vetscan UA
Urine Analyzer

USER'S MANUAL

For Veterinary Use Only

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FOR VETERINARY USE ONLY RoHS

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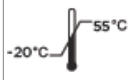
Symbols

Symbol	Definition/Use	
	Operator's manual; operating instructions	User's manual available. Consult manual for detailed use instructions.
	European Community representative	Authorized Representative in the European Community
	Electrical and electronic products recycling symbol	Recycle only as electronic waste. Do not dispose in normal waste.
	Protect from heat, radioactive sources and direct sunlight	Keep away from radiation, heat and direct sunlight.
	Environment-Friendly Use Period	
	Caution	Caution to safety hazard
	Manufacturer	Manufacturer of record
	Keep Dry	Protect from moisture. Do not allow it to be wet.
	This side Up	Keep package and analyzer right side up.
	Use by date	Expiration date of product.
	CE Mark	Denotes conformity to specific European directives and regulations
	NRTL compliance mark	Indicates compliance with the requirements of one or more appropriate product safety test standards in the USA and Canada
	Handle with care	Handle with care.
	RCM Mark	Indicates compliance with Australian safety test standards

Symbol	Definition/Use	
	Transit and Storage Temperature	Storage and transit temperatures; does not indicate operating temperatures.
RoHS	RoHS Compliant	Compliance with RoHS environmental standards.
	For Veterinary Use Only	For Veterinary Diagnostic Use only. Not for use for humans.
	Do not tip/Do not roll	Keep upright. Do not tip on side.
	Date of Manufacture	Date of manufacture.
SN	Serial number	Analyzer or Printer serial number
	Fragile, Handle with care	Fragile
	Potential Biohazardous Risk	Treat as biohazardous. Use standard safety procedures.

Introduction

The VETSCAN UA Urine Analyzer is a small, portable analyzer that automates urine test strip analysis, bringing efficiency to in-house urine chemistry testing. With features such as a built-in countdown testing timer, automated scanning of test strips and onscreen instructions, the VETSCAN UA eliminates the imperfect process of visual evaluation of urine chemistry strips. In addition to the standard test analytes available on most urine chemistry strips, the VETSCAN UA also calculates a semi-quantitative Urine Protein-Creatinine Ratio and measures Microalbumin to further aid in diagnosis and monitoring of renal disease.

The VETSCAN UA is the first of a 2-part urinalysis solution consisting of the Urine Chemistry and Sediment Analyzers.

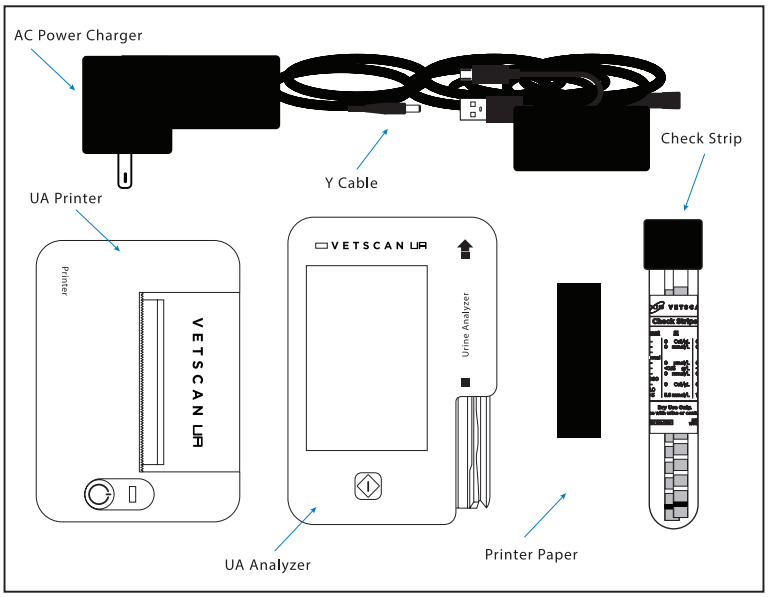


Fig. 1 Top view of the VETSCAN UA Kit (N. America Kit shown)

Intended Use

The VETSCAN UA is intended for veterinary use only for the testing of urine chemistries in mammalian veterinary urine samples, particularly dogs and cats. Urine from other species may be run on the analyzer, but has not been validated. The VETSCAN UA will measure urine analytes through disposable test strips and provide semi-quantitative results on up to 14 analytes including, leukocytes (LEU), ketones (KET), nitrite (NIT), urobilinogen (URO), bilirubin (BIL), glucose (GLU), protein (PRO), specific gravity (SG), pH, blood (BLD), ascorbic acid (ASC), microalbumin (MA), calcium (Ca), creatinine (CR), and a calculated urine protein creatinine ratio (PRO/CR).

Urine testing on the VETSCAN UA is intended to help evaluate chemical analytes in urine for the detection of kidney disease, lower urinary tract disease, and specific endocrine disease. It is meant to be utilized as part of the urinalysis in correlation with urine sediment examination, and other clinical diagnostics to obtain a complete evaluation of the disease process affecting the patient.

System Overview

The VETSCAN UA Kit (Fig. 1) package includes:

- UA Analyzer (Fig. 2)
- UA Printer (Fig. 3)
- Check Strips (2) –Strips for dry-use only verification of the instrument function (in plastic tube)
- AC Power Charger
- Printer Paper roll
- Y cable – Connection from instrument to AC power charger and printer
- Multiple plug adapters (available only for international package)

The VETSCAN UA analyzer works with the following consumables:

- VETSCAN UA10 and UA14 Urine Test Strips (sold separately)
- VETSCAN UA Controls (sold separately)

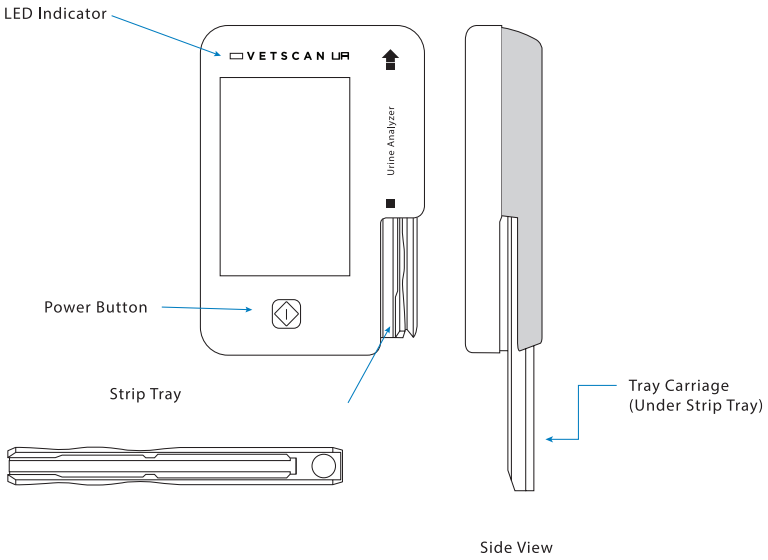


Fig. 2 UA Analyzer

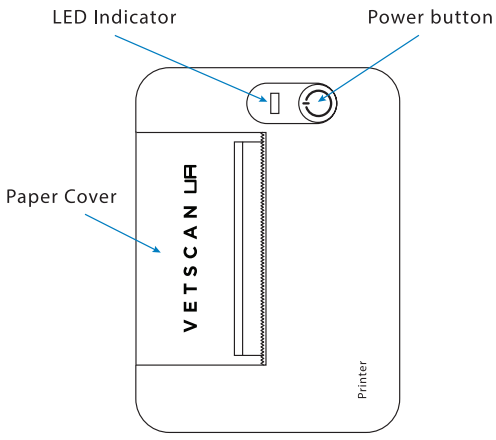


Fig. 3 UA Printer

How the VETSCAN UA Works

The UA analyzer is composed of optical-electronic sensor system, mechanism and I/V converter (Fig. 4)

