

DRSC

Din Rail, 'U' and 'E'- type, Single-Phase Solid State Relays with Integrated Heatsink



Description

The **DRSC** series Industrial Solid-State Relays present a unique opportunity for panel space savings thanks to their very slim footprint and are ready to use with an integrated heatsink. The smallest footprint occupies only a width of 22.5mm with ratings up to 30A and is offered in both U and E configurations. This series will also offer AC or DC control, Zero-Cross, and Random Turn-on switching with Control ON indication provided through a green LED. The output is protected against overvoltages by means of an integrated varistor and will have option for either screw or box clamp power terminals.

Features

- **Panel space savings:** The slimmest product in the range accommodates up to 30 AAC in a width of only 22.5 mm.
- **Less maintenance costs:** Wire bonding technology reduces thermal and mechanical stresses of the output chips resulting in a larger number of operational cycles compared to other assembly technologies.
- **Reduce machine downtime:** Integrated overvoltage protection prevents the solid state relay from breaking down due to uncontrolled transients that may occur on the lines.
- **Ease of use:** The **DRSC** ready-to-use solution is provided with integrated heatsink thus eliminating the need for the user to calculate the size of heatsink needed for adequate thermal dissipation.
- **Cost effective protection co-ordination:** The high I²t specification permits easy Type 2 protection co-ordination with B-type Miniature Circuit Breakers.
- **Fast wiring:** Power connections for models rated >30 A are equipped with terminals that can handle cables up to 25 mm² / AWG3 cables.
- **UL508A for Industrial Control Panels:** The **DRSC** is certified as a listed product. All models carry a 100 kArms Short Circuit Current Rating.
- **Protection against SSR overheat:** Optional feature with integrated over temperature protection protects the **DRSC** output from getting damaged in case of overheating. This feature is present by default on the variants with integrated fan and optional on other variants.

Applications

- Plastic Injection Molding
- Extrusion Machines
- Blow Moulding Machines
- Thermoformers
- Dryers
- Electrical Ovens
- Fryers
- Shrink Tunnels
- Air Handling Units
- Sterilization Equipment
- Climatic Chambers
- Ovens and Furnaces
- Ambient Heating
- Water Treatment Systems
- Battery Charging Systems
- Photovoltaic (PV) Systems
- Motor Control
- Food Processing Equipment
- Industrial Pumps and Compressors
- Semiconductor Manufacturing

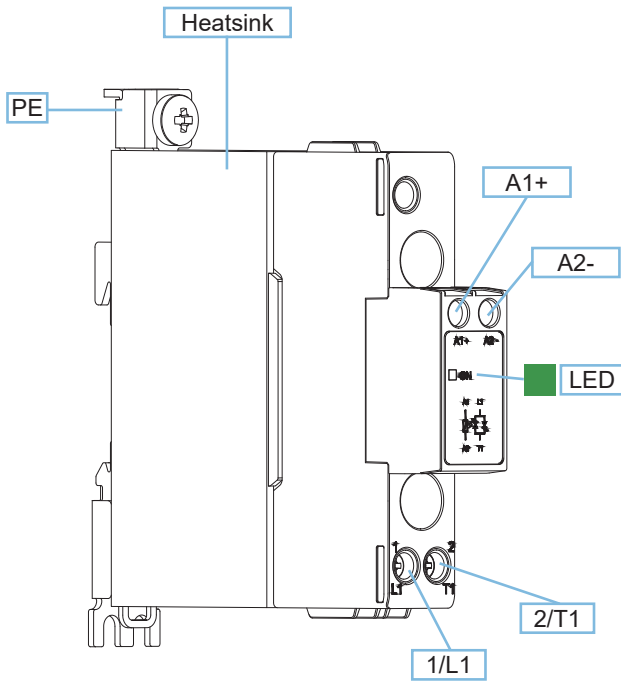
Part Numbering System

Code	Option	Description	Notes*
DRSC		Product Series	
-	60	Operational Voltage Range: 42-660VAC, (1200Vp)	
-	D	Zero Cross, Control Voltage: 3-32VDC*	4-32Vdc for 600VAC models
-	A	Zero Cross, Control Voltage: 20-275 VAC, 24-190 VDC	
-	R	Random Turn-On, Control Voltage: 3-32VDC	4-32Vdc for 600VAC models
-	30	30A Rated Load Current, (1800 A ² s)	22.5 mm wide
-		Input = screw, Output = screw	Leave black for standard screw terminals
-	B	Input: Screw, Output: Box clamp	
-		E Contactor configuration	Leave black for E configuration
-	U	U Contactor configuration	

