

UNISON CONTROLS PVT. LTD.

SOLID STATE RELAY

ISO 9001:2015 & ISO 14001:2015 CERTIFIED by InterConformity GmbH

Approved By
CE E481640
EN-60947-5-1

MODEL 901

ZERO CROSS DETECTION

OUTPUT AC CONTROL

3Q TRIAC & BACK TO BACK SCR

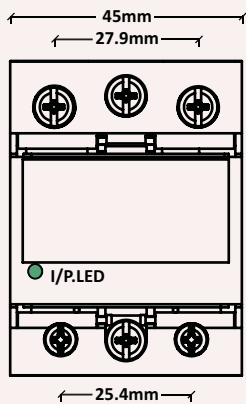
- Product Temperature withstand 150°C.
- "19.5 & 22.5 MM SLIM Height" SSR Design.
- "31 MM Height" Inbuilt "C-56" Heat sink SSR Design.
- With easy open & lock IP 20 protection Flaps on I/P & O/P Terminals.
- Zero Voltage Turn-On SSR.
- Rating from 16 Amp to 200 Amp @25°C 24-600 VAC.
- Short Circuit Protected SSR up to 115 Amp per phase current by help of suitable "B" curve MCB.
- No need to use semiconductor Fuse due to short circuit protected SSR.
- Fire Retardant Plastic as per UL94 VO GRADE.
- New improved SEMS Screw - Washers input & Output terminals.
- Improved Direct Bonded Copper (DBC) for higher Amp Relays.
- High resistance to aggressive chemicals and dust due to special Potting.
- Logic compatibility, Fast switching, Low coupling capacitance.
- Inbuilt transient voltage suppressor.



**5mm
AL PLATE**
Only Al plate
take 14 Amp
Load Current
at 40°C.

**C56
HEAT SINK**
Only C56 Heat Sink
take 20 Amp
Load Current
at 40°C.

**2mm
CU PLATE**

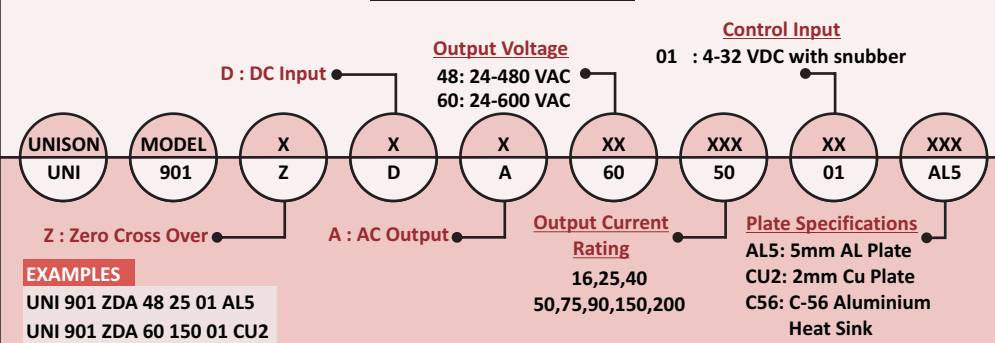


22.5mm
Temperature withstand
Capacity 135°C.
5mm
AL Plate
**Slim 22.5mm
with 5mm Aluminium Plate**

31mm
Temperature withstand
Capacity 135°C.
C-56
HEAT SINK
**Slim SSR with
C-56 Inbuilt Heat Sink**

19.5mm
Temperature withstand
Capacity 155°C.
2mm
CU Plate
**Slim 19.5mm
with 2mm Copper plate Plate**

ORDERING FORMAT

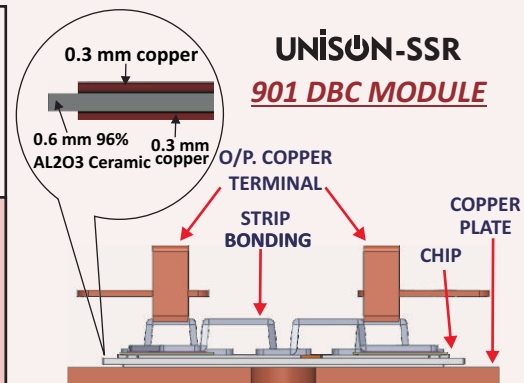


NOTE 1 : 48: 24-480 VAC available for 16Amp to 40Amp.
60: 24-600 VAC available for 50Amp to 200Amp.

