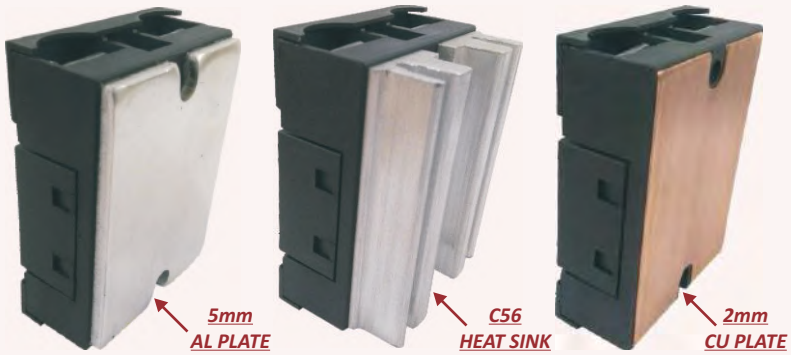
ISO 9001:2015 & ISO 14001:2015 CERTIFIED by InterConformity GmbH

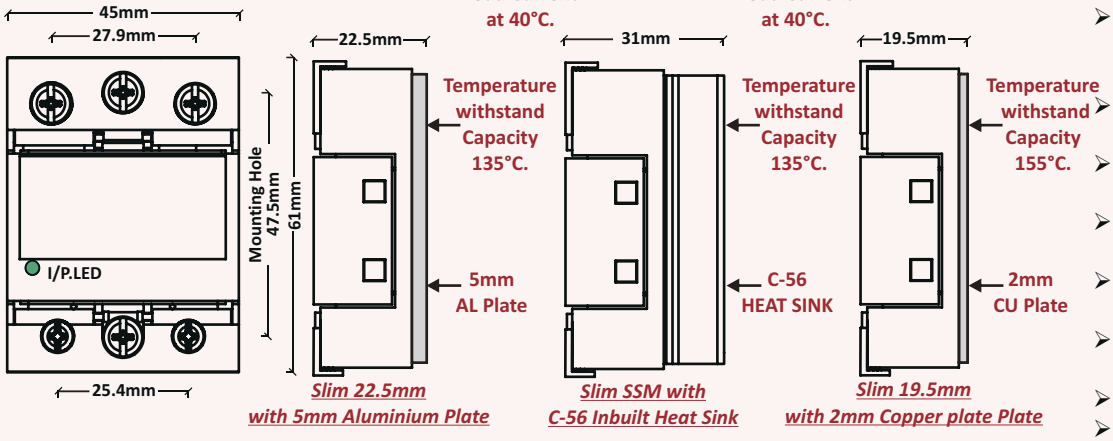
MODEL BS1F



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



Slim 22.5mm with 5mm Aluminium Plate

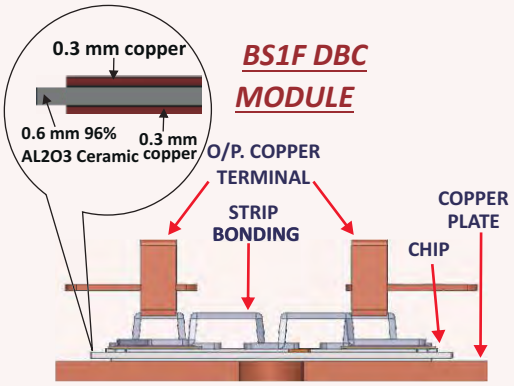
Slim SSM with C-56 Inbuilt Heat Sink

Slim 19.5mm with 2mm Copper plate Plate

ZERO CROSS DETECTION OUTPUT AC CONTROL 3Q TRIAC & BACK TO BACK SCR

- **Product Temperature withstand 150°C.**
- **"19.5 & 22.5 MM SLIM Height" SSM Design.**
- **"31 MM Height" Inbuilt "C-56" Heat sink SSM Design.**
- **With easy open & lock IP 20 protection Flaps on I/P & O/P Terminals.**
- **Zero Voltage Turn-On SSM.**
- **Rating from 16 Amp to 200 Amp @25°C 24-600 VAC.**
- **Short Circuit Protected SSM 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 SSM.**
- **Fire Retardant Plastic as per UL94 VO GRADE.**
- **New improved SEMS Screw - Washers input & Output terminals.**
- **Improved Direct Bonded Copper (DBC) for higher Amp MODULEs.**
- **High resistance to aggressive chemicals and dust due to special Potting.**
- **Logic compatibility, Fast switching,**
- **Low coupling capacitance.**
- **Inbuilt transient voltage suppressor.**

ORDERING FORMAT



BS1F DBC MODULE

ADVANTAGES OF SSM 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 10^{11} cycles
- ❖ Increased system temperature accuracy
- ❖ Improved system reliability because SSMs have no moving parts or contacts to degrade
- ❖ No contact arcing, low electromagnetic interference, high surge capability
- ❖ Solid state MODULEs offer a very fast response time with absolutely NO contact bounce
- ❖ SSMs are typically smaller than EMRs, conserving valuable real estate in printed-circuit board applications
- ❖ SSMs 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

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.

