





MICROCALORIMETRY

MICROCAL PEAQ-ITC **OPERATING INSTRUCTIONS**

MICROCAL PEAQ-ITC OPERATING INSTRUCTIONS

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INTRODUCTION

This section contains important user information, description of safety notices, regulatory information and a general description of the intended use of MicroCal PEAQ-ITC, and a list of associated documentation.

The following topics are covered in this section:

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About this manual

Purpose of this manual

The *Operating Instructions* provide you with the instructions needed to install, operate and maintain the product in a safe way.

Scope of this document

This manual covers MicroCal PEAQ-ITC including the MicroCal PEAQ-ITC Control Software.

Typographical conventions

Software items are identified in the text by **bold italic** text. A colon separates menu levels, thus Malvern InstrumentsFile:Open refers to the Malvern InstrumentsOpen command in the Malvern InstrumentsFile menu.

Hardware items are identified in the text by **bold** text (for example, Malvern InstrumentsPower).

Important user information



Note: All users must read the entire *Operating Instructions* before installing, operating or maintaining the product.

Always keep the Operating Instructions at hand when operating the product.

Do not operate the product in any other way than described in the user documentation. If you do, you may be exposed to hazards that can lead to personal injury and you may cause damage to the equipment.

Intended use of the product

MicroCal PEAQ-ITC is an Isothermal Titration Calorimeter system designed for bio-molecular interaction studies in research applications.

MicroCal PEAQ-ITC is intended for research use only and shall not be used in any clinical procedures or for diagnostic purposes.

MicroCal PEAQ-ITC is not suitable for operation in a potentially explosive atmosphere or for handling flammable liquids.



WARNING! Do not operate the product in any other way than described in the *MicroCal PEAQ-ITC user documentation*.

Prerequisites

In order to operate MicroCal PEAQ-ITC safely and according to the intended use, the following prerequisites must be met:

- You should have a general understanding of the use of a personal computer running Microsoft[®] Windows[®] in the version provided with your product.
- You should be acquainted with the use of general laboratory equipment and with handling of chemical and biological materials.
- You should understand the concepts of isothermal titration calorimetry.
- You must read and understand the Safety instructions of these *Operating Instructions*.
- The system must be installed according to the instructions in Installation.

Safety notices

This user documentation contains safety notices (WARNING, CAUTION, and NOTICE) concerning the safe use of the product. See definitions below.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury. It is important not to proceed until all stated conditions are met and clearly understood.



CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury. It is important not to proceed until all stated conditions are met and clearly understood.



NOTICE indicates instructions that must be followed to avoid damage to the product or other equipment.

Notes and tips



Note: A note is used to indicate information that is important for trouble-free and optimal use of the product.



Tip: A tip contains useful information that can improve or optimize your procedures.

Regulatory information

Introduction

This section lists the directives and standards that the MicroCal PEAQ-ITC system fulfills.

Manufacturing information

The table below summarizes the required manufacturing information. For further information, see the EC Declaration of Conformity (EC DoC) document.

	Malvern instruments
	Grovewood road
Name and address of manufacturer	Malvern
	Worcestershire
	WR14 1XZ, United Kingdom

Conformity with EU Directives

This product complies with the European directives listed in the table, by fulfilling the corresponding harmonized standards.

A copy of the EC Declaration of Conformity is available on request.

Directive	Title
2004/108/EC	Electromagnetic Compatibility (EMC) Directive
2006/95/EC	Low Voltage Directive (LVD)

CE marking

The CE marking and the corresponding EC Declaration of Conformity is valid for the instrument when it is:

- used as a stand-alone unit, or
- connected to other products recommended or described in the user documentation, and
- CE
- used in the same state as it was delivered from Malvern Instruments, except for alterations described in the user documentation.

International standards

The standard requirements fulfilled by this product are summarized in the table below.

Standard	Description	Notes
EN 61010-1, IEC 61010-1, UL 61010-1, CAN/CSA C22.2 No. 61010-1	Safety requirements for electrical equip- ment for measurement, control, and laboratory use.	EN standard is har- monized with EU dir- ective 2006/95/EC.
EN 61326-1, IEC 61326-1 (Emission according to CISPR 11, Group 1, class A)	Electrical equipment for measurement, control and laboratory use - EMC requirements.	EN standard is har- monized with EU dir- ective 2004/108/EC.

Instrument safety compliance specifications

MicroCal PEAQ-ITC calorimeters carry the CUE (Canada, USA, Europe) mark:

The CUE mark (authorized by TÜV America, a division of TÜV Süddeutschland) signifies that:

- The instrument has been tested by an accredited certification body and meets applicable Canadian electrical safety standards/requirements (CSA/SCC).
- The instrument has been tested by an NRTL (Nationally Recognized Testing Laboratory) and meets applicable United States electrical safety standards/requirements (ANSI/UL).
- The instrument has been tested by a competent and notified body for applicable EU directives and meets applicable safety standards/requirements (EN/IEC).



Regulatory compliance of connected equipment

Any equipment connected to MicroCal PEAQ-ITC should meet the safety requirements of EN 61010-1/IEC 61010-1, or relevant harmonized standards. Within EU, connected equipment must be CE marked.

Associated documentation

Introduction

This section lists the user documentation that is delivered with MicroCal PEAQ-ITC and related literature that can be downloaded or ordered from Malvern Instruments.

User documentation

The user documentation for MicroCal PEAQ-ITC consists of:

- MicroCal PEAQ-ITC Operating Instructions
- MicroCal PEAQ-ITC User Manual
- MicroCal PEAQ-ITC Analysis Software User Manual

Related literature

Additional downloadable material can be found at: www.malvern.com

HEALTH AND SAFETY

This section provides vital health and safety information which all users of the system must read and understand. It describes safety precautions and emergency shutdown procedures for MicroCal PEAQ-ITC. The labels on the system and information regarding recycling are also described.



WARNING! Before installing, operating or maintaining the product, all users must read and understand the entire contents of this section to become aware of the hazards involved.

The following topics are covered in this section:

Safety precautions	12
Labels	17
Emergency procedures	19
Recycling information	
Declaration of Hazardous Substances (DoHS)	

Safety precautions

Introduction

Before installing, operating or maintaining the system, you must be aware of the hazards described in the user documentation. Follow the instructions provided to avoid personal injury or damage to the equipment.

The safety precautions in this section are grouped into the following categories:

- General precautions
- Using flammable liquids
- Personal protection
- Installing and moving
- System operation
- Maintenance

General precautions



Warning! Do not operate the product in any other way than described in the *MicroCal PEAQ-ITC user documentation*.

