HVP
High Voltage Products. High Voltage Experts.

Advanced Energy

COOLX®1800

HIGH EFFICIENCEY, INTELLIGENT AND RELIABLE 1800 W MODULAR POWER SUPPLIES

Advanced Energy's CoolX®1800 series, part of our low voltage solutions, is an intelligent modular power supply. The CoolX1800 delivers an incredible 1800 W in a compact 1U high package with PMBus™ digital communications, control and reliability in addition to the most comprehensive feature set and specifications available.

PRODUCT HIGHLIGHTS

Modular Power Supply
- Up to 1800 W
- Up to 12 outputs
- All outputs isolated (1850 VAC)
- Variable fan speed control

Reliability
- MTBF > 200,000 hours
- Level 4 input surge protection
- 23.5 W always ON auxiliary power output
- Safety approved to 5000 m altitude
- 93% efficiency
- Five-year warranty

Flexibility
- Analog and digital management — PMBus™ monitoring and control capability
- Field-configurable — plug and play power
- Series and parallel outputs for higher voltages and currents
- Mounting options — base/side and DIN-Rail mounting

TYPICAL APPLICATIONS

Medical
- Clinical diagnostic equipment, medical lasers, dialysis equipment, radiological imaging, chemical chemistry

Industrial
- Test and measurement, industrial machines, automation equipment, printing, telecommunications, MIL-COTS

Audio Equipment
- Hi Rel, harsh industrial electronics, radar (marine- and ground-based), communications, test and measurement

AT A GLANCE

	CX18S	CX18M
Power		
	1800 W	1800 W
Slots		
	6	6

Cooling

Variable fan speed control

Parameters

267 mm x 127 mm x 41 mm
(10.5 in x 5 in x 1U)

Certifications

Medical (CX18M)
- IEC60601-1 3rd edition, IEC60601-1-2 4th edition (EMC)
- 2 MOPP
- Dual fused
- ISO13485

Industrial (CX18S)
- IEC60950, IEC62368-1
- SEMI F47

Defense/Aero (All Models)
- MIL-STD-810G

MODULES

CoolX CoolMods Table				
Single Output Modules (1 Slot)	**Vnom(V)**	**Set Point Adjust Range (V)**	**Imax(A)**	**Power (W)**
CmA	5	2.5-6.0	30.0	150
CmB[1]	12	6.0-15.0[2]	23.3	280
CmC	24	15.0-28.0	12.5	300
CmD	48	28.0-58.0[3]	6.25	300
High Power Modules (3 Slot)				
CmE[4]	24	22.8-25.2	37.5	900
CmF[4]	48	45.6-50.4	18.75	900
Dual Output Modules (1 Slot)				
CmG[5] V1	24	3.0-30.0	4.0	120
V2	24	3.0-30.0	4.0	120
CmH[6] V1	5	3.0-6.0	10.0	60
V2	24	3.0-30.0	4.0	120
Wide Trim Modules (1 Slot)				
CmA-W01	5	1.0-6.0	30	150
CmB-W01	12	1.0-15.0[2]	23.3	280
CmC-W01	24	2.0-28.0	12.5	300
CmD-W01	48	3.0-58.0[3]	6.25	300

[1] Full dynamic specifications may not be met at full load when output voltage is trimmed above 13 V.

[2] Max Trim 14 V when used with High Power Module

[3] Max Trim 56 V when used with High Power Module

[4] a) Only one High Power module (CmE or CmF) can be used per CoolPac.
b) During load transients starting from 0% load on the High Power modules, other modules in the CoolPac may experience an output voltage dynamic during the load change. Contact applications support for details or support..

[5] For the CmG module the max combined power of both outputs is 200 W.

[6] For the CmH module the max combined power of both outputs is 180 W.

*SEMI F47 compliant at input voltages > 180 VAC. Consult Advanced Energy for details.

