EXCELSYS COOLX®3000

HIGH EFFICIENCY, INTELLIGENT AND RELIABLE 3000 W MODULAR POWER SUPPLY



Advanced Energy's CoolX3000 is the latest addition to the Excelsys product line. The CoolX3000 intelligent modular power supply delivers an incredible 3000 W in a compact package. With market leading specifications and features, including PMBus™ digital communications, CoolX3000 sets the industry standard in terms of flexibility, reliability, and efficiency.

PRODUCT HIGHLIGHTS

Modular Power Supply
- Up to 3000 W
- Up to 24 outputs
- All outputs isolated (1850 VAC)
- Variable fan speed control

Reliability
- MTBF > 150,000 hours
- Level 4 input surge protection
- 23.5 W always ON auxiliary power output
- Safety approved to 5000 m altitude
- 91% 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

TYPICAL APPLICATIONS

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

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

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

AT A GLANCE

	C30S	C30M
Power		
	3000 W	3000 W
Slots		
	12	12

Cooling

Variable fan speed control

Parameters

325 x 131 x 120 mm
12.8 x 5.2 x 4.7”

Certification and Compliance

Medical (C30M)
- IEC60601-1 3rd edition, IEC60601-1-2 4th edition (EMC)
- 2 MOPP
- Dual fused

Industrial (C30S)
- IEC62368-1
- SEMI F47

MODULES

CoolX CoolMods Table				
Parameter	**Vnom (V)**	**Set Point Adjust Range (V)**	**Imax (A)**	**Power (W)**
Single Output Modules (1 Slot)				
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	24-25.2	37.5	900
CmF[4]	48	48-50.4	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
High Voltage Modules (1 Slot)				
CmK[7]	200	175-205	1.0	200

[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.

[7] When a CmK module is used in Unit A along with a CmE or CmF module, one module slot of Unit A must remain unpopulated.
When a CmK module is used in Unit B along with a CmE or CmF module, one module slot of Unit B must remain unpopulated.

ELECTRICAL SPECIFICATIONS

Input					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Nominal Input Voltage Range	47 to 440 Hz	200	—	240	VAC
AC Operating Input Range		180	—	264	VAC
Extended AC Operating Range	Maximum for 5 seconds	—	—	300	VAC
DC Input Voltage Range		283	—	340	VDC
Input Current	See Power Derating Curve	—	—	16	A
Inrush Current	230 VAC	—	—	50	A
Power Factor	230 VAC @ 3000 W	0.98	—	—	—
Undervoltage Lockout	Shutdown	65	—	74	VAC
Input Fuses Rating	Dual Fused (Line and Neutral) 500 VAC	—	30	—	A
Efficiency	230 VAC, 3000 W with 12 x CmC CoolMods	—	—	91	%

Output					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Single Output Modules (1 Slot)					
Line Regulation	From minimum to maximum rated voltage	—	—	±0.2	%
Load Regulation	For 0 to 100% load change	—	—	±0.4	%
Transient Response	For 25% to 75% load change, 0.5 A/µs: voltage deviation	—	—	±6	%
	For 25% to 75% load change, 0.5 A/µs: settling time	—	—	500	µs
Ripple and Noise	Peak-Peak, 20 MHz BW, 100 mV or % of nominal	—	—	1.0	%
Overvoltage Protection	Tracking OVP (autorecovery, % of setpoint)	103	—	125	%
	Hiccup OVP (% of maximum voltage)	107	—	160	%
Remote Sense	Maximum cable drop compensation	—	—	0.5	VDC
Rise Time	Monotonic	—	—	5	ms
Turn-On Delay	From AC in	—	—	1000	ms
	From Global Enable	—	—	12	ms
	From CoolMod Enable	—	—	12	ms
Hold-Up Time	For nominal output voltages at full load, see note 2	16	—	—	ms
Overcurrent Protection	Straight line current limit with hiccup protection at 35% Vo nom	105	—	130	%
Short Circuit Protection	Hiccup, Autorecovery	—	—	—	—
Overtemperature Protection	Autorecovery	—	—	—	—
Capacitive Load		—	—	10	mF
Dual Output Modules (1 Slot)					
Line Regulation	From minimum to maximum rated voltage	—	—	±0.5	%
Load Regulation	For 0 to 100% load change	—	—	±2	%
Transient Response	For 25% to 75% load change, 0.5 A/µs: voltage deviation	—	—	±10	%
	For 25% to 75% load change, 0.5 A/µs: settling time	—	—	1000	µs
Ripple and Noise	Peak-Peak, 20 MHz BW, 100 mV or % of nominal	—	—	2	%
Overvoltage Protection	Hiccup OVP (% of maximum voltage)	110	—	130	%
Rise Time	Monotonic	—	—	20	ms
Turn-On Delay	From AC in	—	—	1000	ms
	From Global Enable	—	—	100	ms
	From CoolMod Enable	—	—	100	ms

