IDEXX **LaserCyte*** **Dx**/IDEXX **LaserCyte***
Hematology Analyzer Operator's Guide

IDEXX
LABORATORIES

Contents

Preface

Safety Precautions

Both the LaserCyte* Dx Hematology Analyzer and LaserCyte* Hematology Analyzer contain two internal lasers and are categorized as Class 1 laser products.

- Under normal operating conditions, no laser light is emitted from the analyzer's protective housing. To avoid the possibility of any laser light exposure, ensure that all operating instructions are followed and that the instrument, specifically its doors and housings, remain closed while the analyzer is operating.

- To reduce the risk of serious personal injury or equipment damage, never remove the cover of the LaserCyte Dx or LaserCyte analyzer without IDEXX Technical Support assistance.

- Operating this product with protective housing and/or doors that are damaged or otherwise not in good operating condition may expose the user and others to laser radiation. If laser light is observed or detected, discontinue use of the product immediately and contact IDEXX Technical Support.

Position the analyzer so that the power switch and power cord are easily accessible.

DO NOT stack other equipment or containers on top of the analyzer.

Keep analyzer away from sources of heat or flames.

DO NOT place or operate the analyzer near x-ray equipment, photocopiers, or other devices that generate static or magnetic fields.

PROTECT your equipment from damp conditions or wet weather.

Take care not to spill water or other fluids on the unit.

DO NOT use any of the following liquids, abrasives, or aerosol sprays on or near the analyzer, as they may damage the outer case and may adversely affect results:

- Organic solvents

- Ammonia-based cleaners

- Ink markers

- Sprays containing volatile liquids

- Insecticides

- Polish

- Room freshener

Line voltage for the LaserCyte Dx and LaserCyte analyzers is 100–240 V AC, 50/60 Hz. Be sure to plug all equipment into properly grounded electrical outlets.

Use only the power cable supplied. Disconnect the power cable:

- If the cable becomes frayed or otherwise damaged.

- If anything is spilled onto the analyzer.

- If your analyzer is exposed to excessive moisture.

- If your analyzer is dropped or the case has been damaged.

The LaserCyte Dx and LaserCyte analyzers should only be used as described in this guide. Failure to follow these instructions may adversely affect results as well as the safety features of the analyzer.

International Symbol Descriptions

International symbols are often used on packaging to provide a pictorial representation of particular information related to the product (such as expiration date, temperature limitations, batch code, etc.). IDEXX Laboratories has adopted the use of international symbols on our analyzers, product boxes, labels, inserts, and manuals in an effort to provide our users with easy-to-read information.

Symbol	Description	Symbol	Description
	Use by A utiliser avant Verwendbar bis Usare entro Usar antes de 使用期限		**Temperature limitation** Température limite Zulässiger Temperaturbereich Temperatura limite Limitación de temperatura 保存温度（下限）
LOT	**Batch code (Lot)** Code de lot (Lot) Chargenbezeichnung (Partie) Codice del lotto (partita) Código de lote (Lote) ロット番号		**Upper limit of temperature** Limite supérieure de température Temperaturobergrenze Limite superiore di temperatura Limite superior de temperatura 保存温度（上限）
SN	**Serial number** Numéro de série Seriennummer Numero di serie Número de serie シリアル番号	i	**Consult instructions for use** Consulter la notice d'utilisation Gebrauchsanweisung beachten Consultare le istruzioni per l'uso Consultar las instrucciones de uso 取扱説明書をご参照ください。
REF	**Catalog number** Numéro catalogue Bestellnummer Numero di catalogo Número de catálogo 製品番号		**Keep away from sunlight** Conserver à l'abri de la lumière Vor direkter Sonneneinstrahlung schützen Mantener alejado de la luz solar Tenere lontano dalla luce diretta del sole 遮光してください。
EC REP	**Authorized Representative in the European Community** Représentant agréé pour la C.E.E. Autorisierte EG-Vertretung Rappresentante autorizzato nella Comunitá Europea Representante autorizado en la Comunidad Europea EC内の正規販売代理店		**WEEE Directive 2002/96/EC** Directive 2002/96/CE (DEEE) WEEE-Richtlinie 2002/96/EG Directiva 2002/96/CE RAEE Direttiva RAEE 2002/96/CE 廃電気電子機器指令（WEEE Directive 2002/96/EC）
	Manufacturer Fabricant Hersteller Ditta produttrice Fabricante 製造元		**Biological risks** Risques biologiques Biogefährlich Rischi biologici Riesgos biológicos 生物学的リスク
⚠	**Caution, consult accompanying documents** Attention, consulter les documents joints Achtung, Begleitdokumente beachten Attenzione, consultare la documentazione allegata Precaución, consultar la documentación adjunta 注意、添付文書をご参照ください。		**Do not reuse** Usage unique Nicht wiederverwenden No reutilizarw Non riutilizzare 再利用しないでください。

Symbol	Description	Symbol	Description
	Caution, hot surface Attention, surface très chaude Precaución, superficie caliente Vorsicht, heiße Oberfläche Attenzione, superficie rovente 高温注意		**Electrostatic-sensitive device** Appareil sensible aux charges éléctrostatiques Dispositivo sensible a descargas electrostáticas Gerät ist sensibel auf elektrostatische Ladung Dispositivo sensibile alle scariche elettrostatiche 静電気の影響を受ける装置
	Keep dry Conserver dans un endroit sec Mantener seco Vor Nässe schützen Tenere al riparo dall'umidità 濡らさないこと。		**Fragile** Fragile Frágil Zerbrechlich Fragile 取扱注意
	This side up Haut Este lado hacia arriba Diese Seite nach oben Alto この面を上にする。		**Date of manufacture** Date de production Fecha de producción Herstelldatum Data di produzione 製造年月日:
GHS P 304	**IF INHALED:** EN CAS D'INHALATION: EN CASO DE INHALACIÓN: BEI EINATMEN: IN CASO DI INALAZIONE: 吸引した場合	**GHS P 312**	**Call a POISON CENTER or doctor/ physician if you feel unwell** Appeler un CENTRE ANTIPOISON ou un médecin en cas de malaise. Llamar a un CENTRO DE INFORMACION TOXICOLOGICA o a un médico en caso de malestar Bei Unwohlsein GIFTINFORMATIONSZENTRUM oder Arzt anrufen In caso di malessere, contattare un CENTRO ANTIVELENI o un medico 気分が悪くなった時は医師に連絡すること
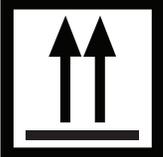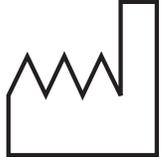
Symbol	Description
GHS H 303/313/333	**May be harmful if swallowed, on contact with skin, and if inhaled** Peut être nocif par ingestion, inhalation, par contact avec la peau et par inhalation Puede ser nocivo en caso de ingestión, en contacto con la piel o en caso de inhalación Kontakt mit der Haut, einatmen oder verschluken kann Gesundheitschäden verursachen Può essere nocivo per ingestione, inalazione, e contatto con la pelle 吸入、接触または飲み込むと有害のおそれ。

Other Symbols

Symbol	Description		Symbol	Description
	USB symbol			Ethernet/network symbol

Getting Started

Introduction

The IDEXX LaserCyte* Dx Hematology Analyzer and LaserCyte* Hematology Analyzer are automated analyzers that evaluate and provide the results of up to 24 parameters for EDTA-anticoagulated whole blood samples from canines, felines, equines, ferrets, pigs, and mini pigs. The LaserCyte Dx and LaserCyte analyzers are for veterinary use only.

