

Phoenix Geophysics Ltd. TXU-30 Current Source Available Waveforms

Domain	Ratio ON:OFF	Duty Cycle	Waveform
Time	1:1	50% bipolar	 1 : 1 : 1 : 1
Time	1:2	33.33% bipolar	 1 : 2 : 1 : 2
Time	1:3	25% bipolar	 1 : 3 : 1 : 3
Frequency	—	100% bipolar	 1 : 1
Frequency ($f+9f$)	10:8	55.55% bipolar	 1 : 1
Time	1:1	50% unipolar positive	 1 : 1 : 1 : 1
Time	1:2	33.33% unipolar positive	 1 : 2 : 1 : 2
Time	1:3	25% unipolar positive	 1 : 3 : 1 : 3
Time	1:1	50% unipolar negative	 1 : 1 : 1 : 1
Time	1:2	33.33% unipolar negative	 1 : 2 : 1 : 2
Time	1:3	25% unipolar negative	 1 : 3 : 1 : 3

↑ = Aligned with 2000/01/01 00:00:00 UTC.



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TXU-30 Geophysical Current Source Frequencies

Manual and automatic frequency selection

The TXU-30 Current Source output is adjustable for both frequency domain and time domain methods. In time domain, output can be bipolar or unipolar.

The TXU-30 has a built-in table of frequencies that can be selected manually using the controller. However, Phoenix current source controllers and System 2000.net receivers are also capable of automatically transmitting and receiving specific signal frequencies according to a GPS-synchronized schedule. (The built-in frequency table represents only a small subset of the frequencies that are possible using a schedule.)

Schedule files can be created on a PC and the files transferred to the instruments, or a schedule can be created by the instruments in real time, calculated from a small set of

parameters. Schedule files created for the TXU-30 specify a waveform, a series of frequencies, a duration for each frequency, and the current for each frequency.

Schedules created by the TXU-30 in real time are determined by a few parameters saved in a file. These schedules specify a waveform, a series of frequencies, a minimum duration for each frequency, a minimum number of cycles for low frequencies, and the requested current. Optionally, an automatic current roll-off can be specified to prevent inductive loads from triggering a fault at higher frequencies.

Phase

For synchronization with other Phoenix GPS-equipped instruments, the phase is such that if the waveform were extended backward in time, the centre of the positive *on* time (or the negative *on* time in unipolar negative) would align with 2000/01/01 00:00:00 UTC.

Frequency

System 2000.net instruments derive frequencies from a 921.6kHz base frequency, and therefore may not be able to produce exactly the requested frequency. Use at least 6 (preferably 8) significant digits when specifying a frequency. The instruments will calculate the closest approximation possible.

The highest frequencies available are 9600Hz for frequency domain modes; 30Hz for time domain modes; and 8Hz for the special FD9 mode ($f + 9f$).

For best results in frequency domain methods, use frequencies from Table 1 that follows. For time domain methods, use frequencies at or below 30Hz from the same table.

Frequencies available for manual selection from the controller are shown in Tables 2 and 3.



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Table 1: Recommended frequencies

Frequency (Hz)									
				1024.0000	512.0000	256.0000	128.0000	64.00000	32.00000
								61.44000	30.72000
	7680.000	3840.000	1920.000	960.0000	480.0000	240.0000	120.0000	60.00000	30.00000
				948.1481	474.0741	237.0370	118.5185	59.25926	29.62963
								56.88889	28.44444
			1706.667	853.3333	426.6667	213.3333	106.6667	53.33333	26.66667
								51.20000	25.60000
	6400.000	3200.000	1600.000	800.0000	400.0000	200.0000	100.0000	50.00000	25.00000
		3072.000	1536.000	768.0000	384.0000	192.0000	96.0000	48.00000	24.00000
								47.40741	23.70370
		2844.444	1422.222	711.1111	355.5556	177.7778	88.8889	44.44444	22.22222
					341.3333	170.6667	85.3333	42.66667	21.33333
	5120.000	2560.000	1280.000	640.0000	320.0000	160.0000	80.0000	40.00000	20.00000
				614.4000	307.2000	153.6000	76.8000	38.40000	19.20000
9600.000	4800.000	2400.000	1200.000	600.0000	300.0000	150.0000	75.0000	37.50000	18.75000
				568.8889	284.4444	142.2222	71.1111	35.55556	17.77778
								34.13333	17.06667
8533.333	4266.667	2133.333	1066.667	533.3333	266.6667	133.3333	66.6667	33.33333	16.66667

