The Kestrel 4500 Pocket Weather Tracker

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Illustration Courtesy of Nielson Kellerman

Have you ever heard the saying, “it’s hard to make a good thing better”? Well, the folks at Nielson Kellerman did just that. While the Kestrel 3500 Pocket Weather Meter is a great tool for the outdoorsman, the K4500 is amazing. The Kestrel 4500 records critical weather information for the outdoorsmen, wilderness hunter, boating enthusiast and airplane pilot. The information can be stored for later recall or uploaded to a computer with the optional N-K interface.

I haven’t been behind the controls of an aircraft in over thirty years or worked as a commercial fisherman in fifty years. But, I can tell you that the K4500 would have saved me a lot of grief if it had been around then. I might not have been required to make an emergency landing due to bad weather or radio the US Coast Guard for assistance in a major squall. If any of you reading this plan to venture far from shore in your boat or fly private aircraft, you should give serious consideration to this device. And, if you venture into the wilderness as a hiker or hunter, the K4500 is a “must have”.

The primary purpose of this article is to evaluate the usefulness of the K4500 for the target shooter and hunter. The Kestrel 4500 isn’t cheap, with a MSRP of $399. But, as with the K3500, there are dealers like Sinclair on the internet discounting it as low as $312. Considering what this device is capable of doing, that is a very good price.

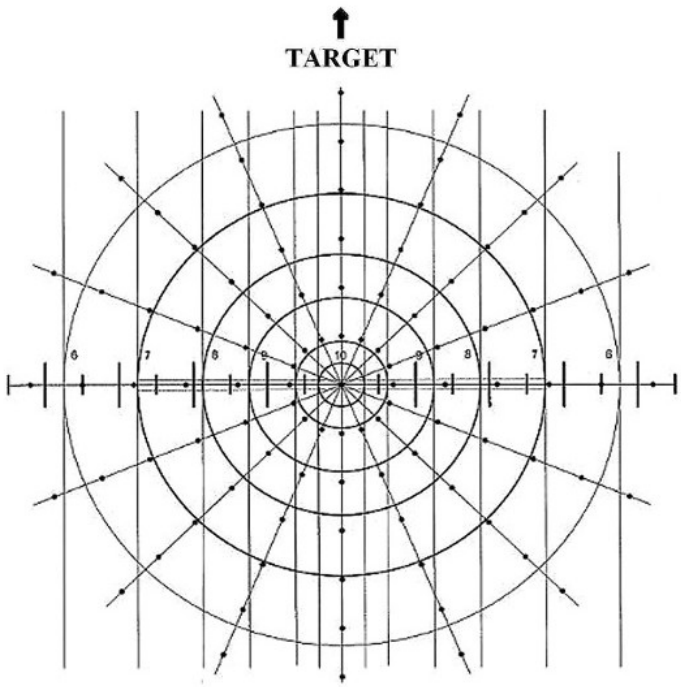
The K4500 is actually a small computer with sensors to record, analyze and store the environmental data it receives. It allows you to save up to 1,400 data points for future reference. That feature alone makes it worth the extra money. For the target shooter, it allows you to go back and check conditions from previous matches for comparison to your current one. It sure beats having to find your notes from last years competition among all of the papers that most target shooters accumulate. And, if you were not one to keep adequate records from one match to the next, the K4500 now makes that task simple and reliable. No more excuses, no more wishing you had kept better records and no more lost records.

The most useful features of the K4500, from the shooter’s viewpoint, are the crosswind/headwind features. Ok, I know, you can use K3500 to measure the wind

speed and estimate the direction before you begin shooting... right? And, because the flags down range are moving in different directions, you mentally calculate the average deviation effect. For a master-level shooter, that works fine. But, for the average shooter, there has to be a better way.

At this point, enter Hans Prinz of Albuquerque, New Mexico. Hans has developed a program (not yet on the market – but I am working on him) which generates a wind chart for the altitude, bullet weight, ballistic coefficient and velocity of the load you are shooting. The black dots on the chart below are wind adjustments for each compass heading-vector. Depending on the velocity and shooting distance, they represent 1 mph or 2 mph wind increments**.** We plot each shot on the chart and make the appropriate adjustments for the next round.

The wind chart below was prepared by Hans for the 600 yard range at Zia Rifle and Pistol Club in Albuquerque, NM. It is specific for my 6.5x284 round; i.e., a Lapua 139 grain Scenar with a muzzle velocity of 2945 fps. The dots on each vector line are 2 mph wind increments on this chart. For example, given a wind of 8 mph from the NE (assuming that you are shooting towards the north), you move out to the 4th dot (edge of the 7-ring), then drop straight down to the horizontal base line and hold off-target at that point to compensate for the wind.