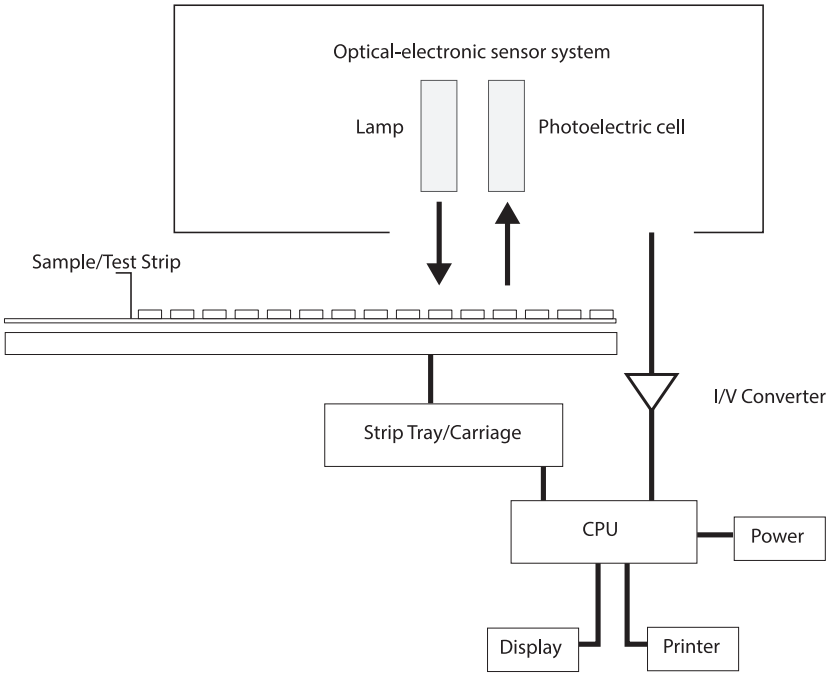


Fig. 4

The optical-electronic sensor system consists of a light source and a light receptor. The light from the light source falls on the reagent pads on the strip. The absorbance and reflectance vary with the color development of reagent pad. The degree of color development is proportional to the concentration of analyte in the urine. If the color of reagent pad is darker, more light is absorbed and less light is reflected, and vice versa.

The reflected light is transmitted into the optical-electronic sensor system where the optical signals are transformed into electric signals. Then, the electric signals are transformed by I/V converter, then processed by CPU.

Setting Up the VETSCAN UA

1. Connect Y cable to the UA analyzer, UA printer and AC power charger. (Fig. 5)

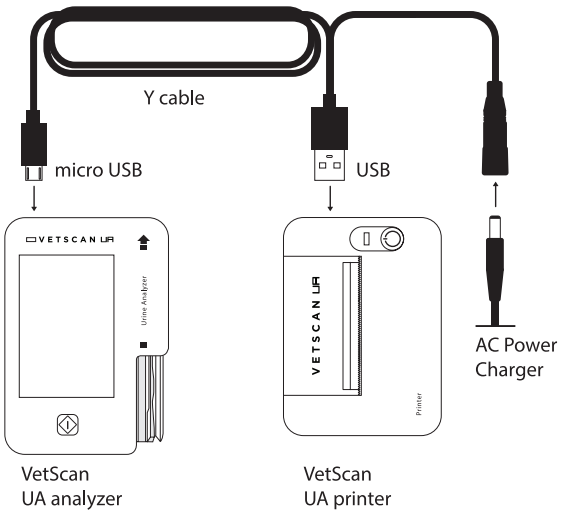


Fig. 5 Connect Y cable.

2. Install paper roll into printer. (Fig. 6)

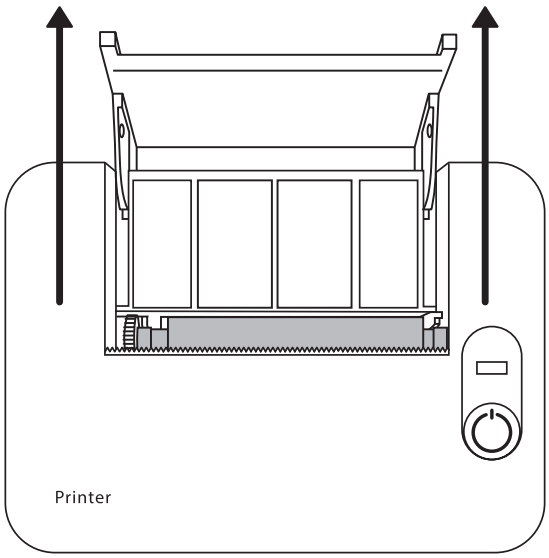


Fig. 6a Lift printer cover.

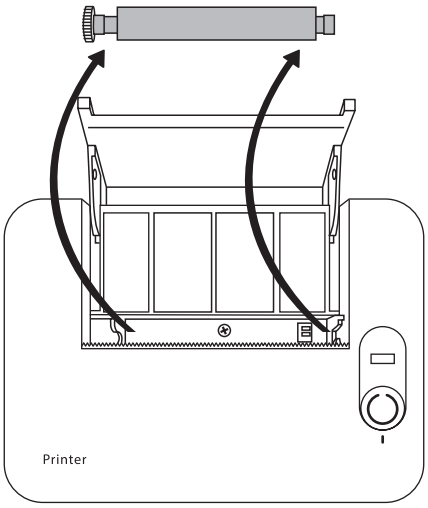


Fig. 6b Pull printer roller toward front and up to remove it.

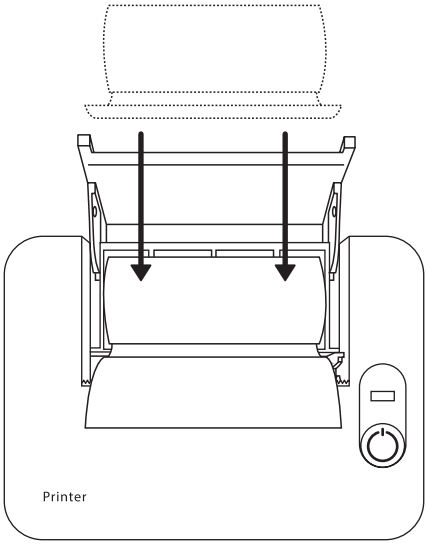


Fig. 6c Insert paper roll with paper rolling up the front of printer.

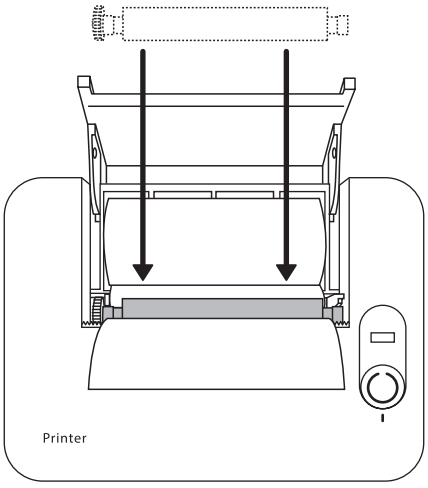


Fig. 6d Re-insert printer roller by inserting white gear first and snapping down right side.

3. Leave at least 7 cm in front of and behind the UA analyzer to allow for movement of the Strip Tray during operation. (Fig. 7)

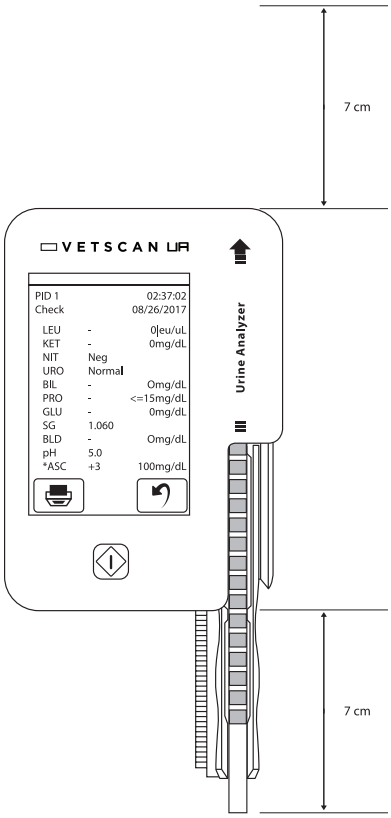


Fig. 7

4. To power on the UA analyzer, press and hold UA power button down for 3 seconds. Press UA printer power button once to power on the printer.

Introduction to the VETSCAN UA Menu

The VETSCAN UA menu consists of a mixture of icons and labeled buttons. The menu icons are described in Table 1 below.