How It Works—Laser Flow Cytometry

The LaserCyte Dx and LaserCyte analyzers use reference laboratory technology to analyze blood samples. The analyzers do so by focusing a laser beam on each individual cell and quantifying the scatter of light on four separate detectors. Simultaneously, it measures the amount of time it takes a cell to travel through the laser beam.
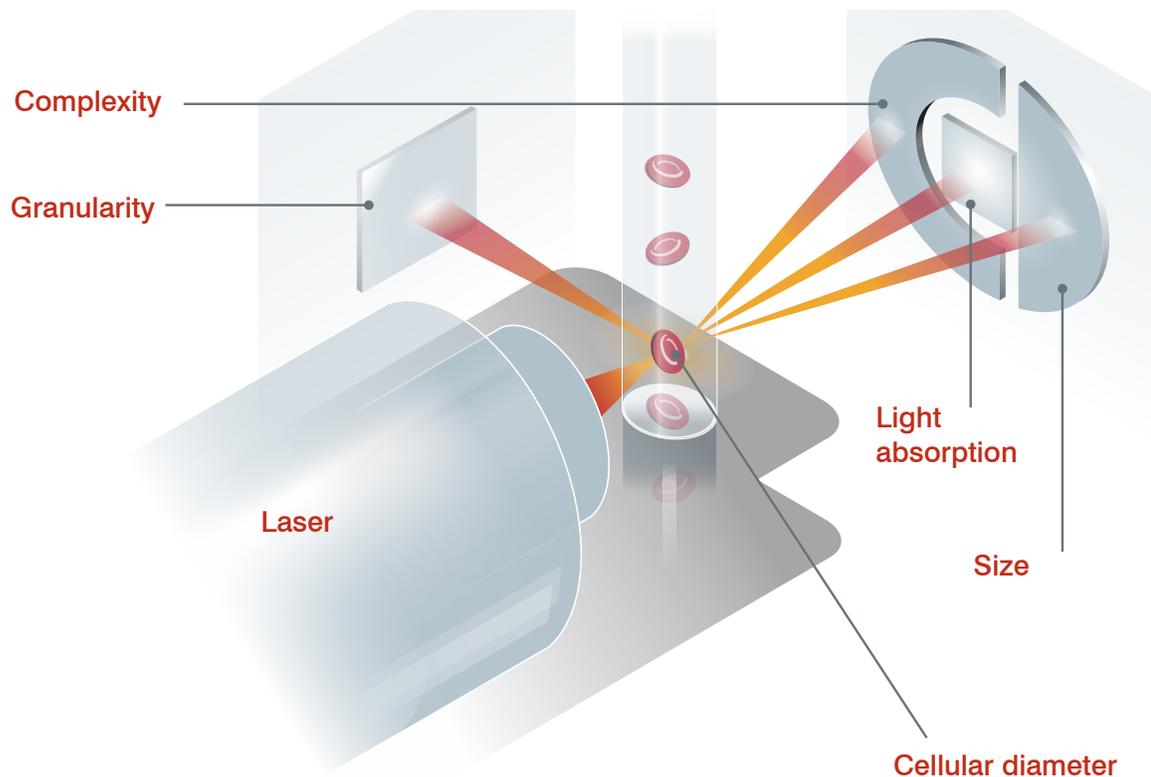
This cell travel time is referred to as the "time of flight" and it provides data on the diameter of the cell. Think of a flashlight as an analogy for the laser. Passing a golf ball in front of the light would be quicker than passing a basketball through the same light. While the time of flight, or cellular diameter, is being measured, the four detectors are measuring the quantity of light bouncing off of a cell, or ball in this analogy. Continuing the analogy, the dimpled design of a golf ball would refract light differently than the seamed design of a basketball. In this analogy, the golf ball would be classified as a different "cell" from the basketball. The four detectors on the analyzer in essence are measuring many of the same qualities that a pathologist would

examine when looking at a blood film. These qualities include size, complexity, granularity, and light absorption. With this information, the analyzer can analyze red blood cells and, most important, arrive at an absolute reticulocyte count. In addition, it can analyze the full five-part white blood cell differential, providing the data needed for a more complete diagnosis.

What Is a Dot Plot?

Dot plots are a visual representation of the complete blood count (CBC) and are a valuable tool for quickly interpreting sample results on the analyzer. Each dot in the plot represents a single cellular event as it is analyzed by the device. The different cellular elements of the blood appear as distinct clouds of dots, and when the definition of the cloud is diminished or intensified, this indicates variability within that particular cellular population, which could indicate an abnormality. The greater the abnormality, the greater the potential variation is from normal. A blood film review will provide additional information. For example, if the clouds of dots are more dense than normal, an increased count for that particular cell will likely be evident in a blood film.

Red Blood Cell Classification

Dot Plot of Light Absorption vs. Granularity (Canine)
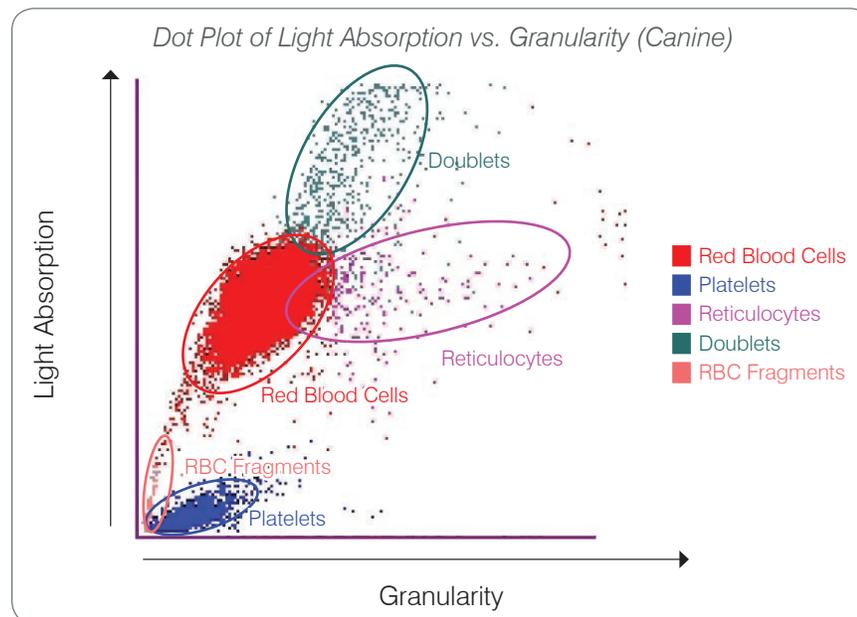
On the red blood cell run, the analyzer classifies the following populations:

- **Red Blood Cells (RBCs)**—The red blood cells (erythrocytes) are primarily responsible for carrying oxygen to tissue cells and carrying carbon dioxide from those cells. The RBC population is colored red.

