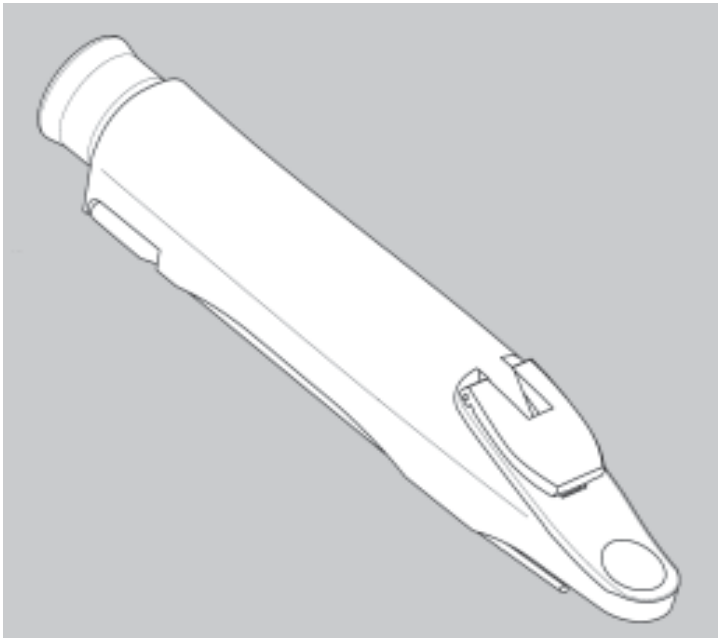

Reichert
VET 360
Instruction Manual

Reichert®

Reichert VET 360

Total Solids Refractometer

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1.0 Introduction

The Reichert Vet 360 TS Meter Model 137536L0 Total Solids Refractometer has been designed for simple, rapid microanalysis of body fluids in veterinary medicine. The three scale reticle provides read out for urine specific gravity of dogs and larger animals, cats, and total protein for all animals. The remaining scale is calibrated for protein concentration of plasma or serum based on human data.

Determinations are precise and rapid and require only a drop of fluid sample. The value on the appropriate scale, as seen through the eyepiece, is read where the sharp boundary between dark and light fields crosses the scale.

The instrument is temperature compensated for temperatures between 60°F (16°C) and 100°F (38°C). The reading does not need to be adjusted for either the temperature of the sample or ambient temperatures.

The Conversion Tables in this manual (pages 4-6) correlate data on the scales to refractive index and to the relevant total solids.

2.0 Operating Instructions

Hold the instrument in a horizontal position and swing up the cover plate to expose both the measuring prism and the bottom surface of the cover plate. If necessary, clean the exposed surfaces.

Place a drop or two of sample on the prism (Figure 1). Do not use glass or metal applicators since they may scratch the prism surface. To minimize evaporation, close the cover plate over the prism immediately.

The instrument may also be loaded by closing the cover plate onto a clean, dry prism and then placing the sample liquid on the exposed portion of the prism, such that the liquid will be drawn into the space between the prism and the cover plate by capillary action. Avoid lifting the cover plate while taking a reading.

