

# 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 I<sup>2</sup>t 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 mm<sup>2</sup> / 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

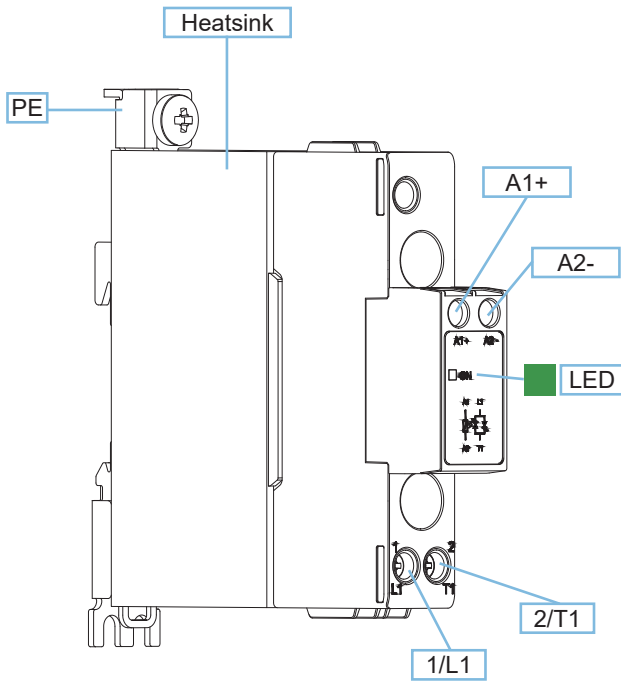
**Part Numbering System**

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

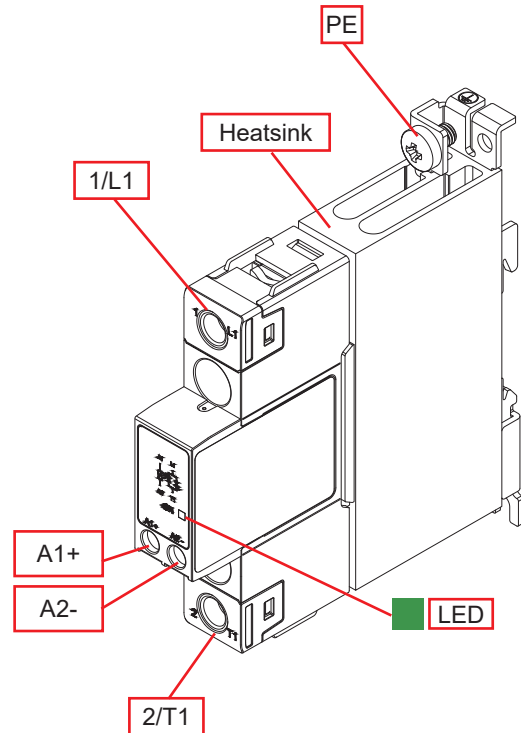
**Example: DRSC 60 A 30 B U**



**Structure for "U" Contactor Configuration**



**Structure for "E" Contactor Configuration**



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

### General Specifications

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

### Output Specifications

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

1. Refer to Current derating curves

2. Overload profile for AC-53a; I<sub>e</sub>: AC-53a: x-Tx: F-S, where I<sub>e</sub> = 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

<b>Operational Voltage Range</b>	42-600 VAC, +10% -15% on max
<b>Blocking Voltage</b>	1200 Vp
<b>Internal Varistor</b>	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