- **Platelets**—Platelets (thrombocytes) play an integral role in the processes of primary and secondary hemostasis leading to the formation of clots. Due to their smaller size, they spend less time in front of the laser beam, absorb less light and, therefore, fall closer to the bottom on the light absorption axis. Platelets are colored blue.

- **Reticulocytes**—Reticulocytes are immature red blood cells that contain ribosomal RNA. The CBC5R tube contains new methylene blue dye, which precipitates and stains the RNA. The reticulocytes are more granular because of the precipitated RNA and, therefore, fall to the right of the RBC population. On the dot plots, the reticulocytes are colored magenta.

- **Doublets**—Doublets are two discreet red blood cells that are in close proximity to one another when they are examined by the laser beam. They are mapped as one event but counted as two cells. These cells are colored **green**.

- **RBC Fragments**—Red blood cell fragments are portions of red blood cell membranes from broken cells. The particles have a similar size to platelets but refract light differently and are therefore located to the left of the platelet population. The red blood cell fragments are colored **pink**.

White Blood Cell Classification

Dot Plot of Light Absorption vs. Granularity (Canine)
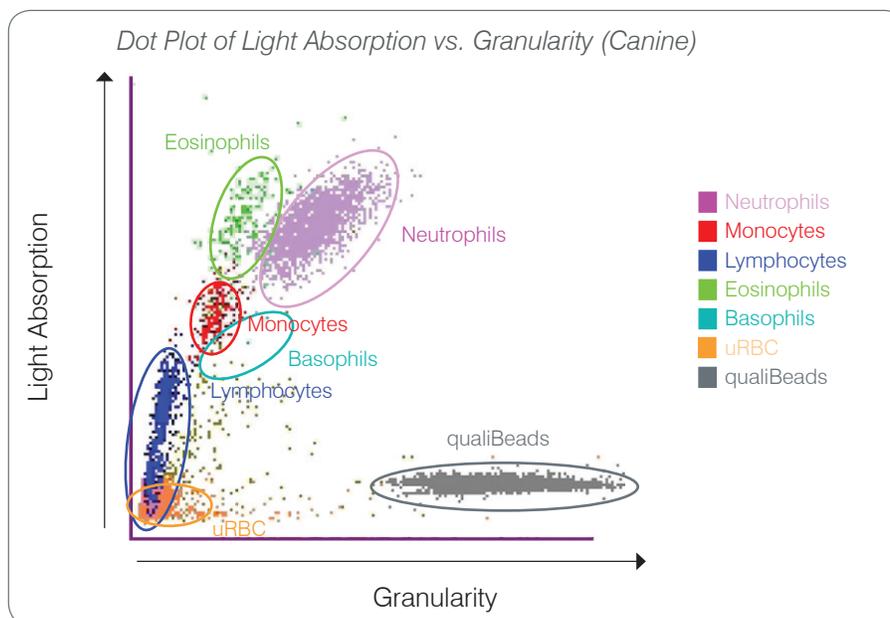
After the analyzer counts and classifies the RBCs, platelets and reticulocytes, the analyzer performs a rinsing cycle and then aspirates additional blood to prepare a dilution for the white blood cell (WBC) analysis. The analyzer classifies the following leukocyte populations:

- **Neutrophils**—Neutrophils are generally the largest of the white blood cell populations. Neutrophils are the primary defense against infection and are phagocytic. The neutrophil population is typically the densest population, and the dot plot representation of this density can quickly reveal inflammatory and infectious changes that may warrant further investigation. The neutrophils are classified above and to the right of the monocyte population in **purple**.

- **Monocytes**—Monocytes are responsible for regulating the inflammatory response and phagocytosis. Monocytes are typically larger then lymphocytes, so they absorb more light. They are also more granular than lymphocytes and are found above and slightly to the right of the lymphocytes. The population is colored **red**.

- **Lymphocytes**—Lymphocytes are an integral part of the immune system and are important in producing antibodies and cytokines. Lymphocytes are small relative to the other major white blood cell types, and because smaller objects tend to absorb less laser light, they are found on the lower half of the light absorption axis. The lymphocyte population is colored **blue**.

- **Eosinophils**—Eosinophils are associated with allergic diseases and parasitic infection by responding to histamine, which is released when parasitic antigens or the allergens bind to mast cells. There is a great deal of variation in the granularity of these cells from species to species. The differences in granularity affect the scatter of light and, therefore, affect the position, from species to species, of the populations relative to the other white blood cell populations. Eosinophils are colored green.

- **Basophils**—Basophils contain both heparin, which is important for inflammation as it prevents coagulation, and histamine, which is associated with hypersensitivity reactions. Basophils comprise the smallest of the major white blood cell populations classified by the analyzer and are found directly to the right of the monocytes and below the neutrophils. The basophil population is colored turquoise.

Non-White Blood Cell Events

- **uRBC**—The unlysed red blood cell (uRBC) population is composed of red blood cells that did not lyse prior to the white blood cell run. uRBCs are classified so they do not interfere with the leukocyte differential. The uRBC population is colored orange.

- **qualiBeads* technology**—Each CBC5R tube contains a known quantity of qualiBeads. The analyzer counts the qualiBeads on both the red blood cell and white blood cell runs as a quality assurance check for each individual run. If the analyzer counts too few or too many qualiBeads, the sample run will be flagged to indicate a potential problem with that portion of the analysis. An advanced algorithm analyzes qualiBead data across runs to ensure a consistent optical response. The qualiBeads population is colored gray.

IDEXX VetLab* Station Connectivity

The LaserCyte Dx and LaserCyte analyzers are part of the IDEXX VetLab* suite of analyzers, all of which connect to the IDEXX VetLab* Station. The IDEXX VetLab Station functions as the communications hub for all IDEXX analyzers, including the LaserCyte Dx and LaserCyte analyzers.

Connecting multiple analyzers to the IDEXX VetLab Station helps you attain a comprehensive picture of your patient's health, with the ability to view test results from multiple analyzers on a single report. With the IDEXX VetLab Station, you can:

- Automatically review patients' prior results for easy comparison.

- Improve client communications with illustrated diagnostic or treatment progress printouts.

- Trend serial data.

- Link to expert descriptions and common causes of abnormal values.

- Print information to help explain the significance of results to your clients.

- Allow new staff to train independently.

- View educational on-screen guides and videos, such as how to properly prepare a whole blood sample.

- Learn proper protocols and tips for best techniques.

Note: For detailed information about the IDEXX VetLab Station, including how to use all of its features, refer to the *IDEXX VetLab Station Operator's Guide*.

