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REVISIONS

PLANT DIST CODE(S): U

REV	DESCRIPTION	DATE	BY
00	Initial Release	06/28/2013	NB

EMS300-1224-D-00 DUAL BATTERY DISCONNECT



**UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES [MM]**
 TOLERANCES ARE: .XX ± .10 [X.X ± 2.5]
 .XXX ± .030 [X.XX ± 0.76]
 INTERPRET GEOMETRIC DIMENSIONS AND
 TOLERANCING PER ASME Y14.5-1994
 DRAWINGS IN THIS DOCUMENT ARE NOT TO SCALE



TITLE
**EMS300-1224-D-00
 DUAL BATTERY DISCONNECT
 SPECIFICATION OUTLINE**

APPROVALS	DATE
DRAWN BY NB	02/13/2013

PROJECT ENG APPROVAL	
ENG MANAGER APPROVAL	
PRODUCT MANAGER APPROVAL	

SIZE A	PLANT OF ORIGIN U	DRAWING NO. EMS300-1224-D-00	REV 00
SCALE: NONE	FILE: EMS300-1225-D-00 Rev 00	SHEET 1 OF 8	

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OVERVIEW

The EMS300-1224-D-00 is a Battery Disconnect control module for 28V systems with two, 300A integrated bi-stable solenoids. Under normal operating conditions, the solenoids are closed. The unit has two signal inputs that, upon receiving a low signal, open the solenoids until the signal is removed.

UNIT CONNECTIONS:

The unit has 8 connections, 4 through a locking header:

1. 12V BATTERY connection

This is the connection to the 12V battery. Product labeling refers to this as the 12V BAT connection.

2. 12V LOAD connection

This is the connection to the 12V loads.

3. 24V BATTERY connection

This is the connection to the 24V battery stack, which also powers the control module. Product labeling refers to this as the 24V BAT connection.

4. 24V LOAD connection

This is the connection to the 24V loads. The voltage on this connection is monitored to determine if the solenoid closed as intended.

5. Locking header connector:

5.1 Ground (GND) – Pins G and H

These are the unit ground connections. Either of the ground connections may be utilized for grounding the unit.

5.2 Run Disable – Pin D

This is the input for operator disconnect. Grounding this input will open both solenoids after a one second delay.

5.3 Regulator Input – Pin C

This is the input for a disconnect signal from the voltage regulator. Grounding this input will immediately open both solenoids.

5.4 LED – Pin E

This is the LED output. This output indicates the status of the unit. This output is a 25mA \pm 5mA current sink. The LED output is off when the solenoids are closed and on when the solenoids are open.

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FUNCTIONAL DESCRIPTION

Note: All values are approximate; see device specification section for exact values and tolerances.

The unit operates the following truth table:

Input		Result
RUN DISABLE INPUT	REGULATOR INPUT	
HIGH	HIGH	Relays are closed
HIGH	LOW	Relays are opened
LOW	HIGH	Relays are opened after a 1-second delay if in the closed state or remain open if in the open state.

COOLDOWN DELAY

The relays require a brief cooldown period following any change of state. This is controlled by the device microcontroller and will prevent chatter on the control lines from causing relay damage. The delay characteristics are shown in the table below:


Timing characteristics				
Parameter	MIN	TYP	MAX	Unit
TCLOSE_COOLDOWN	-	2	-	sec
TOPEN_COOLDOWN	-	1	-	sec

LED OUTPUT

The state of the unit is indicated by the LED output. The LED is off for solenoids closed and on for solenoids open.

Flashing of the LED indicates errors.

1. If the 24V solenoid is intended closed and there is <2.5V on the 24V LOAD connection, the LED will blink at a 2 Hz rate.
2. If the solenoid drive lines are shorted, the LED will blink at a 1 Hz rate.

			
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ENVIRONMENTAL SPECIFICATIONS:

Control module is enclosed in sealed plastic housing and solenoids are hermetically sealed.


Characteristic	Parameter	Notes
Operational Temperature Range	-40°C TO +85°C	
Storage Temperature Range	-55°C TO +85°C	
Corrosion		Ref. MIL-STD-810D
Humidity	0 to 95% RH	Ref. MIL-STD-810D
Dust		Ref. MIL-STD-810D
Vibration	5-500Hz	Ref. MIL-STD-810D, 3 hours per axis
Shock	6G for 11ms	Ref. MIL-STD-810D, 3 shocks per axis

ELECTRICAL:

MAXIMUM RATINGS:

Maximum ratings establish the maximum electrical rating to which the unit may be subjected.

Characteristic	Symbol	Parameter	Unit	Notes:
Input Voltage	V _{INMAX}	32	V	Damage to solenoids MAY occur if repeatedly operated above 32V
Standoff Voltage	V _{SO}	48	V	Applies to 12 and 24V BATTERY and 12 and 24V LOAD terminals only.
Time at Standoff	t _{SO}	Continuous	V	Control is protected from continuous operation at 48V
Solenoid current	I _{S,MAXC}	300	A	CONTINUOUS
Solenoid current	I _{S,MAX10S}	900	A	MAX 10 seconds


			
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Solenoid current	$I_{S,MAX1S}$	2400	A	MAX 1 second
Rupture current	$I_{S,RUPT}$	3000	A	Current above which solenoid may explode.
Electrical Isolation	V_{ISO}	500	VAC	All terminals together with respect to ground.

