

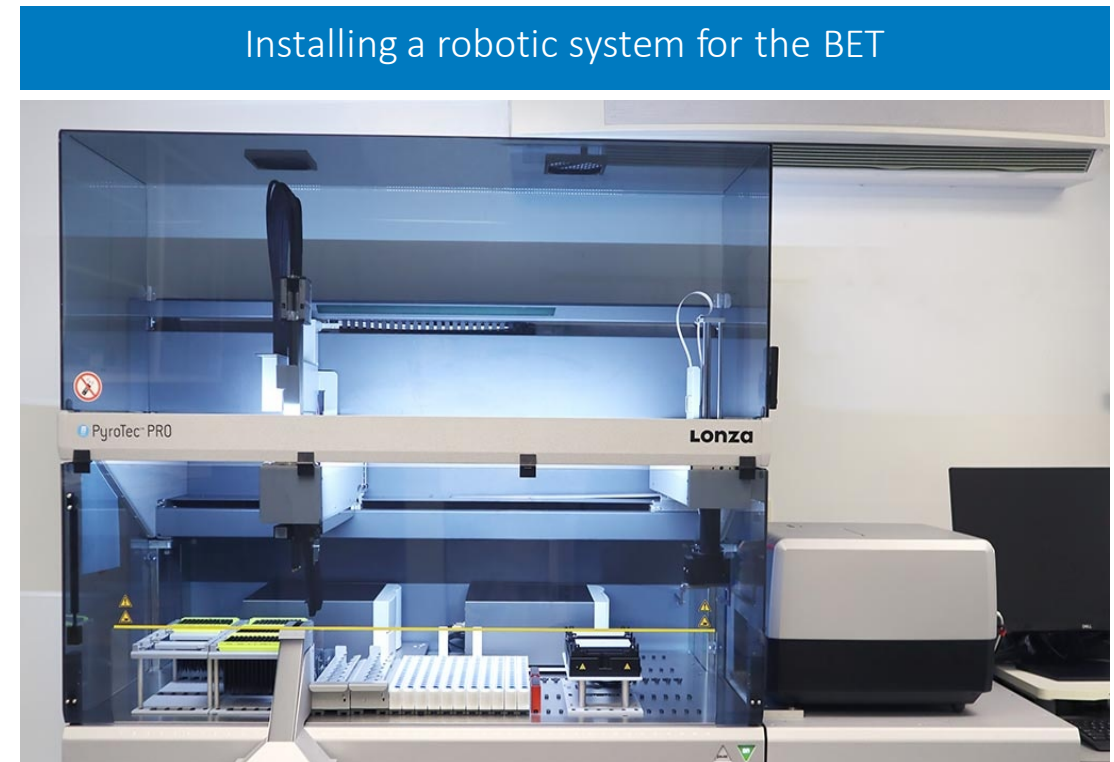
PyroTec[®] PRO System

Strategies for purchase and implementation

Agenda

Steps for successful implementation of a PyroTec® PRO Robotic System for endotoxin testing

- Workflow Analysis and design of the URS
- Generating ROI and other Capex application documents
- Project team: Formation and Installation requirements
- Installation Planning
 - Delivery, uncrating and siting
 - Installation procedures
 - Installation/upgrade to WinKQCL® Software Version 6
 - Sample ID, and LIMS Integration (if applicable)
 - IQOQPQ
- Generating SOPs for routine testing and daily/weekly maintenance procedures
- Procedures for troubleshooting and support calls



Workflow analysis

Optimizing the workflow to maximize ROI

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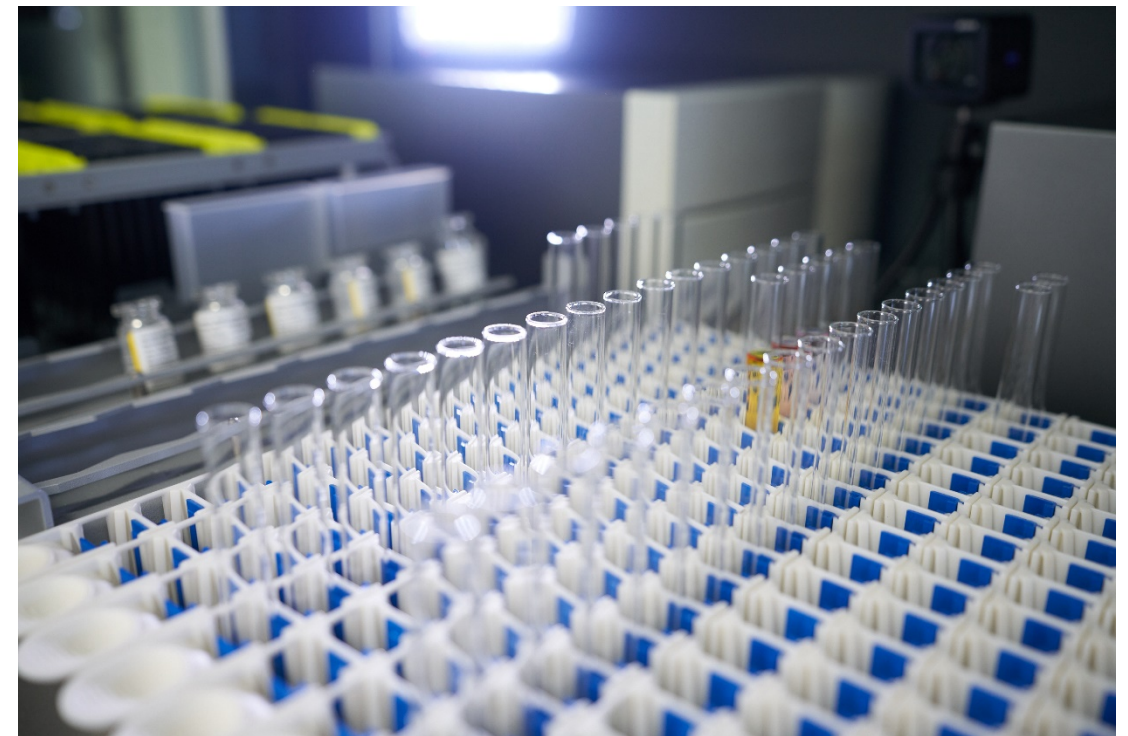


Assessing your workload

User Requirement Specification (URS), capex applications

- The installation of an automated system is a great time to review standard practice for endotoxin testing on site
- You will need be able to assess and quantitate the sample workload and sample flow in order to generate:
 - Your User Requirement Specifications (URS)
 - Required capacity of the system (single or dual reader)
 - The ROI to support a business case for capex
 - A plan for routine testing procedures
 - The design of revised SOPs
- We suggest you take the opportunity to discuss the project with colleagues in QC, QA, IT and regulatory to ensure that:
 - There is agreement on the requirements
 - There is an agreed validation path and timeline

Planning helps maximize the ROI on automated solutions



Sample flow

Sample flow, number and type of samples, work patterns

- An automated system, such as the PyroTec® PRO Robotic System, is going to work best when presented with a regulated flow of samples
- What types of samples will be available at what times?
 - Samples requiring more dilution steps and PPCs will take longer to process than water samples
 - If possible, try to separate simple from complex samples for each run
- We suggest planned 'run times' each day so that samples can be amalgamated for optimum throughput
- Consider the fact that the robot can process samples after hours either by:
 - Loading the system up at the end of the day, or
 - Running during the night with minimal intervention
- Don't ignore the manual method for one-off testing!