Analyzer Components

Status light

Reagent
compartment
(fluidic filter
located
behind the
compartment
bay)

Loading tray

Air filter

Reagent
compartment
(fluidic filter
located
behind the
compartment
bay)

Loading tray

Status light

Air filter
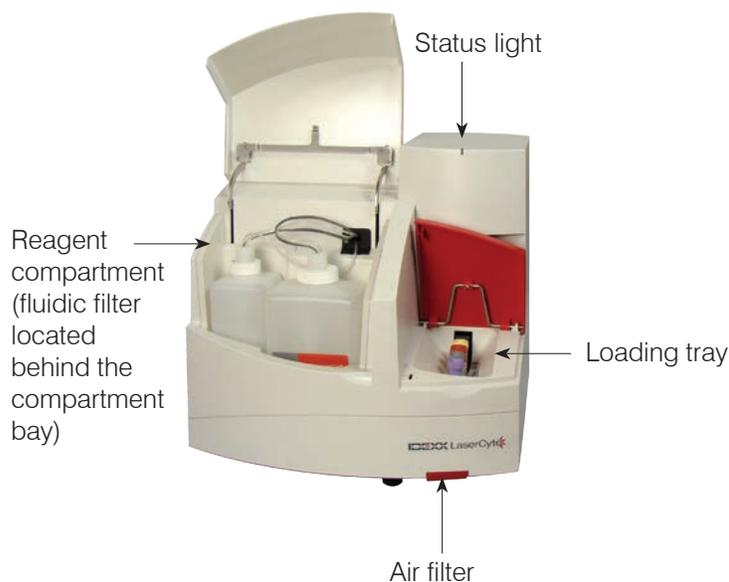
LaserCyte Components   **LaserCyte Dx Components**

Loading Tray

The loading tray contains four slots that are referenced as slots 1, 2, 3, and 4. Insert the four tubes into their respective slots as indicated below:

Slot 1—13 x 75 mm purple-top sample tube (such as an IDEXX VetCollect* tube)

Slot 2—13 x 75 mm gray-top CBC5R tube

Slot 3—16 x 75 mm discard tube (#3)

Slot 4—16 x 75 mm yellow-top enzymatic wash tube

Each of these tubes are provided in various quantities in the LaserCyte* CBC5R Test Kit.

Reagent Compartment

The reagent compartment holds the reusable waste bottle (shipped with the analyzer) and the sheath reagent bottle (shipped with the LaserCyte CBC5R Test Kit).

The reagent compartment contains two fluid-level assembly caps with sensing devices. The larger cap is for the sheath reagent bottle, and its sensor detects a low fluid-level condition. The smaller cap is for the waste bottle, and it detects when the bottle is full.

Status Light

The status light indicates if the analyzer is powered off/on, if the analyzer is currently in the process of analyzing a sample, has an Alert status, or is performing automated maintenance.

Note: You can also view the analyzer status by viewing its icon on the IDEXX VetLab Station Home screen. For more information about status icons on the IDEXX VetLab Station, see the *IDEXX VetLab Station Operator's Guide.*

LED Color	Description
No color	OFF; analyzer is powered off
Green	ON; analyzer is powered on and ready for sample analysis
Orange	IN PROCESS; analyzer is processing a sample, has an Alert status, or is performing automated maintenance

Air Filters

The location of the air filters varies depending on the type of analyzer you are using:

- **LaserCyte**—The air filter is located on the bottom-right corner of the front of the analyzer.

- **LaserCyte Dx**—The air filters are located on the bottom-right corner of the front and the back-right side of the analyzer.

Air filters should be cleaned weekly. For more information, see "Cleaning the Air Filter" on page 25.

LaserCyte CBC5R Test Kit

The LaserCyte CBC5R Test Kit includes:

- 50 CBC5R tubes

- 50 IDEXX VetCollect tubes

- 1 enzymatic wash tube

- 2 bottles of sheath reagent

- 1 discard tube

The CBC5R (complete blood count five-part differential reticulocyte) tube is the primary reagent and contains:

- New methylene blue dye to precipitate and stain the residual RNA in reticulocytes

- A special ingredient to modify the normal biconcave shape of red blood cells to form spherical cells

- A known quantity of internal reference particles called qualiBeads

- Buffers and preservatives

Internal Quality Assurance

The LaserCyte analyzer is capable of determining if it is no longer standardized to its factory settings. Each CBC5R tube contains standard-sized particles called qualiBeads. The instrument evaluates the signal from the qualiBeads to determine if there are shifts in the beads' scatter pattern. If shifts are detected, the analyzer's advanced diagnostic software, along with IDEXX's proprietary, veterinary-specific algorithm, ensure optical alignment and proper calibration by returning them to factory settings for consistent and accurate analyzer response.

Shutting Down and Restarting the Analyzer

The analyzer must be powered on at all times; however, there may be times when you want to shut down the analyzer; for instance, if your clinic is going to be closed for an extended period of time or if you are moving the analyzer to a new location. It is important that you follow the steps outlined below to ensure that the analyzer is shut down properly.

To Shut Down the Analyzer

1. Tap **Instruments** on the IDEXX VetLab Station Home screen.

2. Tap the **LaserCyte Dx** or **LaserCyte** tab and then tap **LaserCyte Diagnostics**.

3. Tap **OK** to proceed to the LaserCyte Diagnostics screen.

4. Tap the **Procedures** tab and tap **Shut Down**.

5. Follow the on-screen instructions for preparing the analyzer to be shut down.

To Restart the Analyzer

1. Reinstall a new system filter (for detailed instructions, see "Changing the Fluidic Filter" on page 26).

2. Install the sheath reagent bottle and the waste bottle in the reagent compartment using their respective caps.

3. Place the yellow-top enzymatic wash tube into slot 4 of the loading tray and an empty discard tube into slot 3.

4. Power on the analyzer using the power switch on the right side of the analyzer.

5. Tap **Instruments** on the IDEXX VetLab Station Home screen.

6. Tap the **LaserCyte Dx** or **LaserCyte** tab and then tap **LaserCyte Diagnostics**.

7. Tap **OK** to proceed to the LaserCyte Diagnostics screen.

8. Tap the **Procedures** tab and tap **Startup**.

Powering the Analyzer On/Off

The analyzer and IDEXX VetLab Station should be powered on 24 hours a day, seven days a week, although we recommend that you reboot the IDEXX VetLab Station once per week.

Analysis Parameters

The analyzer provides results for the following parameters[†]:

Whole Blood Parameter	Description
RBC	Total number of erythrocytes (red blood cell count)
HCT	Hematocrit value; erythrocyte ratio of total blood volume
HGB	Hemoglobin concentration
MCV	Mean erythrocyte volume in total sample
MCH	Mean hemoglobin volume per red blood cell (RBC) count
MCHC	Mean hemoglobin concentration of erythrocytes
RDW	The degree of variation in size of the erythrocyte population

Whole Blood Parameter	Description
%RETIC	Reticulocyte percent
RETIC	Reticulocyte count
WBC	Total number of leukocytes (white blood cell count)
%NEU	Neutrophil percent
%LYM	Lymphocyte percent
%MONO	Monocyte percent
%EOS	Eosinophil percent
%BASO	Basophil percent
NEU	Neutrophil count
LYM	Lymphocyte count
MONO	Monocyte count
EOS	Eosinophil count
BASO	Basophil count
PLT	Total number of platelets
MPV	Mean platelet volume
PDW	Platelet distribution width; the degree of variation in size of the platelet population
PCT	Plateletcrit value

Abdominal/ Thoracic Fluid Parameter	Description
TNCC	Total nucleated cell count
AGRANS	Agranulocyte count
%AGRANS	Agranulocyte percent
GRANS	Granulocyte count
%GRANS	Granulocyte percent
RBC	Total number of erythrocytes (red blood cell count)

[†]The number of reported parameters may vary according to species (e.g., reticulocytes are not reported for equine species).