Table 1. Table of Icons in VETSCAN UA Software

Icon	Description	
	Settings	Software menu for all settings
	Database	Results log for all previously run tests
	Test	Starts running of a test
	Enter	Enter key to save user-inputs
	Delete	Deletes the last character typed
	Back	Returns to previous screen
	Print	Command to print. Blue Printer button indicates printer is connected. Grey Printer button indicates that printer is not connected or not powered on
	Charging	Header icon indicates AC power operation, and battery charging, if red LED is lit power charging operation, battery being charged
	Battery	Header icon indicates battery operation and battery charge level
	Printer	Header icon indicated Auto-Print is ON
	USB Send	Manually send result to SA when UA is connected to SA

Settings Menu

Press buttons to toggle ON or OFF the various settings.

- **Time:** Changes date format from DD/MM/20YY to MM/DD/20YY
- **Auto-print:** Enables UA analyzer to automatically print results after a test is run, if a UA printer is connected
- **12-hour/24-hour Time Format:** Changes clock display to 12 or 24 hour format
- **English:** Language being displayed
- **Admin:** Password-protected Administrative settings
- **Items Choice:** Enables/disables measurement of parameters during a test (ON/OFF)
- **USB Send:** Displays status of setting for an automatic transmission of results from the micro-USB port
- **Unit (SI/CON):** Changes displayed Units for results between SI and Conventional

Home Screen & Test Menu

On the Home screen (Fig. 8), users can start the testing process and access other menus.

- **Strip Type**: Select type of Strip to be tested (UA14, UA10, Check)
- **Species**: Select animal species of the sample (Cat, Dog, Other, Control)
- **Patient ID (PID)**: Enter patient ID

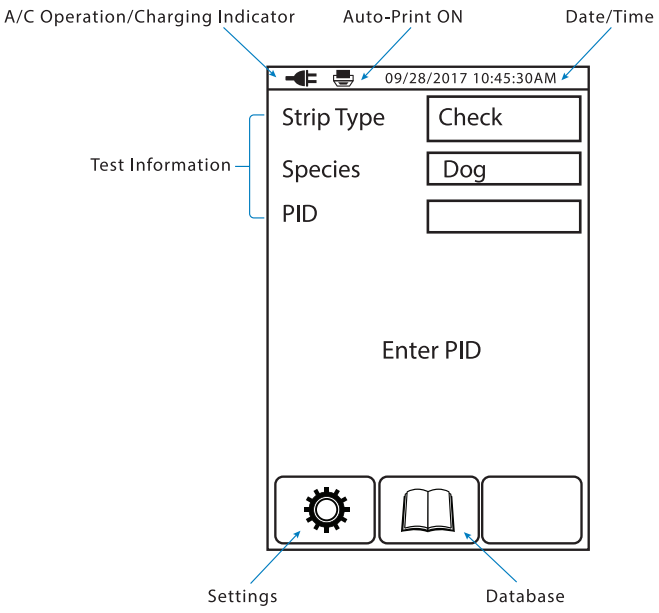


Fig. 8 VETSCAN UA Home screen

Running a Sample

Urine Sample Collection

Urine samples for use with the VETSCAN UA may be collected in each of three different ways.

- Cystocentesis: Insert a small needle into the bladder through the skin and draw urine sterilely into the syringe for sampling and culture, if needed.
- Free catch (mid-stream): Using a sterile urine collection jar, collect a mid-stream urine sample. Culture is not recommended for this type of sample.
- Catheter: Sterilely place a urinary catheter within the urethra and advance it into the bladder. Collect the sample using a sterile syringe.

Urine Sample Handling

Analyzing fresh, well-mixed urine will yield the most accurate results.[1] Do not centrifuge urine samples before use on the VETSCAN UA. Urine samples may be tested on the VETSCAN UA immediately after collection to up to one hour post collection, if stored at room temperature (59-77 °F, 15-25 °C) (Fig. 9 Ⓐ - Ⓑ). If they are not tested within one hour of collection, samples may be refrigerated (36-46 °F, 2-8 °C) for up to 4 hours. Cold samples must be warmed to room temperature (59-77 °F, 15-25 °C) prior to testing. (Fig. 9 Ⓒ).

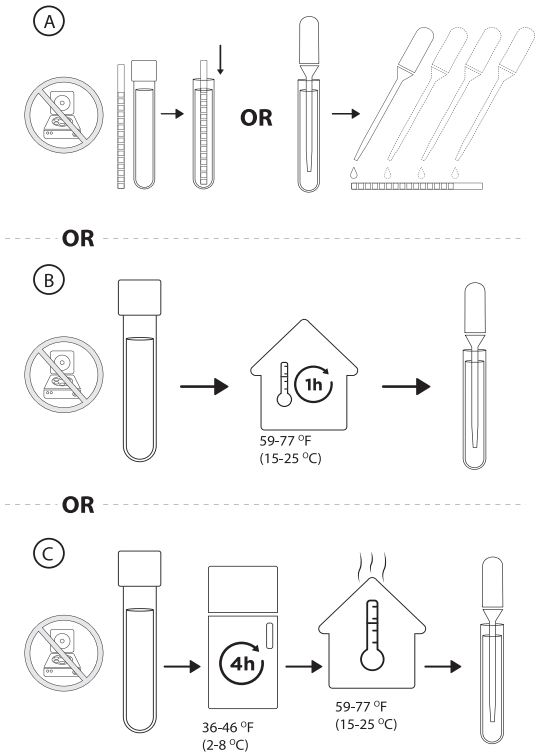


Fig. 9 Sample Handling for the UA: do not centrifuge samples. Samples may be
Ⓐ Tested immediately at room temperature.
Ⓑ Tested within an hour, at room temperature
Ⓒ Refrigerated for up to 4 hours and warmed to room temperature prior to testing.

1. Sink CA and Weinstein NM. Practical Veterinary Urinalysis. Ames, IA: John Wiley & Sons Inc. 2012

Materials needed for Testing

- VETSCAN UA analyzer
- Fresh room temperature (59-77 °F, 15-25 °C) urine sample
- Dropper/pipette (optional)
- Lint-free absorbent paper
- Gloves
- VETSCAN UA Test strip
- Printer (optional)

Set Up for Testing

1. Place the UA analyzer on a stable, flat surface in a room temperature environment (59-77 °F, 15-25 °C).
2. Power on UA analyzer (and printer, if desired).
3. Be sure to leave space at the ends of the UA to allow for movement of the Strip Tray. (Fig. 7)
4. Check that the Strip Tray is clean and dry before starting a test. Clean Strip Tray if needed (See Maintenance).

Running a Test

1. Remove a UA test strip from the tube. Do not touch pads on the Strip. Place the Strip with pads facing up on a clean paper towel or tissue. Tightly recap the tube immediately.

   CAUTION: Be sure to leave desiccant packs inside the Strip tube and to keep the tube tightly capped. Exposure to humidity will decrease the usable life of strips and may change results from strips exposed to humidity. Do not run expired Strips (those that were opened more than 90 days ago or have passed the expiration date).

2. Enter test information (Fig. 10)

   Select **Strip Type** (UA14, UA10 or Check). NOTE: selecting the correct Strip Type is important as the analyzer will only scan for the Strip Type selected. Select **Species** (Cat, Dog, Other, Control). Enter **Patient ID (PID) – PID**.

3. Press Test (Test Tube icon) button to start test.
4. Countdown timer appears. Perform the next three steps before the timer reaches 35. The Test strip must be placed on Strip Tray before timer reaches 35 (Fig. 10).

