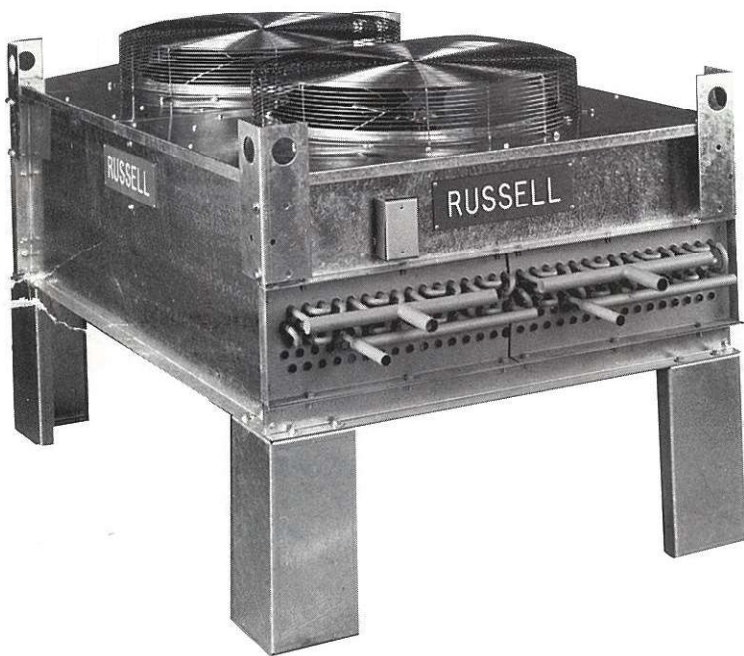


TECHNICAL
BULLETIN

FTD

NOVEMBER 1983

AIR COOLED FLUID COOLERS



Russell
Russell Coil Company

Russell Air Cooled Fluid Coolers

General

Russell models FTD Air-cooled fluid coolers cover 21 different models from 4 through 123 tons (at nominal conditions of 40% ethylene glycol solution and 45°F ent. temp. difference). One ton = 12000 Btu/hr.

Units are direct-drive vertical discharge only (vertical & horizontal standard 5-8 5). Fan motors are permanent split-capacitor type, ball bearing, permanently lubricated, thermally protected. Motors are 200-230 volt, 60 cycle, single phase. FTD 5 thru 17 wired for single phase connection as standard. FTD 19 thru 90 wired for three phase connection. Standard FTD Models are UL-CSA listed.

Features

Coil Surface

Ripple fin coil design results in maximum heat rejection capacity. Cores are circuited for optimum fluid side pressure drop.

Mechanical Specifications

For protection of the aluminum fins in a salt air environment, a "chromate conversion" coating is optionally available.

Housings

The smaller capacity FTD 5-8.5 model casings are constructed from heavy gauge textured aluminum. Models FTD 9.5 & larger are made from sturdy, heavy gauge, galvanized steel, designed to provide maximum housing rigidity as well as to provide excellent resistance against corrosion.

Fans

All FTD fan blades are constructed of heavy gauge aluminum, are operated at low tip speeds and are statically balanced and factory run before shipment.

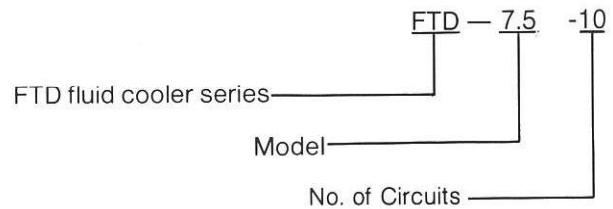
Motors and Wiring

All motors for FTD are equipped with inherent overload protectors rated for group installation. Direct drive motors are drip proof, ball bearing, split capacitor type or 3 phase. All units are factory wired. All leads are marked and terminated in a readily accessible junction box.

Sizing Russell Fluid Coolers

The performance data in table 1 are for "base" conditions of 40% ethylene glycol mixture at 130°F average solution temperature. The data may be used for average solution temperatures of 110°F to 180°F. For temperatures outside this range, consult factory. Use correction factors from tables 2 and 3 for different mixture conditions. Column "CIR" gives number of circuit feeds, which is used as a model number suffix.