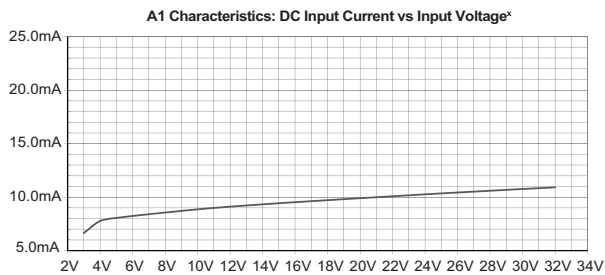
## Input Specifications

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

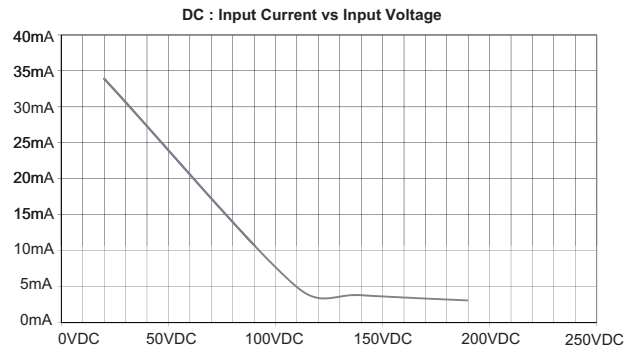
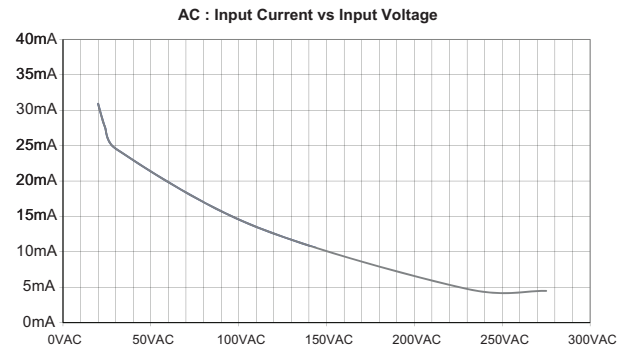
3. DC control to be supplied by class 2 power source according to UL1310  
 4. For GL approved models control range for DRSC60 is 5-32VDC