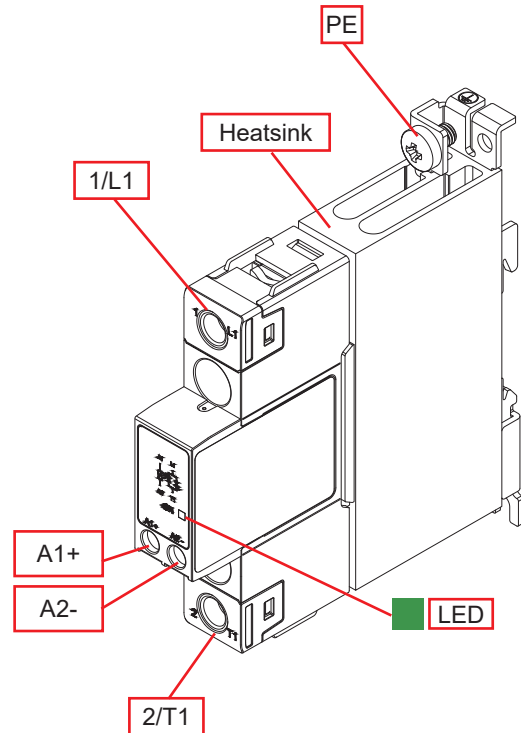
Example: DRSC 60 A 30 B U



Structure for "U" Contactor Configuration



Structure for "E" Contactor Configuration



Element	Component	Function
1/L1	Power connection	Mains connection
2/T1	Power connection	Load connection
A1+, A2-	Control connection	Terminals for control voltage
LED	ON indicator	Indicates presence of control voltage
Heatsink	Integrated heatsink	DIN rail mounting (panel mounting also possible)
PE	Protective Earth	Connection for Protective Earth, PE screw not provided with DRSC

General Specifications

Material	PA66 or PA6 (UL94 V0), RAL7035 Glow wire ignition temperature and Glow wire flammability index conform to EN 60335-1 requirements
Mounting	DIN rail (panel mount also possible)
Touch protection	IP20
Overvoltage category	III, 6 kV (1.2/50 μ s) rated impulse withstand voltage
Isolation	Input and Output to Case: 4000 Vrms Input to Output: 4000 Vrms
Weight	DRSC..30: Approx. 375 g

Output Specifications

Max. Operational Current¹: AC-51 @ Ta=25°C	30 AAC
Max. Operational Current¹: AC-51 @ Ta=40°C	30 AAC
Max. Operational Current¹: AC-53a @ Ta=40°C	8 AAC
Operational Frequency Range	45 to 65 Hz
Output Protection	Integrated varistor
Leakage Current @ Rated Voltage	<3 mAAC
Minimum Operational Current	250 mAAC
Repetitive Overload Current (Motor rating) UL508: Ta=40°C, t_{ON}=1 s, t_{OFF}=9 s, 50 cycles	84 AAC
Non-Repetitive Surge Current (I_{TSM}), t=10 ms	600 Ap
I²t for Fusing (t=10 ms), minimum	1800 A ² s
No. of motor starts per hour² (x=6, Tx=6s, F=50%) @ 40°C	30
Power factor	>0.5 at rated voltage
Critical dV/dt (@Tj init = 40°C)	1000 V/ μ s

1. Refer to Current derating curves

2. Overload profile for AC-53a; Ie: AC-53a: x-Tx: F-S, where Ie = nominal current (AC-53a AAC), x = overload current factor, Tx = duration of overload current (s), F = duty cycle (%), S = number of starts per hour.

Output Voltage Specifications

Operational Voltage Range	42-600 VAC, +10% -15% on max
Blocking Voltage	1200 Vp
Internal Varistor	625 V

Motor Ratings: HP (UL508) / kW (EN/IEC 60947-4-2) @ 40°C

115 VAC	230 VAC	400 VAC	480 VAC	600 VAC
¾HP / 0.37kW	2HP / 1.1kW	3HP / 1.5kW	5HP / 2.2kW	5HP / 3.7kW

Input Specifications

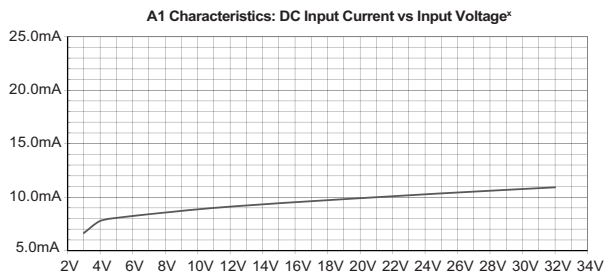
Input Type	DC Input	AC Input
Control Voltage Range ^{3, 4}	4 - 32 VDC	20-275 VAC, 24 (-10%) -190 VDC
Pick-Up Voltage	3.8 VDC	20 VAC/DC
Drop-Out Voltage	1.0 VDC	5 VAC/DC
Maximum Reverse Voltage	32 VDC	-
Maximum Response Time; Zero Cross	0.5 cycle + 500 μ s @ 24 VDC	2 cycles @ 230 VAC/110 VDC
Maximum Response Time; Random Turn-On	350 μ s @ 24 VDC	-
Response Time Drop-Out	0.5 cycle + 500 μ s @ 24 VDC	0.5 cycle + 40 μ s @ 230 VAC/110 VDC
Input Current @ 40°C	See diagrams below	