NOTE 2 : AL5 Plate available for 16Amp to 50Amp
CU2 Plate available for 75Amp to 200Amp
C56 Heat sink available for 16Amp to 50Amp

ADVANTAGES OF SSR OVER CONTACTOR / MECHANICAL

- ❖ Zero voltage turn-on
- ❖ High resistance to shock, vibration and abrasion
- ❖ High resistance to aggressive chemicals and dust
- ❖ No electromechanical or acoustical noise
- ❖ Logic compatibility
- ❖ Low coupling capacitance
- ❖ Long life cycle . Up to 10¹¹ cycles
- ❖ Increased system temperature accuracy
- ❖ Improved system reliability because SSRs have no moving parts or contacts to degrade
- ❖ No contact arcing, low electromagnetic interference, high surge capability
- ❖ Solid state Relays offer a very fast response time with absolutely NO contact bounce
- ❖ SSRs are typically smaller than EMRs, conserving valuable real estate in printed-circuit board applications
- ❖ SSRs can be provided as surface-mount technology (SMT) parts, which means lower cost and easier SMT printed-circuit board manufacture
- ❖ Do not generate electrical noise



UNISON MODULES USE NEW IMPROVED LEAD FREE SOLDER PASTE RATHER THAN SOLDER PREFORMS.

Direct Copper Bonded (DCB) or Direct Bonded Copper (DBC) improves the conduction of heat from semiconductor chip to external heat sink as well as reduces mechanical stress in connection to major load changes. Here two layers of 0.3 mm copper is bonded to ceramic at temperature above 1020 °C. Coefficient of thermal expansion of copper is higher than ceramic (96% AL203) so a joint layer is generated between them at high temperature which will not cause thermal stress or fatigue on power output semiconductors.

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General Specification

Max Barrier Layer Temperature (T _{max})	< 125 °C
Ambient Temperature Range (T _{amb})	0-85 °C
SSR Storage Temperature Range (T _{st})	-40°C to 80°C
Input Terminal Screw Torque Range	T = 1.6 N.m (Max.)
Output Terminal Screw Torque Range	T = 2.5 N.m (Max.)
Power Factor COSφ @ Max. Load @ 480 VAC	> 0.55
Housing Material	UL-94 V0 Grade
Base Plate	5mm Aluminium, 2mm Copper, C-56 Heat Sink
SSR Weight	≤ 120 grams
Control Input Electrical Wire Size (Max.)	Up to 2.1 sq mm(14 AWG)
Power Output Electrical Wire Size (Max.)	Up to 33.6 sq mm(2 AWG)
Test Standards:	ROHS,IP20
Pending Approvals:	UL 508,VDE ,TUV ,CSA 22-2 IEC 60947-5-1:2016 IEC 62314:2006

Digital Oscilloscope



SCR Parameter Tester



V_{TM} Tester



H.V. Insulation Break Down Tester



dv/dt Tester



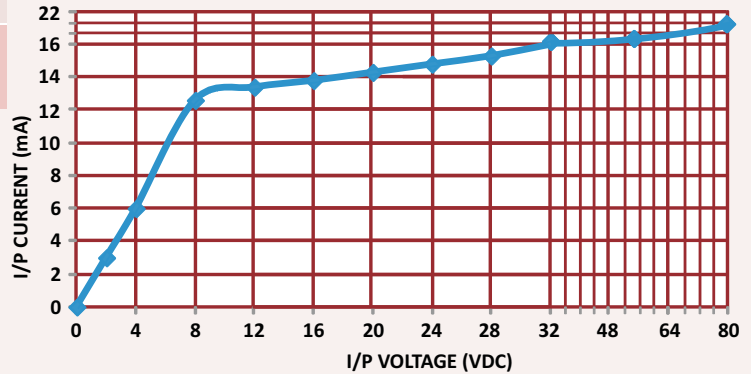
I_{TSM} Tester



Input Technical Specifications

Parameters	Unit	ZDA Type Selection
Control Voltage Range	V	4-32 VDC
Input Frequency Range	Hz	-
Reverse Polarity Protection	-	YES
Control Supply Current Consumption	mA	4-16 mA
Input Impedance (Current Regulator Circuit Impedance)	Ω	1 kΩ - 2 kΩ
Minimum Turn ON Voltage	VDC	3.5 VDC
Turn OFF Voltage	VDC	< 3.25 VDC
Control Input Status Indication	-	GREEN LED Indication
Maximum Turn ON Time	mS	≤ 1/2 Cycle (10 mS)
Maximum Turn OFF Time	mS	≤ 1/2 Cycle (10 mS)