Specify using complete model description:



Formulas

- $BTUH = GPM \times 500 \times (\text{sp. gr} \times \text{sp. ht}) \times \text{fluid temperature drop}$
- $MBH/^{\circ}TD = \frac{BTUH}{1000 \times (\text{Ent. sol'n temp} - \text{Ent. air temp}) \times \text{capacity factor in Table 3}}$
- Fluid Pressure Drop = Pressure drop from data tables x correction factor from Table 3.

Selection Example

- Reject 81,800 BTUH, 25 GPM, 40% solution from 122° to 115°F. Ambient air is 95°F.
- $MBH/F = \frac{81,800}{1,000 \times (122-95)} = 3.03 \text{ MBH/F}$
- Trial Selection FTD-7.5-10 (FTD-7.5 with 10 circuits). Interpolate for 25 GPM: 7.7 ft w.c. pressure drop; 3.25 MBH/F. Heat Rejection = $3.25 \times 1,000 \times (122 - 95) = 87,750 \text{ BTUH}$. Selection is correct. Unit capacity with water instead of glycol mixture, same conditions, is $87,750 \times 1.127 = 98,890 \text{ BTUH}$. Pressure drop would be $7.7 \times 0.781 = 4.1 \text{ ft. w.c.}$
- Specify model FTD-7.5-10.

TABLE 1 Base performance ratings for: 40% ethylene glycol at 130°F average temperature.