ELECTRICAL SPECIFICATIONS (CONTINUED)

Hold-Up Time	For nominal output voltage at full load	16	—	—	ms
Overcurrent Protection	Hiccup, Autorecovery	100	—	250	%
Short Circuit Protection	Hiccup, Autorecovery	—	—	—	—
Overtemperature Protection	Hiccup, Autorecovery	—	—	—	—
Capacitive Load		—	—	270	µF
High Power Modules (3 Slots)					
Line Regulation	From minimum to maximum rated voltage	—	—	±0.5	%
Load Regulation	For 0 to 100% load change	—	—	±3.5	%
Transient Response	For 25% to 75% load change, 0.5 A/µs: voltage deviation	—	—	±4	%
	For 25% to 75% load change, 0.5 A/µs: settling time	—	—	1000	µs
Ripple and Noise	Peak-Peak, 20 MHz BW, 100 mV or % of nominal	—	—	3.5	%
Overvoltage Protection	Tracking OVP (autorecovery, % of setpoint)	102	—	120	%
	Hiccup OVP (% of maximum voltage)	107	—	130	%
Remote Sense	Maximum cable drop compensation	—	—	0.5	VDC
Rise Time	Monotonic	—	—	5	ms
Turn-On Delay	From AC in	—	—	1000	ms
	From Global Enable	—	—	20	ms
	From CoolMod Enable	—	—	20	ms
Hold-Up Time	For nominal output voltage at full load	16	—	—	ms
Overcurrent Protection	Straight line current limit with hiccup protection at 35% Vo nom	105	—	130	%
Short Circuit Protection	Hiccup, Autorecovery	—	—	—	—
Overtemperature Protection	Autorecovery	—	—	—	—
Capacitive Load		—	—	2.5	mF
Wide Trim Power Modules (1 Slot)					
Line Regulation	From minimum to maximum rated voltage	—	—	±0.25	%
Load Regulation	For 0 to 100% load change	—	—	±0.4	%
Transient Response	For 25% to 75% load change, 0.5 A/µs: voltage deviation	—	—	±6	%
	For 25% to 75% load change, 0.5 A/µs: settling time	—	—	500	µs
Ripple and Noise	Peak-Peak, 20 MHz BW, 100 mV or % of nominal	—	—	1.0	%
Overvoltage Protection	Tracking OVP (autorecovery, % of setpoint)	103	—	125	%
	Hiccup OVP (% of maximum voltage)	107	—	160	%
Remote Sense	Maximum cable drop compensation	—	—	0.5	VDC
Rise Time	Monotonic	—	—	5	ms
Turn-On Delay	From AC in	—	—	1000	ms
	From Global Enable	—	—	12	ms
	From CoolMod Enable	—	—	12	ms
Hold-Up Time	For nominal output voltage at full load	16	—	—	ms
Overcurrent Protection	Straight line current limit with hiccup protection at 35% Vo nom	105	—	130	%
Short Circuit Protection	Hiccup, Autorecovery	—	—	—	—
Overtemperature Protection	Autorecovery	—	—	—	—
Capacitive Load		—	—	10	mF
High Voltage Modules (1 Slot)					
Line Regulation	From minimum to maximum rated voltage	—	—	±0.5	%
Load Regulation	For 0 to 100% load change	—	—	±1	%
Transient Response	For 25% to 75% load change, 0.5 A/µs: voltage deviation	—	—	±3.75	%
	For 25% to 75% load change, 0.5 A/µs: settling time	—	—	500	µs