ZDA TYPE



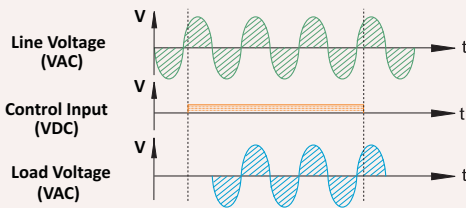
Output Technical Specifications @ 25°C Unless Specified

Parameters	Symbol	Unit	16 Amp	25 Amp	40 Amp	50 Amp	75 Amp	90 Amp	150 Amp	200 Amp
Operating Voltage Range	V _{AC}	V _{RMS}	24-480 VAC - 3Q TRIAC			24-600 VAC BACK TO BACK SCR				
Operating Frequency Range	f	Hz	47-63 Hz							
Peak Inverse Voltage	PIV	V _{PK}	800	800	800	1600	1600	1600	1600	1600
Max. Surge Voltage With Stand Capacity (<1 Second)	V _{surge}	V _{RMS}	2700 V _{RMS} (3800 V _{PK})							
Rated Operational Current AC51a @ 20°C (Resistive Load)	I _T	Amp	16	25	40	50	75	90	150	200
Maximum Load Short Circuit Protection Current @ 55°C	I _{SC}	Amp	-	-	-	15	50	63	80	115
"B" Curve D.P. MCB Rating for Short Circuit Protection	-	Amp	-	-	-	16	50	63	80	125
NON Repetitive Surge Peak ON-State Current @ Rated V _{RRM} applied for 1/2 Cycle t=10 mS / t=8.33 mS (50 Hz/60 Hz)	I _{TSM} @ 50 Hz	A _p	120	260	420	800	1100	1200	1750	2250
	I _{TSM} @ 60 Hz	A _p	126	273	441	840	1155	1260	1837	2360
Max. I²t for Fusing @ t=10 mS (50Hz)	I²t	A²s	72	340	880	3000	6000	7200	15000	25000
Max. I²t for Fusing @ t=8.33 mS (60Hz)	I²t	A²s	65	305	795	2750	5470	6510	13850	22880
Max. Peak ON-state voltage Drop at Full Control	V _{TM}	V _{RMS}	≤1.2	≤1.2	≤1.2	≤1.2	≤1.2	≤1.2	≤1.2	≤1.2
Minimum Isolation Resistance between Input Terminals (+3,-4) to Output Terminals (~1,~2) @ 500 VDC	Ω	GΩ	50	50	50	50	50	50	50	50
Isolation Voltage Input Terminals (+3,-4) to Output Terminals (~1,~2) for 1 Minute (ZDA Type)	V _{ISO}	kV	6	6	6	8	8	8	8	8
Isolation Voltage Input & Output Terminal (+3,-4,~1,~2) to Body Isolation for 1 Minute	V _{ISO}	kV	6	6	6	6	6	6	6	6
Max. Rate of Rise OFF-State Voltage	dV/dt	V/μS	400	400	500	600	600	1000	1000	1000
Max. Rate of Rise OFF-State Current	di/dt	A/μS	50	22	50	100	125	150	300	300
Max. Peak Repetitive Forward OFF-State Voltage	V _{DRM}	V	800	800	800	1200	1200	1600	1600	1600
Max. Peak Repetitive Forward OFF-State current	I _{DRM}	mA	0.05	0.05	0.05	0.1	0.1	0.05	0.3	0.3
Max. Peak repetitive reverse off-state Voltage	V _{RRM}	V	800	800	800	1200	1200	1600	1600	1600
Max. Peak repetitive reverse off-state current	I _{RRM}	mA	0.05	0.05	0.05	0.1	0.1	0.05	0.3	0.3
Max. DC Gate Trigger Voltage	V _{GT}	V	1.2	1.2	1.5	1.5	1.3	1.5	1.3	1.3
Max. DC Gate Trigger Current	I _{GT}	mA	50	50	50	8.8	10	20	150	150
Turn OFF Time	t _q	μS	25	20	35	120	150	200	100	100
Maximum Latching Current	I _L	mA	80	100	100	160	180	200	400	500
Maximum Holding Current	I _H	mA	60	75	60	150	150	150	200	250
Thermal Resistance Rθ (Junction to case)	R θ(j-c)	°C/W	0.8	0.6	0.52	0.35	0.22	0.2	0.09	0.07
OFF State SSR Leakage Current @ Rated Voltage & Frequency (Snubber Leakage)	I _{leak}	mA	For 230 VAC < 1 mA			For 230 VAC < 1.5 mA				
			For 440 VAC < 2 mA			For 440 VAC < 3 mA				
SCCR Current Rating (less than 100 μS)	I _{SCCR}	kA	-	-	-	10 kA	10 kA	10 kA	10 kA	10 kA
Weight	W	gm	≤ 110	≤ 110	≤ 110	≤ 110	≤ 120	≤ 120	≤ 120	≤ 120