MODEL	CIR	FLUID VELOCITY (FT/SEC)															CONN. S = SAME O = OPP.
		2			3			4			5			6			
		GPM	MBH/F	P.D.	GPM	MBH/F	P.D.	GPM	MBH/F	P.D.	GPM	MBH/F	P.D.	GPM	MBH/F	P.D.	
FTD-5	2	2.3	0.96	5.1	3.5	1.30	10.3	4.6	1.53	17.0	—	—	—	—	—	—	S
	4	4.6	1.42	2.5	6.9	1.74	5.1	9.3	1.94	8.4	11.6	2.07	12.4	13.9	2.22	17.1	S
	8	9.3	1.75	1.2	13.9	2.03	2.5	18.5	2.18	4.1	23.1	2.28	6.1	27.8	2.41	8.4	O
	20	23.1	1.99	0.5	34.7	2.22	0.9	46.3	2.34	1.5	57.8	2.42	2.3	69.4	2.55	3.1	S
FTD-6.5	4	4.6	1.67	3.8	6.9	2.08	7.7	9.3	2.36	12.7	11.6	2.54	18.8	—	—	—	O
	10	11.6	2.30	1.5	17.3	2.63	3.0	23.1	2.81	5.0	28.9	2.91	7.3	34.7	3.07	10.1	S
	20	23.1	2.55	0.7	34.7	2.83	1.4	46.3	2.97	2.4	57.8	3.05	3.5	69.4	3.21	4.9	O
FTD-7.5	4	4.6	1.82	5.1	6.9	2.33	10.3	9.3	2.66	17.0	—	—	—	—	—	—	S
	8	9.3	2.47	2.5	13.9	2.88	5.1	18.5	3.10	8.4	23.1	3.25	12.4	27.8	3.41	17.1	S
	10	11.6	2.63	2.0	17.3	3.01	4.0	23.1	3.20	6.7	28.9	3.31	9.9	34.7	3.48	13.6	S
	20	23.1	2.94	1.0	34.7	3.25	2.0	46.3	3.40	3.2	57.8	3.49	4.8	69.4	3.64	6.6	S
FTD-8.5	5	5.8	2.18	5.1	8.7	2.73	10.3	11.6	3.05	17.0	—	—	—	—	—	—	S
	10	11.6	2.84	2.5	17.3	3.26	5.1	23.1	3.46	8.4	28.9	3.57	12.4	34.7	3.75	17.1	S
	20	23.1	3.23	1.2	34.7	3.53	2.5	46.3	3.68	4.1	57.8	3.75	6.1	69.4	3.85	8.4	O
FTD-9.5	4	4.6	1.89	4.5	6.9	2.57	9.2	9.3	3.02	15.2	—	—	—	—	—	—	O
	6	6.9	2.45	3.0	10.4	3.11	6.1	13.9	3.53	10.0	17.3	3.82	14.8	—	—	—	S
	10	11.6	3.04	1.8	17.3	3.65	3.6	23.1	4.00	6.0	28.9	4.23	8.8	34.7	4.51	12.1	O
	26	30.1	3.74	0.6	45.1	4.23	1.3	60.1	4.48	2.2	75.2	4.65	3.2	90.2	4.91	4.4	S
FTD-13	6	6.9	2.76	4.5	10.4	3.66	9.2	13.9	4.24	15.2	—	—	—	—	—	—	O
	8	9.3	3.28	3.4	13.9	4.14	6.8	18.5	4.68	11.3	23.1	5.00	16.7	—	—	—	O
	13	15.0	4.04	2.1	22.5	4.79	4.2	30.1	5.22	6.9	37.6	5.47	10.2	45.1	5.81	14.0	S
	26	30.1	4.74	1.0	45.1	5.36	2.0	60.1	5.65	3.4	75.2	5.85	5.0	90.2	6.15	6.8	O
FTD-15.5	8	9.3	3.57	4.5	13.9	4.62	9.2	18.5	5.24	15.2	—	—	—	—	—	—	O
	13	15.0	4.55	2.8	22.5	5.45	5.6	30.1	5.92	9.3	37.6	6.22	13.7	45.1	6.58	18.8	S
	26	30.1	5.46	1.3	45.1	6.15	2.7	60.1	6.50	4.5	75.2	6.72	6.7	90.2	6.98	9.2	S
FTD-17	8	9.3	3.79	5.7	13.9	4.93	11.5	18.5	5.65	19.0	—	—	—	—	—	—	S
	10	11.6	4.33	4.5	17.3	5.39	9.2	23.1	6.05	15.2	—	—	—	—	—	—	O
	13	15.0	4.87	3.5	22.5	5.87	7.0	30.1	6.43	11.6	37.6	6.74	17.2	—	—	—	S
	26	30.1	5.96	1.7	45.1	6.65	3.5	60.1	7.02	5.7	75.2	7.19	8.4	90.2	7.54	11.6	O
FTD-19	6	6.9	3.10	6.4	10.4	4.27	13.0	—	—	—	—	—	—	—	—	—	O
	13	15.0	5.13	2.9	22.5	6.40	5.9	30.1	7.18	9.8	37.6	7.62	14.5	45.1	8.23	19.9	S
	26	30.1	6.56	1.4	45.1	7.57	2.9	60.1	8.13	4.8	75.2	8.52	7.1	90.2	9.01	9.8	O
FTD-23	8	9.3	4.06	6.4	13.9	5.51	13.0	—	—	—	—	—	—	—	—	—	O
	13	15.0	5.62	3.9	22.5	7.17	7.9	30.1	8.09	13.1	37.6	8.69	19.4	—	—	—	S
	26	30.1	7.49	1.9	45.1	8.65	3.9	60.1	9.34	6.5	75.2	9.68	9.5	90.2	10.25	13.1	S
FTD-26	10	11.6	4.99	6.4	17.3	6.72	13.0	—	—	—	—	—	—	—	—	—	O