ELECTRICAL SPECIFICATIONS (CONTINUED)

Ripple and Noise	Peak-Peak, 20 MHz BW, 100 mV or % of nominal	—	—	1	%
Overvoltage Protection	Tracking OVP (autorecovery, % of setpoint)	103	—	125	%
	Hiccup OVP (% of maximum voltage)	112	—	122	%
Rise Time	Monotonic	—	—	20	ms
Turn-On Delay	From AC in	—	—	1000	ms
	From Global Enable	—	—	30	ms
	From CoolMod Enable	—	—	30	ms
Hold-Up Time	For nominal output voltage at full load	16	—	—	ms
Overcurrent Protection	Straight line current limit with hiccup protection at 35% Vo nom	105	—	130	%
Short Circuit Protection	Hiccup, Autorecovery	—	—	—	—
Overtemperature Protection	Autorecovery	—	—	—	—
Capacitive Load		—	—	10	µF

[1]The CoolX3000 cannot not be used to deliver continuous output power greater than 3000 W. Maximum output power from any row of outputs (6 slots on top row or 6 slots on bottom row) must not exceed 1500 W. For example, if bottom row of outputs are configured to deliver 1200 W, the top row is still limited to a max of 1500 W output power.
[2] In configurations that have a CmE or CmF on both output rails, 16 ms Hold-up is achieved when the total power draw is less than 2600 W (1300 W from each output rail). All other configuration have 16 ms over the total power range.

Auxiliary Output

Parameter	Conditions/Description	Min	Nom	Max	Units
Auxiliary Output Voltage	Aux Voltage Option A	11.6	12	12.4	V
	Aux Voltage Option B	4.8	5	5.2	V
Load Regulation		—	—	±2	%
Line Regulation	For ±10% change from nominal line	—	—	±0.5	%
Ripple and Noise	Peak-Peak, 20 MHz BW, % of nominal	—	—	4	%
Maximum Output Current	Aux Voltage Option A	—	—	1.96	A
	Aux Voltage Option B	—	—	4.7	A
Load Capacitance		—	—	1000	µF
Output Overcurrent Protection	Hiccup	105	—	145	%
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	Telecordia SR-332, Issue 4 CoolMod	—	0.11	—	Fpmh
	CoolPac + Fans	—	1.16	—	Fpmh
Warranty	5 years	—	—	—	—

ELECTRICAL SPECIFICATIONS (CONTINUED)

Environmental					
Parameter	**Conditions/Description**	**Min**	**Nom**	**Max**	**Units**
Operating Temperature		-30	—	50	°C
Storage Temperature		-25	—	85	°C
Derating	C30: Derate from 50°C	—	50	60	°C
Relative Humidity	Non-condensing	5	—	95	%RH
Vibration		—	—	25	Grms
Altitude		—	—	5000	m

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[9]	EN 55011, EN 55022 and FCC, Class B	—	Compliant
Conducted Emissions[9]	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