Supported Species

The LaserCyte Dx and LaserCyte analyzers can analyze blood from:

- Canines
- Felines
- Equines
- Ferrets
- Pigs
- Mini pigs

Supported Sample Types

The analyzer supports the following sample types:

- Whole blood

- Abdominal fluid (canine, feline, and equine only)

- Thoracic fluid (canine, feline, and equine only)

Using the Analyzer

Analyzing Samples

The analyzer produces a complete blood count (CBC) analysis for each patient blood sample it processes. There are four different work flows that can be used to analyze a sample on the analyzer:

- **Analyze Sample Button**—Use this work flow if you **do not have** a practice management system connected to your IDEXX VetLab* Station via IDEXX SmartLink* or IDEXX InterLink* technology.

- **Pending List** or **Census List**—Use one of these work flows if you **have** a practice management system connected to your IDEXX VetLab Station via IDEXX SmartLink or IDEXX InterLink technology. Using these work flows will save you time because you do not need to enter the client and patient information into the IDEXX VetLab Station (since it has already been entered into your practice management system).

- **Ready to Run Icon**—Use this work flow if you initiated the sample run using one of the other work flows, but the analyzer was busy at the time and the sample could not be run immediately.

For more information on these work flows, see the *IDEXX VetLab Station Operator's Guide*.

To Analyze a Sample Using the Analyze Sample Button

1. On the IDEXX VetLab Station Home screen, tap **Analyze Sample**.

2. Enter the client and patient information (required fields are noted with an asterisk) and tap **Next**.

3. On the Select Instruments screen, select the **Reason for Testing**.

4. Tap the **LaserCyte Dx** or **LaserCyte** analyzer icon to add it to the current analysis job list.

5. Select the desired sample type from the **Sample Type** drop-down list.

6. Prepare the sample. **Gently invert the sample a minimum of 8 times (~30 seconds)** to ensure it is well mixed.

7. On the analyzer, lift the red loading tray lid and place a new CBC5R tube into slot 2 of the loading tray. Then, place the patient's sample tube into slot 1 and close the lid.

   Important: Tubes must be placed in the correct slots—an error will occur if a tube is misplaced.

8. Tap **Run**. The analyzer begins to process the patient sample automatically.

To Analyze a Sample Using the Pending List

1. On the IDEXX VetLab Station Home screen, tap a patient name in the Pending List and then tap **Run** (below the Pending List).

2. On the Select Instruments screen, select the **Reason for Testing**.

3. Tap the **LaserCyte Dx** or **LaserCyte** analyzer icon to add it to the current analysis job list.

4. Select the desired sample type from the **Sample Type** drop-down list.

5. Prepare the sample. **Gently invert the sample a minimum of 8 times (~30 seconds)** to ensure it is well mixed.

6. On the analyzer, lift the red loading tray lid and place a new CBC5R tube into slot 2 of the loading tray. Then, place the patient's sample tube into slot 1 and close the lid.

   Important: Tubes must be placed in the correct slots—an error will occur if a tube is misplaced.

7. Tap **Run**. The analyzer begins to process the patient sample automatically.

To Analyze a Sample Using the Census List

1. On the IDEXX VetLab Station Home screen, tap a patient name in the Census List and then tap **Run** (below the Census List).

2. On the Select Instruments screen, select the **Reason for Testing**.

3. Tap the **LaserCyte Dx** or **LaserCyte** analyzer icon to add it to the current analysis job list.

4. Select the desired sample type from the **Sample Type** drop-down list.

5. Prepare the sample. **Gently invert the sample a minimum of 8 times (~30 seconds)** to ensure it is well mixed.

6. On the analyzer, lift the red loading tray lid and place a new CBC5R tube into slot 2 of the loading tray. Then, place the patient's sample tube into slot 1 and close the lid.

   Important: Tubes must be placed in the correct slots—an error will occur if a tube is misplaced.

7. Tap **Run**. The analyzer begins to process the patient sample automatically.

To Analyze a Sample Using the Ready to Run Icon

Note: In order to use this work flow, the LaserCyte Dx or LaserCyte icon must appear in the patient-specific job status area (on the IDEXX VetLab Station Home screen) with a Ready to Run status.

1. On the IDEXX VetLab Station Home screen, tap the Ready to Run **LaserCyte Dx** or **LaserCyte** icon in the patient-specific job status area. A dialog box appears with information about the selected patient and options to start or cancel the sample run.

2. Prepare the sample. **Gently invert the sample a minimum of 8 times (~30 seconds)** to ensure it is well mixed.

3. On the analyzer, lift the red loading tray lid and place a new CBC5R tube into slot 2 of the loading tray. Then, place the patient's sample tube into slot 1 and close the lid.

   Important: Tubes must be placed in the correct slots—an error will occur if a tube is misplaced.

4. Tap **Start Run**. The analyzer begins to process the patient sample automatically.

Canceling a Run That Has Been Scheduled But Not Run

1. In a patient-specific job status area on the Home screen, tap the Ready to Run **LaserCyte Dx** or **LaserCyte** icon. A dialog box appears with information about the selected patient and analyzer.

2. Tap **Cancel Run** to cancel the scheduled sample run for this patient. The LaserCyte Dx or LaserCyte icon is removed from the job status area.

Viewing Test Results

The way that you view results will vary depending on if you want to access the entire database of patient results or only view results that were created in the last three days.

To View Results Created in the Last Three Days

1. Tap the patient name in the Recent Test Results list and then tap **View**.

2. On the Records: Test Results screen, tap the **LaserCyte Dx** or **LaserCyte** tab to view the analyzer's test results for the selected patient.

To View All Results

1. Tap the **Records** button, tap the patient name, and then tap **View Records**.

2. On the Records: Select Results screen, tap the set of results that you want to view and then tap **View Results**.

3. On the Records: Test Results screen, tap the **LaserCyte Dx** or **LaserCyte** tab to view the analyzer's test results for the selected patient.

Printing Test Results

Analyzer results are automatically returned to the IDEXX VetLab Station and recorded in the appropriate patient's record. The diagnostic results report is a comprehensive report of all the test results specified in a laboratory request for that patient on a specific day.

Patient test results can be printed automatically each time a set of results are returned, or you can manually print the results when needed. For more information, see the *IDEXX VetLab Station Operator's Guide.*

Responding to an Alert

If an analyzer experiences a problem, an alert indicator appears on the upper right side of the IDEXX VetLab Station title bar. If you are on the Home screen, the affected analyzer's icon also appears with an Alert status.

To View an Alert from the Home Screen

Tap the analyzer icon, or tap the alert message in the title bar, to display the alert message. Follow the instructions displayed in the alert message.

To View an Alert from Any Screen in the IDEXX VetLab Station

Tap the alert message on the title bar.

Displaying and Printing Dot Plots with Patient Results

You can enable/disable the printing of dot plots with patient results; however dot plots always display with the results on the IDEXX VetLab Station results screen.

1. Tap **Settings** on the IDEXX VetLab Station Home screen.

2. Tap the **Reports** tab.

3. To enable the printing of dot plots with patient results, select the **Print LaserCyte Dot Plot charts with patient results** check box.

   OR

   To disable the printing of dot plots with patient results, clear the **Print LaserCyte Dot Plot charts with patient results** check box.

4. Tap **OK**.

Sample Collection and Preparation

Overview

The quality of your reference laboratory and in-house testing results is impacted by the quality of the sample you provide the laboratory/analyzer. Therefore, it is important that you always prepare samples properly. This chapter provides instructions for preparing quality samples, the recommended order of draw, and more.