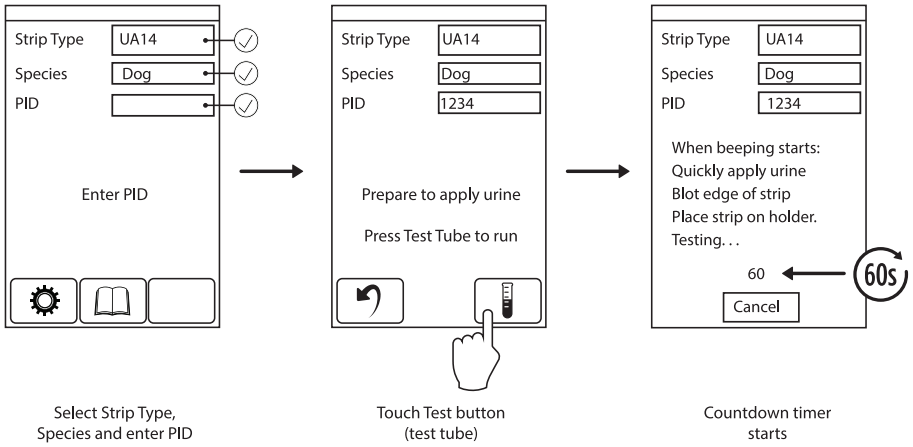


Fig. 10 Enter Patient Information

5. Mix urine sample well by inversion. (Fig. 11).

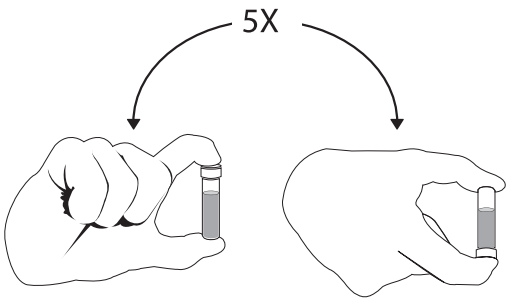


Fig. 11 Mixing Sample

6. Apply urine sample to strip. One method for application is to use a dropper pipette to drop urine over entire strip, completely wetting each pad. Do not leave excess urine on strip for more than 2 seconds (Fig. 12A). Alternatively, strip may be dipped into urine sample, completely wetting each pad. Remove the strip after 2 seconds (Fig. 12B).

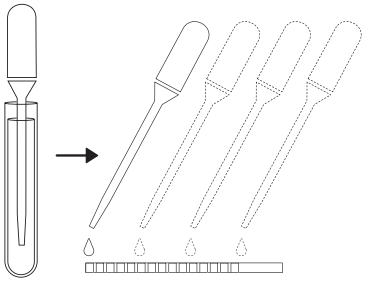


Fig. 12A

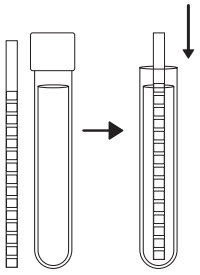


Fig. 12B

Fig 12 Two Ways to Apply Urine to Strips (A) Drop sample on strip (B) Dip strip into sample.

7. Blot long edge of strip on absorbent paper to remove excess urine. DO NOT blot the top surface of the pads to avoid contamination (Fig. 13). Work quickly to blot excess urine. Delays in blotting may affect results.

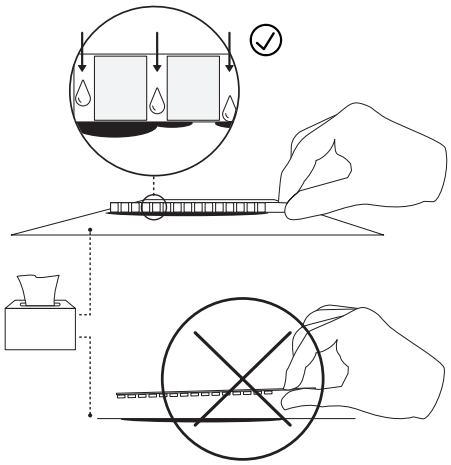


Fig. 13 Blotting long edge of strip.

8. Place strip on the UA Strip Tray. The end of the strip should align with the end of the trough in the Strip Tray, approximately where the top cover of the UA analyzer is indented (Fig. 14). **This step MUST be completed before the countdown timer reaches 35 as the Strip Tray will begin to slide into the analyzer.** The UA analyzer will time the reactions and scan when appropriate.

   WARNING! If the Strip Tray has already moved into the analyzer to start scanning before the strip is placed in the tray, the run must be canceled. For best results, a new strip will have to be wetted to restart the testing.

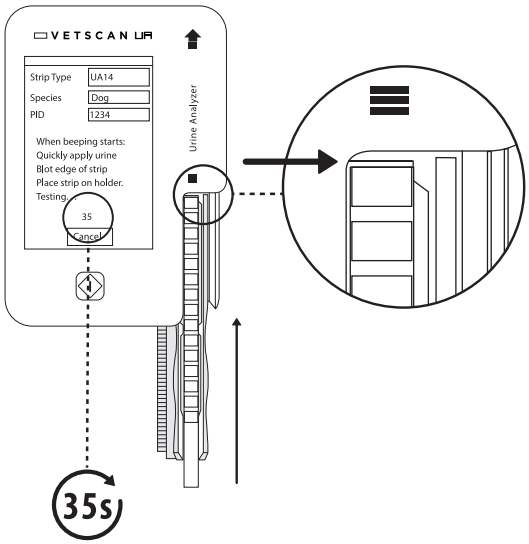


Fig. 14 Insert Strip onto Strip Tray.

9. Results will appear onscreen one minute after start of the test (Fig. 15). The UA analyzer will automatically print the results if Auto-Print is selected in the settings and the printer is connected and powered on. Results may be manually printed via the Printer button at the bottom left of the Results screen.

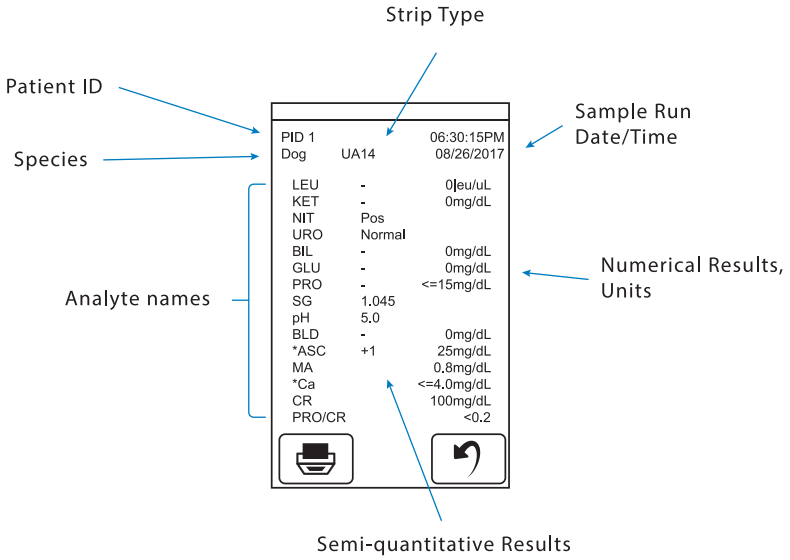


Fig. 15 UA Results screen.

In general, urine dipsticks including those for the VETSCAN UA contain a number of different parameters, some of which are not reliable or have not been well linked to disease processes in veterinary medicine. Parameters which should be ignored include nitrites, leukocytes, ascorbic acid, calcium and urobilinogen[1]. For improved precision, urine specific gravity is best assessed with a refractometer and color is best assessed visually. The primary use of CRE on the UA14 strip is for calculating the urine protein: creatinine ratio, and CRE should not be evaluated on its own.

1 Sink CA and Weinstein NM. Routine Urinalysis: Chemical Analysis In: Practical Veterinary Urinalysis. Ames, IA: John Wiley & Sons Inc. 2012. pgs. 29-53.

Reviewing Previous Results – Database

The VETSCAN UA analyzer stores up to 500 previously run tests.

Reviewing Stored Results

1. From the Home screen, touch the Database button (book icon). 
2. Use the two arrows on the right side to scroll through the Database. For faster scrolling, hold an arrow button down to skip through database by increments of ten (10) records at a time.
3. If a printer is connected, the Printer icon in the bottom left will be in blue/white. If it is disconnected, it will be greyed out.

   Printer button 
4. To print a stored result, scroll to the result in the database and press the printer button.
5. To exit the Database, touch the Back button. 

Maintenance

The UA analyzer and printer require very little maintenance, but to ensure longevity of the system and accuracy of results, they should be cleaned on a regular basis to remove any contaminating urine residue or debris that might interfere with proper function.

NOTE: For instructions on handling and cleaning biohazardous materials, consult the biosafety guidelines provided by your facility.

WARNING! The VETSCAN UA does not have any user serviceable parts inside the analyzer. Do not open the analyzer as opening the analyzer will void the warranty. Contact Zoetis Technical Support if you suspect a problem inside the analyzer.