## Input Current vs. Input Voltage

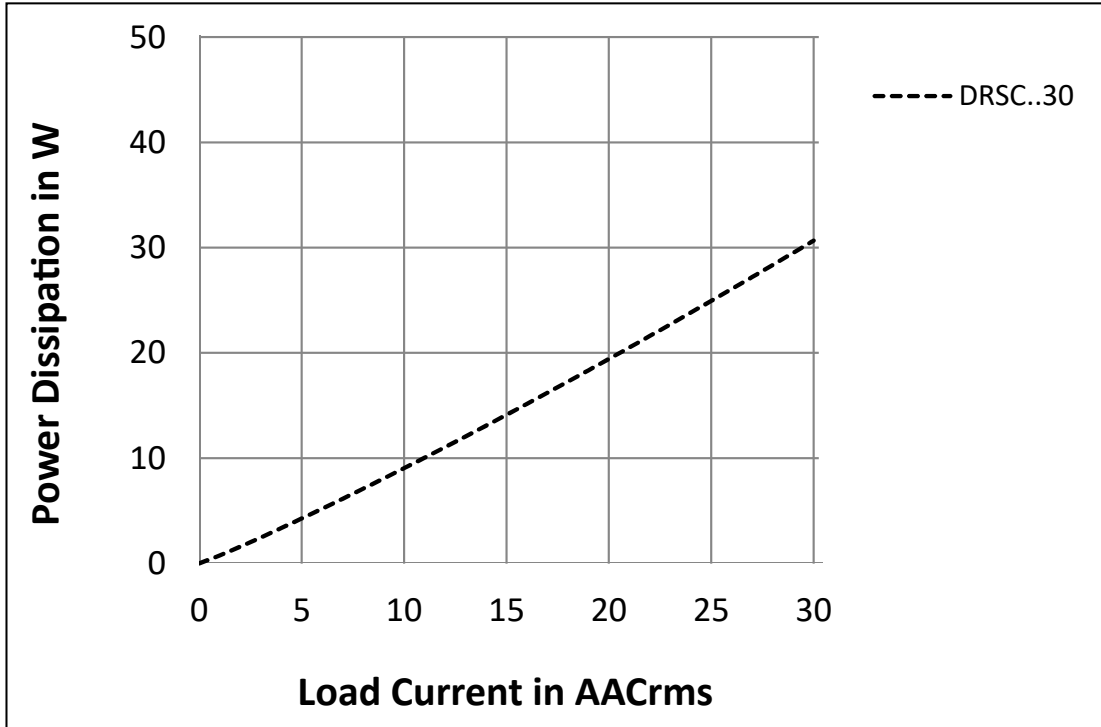
### DC Input



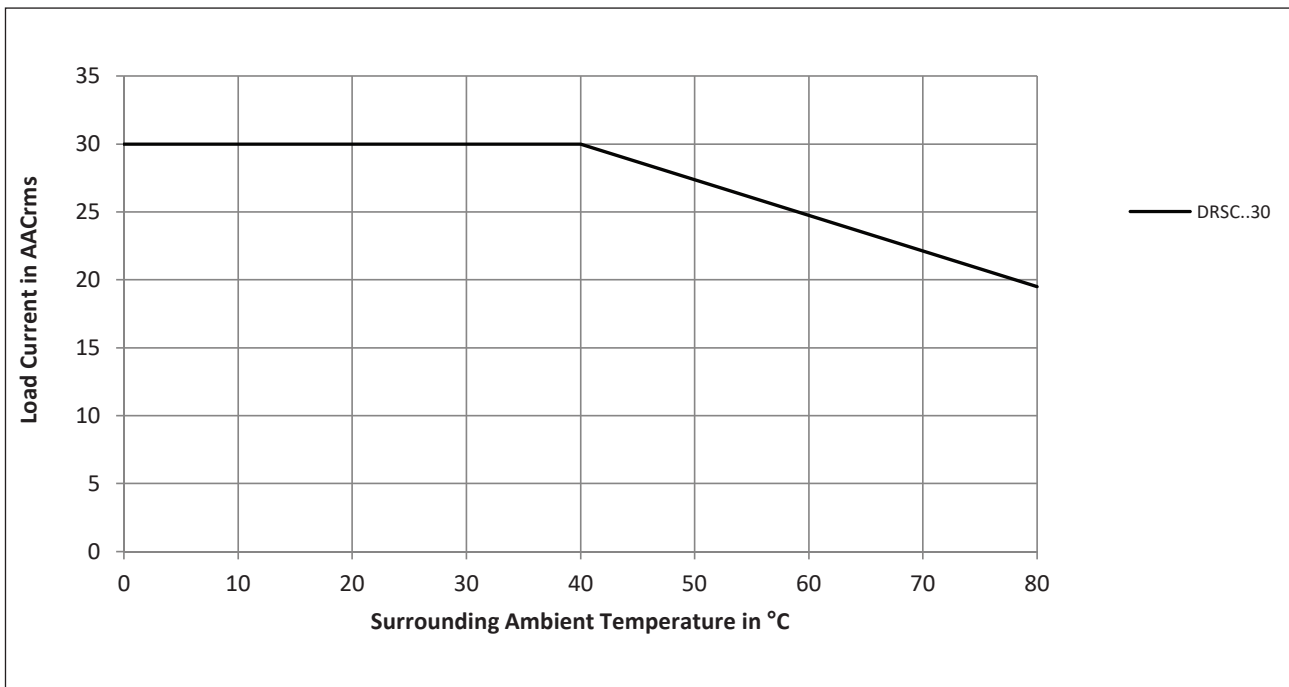
### AC/DC Input



**Output Power Dissipation**

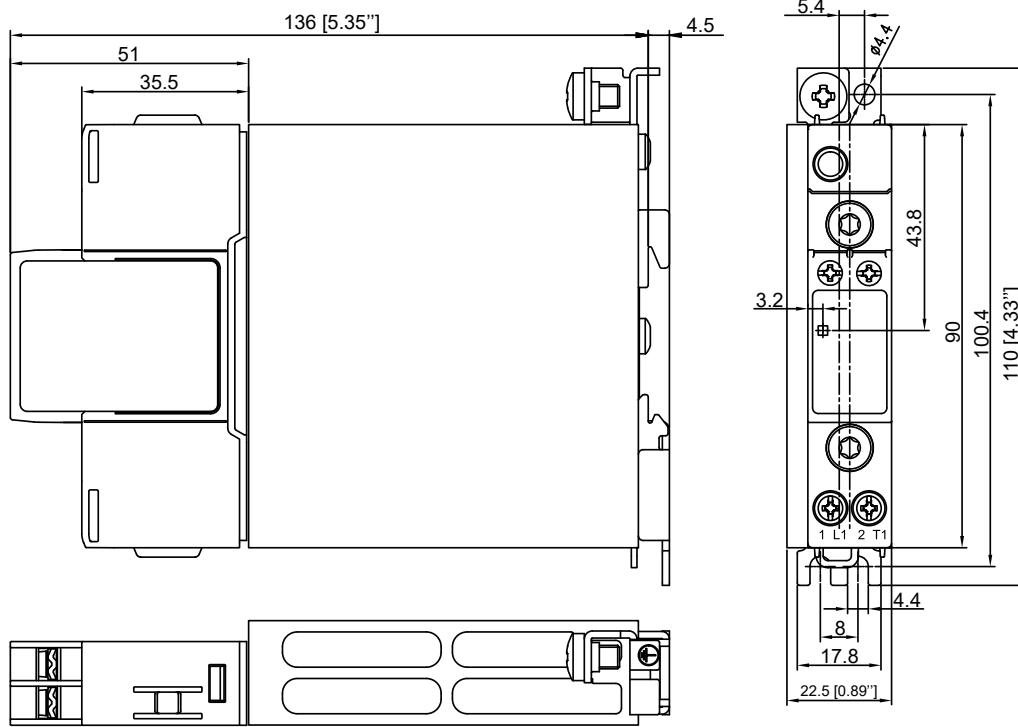


**Current Derating**

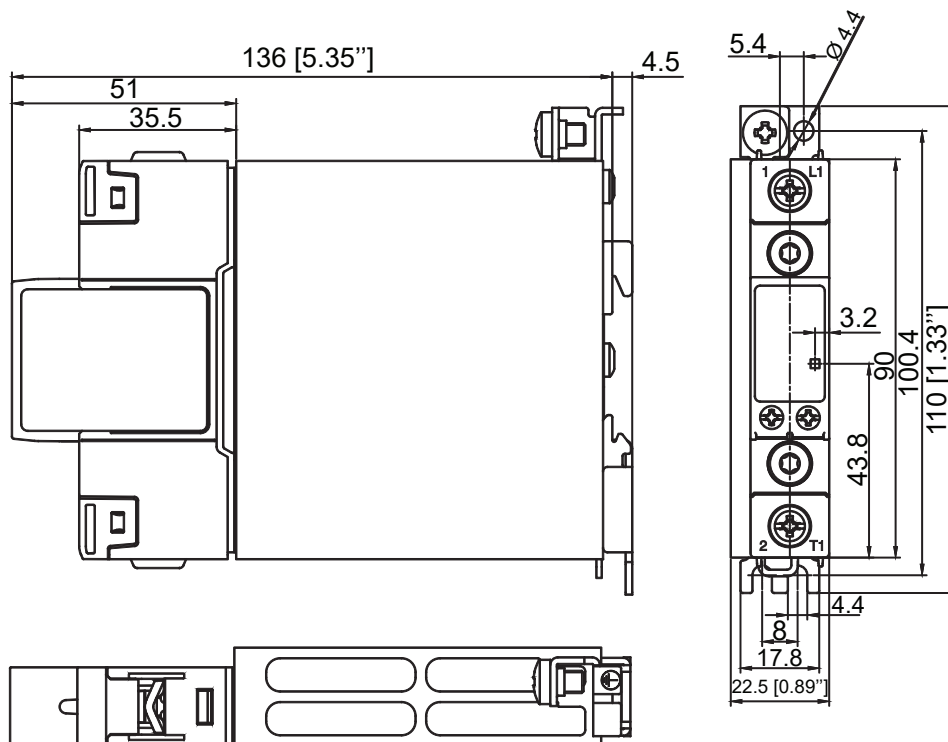


**Dimensions**

**U Configuration**



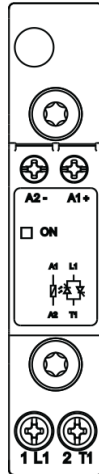
