



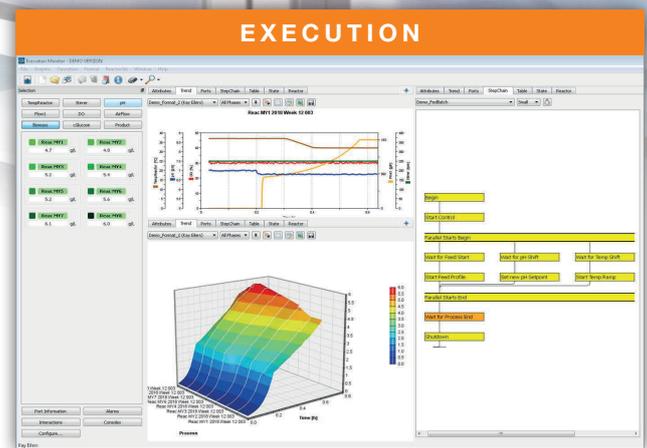
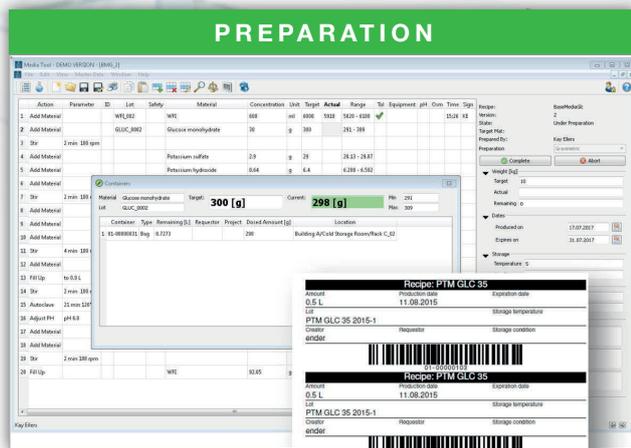
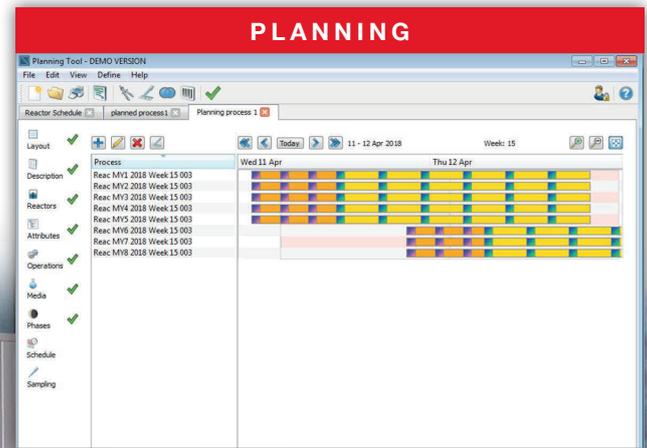
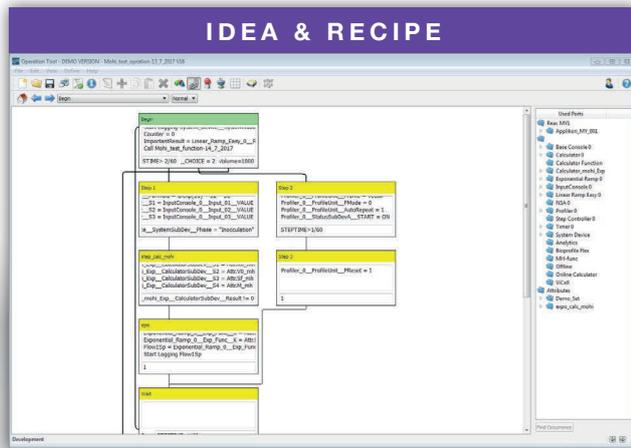
Cultivation Systems From Discovery to Production