Until the K4500 was introduced, shooters had to estimate the crosswind speed and direction. Even with a wind chart, there was a high degree of error in the estimates. In order to ensure that the K4500 was given a thoroughly objective test, I decided to do the field testing with my daughter's Savage 6.5x284. An experienced target shooter might subconsciously compensate for the wind based on their experience, even though I asked them to use the chart and K4500. As such, I would not be sure that the results represented the data provided by the Kestrel or the intuition and experience of the shooter. But for me, with minimal (translate that to zero) long range shooting experience, I would have to rely completely on the K4500 for crosswind values.

Because the direction of the target is not always pointing north, I added a compass diagram next to my wind charts. I take my Kestrel readings, mark them on the compass diagram and then transfer them to the appropriate vector on the wind chart.

We got up to leave for the Zia range at o'dark thirty, about 0530, much too early for my liking. However, we're expected to be at the range by seven-fifteen, so after three cups of coffee, my wife and I piled into her truck and headed north. Thank goodness Mary likes to drive, as it gives me time to down some more coffee and get my body into first gear.

September in New Mexico is infamous for its changeable weather. It can feel as cold as an Alaskan winter in the morning and hotter than Death Valley by noon. The temperatures this morning were in the mid 50's, ideal for shooting… at least for the first hour or so. After that, the winds come up, the sun begins to generate a mirage and the bugs come out to play. Sometimes I wonder why, being retired, I put myself through this. As we unloaded at the range, Mary looked at me and asked, "Are we having fun yet?"

Mary drew the first relay, lucky her, no wind. With my usual luck, I drew the second relay, just about the time the wind was picking up. But, after all, I was there to test the crosswind feature of the K4500, so I was going to get my chance.

At the Zia range, we shoot to the east, just about into the rising sun. The guy that designed that setup needs swift kick in the head. When it came my turn to shoot, I brought out the K4500 and took my readings. Several of the other shooters gave me a rather nasty look, as if to say, why didn't you do that for us. The K4500 indicated that the wind was coming from the SE at a steady 8 mph. I marked the SE vector on my compass diagram in red and transferred that to the wind chart below.

The rest, as they say, is history. Even though it was uncomfortable for me to lie on the ground at the tender age of 69, it was great. I now thoroughly understood everything that F-class shooters have been telling me the past two years. The mirages, the boils, the wind effects and the thrill of getting an **X**….. Incredible!

But, I digress. How did I do with the help of the K4500 compared to the other shooters? I shot a 194/200 at 600 yards. I wasn't high, but I was by no means anywhere near the bottom. The K4500, coupled with Hans' wind chart, allowed me to compensate and hold at the appropriate point on the target. The six points that I dropped were 9's, just barely out of the center. I believe that one can honestly attribute them to the fact that this was my first time shooting, not only this rifle, but also at 600 yards lying on the ground. I would hate to imagine what my score would have been without the aid of the K4500.

For those of you who remember my article on the K3500, it also provides wind speed, but no direction. And yes, I probably could have taken a wind speed reading with the K3500 and made an educated guess as to the direction and plotted the same information. But, it was so easy with the K4500. Hold it up, read the wind speed and direction, then plot the values. Why estimate when you can be exact?

The ease of use and simplicity of the K4500 makes it well worth the price. And as stated earlier, I can imagine a myriad of other uses; but for now, I will use the K4500 when Mary and I shoot F-Class. However, I'll keep my K3500 as a backup, just in case. And, for the record: Military sharpshooters from several countries use the K4500 as "standard issue". If you buy the K4500, you won't leave home without it.

And my wife? I knew you were going to ask….. She beat me by one point and slammed me on the X-count. Imagine what she'd have done if I'd let her use the K4500? But, tomorrow is another day and another match is coming up.