Frequency (Hz)					Period (s)	Frequency	Period (s)	Frequency	Period (s)
16.00000	8.000000	4.000000	2.000000	1.000000	1.000000	0.500000	2.000000	0.250000	4.000000
15.36000	7.680000	3.840000	1.920000	0.960000	1.041667	0.480000	2.083333		
15.00000	7.500000	3.750000	1.875000	0.937500	1.066667	0.468750	2.133333	0.234375	4.266667
14.81481	7.407407	3.703704	1.851852	0.925926	1.080000	0.462963	2.160000		
14.22222	7.111111	3.555556	1.777778	0.888889	1.125000	0.444444	2.250000		
13.33333	6.666667	3.333333	1.666667	0.833333	1.200000	0.416667	2.400000	0.208333	4.800001
12.80000	6.400000	3.200000	1.600000	0.800000	1.250000	0.400000	2.500000	0.200000	5.000000
12.50000	6.250000	3.125000	1.562500	0.781250	1.280000	0.390625	2.560000		
12.00000	6.000000	3.000000	1.500000	0.750000	1.333333	0.375000	2.666667	0.187500	5.333333
11.85185	5.925926	2.962963	1.481481	0.740741	1.350000	0.370370	2.700000	0.185185	5.400000
11.11111	5.555556	2.777778	1.388889	0.694444	1.440000	0.347222	2.880000		
10.66667	5.333333	2.666667	1.333333	0.666667	1.500000	0.333333	3.000000	0.166667	5.999999
10.00000	5.000000	2.500000	1.250000	0.625000	1.600000	0.312500	3.200000	0.156250	6.400000
9.60000	4.800000	2.400000	1.200000	0.600000	1.666667	0.300000	3.333333	0.150000	6.666667
9.37500	4.687500	2.343750	1.171875	0.585938	1.706667				
8.88889	4.444444	2.222222	1.111111	0.555556	1.800000	0.277778	3.600000	0.138889	7.199999
8.53333	4.266667	2.133333	1.066667	0.533333	1.875000	0.266667	3.750000		
8.33333	4.166667	2.083333	1.041667	0.520833	1.920000	0.260417	3.840000		

Table 1: Recommended frequencies (continued)

Frequency	Period (s)	Frequency	Period (s)	Frequency	Period (s)	Frequency	Period (s)	Frequency	Period (s)
0.1250000	8.00000	0.0625000	16.00000	0.0312500	32.00000	0.01562500	64.0000	0.00781250	128.000
0.1200000	8.33333	0.0600000	16.66667	0.0300000	33.33333	0.01500000	66.6667	0.00750000	133.333
0.1171875	8.53333								
0.1111111	9.00000	0.0555556	18.00000	0.0277778	36.00000	0.0138889	72.0000	0.00694444	144.000
0.1041667	9.60000	0.0520833	19.20000	0.0260417	38.40000	0.01302083	76.8000		
0.1000000	10.00000	0.0500000	20.00000	0.0250000	40.00000	0.01250000	80.0000	0.00625000	160.000
0.0937500	10.66667	0.0468750	21.33333	0.0234375	42.66667				
0.0925926	10.80000	0.0462963	21.60000	0.0231482	43.20000	0.01157407	86.4000	0.00578704	172.800
0.0833333	12.00000	0.0416667	24.00000	0.0208333	48.00001	0.01041667	96.0000	0.00520833	192.000
0.0781250	12.80000	0.0390625	25.60000						
0.0750000	13.33333	0.0375000	26.66667	0.0187500	53.33333	0.00937500	106.6667	0.00468750	213.333
0.0694444	14.40000	0.0347222	28.80000	0.0173611	57.60000	0.00868056	115.2000	0.00434028	230.400
0.0666667	15.00000	0.0333333	30.00000	0.0166667	59.99999	0.00833333	120.0000	0.00416667	240.000
								0.00390625	256.000

Table 2: Manually selectable frequencies (Hz), frequency domain

9600.00	7680.00	6400.00		
4800.00	3840.00	3200.00	2844.44	
2400.00	1920.00	1600.00	1422.22	1200.00
1024.00	960.000	800.000	711.111	600.000
512.000	480.000	400.000	355.555	300.000
256.000	213.333	170.667	150.000	
128.000	106.667	85.3333	75.0000	
64.0000	53.3333	42.6667	37.5000	
32.0000	26.6667	21.3333	18.7500	
16.0000	13.3333	10.6667	9.37500	
8.00000	6.66667	5.33333	4.68750	
4.00000	3.33333	2.66667	2.34375	
2.00000	1.66667	1.33333	1.17188	
1.00000	0.833333	0.666667	0.600000	
0.500000	0.416667	0.333333	0.300000	
0.250000	0.208333	0.166667	0.150000	
0.125000	0.1041667	0.0833333	0.0750000	0.0666667
0.0625000	0.0520833	0.0520833	0.0416667	0.0333333
0.0312500	0.0260417	0.0208333	0.0187500	0.0166667
0.0156250	0.0130208	0.0104167	0.0937500	0.00833333
0.00781250	0.00520833	0.00468750	0.00416667	
0.00390625				

Table 3: Manually selectable frequencies (Hz), time domain

	30.0000	25.0000
16.0000	10.0000	8.33333
8.00000	5.00000	
4.00000	2.50000	
2.00000		
1.00000		
0.500000		
0.250000		
0.125000	0.0666667	
0.06250000	0.03333333	
0.03125000	0.0166667	
0.01562500	0.00833333	
0.00781250		