ELECTRICAL SPECIFICATIONS

Input

Parameter	Conditions/Description	Min	Nom	Max	Units
Nominal Input Voltage Range	Universal Input 47-440Hz	100	—	240	VAC
AC Operating Input Range		85	—	264	VAC
Extended AC Operating Range	Maximum for 5 seconds	—	—	300	VAC
DC Input Voltage Range		120		300	VDC
Input Current	90 VAC @ 1800 W	—	—	14.5	A
Inrush Current	230 VAC @ 1800 W	—	—	25	A
Power Factor	120 VAC @ 1400 W	0.98	—	—	—
Undervoltage Lockout	Shutdown	65	—	74	VAC
Input Fuses Rating	Dual Fused (Line and Neutral) 250 VAC	—	16	—	A
Efficiency	230 VAC, 1800 W with 6 x CmC CoolMods	91		%	
	230 VAC, 1800 W with 2 x CmF CoolMod	—	93	—	%

Output

Parameter	Conditions/Description	Min	Nom	Max	Units
Power Rating	CX18: See derating curves	—	—	1800	W
Minimum Load		0	—	—	A
Line Regulation	For ±10% change from nominal line	—	—	±0.1	%
	CmE, CmF, CmG, CmH	—	—	±0.5	%
Load and Cross Regulation	For 25% to 75% load change	—	—	±0.2	%
Transient Response	Voltage Deviation, for 25% to 75% load change 0.5A/uS	—	—	4 (4)	%
	Settling Time, *CmE and CMF in ()	—	—	500 (1000)	µS
Ripple and Noise	100 mV or 1.0% pk-pk. 20 MHz BW	—	—	1	%
	CmF	—	—	1.5	%
Overvoltage Protection	Tracking OVP Level (N/A in CmE and CmF, CmG, CmH)	105	—	125	%
	Latching OVP Level	125	—	160	%
Remote Sense	Max. line drop compensation (N/A in CmG and CmH)	—	—	0.5	VDC
Overshoot		—	—	1	%
Rise Time	Monotonic	—	—	10	ms
	CmG and CmH	—	—	20	ms
Capacitive Load	CmA-CmE			10	mF
	CmG, CmH			< 0.47	mF
Turn-On Delay	From AC in	—	—	1000	ms
	From Global Enable	—	—	10	ms
	From CoolMod Enable	—	—	10	—
Hold-Up Time	For nominal output voltages at full load CmE and CmF combination at 1300 W	16	—	—	ms
CoolMod Power	As per CoolMod table	—	—	—	—
Output Adjustment Range	Manual: Multi-turn potentiometer. As per CoolMod table	—	—	—	—
	Vtrim: As per CoolMod table	—	—	—	—
Overcurrent Protection	Straight line with hiccup activation @ 35% Vo nom CmE, CmF, CmG, CmH: Current limit hiccup autorecovery	110	130	150	%
Short Circuit Protection	Yes, Autorecovery	—	—	—	—
OverTemperature Protection	Yes, Autorecovery (CmG, CmH latch off)	—	—	—	—

ELECTRICAL SPECIFICATIONS (CONTINUED)

Auxiliary Output					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Auxiliary Output Voltage	Aux Voltage Option A	11.76	12	12.24	V
	Aux Voltage Option B	4.75	5	5.25	V
Load Regulation		—	—	±2	%
Line Regulation	For ±10% change from nominal line	—	—	±0.5	%
Maximum Output Current	Aux Voltage Option A	—	—	1.96	A
	Aux Voltage Option B	—	—	4.7	A
Load Capacitance		—	—	1000	uF
Output Overcurrent Protection	Hiccup	110		140	%
Short Circuit Protection	Yes, Autorecovery	—	—	—	—

Galvanic Isolation					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Input to Output	Reinforced (2 x MOPP); contact Advanced Energy for Hi-Pot instructions	4000	—	—	VAC
Input to Case	Basic (1 x MOPP)	1850	—	—	VAC
Output to Case	Basic (1 x MOPP)	1850	—	—	VAC
Output to Output	Basic (1 x MOPP)	1850	—	—	VAC
CmG, CmH V1-V2	Operational	500	—	—	VDC

Reliabilty					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Reliability and MTBF	MTBF of >>3 million hours, Telecordia SR-332, Issue 4 CoolPac (excludes fans)	—	0.33	—	Fpmh
Warranty	5 years	—	—	—	—

Environmental					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Operating Temperature	Operates to specification below -20°C after 10 min warmup	-40	—	70	°C
Storage Temperature		-40	—	85	°C
Derating	See derating curves	—	—	—	—
Relative Humidity	Non-condensing	5	—	95	%RH
Shock and Vibration	MIL-STD-810G Method 514.6	—	—	—	—
Altitude		—	—	5000	m

ELECTRICAL SPECIFICATIONS (CONTINUED)