We recommend that you familiarize yourself thoroughly with the following guidelines. If you have any questions about sample preparation, contact IDEXX Technical Support and we will be happy to assist you (for more information, see "IDEXX Technical Support Contact Information" on pages 33–34).

- **Do not reuse syringes and needles**—Dull needles can cause trauma to the blood vessel, leading to cell destruction, hemolysis and platelet activation, especially in cats.

- **Choose the appropriate blood vessel and needle size**—Use a blood vessel that allows enough blood to collect within the tube or syringe selected. Select the appropriate needle size for the species.

- **Be gentle on the blood draw**—Exceeding the normal blood flow can collapse the blood vessel, which can be painful to the animal and cause hemolysis.

- **Mix the sample with EDTA as soon as possible**—When using a syringe and needle, pierce the rubber stopper on the IDEXX VetCollect* tube and let the sample draw naturally by vacuum. If necessary, gently press the plunger to start the flow of blood and dispense 0.5–1.5 cc of sample into the tube.

  Important: Immediately mix the EDTA sample at least 8 times (~30 seconds) by gentle inversion.

- **Make sure the sample-to-EDTA ratio is appropriate**—Fill the tube to its appropriate level for adequate mixing with EDTA. Overfilling will result in clotting; underfilling will alter the hematocrit and hemoglobin values. Refer to the manufacturer's package insert for appropriate fill volumes.

- **Analyze the sample as soon as possible**—For best results, we recommend preparing and testing the sample as soon as possible. Even when refrigerated, blood samples can become less viable in as little as 4 hours.

- **Discard severely hemolyzed samples**—Hemolysis can impact RBC and HCT results. If hemolysis is due to improper sample collection, discard the sample and redraw. If hemolysis is persistent, it may be due to a disease state.

- **Discard clotted samples and redraw**—The presence of clots will invalidate any results obtained, with the exception of the hematocrit.

See the table on pages 22–24 for a list of the different sample types that each IDEXX VetLab* analyzer is capable of running. The table provides the sample volume required for each sample type as well as how to prepare the sample.

IDEXX Quality Sample Preparation

Analyzer/Test	Sample Volume Required	Serum	Plasma Lithium Heparin	Plasma Fluoride/Oxalate	Whole Blood Lithium Heparin	Whole Blood EDTA	Whole Blood Citrate	Whole Blood Untreated	Urine	Sample Preparation	Centrifuge (time/speed)	Notes
Catalyst Dx* Chemistry Analyzer lithium heparin whole blood separator	0.6–0.8 cc (max)							✓		gently swirl (do not invert or shake) the separator at least 5 times to mix the sample with the anticoagulant	processed automatically within Catalyst Dx analyzer	
Catalyst Dx* Chemistry Analyzer sample cup	See "Proper Sample Cup Volume" in the *Catalyst Dx Chemistry Analyzer Operator's Guide*	✓	✓	✓					✓	**serum:** allow to clot for 20 minutes **plasma:** gently invert collection tube for 30 seconds **urine:** use Urine P:C Diluent to dilute the UCRE sample	**serum/plasma:** 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm) **urine:** 45 seconds on Urine setting	**fluoride/oxalate:** only for LAC or GLU **urine:** for UPC ratio only **Sample volume required per test** varies depending on slide type: • AST requires 7 µL • Electrolytes require 11 µL • All other chemistries require 10 µL
Ammonia Test	see Catalyst Dx analyzer or VetTest analyzer (in this chart)		✓							analyze sample immediately after collection	none	
VetTest* Chemistry Analyzer	30 µL + 10 µL per test	✓	✓	✓					✓	**serum:** allow to clot for 20 minutes **plasma:** gently invert collection tube for 30 seconds **urine:** use Urine P:C Sample Preparation Kit to dilute the UCRE sample	**serum/plasma:** 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm) **urine:** 45 seconds on Urine setting	**fluoride/oxalate:** only for LAC or GLU **urine:** for UPC ratio only
VetLyte* Electrolyte Analyzer	90 µL	✓	✓		✓					**serum:** allow to clot for 20 minutes **plasma:** fill collection tube to ½ – ¾ full then gently invert for 30 seconds **whole blood:** gently invert collection tube several times	**serum:** 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm) **plasma:** 90 seconds at 12,000 rpm (5 minutes at 8,000 rpm) **whole blood:** none	**plasma/whole blood:** do not use anticoagulants (e.g., EDTA, citrate, oxalate, or sodium heparin)

Analyzer/Test	Sample Volume Required	Serum	Plasma Lithium Heparin	Plasma Fluoride/Oxalate	Whole Blood Lithium Heparin	Whole Blood EDTA	Whole Blood Citrate	Whole Blood Untreated	Urine	Sample Preparation	Centrifuge (time/speed)	Notes
VetStat* Electrolyte and Blood Gas Analyzer	200 µL	✓	✓		✓					**serum:** allow to clot for 20 minutes. **plasma:** gently invert collection tube for 30 seconds. **whole blood, syringe/capillary tube:** roll between fingers. **whole blood, collection tube:** gently invert for 30 seconds	**serum/plasma:** 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm). **whole blood:** none	**plasma/whole blood:** do not use anticoagulants (e.g., EDTA, citrate, oxalate, or sodium heparin)
ProCyte Dx* Hematology Analyzer	500 µL of sample from an IDEXX VetCollect* tube or 650 µL from a 1.3 mL Sarstedt tube (analyzer aspirates 30 µL of sample)					✓				gently invert collection tube 10 times	none	VetCollect* tubes are recommended for patient samples
LaserCyte Dx or LaserCyte* Hematology Analyzer	analyzer aspirates 95 µL of sample from 500 µL draw					✓				gently invert collection tube for 30 seconds	none	use CBC5R tube and VetCollect* tube
Coag Dx* Analyzer	200 µL						✓	✓		**citrate:** use 1.8- or 2.7-mL tube containing 3.2% sodium citrate; gently invert collection tube at least 4 times; wait 5 minutes before analyzing sample	none	**citrate:** analyze sample within 2 hours; keep at room temperature. **whole blood:** collect sample only when analyzer displays "Add Sample...Press Start."
IDEXX VetAutoread* Hematology Analyzer	111 µL					✓	✓			gently invert collection tube for 30 seconds (at least 10 times)	**EDTA:** 5 minutes. **citrate:** 10 minutes (2 cycles)	use EDTA anticoagulated blood. **EDTA:** canine, feline, equine. **citrate:** bovine
IDEXX VetLab* UA* Analyzer	5 mL								✓	dip IDEXX UA* Strip into urine and blot	none	
SNAP* Total T₄ Test	65 µL	✓	✓							**serum:** allow to clot for 20 minutes. **plasma:** gently invert collection tube for 30 seconds. **Note:** Plasma recovered from a Catalyst* lithium heparin whole blood separator may be used.	**serum/plasma:** 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm)	