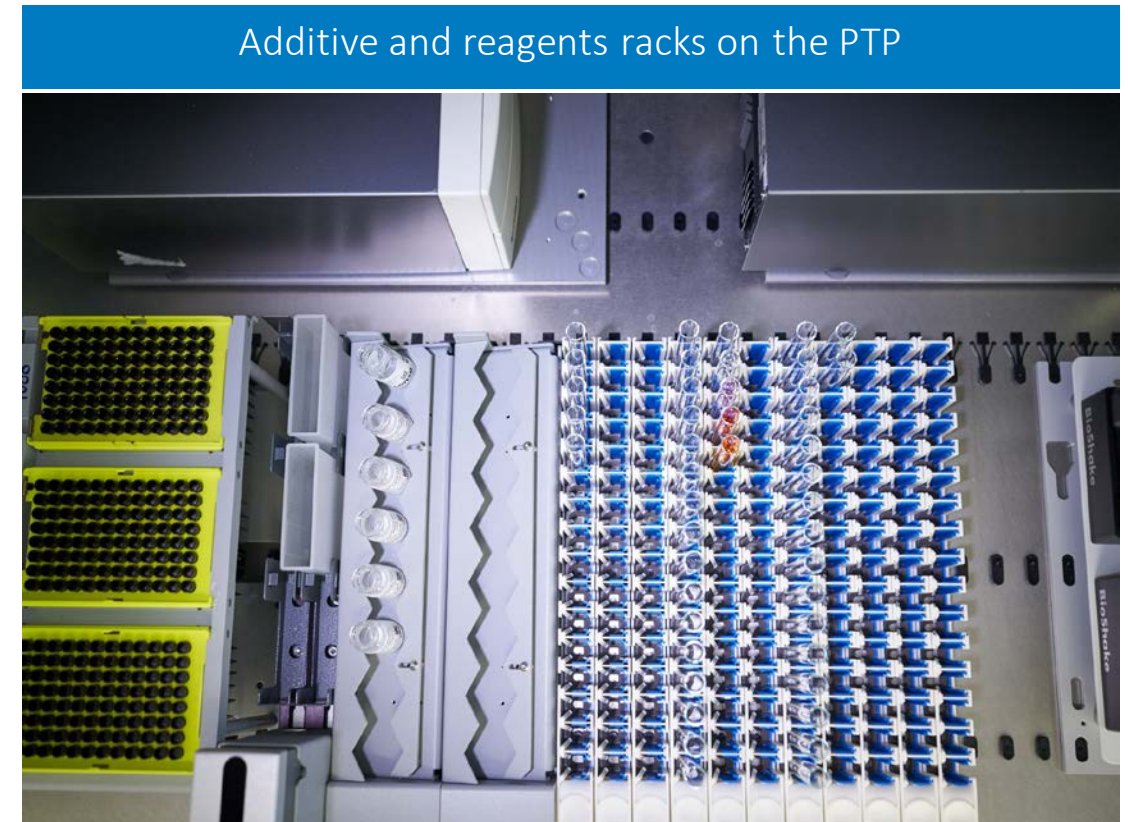
Grouping samples if possible will maximize throughput



Assay preparation

Additives and endotoxin stock solution

- The only manual step remaining is the reconstitution and vortex mixing of the stock CSE (or RSE) solution
- A decision was made not to design a vortex mixer on the deck to avoid potential problems with vibration
- All further endotoxin dilution steps, e.g., for making standards, are handled by the PyroTec® PRO System automatically
- The system can also handle the addition of additives such as $MgCl_2$, Tris buffer, PYROSPERSE™ Dispersing Agent etc. as required, which can be specified in the product database
- The PyroTec® PRO System can normally handle all necessary sample dilutions and such dilutions are usually handled in multiple steps
- It is possible for the user to specify maximum dilution and/or sample premix steps if required



Some remaining items to consider

Manual testing, LIMS, barcodes

- If you are currently operating an earlier version than WinKQCL® Software 6.0:
 - Will you still maintain manual systems as back up or for small number runs?
 - Is there more than one user group on site? If so, consider using the workgroups feature
- Are you considering LIMS integration?
 - If so, this may be a customization that will need to be scoped and quoted separately
- Do you plan to use bar codes now or in the future?
 - The PyroTec® PRO System may be compatible with a handheld scanner you already are using
 - Do you need to consider the addition of the Loading-ID module for scanning of sample tubes? This bar code scanner should be available as part a future version of WinKQCL® Software

Barcode scanning of Lonza Kinetic-QCL® lysate label



Applying for capex

Generating the ROI and capex documents



PyroTec[®] PRO System – Return on Investment (ROI)

Some factors that support the business case for the PyroTec[®] PRO System

- In common with any significant capital purchase, a business case will need to be generated to justify the cost of the system
- Part of that business case should include a calculation of the Return on Investment (ROI) for the system, which is usually expressed as the number of years required to reach a point where the savings exceed the cost
- The table on the right identifies several areas that have the potential to show significant cost savings
- Lonza has developed a spreadsheet model that can be used to generate a starting point for the ROI calculation to be used in a business case
- Your local testing specialist can assist, if required, with the completion of the sheet

