

M Series

50 Watt DC-DC Converters



Wide input voltage from 8...372 V DC
1, 2 or 3 isolated outputs up to 48 V DC
4 kV AC I/O electric strength test voltage



- Rugged electrical and mechanical design
- Outputs individually controlled with excellent dynamic properties
- Operating ambient temperature range -40...71 °C

Selection chart

Output 1		Output 2		Output 3		Type	Type	Type	Options
$U_{o\ nom}$ [V DC]	$I_{o\ nom}$ [A]	$U_{o\ nom}$ [V DC]	$I_{o\ nom}$ [A]	$U_{o\ nom}$ [V DC]	$I_{o\ nom}$ [A]	Input voltage 8...35 V DC	Input voltage 14...70 V DC	Input voltage 20...100 V DC	
5.1	8	-	-	-	-	AM 1001-7R	BM 1001-7R	FM 1001-7R	-9, P, D, V, A, H, F
12	4	-	-	-	-	AM 1301-7R	BM 1301-7R	FM 1301-7R	-9, P, D, A, H, F
15	3.4	-	-	-	-	AM 1501-7R	BM 1501-7R	FM 1501-7R	-9, P, D, A, H, F
24	2	-	-	-	-	AM 1601-7R	BM 1601-7R	FM 1601-7R	-9, P, D, A, H, F
48	1	-	-	-	-	AM 1901-7R	BM 1901-7R	FM 1901-7R	-9, P, D, A, H, F
12	2	12	2	-	-	AM 2320-7	BM 2320-7	FM 2320-7	-9, P, D, A, H, F
15	1.7	15	1.7	-	-	AM 2540-7	BM 2540-7	FM 2540-7	-9, P, D, A, H, F
5.1	5	12	0.7	12	0.7	AM 3020-7	BM 3020-7	FM 3020-7	-9, P, D, V, A, H, F
5.1	5	15	0.6	15	0.6	AM 3040-7	BM 3040-7	FM 3040-7	-9, P, D, V, A, H, F

Output 1		Output 2		Output 3		Type	Type	Type	Options
$U_{o\ nom}$ [V DC]	$I_{o\ nom}$ [A]	$U_{o\ nom}$ [V DC]	$I_{o\ nom}$ [A]	$U_{o\ nom}$ [V DC]	$I_{o\ nom}$ [A]	Input voltage 28...140 V DC	Input voltage 44...220 V DC	Input voltage 88...372 V DC	
5.1	8	-	-	-	-	CM 1001-7R	DM 1001-7R	LM 1001-7R	-9, E, P, D, V, A, H, F
12	4	-	-	-	-	CM 1301-7R	DM 1301-7R	LM 1301-7R	-9, E, P, D, A, H, F
15	3.4	-	-	-	-	CM 1501-7R	DM 1501-7R	LM 1501-7R	-9, E, P, D, A, H, F
24	2	-	-	-	-	CM 1601-7R	DM 1601-7R	LM 1601-7R	-9, E, P, D, A, H, F
48	1	-	-	-	-	CM 1901-7R	DM 1901-7R	LM 1901-7R	-9, E, P, D, A, H, F
12	2	12	2	-	-	CM 2320-7	DM 2320-7	LM 2320-7	-9, E, P, D, A, H, F
15	1.7	15	1.7	-	-	CM 2540-7	DM 2540-7	LM 2540-7	-9, E, P, D, A, H, F
5.1	5	12	0.7	12	0.7	CM 3020-7	DM 3020-7	LM 3020-7	-9, E, P, D, V, A, H, F
5.1	5	15	0.6	15	0.6	CM 3040-7	DM 3040-7	LM 3040-7	-9, E, P, D, V, A, H, F

CM, DM and LM types available as CMZ, DMZ and LMZ class II equipment

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Cassette Style

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Input

Input voltage	6 wide-input ranges (1:5)	refer to selection chart
Inrush current limitation	CM, DM, LM by thermistor	

