PRELIMINARY

VOLTAGE PROTECTION FOR DC SOLID-STATE RELAYS

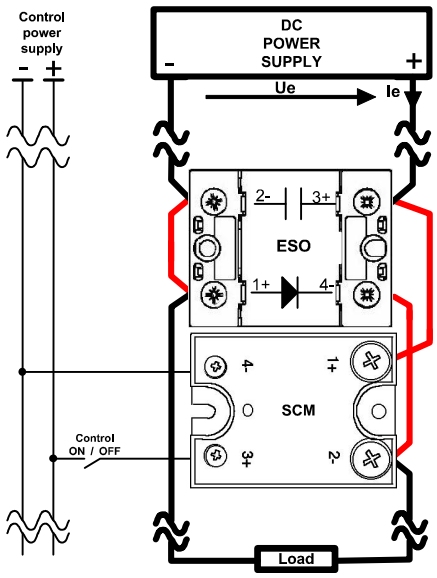
ESO02000

- Helps protecting solid-state relays against voltage transient due to the inductive effect of lines and loads.
- Clamping function (D1) to limit voltage transients across the power element of the DC solid state relay without built-in voltage clamp (SCM)
- Fly wheel diode (D2), with fast response, low on-state voltage drop and connection polarity free, mounted on the metal base plate to be cooled by a heatsink for high switching frequency applications (PWM)
- Decoupling capacitor (C1), connection polarity free and non polarized (polyester) equipped with a discharging resistor
- Led indicating voltage presence across the load

Non-repetitive peak voltage	75VDC
Max operating permanent current	80A
Clamping voltage function for DC relays (D1)	Yes

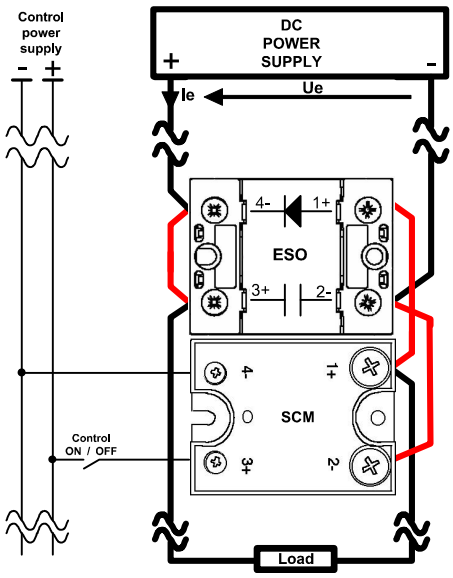
Operating voltage range	Current range	DC SSR clamping voltage function	Isolations	Connections	Dimensions (LxHxD)	Weight
0-130VDC	0-80A	Yes	4kV	Screw terminals	45 x 58.5 x 30	80g

Fig. 1 HIGH SIDE WIRING DIAGRAM (Load connected to "-")



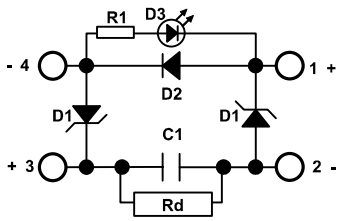
Red wires must be as short as possible

Fig. 2 LOW SIDE WIRING DIAGRAM (Load connected to "+")



Red wires must be as short as possible

Fig. 3 INTERNAL DIAGRAM



GENERAL CHARACTERISTICS

	CHARACTERISTIC	LABEL	VALUE	INFO.
POWER CIRCUIT	DC mains max voltage	Uemax	**40VDC**	
	Non repetitive peak voltage	Uep	75V	
	Max voltage rise	dUe/dt	125V/µs	Ue=Uep
	Max nominal current	Ie max	80A	
	Power output/case insulation	Uimp	4kV	
	Isolation resistance	Rio	1GΩ	
	Isolation capacitance	Cio	<8pF	
	Storage ambient temperature	Tstg	-40°C -> +100°C	
	Operating ambient temperature	Tamb	**-40°C -> +90°C**	
	Max. case temperature	Tc	**100°C**	