**E Configuration**



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

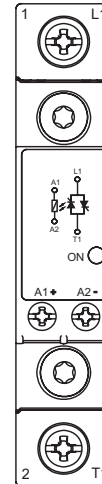
**Terminal Layout**

**U Configuration**



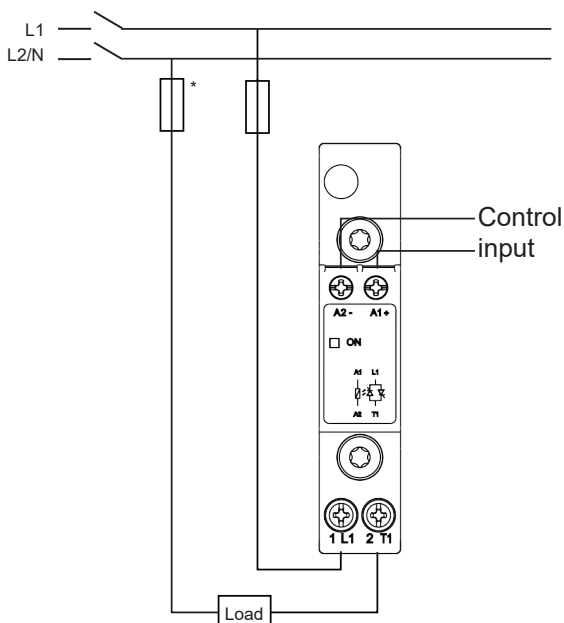
1/L1: Mains supply connection  
2/T1: Load connection  
A1(+): Positive control signal  
A2(-): Control ground  
⊕: Protective Earth