Warning! Do not use MicroCal PEAQ-ITC if it is not working properly, or if it has suffered any damage, for example:



- damage to the power cord or its plug
- damage caused by dropping the equipment
- damage caused by splashing liquid onto it



Warning! In case of fire. In case of fire, unplug MicroCal PEAQ-ITC.

Warning! Liquid solutions. Use caution when using solutions near the instrument. If any liquid is spilled on or around the instrument, unplug the instrument immediately and wipe up the spilled liquid. If there is any possibility that liquid may have leaked into the instrument case, contact Malvern Instruments immediately. Do not plug the instrument into any electrical outlet until the problem is resolved.



Warning! Strong acids. The MicroCal PEAQ-ITC cells are constructed out of Hastelloy[™]. Strong acids must be avoided.

Notice! Electromagnetic and radio frequency interference (EMI/RFI). Laboratory tests have shown that significant electromagnetic waves may affect the performance of MicroCal PEAQ-ITC.



Strong electrical or magnetic fields may be produced by an NMR, microwave oven, large motors or refrigeration units. In some cases, these waves can cause unintended data results.

Please refrain from all use of such equipment.

Using flammable liquids



Warning! Fire Hazard. Before starting the system, make sure that there is no leakage.



Warning! A fume hood or similar ventilation system shall be installed when flammable or noxious substances are used.

Personal protection



Warning! Always use appropriate Personal Protective Equipment (PPE) during operation and maintenance of this product.



Warning! Hazardous substances and biological agents. When using hazardous chemical and biological agents, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the substances used. Follow local and/or national regulations for safe operation and maintenance of MicroCal PEAQ-ITC.

Installing and moving



Warning! The product must be installed and prepared by Malvern Instruments personnel or a third party authorized by Malvern Instruments.



Warning! Power cord. Only use power cords with approved plugs delivered or approved by Malvern Instruments.



Warning! Electrical power. Provide proper electrical power to the instrument. This should be 100-240 VAC, 50/60 Hz, observing any local electrical safety requirements. Only power cords supplied with the instrument should be used.



Warning! Protective ground. The product must always be connected to a grounded power outlet.



Warning! Access to power switch and power cord with plug. Do not block access to the power switch and power cord. The power switch must always be easy to access. The power cord with plug must always be easy to disconnect.



Warning! Do not block the ventilation inlets or outlets on the system.



Notice! Disconnect power. To prevent equipment damage, always disconnect the power from the product before an instrument module is removed or installed, or a cable is connected or disconnected.

System operation



Warning! Removal of solutions. All solutions in the cells must be cooled down below 40°C before removal using the titration syringe. Any higher temperature may cause the syringe to break, and the exposure to hazardous substances may increase.



Warning! Placement of vessels containing liquid. Do not place vessels containing liquid on top of the instrument, except those designed for the washing module. Spilled liquid is a fire, electrical and corrosion hazard.



Warning! Hazardous chemicals during run. When using hazardous chemicals, flush the entire system tubing with distilled water, before service and maintenance.

Warning! Methanol is highly volatile and can be hazardous to humans.

• Storage containers should be kept tightly closed.



- Methanol should always be transferred in a well-ventilated area with no ignition sources. The operator should have protective clothing, eye protection and gloves.
- Methanol can be absorbed through the skin. Do not allow methanol to be swallowed or to come in contact with skin or eyes. If accidental exposure occurs, flush the affected area with water. If methanol is swallowed, or there is significant skin or eye exposure, seek medical help.



Caution! Waste tubes and containers must be secured and sealed to prevent accidental spillage.



Notice: Never allow liquid in the cells to freeze. The expansion of the liquid can distort the cells and rupture the most critical sensor, causing irreparable damage.



Notice: The MicroCal PEAQ-ITC should always be moved in its normal operating orientation. Other orientations will subject delicate sensors inside the instrument to stress.

Maintenance



Warning! Repairs, alterations or modifications must only be carried out by a Malvern Instruments specialist, or with explicit directions from a technician. Removal or modification of any cover or component could result in an unsafe or easily damaged instrument.



Warning! Only spare parts and accessories that are approved or supplied by Malvern Instruments may be used for maintaining or servicing the product.



Warning! Disconnect power. Always disconnect power from the instrument before replacing any component on the instrument, unless stated otherwise in the user documentation.



Warning! Hazardous chemicals during maintenance. When using hazardous chemicals for instrument cleaning, use a neutral solution in the last phase or step.



Warning! Decontaminate the equipment before decommissioning to ensure the removal of all hazardous residues.



Warning! Contrad 70TM (Decon 90TM) is corrosive and therefore dangerous to health. When using hazardous chemicals, avoid spillage and wear protective glasses, gloves, and other suitable personal protective equipment as specified in the Safety Data Sheet.

Labels

Introduction

This section describes the various labels on the MicroCal PEAQ-ITC instrument and their meaning.

Instrument label

The following illustration shows an example of the identification label that is attached to the MicroCal PEAQ-ITC instrument.





The following label is also attached on the instrument.

Label explanations

The following table describes the various labels that may be found on the MicroCal PEAQ-ITC instrument.

Label text	Description
CE	The system complies with applicable European directives. Refer to Regulatory inform- ation.
	This symbol indicates that the product contains hazardous materials in excess of the

This symbol indicates that the product contains hazardous materials in excess of the limits established by the Chinese standard SJ/T11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in Electronics.



Warning! Read the user documentation before using the system. Do not open any covers or replace parts unless specifically stated in the user documentation.



This symbol indicates that waste electrical and electronic equipment (WEEE) must not be disposed as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.



The system complies with applicable requirements for Australia and New Zealand.

This symbol indicates that the instrument been tested by:



- an accredited certification body and meets applicable Canadian electrical safety standards/requirements (CSA/SCC), and
- an NRTL (Nationally Recognized Testing Laboratory) and meets applicable United States electrical safety standards/requirements (ANSI/UL).

Refer to Instrument safety compliance specifications.



Warning! High Voltage. Always make sure that the system is disconnected from electric power before opening the cabinet doors or disconnecting any electric equipment.

Emergency procedures

Introduction

This section describes what to do in an emergency situation and what will happen in the event of power failure.

Emergency situation

In an emergency situation, do as follows to stop the run:

Switch off the power supply by either:

- using the system power switch, or
- disconnecting the power cord, or
- switching off the fixed power supply circuit breaker.