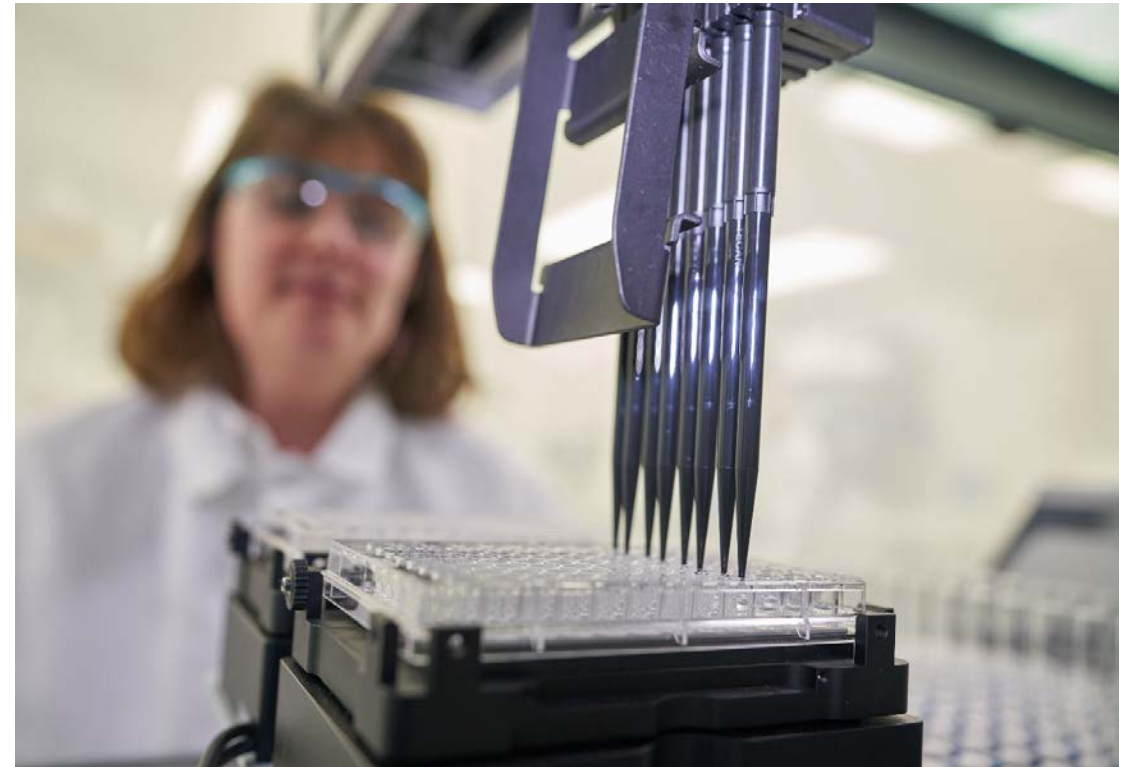
Labor savings	Training costs	Reagent costs	Accessories costs
Sample preparation	Training hours	Lysate	Plates
Making the standards	Course costs	CSE	Tips
Repeat assays		Add reagent costs for repeat assays	Troughs
Administration costs (OOS & OOT investigations)			
QA & QC costs (OOS & OOT investigations)			

PyroTec® PRO System – Return on Investment (ROI)

Benefits from automating the BET that add weight to the business case

- Benefits include, but are not limited to:
 - Improvements in overall data integrity. In addition to the safeguards already present within the WinKQCL® Software, the automation module adds secure information on sample preparation steps
 - Avoidance of Repetitive Strain Injuries (RSIs) associated with the manual pipetting required for the handling of medium-to-large volumes of samples for the BET
 - Reduction in human intervention. One of the most common sources of error in the test is distraction or temporary loss of focus during the sample preparation and plating activities
 - Improved reproducibility because a single robotic processor handles the bulk of the workload
 - Reduced training requirements for operators
- These benefits may not all have an immediately quantifiable cost saving but potential opportunities can be significant

Automated Pipetting into the plate



Project considerations

Project team, responsibilities, Lonza support



Project management

Project team formation and composition

- Lonza regards all PyroTec® PRO System installations as an individual project and will appoint a project manager responsible for coordination of the installation and validation of your system
- Lonza recommends that you also select and assign a project team to ensure a smooth and rapid implementation
- We would suggest that project team members include personnel from:
 - Quality control
 - Quality assurance / validation
 - IT
 - Engineering
- Optional
 - Procurement
 - MSAT

View of RoMa arm and QInstruments HeatPlates



Project management from Lonza

Project lead responsibilities

- The Lonza project manager is responsible for coordination between Lonza, the customer and Tecan to:
 - Identify and review roles with the Lonza installation team
 - Agree upon the delivery date for the main unit and initial accessories needed for the IQOQ
 - Ensure that the site will have the necessary reagents and accessories delivered to cover the IQOQ and PQ processes
 - Arrange for the Tecan engineer and Lonza team member to be on site at the agreed time and date
 - *Note that Tecan performs assembly, installation and robot IQOQ.*
- Members of the Lonza installation team will:
 - Install the WinKQCL® Software and perform the system test of the complete PyroTec® PRO system
 - Set up the deck layout and ensure proper tip alignment
 - Perform the system IQOQPQ
 - Review completed documentation post-IQOQPQ

System in operation with safety screen lowered



Project management from the customer

Suggestions to keep the project timeline on track

- In our experience the most likely cause of an automation project going off-track is a lack of resources
- It is vital during the software installation that the IT lead is available and full administrator permissions have been granted
- Given that the normal laboratory testing must take place during the installation, validation and comparability testing, it is essential to ensure that there are adequate working hours for the QC micro team to participate and to be fully trained
- The second likely issue that may cause delays is in QA approval of the validation process
 - Ensure that the described protocols have been reviewed and signed off, well in advance of the installation date
 - Try to ensure that the QA project lead will have time to review and sign off data generated during the installation and validation stages

Lysate reconstitution in progress



Initial considerations

Delivery, placement and software installation



System delivery and placement

Weight, dimensions and power requirements

- PyroTec® PRO Systems are built to order and have a standard lead time of 12-14 weeks from receipt of order
- The system is delivered in three separate crates, usually on a double pallet, with the weights and dimensions shown (25-A20 illustrated)
- Moving the instrument into place:
 - This should be carefully planned and consideration made to limit particulate contamination from the packing (cleaning)
 - The crated main instrument platforms will require mechanical lift and trolley facilities to transport to the lab. Please check doorways and corridors for clearance
 - To lift onto the bench or the optional Tecan instrument table the customer will need to provide 4 people, this cannot be done with a mechanical lifting system
 - The instrument and its components should not be uncrated without the presence of a supervising Tecan Engineer**

Packaging Type/No	Total Weight	Loading Weight	Length Width Height
Pallet 1	257 kg	198 kg	157 cm 96 cm 128 cm
Pallet 2	67 kg	66.999 kg	152 cm 74 cm 73 cm
Pallet 3	62 kg	52.980 kg	120 cm 80 cm 95 cm

Accommodating the PyroTec[®] PRO System

Weight and dimensions – Standard System

- Weight and dimensions for a typical standard PyroTec[®] PRO System part number 25-A20 containing 2 Tecan[®] Sunrise[™] readers are in the table opposite
- Check for operating space requirements:
 - Enough space for cabinet and extensions?
 - Enough space to open instrument doors?
 - Adequate access for loading the deck?
 - Space for waste unit?
 - Space for control computer?

Dimensions PyroTec [®] PRO System	
Height	870 mm/34.3"
Width	1,450 mm/57.0"
Depth	780 mm/30.7"
Weight (base unit only)	130 kg/286 lbs
Weight (full build)	187 kg/412 lbs to 200 kg/441 lbs dependent on configuration
Floor and table minimum load capacities	Table or bench: 300 kg /662 lbs
	Floor: 365 kg /805 lbs
Minimum space requirement between the wall and the instrument	10 cm/4 inches

System delivery and placement

Power and environment requirements

- The operating conditions and power requirements for the PyroTec® PRO System are shown on the right.
- Lonza recommends an Uninterruptable Power Supply (UPS) to avoid assay disruption in the event of a power failure.
- Allow adequate access space around the instrument for service access.
- Full specifications are provided in the User Manual.