**E Configuration**

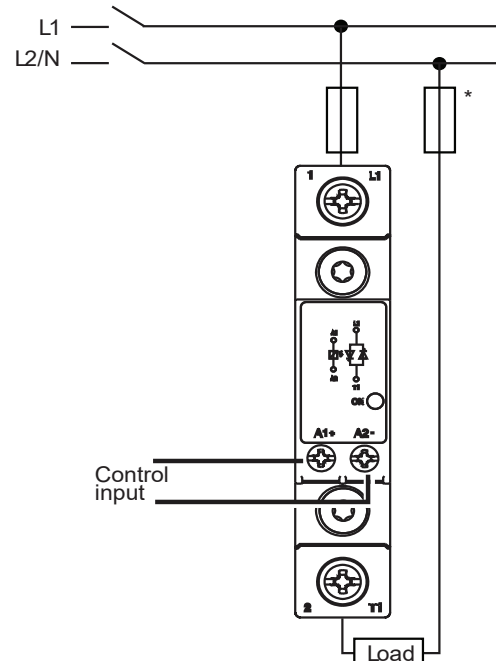


**Connection Diagram**

**U Configuration**



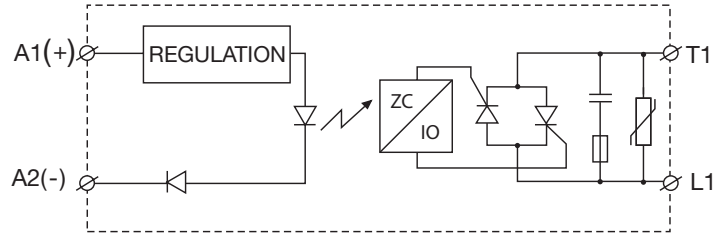
**E Configuration**



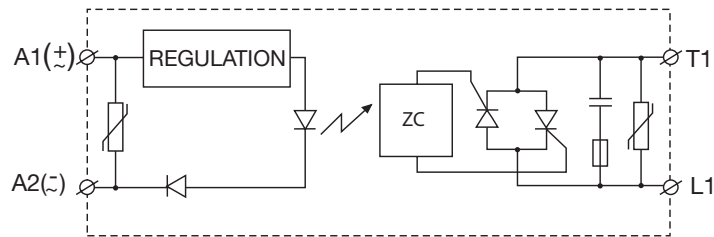
\* depends on system requirements

**Functional Diagram**

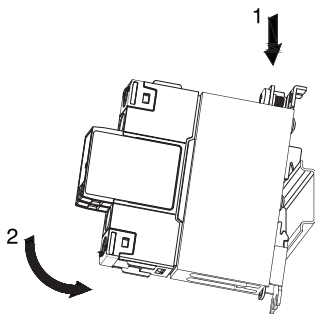
**DC control**



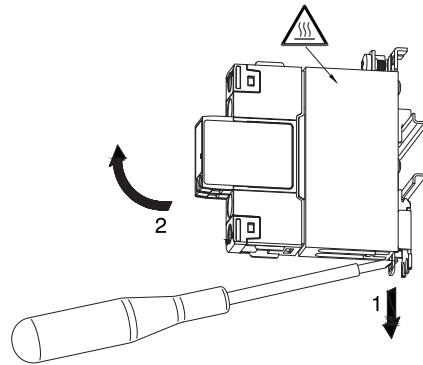
**AC control**



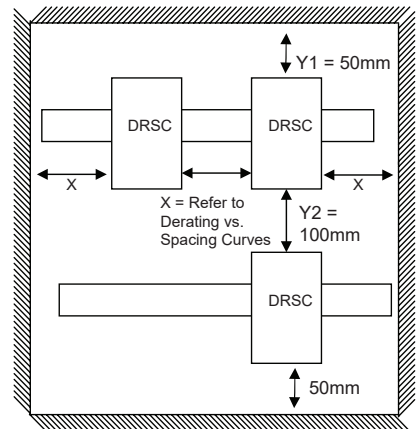
**Installation**



Mounting on DIN rail

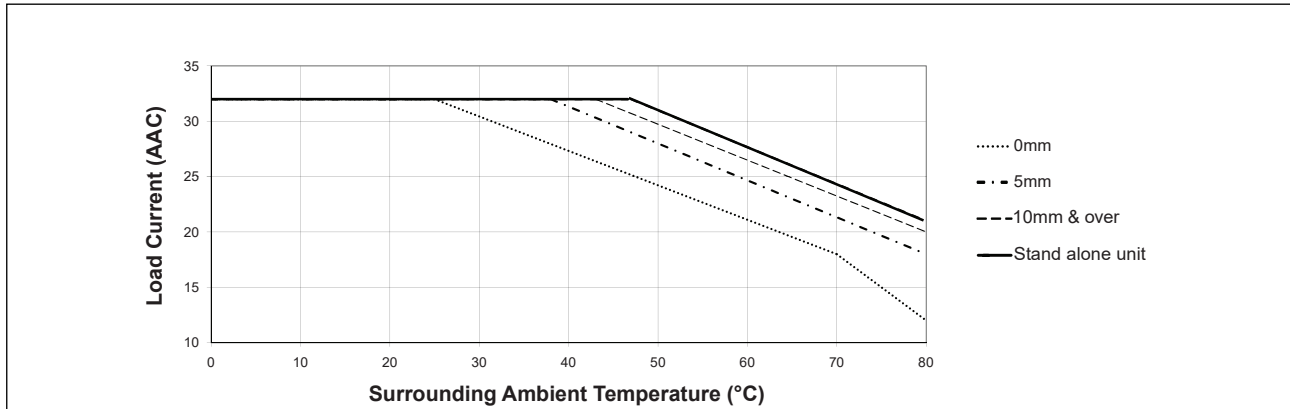


Dismounting from DIN rail





### Derating vs. Spacing Curves



### Compatibility and Conformance

<b>Approvals</b>	
<b>Standards Compliance</b>	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
<b>UL Short Circuit Current Rating</b>	100k Arms (refer to short circuit current section, Type 1 – UL508)