3. DC control to be supplied by class 2 power source according to UL1310

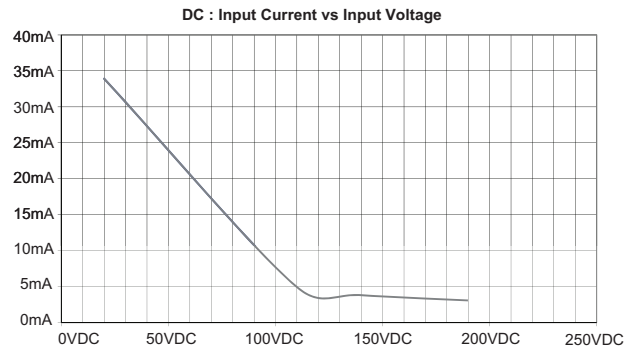
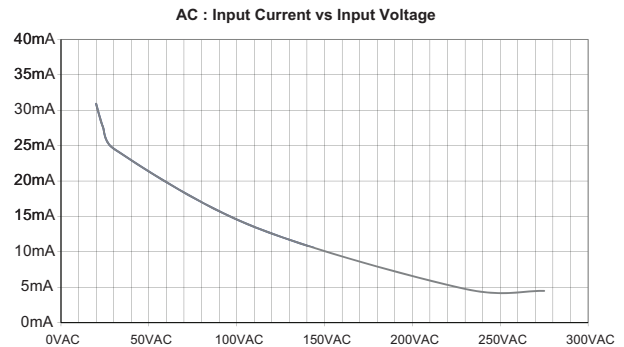
4. For GL approved models control range for DRSC60 is 5-32VDC