PyroTec® PRO System working requirements

Instrument dimensions

- Height: 870 mm
- Depth: 780 mm
- Width: 1,450 mm
- Weight: 130 kg

Power Requirements

- 100-240 Volts, 1,200 VA
- Frequency 50/60 MHz (auto-sensing)
- Power outlets per reader, HeatPlate, PC workstation and robot

Environment

- Operating conditions
 - Relative humidity 30-80% (non-condensing)
 - Temperature 15-32°C
- Pipetting Conditions
 - Relative humidity 30-60% (non-condensing)
 - Temperature 20-27°C

Avoid subjecting the system to vibration or electrical interference

System delivery and placement

Add-on PyroWave® XM reader Unit

- Perform Lonza's PyroGene® Recombinant Factor C (rFC) assay by adding a PyroWave® XM Fluorescent Reader
- This new configuration (PTP-PW) includes a new side-mounted panel with plate carrier access and a positioning bracket
- This configuration can either be:
 - Ordered with the PyroTec® PRO System standard setup to "future-proof" the system
 - Retro-fitted at a later date for an additional cost
- The IQOQPQ of a PTP-PW system includes a Lonza reader IQOQPQ of the PyroWave® XM Reader as well as a PyroGene® Assay-specific PQ for the robotic system

PyroTec® PRO System with PyroWave® XM reader



System delivery and placement

Add-on PyroWave® XM reader unit

PyroWave® XM instrument

- Dimensions
 - Width: 39.1 cm
 - Depth: 47.2 cm
 - Height: 32.8 cm
 - Weight: 22.5 kg
- Power requirements
 - 24V external power supply
 - Compatible with 100 – 240 Volts AC 50/60 Hz
 - 250W max. power consumption

PyroWave® XM Instrument operating conditions

- 10 - 85%, non-condensing
- 18°C - 32°C

Add-on mounting kit on PyroTec® PRO

- Lonza hardware part number PTP-PW-HW
- Lonza installation part number PTP-PW-INST
- Net Weight ~15 kg
- Requires ~50 cm (+15 cm clearance) to the right-hand side of the PyroTec® PRO unit
- May require table extension

PyroTec® PRO System

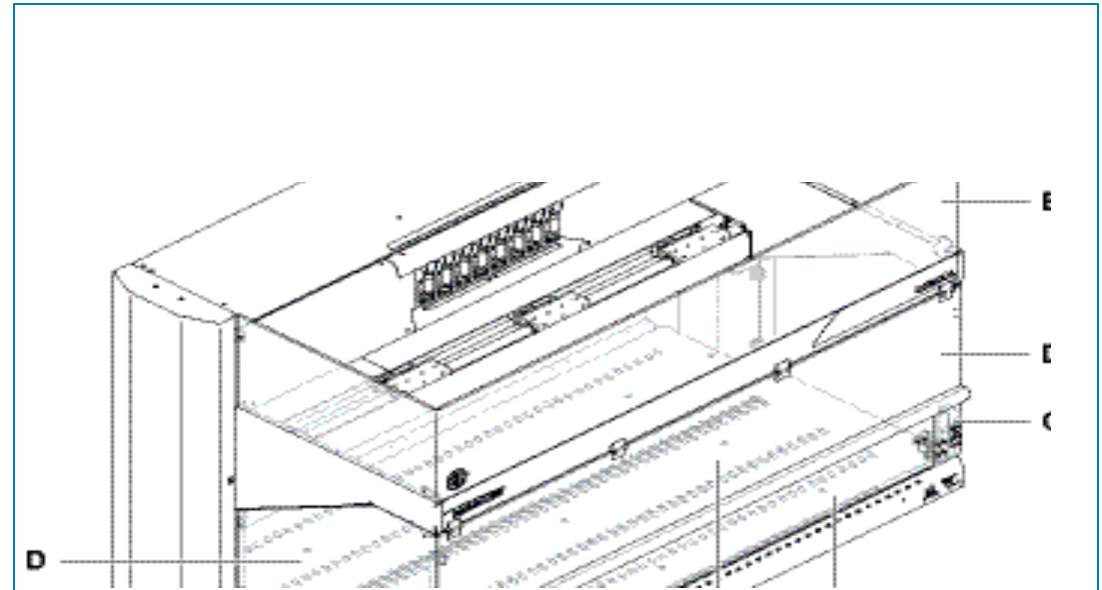
Safety features and compliance

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- Safety features
 - User activated, interlocked door prevents non-intentional access to work area or non-intentional system halt.
 - Runs cannot be started until door is closed and the lock prevents it from being opened during the run.
 - The space around the worktable is protected with safety panels. Whereas the front safety panel can be opened, the other safety panels are permanently installed on the PyroTec® PRO System.
 - Optional restricted access door available (B)
- Safety Compliance
 - 2014/35/EU – low voltage directive
 - 2014/30/EU – EMC directive
 - 2011/65/EU – RoHS directive
 - CSA compliant.

PyroTec® PRO System safety features



A Front safety panel
B Adjustable access window
C Door lock

D Side safety panel
E Top safety panel

WinKQCL® Software installation

Requirements and procedure

- The PyroTec® PRO System can operate using a stand-alone configuration but we recommend a client-server installation
- WinKQCL® Software Version 6 is required to operate the automation module
- WinKQCL® Software Version 6 requires a Windows® 10 operating environment and is not compatible with Windows® 7 or earlier Windows® OS versions
- A full licensed version of SQL Server® is recommended
- Full administrator installation rights are required for Database management including Microsoft Windows®, Server and SQL Server

Minimum system requirements – Windows® 10 is *mandatory*

- *Database requires 20 GB*
- *Client Workstation*
 - *Processor: Intel® Core™ Intel® Core™ i3 equivalent processor or greater*
 - *64-bit Operating System*
 - *Memory: 8 GB RAM*
 - *A monitor with a minimum resolution of 1280x1024 (1920 x 1080 is recommended)*
 - *To ensure correct display of the dialog boxes, we recommend you configure your display settings in the Control Panel for Small Fonts (recommend screen size 20" or more)*
 - *Hard disk with a minimum of 5 GB of unused space*
 - *One USB port for the data interface to the pipetting instrument*
 - *Mouse/Keyboard*
 - *2-4 RS232 ports for the readers and heat plates (OR Four USB to RS232 adapters Lonza P/N 25-361) depending on configuration*