[9] Consult AE applications for system level compliance

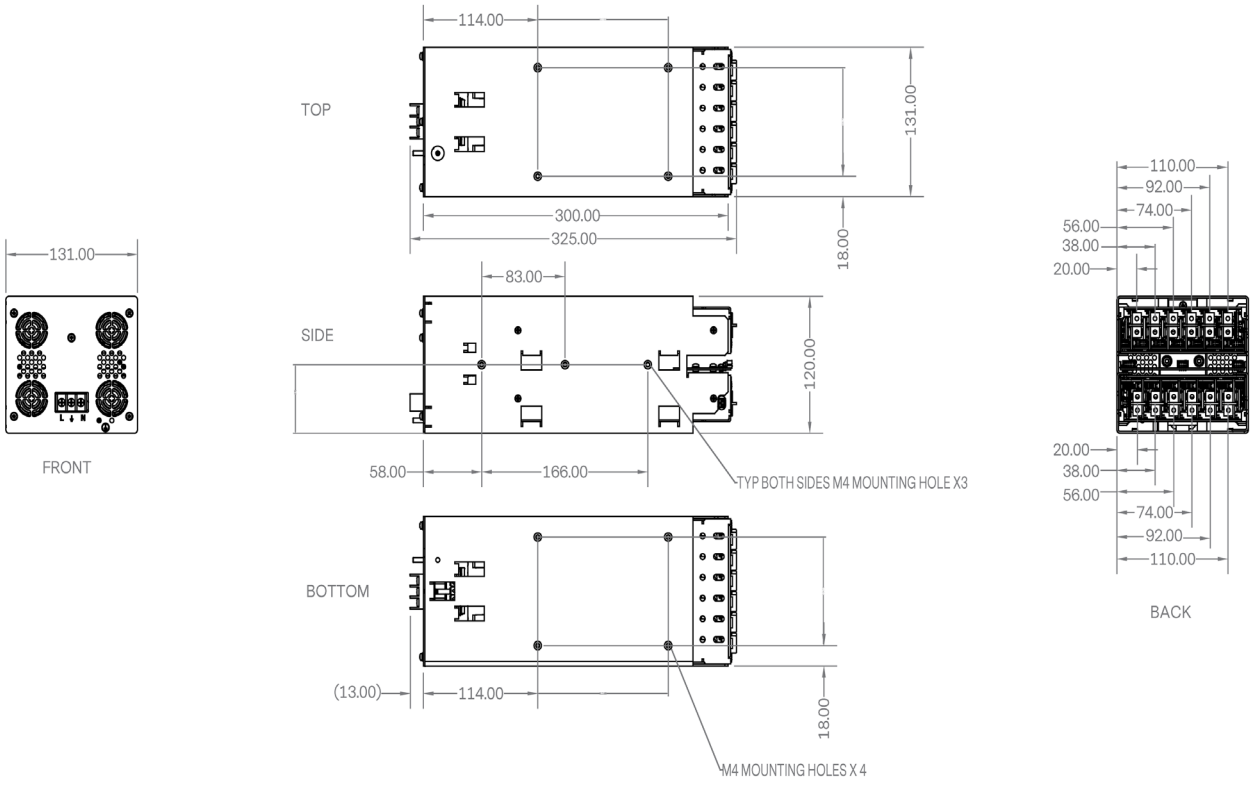
Standards and Directives	
Standard	**Conditions/Description**
Safety Agency Approvals	EN60601-1 3rd Edition, UL60601-1, CSA601,
IEC/EN 60601-1, Edition 3	IEC 60601-1 (2005), EN60601-1 (2006), ANSI/AAMI ES 60601-1 (2005), CAN/CSA C22.2 No. 60601-1 (2008); 5,000 m (16,400 ft) altitude, 100 VAC to 240 VAC ±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	325 x 131 x 120 mm (12.8 x 5.2 x 4.7 in)
Weight	Nominal Weight: CoolPac + 12 x CoolMods	3.5 kg
Connectors	**Description**	**Mating Connectors (if applicable)**
AC/DC IEC input (Option)	Screw terminal Block	—
Main DC output terminal block (CmA-CmF, CmM-CmQ)	M4 Screws	—
Main DC output terminal block (CmG, CmH)	Camden - CTB9350/4A	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	—
Signal Board Connector J11	Molex 87833-0831 8-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
Signal Board Reverse Polarity Header J13	Harwin M22-2010305	M22-1900005, 2 x 1 2.00 mm Pitch