Leakage Currents			
Parameter	**Conditions/Description**	**Nom**	**Units**
AC Leakage Current	**Input to earth ground**		
Normal Condition (High Line)	Mains Voltage 264 VAC/60 Hz	244	µA
Single Fault Condition (High Line)	Mains Voltage 264 VAC/60 Hz	435	µA
Touch Current			
Normal Condition	Mains Voltage 264 VAC/60 Hz	14.2	µA
Single Fault Condition	Mains Voltage 264 VAC/60 Hz	246	µA

EMC			
Parameter	**Conditions/Description**		**Notes**
Radiated Emissions[1]	EN 55011, EN 55022 and FCC, Class B	—	Compliant
Conducted Emissions[1]	EN 55011, EN 55022 and FCC, Class B	—	Compliant
Power Line Harmonics	EN 61000-3-2, Class A	—	Compliant
Voltage Flicker	EN 61000-3-3	—	Compliant
ESD	EN 61000-4-2, level 4, 8 kV contact, 15 kV air	—	A
Radiated Immunity	EN 61000-4-3, level 3, 10 V/m 80-2700 MHz	—	A
Electrical Fast Transient	EN 61000-4-4, level 4, ±4 kV	—	A
Surge Immunity	EN 61000-4-5, level 4, 2 kV DM, 4 kV CM	—	A
Conducted RF Immunity	EN 61000-4-6, level 3, 10 Vemf 150 KHz-80 MHz	—	A
Power Frequency Magnetic Field	EN 61000-4-8, level 4, 30 A/m	—	A
Voltage Dips and Interruptions	EN61000-4-11	10 ms 100 ms 500 ms	A B B

[1] Consult AE applications for system level compliance

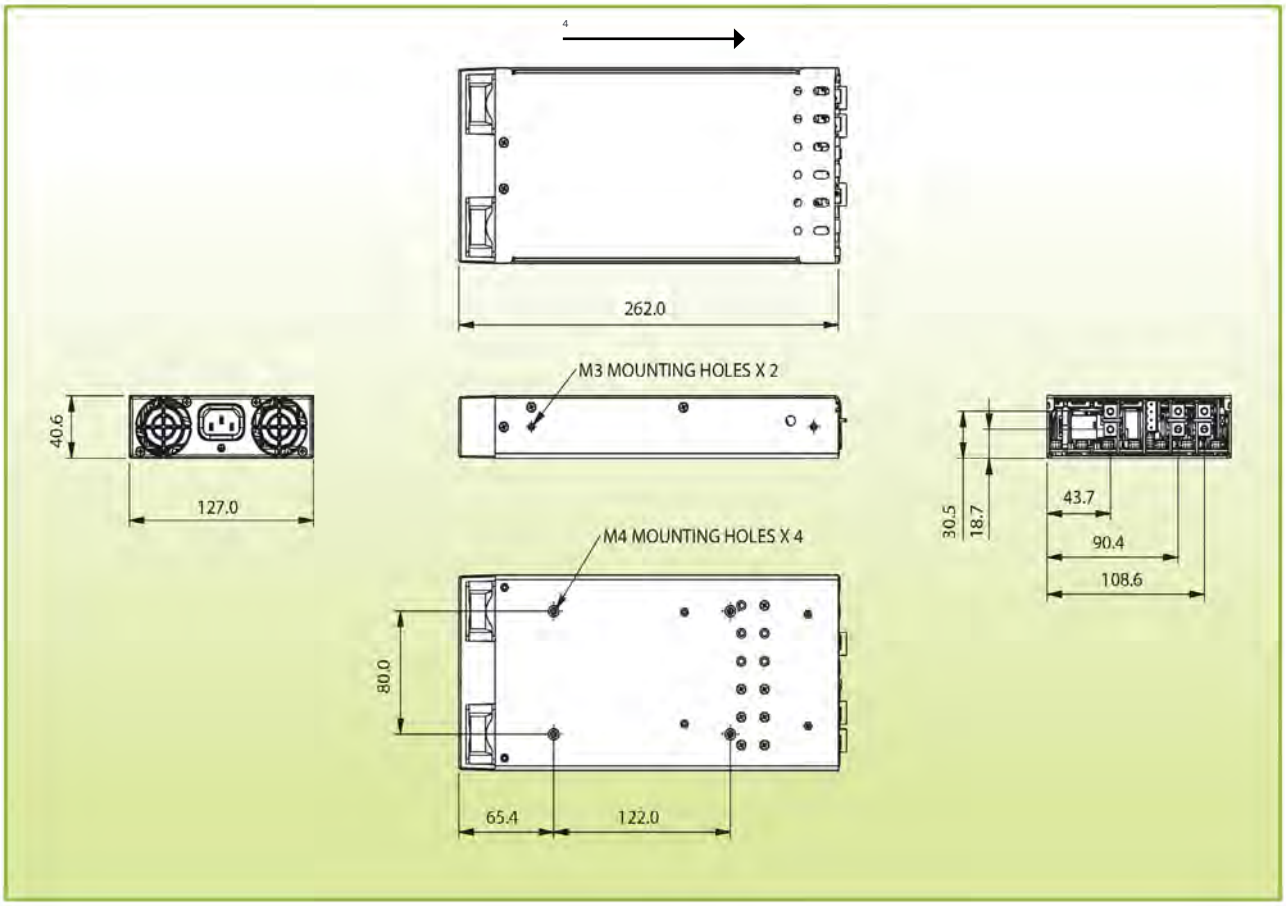
Standards and Directives	
Standard	**Conditions/Description**
Safety Agency Approvals	EN60601-1 3rd Edition, UL60601-1, CSA601, EN60950 2nd Edition, CSA C22.2 No. 60950-1
IEC/EN 60950-1, Edition 2 and all national deviations	UL 60950-1/CSA 22.2 No 60950-1, Edition 2; 5000 m (16,400 ft) altitude, 100 VAC to 240 VAC ±10%
IEC/EN 60601-1, Edition 3 and all national deviations	IEC 60601-1 (2005), EN60601-1 (2006), ANSI/AAMI ES 60601-1 (2005), CAN/CSA C22.2 No. 60601-1 (2008); 5,000 m (16,400 ft) altitude, 100 VAC to 240 VAC ±10%
IEC 62368 Edition 2	IEC 62368-1 (2014) Edition 2; 5000 m (16,400 ft) altitude, 100 VAC to 240 VAC ±10%
IEC 60601-1-2 Edition 4	IEC 60601-1-2 (2014)
Protection class	Class I
ROHS	EU DIRECTIVE 2015/863 RoHS compliant
REACH-171	Compliant
Conflict Materials	Compliant with Conflict Free Sourcing Initiative