Installation and validation

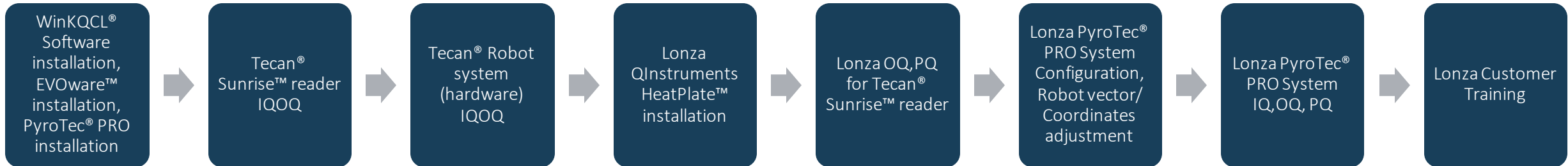
Primary Install, IQOQ, PQ, timings



PyroTec® PRO System associated installation

Actions, associated documents and approximate timings

- The IQOQPQ of the PyroTec® PRO System follows a specific sequence with controlled documents for building, testing and qualifying the mechanical, electronic and software components of the system
- The scheduling of the responsible persons will be organized by the Lonza project manager associated with the system purchase
- IOPQ of Lonza PyroWave® XM Reader add-on would be performed in parallel with the Tecan® Sunrise™ Reader installation and PQ of the complete add-on would be done as part of the PyroTec® PRO System PQ



Installation schedule

Installation steps Tecan: 1 – 2 days

- 1) Tecan supervised uncrating and Tecan engineer assembly of the robot
- 2) The Tecan engineer conducts IQ and OQ tests for the mechanical performance of the system, including:
 - i. Installation and test of the Liquid Handling (LiHa) pipetting head
 - ii. Installation and test of the Robotic Manipulator (RoMa) arm
 - iii. Installation and IQOQ for the Sunrise™ reader(s)
- 3) The IQOQ procedures for each of these steps are available in .pdf format and can be requested from Tecan (post-purchase)

View of RoMa arm and QInstruments HeatPlates



Installation schedule

Installation steps Lonza: minimally 3 days

- WinKQCL® Software V6 installation must occur before Lonza IQOQPQ
 - Please check the minimum system requirements for the computer system as shown on slide 22
 - A pre-IQOQPQ check list is provided for the customer during planning to confirm all required conditions and responsibilities for installation and configuration of the software
 - Please ensure that the IT project member is available on the day of installation and that full administrator rights are granted
- HeatPlate, reader and WinKQCL® Software qualification using the Tecan® EVOware® software and WinKQCL® Software V6
- Deck layout and labware coordinates set up
- System IQOQPQ
 - Add 2 days for each additional test method to be used in routine testing

View of a technician setting up a PQ assay on deck

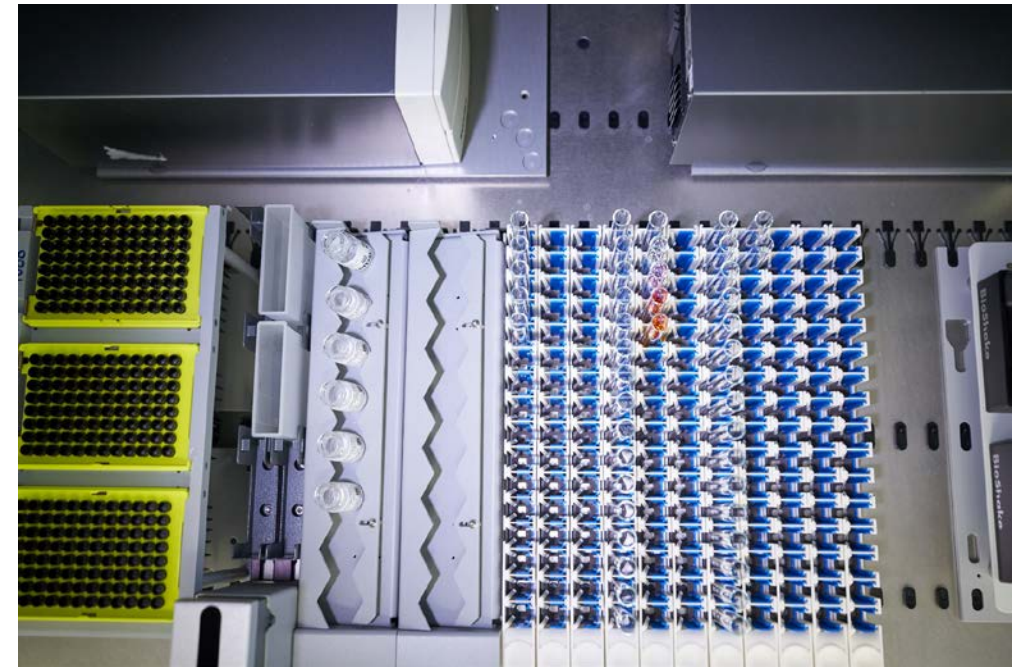


PyroTec[®] PRO System configuration

Hardware and software set up components

- Tecan[®] EVOware[®]
 - EVOware[®] 2.8 SP1 Installation & Configuration
 - Windows[®] USB Power Management
- Lonza PyroTec[®] PRO Instrument Setup
 - Deck Setup
- PyroTec[®] PRO System Software
 - PyroTec[®] PRO System Software Installation
 - EVOware[®] Components Import
 - PyroTec[®] PRO System Software Configuration
- QInstruments HeatPlate Configuration
- Tecan[®] EVO[®] Labware Coordinates Configuration
 - XY Coordinates
 - Z Coordinates (height)
- EVOware[®] Robot Vectors Adjustments
- Lonza and Customer representatives confirm and approve PyroTec[®] PRO System Configuration