Power failure

The following list describes what happens in the event of power failure.

- The MicroCal PEAQ-ITC run is interrupted immediately.
- The data collected up to the time of the power failure is saved.
- The Controller PC shuts down.
- The washing module shuts down immediately.

Restart after emergency shutdown or power failure

To restart MicroCal PEAQ-ITC after emergency shutdown or power failure:

Step	Action
1	Make sure that the condition that caused the power failure or emergency stop is corrected.
2	Restart the system according to the instrument starting procedure, see Prepare the instrument.

Recycling information

Introduction

This section contains information about the decommissioning of MicroCal PEAQ-ITC.

Decontamination

MicroCal PEAQ-ITC shall be decontaminated before decommissioning and all local regulations shall be followed with regard to scrapping of the equipment.

Disposal, general instructions

When taking MicroCal PEAQ-ITC out of service, the different materials must be separated and recycled according to national and local environmental regulations.

Recycling of hazardous substances

MicroCal PEAQ-ITC contains hazardous substances. Detailed information is available from your Malvern Instruments representative.

Disposal of electrical components

Waste electrical and electronic equipment must not be disposed of as unsorted municipal waste and must be collected separately. Please contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment.



Declaration of Hazardous Substances (DoHS)

Introduction

The following product pollution control information is provided according to SJ/T11364-2006 Marking for Control of Pollution caused by Electronic Information Products.

根据SJ/T11364-2006) 健子信息产品污染控制标识要求》特提供如下有关污染 控制 方面的信息

Symbols used in pollution control label

电子信息产品污染控制标志说明

Label	Meaning
-------	---------

This symbol indicates the product contains hazardous materials in excess of the limits established by the Chinese standard SJ/T11363-2006 Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Products. The number in the symbol is the Environment-friendly Use Period (EFUP), which indicates the period during which the toxic or hazardous substances or elements contained in electronic information products will not leak or mutate under normal operating conditions so that the use of such electronic information products will not result in any severe environmental pollution, any bodily injury or damage to any assets. The unit of the period is "Year".



In order to maintain the declared EFUP, the product shall be operated normally according to the instructions and environmental conditions as defined in the product manual, and periodic maintenance schedules specified in Product Maintenance Procedures shall be followed strictly.

Consumables or certain parts may have their own label with an EFUP value less than the product. Periodic replacement of those consumables or parts to maintain the declared EFUP shall be done in accordance with the Product Maintenance Procedures.

This product must not be disposed of as unsorted municipal waste, and must be collected separately and handled properly after decommissioning.

该标志表明本产品含有超过SJ/T11363-2006 电子信息产品中有毒有害物质的限量要求》中限量的有毒有害物质。标志中的数字为本产品的环保使用期,表明本产品在正常使用的条件下,有毒有害物质不会发生外泄或突变,用户使用本产品不会对环境造成严重污染或对其人身、财产造成严重损害的期限。单位为年。



为保证所申明的环保使用期限,应按产品手册中所规定的环境条件和方法进行正常使用,并严格遵守产品维修手册中规定的期维修和保养要求。

产品中的消耗件和某些零部件可能有其单独的环保使用期限标志,并且其 环保使用期限有可能比整个产品本身的环保使用期限短。应到期按产品维 修程序更换那些消耗件和零部件,以保证所申明的整个产品的环保使用期 限。

本产品在使用寿命结束时不可作为普通生活垃圾处理,应被单独收集妥善处理

List of hazardous substances and their concentrations

产品中有毒有害物质或元素的名称及含量

Indication for each major part if substance exceeds limit

Valu	ue Meaning		
0	Indicates that this toxic or hazardous substance contained in all of the homogeneous mater- ials for this part is below the limit requirement in SJ/T11363-2006.		
0	表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006标准规定的限量要求以下		
	Indicates that this toxic or hazardous substance contained in at least one of the homo- geneous materials used for this part is above the limit requirement in SJ/T11363-2006.		
	Data listed in the table represents best information available at the time of pub- lication		
Х	表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的		
	限量要求		
	• 此表所列数据为发布时所能获得的最佳信息		

List of hazardous substances

Component name	Hazardous sub- stance					
部件名称	有毒有害物质或元 素					
	Pb	Hg	Cd	Cr6+	PBB	PBDE
	铅	汞	镉	六价 铬	多溴联 苯	多溴二苯 醚
MicroCal PEAQ-ITC, cell unit ¹	Х	0	0	0	0	0
MicroCal PEAQ-ITC, washing mod- ule ¹	Х	0	0	0	0	0
MicroCal PEAQ-ITC, controller PC ¹	0	0	0	0	0	0

The product has not been tested as per the Chinese standard SJ/T11363-2006
Requirements for Concentration Limits for Certain Hazardous Substances in Electronic Information Product.

SYSTEM DESCRIPTION

This section provides a description of MicroCal PEAQ-ITC and an overview of its components.

The following topics are covered:

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Instrument cell unit	26
Washing module	30

General introduction

MicroCal PEAQ-ITC provides detailed insight into binding energetics.

The system has a sample cell and provides direct measurement of the heat absorbed or evolved as a result of mixing precise amounts of reactants. The sample and reference cells are made from Hastelloy[™], a highly inert material.

Data analysis is performed using MicroCal PEAQ-ITC Analysis Software, wherein the user obtains the stoichiometry (n), dissociation constant (K_D), and enthalpy (Δ H) of the interaction. The MicroCal PEAQ-ITC Analysis Software can also be used to fit more complicated models.

System overview

The following illustration shows the MicroCal PEAQ-ITC instrument with the washing module and the Controller PC.



Part	Description
1	MicroCal PEAQ-ITC washing module
2	MicroCal PEAQ-ITC cell unit
3	Controller PC (not shown)

Instrument cell unit

The following illustration shows the MicroCal PEAQ-ITC cell unit.



Part	Description
1	Sample cell
2	Injector tower
3	Pipette
4	Loading syringe
5	Fill Port Adaptor (FPA)
6	FPA Storage Location
7	Wash/load station
8	Titration syringe
9	Titration loading station
10	Clamp

Injector tower (top view)

The following illustration shows a top view of the injection tower of the MicroCal PEAQ-ITC cell unit.



Part	Description
1	Sample cell
2	Reference cell
3	Cell Location
4	Rest Location
5	Load Location
6	Clean Location

Pipette

The following illustration shows the MicroCal PEAQ-ITC pipette unit.