Note : Specifications are subject to change without prior notice.

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ÜRETİMLERİMİZ

BS1FA Monofaze SSR AC&AC Model

General Specification	
Max Barrier Layer Temperature (T_{max})	< 125 °C
Ambient Temperature Range (T_{amb})	0-85 °C
SSM 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
SSM 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

VTM Tester

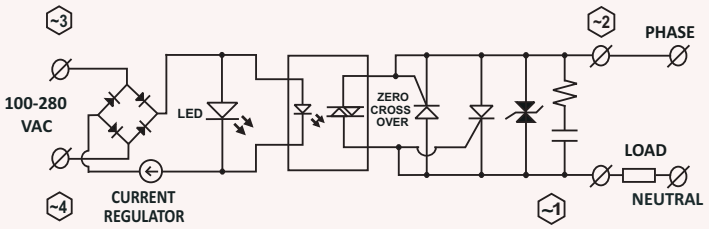
H.V. Insulation Break Down Tester

dv/dt Tester

ITSM Tester

Input Technical Specifications		
Parameters	**Unit**	**BS1FA**
Control Voltage Range	V	100-280 VAC
Input Frequency Range	Hz	47-63 Hz
Reverse Polarity Protection	-	-
Control Supply Current Consumption	mA	4-12 mA
Input Impedance (Current Regulator Circuit Impedance)	Ω	1 kΩ - 2.5 kΩ
Minimum Turn ON Voltage	VDC	100 VAC
Turn OFF Voltage	VDC	< 95 VAC
Control Input Status Indication	-	GREEN LED Indication
Maximum Turn ON Time	mS	⩽20 mS
Maximum Turn OFF Time	mS	⩽20 mS

BLOCK DIAGRAM
BS1FA- ZERO CROSS OVER AC TO AC



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. I^2t for Fusing @ t=10 mS (50Hz)	***I^2t***	***A^2s***	***72***	***340***	***880***	***3000***	***6000***	***7200***	***15000***	***25000***
Max. I^2t for Fusing @ t=8.33 mS (60Hz)	I^2t	A^2s	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 (ZAA 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 Rè (Junction to case)	$R_{\theta(j-c)}$	°C/W	0.8	0.6	0.52	0.35	0.22	0.2	0.09	0.07
OFF State SSM Leakage Current @ Rated Voltage & Frequency (Snubber Leakage)	I_{leak}	mA	For 230 VAC < 1 mA For 440 VAC < 2 mA			For 230 VAC < 1.5 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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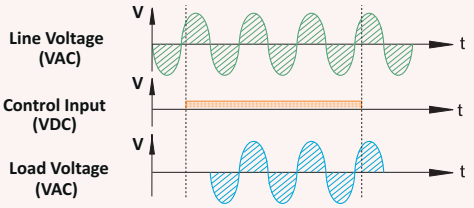
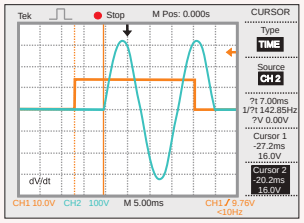
Zero Cross Switching SSM