Input Current vs. Input Voltage

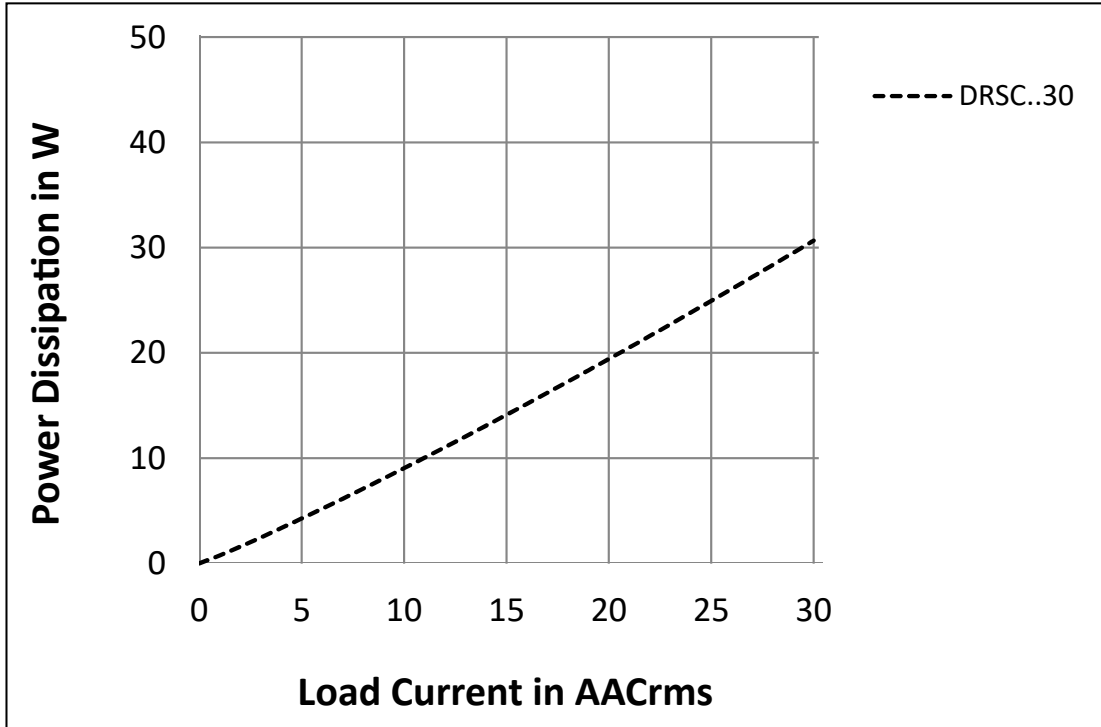
DC Input



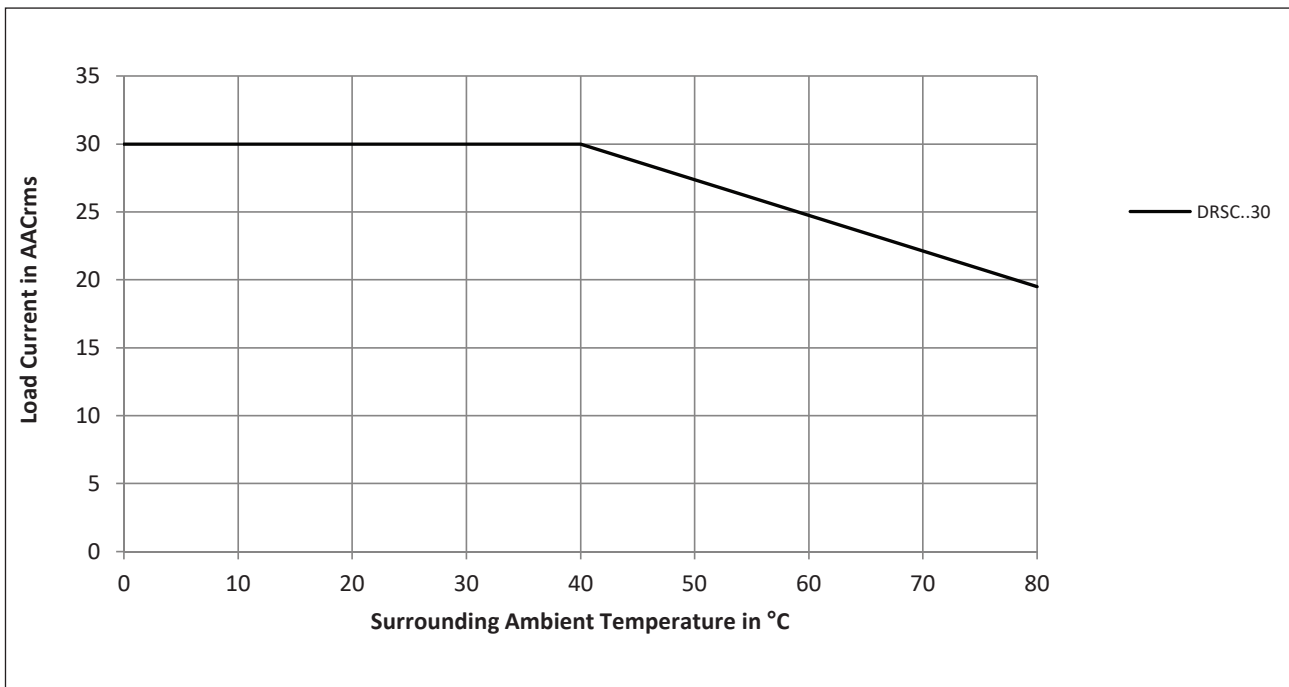
AC/DC Input



Output Power Dissipation

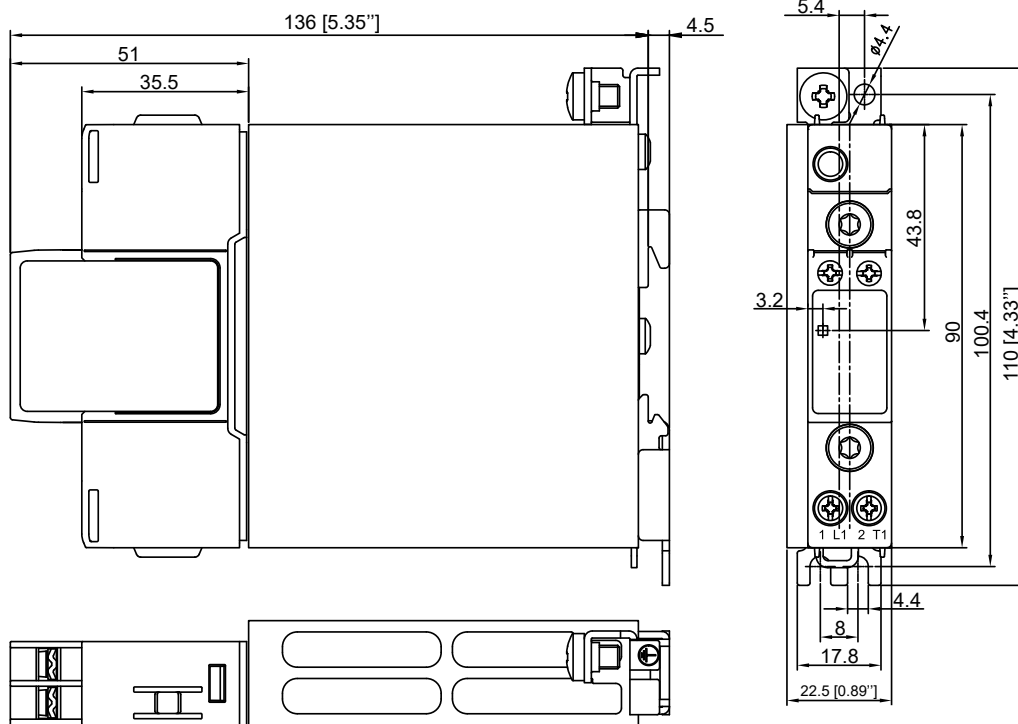


Current Derating

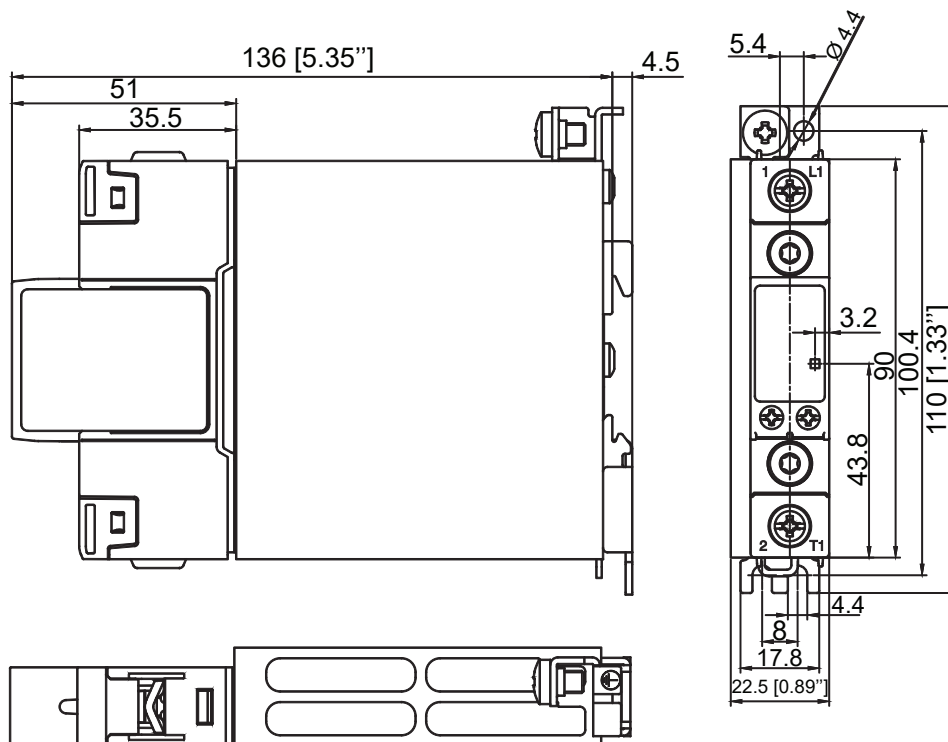


Dimensions

U Configuration



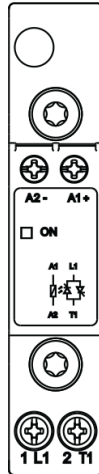
E Configuration