Analyzer/Test	Sample Volume Required	Serum	Plasma Lithium Heparin	Plasma Fluoride/Oxalate	Whole Blood Lithium Heparin	Whole Blood EDTA	Whole Blood Citrate	Whole Blood Untreated	Urine	Sample Preparation	Centrifuge (time/speed)	Notes
SNAP* Cortisol Test	25 µL or 100 µL	✓								serum: allow to clot for 20 minutes	serum: 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm)	volume varies depending on test protocol
SNAP* Bile Acids Test	100 µL	✓								serum: allow to clot for 20 minutes	serum: 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm)	
SNAP* cPL* Test	3 drops	✓								serum: allow to clot for 20 minutes	serum: 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm)	
SNAP* fPL* Test	3 drops	✓								serum: allow to clot for 20 minutes	serum: 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm)	
SNAP* Feline Triple* Test	3 drops	✓	✓		✓	✓				serum: allow to clot for 20 minutes plasma: gently invert collection tube for 30 seconds whole blood: gently invert collection tube for 30 seconds	serum/plasma: 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm) whole blood: none	
SNAP* 4Dx* Plus Test	3 drops	✓	✓		✓	✓				serum: allow to clot for 20 minutes plasma: gently invert collection tube for 30 seconds whole blood: gently invert collection tube for 30 seconds	serum/plasma: 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm) whole blood: none	
SNAP* FIV/FeLV Combo Test	3 drops	✓	✓		✓	✓				serum: allow to clot for 20 minutes plasma: gently invert collection tube for 30 seconds whole blood: gently invert collection tube for 30 seconds	serum/plasma: 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm) whole blood: none	
SNAP* Heartworm RT	3 drops	✓	✓		✓	✓				serum: allow to clot for 20 minutes plasma: gently invert collection tube for 30 seconds whole blood: gently invert collection tube for 30 seconds	serum/plasma: 120 seconds at 12,000 rpm (10 minutes at 8,000 rpm) whole blood: none	

Maintenance

Automated Maintenance

The analyzer performs several automated maintenance procedures to keep the internal components of the analyzer clean.

- After each sample run, the analyzer runs an automated maintenance procedure to ensure that the system is cleaned and primed for the next sample.

- Every four hours, the analyzer cycles sheath reagent through the lines to rinse the system.

- Every 24 hours, the analyzer runs a periodic rinsing cycle that moves sheath reagent through the instrument, preventing the aggregation of debris.

- After every 20 sample runs, the instrument performs an extensive enzymatic cleaning procedure to flush itself and prevent protein buildup. The procedure is nearly an hour long and defaults to running at 2:00 a.m.; however, the time can be adjusted to a time that works best for your practice.

Cleaning the Case

Always disconnect the power cable before cleaning the analyzer.

Clean the outside of the analyzer with a damp (not wet) lint-free cloth. A mild disinfectant or liquid soap will remove grease. Do not use any of the following near the analyzer: organic solvents, ammonia-based cleaners, ink markers, sprays containing volatile liquids, insecticides, polish, or room freshener.

Care should be taken not to spill any samples, chemicals, cleaning agents, water, or other fluids on/in the analyzer.

Note: Dust and animal hair can lead to analyzer failures. Routinely dust off the analyzer and surrounding surfaces with a damp cloth.

Cleaning the Air Filter

The air filter should be cleaned once per week to prevent buildup that may elevate the internal temperature of the analyzer. The location of the air filters varies depending on the type of analyzer you are using:

- **LaserCyte***—The air filter is located on the bottom-right corner of the front of the analyzer.

- **LaserCyte* Dx**—The air filters are located on the bottom-right corner of the front and the back-right side of the analyzer.

Air filters should be cleaned weekly.

LaserCyte   **LaserCyte Dx**

Emptying the Waste Bottle

The analyzer comes with a waste bottle that screws into a permanently attached fluid-level assembly cap located in the reagent compartment. The LaserCyte Dx or LaserCyte icon on the IDEXX VetLab Station Home screen displays with an Alert status when the waste bottle should be emptied.

Note: It is recommended that you empty the waste bottle when a new LaserCyte CBC5R Test Kit is installed.

To Empty the Waste Bottle

1. Unscrew the bottle from the fluid-level assembly cap located on the left side of the reagent compartment.

2. Dispose of the liquid waste in a manner consistent with your standard disposal procedures for biomedical waste.

3. Screw the waste bottle back onto the fluid-level assembly cap and place the bottle into the reagent compartment.

Changing the Fluidic Filter

1. Tap **Instruments** on the IDEXX VetLab Station Home screen.

2. Tap the **LaserCyte Dx** or **LaserCyte** tab, tap **LaserCyte Diagnostics**, tap **OK** (in the warning message), and then tap **Replace Filter**.

3. Follow the on-screen instructions.

4. Open the reagent compartment and remove the caps from the reagent and waste bottles. Set the assembly caps to the side.

5. Remove the reagent and waste bottles and the compartment bay. Place the assembly caps in the compartment so that they are not in the way of the filter and filter tubes located in the back right corner of the compartment.

6. Place an absorbent cloth in the compartment.

7. Without disconnecting the filter tubes, remove the filter from its clamp by placing your fingers behind the filter and pulling outward.

8. Disconnect the filter tubes by turning the top and bottom connectors counterclockwise. Discard the used filter.

9. Attach the filter tubes to their respective connectors on the new filter. Secure by turning clockwise. Place the filter into the clamp.

    Note: The top and bottom connectors of the filter are different. The filter can be installed only one way.

10. Remove the absorbent cloth and assembly caps from the compartment. Place the compartment bay with the two bottles back into the compartment.

11. Insert the assembly caps into their respective bottles and secure them by turning the caps clockwise. Close the compartment lid.
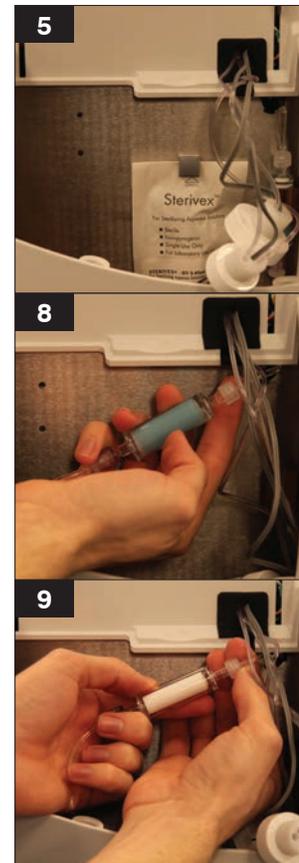
Upgrading the Software

IDEXX will provide you, at no charge, updated instrument software on a periodic basis. These updates may include new features. Be sure to read the software notes contained within each new release.

Troubleshooting

Differences in Results

With a Commercial Laboratory or Other Instrument

Comparing results from different laboratories that may be using different equipment or methods is imprecise at best. Any comparisons should be performed on the same sample that has been "split," stored under like conditions, and tested at approximately the same time. If too much time elapses between running sample, the sample can age. For example, MCV values change as cells tend to swell over time. Compare each result to the reference interval stated by IDEXX or the commercial laboratory (as appropriate). Each result should have the same relationship to its method's reference interval. For instance, a sample giving an analyzer result that is slightly below the reference interval should produce a laboratory result slightly below the laboratory's reference interval.

With Your Own Expectations

If you receive results that are not what you expected for a particular patient, consider the following:

- Were there any abnormalities noted in the sample taken (e.g., hemolysis, lipemia, and stress) that could cause the changes seen?