	13	15.0	5.99	4.9	22.5	7.65	9.9	30.1	8.69	16.4	—	—	—	—	—	—	S
	26	30.1	8.13	2.4	45.1	9.43	4.9	60.1	10.07	8.1	75.2	10.49	12.0	90.2	10.99	16.5	O
FTD-31	16	18.5	7.26	4.6	27.8	9.26	9.3	37.0	10.60	15.5	—	—	—	—	—	—	O
	26	30.1	9.21	2.8	45.1	10.95	5.7	60.1	11.99	9.4	75.2	12.59	14.0	90.2	13.29	19.2	S
	53	61.3	11.08	1.3	91.9	12.49	2.7	122.6	13.20	4.5	153.2	13.50	6.7	183.9	14.25	9.2	S
FTD-35	24	27.8	9.55	3.8	41.6	11.59	7.8	55.5	12.72	12.9	69.4	13.40	19.0	—	—	—	O
	33	38.2	10.79	2.8	57.2	12.49	5.6	76.3	13.46	9.3	95.4	13.96	13.7	114.5	14.64	18.9	S
	53	61.3	12.06	1.7	91.9	13.45	3.5	122.6	14.24	5.7	153.2	14.63	8.4	183.9	15.20	11.6	O
FTD-37	14	16.2	7.02	6.9	24.3	9.43	14.1	—	—	—	—	—	—	—	—	—	S
	18	20.8	8.28	5.4	31.2	10.57	10.9	41.6	12.05	18.1	—	—	—	—	—	—	O
	33	38.2	11.07	2.9	57.2	12.79	5.9	76.3	13.64	9.8	95.4	14.27	14.5	114.5	14.79	19.9	S
FTD-45	23	26.6	10.53	4.5	39.9	13.62	9.1	53.2	15.51	15.0	—	—	—	—	—	—	S
	46	53.2	14.51	2.2	79.8	16.91	4.5	106.4	18.34	7.4	133.0	19.15	11.0	159.6	20.03	15.1	S
	61	70.5	15.65	1.7	105.8	17.78	3.4	141.1	18.94	5.6	176.4	19.72	8.2	211.6	20.52	11.3	O
FTD-51	23	26.6	11.07	5.6	39.9	14.37	11.4	53.2	16.71	18.9	—	—	—	—	—	—	S
	46	53.2	15.69	2.8	79.8	18.40	5.6	106.4	19.84	9.3	133.0	20.71	13.8	159.6	21.72	19.0	O
	57	65.9	16.73	2.2	98.9	19.23	4.5	131.8	20.40	7.5	164.8	21.15	11.1	197.7	22.10	15.2	S
FTD-55	34	39.3	14.68	4.5	59.0	18.03	9.2	78.6	19.89	15.3	—	—	—	—	—	—	S
	46	53.2	16.73	3.3	79.8	19.56	6.8	106.4	21.10	11.2	133.0	21.82	16.6	—	—	—	S
	55	63.6	17.75	2.8	95.4	20.33	5.7	127.2	21.54	9.4	159.0	22.33	13.8	190.8	23.34	19.0	O
FTD-62	30	34.7	13.40	3.8	52.0	17.45	7.7	69.4	20.11	12.7	86.7	21.79	18.7	—	—	—	S
	45	52.0	16.68	2.5	78.1	20.35	5.1	104.1	22.53	8.4	130.1	24.00	12.4	156.1	25.70	17.1	S
	60	69.4	18.54	1.9	104.1	21.98	3.8	138.8	23.84	6.2	173.5	25.11	9.2	208.2	26.67	12.7	O
	90	104.1	20.66	1.2	156.1	23.69	2.5	208.2	25.32	4.1	260.2	26.22	6.1	312.2	27.67	8.3	S
FTD-73	30	34.7	14.52	5.0	52.0	19.18	10.3	69.4	22.39	17.0	—	—	—	—	—	—	S
	48	55.5	19.09	3.1	83.3	23.41	6.4	111.0	25.94	10.5	138.8	27.55	15.6	—	—	—	O
	60	69.4	20.77	2.5	104.1	24.90	5.1	138.8	27.21	8.4	173.5	28.43	12.4	208.2	30.06	17.1	S
	80	92.5	22.96	1.9	138.8	26.53	3.8	185.0	28.46	6.2	231.3	29.53	9.2	277.5	30.97	12.7	O
FTD-83	30	34.7	15.10	6.3	52.0	20.09	12.9	—	—	—	—	—	—	—	—	—	S
	50	57.8	20.75	3.8	86.7	25.35	7.7	115.6	28.21	12.7	144.6	29.94	18.7	—	—	—	S
	60	69.4	22.51	3.1	104.1	26.85	6.4	138.8	29.24	10.5	173.5	30.64	15.6	—	—	—	O
	75	86.7	24.39	2.5	130.1	28.24	5.1	173.5	30.45	8.4	216.8	31.65	12.4	260.2	33.21	17.1	S
FTD-90	45	52.0	20.45	5.0	78.1	25.73	10.3	104.1	28.56	17.0	—	—	—	—	—	—	S
	60	69.4	23.67	3.8	104.1	28.17	7.7	138.8	30.73	12.7	173.5	31.97	18.7	—	—	—	S
	72	83.3	25.34	3.1	124.9	29.54	6.4	166.5	31.56	10.5	208.2	32.72	15.6	—	—	—	O