LINE CIRCUIT CHARACTERISTICS (C1 & Rd)

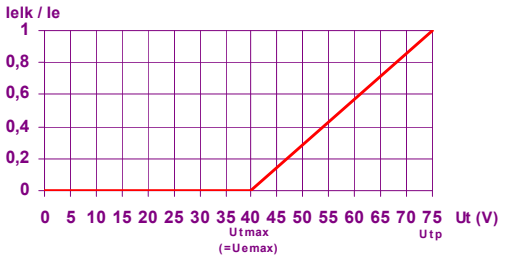
	CHARACTERISTIC	LABEL	VALUE	INFO.
LINE CIRCUIT	Decoupling capacitor	C1	4.4µF ±20%	
	Technology		Polyester	
	Discharging resistor	Rd	1MΩ / 0.5 W	
	Discharging time constant	t	1s	

LOAD CIRCUIT CHARACTERISTICS (D2)

	CHARACTERISTIC	LABEL	VALUE	INFO.
LOAD CIRCUIT	Voltage drop during fly wheel	U_{D2} (VF)	1.2V	@Ie=80A see fig. 6
	Instantaneous power dissipation	P_{D2}	0.96 + 0.003 x Ie	
	Max nominal average current	I_{D2av} (IFav)	80A	
	Max repetitive peak overload current	I_{D2peak} (IFRM)	500A	Tpulse=25µs
	Max non repetitive peak overload current	I_{D2peak} (IFSM)	1000A	Tpulse=25µs
	Max leakage current	$-I_{D2}$ (IR)	= current in the ouput LED	See fig. 7
	Recovering time	trr	190ns	I_{D2}=1A,di/dt=50A/µs, Tc=25°C
	Junction/case thermal resistance	Rthjc	0.35K/W	
	Housing thermal resistance vertically mounted	Rthra	10K/W	@ΔTra=75°C
	Housing thermal time constant	Tthra	10 minutes	@ΔTra=60°C
	Maximum junction temperature	Tjmax	125°C	

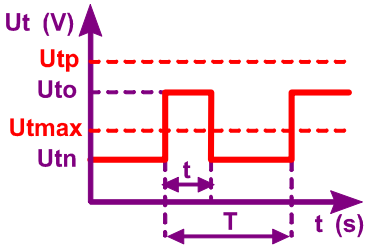
CHARACTERISTICS OF THE BUILT-IN VOLTAGE PROTECTION (D1)

Fig. 4 LEAKAGE CURRENT (Ielk) VS DC OUTPUT SSR SWITCH VOLTAGE (Ut)



Ielk : Leakage current of the relay
Ie : User load nominal current
Utp : Relay max. non repetitive peak voltage

Fig. 5 OVERVOLTAGE DURATION AND FREQUENCY ABSOLUTE LIMITS



Utmax : Max. nominal voltage of the relay
Uto : Possible overvoltage above Utmax
Utn = Ue : User DC power supply voltage

Uto < Utp

$$t\max = \frac{2.5}{(Uto - Ut\max) \times Ie}$$

$$P_{(protection)} = 2W_{\max}$$
$$\Rightarrow \frac{(Uto - Ut\max) \times Ie \times t}{T} \leq 2$$

t : Overvoltage duration
T: Time between 2 overvoltage

OUTPUT CHARACTERISTIC CURVES

Fig. 6 VOLTAGE DROP VS CURRENT (DIODE D2 DURING FLY WHEEL)