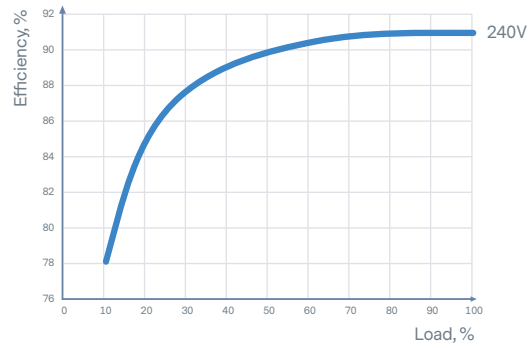
MECHANICAL SPECIFICATIONS (CONTINUED)

Mechanical Drawings

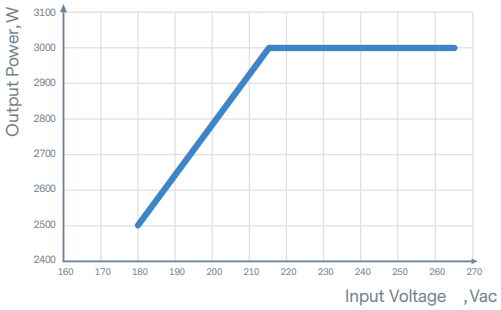


EFFICIENCY AND DERATING CURVES

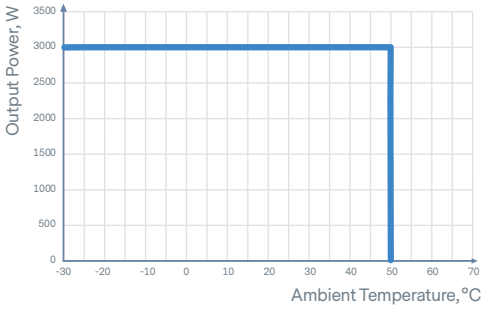
Efficiency vs Load



C30 Input Voltage Derating Curve



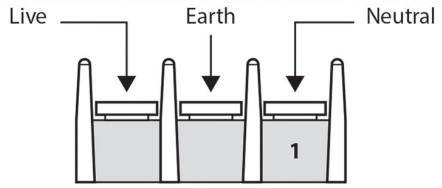
C30 Temperature Derating Curve



INTERFACE

Input Connectors

Screw Terminal



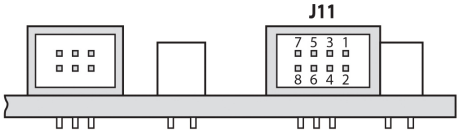
Standard (Screw Terminal)

Note: Screw Terminal Earth is Functional Earth only. The Protective Earth connection is located on the faceplate of the chassis.