Part	Function
1	Rotating assembly
2	Plunger tip
3	Pipette housing
4	Syringe glass
5	Retaining nut
6	Syringe paddle stem
7	Syringe tip

Connections at the rear of the cell unit

The following illustration shows the connections at the rear of the MicroCal PEAQ-ITC cell unit.



Part	Function
1	Power switch
2	24 VDC input from power supply (AC plug)
3	USB connection to Controller PC
4	Fan

Washing module

The following illustration shows the MicroCal PEAQ-ITC washing module.



Part	Function
1	Cell Cleaning Tool
2	Detergent bottle
3	Methanol bottle
4	Water bottle
5	Waste bottle
6	Overflow bottle

Connections at the rear of the washing module

The following illustration shows the connections at the rear of the MicroCal PEAQ-ITC washing module.



Part	Function
1	Power switch
2	24 VDC input from power supply (AC plug)
3	USB connection to Controller PC
4	Waste/overflow bottle connection

INSTALLATION

This section provides brief information about the installation of MicroCal PEAQ-ITC.

The following topics are covered in this section:

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Note: Any equipment connected to the MicroCal PEAQ-ITC must fulfill applicable standards and local regulations.

Installation precautions



Warning! The product must be installed and prepared by Malvern Instruments personnel or a third party authorized by Malvern Instruments.



Warning! Power cord. Only use power cords with approved plugs delivered or approved by Malvern Instruments.



Warning! Electrical power. Provide proper electrical power to the instrument. This should be 100-240 VAC, 50/60 Hz, observing any local electrical safety requirements. Only power cords supplied with the instrument should be used.



Warning! Protective ground. The product must always be connected to a grounded power outlet.



Warning! Do not block the ventilation inlets or outlets on the system.



Warning! Access to power switch and power cord with plug. Do not block access to the power switch and power cord. The power switch must always be easy to access. The power cord with plug must always be easy to disconnect.



Caution! Disconnect power. To prevent equipment damage, always disconnect the power from the product before an instrument module is removed or installed, or a cable is connected or disconnected.



Note: Lift the product. Lift the MicroCal PEAQ-ITC instrument in the upright position.
Site requirements

Introduction

This section outlines the site requirements for MicroCal PEAQ-ITC.

Bench space

The MicroCal PEAQ-ITC system (instrument and Controller PC) requires about 1.2 meters of bench space (depth approximately 64 cm). For more details, See Site requirements.



WARNING! Access to power switch and power cord with plug. Do not block access to the power switch and power cord. The power switch must always be easy to access. The power cord with plug must always be easy to disconnect.

Ambient environment

Environmental fluctuations may cause subtle performance problems.

The following should be avoided:

- Strong draft
- Room temperature fluctuations
- Intense sunlight
- Vibrations
- Strong electrical or magnetic fields (as may be produced by an NMR, microwave oven, large motors or refrigeration units)

The following table shows the environmental operating requirements.

Specification	Requirement
Temperature	10°C to 28°C
Humidity	0% to 70% RH, non-condensing
Atmospheric pressure	700 to 1060 hPa

Electrical power

The power source (100-240 VAC) should be free from voltage fluctuations, harmonic distortions, power dips and spikes.



WARNING! Electrical power. Provide proper electrical power to the instrument. This should be 100-240 VAC, 50/60 Hz, observing any local electrical safety requirements. Only power cords supplied with the instrument should be used.



WARNING! Protective ground. The product must always be connected to a grounded power outlet.

The AC power line should be dedicated to MicroCal PEAQ-ITC and should not share power with additional equipment.

Although the power filtering in the MicroCal PEAQ-ITC instrument is adequate for most laboratory environments, some disturbances may affect the performance of the instrument and it may be necessary to have the AC power source evaluated (see the following table) or install a power conditioner.

Because power source problems can be manifested in many different ways, it is not possible to recommend a power conditioner for all situations. It is recommended that you test a power conditioner, at your location, before you purchase it.

If you believe you are experiencing power source related problems, please contact a Malvern Instruments field engineer.

The following table show the power supply requirements.

Specification Requirement		
Voltage	100-240 VAC (power adapter), 24 VDC (power supply to the instrument)	
Frequency	50/60 Hz	
Power	150 W	

Unpacking and transport

Introduction

This section outlines important information that must be considered when transporting MicroCal PEAQ-ITC.

Unpacking

MicroCal PEAQ-ITC is delivered in protective packing material.

- Unpack with great care.
- Document any damage and contact your local Malvern Instruments representative.

Moving the system



Notice: Lift the product. Lift the MicroCal PEAQ-ITC instrument in the upright position.

- 1. Disconnect the power cord.
- 2. Disconnect all cables and tubing connected to peripheral components and liquid containers.
- 3. Remove all items from the top of the system.
- 4. Grasp the instrument under the main body.

Set up



Warning! The product must be installed and prepared by Malvern Instruments personnel or a third party authorized by Malvern Instruments.

OPERATION

This section provides the information required to safely operate the MicroCal PEAQ-ITC.

The following topics are covered in this section:

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Precautions



WARNING! Always use appropriate Personal Protective Equipment (PPE) during operation and maintenance of this product.



WARNING! Hazardous substances and biological agents. When using hazardous chemical and biological agents, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the substances used. Follow local and/or national regulations for safe operation and maintenance of MicroCal PEAQ-ITC.



WARNING! Removal of solutions. All solutions in the cells must be cooled down below 40°C before removal using the titration syringe. Any higher temperature may cause the syringe to break, and the exposure to hazardous substances may increase.



WARNING! Placement of vessels containing liquid. Do not place vessels containing liquid on top of the instrument, except those designed for the washing module. Spilled liquid is a fire, electrical and corrosion hazard.



WARNING! Hazardous chemicals during run. When using hazardous chemicals, flush the entire system tubing with distilled water, before service and maintenance.

WARNING! Methanol is highly volatile and can be hazardous to humans.

• Storage containers should be kept tightly closed.



- Methanol should always be transferred in a well-ventilated area with no ignition sources. The operator should have protective clothing, eye protection and gloves.
- Methanol can be absorbed through the skin. Do not allow methanol to



be swallowed or to come in contact with skin or eyes. If accidental exposure occurs, flush the affected area with water. If methanol is swallowed, or there is significant skin or eye exposure, seek medical help.



CAUTION! Waste tubes and containers must be secured and sealed to prevent accidental spillage.



NOTICE! Never allow liquid in the cells to freeze. The expansion of the liquid can distort the cells and rupture the most critical sensor, causing irreparable damage.