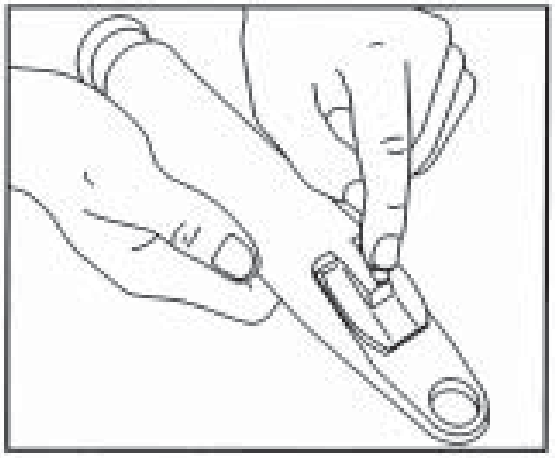


Figure 1

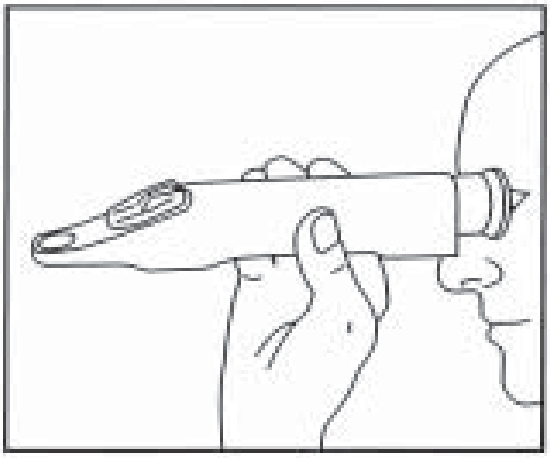
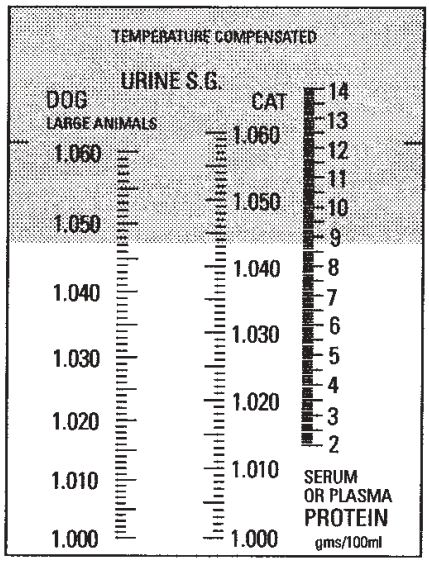


Figure 2

To hold the instrument for a reading, place your finger(s) on the cover plate and **press it gently, but firmly.** This spreads the sample in a thin, even layer over the prism. Point the instrument toward a light source such as the sky, window or lamp. The instrument should be tilted with respect to the light source until the optimum contrast between light and dark boundaries is obtained (Figure 2). Take a reading at the point where the dividing line between light and dark fields crosses the scale. (Figure 3)



Values can be read directly from the scales. The sharp definition of contrast between the light and dark fields seen through the eyepiece assists accurate readings.

To clean the refractometer use a soft cloth or soft tissue paper moistened with water and wipe the prism and bottom surfaces of the cover plate. Dry the surfaces with a soft cloth or tissue paper. If the surfaces are not well cleaned before the next sample is loaded, an erroneous or fuzzy dividing line may result. Do not immerse the eyepiece in water. Never use gritty cleaning compounds or very hot water to clean it.

Figure 3

WARNING: *Never expose the instrument to temperatures above 150°F (60°C).*

3.0 Calibration

Reichert Hand-Held Refractometers rarely need adjustment. To check adjustment, make sure the temperature of the instrument is between 70°F (21°C) and 85°F (29°C) and take a reading with distilled water. If reading departs from 1.000, correction can be made by adjusting the screw on the bottom of the instrument. Turn the screw first counterclockwise to move the dividing line below 1.000, then clockwise to 1.000. Make sure the final adjustment is always clockwise. Never remove the screw from the instrument.

4.0 Temperature compensation

The Refractometer is temperature compensated to provide direct and accurate refractive readings of aqueous solutions. The temperature of the sample has little or no bearing on the accuracy of the reading since it is so small that it immediately equilibrates to the temperature of the instrument. As long as the temperature of the instrument is between 60°F (16°C) and 100°F (38°C), design accuracy is maintained. The actual temperature error for the instrument is shown on the charts (Figure 4) for different concentrations. The largest error occurs at the lowest scale readings and particularly with pure water at temperature of 65°F (18°C) and below.