Cleaning the Strip Tray

1. It is important to clean the Strip Tray after each use to prevent cross-contamination of strips by residue from previous urine samples. The Strip Tray sits on top of the Tray Carriage, which should not be pulled out of the analyzer. (Fig. 16)

   WARNING! The Strip Tray directly contacts urine samples and should be handled with the same biohazard precautions as veterinary patient samples.

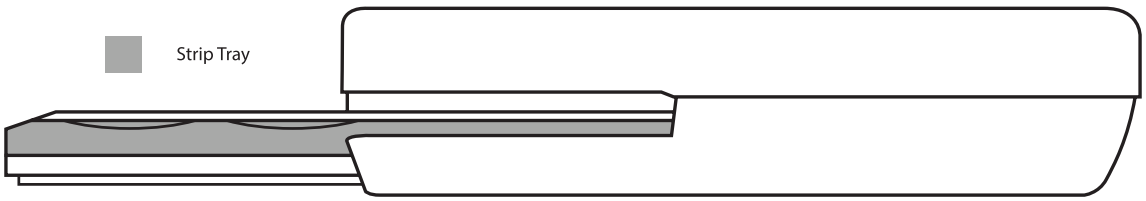


Fig. 16 The Strip Tray sits atop the Tray Carriage. The Tray Carriage should not be removed during cleaning of the Tray

2. To clean the Strip Tray, first power on the UA analyzer. Remove the Strip Tray by grasping the upper right side of the tray (Fig. 17A). Lift up and gently pull Strip Tray (but not the Tray Carriage) in the direction shown (Fig. 17B). The Strip Tray should lift off easily.

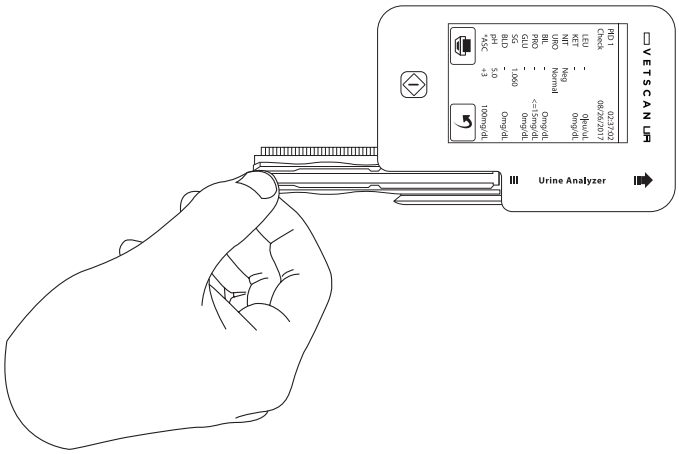


Fig. 17A

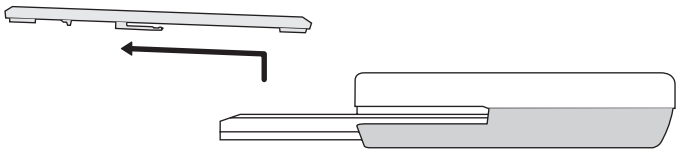


Fig. 17B

Fig. 17 Removing the Strip Tray. A) Grasp corner of Strip Tray B) Lift up and gently pull

3. Clean the Strip Tray using alcohol wipes or a lint free tissue with mild soap and water to remove all residual urine (Fig. 18). Rinse with water to remove any cleaning substance which may affect results. Never use corrosive cleaners, abrasive detergents or rough material that may damage the surface. Cleaning the perimeter of the inner tray will prolong the useful life of the system. Allow Strip Tray to completely dry prior to replacing it into the analyzer.

Fig. 18 Wipe Urine Residue from Strip Tray

4. Replace Strip Tray into the analyzer. Insert the end with the white dot first, aligning the guides on the bottom of the Strip Tray with the slots in the Tray Carriage (see arrows, Fig. 19). Tray will gently snap into place.

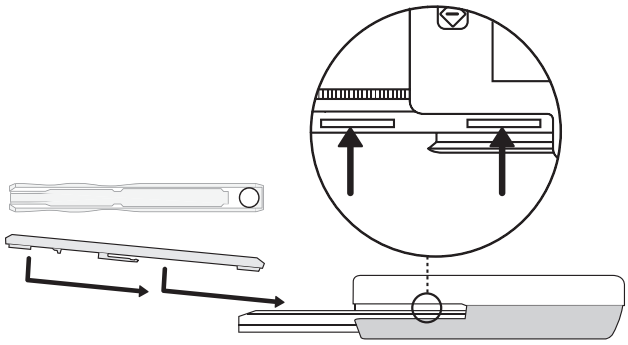


Fig. 19 Re-insert Strip Tray

5. If the Carriage is soiled and requires cleaning, contact Zoetis Technical Support.

Cleaning the VETSCAN UA Analyzer

1. Wipe the analyzer clean with a soft cloth or towel to remove dust and residue. Do not allow moisture to get onto the touch screen.

   WARNING! The VETSCAN UA does not have any user serviceable parts inside the analyzer. Do not open the analyzer as opening the analyzer will void the warranty. Contact Zoetis Technical Support if you suspect a problem inside the analyzer.

   WARNING! Do not blow high pressure air into the inside of the analyzer to clean it.

   WARNING! To prevent electrical shock, always turn off and unplug the UA analyzer before cleaning it. Unplug the power supply from the wall or disconnect the UA analyzer from the Y cable. Do not obstruct the power supply.

Running a Check Strip

1. A Check Strip is an artificial test strip that is intended to be run DRY, with no sample or liquid, in order to test the UA analyzer for proper operation. Run a Check Strip if the analyzer is being used for the first time, has not been used for more than 1 year, or is providing unexpected results. Two (2) identical Check Strips are provided with the VETSCAN UA analyzer kit. Only use Check Strips that are undamaged, not discolored and are not broken.

2. Clean the Strip Tray if it is wet or has urine residue to prevent contamination of the Check Strips. (See Cleaning the Strip Tray)

3. Carefully remove a Check Strip from the tube to prevent contamination of the strip. (Fig. 20)

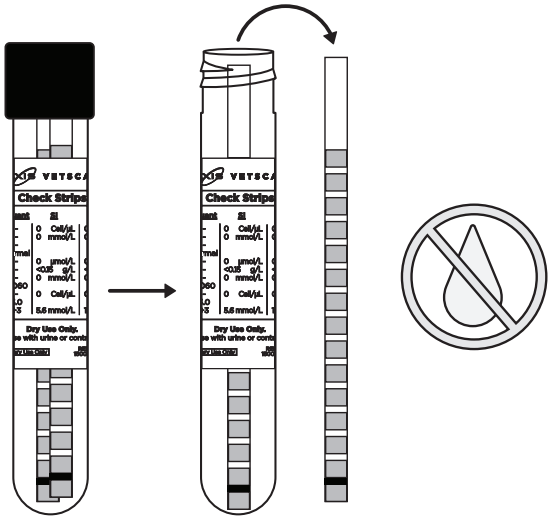


Fig. 20 Check Strip tubel and strip

4. With the UA analyzer powered on, select Check for **Strip Type** and enter “0” for **Patient ID (PID)** on the Home screen. (Fig. 21). The **Species** field will be ignored when the **Strip Type** is Check. Press the **Test** button and place Check Strip onto Strip Tray, aligning end of the Check Strip with the edge of the upper cover of the UA analyzer (see arrow, Fig. 21). DO NOT wet the Check Strip. The analyzer will run the Check Strip.

   CAUTION: DO NOT use the Check Strip if it is wetted. Contact Zoetis to order Checks Strips to replace wetted ones.