Housing width tolerance +0.5mm, -0mm as per DIN 43880. All other tolerances +/- 0.5mm.
Dimensions in mm.

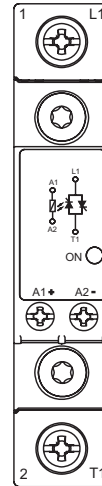
Terminal Layout

U Configuration



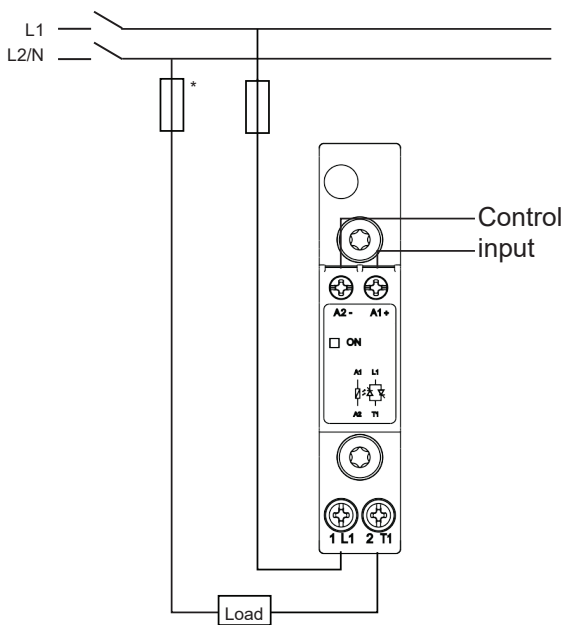
1/L1: Mains supply connection
2/T1: Load connection
A1(+): Positive control signal
A2(-): Control ground
⊕: Protective Earth

