



DNA Extraction Device



Instructions for use

Applicable models : *forensic*GEM, *phyto*GEM, *prep*GEM

IMPORTANT: Read the instructions before operating this device

Purpose of the PDQeX

The ZyGEM PDQeX is a device that is designed for extracting DNA from a wide range of biological substances. It should only be used by trained personnel or under supervision.

The PDQeX is designed to extract DNA from the following types of samples. If your target material is not covered in this document, please contact us on info@zygem.com - we may be able to design a custom solution for you.

- Forensic evidence or Human Identification (HID) samples containing:
 - Saliva
 - Blood
 - Hair follicles
 - Spermatozoa
 - Human or animal cell tissue
 - Touch / trace samples
- Plant material
 - Leaves and stems
 - Plant pathogens
- Animal tissue
 - Muscle and Fat
 - Hair follicles
- Bacteria
- DNA Viruses
- Insects

The PDQeX family of equipment is intended to assist scientists and technicians to simplify their workflow by reducing DNA extraction to hands-off, automated processes. This is achieved inside a disposable, sealed cartridge and thereby protects the integrity of the sample and isolates staff from potential pathogens.

The PDQeX uses different cartridges for different substrates. Each cartridge is designed to perform a single extraction and the reagents within the cartridges are formulated differently for different substrates (tissue, saliva, semen, blood, plant).

The elegance and simplicity of this system removes the need for robotic extraction or time-consuming manipulation by a laboratory technician.

WARNING: Do not modify this equipment without authorisation from the manufacturer.

Specifications

Sample Capacity	24 samples, standard 96 well spacing
For use with	PDQeX Tubes (200 µL)
Interface	5" Touch Screen (colour)
Voltage (24 V DC adapter included)	100-240 VAC, 2A, 50/60Hz
Power	96 Watts at peak draw
Thermal Profiles	Pre-installed & User Programmable
Programmable Thermal Range	34-120 C
Dimensions	8.5" x 7" x 7.25" (L x W x H) (22 x 18 x 18.5 cm)
Weight	10.6 Lbs (4.8 kg)

Process Overview

Step 1. Sample preparation.

Sample preparation prior to extraction will vary from sample to sample.

Step 2. Cell Lysis, DNA liberation and purification.

This multi-stage process all takes place inside the disposable cartridge.

1. The cells are lysed by a cocktail of enzymes. This cocktail varies for different substrates. For example, the lysis of leaf tissue requires a complex mixture of hydrolases and a program on the PDQeX to activate them.
2. A temperature regimen is carried out by the hardware. This brings into play the different enzymes at different temperatures. The final temperature inactivates the enzyme leaving a lysate containing DNA, cell debris and denatured protein.
3. On completion of the extraction, the tube forces the extract through a special column. The columns are tailored to each sample type and designed to remove anything that may inhibit *Taq* DNA polymerase or enzymes used in most other downstream processes.
4. The samples are finally ejected into PCR tubes in a standard format (8 strips or 3x8 strips).

The whole process takes between **7 and 20 minutes** to produce a batch of DNA extracts.

Step 3. Quantification.

The DNA is now ready for quantification. Because the heat step denatures the DNA, we do not advise using OD or fluorescent dye methods. The best method for quantification is qPCR. With normalised samples, quantification is not always required and the DNA can be used directly.

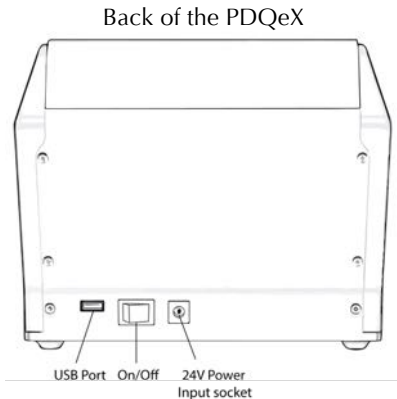
Operating Instructions

WARNING: *Only to be operated by a trained scientist or laboratory technician.*

Machine Set-up.

Connect the PDQeX to the power supply and switch on.