MECHANICAL SPECIFICATIONS

Mechanica Data		
Parameter	**Description**	
Dimensions (L x W x H)	L x W x H	267 mm x 127 mm x 41 mm (10.5” x 5” x 1U)
Weight	Nominal Weight: CoolPac + 6 x CoolMods	1.6 Kg
Connectors	**Description**	**Mating Connectors (if applicable)**
AC/DC IEC input (Option)	Screw terminal Block and IEC inlet options. In Mating Connectors column state "See Interface page"	—
Main DC output terminal block (CmA-CmF, CmM-CmQ)	M4 Screws	—
Main DC output terminal block (CmG, CmH)	Camden - CTB9350/4A	—
Output Signal Connector (CmG, CmH)	Molex - 87833-0831	Camden - CTB9200/4A or Würth Elektronik - 691 352 710 004
System Signal Connector J1007	Molex 87833-0831 8-way	Locking Molex 51110-0860; Non Locking Molex 51110-0850; Crimp Terminal: Molex p/n 50394 or Molex 51110-0856 which includes locking tab and polarization keying
Output Signal Connectors J1001-1006	Molex 87833-0631 6-way	Locking Molex 51110-0660; Non Locking Molex 51110-0650; Crimp Terminal: Molex p/n 50394 or Molex 51110-0656 which includes locking tab and polarization keying
Output Signal Connector (CmG, CmH)	Molex 87833-0831 8-way	Locking Molex 51110-0860; Non Locking Molex 51110-0850 Crimp Terminal: Molex p/n 50394 or Molex 51110-0856 which includes locking tab and polarization keying
Output Sense Connectors J3	JST-S2BPH-K(LF)(SN)	JST PHR2. Crimp Terminal JST BPH-002TP.0.5S or SPH-002T-P.05S
Auxiliary Output Connector J1	Molex 1041880210 2pin	

