Honeywell
THE POWER OF CONNECTED | Cable

Fire Alarm Wiring Guide

April 2017

Wiring guidelines for Honeywell fire alarm system brands
Notifier | Gamewell-FCI | Fire-Lite Alarms | Silent Knight

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ANNUNCIATOR BUS CIRCUITS

CIRCUIT LIMITATIONS

Annunciator circuits are limited by power draw and bandwidth requirements. For circuits with 8 or more devices, consult the device manufacturer's website for information regarding bandwidth limitations. The total power draw of an annunciator circuit limits the wiring distance. The voltage drop from the Fire Alarm Control Panel to the furthest device cannot exceed 6.0 V. No circuit shall exceed 6,000 feet.

WIRE REQUIREMENTS

22 – 14 AWG, 4 conductors, unshielded with an overall jacket.

DISTANCE LIMITATIONS

Maximum Wiring Distance in Feet: Modules to Panel					
Total Worst Case Current (Amps)	Maximum Circuit Resistance (Ohms)	22 AWG	18 AWG	16 AWG	14 AWG
0.100	60.0	1371	3861	* 6000	* 6000
0.200	30.0	685	1931	3067	4886
0.300	20.0	457	1287	2045	3257
0.400	15.0	343	965	1534	2443
0.500	12.0	274	772	1227	1954
0.600	10.0	228	644	1022	1629
0.700	8.6	196	552	876	1396
0.800	7.5	171	483	767	1221
0.900	6.7	152	429	682	1086
1.000	6.0	137	386	613	977

Calculations are based on Direct-Current Resistance data for solid uncoated copper wire, per National Electric Code (2017 Edition) Table 8, Conductor Properties.

RECOMMENDED CABLES

Description	Product Code	
	Riser Rated (UL Listed FPLR)	Plenum Rated (UL Listed FPLP)
22 AWG, 4 conductors, unshielded with an overall jacket	4301	-
18 AWG, 4 conductors, unshielded with an overall jacket	4307	4507
16 AWG, 4 conductors, unshielded with an overall jacket	4312	4512
14 AWG, 4 conductors, unshielded with an overall jacket	4314	4514

SIGNALING LINE CIRCUITS (SLC)

CIRCUIT LIMITATIONS

Electrical Circuit Characteristic		Maximum Limit
Loop Resistance	SK/IDP Devices	40 Ω
	SD Devices	50 Ω
Circuit Capacitance		0.5 µF

WIRE REQUIREMENTS

18 – 12 AWG, 2 twisted conductors, shielded with an overall jacket.

When reusing existing wire that is unshielded or untwisted, the maximum recommended wiring distance is limited to 5,000 feet for 16 AWG – 12 AWG conductors and 3,700 feet for 18 AWG conductors.

DISTANCE LIMITATIONS

Maximum Wiring Distance in Feet: Devices to Panel				
Maximum Loop Resistance (Ohms)	18 AWG	16 AWG	14 AWG	12 AWG
40	2,574	4,090	6,515	10,363
50	3,218	5,112	8,143	12,953

Calculations are based on Direct-Current Resistance data for uncoated copper wire, per National Electric Code (2017 Edition) Table 8, Conductor Properties.

RECOMMENDED CABLES

Description	Product Code	
	Riser Rated (UL Listed FPLR)	Plenum Rated (UL Listed FPLP)
18 AWG, 2 twisted conductors, shielded with an overall jacket	4402	4602
16 AWG, 2 twisted conductors, shielded with an overall jacket	4406	4606
14 AWG, 2 twisted conductors, shielded with an overall jacket	4408	4608

INITIATING DEVICE CIRCUITS (IDC)

WIRE REQUIREMENTS

2-wire devices: 18 - 14 AWG, 2 conductors, unshielded with an overall jacket.
4-wire devices: 18 - 14 AWG, 4 conductors, unshielded with an overall jacket.

DISTANCE LIMITATIONS

Maximum Wiring Distance in Feet: Device to Panel					
Maximum Current (Amps)	Maximum Loop Resistance (Ohms)	22 AWG	18 AWG	16 AWG	14 AWG
0.100	100	2,284	6,435	10,225	16,287
0.100	50	1,142	3,218	5,112	8,143

Calculations are based on Direct-Current Resistance data for solid uncoated copper wire, per National Electric Code (2017 Edition) Table 8, Conductor Properties.