WARNING: *The PDQeX should be installed in such a way that affords easy access for disconnection from the main supply.*



WARNING: *Only use the power supply provided with the PDQeX*

Do not place the PDQeX close to any RF transmitter. A low power transmitter such as a cordless or mobile phone should be at least 2M from the PDQeX, and a powerful transmitter such as a commercial TV or radio broadcast antenna should be at least 25M distant.

The USB port is for software upgrades only and is not to be used for any other purpose.

Loading and unloading the PDQeX.



The door of the PDQeX slides horizontally left and right.

The door will lock during operation or UV decontamination.

MAKE SURE THE LIFTING TOOL IS IN PLACE



Slide out the collection tube rack from between the two slider rails and place 0.2 ml PCR tubes firmly into the rack.

The rack will accommodate up to three 8-strip PCR tubes.

MAKE SURE ALL PDQeX TUBES HAVE A COLLECTION TUBE BELOW THEM.



Replace the rack into its slot in the PDQeX machine

AGAIN, MAKE SURE ALL PDQeX TUBES HAVE A COLLECTION TUBE BELOW THEM AND THAT YOU LOAD THE EXTRACTOR TUBES IN THE WELLS ABOVE THEM.



Load the sample into the PDQeX extractor tube.

This part of the procedure will differ depending on the sample type. In some cases, your sample will be in the solution, in others it may be a solid sample or a disk of storage card.

Insert the cap into the tube.

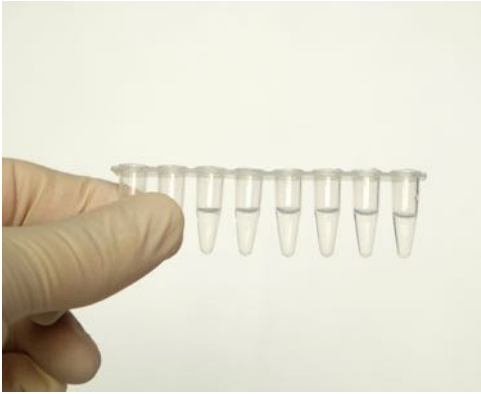


Load the PDQeX extractor tube into the device. When all are loaded, lower the hinged flap over the caps of the tube and close the tube cover.

MAKE SURE THE TUBE POSITIONS IN THE BLOCK CORRESPOND TO THE THOSE OF THE COLLECTOR TUBES BELOW THEM.

WARNING; THE LOWER END OF THE PDQeX TUBE IS DESIGNED TO FIT INSIDE THE COLLECTOR TUBE. IF IT IS ABOVE THE UPPER LIP OF THE TUBE, THERE IS A RISK OF CROSS TUBE CONTAMINATION. THIS PROBLEM MAY OCCUR WHEN LOWER PROFILE COLLECTION PLATES OR TUBES ARE USED.

CONTACT ZYGEM FOR A NEW COLLECTION DRAWER WITH THE CORRECT PROFILE FOR YOUR TUBES



After running the machine (see programming instructions below), your DNA will be in the collection tubes.

First remove the PDQeX extractor tubes and dispose of them. You will then be able to slide out the drawer.

Cap your tubes and store at -20°C

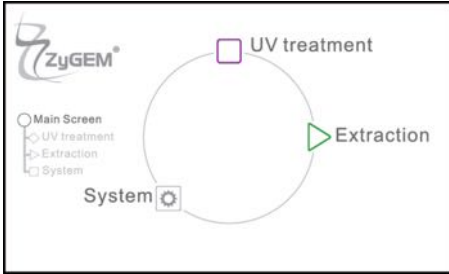
Notes

- The door of the machine will lock while the block is hot.
- If you wish to carry out sequential runs, make sure the block temperature has fallen below the first temperature used in your program.
- Take care when removing tubes to prevent contamination of the block.
- If you abort a run, the tubes cannot be re-used.

Running your program

The PDQeX is very easy to use and is controlled by a touch-screen. The following section provides an overview to help you navigate through the control screens.

1. The Home Screen



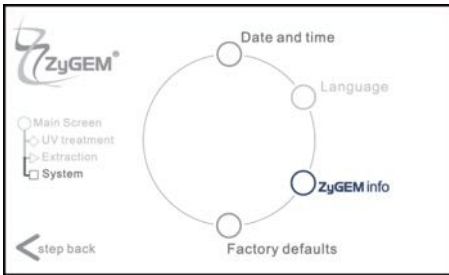
The Home Screen is self-explanatory.