Output

Efficiency	$U_{i\text{ nom}}, I_{o\text{ nom}}$	up to 83%
Output voltage setting accuracy	$U_{i\text{ nom}}, I_{o\text{ nom}}$	$\pm 0.6\% U_{o\text{ nom}}$
Output voltage switching noise	IEC/EN 61204, total	typ. 50 mV _{pp}
Line regulation	$U_{i\text{ min}} \dots U_{i\text{ max}}, I_{o\text{ nom}}$, each output regulated	typ. $\pm 0.3\% U_{o\text{ nom}}$
Load regulation	$U_{i\text{ nom}}, 0 \dots I_{o\text{ nom}}$, each output regulated	typ. $0.15\% U_{o\text{ nom}}$
Minimum load	not required	0 A
Current limitation main output	rectangular U/I characteristic	typ. $110\% I_{o\text{ nom}}$
Current limitation aux. output(s)	rectangular U/I characteristic	typ. $120\% I_{o\text{ nom}}$
Operation in parallel	by current limitation, only main outputs	
Hold-up time	$U_{i\text{ nom}}, I_{o\text{ nom}}, \text{LM}$	typ. 100 ms
	$U_{i\text{ nom}}, I_{o\text{ nom}}, \text{A/B/C/D/FM with ext. diode in input line}$	up to 7 ms

Protection

Input reverse polarity	built-in fuse	
Input undervoltage lockout		typ. $80\% U_{i\text{ min}}$
Input overvoltage lockout		typ. $110\% U_{i\text{ max}}$
Input transient protection	varistor or suppressor diode	
Output	no-load, overload and short circuit proof	
Output overvoltage	suppressor diode in each output	typ. $150\% U_{o\text{ nom}}$
Overtemperature	switch-off with auto restart	T_C typ. 100°C

Control

Output voltage adjustment	single output types	$0 \dots 110\% U_{o\text{ nom}}$
Inhibit	TTL input, output(s) disabled if open circuit	
Status indication	LEDs: OK, inhibit, overload	

Safety

Approvals	EN 60950, UL 1950, CSA C22.2 No. 950	
Class of equipment	AM, BM, CM, DM, FM, LM	class I
	CMZ, DMZ, LMZ	class II
Protection degree	units without options	IP 40
Electric strength test voltage	class I, I/case	2 kV AC
	class I, I/O	4 kV AC
	class II, CMZ/DMZ/LMZ, I/O and I/case	4 kV AC
	O/case	1 kV AC
	O/O	0.2 kV AC

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EMC

Electrostatic discharge	IEC/EN 61000-4-2, level 4 (8/15 kV)	criterion B
Electromagnetic field	IEC/EN 61000-4-3, level x (20 V/m)	criterion A/B
Electr. fast transients/bursts	IEC/EN 61000-4-4, input, level 3/4 (2/4 kV)	criterion A/B
Surge	IEC/EN 61000-4-5, input, level 3/4 (2/4 kV)	criterion A
Conducted disturbances	IEC/EN 61000-4-6, level 3 (10 V)	criterion B
Electromagnetic emissions	CISPR 22/EN 55022, conducted	class B

Environmental

Operating ambient temperature	$U_{i\text{ nom}}, I_{o\text{ nom}}$, convection cooled	-25...71 °C
Operating case temperature T_C	$U_{i\text{ nom}}, I_{o\text{ nom}}$	-25...95 °C
Storage temperature	non operational	-40...100 °C
Damp heat	IEC/EN 60068-2-3, 93%, 40 °C	56 days
Vibration, sinusoidal	IEC/EN 60068-2-6, 10...60/60...2000 Hz	0.35 mm/5 g_n
Shock	IEC/EN 60068-2-27, 6 ms	100 g_n
Bump	IEC/EN 60068-2-29, 6 ms	40 g_n
Random vibration	IEC/EN 60068-2-64, 20...500 Hz	4.9 $g_{n\text{ rms}}$
MTBF	MIL-HDBK-217E, G_B , 40 °C, single output types	320'000 h

Options

Extended temperature range	-40...71 °C, ambient, operating	-9
Electronic inrush current limitation		E
Output voltage adjustment	95...105% $U_{o\text{ nom}}$, excludes feature R and vice versa	P
Input and/or output undervoltage monitoring, excludes option V		D0...D9
Input and/or output undervoltage monitoring (VME), excludes option D		V0, V2, V3
Test sockets for check of output voltage		A
Enhanced electric strength test 2 kV AC		H
Fuse not user accessible		F