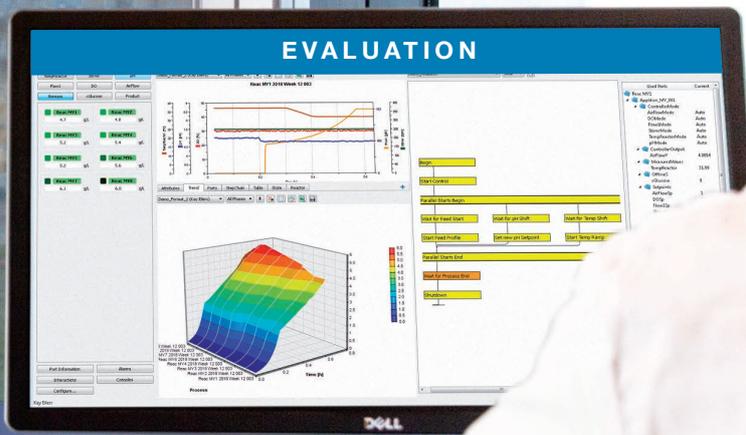
Engineering for Life

Lucillus PIMS | From Idea to Report

One integrated software solution for the whole workflow around bioprocesses



Lucullus Process Information Management System (PIMS) offers a new dimension in upstream bioprocess data management. Classic SCADA solutions are limited to data acquisition and supervisory control functions, but Lucullus can additionally control a heterogeneous collection of devices and bioreactors from different vendors. Furthermore, Lucullus integrates functionalities and activities around creation and planning of recipes, reactor allocation, Design of Experiments, media preparation, media component traceability, data analysis, data mining, automatic reporting and modelling. The integration of all these functions into one comprehensive software solution saves the scientists time, since all data is stored in one central Oracle® database. No more need for data export and import between different solutions. Lucullus integrates all functions needed for complete data management of your upstream process.

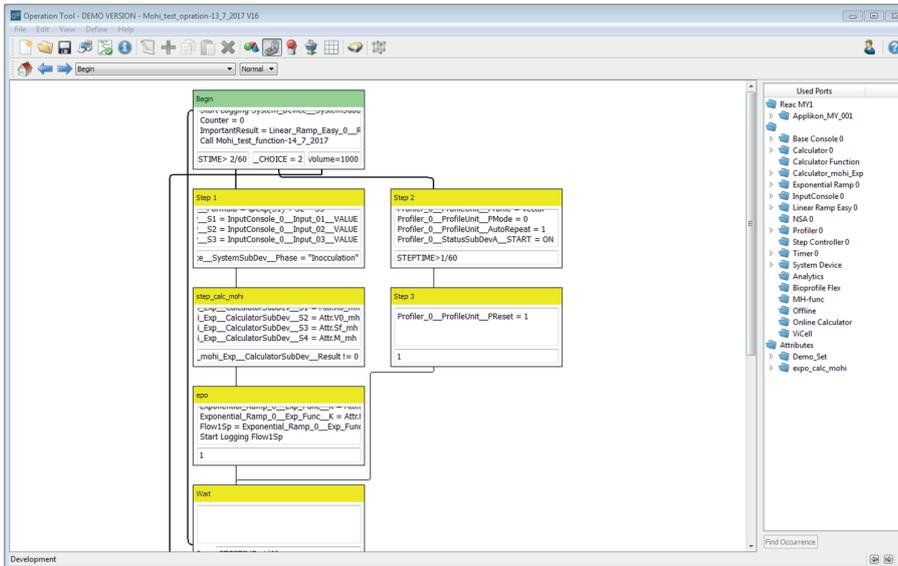


The ever increasing amount of process data generated by more sensors in smaller parallel bioreactor systems needs advanced software to turn this data into useful information. Lucullus PIMS offers a new dimension in data processing. Data management and data analysis is key for the future of R&D and process development in pharmaceutical industry. Lucullus PIMS software allows the user to monitor and control bioprocesses and offers an extensive toolbox for analyzing process data across platforms. Process information can be generated based on data generated in different brands of bioreactor types and wide range of different cultivation volumes. The combination of the software with the broad range of Applikon bioreactor systems offers the user a unique system for validatable fast track development and basic research.

Idea & Recipe

Make your process idea come true with an intuitive tool to create your process recipe

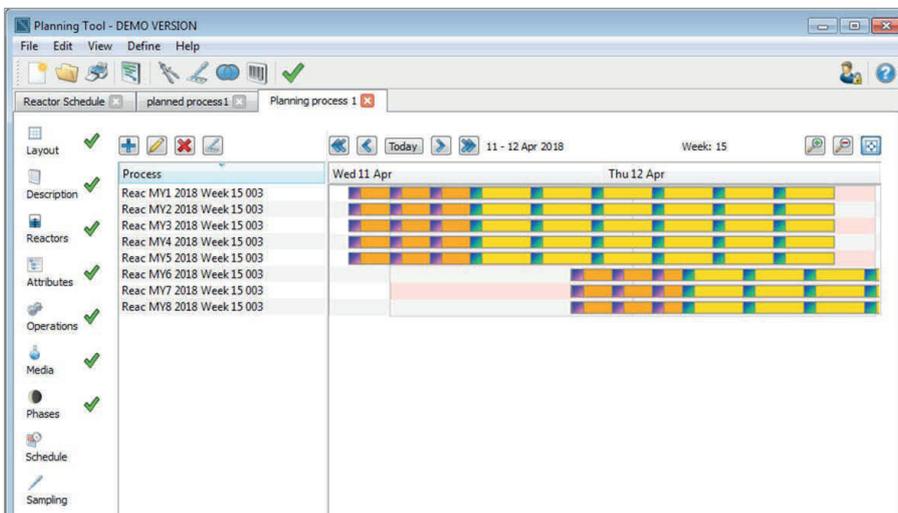
- Create your instruction sequences for simple or advanced processes and use them within multiple processes
- Integrate sequential calculations in your instructions based on time and events
- Receive Notifications, Emails, or SMS alarms in case your process deviates from your predefined limits