RECOMMENDED CABLES

2-WIRE DEVICES

Description	Product Code	
	Riser Rated (UL Listed FPLR)	Plenum Rated (UL Listed FPLP)
18 AWG, 2 conductors, unshielded with an overall jacket	4306	4506
16 AWG, 2 conductors, unshielded with an overall jacket	4311	4511
14 AWG, 2 conductors, unshielded with an overall jacket	4313	4513

4-WIRE DEVICES

Description	Product Code	
	Riser Rated (UL Listed FPLR)	Plenum Rated (UL Listed FPLP)
18 AWG, 4 conductors, unshielded with an overall jacket	4307	4507
16 AWG, 4 conductors, unshielded with an overall jacket	4312	4512
14 AWG, 4 conductors, unshielded with an overall jacket	4314	4514

NOTIFICATION APPLIANCE CIRCUITS (NAC)

WIRE REQUIREMENTS

18 – 12 AWG, 2 conductors, unshielded with an overall jacket.

DISTANCE LIMITATIONS

Maximum Wiring Distance: Device to Panel (CLASS-B WIRING)					
NAC Load (Amps)	Maximum Allowable Total Loop Resistance (Ohms)	18 AWG	16 AWG	14 AWG	12 AWG
0.25	14.40	927	1,472	2,345	3,731
0.50	7.20	463	736	1,173	1,865
0.75	4.80	309	491	782	1,244
1.00	3.60	232	368	586	933
1.25	2.88	185	294	469	746
1.50	2.40	154	245	391	622
1.75	2.06	132	210	335	533
2.00	1.80	116	184	293	466
2.25	1.60	103	164	261	415
2.50	1.44	93	147	235	373

Maximum Wiring Distance: Device to Panel (CLASS-A WIRING)					
NAC Load (Amps)	Maximum Allowable Total Loop Resistance (Ohms)	18 AWG	16 AWG	14 AWG	12 AWG
0.25	14.40	463	736	1,173	1,865
0.50	7.20	232	368	586	933
0.75	4.80	154	245	391	622
1.00	3.60	116	184	293	466
1.25	2.88	93	147	235	373
1.50	2.40	77	123	195	311
1.75	2.06	66	105	168	266
2.00	1.80	58	92	147	233
2.25	1.60	51	82	130	207
2.50	1.44	46	74	117	187

Calculations based on Direct-Current Resistance data for solid uncoated copper wire, per National Electric Code (2017 Edition) Table 8, Conductor Properties. Assumes maximum voltage drop of 3.6V (15%) based on 24V nominal circuit operating voltage.

RECOMMENDED CABLES

Description	Product Code	
	Riser Rated (UL Listed FPLR)	Plenum Rated (UL Listed FPLP)
18 AWG, 2 conductors, unshielded with an overall jacket	4306	4506
16 AWG, 2 conductors, unshielded with an overall jacket	4311	4511
14 AWG, 2 conductors, unshielded with an overall jacket	4313	4513
12 AWG, 2 conductors, unshielded with an overall jacket	4315	4515

EMERGENCY COMMUNICATION CIRCUITS

WIRE REQUIREMENTS

18 – 12 AWG, 2 conductors, shielded with an overall jacket.