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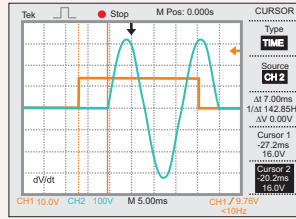
SOLID STATE RELAY

Zero Cross Switching SSR (ZDA)

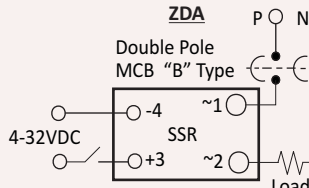


When control input is given to the SSR, irrespective of line voltage condition, output will be ON after zero crossing of sine wave. Zero cross switching SSRs are recommended when LOAD voltage gradually start to increase after zero crossing. It reduces chances of instant high voltage spike applied to the LOAD. Due to this characteristic, it reduces the surge current pass through LOAD during first conduction cycle. Load will be ON in less than 10ms duration for 50Hz line voltage & 8.33ms duration for 60Hz line voltage. These RELAYS are most suitable for industrial applications of heater loads, inductive loads, capacitor bank switching etc. When control input is removed, output of the SSR will be OFF after load current decreases to minimum holding current of the thyristor. This is due to the characteristic of thyristor. Above graph indicates functionality of zero switching SSR.

ZERO CROSSOVER Waveform

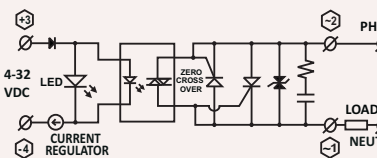


CONNECTION DIAGRAM

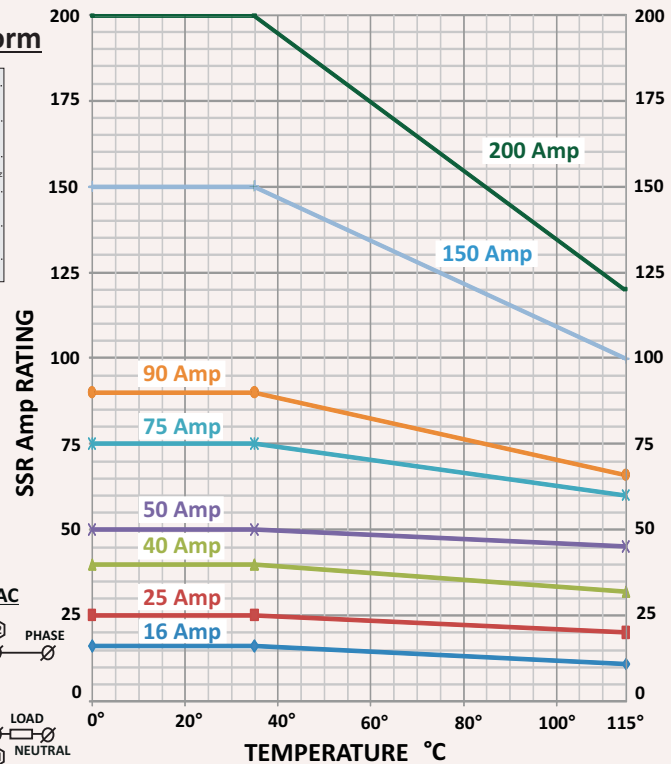


BLOCK DIAGRAM

ZDA- ZERO CROSS OVER DC TO AC



THERMAL DERATING CURVE WITH HEAT SINK

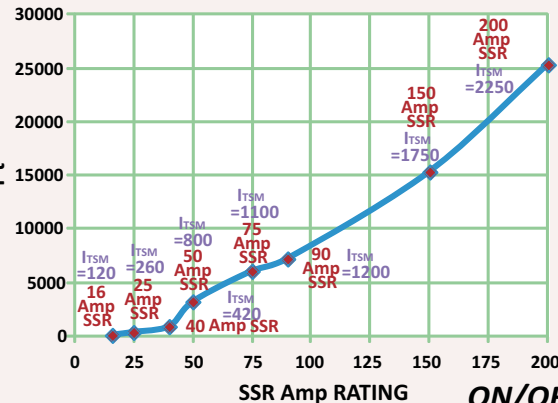
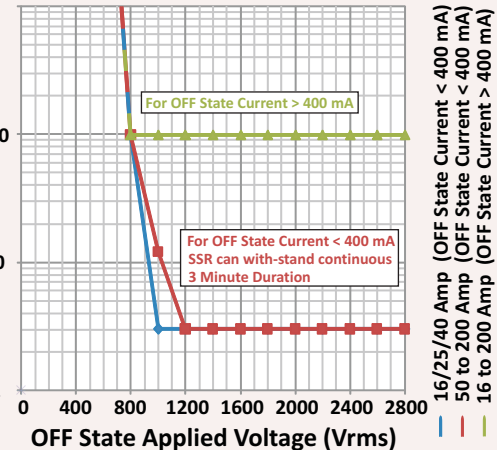


25AMP-MODEL 901 ZDA 48 25 01 C56

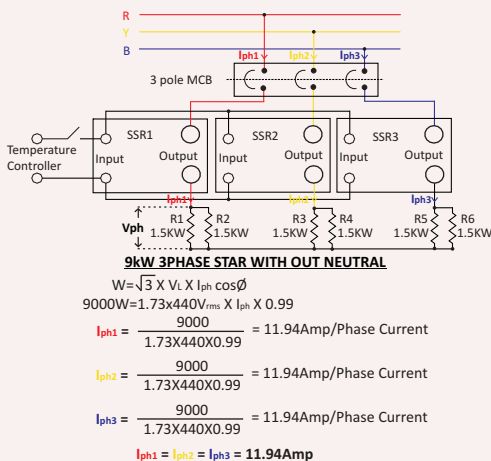


ON/OFF TYPE SSR Connection Diagram

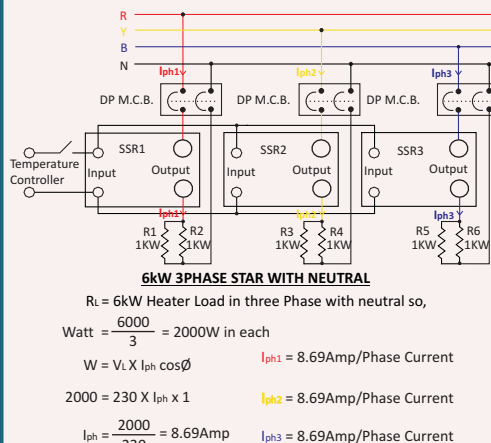
Max. Time Duration
SSR can withstand (Minutes)



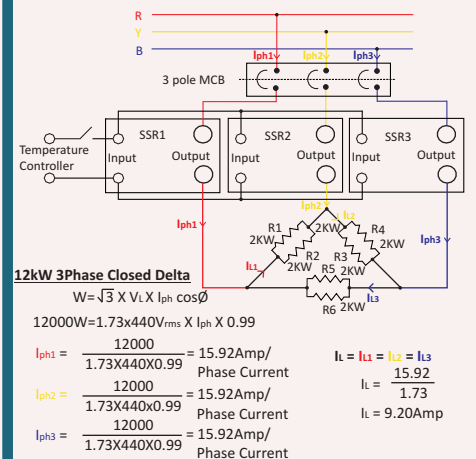
Circuit diagram 901 model - ON/OFF type Star Connection without neutral



Circuit diagram 901 model - ON/OFF type Star Connection with neutral



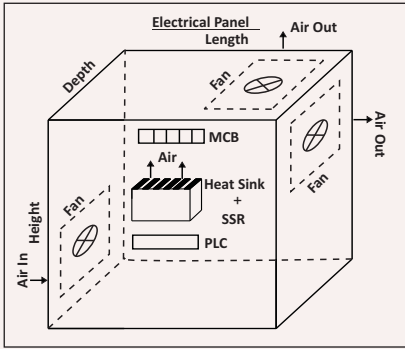
Circuit diagram 901 model - ON/OFF type Closed Delta Connection