NOTICE! The MicroCal PEAQ-ITC should always be moved in its normal operating orientation. Other orientations will subject delicate sensors inside the instrument to stress.

Prepare the instrument

Introduction

This section describes the procedures needed to prepare the MicroCal PEAQ-ITC for a run.

Turn on the MicroCal PEAQ-ITC instrument

Once the MicroCal PEAQ-ITC instrument has been connected to the Controller PC, it is ready to use. At the rear of the instrument unit is a power on/off switch that must be in the **on (I)** position.

Software description

The MicroCal PEAQ-ITC is delivered with two software components as outlined in the following table.

Software component	Description		
MicroCal PEAQ-ITC Control Software	This software is used to control MicroCal PEAQ-ITC and is preinstalled on the Controller PC.		

Software component	Description		
	This software is supplied for data analysis.		
MicroCal PEAQ-ITC Analysis Software	Accessed via theMicroCal PEAQ-ITC Control Software.		
	For more information see <i>MicroCal PEAQ-ITC</i> Analysis Software User Manual.		

Start the control software

TheMicroCal PEAQ-ITC Control Software is used to control the MicroCal PEAQ-ITC instrument directly. The software and hardware need to be started in sequence for correct initialization.

To start the MicroCal PEAQ-ITC Control Software, follow the steps described in the following table.

Step	Action				
1	Start the computer and log in to Windows.				
2	Turn on theMicroCal PEAQ-ITC instrument using the Power switch at the rear of the unit.				
	Double-click the MicroCal PEAQ-ITC Control Software icon.				

3

Result: The MicroCal PEAQ-ITC Software is started.

Leave the power on

During frequent operations, the power may be left on as long as the user interface program, MicroCal PEAQ-ITC Control Software, is running. The software automatically makes sure that the system does not incur any damage and keeps the MicroCal PEAQ-ITC sample cell ready.

Periods of inactivity

When the system will not be used for extended periods of time it is recommended to:

- close the MicroCal PEAQ-ITC application
- switch off the power
- · keep both the sample and reference cells filled with deionized water

Open a method or an experiment

Introduction

This section describes how to open a predefined method or experiment in the MicroCal PEAQ-ITC Control Software.

Open a method or experiment

In the Start Experiment workspace, open a method file or an experiment file.

MicroCal PEAQ-ITC Control Software	hate.	
Malvern MicroCal PEA	Q-ITC Control Software	
Run Experiment Maintena	ance Design Experiment	
Start Experimer	Start Experiment Load Ru	in Clean
Browse <u>C:\</u> > <u>Users</u> >	Public > Documents > Malvern Instruments	> MicroCal PEAQ-ITC > Methods
Name	Modified Date	Preview - 13 Injections itcm
📑 13 Injections.itcm (MicroC	al Method)	i i i i i i i i i i i i i i i i i i i
19 Injections.itcm (MicroC	al Method)	This experimental method will make a single 0.4 µL injection, followed by 12, 3 µL injections.
	<u>O</u> pen	Temperature (°C) 25.0
		Reference Power (µW) 41.9
		Feedback High
		Stir Speed (rpm) 750
		Initial Delay (s) 60.0
		Injection Spacing (s) 150
		Injection Duration (s) 6

- Click **Methods**, browse to a new folder or select a file in the list and then click Open or
- Click **Experiments**, browse to a new folder or select a file in the list and then click Open.

Result: The method opens in the Run workspace.



Note: In most cases the MicroCal standard method can be used.

Instrument control bar

The experienced user can control the instrument from the instrument control bar located at the bottom of the MicroCal PEAQ-ITC Control Software window.

Idle									DP (µcal/s): 1.17 Te	imperature (°C)	25.058
210	Idle Temperature (*C): 25	Set	Syringe:	Plunger Down	Open Fill Port	Close Fill Port	PurpsRell	Cell Clean: Rins v Syring	e Clean: None w	Clean	

The instrument control bar can be used to execute all loading and cleaning tasks performed by the instrument. This allows the user to perform loading and cleaning tasks without referring to the software guided workflows.

For more information, see *MicroCal PEAQ-ITC User Manual*.

Experiment and method files

MicroCal PEAQ-ITC Control Software can open calorimetry data files (experiment files) or method files. Method files only contain instrument settings. Experiment files also contain calorimetric data from an experiment run. Parameters from both file types can be used to create new experiment runs.

File type	File extension	Description
Experiment file	itc	Calorimetric data from MicroCal PEAQ-ITC.
Method file	itcm	Method file created with MicroCal PEAQ- ITC Control Software or MicroCal PEAQ-ITC Analysis Software.
		Contains instrument settings only.

Load the instrument

Load workspace

This workspace is found in the Run Experiment view. Follow the guided workflow that steps the user through loading both the sample cell and the titration syringe. Additionally, the user has the option of watching videos detailing the procedure.

Step	Action
	Click Load <i>Result:</i> The Load workspace opens.
	Land Run Clean
	0-0-0-0-0
	0 Introduction
1	Ext To view a video depicting both sample cell and inner leading, click the Play butts.
	Load Cell
	Attach Fill Port Adapter
	Move Pipette to Load Location
	Obtach Fill Port Adapter
	S Move Pipette to Cell

2	To view a instruction video showing both sample cell and syringe loading, click the Play button in the instruction video window.
3	To start the Load Instrument workflow click Next .
3	Note : Software-instrument connection is required to load the instrument.

Start the experiment

Introduction

This section describes how to start an experiment. Experiments are started from the Run workspace.

• Click Run to enter the Run workspace.



Experiment parameters are displayed in the left Experiment Information pane. Real-time experiment status is displayed in the right pane.

Experiment information

- Enter titrant concentration in the [Syr] (M) box.
- Enter sample cell solution in the [Cell] (M) box.
- Enter any comments in the Comment box.
- To edit the instrument settings, click the Edit settings button \checkmark

Result: More instrument settings and injection settings become available.

For more information, see MicroCal PEAQ-ITC User Manual.

Run experiment

• Click **Start** in the right live pane to start the experiment. The user will be prompted to enter a filename and save location for the .itc file.

Follow the experiment run in real-time. The instrument status is displayed in the right live pane.



For more information, see MicroCal PEAQ-ITC User Manual.

Clean the instrument

Clean workspace

This workspace is found in the **Run Experiment** view. Follow the guided workflow that steps the user through cleaning both the sample cell and the titration syringe. Additionally, the user has the option of watching videos detailing the procedure.