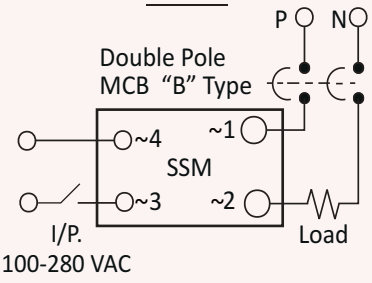


ZERO CROSSOVER Waveform

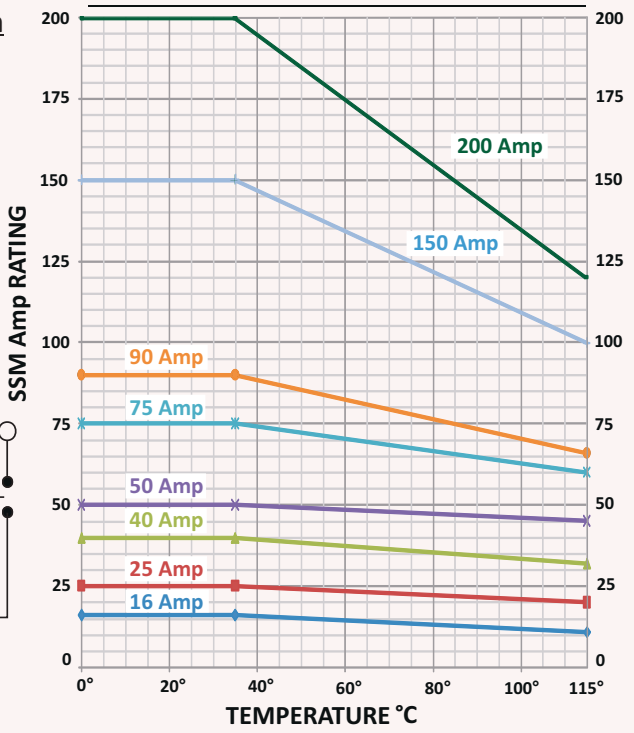


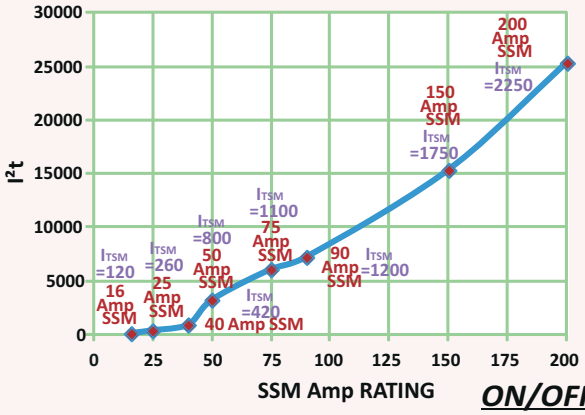
When control input is given to the SSM, irrespective of line voltage condition, output will be ON after zero crossing of sine wave. Zero cross switching SSMs are recommended when LOAD voltage gradually start to increase after zero crossing. It reduces chances of instant high voltage spike applied to 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 MODULEs are most suitable for industrial applications of heater loads, inductive loads, capacitor bank switching etc. When control input is removed, output of the SSM 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 SSM.