DISTANCE LIMITATIONS

25 VOLT CIRCUITS

Number of Speakers		Total Load		Wire Distance in Feet			
@ 1/2 W	@ 1 W	V_{rms}	Watts	18 AWG	16 AWG	14 AWG	12 AWG
10	5	25	5	3,218	5,112	8,143	12,953
20	10	25	10	1,609	2,556	4,072	6,477
30	15	25	15	1,073	1,704	2,714	4,318
40	20	25	20	804	1,278	2,036	3,238
50	25	25	25	644	1,022	1,629	2,591
60	30	25	30	536	852	1,357	2,159
70	35	25	35	460	730	1,163	1,850
80	40	25	40	402	639	1,018	1,619
90	45	25	45	358	568	905	1,439
100	50	25	50	322	511	814	1,295
110	55	25	55	293	465	740	1,178
120	60	25	60	268	426	679	1,079
130	65	25	65	248	393	626	996
140	70	25	70	230	365	582	925
150	75	25	75	215	341	543	864
160	80	25	80	201	320	509	810
170	85	25	85	189	301	479	762
180	90	25	90	179	284	452	720
190	95	25	95	169	269	429	682
200	100	25	100	161	256	407	648
210	105	25	105	153	243	388	617
220	110	25	110	146	232	370	589
230	115	25	115	140	222	354	563
240	120	25	120	134	213	339	540
250	125	25	125	129	204	326	518
260	130	25	130	124	197	313	498
270	135	25	135	119	189	302	480
280	140	25	140	115	183	291	463
290	145	25	145	111	176	281	447
300	150	25	150	107	170	271	432
310	155	25	155	104	165	263	418
320	160	25	160	101	160	254	405
330	165	25	165	98	155	247	393
340	170	25	170	95	150	240	381
350	175	25	175	92	146	233	370
360	180	25	180	89	142	226	360
370	185	25	185	87	138	220	350
380	190	25	190	85	135	214	341
390	195	25	195	83	131	209	332
400	200	25	200	80	128	204	324

NOTE: The above table assumes a uniform distribution of the speakers, and that a max of 20% voltage drop on the last speaker is allowed.

70 VOLT CIRCUITS

Number of Speakers		Total Load		Wire Distance in Feet			
@1/2W	@1W	V_{rms}	Watts	18AWG	16AWG	14AWG	12AWG
10	5	70	5	12,613	40,082	63,844	101,554
20	10	70	10	12,613	20,041	31,922	50,777
30	15	70	15	8,408	13,361	21,281	33,851
40	20	70	20	6,306	10,020	15,961	25,389
50	25	70	25	5,045	8,016	12,769	20,311
60	30	70	30	4,204	6,680	10,641	16,926
70	35	70	35	3,604	5,726	9,121	14,508
80	40	70	40	3,153	5,010	7,980	12,694
90	45	70	45	2,803	4,454	7,094	11,284
100	50	70	50	2,523	4,008	6,384	10,155
110	55	70	55	2,293	3,644	5,804	9,232
120	60	70	60	2,102	3,340	5,320	8,463
130	65	70	65	1,940	3,083	4,911	7,812
140	70	70	70	1,802	2,863	4,560	7,254
150	75	70	75	1,682	2,672	4,256	6,770
160	80	70	80	1,577	2,505	3,990	6,347
170	85	70	85	1,484	2,358	3,756	5,974
180	90	70	90	1,401	2,227	3,547	5,642
190	95	70	95	1,328	2,110	3,360	5,345
200	100	70	100	1,261	2,004	3,192	5,078
210	105	70	105	1,201	1,909	3,040	4,836
220	110	70	110	1,147	1,822	2,902	4,616
230	115	70	115	1,097	1,743	2,776	4,415
240	120	70	120	1,051	1,670	2,660	4,231
250	125	70	125	1,009	1,603	2,554	4,062
260	130	70	130	970	1,542	2,456	3,906
270	135	70	135	934	1,485	2,365	3,761
280	140	70	140	901	1,431	2,280	3,627
290	145	70	145	870	1,382	2,202	3,502
300	150	70	150	841	1,336	2,128	3,385
310	155	70	155	814	1,293	2,059	3,276
320	160	70	160	788	1,253	1,995	3,174
330	165	70	165	764	1,215	1,935	3,077
340	170	70	170	742	1,179	1,878	2,987
350	175	70	175	721	1,145	1,824	2,902
360	180	70	180	701	1,113	1,773	2,821
370	185	70	185	682	1,083	1,726	2,745
380	190	70	190	664	1,055	1,680	2,672
390	195	70	195	647	1,028	1,637	2,604
400	200	70	200	631	1,002	1,596	2,539

NOTE: The above table assumes a uniform distribution of the speakers, and that a max of 20% voltage drop on the last speaker is allowed.

RECOMMENDED CABLES

Description	Product Code	
	Riser Rated (UL Listed FPLR)	Plenum Rated (UL Listed FPLP)
18 AWG, 2 twisted conductors, shielded with an overall jacket	4402	4602
16 AWG, 2 twisted conductors, shielded with an overall jacket	4406	4606
14 AWG, 2 twisted conductors, shielded with an overall jacket	4408	4608
12 AWG, 2 twisted conductors, shielded with an overall jacket	4410	4610