E Configuration

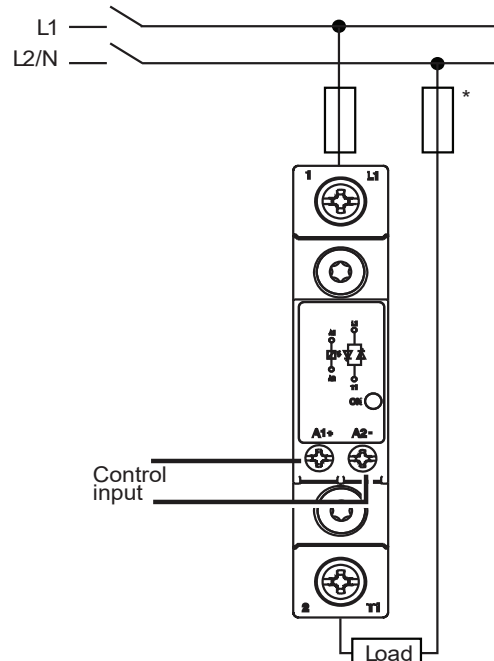


Connection Diagram

U Configuration



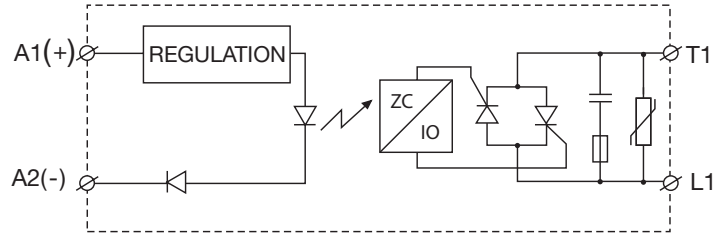
E Configuration



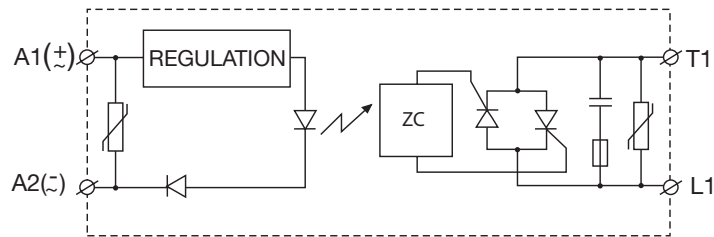
* depends on system requirements

Functional Diagram

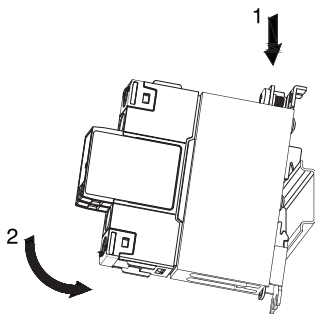
DC control



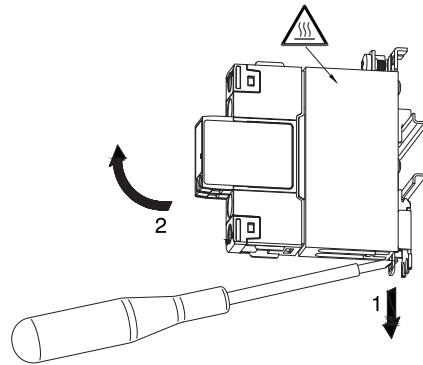
AC control



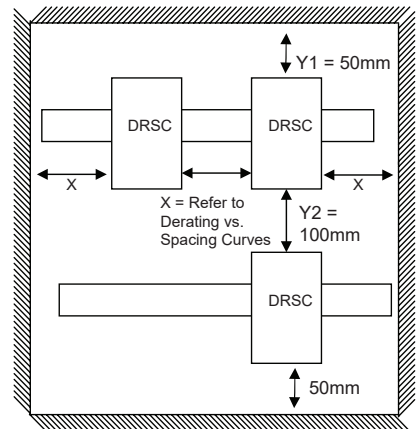
Installation



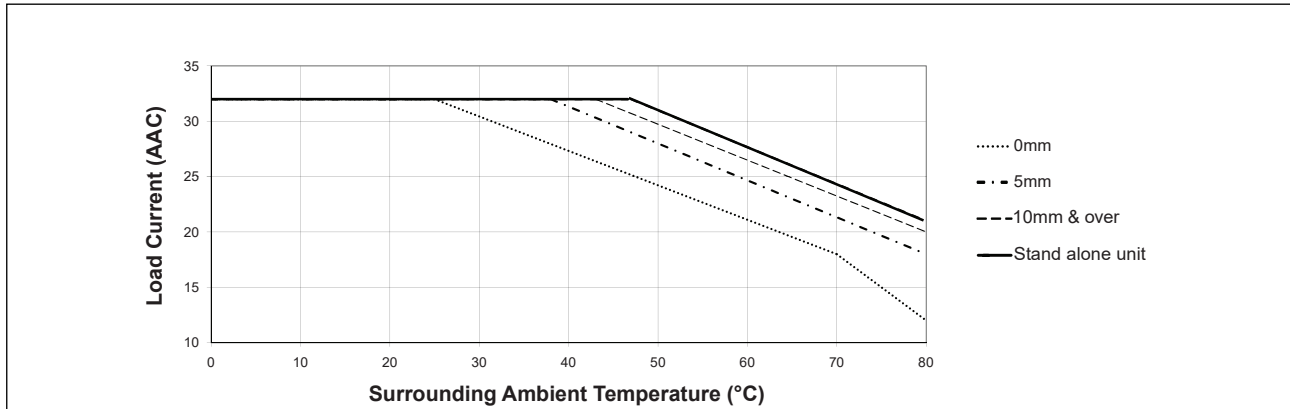
Mounting on DIN rail



Dismounting from DIN rail



Derating vs. Spacing Curves



Compatibility and Conformance

Approvals	
Standards Compliance	LVD: EN/IEC 60947-4-2, EN/IEC 60947-4-3 EMCD: EN/IEC 60947-4-3 EE: EN 60947-4-3 EMC: EN 60947-4-3 UL: UL508 (E172877), NMFT cUL: C22.2 No. 14 (E172877), NMFT7 VDE: VDE0660-109 GL
UL Short Circuit Current Rating	100k Arms (refer to short circuit current section, Type 1 – UL508)

Electromagnetic Compatibility (EMC) - Immunity

Electrostatic Discharge (ESD)	EN/IEC 61000-4-2 8 kV air discharge, 4 kV contact (PC1)
Radiated Radio Frequency	EN/IEC 61000-4-3 10 V/m, from 80 MHz to 1 GHz (PC1) 10 V/m, from 1.4 to 2 GHz (PC1) 10 V/m, from 2 to 2.7 GHz (PC1)
Electrical Fast Transient (burst)	EN/IEC 61000-4-4 Output: 2 kV, 5 kHz (PC1) Input: 1 kV, 5 kHz (PC1)
Conducted Radio Frequency	EN/IEC 61000-4-6 10 V/m, from 0.15 to 80 MHz (PC1)
Electrical Surge	EN/IEC 61000-4-5 Output, line to line: 1 kV (PC1) Output, line to earth: 2 kV (PC1) Input, line to line, 1kV (PC2) Input, line to earth, 2kV (PC2)
Voltage Dips	EN/IEC 61000-4-11 0% for 0.5, 1 cycle (PC2) 40% for 10 cycles (PC2) 70% for 25 cycles (PC2) 80% for 250 cycles (PC2)
Voltage Interruptions	EN/IEC 61000-4-11 0% for 5000 ms (PC2)

