Calculating Current Draw and Standby Battery

This section is for helping you determine the current draw and standby battery needs for your installation.

Worksheet Requirements

The following steps must be taken when determining C-6000 current draw and standby battery requirements.

A. Fill in the Current Draw Worksheet, Table 0-1 (Section 0)

See Section 0 for a completed worksheet example.

1. For the Model C-6000, you must measure the alarm current. If only one current rating is listed, the draw for that device is the same whether the system is in alarm or standby condition. The exception is for notification devices, which are rated at alarm current only—standby current is 0 mA.
2. To measure the maximum alarm current of the panel, measure the current draw (with no devices connected to the panel) by connecting a DC amp meter in series with one of the batteries. Disconnect the AC power source. Put the panel in alarm. The meter will indicate the alarm current, which will be in the range of 120-400 mA. Fill in the system alarm current in the Current per Device column on the Current Draw worksheet. You can estimate without measuring the alarm current by filling in the maximum total alarm current of 400 mA.
3. For smoke detectors, notification devices and devices not mentioned in the manual, refer to the device manual for the current ratings.
4. Make sure that the total alarm current you calculated, including current for the panel itself, does not exceed 5.0 A. This is the maximum alarm current allowable.

B. Fill in the Battery Calculation Worksheet, Table 0-2 (Section 0)

See Section 0 for a completed worksheet example.

1. Use Table 0-2 to determine the battery amp hour rating needed for your installation.

2. Refer to Table 0-3 to verify the battery size you need to provide at least the total standby current you have calculated.

Current Draw Worksheet

Use this worksheet to determine current requirements. See Section 0 for an example of how to fill out the worksheet. (Copy this page if additional space is required.)

Table 0-1. Current Draw Calculations

	Device	Number of Devices	Current per Device		Standby Current	Alarm Current
	For each device, use this formula:	*This column*	*X*	*This column*	*=*	*Current per number of devices*
	C-6000 Panel	1	Standby:	120 mA	mA	
			Alarm:	400 mA		mA
	4180 Status Display module		Standby:	20 mA	mA	
		(1 max.)	Alarm:	140 mA		mA
	5220 Direct Connect module	1	Standby:	50 mA	mA	
			Alarm:	50 mA		mA
	5230 Remote Annunciator		Standby:	60 mA	mA	
		(7 max.)	Alarm:	120 mA		mA
	7181 Zone Converter		Standby	35 mA	mA	
		(4 max.)	Alarm	65 mA		mA
A			**Current Subtotals:**		mA	mA
	Smoke Detectors		*Refer to device manual for current ratings. See Appendix to this manual for max. # per loop.*			
			Standby:	mA	mA	
			Alarm:	mA		mA
			Standby:	mA	mA	
			Alarm:	mA		mA
			Standby:	mA	mA	
			Alarm:	mA		mA
B			**Current Subtotals:**		mA	mA
	Notification Devices		*Refer to device manual for number of devices and current ratings.*			
			Alarm:	mA		mA
			Alarm:	mA		mA
			Alarm:	mA		mA
			Alarm:	mA		mA
C			**Current Subtotals:**		mA	mA
	Additional Devices					
			Standby:	mA	mA	
			Alarm:	mA		mA
			Standby:	mA	mA	
			Alarm:			mA
D			**Current Subtotals:**		mA	mA
	Total current ratings of all devices in system (add A through D):				mA	mA
E	Total current ratings converted to amperes (x .001):				A	A

Current Draw Worksheet Example

A worksheet is included to help you calculate the amount of current the system draws on standby (idle) and in active (trouble or alarm) conditions. Refer to Table 0-3 to see the battery sizes available and the maximum standby current load each can support.
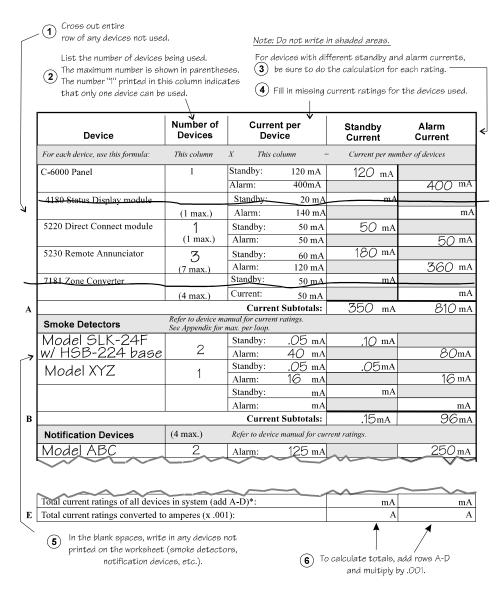
① Cross out entire row of any devices not used.

Note: Do not write in shaded areas.

② List the number of devices being used. The maximum number is shown in parentheses. The number "1" printed in this column indicates that only one device can be used.

③ For devices with different standby and alarm currents, be sure to do the calculation for each rating.

