National Time & Signal

CLOCK CIRCUIT WIRE SIZING GUIDE

Question: What gauge of wire do I use for my clock system? Answer: Depends.

This age-old question has been plaguing installers for a century. These charts will help you find the answer.

When electricity flows through wire, resistance saps some of the voltage before it reaches its destination. How much depends on how much current is flowing and how long the wire is. This “voltage drop” is what limits your wire length and gauge choice — and what makes it complicated is that each segment of wire between clocks carries less current than the one before it. The goal is to make sure the last clock on the run has enough voltage to operate. National Time clocks work down to 18V and our power supplies output 24V, so we have 6V to spare.

To get the most clocks on a single power supply, wire your system in multiple short **branches** rather than one long daisy-chain run. The charts below show the maximum branch length for different clock counts and wire gauges, along with the average spacing between clocks and the total current draw. You can add as many branches as you need to a single transformer output — as long as their combined current does not exceed **3.12 A**.

Wire resistance values used: 18 AWG = 8.45 Ω/1000 ft • 16 AWG = 5.29 Ω/1000 ft • 14 AWG = 3.26 Ω/1000 ft • 12 AWG = 2.05 Ω/1000 ft..
Maximum allowable voltage drop = 6 V on a 24 VAC circuit.
Each power supply transformer supplies 3.12A. PS-3 (1 transformer), PS-6 (2 transformers), PS-12 (4 transformers)
Chart is an estimation and assumes clocks are evenly distributed, use your own calculations and apply safety factor when necessary.
Double-face (corridor) assemblies: count each unit as two (2) clocks — assume both faces draw current from the same transformer output.

TimeCast™ Wired Digital Clocks – D225 Series (2.3″ Wide-Bar Digits) – Bulletin C-630

D225R-4 (4-Digit) | Current per clock: 65 mA | Max. clocks per transformer: 48

		18 AWG		16 AWG		14 AWG		12 AWG	
# of Clocks	Current (A)	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock
5	0.325	2,185	437	3,490	698	5,663	1,133	9,006	1,801
10	0.650	1,092	109	1,745	174	2,832	283	4,503	450
15	0.975	728	49	1,163	78	1,888	126	3,002	200
20	1.300	546	*27*	872	44	1,416	71	2,251	113
25	1.625	437	*17*	698	*28*	1,133	45	1,801	72
30	1.950	364	*12*	582	*19*	944	31	1,501	50
35	2.275	312	*9*	499	*14*	809	*23*	1,287	37
40	2.600	273	*7*	436	*11*	708	*18*	1,126	*28*

⚠ Yellow cells: ft./clock < 30 ft. — use a heavier wire gauge or add a second circuit. Table stops where 12 AWG spacing reaches minimum practical distance.

D225R-6 (6-Digit) | Current per clock: 75 mA | Max. clocks per transformer: 41

		18 AWG		16 AWG		14 AWG		12 AWG	
# of Clocks	Current (A)	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock
5	0.375	1,893	379	3,025	605	4,908	982	7,805	1,561
10	0.750	947	95	1,512	151	2,454	245	3,902	390
15	1.125	631	42	1,008	67	1,636	109	2,602	173
20	1.500	473	*24*	756	38	1,227	61	1,951	98
25	1.875	379	*15*	605	*24*	982	39	1,561	62
30	2.250	316	*11*	504	*17*	818	*27*	1,301	43
35	2.625	270	*8*	432	*12*	701	*20*	1,115	32
40	3.000	237	*6*	378	*9*	613	*15*	976	*24*

⚠ Yellow cells: ft./clock < 30 ft. — use a heavier wire gauge or add a second circuit. Table stops where 12 AWG spacing reaches minimum practical distance.

TimeCast™ Wired Digital Clocks – D400 Series (4″ Wide-Bar Digits) – Bulletin C-630

D400R-4 (4-Digit) | Current per clock: 76 mA | Max. clocks per transformer: 41

		18 AWG		16 AWG		14 AWG		12 AWG	
# of Clocks	Current (A)	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock
5	0.380	1,869	374	2,985	597	4,843	969	7,702	1,540
10	0.760	934	93	1,492	149	2,422	242	3,851	385
15	1.140	623	42	995	66	1,614	108	2,567	171
20	1.520	467	*23*	746	37	1,211	61	1,926	96
25	1.900	374	*15*	597	*24*	969	39	1,540	62
30	2.280	311	*10*	497	*17*	807	*27*	1,284	43
35	2.660	267	*8*	426	*12*	692	*20*	1,100	31
40	3.040	234	*6*	373	*9*	605	*15*	963	*24*

⚠ Yellow cells: ft./clock < 30 ft. — use a heavier wire gauge or add a second circuit. Table stops where 12 AWG spacing reaches minimum practical distance.

D400R-6 (6-Digit) | Current per clock: 87 mA | Max. clocks per transformer: 35

		18 AWG		16 AWG		14 AWG		12 AWG	
# of Clocks	Current (A)	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock
5	0.435	1,632	326	2,607	521	4,231	846	6,728	1,346
10	0.870	816	82	1,304	130	2,116	212	3,364	336
15	1.305	544	36	869	58	1,410	94	2,243	150
20	1.740	408	*20*	652	33	1,058	53	1,682	84
25	2.175	326	*13*	521	*21*	846	34	1,346	54
30	2.610	272	*9*	435	*14*	705	*24*	1,121	37
35	3.045	233	*7*	372	*11*	604	*17*	961	*27*

⚠ Yellow cells: ft./clock < 30 ft. — use a heavier wire gauge or add a second circuit. Table stops where 12 AWG spacing reaches minimum practical distance.

Spectrum™ Wired Analog Clocks – SS-24V (All Case Styles & Sizes) – Bulletin C-572

SS-24V (All Styles) | Current per clock: 25 mA | Max. clocks per transformer: 124

		18 AWG		16 AWG		14 AWG		12 AWG	
# of Clocks	Current (A)	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock	Total ft.	ft. / clock
5	0.125	5,680	1,136	9,074	1,815	14,724	2,945	23,415	4,683
10	0.250	2,840	284	4,537	454	7,362	736	11,707	1,171
15	0.375	1,893	126	3,025	202	4,908	327	7,805	520
20	0.500	1,420	71	2,268	113	3,681	184	5,854	293
25	0.625	1,136	45	1,815	73	2,945	118	4,683	187
30	0.750	947	32	1,512	50	2,454	82	3,902	130
35	0.875	811	*23*	1,296	37	2,103	60	3,345	96
40	1.000	710	*18*	1,134	*28*	1,840	46	2,927	73
45	1.125	631	*14*	1,008	*22*	1,636	36	2,602	58
50	1.250	568	*11*	907	*18*	1,472	*29*	2,341	47
55	1.375	516	*9*	825	*15*	1,339	*24*	2,129	39
60	1.500	473	*8*	756	*13*	1,227	*20*	1,951	33
65	1.625	437	*7*	698	*11*	1,133	*17*	1,801	*28*
70	1.750	406	*6*	648	*9*	1,052	*15*	1,672	*24*

⚠ Yellow cells: ft./clock < 30 ft. — use a heavier wire gauge or add a second circuit. Table stops where 12 AWG spacing reaches minimum practical distance.