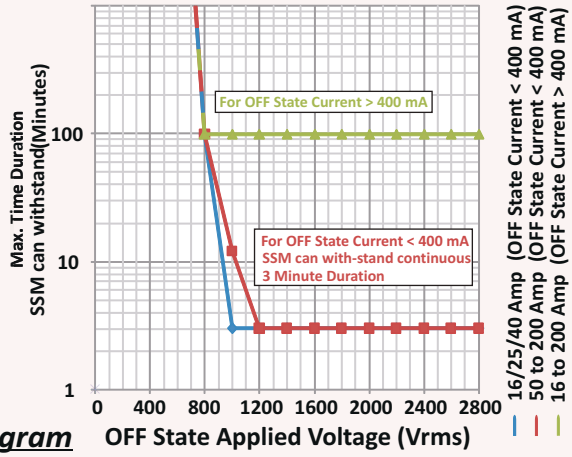
CONNECTION DIAGRAM
BS1FA



THERMAL DERATING CURVE WITH HEAT SINK

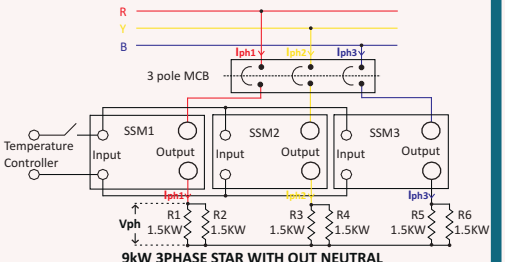






ON/OFF TYPE SSM Connection Diagram

Circuit diagram BS1F model - ON/OFF type Star Connection without neutral



9kW 3PHASE STAR WITH OUT NEUTRAL

$W=\sqrt{3}$ X V_L X I_{ph} cosØ

$9000W=1.73x440V_{rms}$ X I_{ph} X 0.99

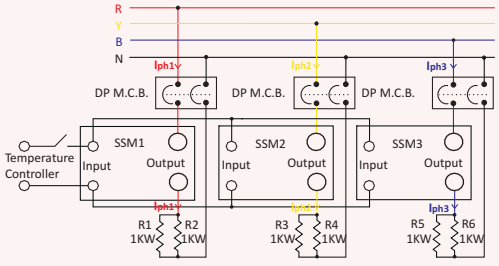
$I_{ph1} = \frac{9000}{1.73X440X0.99}$ = 11.94Amp/Phase Current