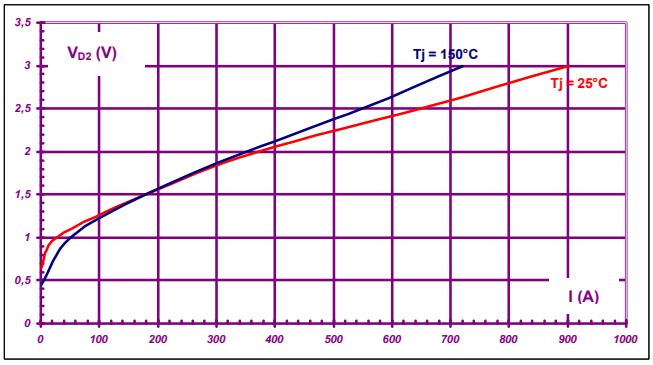


Fig. 7 OUTPUT LED (D3) CURRENT VS LOAD VOLTAGE

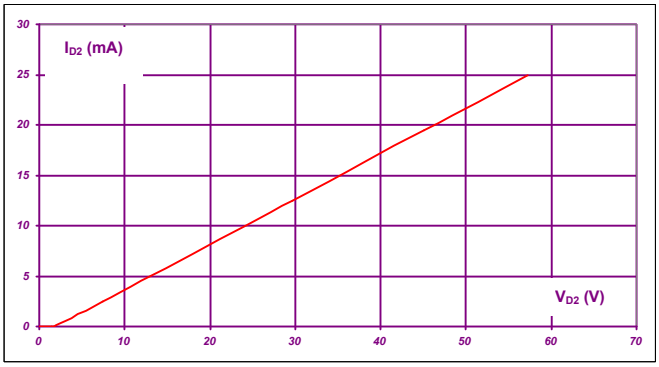


Fig. 8 THERMAL IMPEDANCE (DIODE D2)

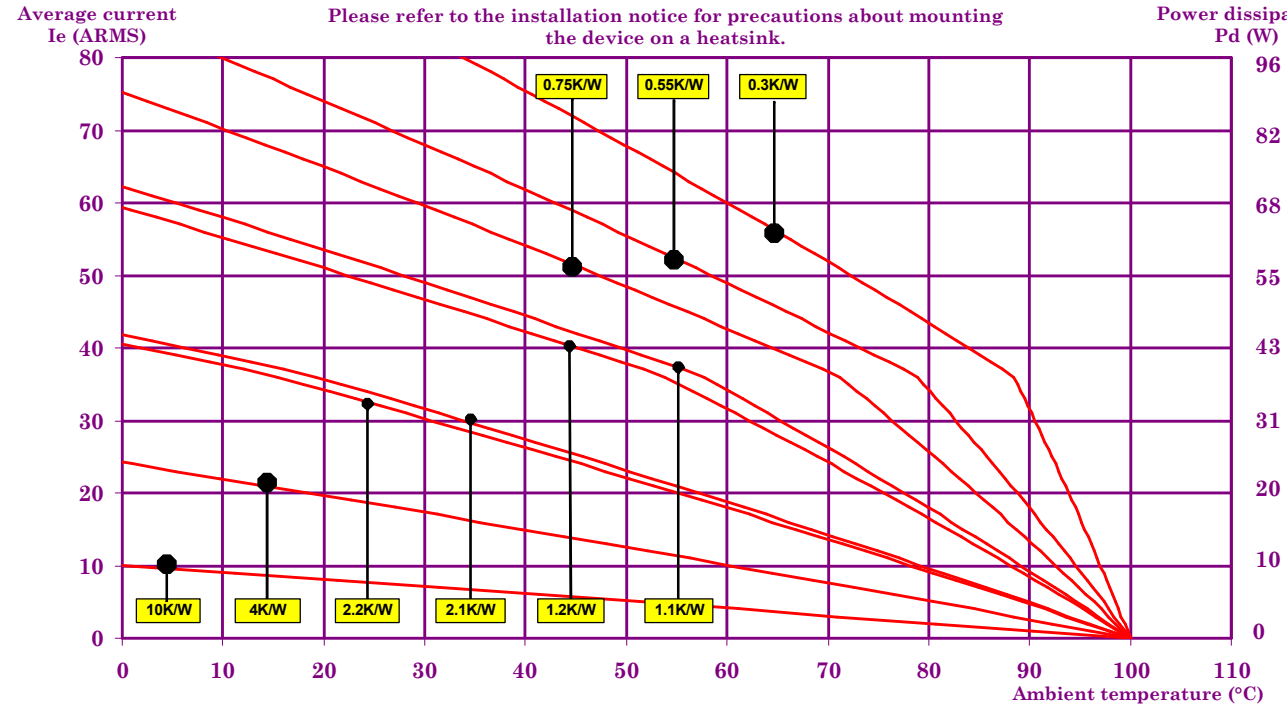
Not available

Fig. 9 OVERLOAD PERMITTED DURING ON-STATE (DIODE D2 DURING FLY WHEEL)

Not available

OUTPUT CHARACTERISTIC CURVES (cont.)