### Electromagnetic Compatibility (EMC) - Immunity

<b>Electrostatic Discharge (ESD)</b>	EN/IEC 61000-4-2 8 kV air discharge, 4 kV contact (PC1)
<b>Radiated Radio Frequency</b>	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)
<b>Electrical Fast Transient (burst)</b>	EN/IEC 61000-4-4 Output: 2 kV, 5 kHz (PC1) Input: 1 kV, 5 kHz (PC1)
<b>Conducted Radio Frequency</b>	EN/IEC 61000-4-6 10 V/m, from 0.15 to 80 MHz (PC1)
<b>Electrical Surge</b>	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)
<b>Voltage Dips</b>	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)
<b>Voltage Interruptions</b>	EN/IEC 61000-4-11 0% for 5000 ms (PC2)

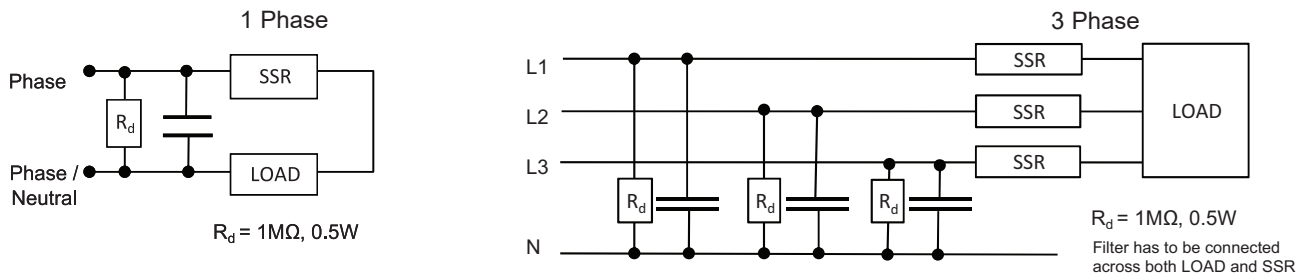
**Electromagnetic Compatibility (EMC) - Emissions**