The specifications for the Kestrel® 4500 Pocket Weather Tracker are as follows:

Measurement Response Time	Units	Operational Range	Resolution	Accuracy (+/-)	Specification Range
Wind Speed 1 second	m/s	0.4 to 60.0 m/s	0.1	Larger of 3% of reading or least significant digit	0.4 to 40.0 m/s
	ft/min	59 to 11,948 ft/min	1		59 to 7877 ft/min
	km/h	1.0 to 218.0 km/h	0.1		1.0 to 144.0 km/h
	mph	0.8 to 135.0 mph	1		0.8 to 89.0 mph
	knots	0.6 to 118.3 kt	0.1		0.6 to 78.0 kt
	Beaufort	0 to 12 B	0.1		0 to 12 B
	1 inch diameter impeller with precision axle and sapphire bearings. Off-axis accuracy -1% @ 5º off-axis; -2% @ 10º; -3% @ 15º. Calibration drift < 1% after 100 hours use at 16 MPH / 7 m/s. Sustained operation above 60 MPH / 27 m/s will wear impeller rapidly and may cause destruction of impeller. Replacement impeller (NK PN-0801) may be field-installed without tools (US Patent 5,783,753).				
Wind Direction / Forward Heading 1 second	°	360°	1	5°	0 to 360°
	Cardinal Points	360°	16 Points	5°	0 to 360°
	2-axis solid-state magneto resistive sensor mounted perpendicular to unit plane to permit operation while measuring wind speed. Declination/variation adjustable for True North readout. Accuracy of measurements dependent upon unit's vertical position. Self-calibration routine eliminates magnetic error from batteries or unit and must be run after every full power-down (battery removal or change).				
Temperature 1 second	°F	-49.0 to 257.0 °F	0.1	1.8 °F	-20.0 to 158.0 °F
	°C	-45.0 to 125.0 °C	0.1	1.0 °C	-29.0 to 70.0 °C
	Measures air, water and snow temperature. Thermally isolated, hermetically sealed, precision thermistor mounted externally (US Patent 5,939,645) Calibration drift negligible.				
Relative Humidity 1 minute	%RH	0.0 to 100.0 %	0.1	3.0 %RH	5.0 to 95.0 % non-condensing
	Polymer capacitive humidity sensor mounted in thin-walled chamber external to case for rapid, accurate response (US Patent 6,257,074). (To achieve stated relative humidity accuracy, unit must be permitted to equilibrate to external temperature when exposed to large, rapid temperature changes and must be kept out of direct sunlight.) Calibration drift +/- 2% over 24 months. Relative humidity may be recalibrated at factory or in field using Kestrel Humidity Calibration Kit (NK PN-0802).				

Pressure 1 second (mb & PSI 4000 model only)	inHg	0.3 to 32.5 inHg	0.01	0.05 inHg	At 77.0 °F 22.1 to 32.5 inHg
	hPa / mb	10.0 to 1100.0 hPa / mb	0.1	1.5 hPa / mb	At 25.0 °C 750 to 1100 hPa / mb
	PSI	0.15 to 16.0 PSI	0.01	0.02 PSI	At 77.0 °F 10.9 to 16.0 PSI
	Monolithic silicon piezoresistive pressure sensor with second-order temperature correction. Maximum error over temperature range 32 to 158 °F (0 to 70°C), +/- 0.06 inHg / +/-2.0 hPa. Calibration drift typically -0.03 inHg / -1.0 hPa per year. Pressure sensor may be recalibrated at factory or in field.				
Altitude 1 second	ft	-6000 to 30000 ft	1	50 ft	At 77.0 °F <19,700 ft. Max error +/- 98 ft
	m	-2000 to 9000 m	1	15 m	At 25.0 °C <6,000 m. Max error +/- 30 m
	Temperature compensated pressure (barometric) altimeter.				
Crosswind Headwind, Tailwind 1 second	mph	0.8 to 135.0 mph	1	5%	8.5 to 89.0 mph
	ft/min	59 to 11,880 ft/min	1	5%	750 to 7832 ft/min
	km/h	1.0 to 217.3 km/h	0.1	5%	13.7 to 143.2 km/h
	m/s	0.4 to 60.0 m/s	0.1	5%	3.8 to 40.0 m/s
	knots	0.6 to 117.3 kt	0.1	5%	7.4 to 77.0 kt
	Calculated from the primary measurements of wind speed, wind direction and target heading. Auto-switching headwind/tailwind indication. Ranges expressed refer to primary wind speed.				
Wind Chill 1 second	°F	0.7 to 135.0 MPH -49.0 to 257.0 °F	0.1	1.8 °F	1.8 to 89.0 mph -50.0 to 50.0 °F
	°C	0.4 to 60.0 m/s -45.0 to 125.0 °C	0.1	1.0 °C	0.4 to 40 m/s -45.6 to 10.0 °C
	Calculated from the primary measurements of wind speed and temperature. Utilizes the NWS Wind Chill Temperature (WCT) Index, revised 2001, with wind speed adjusted by a factor of 1.5 to yield equivalent results to wind speed measured at 10 m above ground.				
Heat Index 1 minute	°F	0.0 to 100.0 %RH -49.0 to 257.0 °F	0.1	3.6 °F	70.0 to 130.0 °F 0 to 100% RH
	°C	0.0 to 100.0 %RH -45.0 to 125.0 °C	0.1	2.0 °C	21.1 to 54.4 °C 0 to 100 %RH
	Calculated from the primary measurements of temperature and relative humidity. Utilizes the NWS Heat Index (HI) tables. (Specification temperature limits established by HI tables.)				
Dewpoint 1 minute	°F	0.0 to 100.0 %RH -49.0 to 257.0 °F	0.1	3.6 °F	-20.0 to 158.0 °F 20.0 to 95.0% RH
	°C	0.0 to 100.0 %RH -45.0 to 125.0 °C	0.1	2.0 °C	-29.0 to 70.0 °C, 20.0 to 95.0 %RH
	Calculated from the primary measurements of temperature and relative humidity. Temperature to which the air would need to be cooled at a constant pressure to become saturated.				