$I_{ph2} = \frac{9000}{1.73X440X0.99}$ = 11.94Amp/Phase Current

$I_{ph3} = \frac{9000}{1.73X440X0.99}$ = 11.94Amp/Phase Current

$I_{ph1} = I_{ph2} = I_{ph3}$ = **11.94Amp**

Circuit diagram BS1F model - ON/OFF type Star Connection with neutral



6kW 3PHASE STAR WITH NEUTRAL

R_L = 6kW Heater Load in three Phase with neutral so,

Watt $= \frac{6000}{3}$ = 2000W in each

$W = V_L X I_{ph} \cos Ø$

$2000 = 230 X I_{ph} x 1$

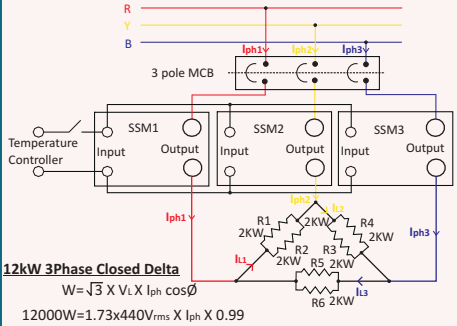
$I_{ph} = \frac{2000}{230}$ = 8.69Amp

I_{ph1} = 8.69Amp/Phase Current

I_{ph2} = 8.69Amp/Phase Current

I_{ph3} = 8.69Amp/Phase Current

Circuit diagram BS1F model - ON/OFF type Closed Delta Connection



12kW 3Phase Closed Delta

$W=\sqrt{3}$ X V_L X I_{ph} cosØ

$12000W=1.73x440V_{rms}$ X I_{ph} X 0.99

$I_{ph1} = \frac{12000}{1.73X440X0.99}$ = 15.92Amp/ Phase Current

$I_{ph2} = \frac{12000}{1.73X440x0.99}$ = 15.92Amp/ Phase Current

$I_{ph3} = \frac{12000}{1.73X440X0.99}$ = 15.92Amp/ Phase Current

$I_{L1} = I_{L2} = I_{L3}$

$I_L = \frac{15.92}{1.73}$

I_L = 9.20Amp

Note : Specifications are subject to change without prior notice.

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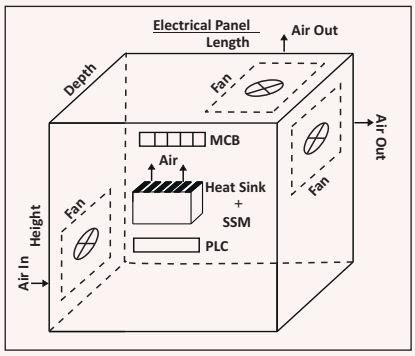
BS1FA Monofaze SSR AC&AC Model

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 SSM 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 SSM 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 SSM used for 26Amp Load Current than "G-68" Type of Heat Sink. **2)** 50Amp SSM used for 32Amp Load Current than "B-48" Type of Heat Sink.

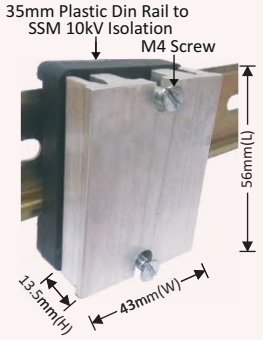
HEAT SINK SELECTION GUIDEHEAT SINK SELECTION GUIDE (Resistive LOAD)

901 MODEL / HEATSINK	HEATSINK RATING	16 AMP SSM	25 AMP SSM	40 AMP SSM	50 AMP SSM	75 AMP SSM	90 AMP SSM	150 AMP SSM	200 AMP SSM
BAL5	12	8.5	10	12	12	-	-	-	-
BC-56	16	10	12	14	16	-	-	-	-
BG-68	26	-	16	18	26	-	-	-	-
BB-48	36	-	-	-	32	36	36	-	-
BB-72	60	-	-	-	-	55	60	-	-
BA-100	80	-	-	-	-	-	65	75	80
BA-190	Upto 115 A for 1 SSM	-	-	-	-	-	-	115*	115*
	Upto 132 A for 3 SSM	-	-	-	-	-	36 A x 3 = 108 A	40 A x 3 = 120 A	44 A x 3 = 132 A
BA-190 WITH FAN	Upto 115 A for 1 SSM	-	-	-	-	-	-	115*	115*
	Upto 156 A for 3 SSM	-	-	-	-	-	40 A x 3 = 120 A	45 A x 3 = 135 A	52 A x 3 = 156 A
BA-285	Upto 210 A for 3 SSM	-	-	-	-	-	-	65 A x 3 = 195 A	70 A x 3 = 210 A
BA-285 WITH FAN	Upto 240 A for 3 SSM	-	-	-	-	-	-	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.

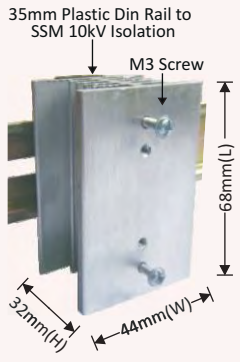
TYPE OF HEATSINKS / CURRENT RATING / RθSA / SURFACE AREA / MECHANICAL DIMENSIONS / WEIGHT