④ Fill in missing current ratings for the devices used.

Device	Number of Devices	Current per Device		Standby Current	Alarm Current
For each device, use this formula:	*This column*	*X*	*This column = Current per number of devices*		
C-6000 Panel	1	Standby:	120 mA	120 mA	
		Alarm:	400mA		400 mA
~~4180 Status Display module~~		~~Standby:~~	~~20 mA~~	mA	
	(1 max.)	Alarm:	140 mA		mA
5220 Direct Connect module	1	Standby:	50 mA	50 mA	
	(1 max.)	Alarm:	50 mA		50 mA
5230 Remote Annunciator	3	Standby:	60 mA	180 mA	
	(7 max.)	Alarm:	120 mA		360 mA
~~7181 Zone Converter~~		~~Standby:~~	~~50 mA~~	mA	
	(4 max.)	Current:	50 mA		mA
A			**Current Subtotals:**	350 mA	810 mA
Smoke Detectors	*Refer to device manual for current ratings. See Appendix for max. per loop.*				
Model SLK-24F w/ HSB-224 base	2	Standby:	.05 mA	.10 mA	
		Alarm:	40 mA		80mA
Model XYZ	1	Standby:	.05 mA	.05mA	
		Alarm:	16 mA		16 mA
		Standby:	mA	mA	
		Alarm:	mA		mA
B			**Current Subtotals:**	.15 mA	96 mA
Notification Devices	(4 max.)	*Refer to device manual for current ratings.*			
Model ABC	2	Alarm:	125 mA		250 mA
E	Total current ratings of all devices in system (add A-D)*:			mA	mA
	Total current ratings converted to amperes (x .001):			A	A

⑤ In the blank spaces, write in any devices not printed on the worksheet (smoke detectors, notification devices, etc.).

⑥ To calculate totals, add rows A-D and multiply by .001.

Figure 0-1. Current Draw Worksheet Example

Maximum current draw for panel: **5.0 A**

Maximum current draw for notification devices: **3.0 A per output**

Maximum Loop resistance for smoke detectors: **100 ohms**

To measure maximum loop resistance, connect an ohmmeter across the leads of a disconnected loop.

(See *Appendix* to this manual, for maximum number of smoke detectors per loop.)

Battery Calculation Worksheet

Table 0-2. Battery Calculations

		Total Standby Current	Total Alarm Current
A	Total supervisory current from the Current Draw worksheet (Row E).	A	
B	Number of standby hours (24 and 60 for NFPA 72, Chapter 1, 1-5.2.5).	H	
C	Multiply Lines A and B.	AH	
D	Total alarm current from the Current Draw worksheet (Row E).		A
E	Alarm sounding period in hours. (For example, 5 minutes = .084 hours.)		H
F	Multiply lines D and E.		AH
G	Add lines C and F.	AH	
H	Multiply line G by 1.2. (Total ampere/hours required*)	AH	

* Use next size battery with capacity greater than required.

Battery Calculation Worksheet Example

This calculation is based on the Current Draw worksheet example data.
From this table, the installer would use a 17 AH battery

		Total Standby Current	Total Alarm Current
A	Total supervisory current from the Current Draw worksheet (Row E).	0.360 A	
B	Number of standby hours (24 and 60 for NFPA 72, Chapter 1, 1-5.2.5.).	24 H	
C	Multiply lines A and B.	8.64 AH	
D	Total alarm current from the Current Draw worksheet (Row E).		0.957 A
E	Alarm sounding period in hours. (For example, 5 minutes = .084 hours.)		.084 H
F	Multiply lines D and E.		0.08 AH
G	Add lines C and F.	8.72 AH	
H	Multiply line G by 1.2. (Total ampere/hours required*)	10.46 AH	

Figure 0-2. Battery Calculation Example

Maximum Battery Standby Load

Table 0-3 shows the maximum battery standby load for the C-6000 based on 24 hours and 60 hours of standby.

Table 0-3. Maximum Battery Standby Load

Rechargeable Battery Size	Max. Load for 24 hrs. Standby, 5 mins. Alarm	*Max. Load for 60 hrs. Standby, 5 mins. Alarm
17 Amp Hours	500 mA	200 mA

* *Required for NFPA 72 Auxiliary Protected Fire Alarm systems for Fire Alarm Service (City Box) and Remote Station Protected Fire Alarm systems (Polarity Reversal) and digital dialer.*

Warning
Silent Knight does not support the use of batteries smaller than those listed in Table 0-3. If you use a battery too small for your installation, the system can overload it and you may have less than the required 24 hours standby power. Use Table 0-2 to calculate the correct battery amperes/hour rating needed for your installation.

The following formula was used to calculate the standby battery load in Table 0-3:

$$AH = 1.2 \times (I \times H)$$

Where: I =   Standby current

AH =   Ampere-hour rating of battery

H =   Standby hours

1.2   =   A constant used to de-rate the battery to assure a 5-year life.