CoolPac Connectors

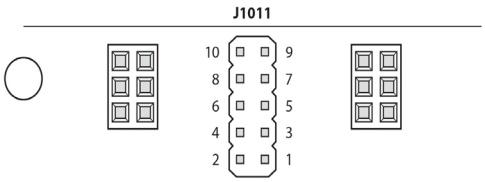
J11 - System Signal Connector

1 - COMMON	5 - PG GLOBAL
2 - SCL (PMBUS CLK)	6 - FAN FAIL
3 - CONTROL	7 - OTP
4 - SDA (PMBUS DATA)	8 - AC FAIL



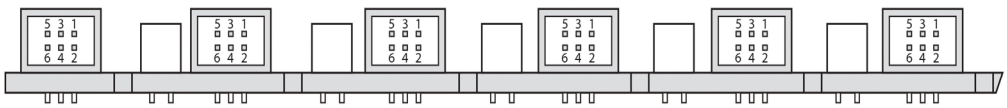
J1011 - PMBus Address Header

10 - COMMON	9 - ADDR_3
8 - COMMON	7 - ADDR_2
6 - COMMON	5 - ADDR_1
4 - COMMON	3 - ADDR_0
2 - COMMON	1 - PRG_DATA

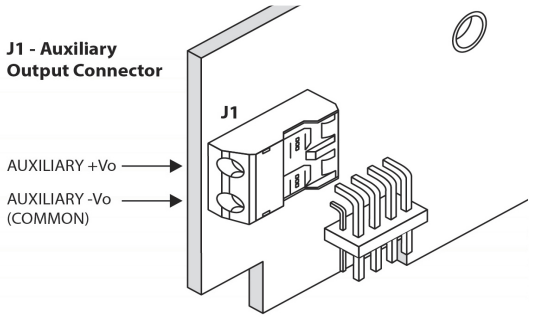


J1001, J1002, J1003, J1004, J1005 & J1006

J1001	J1002	J1003	J1004	J1005	J1006
1 - COMMON	1 - COMMON	1 - COMMON	1 - COMMON	1 - COMMON	1 - COMMON
2 - PG1	2 - PG2	2 - PG3	2 - PG4	2 - PG5	2 - PG6
3 - COMMON	3 - COMMON	3 - COMMON	3 - COMMON	3 - COMMON	3 - COMMON
4 - EN1	4 - EN2	4 - EN3	4 - EN4	4 - EN5	4 - EN6
5 - ITRIM1	5 - ITRIM2	5 - ITRIM3	5 - ITRIM4	5 - ITRIM5	5 - ITRIM6
6 - VTRIM1	6 - VTRIM2	6 - VTRIM3	6 - VTRIM4	6 - VTRIM5	6 - VTRIM6



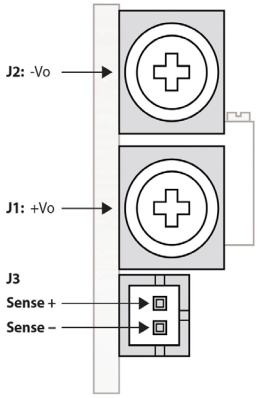
J1 - Auxiliary Output Connector



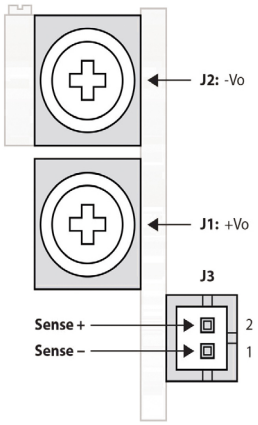
INTERFACE (CONTINUED)