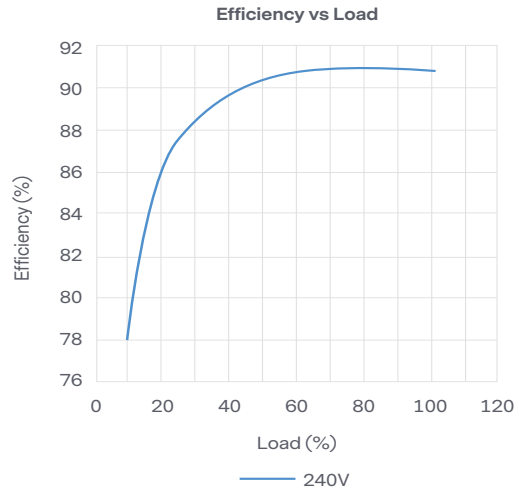
MECHANICAL SPECIFICATIONS (CONTINUED)

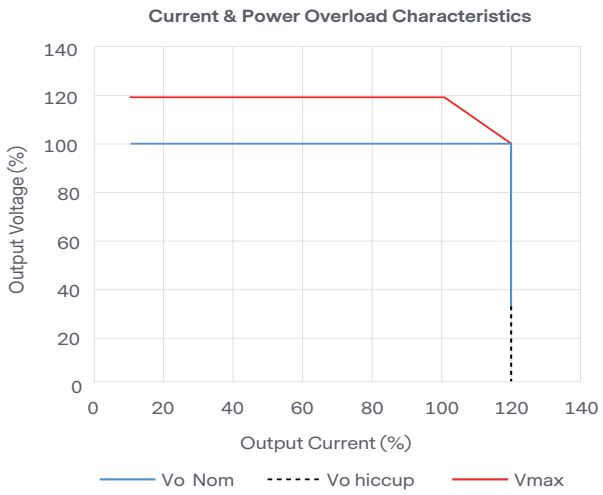
Mechanical Drawings

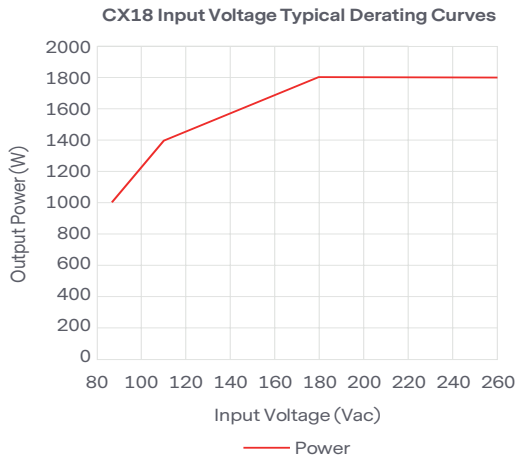


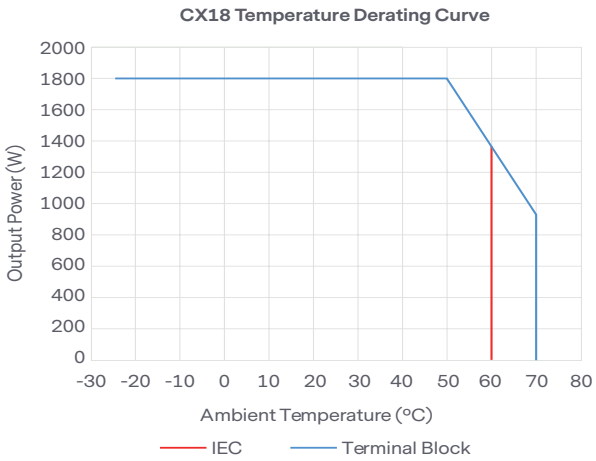
[1] Standard airflow direction
[*] Maximum screw penetration from base does not exceed 2mm.