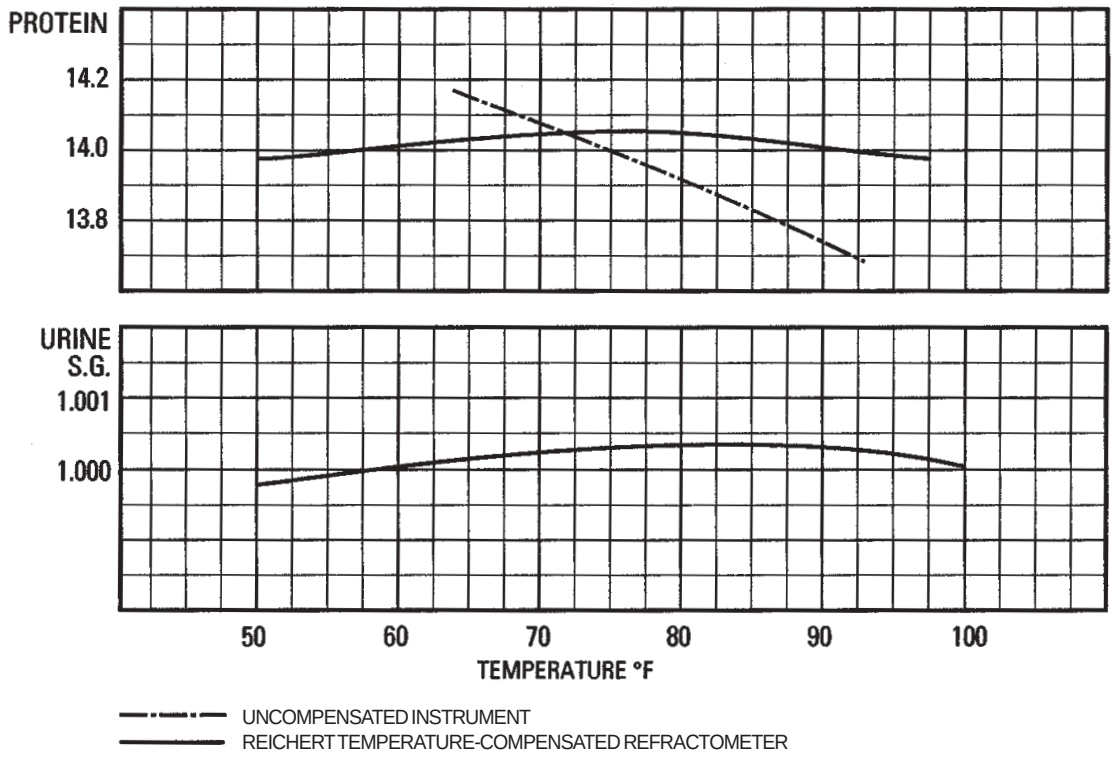


Figure 4

KEY	C_{TS} Concentration Total Solids	C_{PR} Concentration Protein	n_D Refractive Index	$D_{20/20}$ Specific Gravity

Plasma or Serum 20°C		Refractive Index 20°C	Urine Solids 20°C			
			Dog/LargeAnimal		Cat	
C_{TS}	C_{PR}	n_D	$D_{20/20}$	C_{TS}	$D_{20/20}$	C_{TS}
		1.3330	1.0000	0	1.0000	0
		1.3332	1.0005	0.1	1.0004	0.1
		1.3334	1.0010	0.2	1.0008	0.3
		1.3336	1.0020	0.4	1.0015	0.4
		1.3338	1.0025	0.5	1.0019	0.5
		1.3340	1.0029	0.6	1.0023	0.6
		1.3342	1.0034	0.7	1.0027	0.8
		1.3344	1.0042	0.9	1.0034	0.9
		1.3346	1.0047	1.0	1.0037	1.0
		1.3348	1.0051	1.1	1.0040	1.1
		1.3350	1.0056	1.2	1.0044	1.3
		1.3352	1.0065	1.4	1.0051	1.4
		1.3354	1.0069	1.5	1.0054	1.5
		1.3356	1.0074	1.6	1.0058	1.6
		1.3358	1.0082	1.8	1.0066	1.8
		1.3360	1.0086	1.9	1.0070	1.9
		1.3362	1.0091	2.0	1.0074	2.0
		1.3364	1.0100	2.2	1.0081	2.2
		1.3366	1.0104	2.3	1.0085	2.3
		1.3368	1.0109	2.4	1.0088	2.4
		1.3370	1.0114	2.5	1.0091	2.5
		1.3372	1.0122	2.7	1.0098	2.7
		1.3374	1.0127	2.8	1.0102	2.8
		1.3376	1.0131	2.9	1.0105	2.9
		1.3378	1.0139	3.1	1.0112	3.1
		1.3380	1.0144	3.2	1.0116	3.2
		1.3382	1.0148	3.3	1.0119	3.3
		1.3384	1.0155	3.5	1.0127	3.4
3.1	2.0	1.3386	1.0159	3.6	1.0131	3.6
3.2	2.1	1.3388	1.0166	3.8	1.0139	3.7
3.3	2.2	1.3390	1.0170	3.9	1.0142	3.8
3.4	2.3	1.3392	1.0174	4.0	1.0146	4.0
3.5	2.4	1.3394	1.0181	4.2	1.0153	4.1
3.7	2.5	1.3396	1.0185	4.3	1.0157	4.2
3.8	2.6	1.3398	1.0189	4.4	1.0161	4.4
3.9	2.7	1.3400	1.0196	4.6	1.0168	4.5
4.0	2.8	1.3402	1.0200	4.7	1.0172	4.6
4.1	2.9	1.3404	1.0204	4.8	1.0175	4.8
4.2	3.0	1.3406	1.0212	5.0	1.0782	4.9
4.3	3.1	1.3408	1.0216	5.1	1.0186	5.0
4.4	3.2	1.3410	1.0222	5.3	1.0193	5.2
4.5	3.3	1.3412	1.0226	5.4	1.0197	5.3
4.7	3.4	1.3414	1.0230	5.5	1.0201	5.4
4.8	3.5	1.3416	1.0237	5.7	1.0207	5.6
4.9	3.6	1.3418	1.0241	5.8	1.0211	5.7
5.0	3.7	1.3420	1.0245	5.9	1.0214	5.8
5.1	3.8	1.3422	1.0252	6.1	1.0220	5.9
5.2	3.9	1.3424	1.0256	6.2	1.0224	6.1
5.3	4.0	1.3426	1.0262	6.4	1.0231	6.2
5.4	4.1	1.3428	1.0266	6.5	1.0235	6.4
5.6	4.2	1.3430	1.0270	6.6	1.0238	6.5