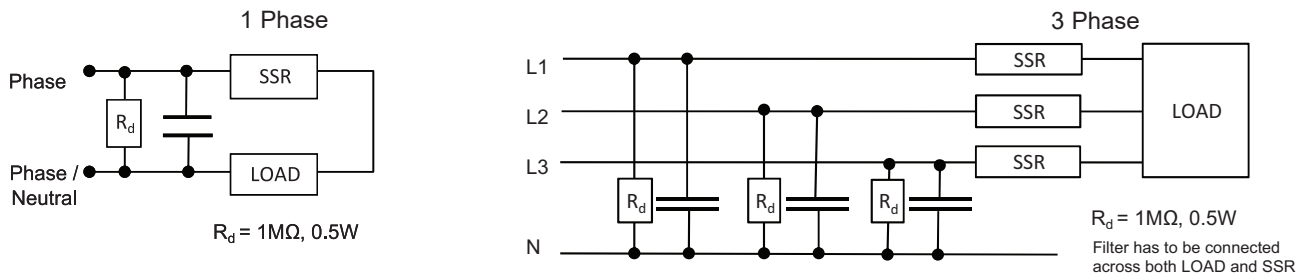
Electromagnetic Compatibility (EMC) - Emissions

Radio Interference Field Emission (radiated)	EN/IEC 55011 Class A: from 30 to 1000 MHz
Radio Interference Voltage Emissions (conducted)	EN/IEC 55011 Class A: from 0.15 to 30 MHz (External filter may be required - refer to Filtering section)

Additional Conformance to Railway Standards

Additional conformance specific to railway applications	EN 50155 EN 45545-2 EN 50121-3-2
Hazardous level conformance according to EN 45545-2	HL1, HL2 for requirement R23 HL1 for requirement R22
Operating temperature class according to EN 50155	OT3 (-25 °C to +70 °C)
Vibration and shock	EN 61373 Category 1, Class B
Additional EMC conformance	according to EN 50121-3-2
Radiated radio frequency immunity	EN/IEC 61000-4-3 20 V/m, from 80 MHz to 1 GHz (PC1) 10 V/m, from 1.4 to 2 GHz (PC1) 5 V/m, from 2 to 2.7 GHz (PC1) 3 V/m, 5.1 - 6 GHz (PC1)
Power quality measurement	EN/IEC 61000-4-30 50 Hz - 2 kHz, <8% THD (PASS)

Filter Connection Diagram




Filtering

Suggested Filter for EN 55011 Class A Compliance	Maximum Heater Current [AAC]
220 nF / 760V / X1	30 AAC

Note:

- Control input lines must be installed together to maintain products' susceptibility to Radio Frequency interference.
- Use of AC solid state relays may, according to the application and the load current, cause conducted radio interferences. Use of mains filters may be necessary for cases where the user must meet E.M.C requirements. The capacitor values given inside the filtering specification tables should be taken only as indications, the filter attenuation will depend on the final application.
- This product has been designed for Class A equipment. Use of this product in domestic environments may cause radio interference, in which case the user may be required to employ additional mitigation methods.
- Performance Criteria 1 (PC1): No degradation of performance or loss of function is allowed when the product is operated as intended.
- Performance Criteria 2 (PC2): During the test, degradation of performance or partial loss of function is allowed. However when the test is complete the product should return operating as intended by itself.
- Performance Criteria 3 (PC3): Temporary loss of function is allowed, provided the function can be restored by manual operation of the controls.

Environmental Specifications

Operating Temperature	-40°C to +80°C (-40°F to +176°F)
Storage Temperature	-40 to +100°C (-40 to +212 °F)
Relative Humidity	95% non-condensing @ 40°C
Pollution Degree	2
Installation Altitude	0-1000 m. Above 1000 m derate linearly by 1% of FLC per 100 m up to a maximum of 2000 m
Vibration Resistance	2g / axis (2-100Hz, IEC 60068-2-6, EN 50155, EN 61373)
Impact Resistance	15/11 g/ms (EN50155, EN61373)
EU RoHS Compliant	Yes
China RoHS	

The declaration in this section is prepared in compliance with People's Republic of China Electronic Industry Standard SJ/T11364-2014: Marking for the Restricted Use of Hazardous Substances in Electronic and Electrical Products.

Substance Name	Toxic or Harardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr(VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
Power Unit Assembly	x	o	o	o	o	o

O: Indicates that said hazardous substance contained in homogeneous materials for this part are below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in one of the homogeneous materials used for this part is above the limit requirement of GB/T 26572.

Short Circuit Protection

Protection Co-ordination, Type 1 vs Type 2:

Type 1 protection implies that after a short circuit, the device under test will no longer be in a functioning state. In Type 2 co-ordination the device under test will still be functional after the short circuit. In both cases, however the short circuit has to be interrupted. The fuse between enclosure and supply shall not open. The door or cover of the enclosure shall not be blown open. There shall be no damage to conductors or terminals and the conductors shall not separate from terminals. there shall be no breakage or cracking of insulating bases to the extent that the integrity of the mounting of live parts is impaired. Discharge of parts or any risk of fire shall not occur.