Pin allocation

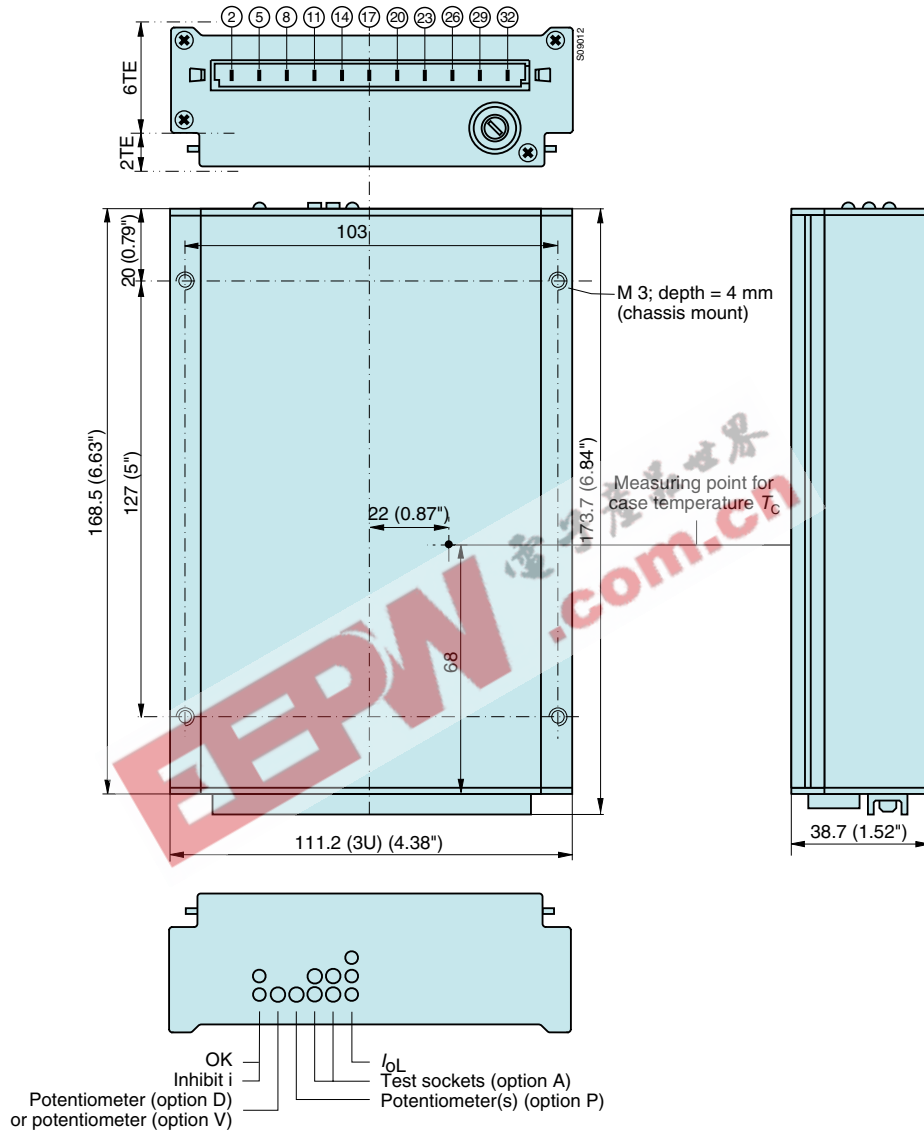
Pin	Electrical determination	AM...LM 1000	CMZ...LMZ 1000	AM...LM 2000	CMZ...LMZ 2000	AM...LM 3000	CMZ...LMZ 3000
2	Inhibit control input	i	i	i	i	i	i
5	Safe data or ACFAIL	D or V	D or V	D or V	D or V	D or V	D or V
8	Output voltage (positive)	Vo1+	Vo1+			Vo3+	Vo3+
11	Output voltage (negative)	Vo1-	Vo1-			Vo3-	Vo3-
14	Control input +	R	R				
17	Control input -	G	G				
14	Output voltage (positive)			Vo2+	Vo2+	Vo2+	Vo2+
17	Output voltage (negative)			Vo2-	Vo2-	Vo2-	Vo2-
20	Output voltage (positive)	Vo1+	Vo1+	Vo1+	Vo1+	Vo1+	Vo1+
23	Output voltage (negative)	Vo1-	Vo1-	Vo1-	Vo1-	Vo1-	Vo1-
26	Protective earth	⊕		⊕		⊕	
29	DC input voltage	Vi+	Vi+	Vi+	Vi+	Vi+	Vi+
32	DC input voltage	Vi-	Vi-	Vi-	Vi-	Vi-	Vi-

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Mechanical data

Tolerances ± 0.3 mm (0.012") unless otherwise indicated.



Accessories

Front panels 19" (Schroff/Intermas)

Mating H11 connectors with screw, solder, fast-on or press-fit terminals

Connector retention facilities and code key system for connector coding

Flexible PCB for connecting the converter via an H11 connector, if mounted on a PCB

Chassis or wall mounting plates for frontal access

Universal mounting brackets for chassis or DIN-rail mounting