Step	Action					
	Click Clean					
	Result: The Clean workspace opens.					
	Load Run Clean					
	0-0-0-0-0					
	O Introduction					
	To view a video depicting all the cleaning steps, click the Play button.					
1	To enter the Clean Instrument workflow, click Next.					
	Choose Cleaning Method(s)					
	Insert Cell Cleaning Tool					
	Attach Fill Port Adapter					
	Move Pipette to Clean Location					
	5 Detach Fill Port Adapter					
	3 Remove Cell Cleaning Tool					
	•					
2	Detach Fill Port Adapter Remove Cell Cleaning Tool To view an instruction video showing all the default cleaning steps, click the Play					

2	in the instruction video showing all the default cleaning steps, click the Play button in the instruction video window.
3	To start the clean instrument workflow click Next . Select what cleaning methods to use. In most cases you can use the default cleaning methods.

Step	Action		
	Start Experiment Lood Ru		
	Introduction	n	
	1 Choose Cle	aning Method(s)	
		Cell Cleaning Method	Syringe Cleaning Method
		Rinse	Rinse
		Rinse with water,	Rinse with water, then dry using methanol.
		Wash Wash with detergent, then rinse with water.	Wosh Wash with detergent, rinse with water, then dry using methanol.
		 Sook Soak in detergent for 30 minutes at 60 °C, then rinse with water. 	 None
		 None 	
	Back		Next
	Insert Cell 0	leaning Tool	
	Attach Fill F	'ort Adapter	
	Move Pipet	te to Clean Location	
	(5) Detoch Fill	Port Adapter	
	6 Remove Ce	II Cleaning Tool	



Note: Software-instrument connection is required to clean the instrument.

MAINTENANCE

This section provides the user with basic information on the proper maintenance of the instrument. For a more detailed description of maintenance procedures, watch the videos provided with the software (in English only).

The following topics are covered:

Maintenance overview	52
Replace the syringe plunger tip	55
Replace the titration syringe	62
Clean the titration syringe	66
Refill the reference cell	71

Maintenance overview

Precautions



WARNING! Repairs, alterations or modifications must only be carried out by a Malvern Instruments specialist, or with explicit directions from a Malvern Instruments technician. Removal or modification of any cover or component could result in an unsafe or easily damaged instrument.



WARNING! Always use appropriate Personal Protective Equipment (PPE) during operation and maintenance of this product.



WARNING! Hazardous substances and biological agents. When using hazardous chemical and biological agents, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the substances used. Follow local and/or national regulations for safe operation and maintenance of MicroCal PEAQ-ITC.



WARNING! Only spare parts and accessories that are approved or supplied by Malvern Instruments may be used for maintaining or servicing the product.



WARNING! Disconnect power. Always disconnect power from the instrument before replacing any component on the instrument, unless stated otherwise in the user documentation.



WARNING! Hazardous chemicals during maintenance. When using hazardous chemicals for instrument cleaning, use a neutral solution in the last phase or step.



WARNING! Decontaminate the equipment before decommissioning to ensure the removal of all hazardous residues.



WARNING! Contrad 70 (Decon 90) is corrosive and therefore dangerous to health. When using hazardous chemicals, avoid spillage and wear protective glasses, gloves, and other suitable personal protective equipment as specified in the Safety Data Sheet.

Maintenance tools

The following tools are used for MicroCal PEAQ-ITC maintenance.



Part	Function
1	Tweezers
2	Syringe Glass Removal Tool
3	Syringe Glass Cleaning Brush
4	Plunger Tip Removal Tool
5	Plunger Tip Install Tool

Maintenance workspaces

To open a specific maintenance workspace, click Maintenance and the workspace name.

The following instruction is an example only, and displays how to open the Change Plunger Tip workspace.

Step	Action
1	Click Maintenance.

Click Change Plunger Tip.

Result: The Change Plunger Tip workspace is displayed.



2	
/	
-	
2	

Change Plunger Tip	Pange Hunger Tip Replace Syringe Clean Syringe	
	0-0-6	0-0-0
	Introduction	
	Move Pipette to Clean Location	
		Move the Pipette partway into the Clean Location.
		Grasp the rotating assembly of the Pipette with one hand.
		With your other hand, remove the steel retaining nut where the paddle stem meets the Pipette. Let the retaining nut fall into the Clean Location.
	31	Cick Next
	Back	* - Requires Instrument Connection Next
	Move Pipette to Load Location	
	Remove Syringe Glass and Plunger Tip	
	Install Plunger Tip	
	Install Suringe Glass	

Replace the syringe plunger tip

Introduction

The plunger tip forms a seal with the syringe glass. The tip spins along with the syringe glass while the metal plunger itself remains stationary. As the plunger drives titrant out of the syringe glass, plunger tip wear can occur. Too much wear can result in poor data. If left unreplaced, the metal plunger can break through the worn plunger tip.

Replace the plunger tip every 300 experiments or at the first sign of wear.

To replace the syringe plunger tip, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.



Note: Instrument connection is required to replace the syringe plunger tip.

The Change Plunger Tip workflow

The software guided The Change Plunger Tip workflow is divided into the following steps:

Stage	Description
1	Move Pipette to Clean Location
2	Move Pipette to Load Location
3	Remove Syringe Glass and Plunger Tip
4	Install Plunger Tip
5	Install Syringe Glass

Move the pipette to the Clean Location

To move the pipette to the Clean Location, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Move the pipette partway into the Clean Location.
2	Grasp the rotating assembly of the pipette with one hand, and remove the steel retain-

ing nut where the paddle stem meets the pipette with your other hand.



3

Let the retaining nut drop into the Clean Location.

Move the pipette to the Load Location

To move the pipette to the Load Location, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Make sure that the Load Location does not contain a microcentrifuge tube.
2	Move the pipette to the Load Location.
-	Note: It should not be necessary, but have your hand ready to receive the syringe glass.
3	Click Next.
	Result: The instrument will move the plunger down and press out the syringe glass.

Remove the syringe glass and the plunger tip

To remove syringe glass and plunger tip, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Carefully remove the syringe glass using the supplied tweezers.



If the plunger motion did not expose enough syringe glass, use the Syringe Glass Removal Tool.



2

1

Insert the Plunger Tip Removal Tool into the empty pipette housing.



5 Make sure that the tip was removed.

Install the plunger tip

To install the plunger tip, follow the instruction video and/or the software guided work-flow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Install a new plunger tip in the Plunger Tip Install Tool.
I	Pay careful attention to the orientation of the plunger tip.



