

SENSEI

Fire Alarm Calculations For:

**Lee's Summit Hospital
HYBRID OR Addition**

**44op-307325
2100 SE Blue Parkway
Lee's Summit, Missouri 64063**

MISSOURI CERTIFICATE OF AUTHORITY #000816



4-21-2021

TIM L. SCOTT
LICENSE # E-23228

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System installed by:

Siemens Industry, Inc.
Building Technologies Division
Fire Safety
8066 Flint Street
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SIEMENS

Date 4/6/2021		Project Name: HCA Hospital		Main Panel		Kansas City				
XLS Power Supply & Battery Calculations										
Power Supply - Supervisory Load Current										
Module Part Number & Description		QTY	Module Current	EOL Current	Device Current	Total 24 VDC Standby Current				
PMI	Person Machine Interface	1	230 mA			0.230 Amps				
PMI-REM	Remote Annunciator	0	230 mA			0.000 Amps				
PSC-12	Power Supply/Battery Charger	1	150 mA			0.150 Amps				
	Active Relays	4			20 mA per active relay	0.080 Amps				
PSX-12	Power Supply Extender	0	170 mA			0.000 Amps				
CPC	Central Processor Card									
CRC-6	Controllable Relay Card	0	51 mA			0.000 Amps				
	Active Relays	0			20.5 mA per active relay	0.000 Amps				
DLC	Device Loop Card	5	145 mA			0.725 Amps				
	Devices	435			1.8 mA per device	0.783 Amps				
CDC-4	Conventional Detector Card									
NIC-C	Network Interface Card	1	120 mA			0.120 Amps				
WAC	Wide Area Card									
RPM	Remote Printer Module	1	150 mA			0.150 Amps				
ZIC-4A	Zone Indicating Card	0	90 mA			0.000 Amps				
	Active Circuits	0		1 mA per circuit		0.000 Amps				
	Devices	-								
ZIC-8B	Zone Indicating Card	2								
	Active Circuits	8								
	Devices									
ZAC-40	Zone Amplifier Card 40 Watts	0	150 mA			0.000 Amps				
	Speaker Load Watts	N/A								
ZAM-80	Zone Amplifier Module 80 Watts									
	Speaker Load Watts									
ZAM-180	Zone Amplifier Module 180 Watts	0	280 mA			0.000 Amps				
	Speaker Load Watts	N/A								
ARC	Audio Router Card									
AIC	Audio Interface Card (External Input)	0	150 mA			0.000 Amps				
DAC	Digital Audio Card	0	100 mA			0.000 Amps				
DAC-NET	Digital Audio Card with Network	0	140 mA			0.000 Amps				
LVM	Live Voice Microphone	0	25 mA			0.000 Amps				
LPB	Local Page Board	0	100 mA			0.000 Amps				
TRC	Tape Recorder Card									
FRC	Firefighter Riser Card									
FMT	Firefighter Master Telephone	0	150 mA			0.000 Amps				
	Active Handsets	0			30 mA per handset	0.000 Amps				
TZC-8	Telephone Zone Card	0	280 mA			0.000 Amps				
	Active Zones	0			35 mA per zone	0.000 Amps				
FCM-6	Fan Control Module	0	14 mA			0.000 Amps				
	Active LEDs	0			1 mA per LED	0.000 Amps				
LCM-8	LED Control Module	0	14 mA			0.000 Amps				
	Active LEDs	0			1 mA per LED	0.000 Amps				
SCM-8	Switch Control Module	0	14 mA			0.000 Amps				
	Active LEDs	0			1 mA per LED	0.000 Amps				
CSB	CAN Sounder Board									
OCM-16	Output Control Module	0	14 mA			0.000 Amps				
	Active LEDs	0			10 mA per LED	0.000 Amps				
	Supervised Input Module	0	20 mA			0.000 Amps				
SIM-16	Active Outputs	0		1.2 mA/supv'd input		0.000 Amps				
	Active Relays	0			10 mA per active relay	0.000 Amps				
RNI	Remote Network Interface	0	75 mA			0.000 Amps				
SSD	System Status Display	4	200 mA			0.800 Amps				
Total Supervisory Current						3.038 Amps				
Power Supply - Active Load Current										
Module Part Number & Description		QTY	24 VDC Current				6.2 VDC Current			
			Back Plane		Screw Terminal		Total 24 VDC Current (Total 1 + Total 2)	Per Card	Total	
			Per Card	Total 1	Per Card	Total 2				
PMI	Person Machine Interface	1	230 mA	0.230			0.230			
PMI-REM	Remote Annunciator	0	230 mA	0.000			0.000			
CPC	Central Processor Card	0								
CRC-6	Controllable Relay Card	0	10 mA	0.000			0.000	120 mA	0.000	
	Active Relays	0	20.5 mA	0.000			0.000			
DLC	Device Loop Card	5			95 mA	0.475	0.475	200 mA	1.000	
	Devices	435			1.8 mA	0.783	0.783			
CDC-4	Conventional Detector Card	0								
NIC-C	Network Interface Card	1	120 mA	0.120			0.120			
WAC	Wide Area Card	0								
RPM	Remote Printer Module	1			150 mA	0.150	0.150			
ZIC-4A	Zone Indicating Card	0	275 mA	0.000			0.000			
	Active Circuits	0			1 mA	0.000	0.000			
	Devices	-			Total NAC	0	0.000			
ZIC-8B	Zone Indicating Card	2								
	Active Circuits	8								
	Devices									
ZAC-40	Zone Amplifier Card 40 Watts	0			150 mA	0.000	0.000			
	Speaker Load Watts	0			53 mA/W	0.000	0.000			
ZAM-80	Zone Amplifier Module 80 Watts	0								
	Speaker Load Watts									
ZAM-180	Zone Amplifier Module 180 Watts	0			280 mA	0.000	0.000			
	Speaker Load Watts	0			53 mA/W	0.000	0.000			
ARC	Audio Router Card	0								
AIC	Audio Interface Card (External Input)	0	30 mA	0.000			0.000	200 mA	0.000	
DAC	Digital Audio Card	0	100 mA	0.000			0.000			
DAC-NET	Digital Audio Card with Network	0	140 mA	0.000			0.000			
LVM	Live Voice Microphone	0			25 mA	0.000	0.000			
LPB	Local Page Board	0	50 mA	0.000			0.000	200 mA	0.000	
TRC	Tape Recorder Card	0								
FRC	Firefighter Riser Card	0								
FMT	Firefighter Master Telephone	0			150 mA	0.000	0.000			
	Active Handsets	0			30 mA	0.000	0.000			
TZC-8	Telephone Zone Card	0			275 mA	0.000	0.000			
	Active Zones	0			35 mA	0.000	0.000			
FCM-6	Fan Control Module	0			14 mA	0.000	0.000			
	Active LEDs	0			1 mA	0.000	0.000			
LCM-8	LED Control Module	0			14 mA	0.000	0.000			
	Active LEDs	0			1 mA	0.000	0.000			
SCM-8	Switch Control Module	0			14 mA	0.000	0.000			
	Active LEDs	0			1 mA	0.000	0.000			
CSB	CAN Sounder Board	0								
OCM-16	Output Control Module	0			14 mA	0.000	0.000			
	Active LEDs	0			10 mA	0.000	0.000			
	Supervised Input Module	0			20 mA	0.000	0.000			
SIM-16	Active Relays	0			10 mA	0.000	0.000			
	Active Inputs	0			1.2 mA	0.000	0.000			
RNI	Remote Network Interface	0	75 mA	0.000			0.000			
SSD	System Status Display	4			200 mA	0.800	0.800			
Totals			0.35	Amps	1.408	Amps	1.758	Amps	1.000	Amps
			2 Amps				12 Amps		2 Amps	
			MAX				MAX		MAX	