Plasma or Serum 20°C		Refractive Index 20°C	Urine Solids 20°C			
			Dog/LargeAnimal		Cat	
C_{TS}	C_{PR}	n_D	$D20/_{20}$	C_{TS}	$D20/_{20}$	C_{TS}
5.7	4.3	1.3432	1.0278	6.8	1.0245	6.6
5.8	4.4	1.3434	1.0282	6.9	1.0249	6.8
5.9	4.5	1.3436	1.0285	7.0	1.0252	6.9
6.0	4.6	1.3438	1.0292	7.2	1.0258	7.0
6.1	4.7	1.3440	1.0296	7.3	1.0261	7.2
6.2	4.8	1.3442	1.0301	7.5	1.0267	7.3
6.3	5.0	1.3444	1.0305	7.6	1.0271	7.4
6.4	5.1	1.3446	1.0309	7.7	1.0274	7.6
6.6	5.2	1.3448	1.0315	7.9	1.0280	7.7
6.7	5.3	1.3450	1.0318	8.0	1.0284	7.8
6.8	5.4	1.3452	1.0325	8.2	1.0291	8.0
6.9	5.5	1.3454	1.0328	8.3	1.0295	8.1
7.0	5.6	1.3456	1.0331	8.4	1.0298	8.2
7.1	5.7	1.3458	1.0338	8.6	1.0304	8.4
7.2	5.8	1.3460	1.0341	8.7	1.0307	8.5
7.3	5.9	1.3462	1.0344	8.8	1.0310	8.6
7.5	6.0	1.3464	1.0351	9.0	1.0317	8.8
7.6	6.1	1.3466	1.0355	9.1	1.0320	8.9
7.7	6.2	1.3468	1.0362	9.3	1.0327	9.0
7.8	6.3	1.3470	1.0365	9.4	1.0331	9.2
7.9	6.4	1.3472	1.0369	9.5	1.0334	9.3
8.0	6.5	1.3474	1.0373	9.7	1.0340	9.5
8.1	6.6	1.3476	1.0377	9.8	1.0344	9.6
8.2	6.7	1.3478	1.0381	9.9	1.0348	9.7
8.4	6.8	1.3480	1.0387	10.1	1.0355	9.9
8.5	6.9	1.3482	1.0390	10.2	1.0358	10.0
8.6	7.0	1.3484	1.0393	10.3	1.0361	10.1
8.7	7.1	1.3486	1.0399	10.5	1.0368	10.3
8.8	7.2	1.3488	1.0402	10.6	1.0371	10.4
8.9	7.4	1.3490	1.0408	10.7	1.0374	10.6
9.0	7.5	1.3492	1.0413	10.8	1.0381	10.7
9.1	7.6	1.3494	1.0417	11.0	1.0385	10.8
9.3	7.7	1.3496	1.0422	11.1	1.0388	11.0
9.4	7.8	1.3498	1.0426	11.3	1.0391	11.1
9.5	7.9	1.3500	1.0431	11.4	1.0398	11.2
9.6	8.0	1.3502	1.0436	11.5	1.0401	11.4
9.7	8.1	1.3504	1.0440	11.7	1.0404	11.5
9.8	8.2	1.3506	1.0445	11.8	1.0411	11.7
9.9	8.3	1.3508	1.0449	12.0	1.0414	11.8
10.0	8.4	1.3510	1.0454	12.1	1.0418	11.9
10.2	8.5	1.3512	1.0459	12.2	1.0425	12.1
10.3	8.6	1.3514	1.0463	12.4	1.0428	12.2
10.4	8.7	1.3516	1.0468	12.5	1.0432	12.3
10.5	8.8	1.3518	1.0472	12.7	1.0439	12.5
10.6	8.9	1.3520	1.0477	12.8	1.0442	12.6
10.7	9.0	1.3522	1.0482	12.9	1.0445	12.8
10.8	9.1	1.3524	1.0486	13.1	1.0452	12.9
10.9	9.2	1.3526	1.0493	13.2	1.0455	13.0
11.1	9.3	1.3528	1.0495	13.4	1.0458	13.2
11.2	9.4	1.3530	1.0500	13.5	1.0465	13.3
11.3	9.5	1.3532	1.0505	13.6	1.0468	13.5
11.4	9.6	1.3534	1.0509	13.8	1.0472	13.6
11.5	9.8	1.3536	1.0514	13.9	1.0478	13.7
11.6	9.9	1.3538	1.0518	14.0	1.0481	13.9