Planning

Define everything in advance with an intuitive workflow to start processes with minimal effort

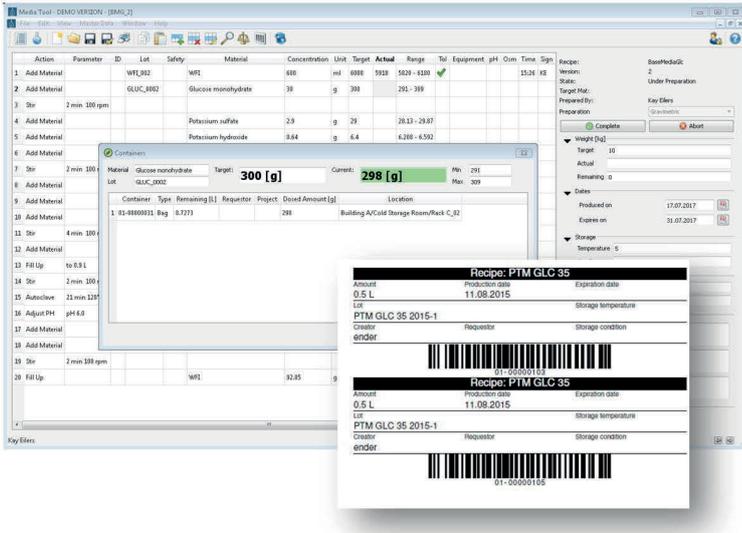
- Make optimal use of your shared resources using integrated scheduling tools
- Maximize your experiment efficiency by integrating third party DOE modules into your planning process
- Manage samples efficiently with overall strategies to coordinate sampling, sample tube preparation and barcoding
- Retrieve data automatically from at-line analyzers (E.g. Vicell, Nova pHox, Nova Flex etc.)



Preparation

Manage your Media center components and storage uniformly and efficiently

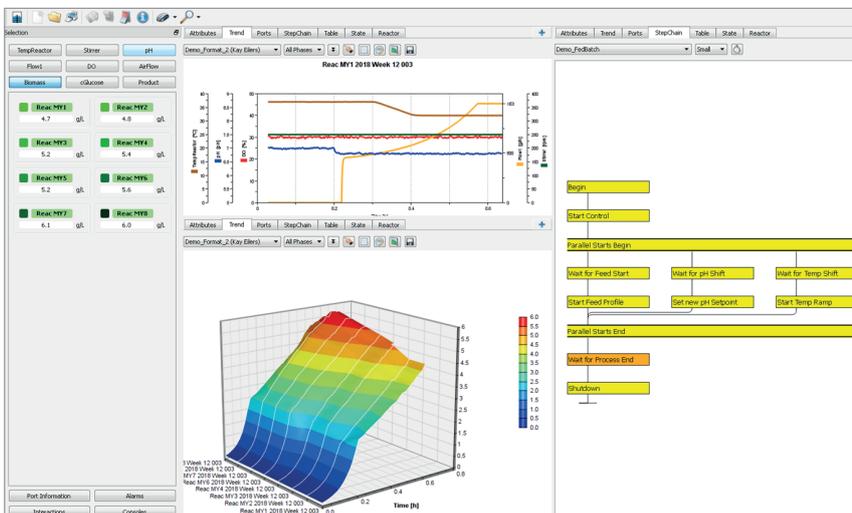
- Automate culture media creation
- Keep track of the availability of culture media in your storage
- Optimize the availability of raw materials in your storage
- Get more insight by keeping track of raw media components used in your culture runs