<b>Radio Interference Field Emission (radiated)</b>	EN/IEC 55011 Class A: from 30 to 1000 MHz
<b>Radio Interference Voltage Emissions (conducted)</b>	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**

<b>Additional conformance specific to railway applications</b>	EN 50155 EN 45545-2 EN 50121-3-2
<b>Hazardous level conformance according to EN 45545-2</b>	HL1, HL2 for requirement R23 HL1 for requirement R22
<b>Operating temperature class according to EN 50155</b>	OT3 (-25 °C to +70 °C )
<b>Vibration and shock</b>	EN 61373 Category 1, Class B
<b>Additional EMC conformance</b>	according to EN 50121-3-2
<b>Radiated radio frequency immunity</b>	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)
<b>Power quality measurement</b>	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

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

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)
<b>Power Unit Assembly</b>	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 <sup>2</sup> ]	Minimum length of Cu wire conductor [m] <sup>8</sup>
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


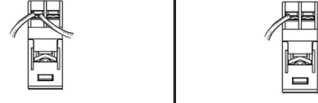
8. Between MCB and Load (including return path which goes back to the mains)

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			
<b>Terminals</b>	1/L1, 2/T1		
<b>Conductors</b>	Use 75°C copper (Cu) conductors		
<b>Configuration</b>	<b>U</b>		<b>E</b>
			
<b>Connection Type</b>	M3.5 screw with box clamp		M4 screw with captivated washer
<b>Stripping Length</b>	12 mm		
<b>Rigid (Solid &amp; Stranded) UL/cUL Rated Data</b>	1x 1.0 – 6.0 mm <sup>2</sup> 1x 18 – 10 AWG	2x 2.5 – 6.0 mm <sup>2</sup> 2x 14 – 10 AWG	1x 2.5 – 6.0 mm <sup>2</sup> 1x 14 – 10 AWG
<b>Flexible with End Sleeve</b>	1x 0.5 – 2.5 mm <sup>2</sup> 1x 20 – 2.5 mm <sup>2</sup>	2x 1.0 – 2.5 mm <sup>2</sup> 2x 2.5 – 4.0 mm <sup>2</sup> 2x 18 – 14 AWG 2x 14 – 12 AWG	1x 1.0 – 4.0 mm <sup>2</sup> 1x 18 – 12 AWG
<b>Flexible without End Sleeve</b>	1x 1 – 4 mm <sup>2</sup> 1x 18 – 12 mm <sup>2</sup>	2x 1.0 – 2.5 mm <sup>2</sup> 2x 2.5 – 6.0 mm <sup>2</sup> 2x 18 – 14 AWG 2x 14 – 10 AWG	1x 1.0 – 6.0mm <sup>2</sup> 1x 18 – 10 AWG
<b>Torque Specifications</b>	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)
<b>Aperture for termination lug (fork or ring)</b>			12.3 mm
<b>Protective Earth (PE) Connection</b>	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				
<b>Terminals</b>	A1+, A2-			
<b>Conductors</b>	Use 60/75°C copper (Cu) conductors			
<b>Configuration</b>	<b>U</b>		<b>E</b>	
				
<b>Connection type</b>	M3 screw with captivated washer			
<b>Stripping length</b>	8 mm			
<b>Rigid (solid &amp; stranded) UL/cUL rated data</b>	2x 0.5 - 2.5 mm <sup>2</sup> 2x 18 - 12 AWG	1x 0.5 - 2.5 mm <sup>2</sup> 1x 18 - 12 AWG	2x 0.5 - 2.5 mm <sup>2</sup> 2x 18 - 12 AWG	1x 0.5 - 2.5 mm <sup>2</sup> 1x 18 - 12 AWG
<b>Flexible with end sleeve</b>	2x 0.5 - 2.5 mm <sup>2</sup> 2x 18 - 12 AWG	1x 0.5 - 2.5 mm <sup>2</sup> 1x 18 - 12 AWG	2x 0.5 - 2.5 mm <sup>2</sup> 2x 18 - 12 AWG	1x 0.5 - 2.5 mm <sup>2</sup> 1x 18 - 12 AWG
<b>Torque specification</b>	Posidrive 1 UL: 0.5 Nm (4.4 lb-in), IEC: 0.5-0.6 Nm (4.4-5.3 lb-in)			