Wet Bulb Temperature 1 minute	°F	-49.0 to 257.0 °F 0.0 to 100.0 %RH 8.86 to 32.48 inHg	0.1	3.6 °F	32.0 to 100.0 °F 5.0 to 95.0% RH 8.86 to 32.48 inHg, <19700 ft
	°C	-45.0 to 125.0 °C 0.0 to 100.0 %RH 300.0 to 1100.0 hPa	0.1	2.0 °C	0.0 to 37.8 °C 5.0 to 95.0 %RH -2000.0 to 9000.0 hPa <6000 m
	Calculated from the primary measurements of temperature, relative humidity and pressure. Temperature indicated by a wet bulb psychrometer.				
Density Altitude 1 second	ft	-49.0 to 257.0 °F 0.0 to 100.0 % RH 8.86 to 32.48 inHg	1	246	32.0 to 100.0 °F 5.0 to 95.0 %RH 8.86 to 32.48 inHg <19700 ft
	m	-45.0 to 125.0 °C 0.0 to 100.0 %RH 300.0 to 1100.0 hPa	1	75	0.0 - 37.8 °C 5.0 to 95.0 %RH -2000 to 9000 hPa <6000 m
	Calculated from the primary measurements of temperature, relative humidity and pressure. Air density converted to equivalent sea level elevation at the International Standard Atmosphere.				
Max/Avg Wind Speed (Air Velocity), Crosswind, Headwind/Tailwind	One-button clear and restart of Max Wind Gust and Average Wind measurement.				
Data Storage / Display	Minimum, maximum, average and logged history stored and displayed for every measured value. 1400-point data logger with graphical display. Auto data storage; interval settable from 2 seconds to 12 hours. Manual data capture.				
Data Upload	Requires optional PC interface (NK PN-0830) and provided software. RS-232 connection with USB adapter available.				
Display	Multifunction, multi-digit programmable dot-matrix display.				
Display Update	1 second.				
Display Backlight	Choice of aviation green or visible red electroluminescent backlight. Automatic or manual activation.				
Clock / Calendar	Real-time hours:minutes:seconds clock, calendar, automatic leap-year adjustment.				
Operational Temperature Range (LCD and Batteries)	The operational temperature range of the liquid crystal display and batteries is: 14° F to 131° F / -10 °C to 55 °C. Beyond the limits of the operational temperature range, the unit must be maintained within range and exposed for minimum time necessary to take reading.				
Storage Temperature	-22 °F to 140 °F / -30 °C to 60 °C.				
Auto Shutdown	User-selectable: 15 or 60 minutes with no key presses or disabled.				
Languages	English, French, German, Italian, Spanish.				
Certifications	CE certified. Individually tested to NIST-traceable standards (written certificate of tests available at additional charge).				
Batteries	AAA Alkaline, two, included. Average life, 400 hours of use, +/-depending on backlight use.				
Environmental	Waterproof (IP67 standard). Drop-tested (MIL.STD.810F; unit only) Substantial impact may damage replaceable impeller.				
Dimensions Weight	Unit 5.0 x 1.8 x 1.1 in / 12.7 x 4.5 x 2.8 cm. Unit 3.6 oz / 102 g.				

Kestrel Meters are designed and manufactured at NK's facility in Boothwyn, Pennsylvania, and are individually calibrated at the time of manufacture. Every Kestrel Meter comes with a Certificate of Conformity to document the unit's accuracy—all Kestrel measurements are traceable to the National Institute of Standards and Technology, ensuring the highest level of reliability. Additional NIST Calibration and Certification services are available.