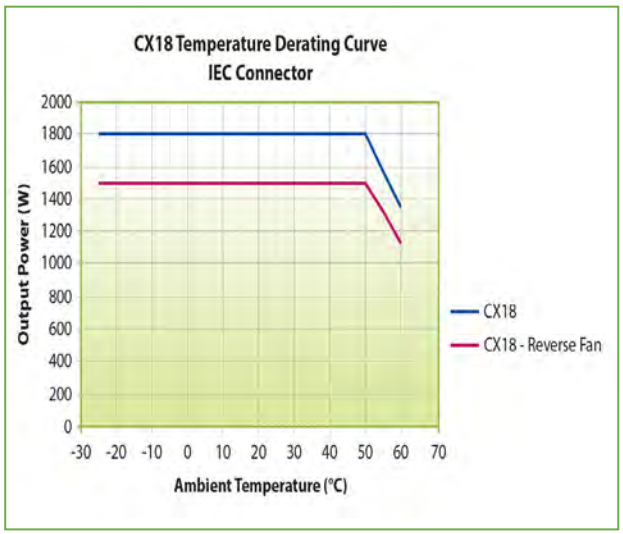
EFFICIENCY AND DERATING CURVES

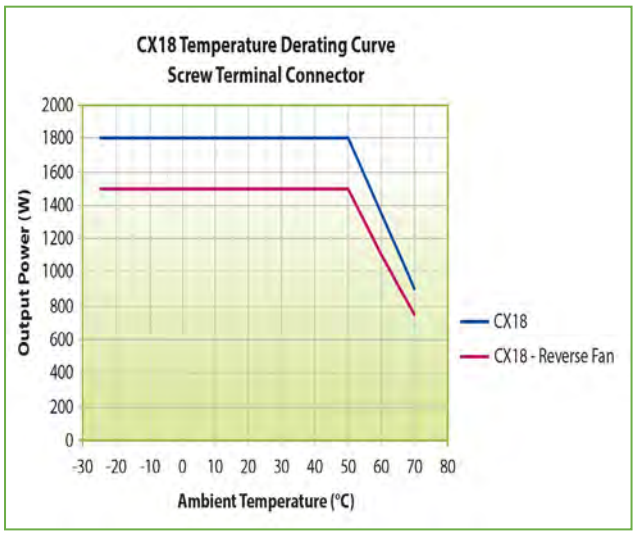






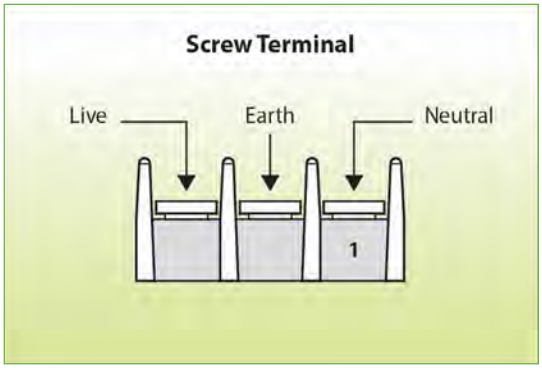




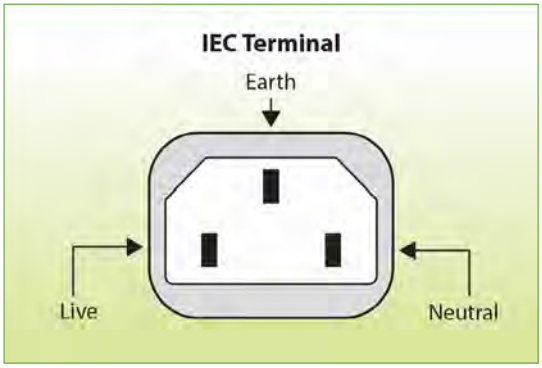


INTERFACE (CONTINUED)

Input Connectors

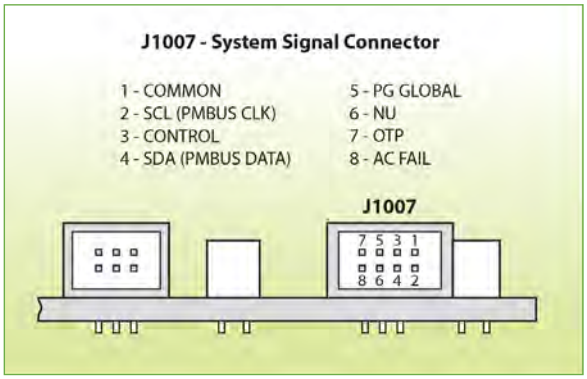


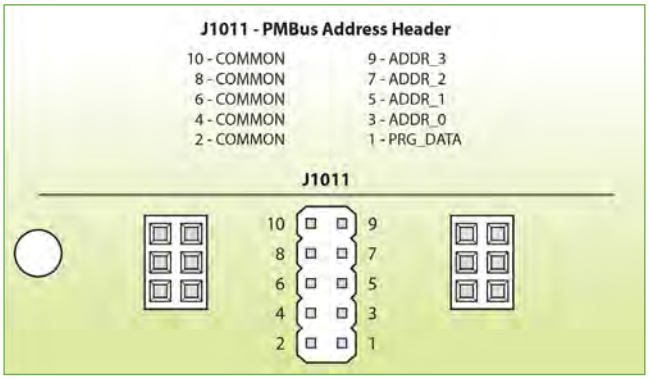
Standard (Screw Terminal)