Top view of deck layout for PyroTec[®] PRO System

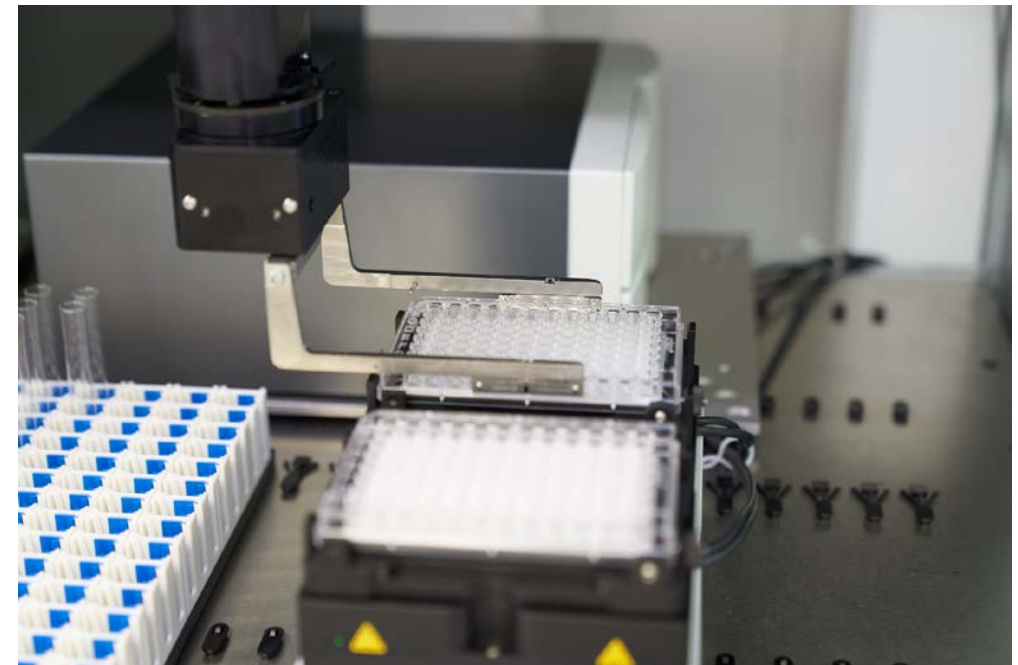


PyroTec[®] PRO System – IQOQ procedures

Readers and Robotic systems including LiHa and RoMa

- The information below represents a brief summary of the steps involved
- For a full IQOQPQ description and work sheets please consult document# PTPIOPQ-25-614.pdf
- IQ Steps
 - WinKQCL[®] Software connection to the PyroTec[®] PRO System
 - Connectivity to Sunrise[™] or PyroWave[®] Readers (1, 2 or 3 units)
 - Connectivity to the QInstruments HeatPlates (1 or 2 units)
- OQPQ Steps
 - Liquid Handling arm (LiHa) movement & functions
 - Microplate 1 & 2 Robotic Manipulator (RoMa) arm functionality
 - Incubators 1 & 2 as per QInstruments IQOQ document
 - All Sunrise[™] readers qualified as per Tecan[®] IQOQ document and Lonza OQPQ document
 - PyroWave[®] XM Reader qualified as per Lonza IQOQPQ document

RoMa moving microplates to plate heaters



System performance qualification

Vendor PQ assay and suggested user protocols

- In order to test the full functionality of the system, Lonza carries out a standardized PQ assay protocol for each assay method that will be used on the system
- Lonza's PQ assay tests the system's ability to dilute and assay samples made from a stock CSE or RSE solution across the plate, for each reader present
- The main criteria for success are:
 - Satisfactory standard curve values
 - Samples results within an acceptable level
 - PPC recovery percentages
 - % CV values for both samples and PPC recovery
- Lonza recommends that the customer prepare their own PQ protocol based on knowledge of the types of samples to be tested and the results obtained by the current manual method

Performance qualification run in progress



Standard operation

Routine use, maintenance and troubleshooting



Routine operation and maintenance

Procedures for day-to-day operation

- The PyroTec® PRO System is both simple to operate and to maintain
- Users should carry out a few simple procedures at the specified intervals, to ensure smooth daily operation, described on the next slide
- The system is protected by Tecan's Te-Care™ Program, described in the following slides, that provides for both routine annual maintenance and emergency call out in the event of breakdown
- Troubleshooting and support procedures are also detailed in later slides in the event of any problems that may be encountered during use

PyroTec® PRO System in operation

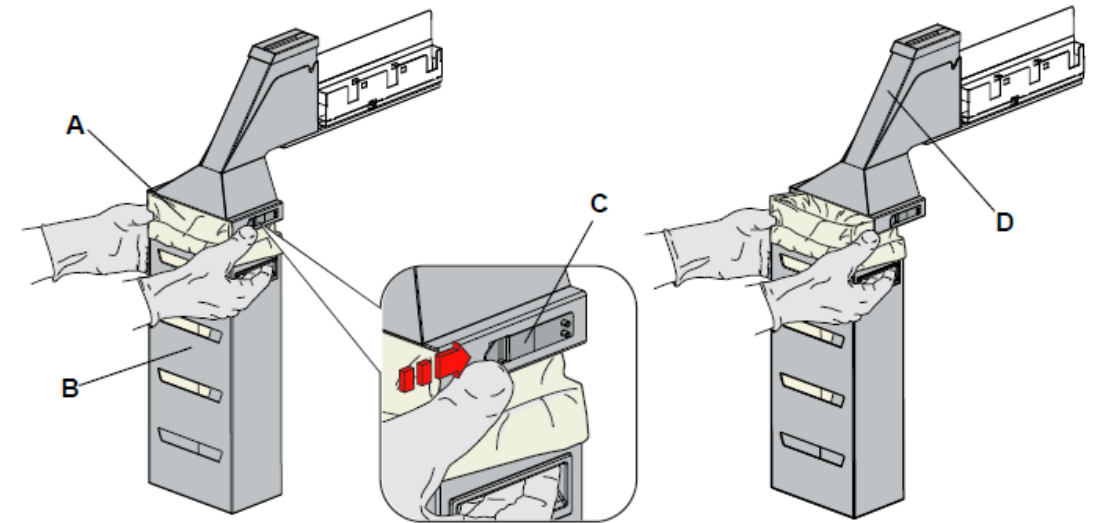


Daily maintenance

Daily procedures: cleaning and waste tips disposal

- Daily cleaning of the worktable; decontamination can be performed with the following agents:
 - Bleach 0.5% to 3%.
 - 70% ethanol + 30% H₂O
- Check and empty the Disposable Tip (DiTi) waste bag
 - The filling height of the DiTi waste bag must be checked regularly
 - Make sure that there is no jam within the DiTi waste slide and change the DiTi waste bag at least once at the end of the day

DiTi waste bag placement



A - DiTi waste bag

B - Bag housing

C - Fastener

D - DiTi waste slide

Daily maintenance

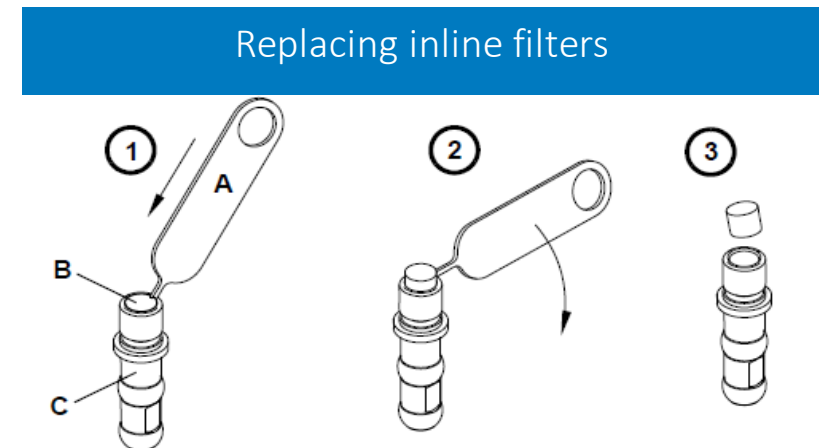
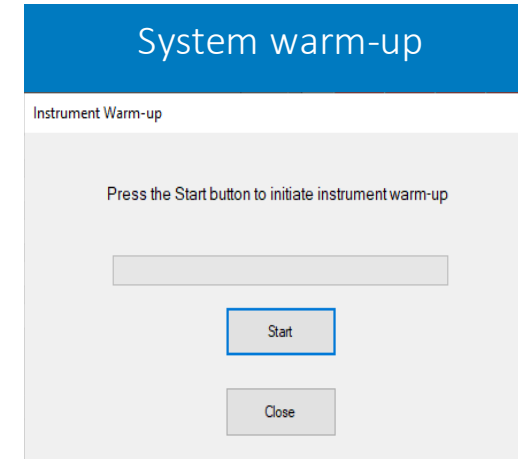
Daily procedures: system warm-up