ELECTRICAL CHARACTERISTICS:

Unless otherwise stated, conditions apply to full operational temperature range (-40°C TO +85°C) and full voltage range (18V to 32V)

Characteristic	Symbol	MIN	TYP	MAX	Unit	Notes:
Normal Input Voltage	V_{IN}	18		32	V	Voltage range unit is guaranteed to function within specification.
Minimum Input Voltage	V_{INMIN}		12	18	V	Proper solenoid operation not guaranteed below 18V, but typically operates to 12V
Undervoltage Shutdown	V_{USD}		7.5		V	Voltage at which unit will reset.
Contact voltage drop	V_{IOD}		0.15		V	300A resistive load.

			
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Electrical Characteristics Continued...

Characteristic	Symbol	MIN	TYP	MAX	Unit	Notes:
Contact life			50,000		Cycles	300A resistive load.
Quiescent Current	I _{QUES}		12	14	mA	Solenoid not switching and LED off.
Solenoid drive current	I _{SOLD}		14.0		A	7.0A per solenoid.
Solenoid drive time	t _{DR}			40	ms	
LED sink current	I _{LED}	20	25	30	mA	
LED output compliance voltage	V _{LEDC}	0.75		32	V	Range of voltages that LED output current is specified for.
REGULATOR INPUT threshold voltage	V _{PIT}	4.5	7.4	9.5	V	Voltage where REGULATOR input switches state. This input will source approximately 7mA when switched to ground.
RUN DISABLE threshold voltage	V _{RDT}	4.5	7.4	9.5	V	Voltage where RUN DISABLE input switches state. This input will source approximately 7mA when switched to ground.
REGULATOR INPUT Disconnect Delay	t _{RIDD}	45		85	ms	Measured from the falling edge of REGULATOR INPUT to solenoid disconnect.
RUN DISABLE Disconnect Delay	t _{RDDD}	0.9	1	1.1	s	Measured from the falling edge of RUN DISABLE input to solenoid disconnect.
Error mode 1 voltage	V _{ERR2}			2.5	V	Voltage on load to enter error mode 1.
Regulator Input/Run Disable	R _{MIN}	0		680	Ohms	Resistance to ground required for a valid input signal



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ELECTROMAGNETIC COMPATIBILITY

Radiated Immunity Test	Level	Notes:
Absorber Lined Chamber 150MHz to 14GHz	80V/m	Ref. SAE J1113/21 Rev 10/94.
Stripline Test Method 10kHz to 150MHz	100V/m	Ref. SAE J1113/23 Rev 9/95.

Transient Immunity Test	Level	Notes:
Inductive Load Switching	±600V	Ref. SAE J1455, Section 4.11.2.2.2 Rev 8/94
Mutual Coupling	±300V	Ref. SAE J1455, Section 4.11.2.2.3 Rev 8/94
Load Dump	100V	Ref. SAE J1455, Section 4.11.2.2.1 Rev 8/94

Electrostatic Discharge Immunity	Level	Notes:
ESD	±8kV direct ±15kV air	Ref. SAE J1113/13 Rev 2/95.

Emissions Limit Test	Level	Notes:
Conducted Emissions	Per Spec	Ref. SAE J1113/41 Rev 7/95
Radiated Emissions	Per Spec	Ref. SAE J1113/41 Rev 7/95


All terminals protected against all combinations of reverse polarity conditions.

The solenoid drive lines are protected from continuous shorts to ground and the LED output is protected from continuous connection to battery positive.

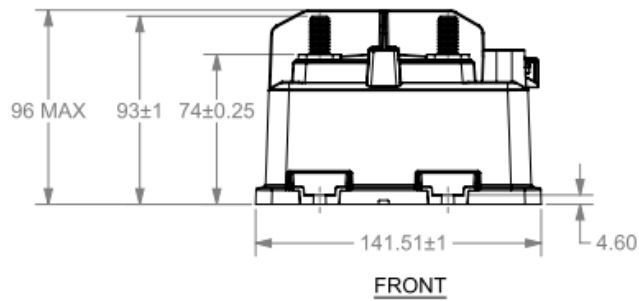
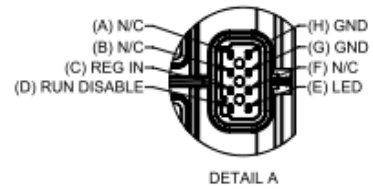
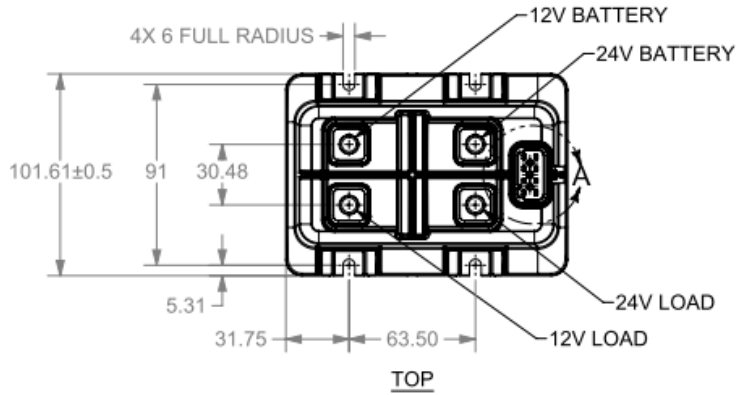
The Regulator and Run Disable inputs are both protected from connection to battery inputs.

MECHANICAL SPECIFICATIONS:

Weight: 3.13 lbs. (1.42 kg)

			
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UNIT DIMENSIONS:



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