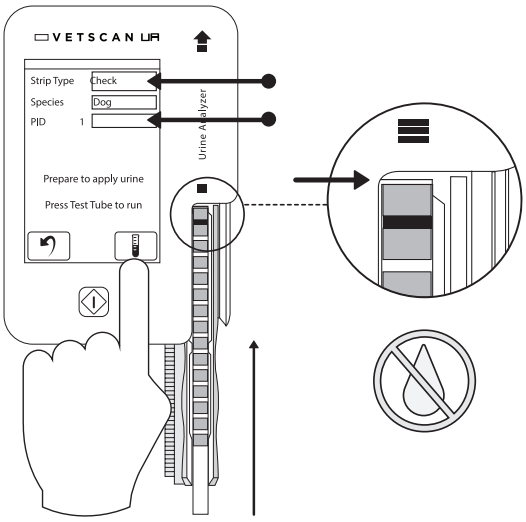


Fig. 21 Starting a Check Strip test

5. When testing is completed, compare the onscreen results with those on the label on the Check Strip tube. (Fig. 22) If the results match, the analyzer is fit for analyzing samples. If the results do not match, run the second Check Strip (provided) to be sure the first strip is not damaged.

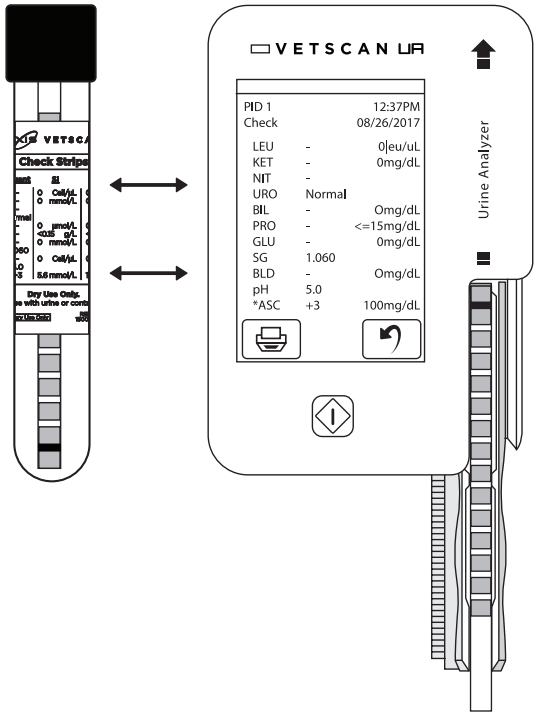


Fig. 22 Compare Check Strip results with Tube Label

6. Replace Check Strip into the tube for future use. Be sure that it is not contaminated with any urine residue from the Strip Tray before placing into the tube. Check Strips may be used indefinitely, as long as they are not damaged or discolored.

Running UA Controls

1. UA Controls are liquid control samples used to check the performance of the entire VETSCAN UA analyzer system (UA analyzer and strips). UA controls kits contain two levels of control solution, Control I (negative control) and Control II (positive control). Run UA test strips with UA control samples (one strip for each of the UA controls) if the analyzer has been inactive for more than one year or if the analyzer is producing unexpected results. NOTE: Running at least the Control II with one strip from each new tube is a good practice when switching to a new lot of strips.

2. Remove UA Controls from the refrigerator prior to use to allow controls to warm to room temperature (59-77 °F, 15-25 °C), typically about 15 minutes. Record the date of opening on the box if this is the first use of the kit.

3. To run UA Controls, prepare to run a sample as normal, by selecting the **Strip Type** and selecting Dog for **Species**. The UA Controls may be used on both UA10 and UA14 strips. Enter **PID**. Touch the **Test** button to start the timer. (Fig. 23)

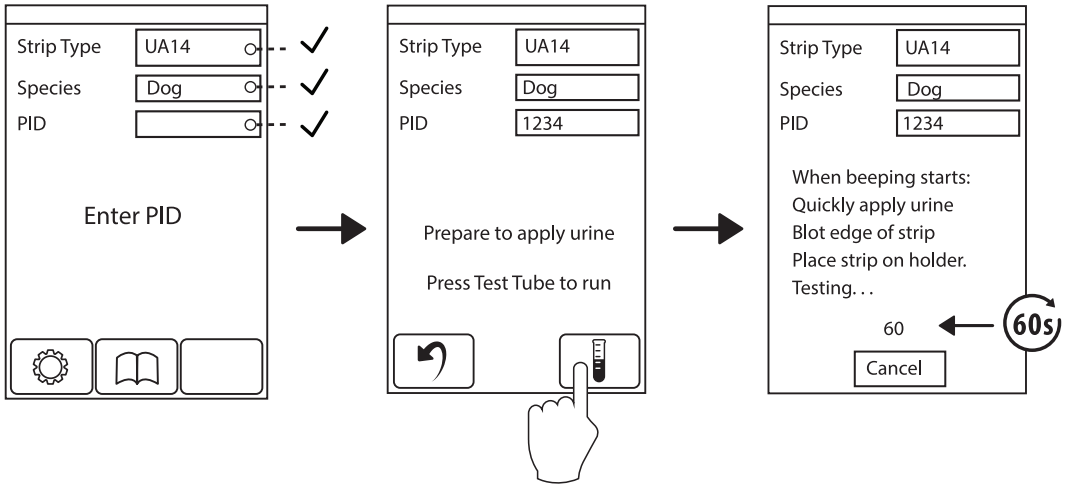


Fig. 23 Select Info for Running Controls – Select Strip Type and Species

4. Remove one UA test strip from the tube. *Tightly recap the tube immediately*.

5. Wet one strip with liquid from Control I bottle by squeezing the liquid from the dropper bottle onto the strip, about a drop per pad. Do not leave excess Control on strip for more than 2 seconds. Do not use expired strips or strips from a tube that was first opened more than 90 days ago. Do not use strips that are discolored or damaged.

   CAUTION: Steps 4-6 must be performed before the timer counts down to 35.

6. Blot long edge of strip on lint-free absorbent paper to remove excess Control liquid.

7. Place strip on the Strip Tray and push the strip forward to the notch or “stop”. The end of the strip should stop at the indent in the top cover of the UA analyzer, as with normal sample runs. (Fig. 24) **This step should be completed before the countdown timer reaches 35.** The UA analyzer will time the reactions and scan when appropriate.

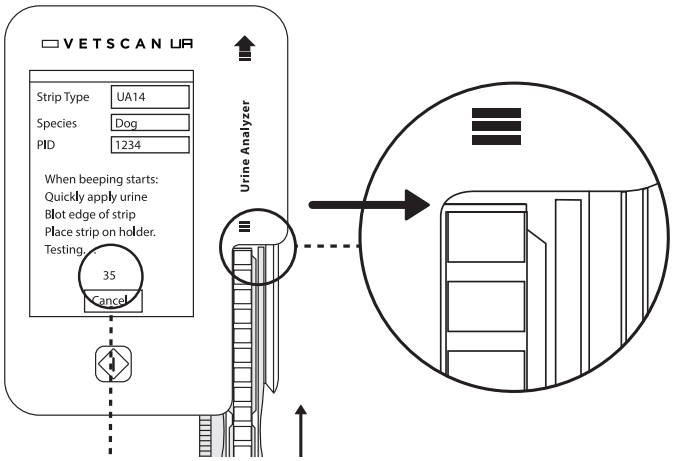


Fig. 24 Place strip onto Strip Tray

8. Results will appear onscreen when they are completed.

9. Compare results to values on UA Controls Package Insert.

10. Repeat steps 4 – 7. with a second UA test strip and the bottle of Control II. Results should match the values on the Controls Package insert. If they do not match, check that strips are not expired and that the strips have not been exposed to humidity (evidenced by discoloration). Contact Zoetis Technical Support if the control results do not match expected Control values after running them twice.

Appendix A: Troubleshooting

The VETSCAN UA instrument hardware is not intended to be serviced by operators. Any UA instrument that requires servicing should be returned to Zoetis for repair or replacement. Do not open the analyzer as opening the analyzer will void the warranty. Contact Zoetis Technical Support if you suspect a problem inside the analyzer.

Frequently Asked Questions?

1. What if I get an Error code screen?

   - Follow the recovery instructions onscreen (and see Appendix C for additional troubleshooting steps).

2. The Strip Tray moved before I put the wetted strip on it. Can I still run the strip?

   - Best practice is to re-run the entire test again by applying sample to a new strip as the timer ensures that reactions are run to the same standard each time a sample is run.

3. How does running a cold strip or a cold sample affect my results?

   - In general, results will be falsely lowered. For example, LEU, GLU, CR will all be falsely decreased with cold samples and/or cold strips. BIL and URO will also be decreased with cold samples.

4. If I accidentally pull the Tray Carriage out, how do I replace it?

   The Tray Carriage may be mistakenly removed when pulling out the Strip Tray. The analyzer will not function properly when the Tray Carriage is removed.