Part	Function
1	Plunger tip
2	Plunger Tip Install Tool

The plunger tip opening should face out from the tool.



Insert the tool into the pipette housing.

2

You will meet resistance as the new plastic tip slides over the plunger. A very soft click

should be felt when it is seated.



Note: Do not apply any additional pressure.

3 Remove the tool.

Install the syringe glass

To install the syringe glass, follow the instruction video and/or the software guided work-flow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Grasp the pipette's rotating assembly.
2	Gently insert the syringe glass with the syringe's fill port facing the same direction as the hole in the pipette's rotating assembly.



If aligned properly, the installed syringe glass should leave approximately 2 mm of glass exposed.



3	Leave the retaining nut in the Clean Location, and insert the pipette into the Clean Loca- tion without fully engaging the clamp.
4	Start to reinstall the retaining nut by turning the pipette's rotating assembly with its threads engaged with the retaining nut.
5	Move the pipette to the Rest Location and finish reinstalling the retaining nut.

Replace the titration syringe

Introduction

The syringe can be replaced as a part of preventive maintenance.

A broken syringe will not operate properly, will likely result in poor experimental results, and could contaminate the cell with broken glass.



WARNING! Hazardous substances and biological agents. When using hazardous chemical and biological agents, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the substances used. Follow local and/or national regulations for safe operation and maintenance of MicroCal PEAQ-ITC.

To replace the titration syringe, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following tables.



Note: Instrument connection is required to replace the syringe plunger tip.

The Replace Syringe workflow

The software guided Replace Syringe workflow is divided into the following steps:

Stage	Description
1	Move Pipette to Clean Location
2	Move Pipette to Load Location
3	Remove Syringe Glass
4	Install Syringe Glass

Move the pipette to the Clean Location

To move the pipette to the Clean Location, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Move the pipette partway into the Clean Location.
	Grasp the rotating assembly of the pipette with one hand, and remove the steel retain- ing nut where the paddle stem meets the pipette with your other hand.



3 Let the retaining nut drop into the Clean Location.

Move the pipette to the Load Location

To move the pipette to the Load Location, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Make sure that the Load Location does not contain a microcentrifuge tube.
2	Move the pipette to the Load Location.
-	Note: It should not be necessary, but have your hand ready to receive the syringe glass.
2	Click Next.
Э	Result: The instrument will move the plunger down and press out the syringe glass.

Remove the syringe glass

To remove the syringe glass, follow the instruction video and/or the software guided work-flow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

2

Carefully remove the syringe glass using the supplied tweezers.



Use the syringe glass removal tool if the plunger motion did not expose enough syringe glass.



Install the syringe glass

To install the syringe glass, follow the instruction video and/or the software guided work-flow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

2

1

Step	Action
1	Grasp the pipette's rotating assembly.

Gently insert the syringe glass with the syringe's fill port facing the same direction as the hole in the pipette's rotating assembly.



If aligned properly, the installed syringe glass should leave approximately 2 mm of glass exposed.





3	Leave the retaining nut in the Clean Location, and insert the pipette into the Clean Location without fully engaging the clamp.
4	Start to reinstall the retaining nut by turning the pipette's rotating assembly with its threads engaged with the retaining nut.
5	Move the pipette to the Rest Location and finish reinstalling the retaining nut.

Clean the titration syringe

Introduction

A dirty syringe can result in poor data.

Detergent cleaning of the syringe between runs is recommended if performing reverse titrations (protein is loaded into the syringe). If poor data persists after extensive cell cleaning, remove the syringe for cleaning.



WARNING! Hazardous substances and biological agents. When using hazardous chemical and biological agents, take all suitable protective measures, such as wearing protective glasses and gloves resistant to the substances used. Follow local and/or national regulations for safe operation and maintenance of MicroCal PEAQ-ITC.

To clean the titration syringe, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following tables.



Note: Instrument connection is required to replace the syringe plunger tip.

The Clean Syringe workflow

The software guided Clean Syringe workflow is divided into the following steps:

Stage	Description
1	Move Pipette to Clean Location
2	Move Pipette to Load Location
3	Remove Syringe Glass
4	Clean Syringe Glass
5	Install Syringe Glass

Move the pipette to the Clean Location

To move the pipette to the Clean Location, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Move the pipette partway into the Clean Location.

Grasp the rotating assembly of the pipette with one hand, and remove the steel retaining nut where the paddle stem meets the pipette with your other hand.



3 Let the retaining nut drop into the Clean Location.

Move the pipette to the Load Location

To move the pipette to the Load Location, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Make sure that the Load Location does not contain a microcentrifuge tube.
2	Move the pipette to the Load Location.
-	Note: It should not be necessary, but have your hand ready to receive the syringe glass.
2	Click Next.
3	<i>Result</i> : The instrument will move the plunger down and press out the syringe glass.

Remove the syringe glass

To remove the syringe glass, follow the instruction video and/or the software guided work-flow integrated in the MicroCal PEAQ-ITC Control Software.

2

The software guided workflow is also shown in the following table.

Step	Action
	Carefully remove the syringe glass using the supplied tweezers.
1	Tweezers

Use the syringe glass removal tool if the plunger motion did not expose enough syringe glass.



Clean the syringe glass

A

Clean the glass syringe occasionally by hand, as the instrument does not clean the entire inner diameter of the glass syringe. If there is any blockages in the syringe, these should be taken care of before cleaning using the supplied Cleaning Wire.

2

To remove any blockages in the paddle stem and clean the inner diameter of the glass syringe, follow the instruction video and/or the software guided workflow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
	Carefully insert the supplied Cleaning Wire into the end of the paddle and pass it up through the stem into the syringe glass.
1	000

Scrub the inside of the syringe with detergent using the supplied Syringe Glass Cleaning Brush.



3	Rinse thoroughly with water to remove as much detergent as possible.
4	Dry the syringe to prevent sample dilution.

Install the syringe glass

To install the syringe glass, follow the instruction video and/or the software guided work-flow integrated in the MicroCal PEAQ-ITC Control Software.

The software guided workflow is also shown in the following table.

Step	Action
1	Grasp the pipette's rotating assembly.
2	Gently insert the syringe glass with the syringe's fill port facing the same direction as the hole in the pipette's rotating assembly.



If aligned properly, the installed syringe glass should leave approximately 2 mm of glass exposed.