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AIRFLOW FOR EFFICIENT HEAT TRANSFER



- Heat Sink Fins should be in Vertical Position So that Hot Air flow from Bottom to Top - Self Cooling.
- Our heat sinks are designed in such manner that horizontal & vertical convection both occurs properly.
- Keep 20mm Gap at Top and Bottom of Heat Sink.
- Apply Heat Sink Compound between SSR and Heat Sink.
- The Screw should be tightened properly so that total Exposed Aluminum is Sufficient to Dissipated One Watt of Heat Generated.
- **Advantages of using DBC Technology :**
Copper has higher thermal conductivity So more heat dissipation of junction to case & case to sink. Due to this thermal resistance $R_{\theta jc}$ is very less. Reduction in thermal resistance increases thermal efficiency of whole system.

THERMAL CALCULATION	
$\Delta T = T_j - T_a$	= $P(R_{\theta jc} + R_{\theta cs} + R_{\theta sa})$
T_j	= Junction Temperature (°C) 125 °C
T_a	= Ambient Temperature (°C)
P_d	= Power Dissipation (Watts) Voltage Drop X Load Current
$R_{\theta jc}$	= Thermal Resistance Junction to Case °C/W
$R_{\theta cs}$	= Thermal Resistance of Heat Sink Compound (0.2°C/W Type)
$R_{\theta sa}$	= Thermal Resistance of External Heat Sink (°C/W) it depend upon Length, Width, Expose Aluminum (0.5 to 5)

NOTE : If SSR Current Capacity is high and it is mounted on lower capacity heat sink than maximum load current will also decrease as heat dissipation area decreases.

Example: 1) 50Amp SSR used for 26Amp Load Current than "G-68" Type of Heat Sink. 2) 50Amp SSR used for 32Amp Load Current than "B-48" Type of Heat Sink.

HEAT SINK SELECTION GUIDE (Resistive LOAD)

901 MODEL / HEATSINK	HEATSINK RATING	16 AMP SSR	25 AMP SSR	40 AMP SSR	50 AMP SSR	75 AMP SSR	90 AMP SSR	150 AMP SSR	200 AMP SSR
AL5	12	8.5	10	12	12	-	-	-	-
C-56	16	10	12	14	16	-	-	-	-
G-68	26	-	16	18	26	-	-	-	-
B-48	36	-	-	-	32	36	36	-	-
B-72	60	-	-	-	-	55	60	-	-
A-100	80	-	-	-	-	-	65	75	80
A-190	Upto 115 A for 1 SSR	-	-	-	-	-	-	115*	115*
	Upto 132 A for 3 SSR	-	-	-	-	-	36 A x 3 = 108 A	40 A x 3 = 120 A	44 A x 3 = 132 A
A-190 WITH FAN	Upto 115 A for 1 SSR	-	-	-	-	-	-	115*	115*
	Upto 156 A for 3 SSR	-	-	-	-	-	40 A x 3 = 120 A	45 A x 3 = 135 A	52 A x 3 = 156 A
A-285	Upto 210 A for 3 SSR	-	-	-	-	-	-	65 A x 3 = 195 A	70 A x 3 = 210 A
A-285 WITH FAN	Upto 240 A for 3 SSR	-	-	-	-	-	-	75 A x 3 = 225 A	80 A x 3 = 240 A

* As per UL 508 2 AWG (33.6 Sq. mm) wire can draw 115 Amp at 40°C.

TYPE OF HEATSINKS / CURRENT RATING / $R_{\theta SA}$ / SURFACE AREA / MECHANICAL DIMENSIONS / WEIGHT

HEAT SINK TYPE "C-56" + DIN RAIL
35mm Plastic Din Rail to SSR 10kV Isolation
M4 Screw

Model 901-1 Nos.
Current upto 16Amp @40°C with Din Rail 42mm,
Thermal Resistance $R_{\theta SA} = 4^\circ\text{C/W}$
 $R_{\theta SA} = 277.15 \text{ K/W}$
 $\Delta T = 75^\circ\text{C}$
Surface Area:
353mm²x56mm
=19768mm²
43mm(W)x 56mm(L)
x 13.5mm(H) + SSR
Inbuilt Heat Sink IN 901 SSR MODEL Weight : @ 57gms
No Separate Heat Sink available