   - If the Tray Carriage is mistakenly pulled out of the analyzer and Error-7 is displayed on the screen and the Carriage is still partially in the analyzer, simply push the Tray Carriage into the analyzer by 1 cm and then power off. The analyzer will pull the Carriage to home position and recover.
   - If the Carriage is mistakenly completely removed from the analyzer, power the analyzer off. Remove the Strip Tray from the Carriage (see Cleaning the Strip Tray).
   - Position Carriage so that the gears are on the left, with the tab pointing straight up (Fig. 25).
   - Insert the Carriage into the analyzer, inserting the tab into the notch in the white case (Fig. 26A). A notch in the blue case should fit into the bottom of the carriage (Fig. 26B).
   - Gently push Carriage into the analyzer with increasing force until the Carriage is caught by the gears (push in about one cm).
   - Replace Strip Tray.
   - Power analyzer ON and OFF and ON again to allow Carriage to move to home position. Analyzer should be ready to run samples. Contact Zoetis Technical Support for more information on this process.

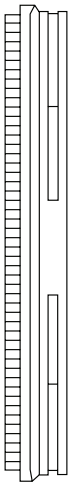


Fig. 25 Position Strip Tray with gear teeth to Left and tab pointed up.

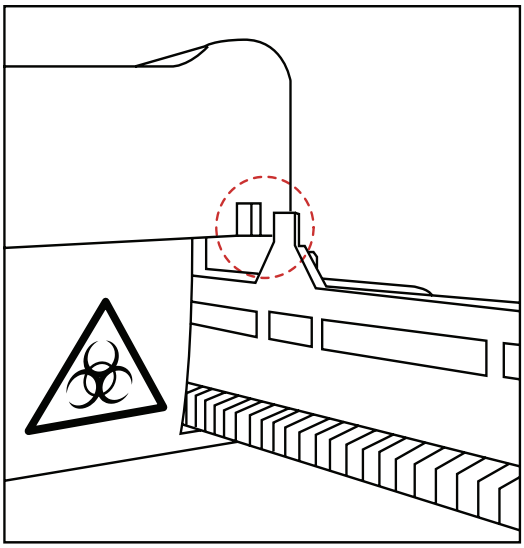


Fig. 26A

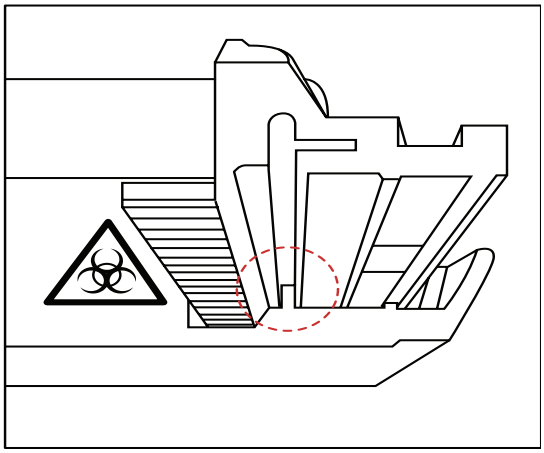


Fig. 26B

Fig. 26 A) Insert Carriage Tab B) Insert blue notch in Carriage

Zoetis Resources

Zoetis provides many resources for animal health laboratories and hospitals. The Zoetis website (www.Zoetis.com) contains useful information for running the VETSCAN UA Urine Analyzer and the VETSCAN UA test strips. It also contains links to technical notes, manuals, product information, and technical support information as well as technical resources on a variety of applications related to the VETSCAN UA analyzer.

Resource	How to Contact
Local Authorized Zoetis Distributors	Find local Zoetis authorized Distributors on the Zoetis website (www.Zoetis.com).
Technical Information	Find technical information, package inserts and manuals on the Reference Center on the Zoetis website (www.Zoetis.com).
Technical Support	For technical support assistance in the United States and Canada, call 1-800-822-2947 (toll-free phone), and select option 2. For Rest of World, dial +49 6155 780 210 or contact local Zoetis distributor.

Appendix B: UA Results Bins

Analyte	Result Type	Species	Semi-Quantitative Symbol and Concentration								
LEU	Semi-Quantitative	*	-	+/-	+1	+2	+3				
	Cell/µL (CON)	*	0	15	70	125	500				
	Cell/µL (SI)	*	0	15	70	125	500				
KET	Semi-Quantitative	*	-	+/-	+1	+2	+3				
	mg/dL (CON)	*	0	5	15	40	≥80				
	mmol/L (SI)	*	0	0.5	1.5	4	≥8.0				
NIT	Semi-Quantitative (CON)	*	-	+							
	Semi-Quantitative (SI)	*	-	+							
URO	Semi-Quantitative	*	Normal	+1	+2	+3					
	mg/dL (CON)	*		2.0	4.0	≥8.0					
	µmol/L (SI)	*		33	66	≥131					
BIL	Semi-Quantitative	*	-	+1	+2	+3					
	mg/dL (CON)	*	0	0.5	2	6					
	µmol/L (SI)	*	0	8.6	33	100					
GLU	Semi-Quantitative	*	-	+/-	+1	+2	+3	+4			
	mg/dL (CON)	*	0	50	100	250	500	≥1000			
	mmol/L (SI)	*	0	2.8	5.5	14	28	≥55			
PRO	Semi-Quantitative	*	-	+/-	+1	+2	+3				
	mg/dL (CON)	*	<15	15	30	100	300				
	g/L (SI)	*	<0.15	0.15	0.3	1	3				
SG	(no units)	*	1.000	1.010	1.015	1.020	1.030	1.040	1.045	1.050	1.060
pH	(no units)	*	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
BLD	Semi-Quantitative	*	-	+/-	+1	+2	+3				
	Cell/µL (CON)	*	0	10	25	80	200				
	Cell/µL (SI)	*	0	10	25	80	200				
ASC	Semi-Quantitative	*	-	+/-	+1	+2	+3				
	mg/dL (CON)	*	0	10	25	50	100				
	mmol/L (SI)	*	0	0.6	1.4	2.8	5.6				
MA	mg/dL (CON)	*	<2.5	≥2.5							
	mg/L (SI)	*	<25	≥25							
Ca	mg/dL (CON)	*	≤4.0	10	20	30	≥40				
	mmol/L (SI)	*	≤1.0	2.5	5	7.5	≥10				
CR	mg/dL (CON)	*	≤	50	100	200	≥300				
	mmol/L (SI)	*	≤0.9	4.4	8.8	17.6	≥26.4				
PRO/ CR	(no units) CON & SI same	Dog & Other	<0.2	≥0.2 to <0.5	≥0.5 to <2.0	≥2.0					
		Cat	<0.2	≥0.2 to <0.4	≥0.4 to <2.0	≥2.0					
Color	(no units)	*	Transparent	Yellow	Orange	Red	Green	Other			

*Not applicable

In general, urine dipsticks including those for the VETSCAN UA contain a number of different parameters, some of which are not reliable or have not been well linked to disease processes in veterinary medicine. Parameters which should be ignored include nitrites, leukocytes, ascorbic acid, calcium and urobilinogen.[1] For improved precision, urine specific gravity is best assessed with a refractometer and color is best assessed visually. The primary use of CRE on the UA14 strip is for calculating the urine protein: creatinine ratio, and CRE should not be evaluated on its own.

1. Sink CA and Weinstein NM. Routine Urinalysis: Chemical Analysis In: Practical Veterinary Urinalysis. Ames, IA: John Wiley & Sons Inc. 2012. pgs. 29-53.