Fig. 10 POWER DISSIPATION AND AVERAGE CURRENT VS AMBIENT TEMPERATURE



10K/W = No Heatsink / 1LD12020
2.1K/W = WF210000
0.75K/W = WF070000

4K/W = 150x150x3mm aluminium sheet
1.2K/W = WF121000
0.55K/W = WF050000

2.2K/W = WF262100 / WF151200
1.1K/W = WF131100
0.3K/W = WF031100

GENERAL INFORMATION

GENERAL INFORMATION	Mounting		2 screws (M4x12mm ; tightening = 1.2N.m)	See mounting sheet
	Screwdriver for connections		POZIDRIV2	
	tightening torque for		2 N.m	
	Insulated crimp terminals (round tabs, eyelet type)		M5	
	Display		Green LED (load supplied)	
	Housing		UL94V0	
	Weight		80g	

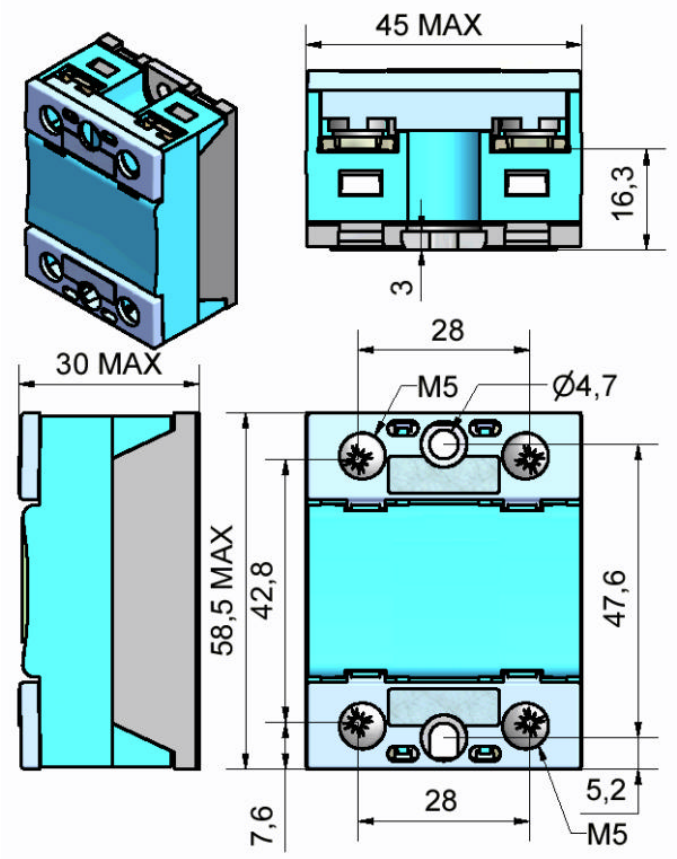
STANDARDS

STAN-DARDS	Standards		IEC60947-1	
	Protection level		IP20	
	Protection against direct touch		Yes	
	CE marking		Yes	
	UL, cULUS and VDE approvals		Pending	

DIMENSIONS ET ACCESSORIES

Fig. 11

DIMENSIONS (mm)



ACCESSORIES

FLAT TAB CONNECTION ADAPTORS
1L587000

Please consult our website for other accessory references
(Heatsinks, mounting adaptors, thermal grease...)

5, rue Ampère B.P. 30004 42290 SORBIERS - France
Phone : 33 (0) 4 77 53 90 21 Fax : 33 (0) 4 77 53 85 51 Email : celduc-relais@celduc.com