Execution

Execute recipes and monitor experiments

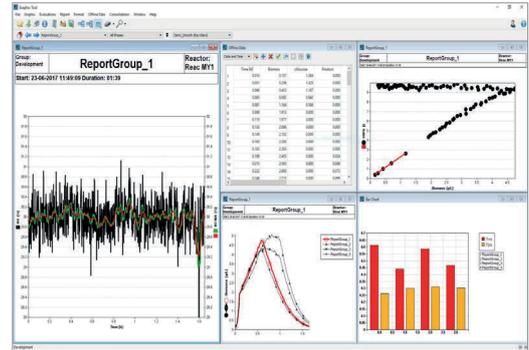
- Execute a process based on a predefined recipe or planning
- Start several bioreactors in parallel and monitor them simultaneously
- Store process data in a safe and industry standard Oracle database
- Make well informed decisions by comparing multiple processes simultaneously
- Evaluate running processes via 3D graphs and tables



Evaluation

Turn data into useful information using a wide range of evaluation components

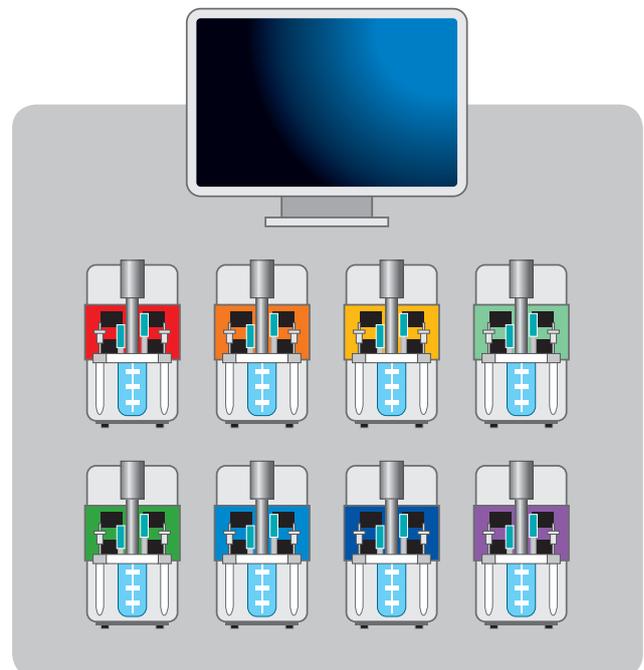
- Visualize process results by creating advanced graphs and tables
- Deepen your insight by using overlay graphs for a set of processes
- Turn data into useful information using advanced data analysis tools
- Automatically verify your process model against your experimental data
- Save time and achieve consistency by generating reports automatically