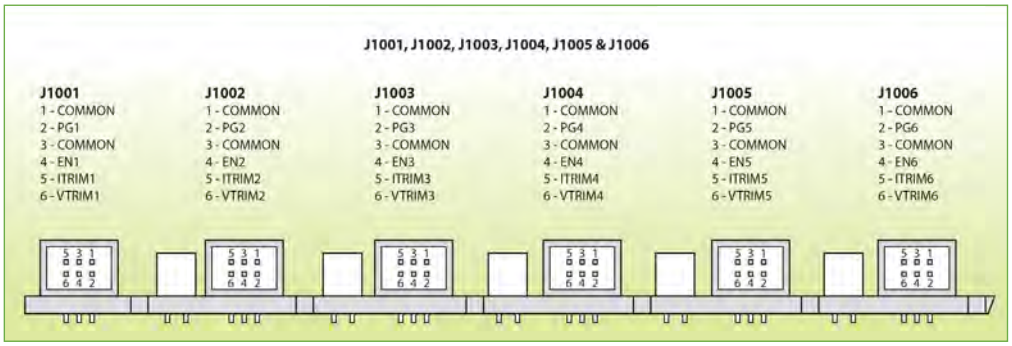


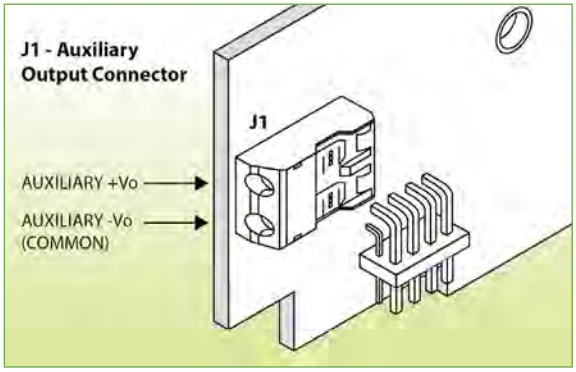
Option 1 (IEC Terminal)