HEAT SINK TYPE "G-68" + DIN RAIL
35mm Plastic Din Rail to SSR 10kV Isolation
M3 Screw

Model 901-1 Nos.
Model 808-1 Nos.
Current upto 26Amp @40°C with Din Rail 22.5mm,
Thermal Resistance $R_{\theta SA} = 2.5^\circ\text{C/W}$
 $R_{\theta SA} = 275.65 \text{ K/W}$
 $\Delta T = 75^\circ\text{C}$
Surface Area:
491mm²x68mm
=33388 mm²
44mm(W) X 68mm(L)
X 32mm(H) + SSR
Weight : @ 95gms

HEAT SINK TYPE "B-48" + DIN RAIL
35mm Plastic Din Rail to SSR 10kV Isolation
M4 Screw

Model 803-Upto 2 Nos.
Model 901-1 Nos.
Current upto 36Amp @40°C with Din Rail 42mm
Thermal Resistance $R_{\theta SA} = 1.17^\circ\text{C/W}$
 $R_{\theta SA} = 274.32 \text{ K/W}$
 $\Delta T = 75^\circ\text{C}$
Surface Area:
2630mm²x48mm
=126240 mm²
48mm(W) X 87mm(L)
X 80mm(H) + SSR
Weight : @ 310gms

HEAT SINK TYPE "B-72" + DIN RAIL
35mm Plastic Din Rail to SSR 10kV Isolation
M4 Screw

Model 803-Upto 3 Nos.
Model 901-1 Nos.
Current upto 60Amp @40°C with Din Rail 42mm
Thermal Resistance $R_{\theta SA} = 0.85^\circ\text{C/W}$
 $R_{\theta SA} = 274 \text{ K/W}$
 $\Delta T = 75^\circ\text{C}$
Surface Area:
2630mm²x72mm
=189360 mm²
72mm(W) X 87mm(L)
X 80mm(H) + SSR
Weight : @ 500gms

HEAT SINK TYPE "A-100" + DIN RAIL
35mm Plastic Din Rail to SSR 10kV Isolation
M4 Screw
Joint Plate

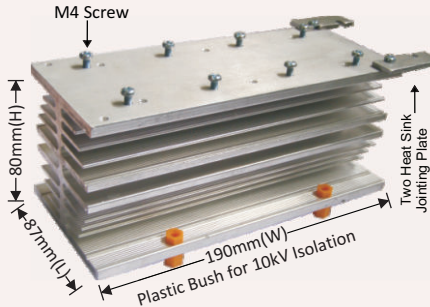
Model 901-Upto 2 Nos.
Model 905-Upto 1 Nos.
Current upto 80Amp @40°C with Din Rail 42mm
Thermal Resistance $R_{\theta SA} = 0.65^\circ\text{C/W}$
 $R_{\theta SA} = 273.83 \text{ K/W}$
 $\Delta T = 75^\circ\text{C}$
Surface Area:
2630mm²x100mm
=263000 mm²
100mm(W) X 87mm(L)
X 80mm(H) + SSR
Weight : @ 690gms

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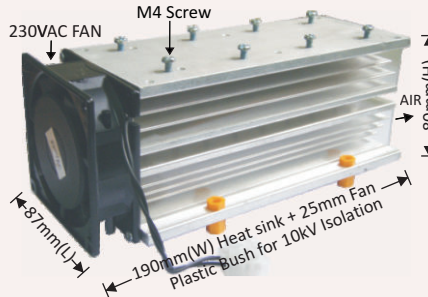
TYPE OF HEATSINKS / CURRENT RATING / R_{θSA} / SURFACE AREA / MECHANICAL DIMENSIONS / WEIGHT

HEAT SINK TYPE "A-190" WITH OUT FAN



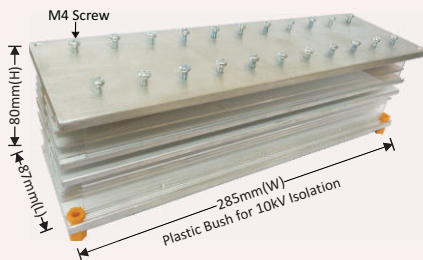
TYPE "A-190" WITH OUT FAN
 Model 901-Upto 4 Nos.
 Model 905-Upto 1 Nos.
 Model 803-Upto 4 Nos.
 Current upto 132Amp @40°C
 with Din Rail 42mm
 Thermal Resistance
 $R_{\theta SA} = 0.33^{\circ}\text{C/W}$
 $R_{\theta SA} = 273.48 \text{ K/W}$
 $\Delta T = 75^{\circ}\text{C}$
 Surface Area:
 $2630\text{mm}^2 \times 190\text{mm}$
 $= 499700 \text{ mm}^2$
 $190\text{mm(W)} \times 87\text{mm(L)}$
 $\times 80\text{mm(H)} + \text{SSR}$
 Weight : @ 1300gms