System Warm-up* test

- Provides functionality to “warm up” the PyroTec® PRO System’s pipetting motors and channels in preparation for use
- Should be executed at the start of each day, and/or whenever the instrument is inactive for several hours
- Takes approximately 60 seconds to complete
- Displays a status message to indicate failure or success of the warm-up process

NOTE: Failure may require replacement of one or more of the pipetting channel inline filters. Please contact Lonza’s support for assistance

* Typically known as Inline Filter Test at Tecan

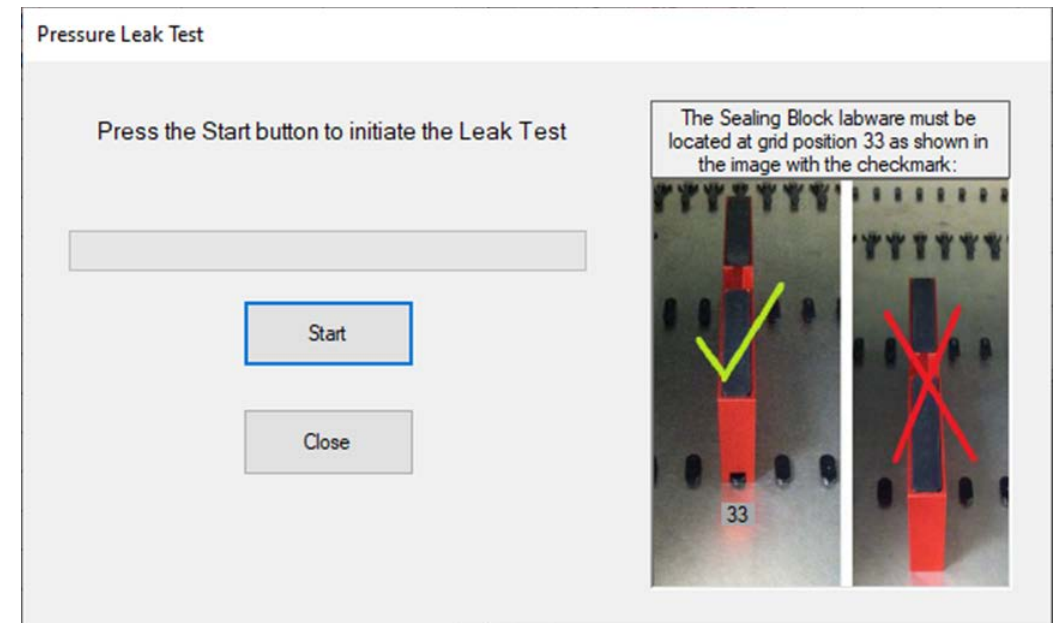


Weekly post-use maintenance

Performing the pressure leak test

- In order to pipette and dispense accurately, the PyroTec® PRO System uses an air-driven liquid handling arm.
- For the arm to work correctly, there must be a continuous seal between the volume cylinders in the arm and the DiTi for all of the 8 channels.
- Provided with the system is a red test block with a special rubber seal that should be used to test for leakage weekly.
- In the event of a pressure leak test failure, please follow the procedures described more fully in the manual.
- The rubber seal in the special block should be replaced periodically to maintain its integrity.

Carrying out the pressure leak test



PyroTec[®] PRO System preventative maintenance

Te-Care[™] Program

Lonza

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- Covers Tecan robot parts and readers
- Scheduled preventive maintenance visit, once per year, including the following actions:
 - Cleaning and greasing
 - Replacement of wear & tear parts
 - Any necessary adjustments
 - Instrument Operational Qualification
 - Maintenance report
 - Travel costs and work-time
- On-site repairs in case of instrument failures including:
 - Spare parts (as required)
 - Travel costs and work-time
 - Repair report

Servicing the LiHa pipetting arm



PyroTec® PRO System preventative maintenance

Updates and other services

Te-Care™ Program

- Updates included at the time of scheduled preventive maintenance visits:
 - ONLY those approved by Lonza, supported by a Lonza field change notice and released for use on the equipment and at the discretion of Tecan, that are required to be installed on the equipment to maintain reliability, usability and/or safety
- *Without Te-Care™ Program*
 - Annual PM will cost approximately \$27,000
 - Emergency call out is minimally \$4500 + parts and additional labour