CoolPac Connectors



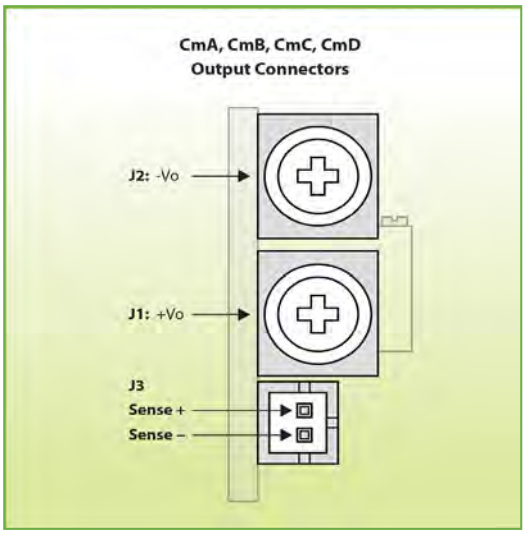


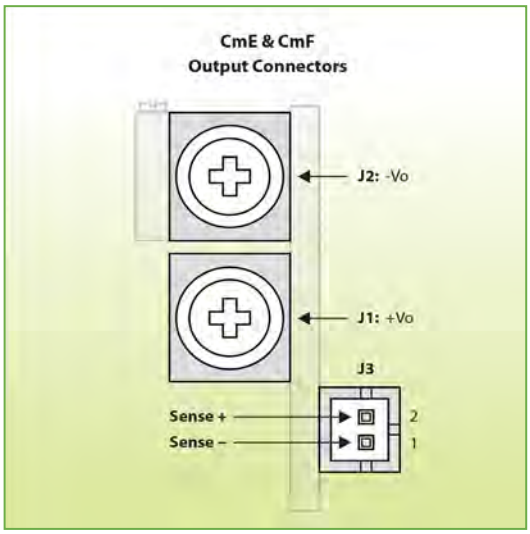


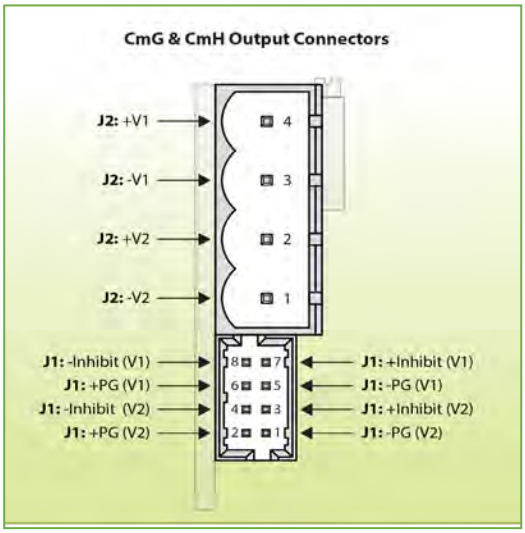


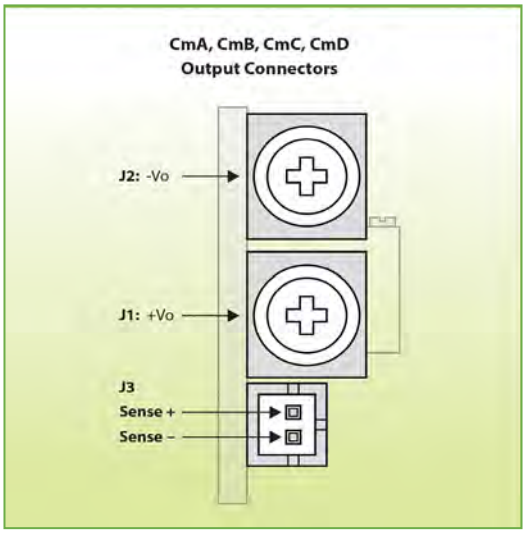
INTERFACE (CONTINUED)

CoolMod Connectors

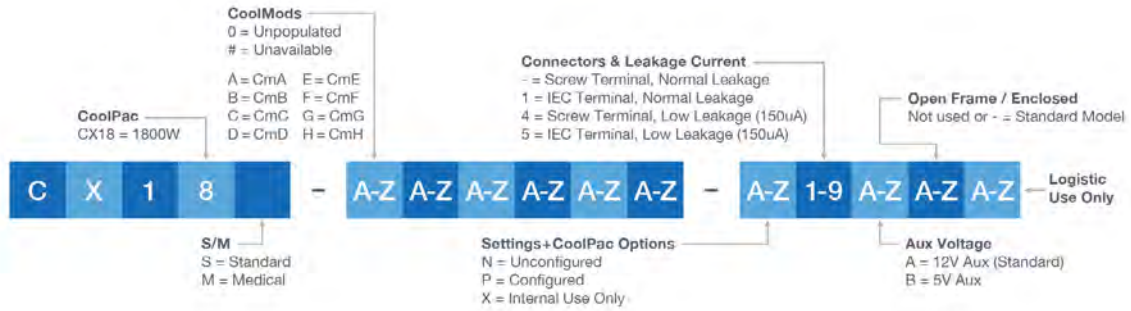








CONFIGURATION



*CmE or CmF High Power Module (3 slot module) can only occupy Slots D/E/F.

Configuration Example 1
CoolX part number CX18S-ADG##E-N-A specifies the following product;
- CX18S 1800W IEC60950 approved
- Slot 1: CmA: 2.5-6.0V (150W)
- Slot 2: CmD: 28-58V (300W)
- Slot 3: CmG: Dual output 3-30V (120 per channel)
- Slot 4: Not Available (CmE is three slot CoolMod module)
- Slot 5: Not Available (CmE is three slot CoolMod module)
- Slot 6: CmE: 22.8-25.2 (900W)
- Option N: Nominal Output voltage settings
- Option A: 12V/(1.96)A Bias Supply Voltage

Configuration Example 2
CoolX part number CX18M-BABBDC-N-B specifies the following product;
- CX18M 1800W IEC60601-1 approved
- Slot 1: CmB: 6-15V (280W)
- Slot 2: CmA: 2.5-6.0V (150W)
- Slot 3: CmB: 6-15V (280W)
- Slot 4: CmB: 6-15V (280W)
- Slot 5: CmD: 28-58V (300W)
- Slot 6: CmC: 15-28V (300W)
- Option N: Nominal Output voltage setting
- Option B: 5V/(4.7A) Nominal Output voltage setting