CoolMod Connectors

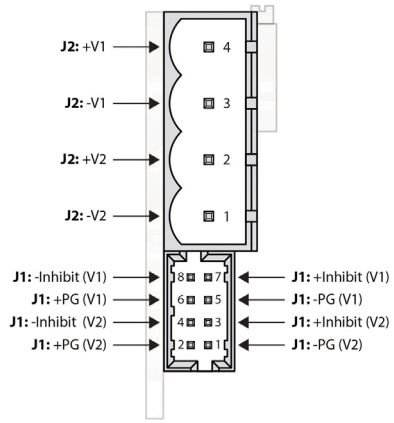
CmA, CmB, CmC, CmD Output Connectors



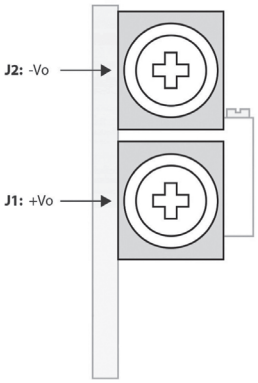
CmE & CmF Output Connectors



CmG & CmH Output Connectors



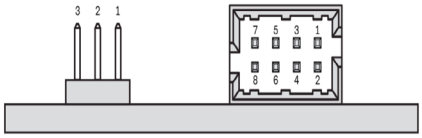
CmK Output Connectors



J13 - Signal-Board Revers-Polarity Header

1-2 - SHORT, REVERSE POLARITY

2-3 - SHORT, NORMAL POLARITY



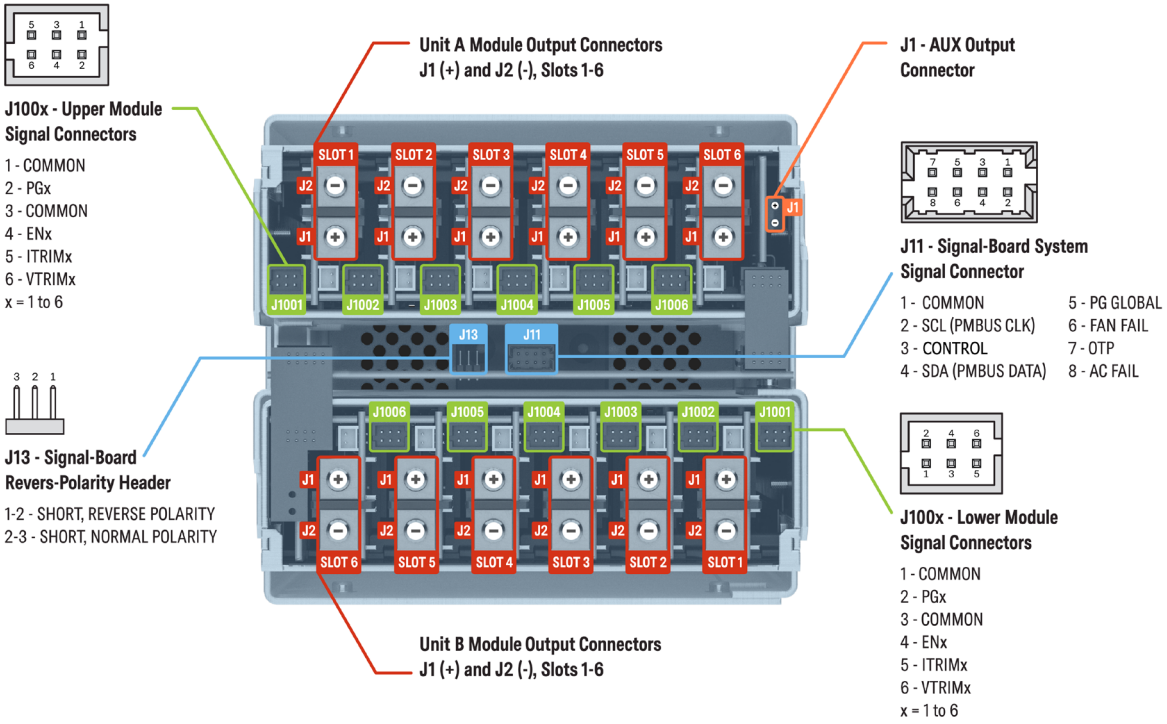
J11 - Signal-Board System Signal Connector

1 - COMMON
2 - SCL (PMBUS CLK)
3 - CONTROL
4 - SDA (PMBUS DATA)
5 - PG GLOBAL
6 - FAN FAIL
7 - OTP
8 - AC FAIL

*For reverse polarity mode, a shunting header must be placed on each CX18 comms board to short J1011 pin 1 to 2.

INTERFACE (CONTINUED)

Output Conections



CONFIGURATION



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

Example of standard product part number with 12V Aux(six A modules, and six B modules):
C3SAAAAAABBBBBBNA
Example of Medical part number with 5V Aux (one CmE module populated & 6 other modules):
C3M000##EABCDABNB

ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than three decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

AE's power solutions enable customer innovation in complex semiconductor and industrial thin film plasma manufacturing processes, demanding high and low voltage applications, and temperature-critical thermal processes.

With deep applications know-how and responsive service and support across the globe, AE builds collaborative partnerships to meet rapid technological developments, propel growth for its customers and power the future of technology.

PRECISION | POWER | PERFORMANCE

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