HEAT SINK TYPE "A-190" WITH 230VAC FAN



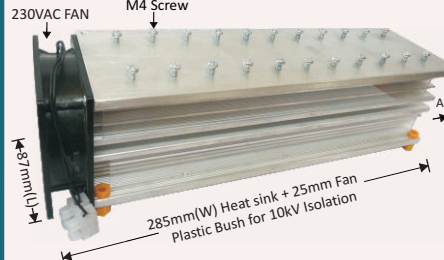
TYPE "A-190" WITH 230VAC FAN
 Model 901-Upto 4 Nos.
 Model 905-Upto 1 Nos.
 Model 803-Upto 4 Nos.
 Current upto 156Amp @40°C
 with Din Rail 42mm
 Thermal Resistance
 $R_{\theta SA} = 0.22^{\circ}\text{C/W}$
 $R_{\theta SA} = 273.37 \text{ K/W}$
 $\Delta T = 75^{\circ}\text{C}$
 Surface Area:
 $2630\text{mm}^2 \times 190\text{mm}$
 $= 499700 \text{ mm}^2$
 $190\text{mm(W)} \times 87\text{mm(L)}$
 $\times 80\text{mm(H)} + \text{SSR}$
 Weight : @ 1530gms

HEAT SINK TYPE "A-285" WITH OUT FAN



TYPE "A-285" WITH OUT FAN
 Model 901-Upto 6 Nos.
 Model 905-Upto 2 Nos.
 Model 803-Upto 11 Nos.
 Current upto 210Amp @40°C
 with Din Rail 42mm
 Thermal Resistance
 $R_{\theta SA} = 0.09^{\circ}\text{C/W}$
 $R_{\theta SA} = 273.24 \text{ K/W}$
 $\Delta T = 75^{\circ}\text{C}$
 Surface Area:
 $2630\text{mm}^2 \times 285\text{mm}$
 $= 749550 \text{ mm}^2$
 $285\text{mm(W)} \times 87\text{mm(L)}$
 $\times 80\text{mm(H)} + \text{SSR}$
 Weight : @ 1950gms

HEAT SINK TYPE "A-285" WITH 230VAC FAN



TYPE "A-285" WITH 230VAC FAN
 Model 901-Upto 6 Nos.
 Model 905-Upto 2 Nos.
 Model 803-Upto 11 Nos.
 Current upto 240Amp @40°C
 with Din Rail 42mm
 Thermal Resistance
 $R_{\theta SA} = 0.04^{\circ}\text{C/W}$
 $R_{\theta SA} = 273.19 \text{ K/W}$
 $\Delta T = 75^{\circ}\text{C}$
 Surface Area:
 $2630\text{mm}^2 \times 285\text{mm}$
 $= 749550 \text{ mm}^2$
 $285\text{mm(W)} \times 87\text{mm(L)}$
 $\times 80\text{mm(H)} + \text{SSR}$
 Weight : @ 2175gms

50AMP- MODEL 901 ZDA 60 50 01 AL5



Weight: 110gms SSR +
 95gms G-68 Heat sink

200AMP-MODEL 901 ZDA 60 200 01 CU2 - 1 Nos. SSR

"A-190" H.S. WITH 230VAC FAN



Weight: 120gms SSR +
 1300gms A-190 Heat sink

90AMP- MODEL 901 ZDA 60 90 01 CU2



Weight:
 120gms SSR +
 690gms A-100 Heat sink

200AMP-MODEL 901 ZDA 60 200 01 CU2- 3Nos. SSR

"A-285" H.S. WITH 230VAC FAN



Weight: 120gms 3NOS. SSR +
 2175gms A-285 Heat sink

APPLICATIONS



**Timely
Delivery**



**User
Friendly**



Cost Efficient



**Minimizing
Energy Cost**



**Long Term
Reliability**