TABLE 2 Specific Heat x Specific Gravity

Avg. Sol'n Temp. °F	% Ethylene Glycol					
	0	10	20	30	40	50
110	1.000	0.978	0.956	0.934	0.910	0.874
120	1.000	0.979	0.958	0.935	0.912	0.876
130	1.000	0.978	0.956	0.935	0.912	0.878
140	1.000	0.978	0.955	0.934	0.914	0.881
150	1.000	0.976	0.952	0.933	0.915	0.882
160	1.000	0.975	0.950	0.932	0.916	0.883
170	1.000	0.974	0.947	0.932	0.917	0.885
180	1.000	0.959	0.944	0.931	0.919	0.887

TABLE 3 Pressure Drop and Capacity Correction Factors

% Glycol	Pressure Drop	Capacity
0	0.781	1.127
10	0.814	1.050
20	0.875	1.019
30	0.937	1.008
40	1.000	1.000
50	1.068	0.983

TABLE 4 Altitude Correction Factors

(Multiply MBH/F rating in Table 1 x factor)

Altitude (ft)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
Factor	1.0	.98	.96	.93	.91	.89	.86	.84	.82	.79	.77

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Model FTD Specifications

Model Number	Total CFM	Condenser Fans No.	Diam. RPM	Fan Motors* No. HP	Total Motor Amps ***200V-230V**	460V	**	Wiring Stand.	Arrangement Optional
FTD-5	5750	1	24 1100	1 ½	4.2	2.1		1 phase	
FTD-6.5	5400	1	24 1100	1 ½	4.2	2.1		1 phase	
FTD-7.5	5150	1	24 1100	1 ½	4.2	2.1		1 phase	
FTD-8.5	4900	1	24 1100	1 ½	4.2	2.1		1 phase	
FTD-9.5	11500	2	24 1100	2 ½	8.4 7.3	4.2 3.6		1 phase	3 phase
FTD-13	10800	2	24 1100	2 ½	8.4 7.3	4.2 3.6		1 phase	3 phase
FTD-15.5	10300	2	24 1100	2 ½	8.4 7.3	4.2 3.6		1 phase	3 phase
FTD-17	9800	2	24 1100	2 ½	8.4 7.3	4.2 3.6		1 phase	3 phase
FTD-19	16200	3	24 1100	3 ½	12.6 7.3	6.3 3.6		1 phase	3 phase
FTD-23	15450	3	24 1100	3 ½	12.6 7.3	6.3 3.6		1 phase	3 phase
FTD-26	14700	3	24 1100	3 ½	12.6 7.3	6.3 3.6		1 phase	3 phase
FTD-31	21000	4	24 1100	4 ½	16.8 11.1	8.4 5.6		1 phase	3 phase
FTD-35	20000	4	24 1100	4 ½	16.8 11.1	8.4 5.6		1 phase	3 phase
FTD-37	19300	4	24 1100	4 ½	16.8 11.1	8.4 5.6		1 phase	3 phase
FTD-45	30200	6	24 1100	6 ½	14.5	7.3		3 phase	
FTD-51	29000	6	24 1100	6 ½	14.5	7.3		3 phase	
FTD-55	28400	6	24 1100	6 ½	14.5	7.3		3 phase	
FTD-62	49000	9	24 1100	9 ½	21.8	10.9		3 phase	
FTD-73	46500	9	24 1100	9 ½	21.8	10.9		3 phase	
FTD-83	44500	9	24 1100	9 ½	21.8	10.9		3 phase	
FTD-90	42000	9	24 1100	9 ½	21.8	10.9		3 phase	