Plasma or Serum 20°C		Refractive Index 20°C	Urine Solids 20°C			
			Dog/LargeAnimal		Cat	
C_{TS}	C_{PR}	n_D	$D20/_{20}$	C_{TS}	$D20/_{20}$	C_{TS}
11.7	10.0	1.3540	1.0523	14.2	1.0484	14.0
11.8	10.1	1.3542	1.0528	14.3	1.0491	14.1
12.0	10.2	1.3544	1.0532	14.4	1.0494	14.3
12.1	10.3	1.3546	1.0537	14.5	1.0500	14.4
12.2	10.4	1.3548	1.0541	14.7	1.0504	14.6
12.3	10.5	1.3550	1.0546	14.8	1.0507	14.7
12.4	10.6	1.3552	1.0551	14.9	1.0513	14.8
12.5	10.7	1.3554	1.0555	15.1	1.0517	15.0
12.6	10.8	1.3556	1.0560	15.2	1.0521	15.1
12.7	10.9	1.3558	1.0564	15.4	1.0527	15.3
12.9	11.0	1.3560	1.0569	15.5	1.0531	15.4
13.0	11.1	1.3562	1.0574	15.6	1.0534	15.5
13.1	11.2	1.3564	1.0578	15.8	1.0542	15.7
13.2	11.3	1.3566	1.0583	15.9	1.0545	15.8
13.3	11.4	1.3568	1.0587	16.1	1.0548	16.0
13.4	11.5	1.3570	1.0592	16.2	1.0552	16.1
13.5	11.6	1.3572	1.0597	16.3	1.0558	16.2
13.6	11.7	1.3574	1.0601	16.5	1.0562	16.4
13.8	11.8	1.3576			1.0568	16.5
13.9	11.9	1.3578			1.0571	16.7
14.0	12.0	1.3580			1.0574	16.8
14.1	12.2	1.3582			1.0580	16.9
14.2	12.3	1.3584			1.0584	17.1
14.3	12.4	1.3586			1.0587	17.2
14.4	12.5	1.3588			1.0594	17.4
14.5	12.6	1.3590			1.0598	17.5
14.7	12.7	1.3592				
14.8	12.8	1.3594				
14.9	12.9	1.3596				
15.0	13.0	1.3598				
15.1	13.1	1.3600				
15.2	13.2	1.3602				
15.3	13.3	1.3604				
15.4	13.4	1.3606				
15.5	13.5	1.3608				
15.7	13.6	1.3610				
15.8	13.7	1.3612				
15.9	13.8	1.3614				
16.0	13.9	1.3616				
16.1	14.0	1.3618				

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