Drop		0.85	V
Output Power Dissipation (Max)			
12 output current	0.9 x 0.85 x I + 0.035 x I^2		W
23 output current	0.9 x 0.85 x I + 0.016 x I^2		W
32 output current	0.9 x 0.85 x I + 0.0075 x I^2		W
Zero-Cross Window (Typical)		±20	Vac
Off-State Leakage Current		1	mA
Turn-On Time (60 Hz)		8.3	ms
Turn-Off Time (60 Hz)		8.3	ms
Off-State dv/dt		500	V/µs
Maximum di/dt (Non-Repetitive)		50	A/µs
Operating Frequency	0.1	800	Hz

	Min	Max	Units
I^2t for fuse matching (<10ms)			
12 output current		78	A^2s
23 output current		340	A^2s
32 output current		1680	A^2s
Junction-Case Thermal Resistance			
12 output current		2.5	°C/W
23 output current		1.8	°C/W
32 output current		0.75	°C/W

Conducted Immunity Level

IEC/EN61000-4-4 (bursts)	
All Relays	2kV criterion A
IEC/EN61000-4-5 (surge)	
All Relays	2kV criterion B
	2kV criterion A on -16 models

GENERAL SPECIFICATIONS
(+25°C ambient temperature unless otherwise specified)

ENVIRONMENTAL SPECIFICATIONS

	Min	Max	Units
Operating Temperature			
All Relays	–40	+80	°C
Storage Temperature			
All Relays	–55	+125	°C
Ambient Humidity		40 to 85	%
Input-Output Isolation	4000		Vrms
Output-Case Isolation			
25A output current	4000		Vrms
50A output current	4000		Vrms
Insulation Resistance @500Vdc	1000		MΩ
Rated Impulse Voltage		4000	V
Vibration (10–55 Hz according to CE168)		1.5	mm
Shock (according to CD168)		30	g
Housing Material	PA6 UL94V0		
Baseplate	Aluminum		

SURGE CURRENT

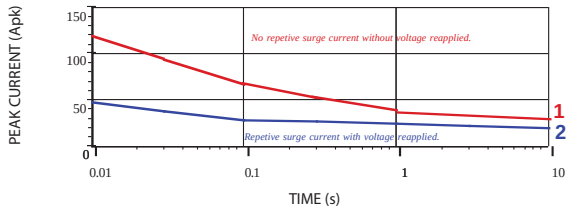


Figure 4a — 12A output current*

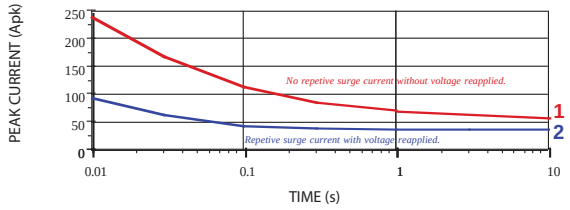


Figure 4b — 23A output current*

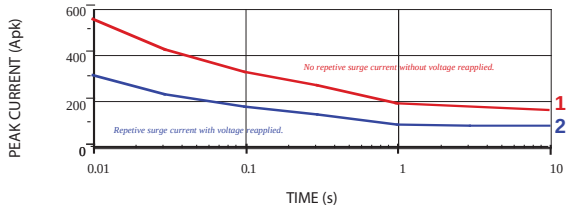


Figure 4d — 32A output current*

Non-Repetitive Surge:

This curve is used to define the protection fuse value. The SSR will not be able to sustain reapplied voltage.

Repetitive Surge:

This curve is used in normal operation with values which must not be exceeded. Maximum inrush current are given for initial junction temperature $T_j = 70°C$. In normal operation, this curve must not be exceeded. Please note that repeated surge currents will decreease the life expectancy of the relay.

Thermal Curve 1:

This curve gives the limits of the relay. The temperature reached is acceptable for the internal components. These values are in compliance with standard specifications for solid state relays. These values are also acceptable in situations where there is some ventilation in the cabinet or load current is not at its maximum.

Thermal Curve 2:

This curve gives the limits for the relay according to EN60947-4-3 with a maximum temperature rise of 50°C (@ ambient 40°C) for constant current in calm air (during 8 hours of test).

For intermitent current applications, the average Power = P_d x Duty Cycle; Temperature rise = ΔT_j = Avg. P_d x $R_{thj/c}$. Junction temperature must never exceed 125°C at ambient temperature.