Three options are provided:

1. System settings
2. UV treatment (sterilisation)
3. Extraction

To the left of the screen is a map to help you navigate the program.

2. System Settings



The System Settings window allows you to:

1. Set Date and Time
2. Reset to Factory Defaults
3. Provide links so that you can obtain more information.

Future releases will allow you to pick your preferred language.

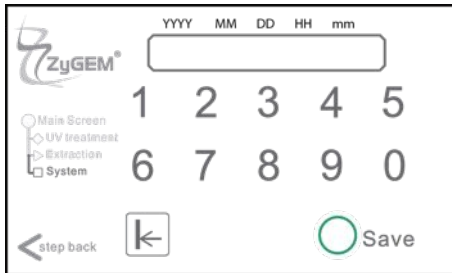
2.1 Factory Reset



The machine arrives with a number of pre-installed programs. If you lose these, a Factory Reset will restore them.

However, if you choose to do this, all of your custom programs will be removed and the Date and Time will need to be reset.

2.2 Date and Time



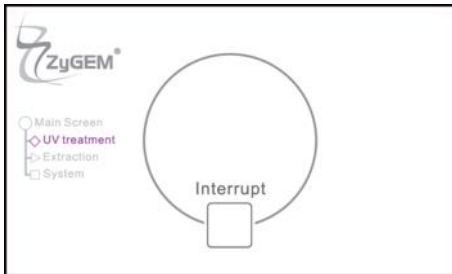
Set the Date and Time using the keypad and press Save.



The last System option gives you a QR-code so that you can access more information from the ZyGEM webpage.

3. UV treatment

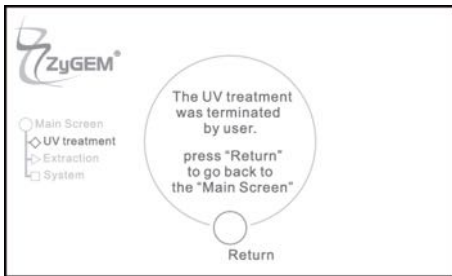
The PDQeX is fitted with four UV strip lights to reduce DNA contamination. Three lights are situated below the collection tube drawer. The drawer should be removed before treatment to allow the light to access the lower side of the heating block. The other is above the heating block. During UV treatment, the sliding door will be locked.



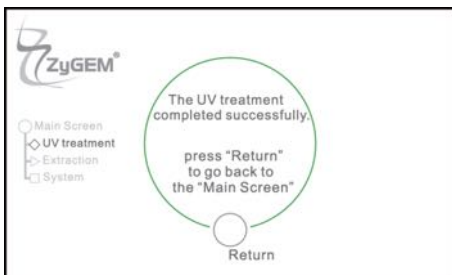
Press “UV Treatment” on the Home screen.

The procedure takes 30 minutes and can be interrupted at any time.

If you press “Interrupt” you have an opportunity to change your mind by pressing “Step Back”.



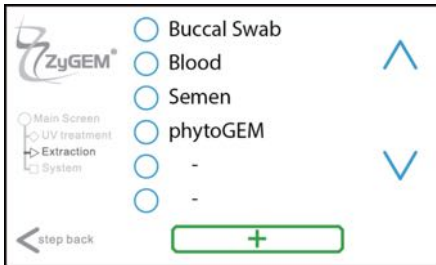
After the treatment is complete, press “Return” to go back to the Home screen.



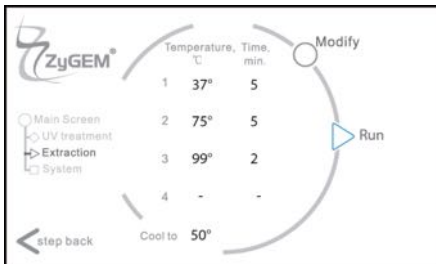
NOTE: The UV treatment will only remove superficial contamination. For more serious spills, clean the inside of the device using a cotton bud soaked in 1% bleach. Follow this by swabbing with 80% ethanol.

4. Running pre-defined programs on the PDQeX

From the Home Screen, press “Extract”.