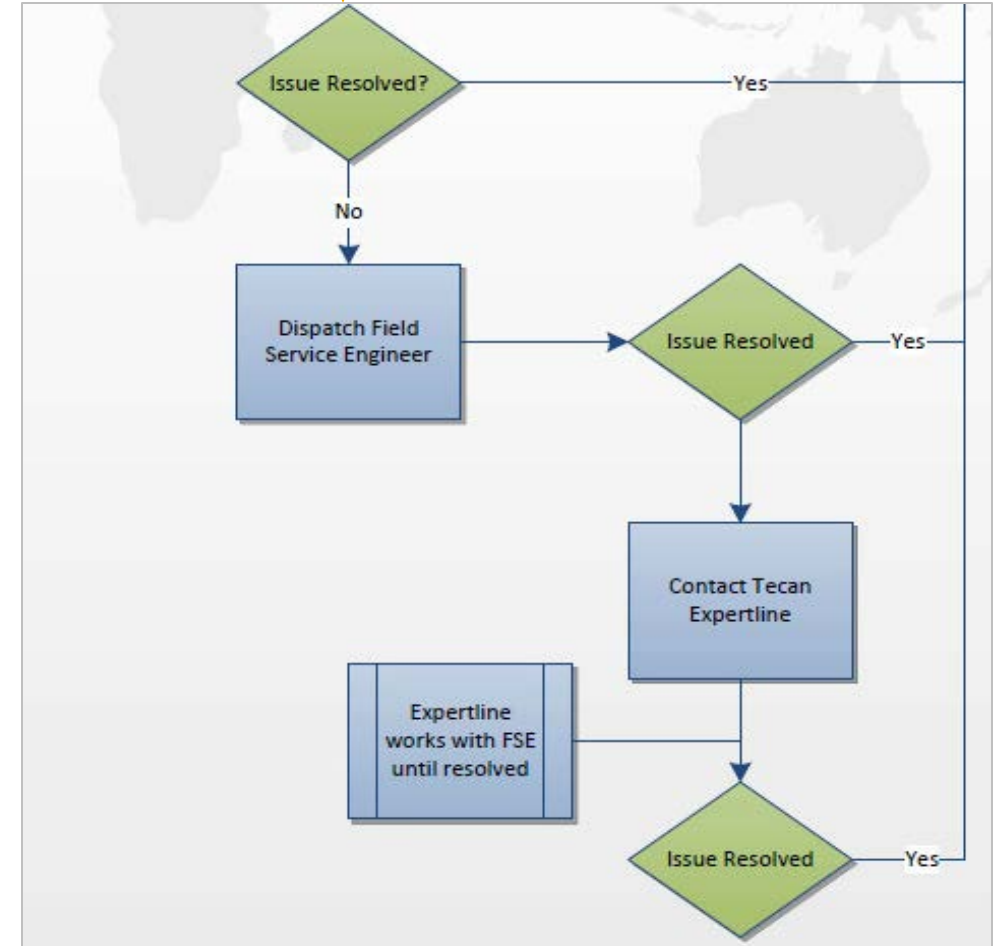
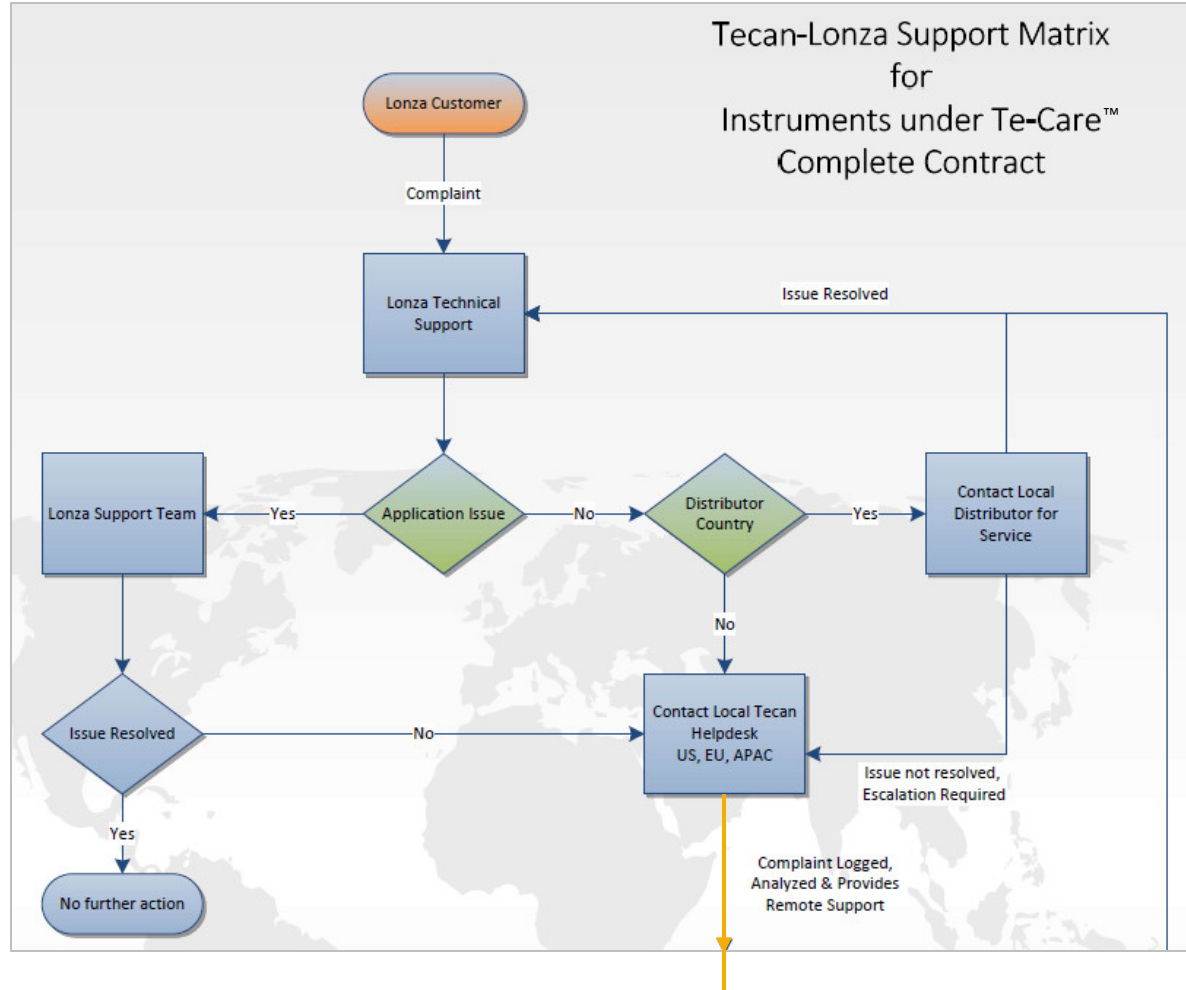
Lonza PyroWave® XM Reader on PyroTec® PRO System

Installation and servicing is provided by Lonza field service engineers under separate Lonza service support channels and quotes



Troubleshooting and support procedures

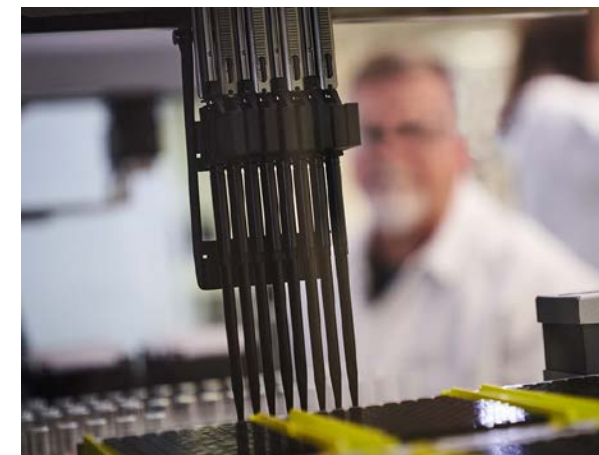
Support Matrix for PyroTec® PRO Systems



PyroTec® PRO System

Consumables for automation

- Standard
 - 13 x 100 mm tubes, P/N N207
 - 96-well microplates, P/N 25-340
- Specialist
 - Automation pipette tips, P/N 00229884
 - Automation reagent reservoirs, P/N 00229888
- All certified endotoxin-free < 0.005 EU/ml
- Unit information below:



LAL Reagent Grade 1000ul Filtered Tips for PyroTec® PRO	LAL Reagent Grade 100 ml Disposable Troughs for PyroTec® PRO	Pyrogen-free Dilution Tubes	LAL Grade Multi-well Plates
24 racks in a case. 96 tips per rack	108 troughs per case (individually packed)	30 Tubes per pack	50 plates per case

Thank you

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