Minimum Number of Power Supplies = 1

See ZIC-4A and ZIC-8B NAC worksheets for the details on the circuit loads.

Backup Battery Calculations				
Total Supervisory Current	3.04 Amps	Standby Battery Model Supplied	100 AH	
Standby Time Required	24 Hours	Standby Battery Size	100.000 AH	
AMP/Hour Required	72.91 AH			
Standby Battery With Reserve	94.79 AH	Reserve Battery Power	5.214 AH	

1. CURRENT DRAW CALCULATION

PAD-3 #34

Project Name: Lees Summit Hospital-HYBRID OR

Project #: 44OP-307325

NOTIFICATION APPLIANCES	MOUNTING	STROBE CANDELA	CURRENT (AMPS)		APPLIANCE QUANTITIES PER CIRCUIT				
			Standby	Alarm	ST73	CH73	ST74	CH74	AUX 5
STROBE	wall	15	0.000	0.064	1		1		
		30	0.000	0.098					
		75	0.000	0.175					
		110	0.000	0.233					
	ceiling	15	0.000	0.069					
		30	0.000	0.111					
		75	0.000	0.200					
		95	0.000	0.264					
HIGH OUTPUT STROBE	wall	135	0.000	0.318					
		185	0.000	0.445					
	ceiling	115	0.000	0.318					
		177	0.000	0.445					
CHIME/ STROBE	wall	15	0.000	0.064	4		2		
		30	0.000	0.098	1				
		75	0.000	0.175	1				
		110	0.000	0.233			1		
	ceiling	15	0.000	0.069					
		30	0.000	0.111					
		75	0.000	0.200					
		95	0.000	0.264					
HIGH OUTPUT SPEAKER/ STROBE	wall	135	0.000	0.318					
		185	0.000	0.445					
	ceiling	115	0.000	0.318					
		177	0.000	0.445					
CHIME	wall			0.024		6		3	
W.P. STROBE	wall	115	0.000	0.146					
W.P. STROBE	wall	115	0.000	0.445					
W.P. SPEAKER/ STROBE	wall	30	0.000	0.146					
W.P. SPEAKER/ STROBE	wall	185	0.000	0.445					
ABHW-4B	wall/ ceiling		0.000	0.024					
PAD-3	Wall		0.000	0.006					
0	0								
0	0								