HEAT SINK TYPE "BC-56" + DIN RAIL



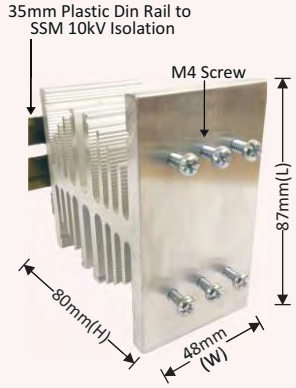
TYPE "C-56"
Model 901-1 Nos.
Current upto 16Amp @40°C with Din Rail 42mm,
Thermal Resistance
RθSA = 4°C/W
RθSA = 277.15 K/W
ÄT= 75°C
Surface Area:
353mm²x56mm
=19768mm³
43mm(W)x 56mm(L) x 13.5mm(H) + SSM
Inbuilt Heat Sink IN 901 SSM MODEL
No Separate Heat Sink available
Weight : @ 57gms

HEAT SINK TYPE "BG-68" + DIN RAIL



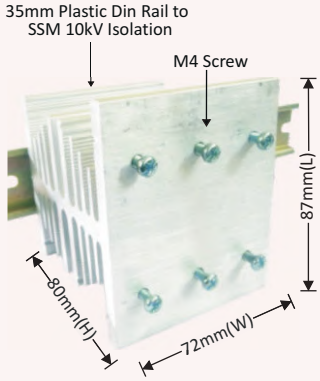
TYPE "G-68"
Model 901-1 Nos.
Model 808-1 Nos.
Current upto 26Amp @40°C with Din Rail 22.5mm,
Thermal Resistance
RθSA = 2.5°C/W
RθSA = 275.65 K/W
ÄT= 75°C
Surface Area:
491mm²X68mm
=33388 mm³
44mm(W) X 68mm(L) X 32mm(H) + SSM
Weight : @ 95gms

HEAT SINK TYPE "BB-48" + DIN RAIL



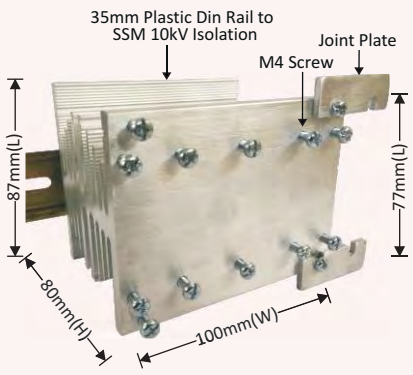
TYPE "B-48"
Model 803-Upto 2 Nos.
Model 901-1 Nos.
Current upto 36Amp @40°C with Din Rail 42mm
Thermal Resistance
RθSA = 1.17°C/W
RθSA = 274.32 K/W
ÄT= 75°C
Surface Area:
2630mm²X48mm
=126240 mm³
48mm(W) X 87mm(L) X 80mm(H) + SSM
Weight : @ 310gms

HEAT SINK TYPE "BB-72" + DIN RAIL



TYPE "B-72"
Model 803-Upto 3 Nos.
Model 901-1 Nos.
Current upto 60Amp @40°C with Din Rail 42mm
Thermal Resistance
RθSA = 0.85°C/W
RθSA = 274 K/W
ÄT= 75°C
Surface Area:
2630mm²X72mm
=189360 mm³
72mm(W) X 87mm(L) X 80mm(H) + SSM
Weight : @ 500gms

HEAT SINK TYPE "BA-100" + DIN RAIL



TYPE "A-100"
Model 901-Upto 2 Nos.
Model 905-Upto 1 Nos.
Current upto 80Amp @40°C with Din Rail 42mm
Thermal Resistance
RθSA = 0.65°C/W
RθSA = 273.83 K/W
ÄT= 75°C
Surface Area:
2630mm²X100mm
=263000 mm³
100mm(W) X 87mm(L) X 80mm(H) + SSM
Weight : @ 690gms

Note : Specifications are subject to change without prior notice.

Web: www.biltekelektrik.com **Email** : info@biltekelektrik.com
Tel: +90-212-545-73-50, **Fax:** +90-212-545-73-50