3	Leave the retaining nut in the Clean Location, and insert the pipette into the Clean Location without fully engaging the clamp.
4	Start to reinstall the retaining nut by turning the pipette's rotating assembly with its threads engaged with the retaining nut.
5	Move the pipette to the Rest Location and finish reinstalling the retaining nut.
Refill the reference cell

Introduction

The MicroCal PEAQ-ITC instrument has two cells, the sample cell and the reference cell. The reference cell must be refilled manually. An underfilled reference cell can result in a starting baseline position *greater* than specified in the ITC Method.

Refilling the reference cell is recommended approximately once a week.

Procedure

The following steps describes how to refill the reference cell.

Step	Action
1	Gently insert a glass Hamilton syringe into the reference cell until it touches the bottom.
2	Empty the reference cell completely by pulling up the syringe plunger.
-	Note: Make sure that no bubbles are trapped in the cell.
3	Remove and empty the syringe. Clean the syringe, if necessary.
4	Pull approximately 300 μl of degassed, distilled water into the syringe.
	Tap the syringe glass gently so that all the bubbles are at the top volume of the syringe.
5	Insert the syringe into the cell and gently touch the bottom of the cell with the tip of the syringe needle.
5	Raise the needle tip about 1 mm off the bottom of the cell (as illustrated in the trans- parent cell model), and hold it there during the filling process.

Step



Inject the water solution slowly into the cell until it spills out over the top of the cell stem.

6	Dislodge any trapped bubbles with several abrupt spurts of the water solution.
	Note : Make sure no bubbles are transported into the reference cell while loading the water solution.
7	Lift the tip of the syringe to the cell port (just below the visible portion of the cell port) and remove the excess water solution.
8	Remove the syringe. Install the reference cell cover to prevent evaporation.

TROUBLESHOOTING

This section provides information on how to solve problems that may arise.

The following topics are covered:

Troubleshooting overview	74
Troubleshooting chart	75

Troubleshooting overview

Contact information

Please contact Malvern Instruments for any instrument or data analysis questions or issues you may have.

Include data file

When emailing for technical assistance, if possible, please attach a recent data file(s) (*.itc raw ITC data file) that demonstrates the problem. Also, please include all details that may be relevant to the problem. Where the problem or question relates to post run data analysis, it is best to attach the raw data file (*.itc).

Diagnosing the problem

Perform the following minimum diagnostic steps prior to requesting service:

Step	Action
1	Run a thorough cleaning routine with detergent.
2	Load both the cell and syringe with degassed distilled water.
3	Run a water into water titration with at least 15 injections of $2\mu l$ each.

If, after completion of the steps listed above, the MicroCal PEAQ-ITC performance is not corrected, please contact the Malvern Instruments help desk. The water runs should be provided to the Malvern Instruments technician for evaluation. Following evaluation, a representative will contact you with comments and recommendations.

Troubleshooting chart

Error symptom	Corrective action	
	Check that power is plugged in and switched on.	
Instrument not running	• Check that the USB cable is properly connected.	
	 Check that MicroCal PEAQ- ITC Control Software is running and prop- erly initialized. 	
Software reports networking errors	Unplug the network port from controller PC, reboot the Controller PC, and restart the control software.	
	• Visually check that the syringe is straight, that no fluids are leaking and that the sample containers are properly inserted.	
Instrument not working properly	• Watch a cleaning and loading cycle for any obvious problems.	
	 Check that the Fill Port Adapter that connects to the titration syringe is not damaged. 	
Control software reports initialization errors, communication problems, or hard- ware errors not covered in this manual	Contact your Malvern Instruments service representative.	
	Check that the reagent bottles are not empty and are properly attached to the cor- rect ports.	
Result data shows artifacts	• Refill the reference cell (see Refill the reference cell).	
	If these steps do not resolve the problem, see How to get help.	
Titration syringe is damaged	See Replace the titration syringe for replacement.	

REFERENCE

This section provides reference information that may be useful when installing, operating, maintaining and troubleshooting the MicroCal PEAQ-ITC system.

The following topics are covered in this section:

MicroCal PEAQ-ITC specifications	78
Chemical resistance guide	.79
Wetted materials	.80

MicroCal PEAQ-ITC specifications

Physical specifications

Property	Value	
Cell material	Hastelloy Alloy C-276	
Weight:		
Fully assembled	13.6 kg	
Dimensions:		
Fully assembled (W x I	1 x D) 43 × 38 × 46 cm	

Electrical specifications

Property	Function
Electrical ratings:	
Voltage	100-240 VAC (power adapter), 24 VDC (power supply to the instrument)
Frequency	50/60 Hz
Power	150 W
Output	Secondary/Data connection only
Mode of oper- ation	Continuous
Classification	Class I

Site requirements

Property	Function	
	• width \geq 120 cm	
Bench space and	• depth \geq 64 cm with Controller PC	
load	depth \geq 51 cm without Controller PC	
	• free height above bench ≥ 80 cm	

Property	Function	
	• rated for at least 115 kg	
	• \geq 15 cm behind the instrument	
Clearance	• \geq 40 cm in front of the instrument	
	Service functions will require an additional 30 cm overhead clearance.	

Chemical resistance guide

Introduction

This section specifies the chemical resistance of MicroCal PEAQ-ITC to some of the most commonly used chemicals in isothermal titration calorimetry.

List of tested compatible chemicals



Note: A user can be exposed to large volumes of chemical substances over a long time period. Material Safety Data Sheets (MSDS) provide the user with information regarding characteristics, human and environmental risks and preventive measures. Make sure that you have the MSDS available from your chemical distributor and/or databases on the internet.

Chemical	Concentration
Potassium acetate pH 5.5	100 mM
Sodium citrate pH 4.0	100 mM
Glycine pH 3 and pH 10	100 mM
PBS buffer pH 7.4	100 mM
HEPES pH 7.0	100 mM
MES pH 5.6	100 mM
NaCl	1 M
Dithioerytritol (DTE)	20 mM
DMSO	50%
Acetonitrile	50%
Methanol	100%

Chemical	Concentration
Ethylene Glycol	50%
Contrad 70	20%
Decon 90	14%

Wetted materials

Introduction

This section specifies the wetted materials of MicroCal PEAQ-ITC.

Wetted surface materials

The following wetted surface materials are used in MicroCal PEAQ-ITC:

- Hastelloy C276
- 316 SST
- PEEK
- Kalrez[™]
- PTFE
- Borosilicate glass
- EPDM
- ULTEM™
- Tygon™ 2375
- ETFE
- Aluminium oxide

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