THERMAL CURVES

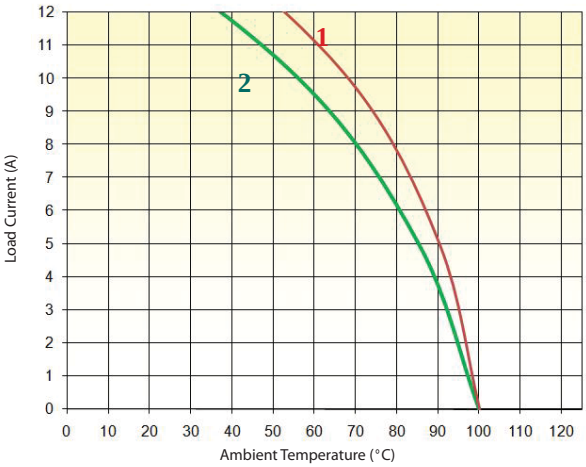


Figure 5a — 12A output power

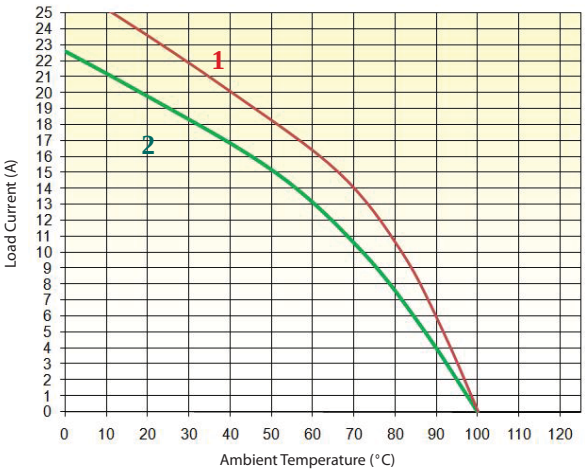


Figure 5a — 12A output power

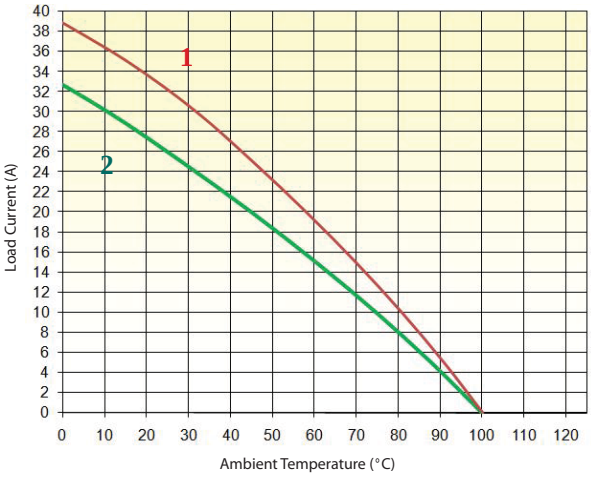
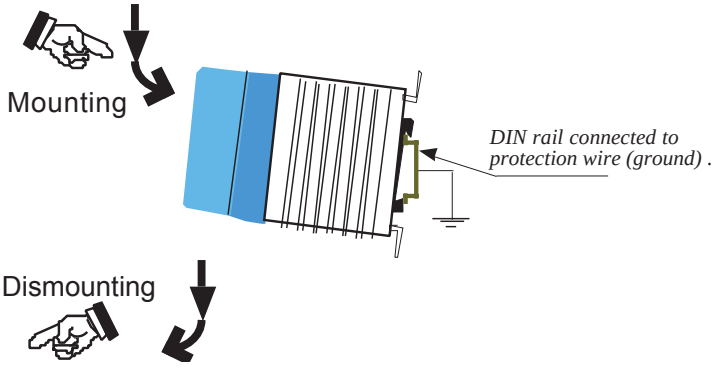


Figure 5a — 12A output power

MOUNTING RECOMMENDATIONS

Semiconductor relays do not provide any Galvanic insulation between the load and the source. Always use in conjunction with an adapted circuit breaker with isolation feature or a similar device in order to ensure reliable insulation in the event of malfunction or when insulation from the source is required.



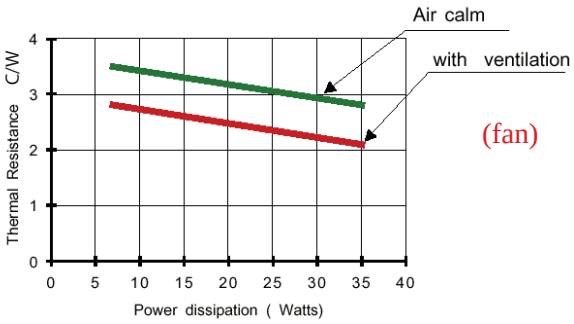
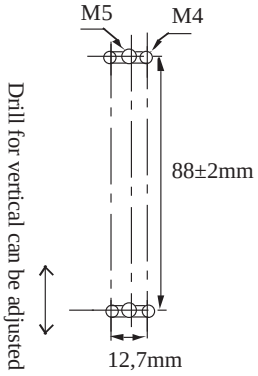
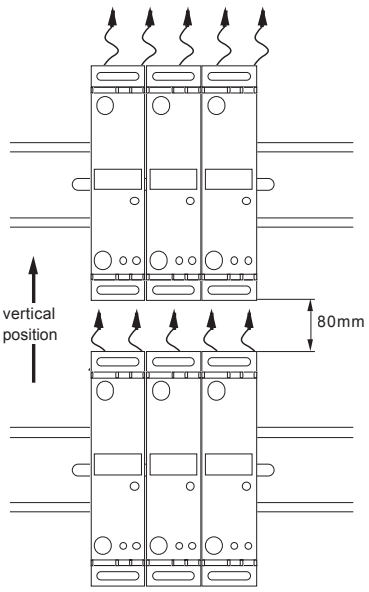


Figure 6a





The user should protect heat sensitive materials as well as operators from any contact with the heatsinks. For appropriate cooling, the relay needs air convection. Insufficient air convection produces abnormal heating. In the case of not having enough spacing between 2 relays, please reduce the load current.
Forced cooling (fan inside cabinet) improves the thermal performance significantly. In all cases please make sure the heatsink temperature never exceeds 90°C.

CONTROL WIRING					
Number of Wires				Screwdriver Type	Recommended Torque
1		2			
Solid (no ferrule)	Fine Stranded (with ferrule)	Solid (no ferrule)	Fine Stranded (with ferrule)		N.m
AWG18…AWG14	AWG18…AWG14	AWG18…AWG14	AWG18…AWG14	Pozidriv 2	1.2

POWER WIRING					
Number of Wires				Screwdriver Type	Recommended Torque
1		2			
Solid (no ferrule)	Fine Stranded (with ferrule)	Solid (no ferrule)	Fine Stranded (with ferrule)		N.m
AWG16…AWG8	AWG16…AWG10	AWG16…AWG8	AWG16…AWG10	Pozidriv 2	2