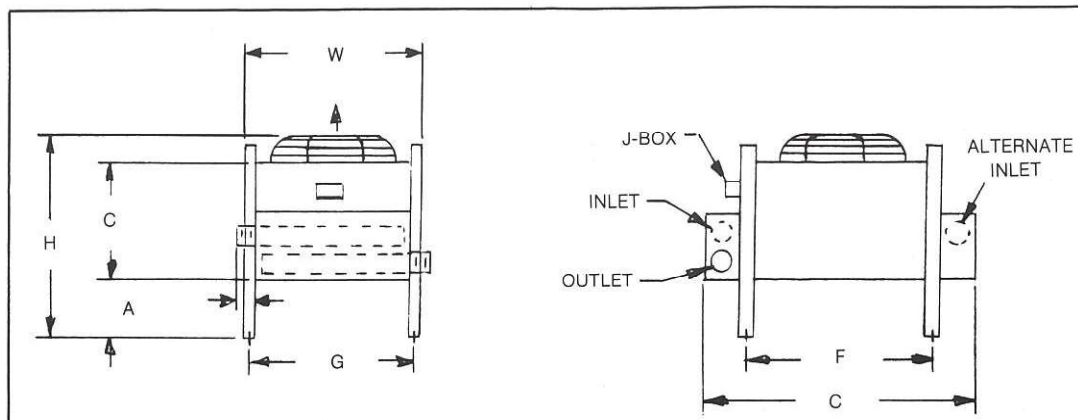
* All motors are ½HP, 200-230/1/60 or 460/1/60, 4.2 FLA or 2.1 FLA, Ball Bearing.

** For optional 3 phase wiring, units shown 3 phase have 1 phase motors arranged 3 phase delta.

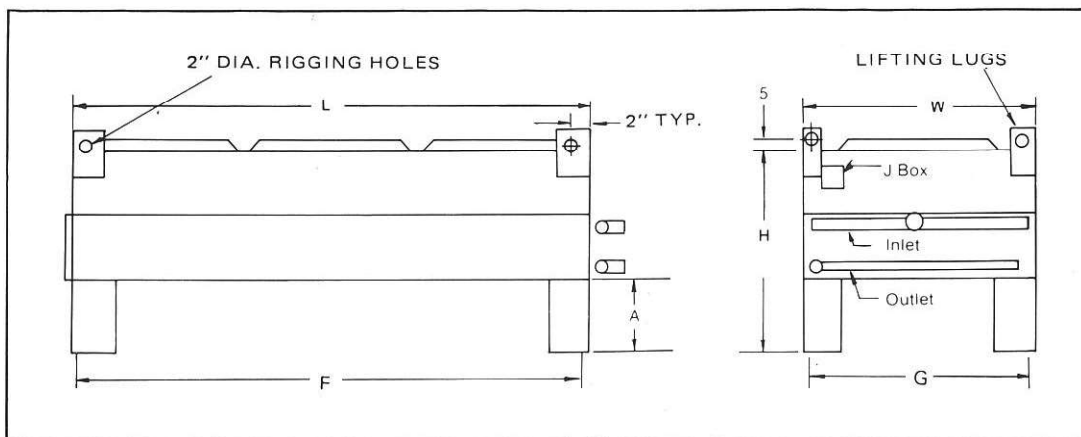
*** 3 phase motors also optionally available, consult factory for more information.

Dimensional Data

FTD-5 thru-8.5/Horizontal or Vertical Discharge



FTD-9.5 thru-90/Vertical Discharge (Horiz. Discharge Avail. 9.5-26)