Appendix C: Error Codes

Error Code	Description	Remedy
Error-1	Strip Tray not detected, dirty or IR LED has failed	Check that Strip Tray is correctly inserted, with white dot at top. Power cycle the analyzer to recover. If failure repeats, remove Strip Tray and clean white dot with alcohol and replace. If error continues call Zoetis Technical Support
Error-2	Strip Tray not detected, dirty or Red LED has failed	Check that Strip Tray is correctly inserted, with white dot at top. Power cycle the analyzer to recover. If failure repeats, remove Strip Tray and clean white dot with alcohol and replace. If error continues call Zoetis Technical Support
Error-3	Strip Tray not detected, dirty, or Green LED has failed	Check that Strip Tray is correctly inserted, with white dot at top. Power cycle the analyzer to recover. If failure repeats, remove Strip Tray and clean white dot with alcohol and replace. If error continues call Zoetis Technical Support
Error-4	Reagent strip in incorrect position on Strip Tray	Re-run test with a new strip, placing strip against the stop. Ensure the top end of the strip is at the stop and not short of or beyond the stop position If the error repeats, run a Check Strip. If error occurs with Check Strip, call Zoetis Technical support
Error-5	Incorrect strip type selected	Change Strip Type setting to match the type of strip being used. Run new test. For example, check that Strip Type is set to UA14 Strip Type on Home Screen, if using UA14 strips, etc. If the error repeats, run a Check Strip. If error occurs with Check Strip, call Zoetis Technical support
Error-6	No strip detected	Place a new strip in analyzer and retest. If the error repeats, run a Check Strip. If error occurs with Check Strip, call Zoetis Technical support
Error-7	Carriage not engaged in analyzer or hardware failure of carriage motor/sensor system.	Check the Strip Tray is correctly inserted, with white dot at top. Power cycle the analyzer to recover. If failure repeats, remove Strip Tray and clean white dot with alcohol and replace. If error continues, call Zoetis Technical Support.
Error-8	Strip Tray not detected, dirty or Blue LED has failed.	Check that Strip Tray is correctly inserted, with white dot at top. Power cycle the analyzer to recover. If failure repeats, remove Strip Tray and clean white dot with alcohol and replace. If error continues call Zoetis Technical Support.

Appendix D: Interfering Substances

The table below should not be considered exhaustive, but a guide for interpretation of results.

As with all chemical reactions, temperature of the sample, strips or ambient air is important for accurate results and all UA strip tests should be performed at room temperature with room temperature (59-77 °F, 15-25 °C) reagents and samples.

Substance	Parameter(s) Affected	Effect
High glucose	LEU	Decreased LEU
Naphthyl ethylenediamine hydrochloride	BIL, URO	Increased BIL Increased URO
High specific gravity	LEU, KET, GLU, BLD, CR, PRO, MA	Decreased LEU Increased KET Decreased GLU Decreased BLD Increased CR Increased PRO Increased MA
Cephalexin, Cephalothin, tetracycline	LEU	Decreased LEU
Low pH	KET, LEU, SG	Increased KET Increased SG Decreased LEU
High pH	PRO, CR, LEU, SG	Increased PRO Increased CR Increased LEU Decreased SG
Red or darkly colored urine	KET, URO, BLD	False positive KET False positive URO Decreased BLD
Vitamin C (Ascorbic acid)	NIT, BIL, BLD, GLU	Decreased NIT Decreased BIL Decreased BLD Decreased GLU
Hypochlorite	GLU, BLD	Increases GLU Increased BLD
Peroxide	GLU	Increases GLU
High protein	SG	Increased SG
Reducing agents	ASC	Increased ASC
High CR	MA	Increased with very high CR
High Hemoglobin	MA, PRO	Increased with very high Hemoglobin
High Mg Concentration	Ca	Increased Ca
Microbial peroxidase	BLD	Increased BLD

Appendix E: VETSCAN UA Analyzer and Printer Specifications

Analyzer Specifications

- Measuring Principle: Reflectance photometry
- Measurement Wavelength: 470 nm, 550 nm, 620 nm, 720 nm
- Sample Supply Method: Manual dipping or dropper onto the test strip
- Throughput: approximately 60 tests / hour
- Reaction Time: About 60 seconds/test
- Display: Touch screen, which allows entry for Reagent Strips type, Species, and Patient ID for each test, as well as User Settings and Database review, and displays test results and allows printing.
- Database Memory: Stores up 500 samples.
- Specific Gravity Correction: Automatically corrected based on pH readings.
- Chromaturia Correction: Automatically corrected by color correction test pad.
- Data Output: Printing of results or view on screen display only. No data transmission to PC is currently supported.
- Dimension: 120 mm x 83 mm x 31 mm (L x W x H).
- Weight: 180 g.
- Power Supply: The instrument: 5 V, 3 A. The AC adapter: Input: 100 V - 240 V~, 50/60 Hz.
- Power Consumption: 5 W instrument

Printer Specifications

- Printer: Thermal line printer
- Printer Paper: Thermal paper
- Dimension: 110 mm x 80 mm x 38 mm (L x W x H)
- Weight: 180 g (without paper roll)
- Operating Voltage Range: 5 V
- Power Supply: Printer: 5 V, 3 A. The adapter: Input: 100 V - 240 V~, 50/60 Hz
- Power Consumption: 6 W
- Paper roll capacity – 50 to 55 results per roll

Conditions for Use

Environmental Condition	**Approved Usage Conditions**
Temperature	59 - 86 °F (15-30°C)
Humidity	≤ 80% (Recommended), non-condensing
Location	Indoor use only
Rated Input power	100 V - 240 V~, 50/60 Hz
UA Analyzer	5 V, 3 A, input power
UA Printer	5 V, 3 A, input power

Appendix F: Safety and Regulatory Compliance

Safety Warning Labels

Warning labels posted on the analyzer and in this manual warn you about potential sources of injury or harm. Refer to the Symbols Table to review the meaning of each safety warning label.

Use only the provided power supply and cable when connecting the UA analyzer and printer.

The UA analyzer and the printer have been tested and found to be in compliance with all applicable requirements of the following safety and electromagnetic standards:

Safety Compliance

- IEC 61010-1:2010 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, Part 1: General Requirements
- IEC 61010-2-081:2015 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory use, Part 2-081: Particular Requirements for automatic and semi-automatic laboratory equipment for analysis and other purposes
- CAN/CSA-C22.2 No. 61010-1-12 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 1: General Requirements
- UL 61010-1:2012 Safety Requirements for Electrical Equipment For Measurement, Control, And Laboratory Use – Part 1: General Requirement

Electromagnetic Compatibility (EMC)

- IEC 61326-1:2012 Electrical Equipment for Measurement Control and Laboratory Use – EMC Requirements – Part 1: General Requirements, Class A
- EN61326-1:2013 Electrical Equipment for Measurement Control and Laboratory Use – EMC Requirements – Part 1: General Requirements, Class A
- EN 61326-2-6:2013 Electrical Equipment for Measurement, Control And Laboratory Use – EMC Requirement- Part 2-6: Particular Requirements – In Vitro Diagnostic (IVD) Medical Equipment
- FCC Part 15 Subpart B:2016

FCC Warnings and Notes

- Warning: Changes or modifications to this unit, not expressly approved by Zoetis, could void the user's authority to operate the equipment.
- Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable production against harmful interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference, at his own expense.
- Note regarding FCC compliance. Although this instrument has been tested and found to comply with Part 15, Subpart B of the FCC Rules for a Class A digital device, please note that this compliance is voluntary, in regard to the cited FCC regulations in effect at the time of manufacture.
- Note regarding Canadian EMC compliance: This digital apparatus does not emit radio noise exceeding the limits for class A digital apparatus prescribed in the Radio Interference Regulations made by the Department of Communications of Canada.

Battery

The VETSCAN UA Analyzer uses a 3.7 V lithium ion rechargeable cell battery to run the system in the event of AC power loss. When not connected to the AC Charger, the UA will automatically operate by battery power, the LED will be off and the battery icon will appear to indicate the charge on the battery. When connected to AC Charger, the Red LED will illuminate while the battery is charging and turn off after the battery is fully charged. The plug icon on the screen header will continue to indicate that the UA is operating off AC power.

The battery should fully charge within 5 hours when it is new. A full battery charge will allow analyzer testing for up to 200 tests. After repeated charging, the battery may lose its ability to hold a charge.

If less than 100 tests are received on a full charge, it may be an indication that the battery is getting weak. If this occurs, the analyzer may be run off AC power. Contact Zoetis Technical Support (See "Zoetis Resource" section) for assistance in replacing the battery.

> **Warning!** Contact Zoetis technical support when attempting to replace the battery. Do not attempt to change the battery on without Zoetis support.

Perchlorate material – lithium battery contains perchlorate. Special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate.

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Kalamazoo, MI 49007, USA

Zoetis Belgium S.A.
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