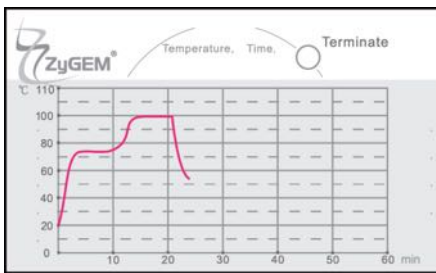


Select the program you wish to run.



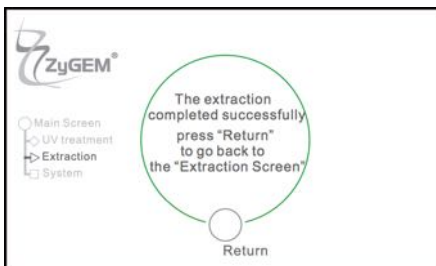
The temperature regimen will be shown.

Press “Run”.



The PDQeX will switch to a display that shows the progress of your program.

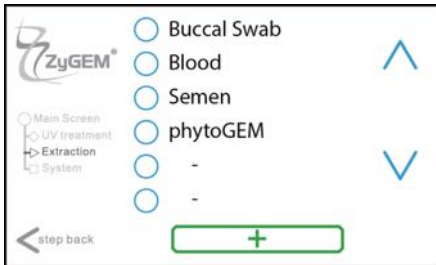
At any time, you can terminate the program but be aware that your tubes and samples cannot be re-run.



Once the run is complete, you will be prompted to return to the “extraction screen”.

5. Writing a custom program on the PDQeX

From the Home Screen, press “Extract”.

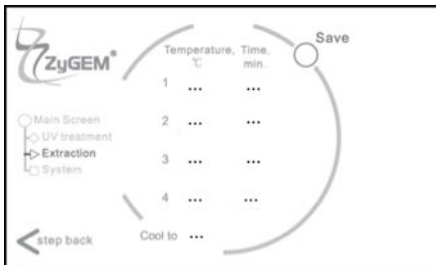


Instead of choosing one of the pre-defined programs, you can write your own. This can be useful for optimising the PDQeX for your specific sample type.

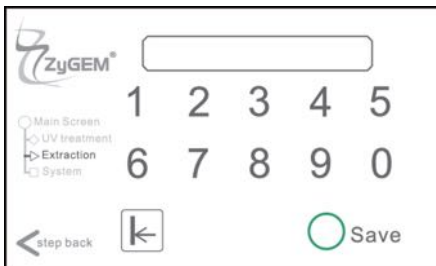
Press the “+” Button.



You will be asked to give your program a name. Use the keyboard and press “Save”.



Press on each of the dotted lines “...” one by one...



...and enter the temperature (°C) or the time (min).

Press “Save”.

When you have completed all the entries you need, press “Save” and follow the steps in Section 4.

6. Error messages

Running the PDQeX is easy, so it is unlikely that anything serious will go wrong. A few common mistakes are detected by the machine.



The PDQeX has a sensor at the back of the collection tube drawer. If the drawer is not in place or is crooked, the machine will not run. This prevents the DNA from being seriously contaminated.



The block is hot and we don't want you to burn your fingers.

Make sure the sliding door is fully closed before running the PDQeX.



This is not an error but a reminder that you cannot run the same tubes twice if you abort a run.

Cleaning and Sterilisation.

- Collection trays and cartridge holders should be cleaned and sterilised in accordance with laboratory procedure.
- The UV treatment option on the control screen gives a 30 minute UV light exposure (see page 9).
- In the event of gross contamination of the heating block or machine, clean with a cotton swab and wipe with 0.5% bleach followed by a thorough removal of the bleach with water-dampened swabs and wipes.
- Aluminium parts of this machine should not be soaked in Virkon or Bleach. Extended use of chemical agents such as these will corrode the parts.

WARNING *DO NOT GET LIQUIDS INSIDE THE MACHINE*

If you are forced to use bleach, make sure that ALL of it is removed.

Inspection and Maintenance

The PDQeX has been designed to require no operator maintenance.

Disposal of Waste

Used PDQeX tubes are to be disposed of as hazardous waste in accordance to laboratory protocols.

Contact Information

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