NOTE: All calculations utilize horn settings @ the highest setting (largest draw)

AUXILIARY OUTPUT	Standby	Alarm						
Flush 24vdc door holder [SDH-2D]	0.068	0.068						
Surface 24vdc door holder [SDH-3D]	0.068	0.068						
Flush 24vdc door holder [SDH-4D]	0.068	0.068						
Floor mount 24vdc door holder [SDH-5D]	0.068	0.068						
Double floor mount door holder [SDH-6D]	0.136	0.136						

CURRENT DRAW PER CIRCUIT IN AMPERES: 0.593 0.144 0.425 0.072 0.000

2. CURRENT LOAD & VOLTAGE DROP CALCULATIONS

PAD-3 #34

Project Name: Lees Summit Hospital-HYBRID OR

Project #: 44OP-307325

SYSTEM INFORMATION & PROJECT THRESHOLDS

3.00 amps	Maximum PAD-3 Circuit Current	2.40 amps	Maximum Permitted Current Capacity
6.00 amps	Maximum PAD-3 Capacity	4.80 amps	Maximum Permitted PAD-3 Current Capacity
24.0 Vdc	Nominal System Voltage Output	20.4 Vdc	Calculated starting Voltage
20%	Voltage Drop Threshold %	16.0 Vdc	Minimum Voltage Threshold

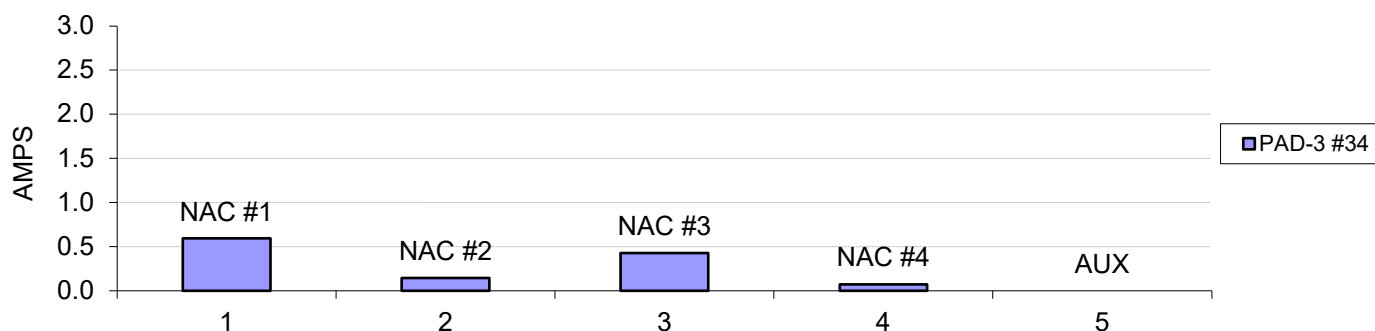
Standard Solid Copper Wire Resistance in Ohms per 1000 ft from NEC Chapter 9, Table 8

18=7.77 16=4.89 14=3.07 12=1.93

CIRCUIT CALCULATION RESULTS

CIRCUIT NUMBER	SOLID WIRE (AWG)	EST'D CKT LENGTH (FT)	NEC OHMS (kFT)	ALARM CURRENT (AMP)	CKT. OHMS	VOLTS @ EOL (min 16.0)	PERCENT DROP (max 20%)
ST73	14 GAGE	350	3.07	0.593 PASS	2.149 PASS	19.1 PASS	6.2% PASS
CH73	14 GAGE	350	3.07	0.144 PASS	2.149 PASS	20.1 PASS	1.5% PASS
ST74	14 GAGE	477	3.07	0.425 PASS	2.9288 PASS	19.2 PASS	6.1% PASS
CH74	14 GAGE	477	3.07	0.072 PASS	2.9288 PASS	20.2 PASS	1.0% PASS
AUX # 5	14 GAGE		3.07	0.000 PASS	0 PASS	20.4 PASS	0.0% PASS

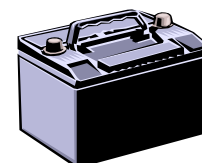
TOTAL PAD-3 CURRENT [AMPS]: 1.234 **PASS**



3. BATTERY SIZE CALCULATION

PAD-3 #34

STANDBY		ALARM	
Standby Period in Hours->	24 Hr	15 Min	<-Alarm Period in Minutes
PAD-3 internal current->	0.035 amp	0.140 amp	<-PAD-3 internal current
PAD-3 circuit current->	0.004 amp	1.234 amp	<-PAD-3 circuit current
Total Standby Current ->	0.039 amp	1.374 amp	<-Total Alarm Current:
Standby Amp-Hrs Required->	0.94 AH	0.34 AH	<-Standby Amp-Hrs Required
Standby + Alarm Amp-Hrs->	1.28 AH		
Multiplied by the Derating Factory ->	20%		
Minimum Battery Amp-Hrs Required->	1.54 AH		
Actual Battery Size->	7.00 AH		
Battery Safety Factor->	547%		



NOTE: The PAD-3 draws 0.035 amps in standby mode and 0.140 amps in alarm mode for internal operations.