- How far outside the reference interval is the result? The more narrow the reference interval, the more important minor changes become.

- Would any treatments or drugs the patient may be taking alter the results?

- Were the results flagged and were any parameters qualified with an asterisk (*) or less than symbol (<)?

- Do clinical findings support the results? Unexpected abnormal results are usually accompanied by other evidence.

- Is the result biologically significant or possibly so?

- What other tests or procedures might be used to confirm or reject this result?

All laboratory results should be interpreted in light of the case history, the clinical signs, and the results of ancillary tests.

Interpreting Message Codes

Message codes appear on the printed test results report in the event of any issues with the sample analysis. You can choose to have just the code print (e.g., WD) or to have the full text of the message print.

You can change this setting by tapping the **Settings** button on the Home screen, tapping the **Reports** tab and selecting either the **Short Text** or **Full Text** option from the Hematology Message Codes options.

Sample Message Codes

Suspect results will be marked with an asterisk (*) or less than symbol (<), indicating a need for further investigation.

Code	Full Text	Action Required	Description
VRL	Value Out of Range	Review the parameters in question. Check the sample for artifacts (lipemia/hemolysis). If very high or low values were not expected for the suppressed parameter, rerun the sample.	The suppressed parameter was outside of the reportable range of the LaserCyte* Dx Hematology Analyzer or LaserCyte* Hematology Analyzer.
RD	RBC Abnormal Distribution	Evaluate the patient's condition. If a very low RBC count was not expected, rerun the sample.	The RBC count was between 0.25 and 1.00 M/μl. MCV, RDW, HCT, MCH and MCHC cannot be determined because of the questionable RBC count.
RD	Retic. Abnormal Distribution	A blood film should be reviewed to confirm the presence of a significant population of reticulocytes.	The percentage of reticulocytes was >30% and therefore suspect.
WD	WBC Abnormal Distribution	A blood film review is suggested to confirm the reported values.	The patient's morphology made it difficult to clearly separate certain WBC populations.
PA	Platelet Aggregates Detected	Confirm the presence of platelet aggregates (the differential can be affected in cases of extreme platelet aggregation). **Note:** This feature is currently only available for feline patients.	The presence of platelet aggregates or clumps is likely.
RD	PLT Abnormal Distribution	A blood film should be reviewed to confirm the platelet count.	The platelet value was either very low or fragile RBCs may have interfered with the platelet count.

Instrument Message Codes

Suspect results will be marked with an asterisk (*) or greater than symbol (>), indicating a need for further investigation.

Code	Full Text	Action Required	Description
HC	HGB Channel Error	Rerun the sample.	Air bubbles may have been present during the HGB analysis or it is possible an improper dilution was made during the HGB and WBC analysis.
IQA	Internal Quality Assurance Error	Rerun the sample.	The sample run did not meet one of the LaserCyte Dx or LaserCyte analyzer's internal quality assurance checks.
TI	Temperature Out of Range	Ensure that the fan filter of the analyzer is clean and that the analyzer is located in an area where the ambient temperature is 60°F–80°F (15°C–27°C).	The internal temperature of the LaserCyte Dx or LaserCyte analyzer was outside of the acceptable operating range.

Providing Data to IDEXX Technical Support

With IDEXX SmartService* Solutions, our specially trained customer support staff can remotely access your instruments. The service also monitors your instrument performance. If you do not have IDEXX SmartService Solutions, there are several features on the Data tab on the LaserCyte Diagnostics screen that help you to print and export data for use by an IDEXX Technical Support Representative, including:

- **Print**—Allows you to print a dot plot that IDEXX Technical Support can use to assist you in troubleshooting.

- **Export**—Allows you to export data to a CD-R to be used by IDEXX Technical Support for troubleshooting.

- **Print Performance Report**—Allows you to print a report that includes trending data from a larger number of sample runs and the three most recent dot plots. This report is helpful when tracking analyzer performance.

To Access the Data Tab on the LaserCyte Diagnostics Screen

1. From the Home screen, tap the **Instruments** button.

2. On the Instruments screen, tap the **LaserCyte Dx** or **LaserCyte** tab.

3. Tap **LaserCyte Diagnostics**.

4. Tap the **Data** tab.

Important: Do not use these features without IDEXX Technical Support assistance.

Configuring the System

The System Configuration tab on the LaserCyte Diagnostics screen contains options for IDEXX Technical Support to use to troubleshoot potential problems.

To Access the System Configuration Tab on the LaserCyte Diagnostics Screen

1. From the Home screen, tap the **Instruments** button.

2. On the Instruments screen, tap the **LaserCyte Dx** or **LaserCyte** tab.

3. Tap **LaserCyte Diagnostics**.

4. Tap the **System Configuration** tab.

Important: Do not change these options without consulting IDEXX Technical Support.

Appendix

Installing the Analyzer

- Position the analyzer so that the power switch and power cord are easily accessible.

- The analyzer should be installed in a well-ventilated location, away from water, dust, and direct sunlight. Do not place the analyzer in a location where it can be splashed by water. It should be located in a space large enough to be used safely. If additional equipment is to be attached/connected to it, additional desk space will be required.

- The analyzer should be placed on a level surface.

- Do not install in an area of elevated temperature and vibration.

- Do not install this instrument in places where chemicals are stored or gas can develop.

- Do not use this instrument in any operating environment that has electroconductive or flammable gases, including oxygen, hydrogen, and anesthesia.

To Install the Analyzer

1. Place the analyzer in its designated location. Ensure there is adequate counter space and spacing around the analyzer (18" on all sides) and is not located near any equipment that generates excessive heat.

   Note: The analyzer connects to the IDEXX VetLab* Station computer by a USB cable. Ensure they are positioned close enough to each other for the cable to connect to both.

2. Open the loading tray lid and load the discard tube into slot 3, the enzymatic wash tube into slot 4, and then close the lid.

3. Open the reagent compartment lid, connect the sheath reagent bottle to its fluid-level assembly cap in the reagent compartment, and then close the reagent compartment lid.

4. Connect the power cable to the power supply.

5. Connect the power supply to the analyzer.

6. Connect the USB cable to the analyzer and the other end of the cable to the IDEXX VetLab Station computer.

7. Plug the power cable into an open outlet on the surge protector.

8. Ensure the IDEXX VetLab Station is powered on and then power on the analyzer using the rocker switch on the right side of the analyzer.

9. When the LaserCyte Dx* or LaserCyte* icon has a green Ready status on the IDEXX VetLab Station Home screen, tap **Instruments**, tap **LaserCyte Diagnostics**, and then tap **Startup** to run the startup procedure.

   Note: The startup procedure sets up the fluidics of the analyzer and takes approximately 50 minutes.

10. When the startup procedure is complete, load a new sheath reagent bottle in the reagent compartment and new discard and enzymatic wash tubes in the loading tray.

Technical Specifications

Class 1 Laser Product

This equipment complies with:

- FDA Standard 21 CFR 1040.10

- IEC 60825-1, Ed. 2.0, 2007, Safety of Laser Products—Part 1: Equipment Classificiation and Requirements

Maximum Operating Limits

Product Installation (Overvoltage): Category II

Pollution Degree: 2

Altitude: up to 2,000 m

Temperature: 60°F–80°F (15°C–27°C)

Relative Humidity: 80%

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