Dimensions in Inches

Model Number	A	B	C	F	G	H	L	W	Connections In. & Out. MPT	Approx. Shipping Wt.
FTD-5	10	8 $\frac{3}{4}$	19	41 $\frac{1}{2}$	34 $\frac{1}{4}$	31 $\frac{1}{2}$	43 $\frac{1}{2}$	35 $\frac{1}{2}$	2 $\frac{1}{2}$	195
FTD-6.5	10	8 $\frac{3}{4}$	19	41 $\frac{1}{2}$	34 $\frac{1}{4}$	31 $\frac{1}{2}$	43 $\frac{1}{2}$	35 $\frac{1}{2}$	2 $\frac{1}{2}$	220
FTD-7.5	10	8 $\frac{3}{4}$	19	41 $\frac{1}{2}$	34 $\frac{1}{4}$	31 $\frac{1}{2}$	43 $\frac{1}{2}$	35 $\frac{1}{2}$	2 $\frac{1}{2}$	245
FTD-8.5	10	8 $\frac{3}{4}$	19	41 $\frac{1}{2}$	34 $\frac{1}{4}$	31 $\frac{1}{2}$	43 $\frac{1}{2}$	35 $\frac{1}{2}$	2 $\frac{1}{2}$	285
FTD-9.5	15			58 $\frac{1}{2}$	38 $\frac{3}{4}$	34	63 $\frac{1}{4}$	43 $\frac{1}{2}$	2 $\frac{1}{2}$	434
FTD-13	15			58 $\frac{1}{2}$	38 $\frac{3}{4}$	34	63 $\frac{1}{4}$	43 $\frac{1}{2}$	2 $\frac{1}{2}$	484
FTD-15.5	15			58 $\frac{1}{2}$	38 $\frac{3}{4}$	34	63 $\frac{1}{4}$	43 $\frac{1}{2}$	2 $\frac{1}{2}$	534
FTD-17	15			58 $\frac{1}{2}$	38 $\frac{3}{4}$	34	63 $\frac{1}{4}$	43 $\frac{1}{2}$	2 $\frac{1}{2}$	581
FTD-19	15			88 $\frac{1}{2}$	38 $\frac{3}{4}$	34	93 $\frac{1}{4}$	43 $\frac{1}{2}$	2 $\frac{1}{2}$	656
FTD-23	15			88 $\frac{1}{2}$	38 $\frac{3}{4}$	34	93 $\frac{1}{4}$	43 $\frac{1}{2}$	2 $\frac{1}{2}$	731
FTD-26	15			88 $\frac{1}{2}$	38 $\frac{3}{4}$	34	93 $\frac{1}{4}$	43 $\frac{1}{2}$	2 $\frac{1}{2}$	806
FTD-31	15			58 $\frac{1}{2}$	78 $\frac{3}{4}$	35 $\frac{1}{2}$	63 $\frac{1}{4}$	83 $\frac{1}{2}$	2 $\frac{1}{2}$	991
FTD-35	15			58 $\frac{1}{2}$	78 $\frac{3}{4}$	35 $\frac{1}{2}$	63 $\frac{1}{4}$	83 $\frac{1}{2}$	2 $\frac{1}{2}$	1081
FTD-37	18			94 $\frac{1}{2}$	48 $\frac{3}{4}$	45 $\frac{1}{4}$	99 $\frac{1}{4}$	53 $\frac{1}{2}$	2 $\frac{1}{2}$	1176
FTD-45	18			103 $\frac{1}{2}$	68 $\frac{3}{4}$	39 $\frac{3}{4}$	108 $\frac{1}{4}$	73 $\frac{1}{2}$	2 $\frac{1}{2}$	1923
FTD-51	18			103 $\frac{1}{2}$	68 $\frac{3}{4}$	39 $\frac{3}{4}$	108 $\frac{1}{4}$	73 $\frac{1}{2}$	2 $\frac{1}{2}$	2078
FTD-55	18			103 $\frac{1}{2}$	68 $\frac{3}{4}$	39 $\frac{3}{4}$	108 $\frac{1}{4}$	73 $\frac{1}{2}$	2 $\frac{1}{2}$	2233
FTD-62	22			118 $\frac{1}{2}$	88 $\frac{3}{4}$	42 $\frac{3}{4}$	123 $\frac{1}{4}$	93 $\frac{1}{2}$	2 $\frac{1}{2}$	2315
FTD-73	22			118 $\frac{1}{2}$	88 $\frac{3}{4}$	42 $\frac{3}{4}$	123 $\frac{1}{4}$	93 $\frac{1}{2}$	2 $\frac{1}{2}$	2520
FTD-83	22			118 $\frac{1}{2}$	88 $\frac{3}{4}$	42 $\frac{3}{4}$	123 $\frac{1}{4}$	93 $\frac{1}{2}$	2 $\frac{1}{2}$	2735
FTD-90	22			118 $\frac{1}{2}$	88 $\frac{3}{4}$	42 $\frac{3}{4}$	123 $\frac{1}{4}$	93 $\frac{1}{2}$	2 $\frac{1}{2}$	2960

Russell

Russell Coil Company A subsidiary of Ardco Inc.
221 South Berry Street Brea, California 92621
(714) 529-1935/(213) 691-3246