The product variants listed in the table hereunder are suitable for use on a circuit capable of delivering not more than 100,000 Arms Symmetrical Amperes, 600 Volts maximum when protected by fuses. Tests at 100,000 A were performed with Class J fuses, fast acting; please refer to the table below for maximum allowed ampere rating of the fuse. Use fuses only.

Tests with Class J fuses are representative of Class CC fuses.

Protection co-ordination Type 1 according to UL 508			
Prospective short circuit current [kArms]	Max fuse size [A]	Class	Voltage [VAC]
100	30	J or CC	Max. 600

Protection co-ordination Type 2 (IEC/EN 60947-4-2/ -4-3)					
Prospective short circuit current [kArms]	Ferraz Shawmut (Mersen)		Siba		Max. voltage [VAC]
	Max fuse size [A]	Part number	Max fuse size [A]	Part number	
10	40	6.9xx CP GRC 22x58 /40	32	50 142 06.32	600
100					

xx = 00, without fuse trip indication, xx= 21, with fuse trip indication



Protection co-ordination Type 2 with Miniature Circuit Breakers (M.C.B.s)			
ABB Model no. for Z - type M. C. B. (rated current)	ABB Model no. for B - type M. C. B. (rated current)	Wire cross sectional area [mm ²]	Minimum length of Cu wire conductor [m] ⁸
S201 - Z10 (10A)	S201-B4 (4A)	1.0	7.6
		1.5	11.4
		2.5	19.0
S201 - Z16 (16A)	S201-B6 (6A)	1.0	5.2
		1.5	7.8
		2.5	13.0
		4.0	20.8
S201 - Z20 (20A)	S201-B10 (10A)	1.5	12.6
		2.5	21.0
S201 - Z25 (25A)	S201-B13 (13A)	2.5	25.0
		4.0	40.0
S202 - Z25 (25A)	S202-B13 (13A)	2.5	19.0
		4.0	30.4


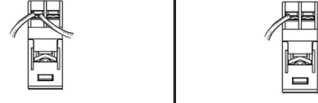
8. Between MCB and Load (including return path which goes back to the mains)

Note: A prospective current of 6 kA and a 230 / 400 V power supply is assumed for the above suggested specifications. For cables with different cross section than those mentioned above please consult Teledyne Relays' Technical Support team.

S201 models refer to 1-pole M.C.B., S202 models refer to 2-poles M.C.B.

Connection Specifications

Power Connections			
Terminals	1/L1, 2/T1		
Conductors	Use 75°C copper (Cu) conductors		
Configuration	U		E
			
Connection Type	M3.5 screw with box clamp		M4 screw with captivated washer
Stripping Length	12 mm		
Rigid (Solid & Stranded) UL/cUL Rated Data	1x 1.0 – 6.0 mm ² 1x 18 – 10 AWG	2x 2.5 – 6.0 mm ² 2x 14 – 10 AWG	1x 2.5 – 6.0 mm ² 1x 14 – 10 AWG
Flexible with End Sleeve	1x 0.5 – 2.5 mm ² 1x 20 – 2.5 mm ²	2x 1.0 – 2.5 mm ² 2x 2.5 – 4.0 mm ² 2x 18 – 14 AWG 2x 14 – 12 AWG	1x 1.0 – 4.0 mm ² 1x 18 – 12 AWG
Flexible without End Sleeve	1x 1 – 4 mm ² 1x 18 – 12 mm ²	2x 1.0 – 2.5 mm ² 2x 2.5 – 6.0 mm ² 2x 18 – 14 AWG 2x 14 – 10 AWG	1x 1.0 – 6.0mm ² 1x 18 – 10 AWG
Torque Specifications	Posidrive bit 1 UL: 1.0 Nm (8.85 lb-in) IEC: 0.9 - 1.1Nm (8 - 9.7 lb-in)		Posidrive bit 2 UL: 2.0 Nm (17.7 lb-in) IEC: 1.5 – 2.0 Nm (13.3 – 17.7 lb-in)
Aperture for termination lug (fork or ring)			12.3 mm
Protective Earth (PE) Connection	M5, 1.5 Nm (13.3 lb-in) M5 PE screw is not provided with the solid state relay. PE connection is required when product is intended to be used in Class 1 applications according to EN/IEC 61140		

Control Connections			
Terminals	A1+, A2-		
Conductors	Use 60/75°C copper (Cu) conductors		
Configuration	U		E
			
Connection type	M3 screw with captivated washer		
Stripping length	8 mm		
Rigid (solid & stranded) UL/cUL rated data	2x 0.5 - 2.5 mm ² 2x 18 - 12 AWG	1x 0.5 - 2.5 mm ² 1x 18 - 12 AWG	2x 0.5 - 2.5 mm ² 2x 18 - 12 AWG
Flexible with end sleeve	2x 0.5 - 2.5 mm ² 2x 18 - 12 AWG	1x 0.5 - 2.5 mm ² 1x 18 - 12 AWG	2x 0.5 - 2.5 mm ² 2x 18 - 12 AWG
Torque specification	Posidrive 1 UL: 0.5 Nm (4.4 lb-in), IEC: 0.5-0.6 Nm (4.4-5.3 lb-in)		

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