Lucillus PIMS can be supplied in three different architectures

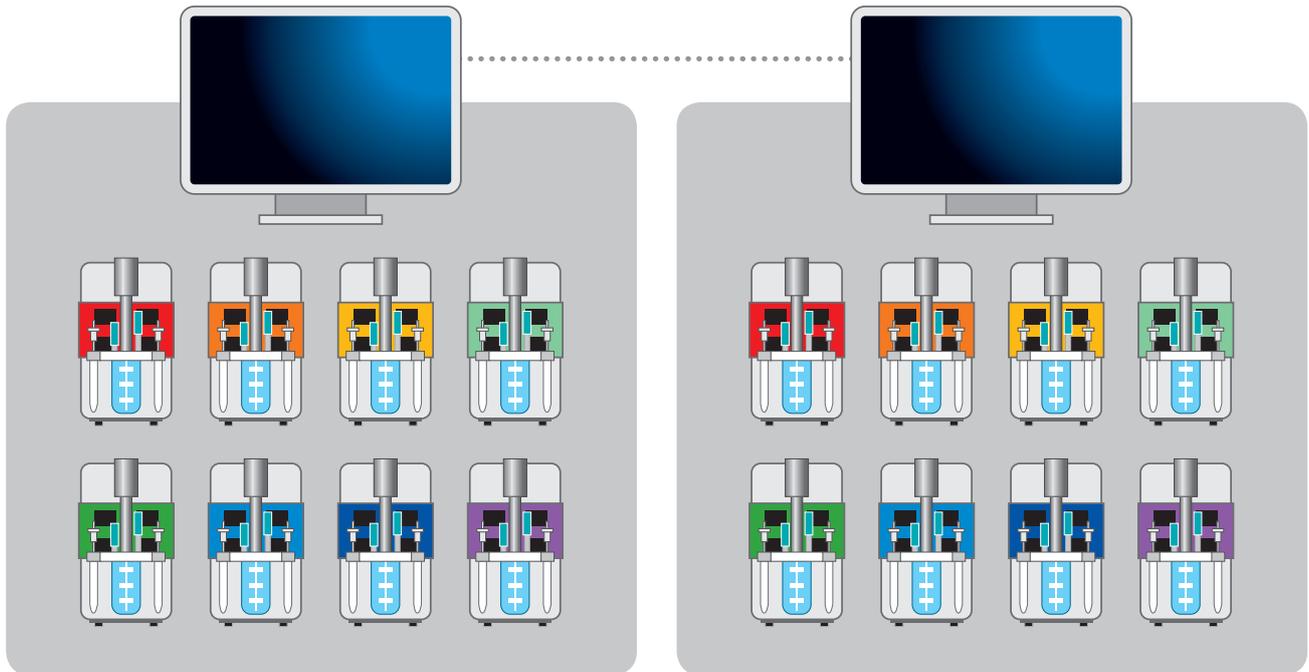
1 | Stand-alone edition

The stand-alone edition is used for up to 8 different bioreactors or one multi-bioreactor system on one computer. Data is stored in a local Oracle database and access to the process data can occur via the local computer or via a remote network link to this process computer. Interactions to the process can occur via the local computer in the laboratory.



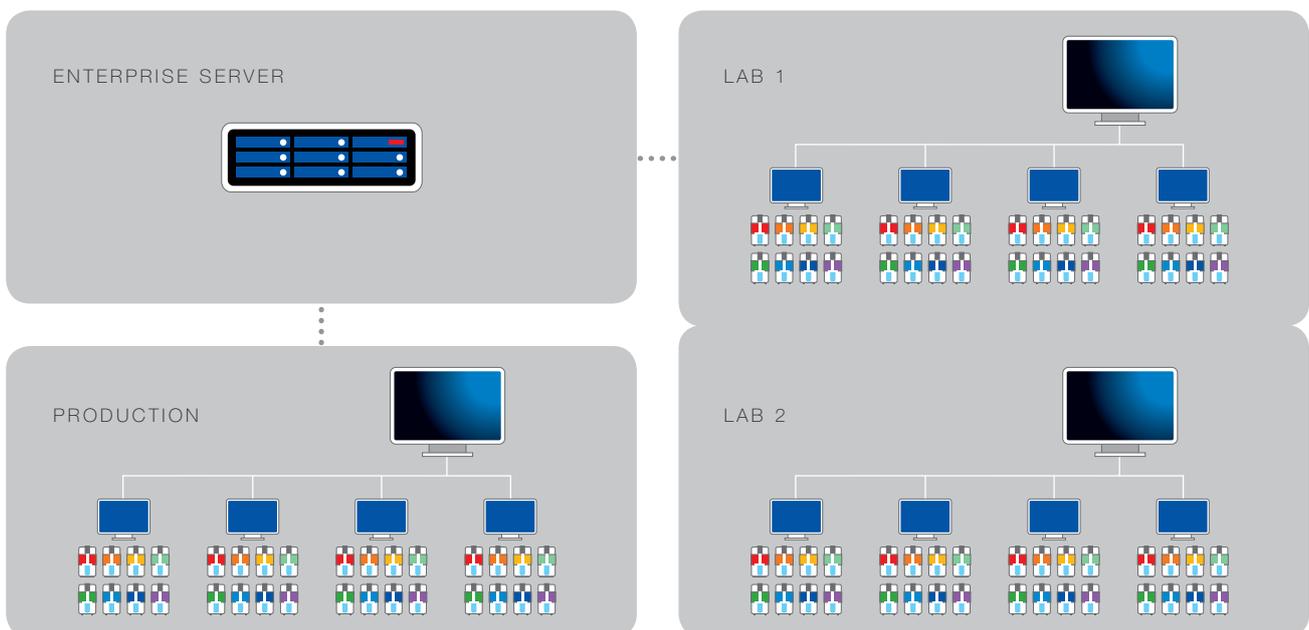
2 | Client Server Edition

The Client-Server edition is used for larger Lucullus installations, when different labs use the software. This distributed architecture allows the data to be stored in a safe location while the front end user interfaces are located near the bioreactors where they need to be. At the office, data can be reviewed via a direct link to the data server on the network. Data from different laboratories can be compared and can be used for process control or for reporting and making decisions for further process development.



3 | Enterprise Edition

For even larger Lucullus installations at different sites (and even in different countries) the Enterprise edition can be used. This version connects different installations of Lucullus and allows on the fly conversion and translation of process data. The authorized user can view and compare data between different sites. This could be a production site and a process development site, or could even be different development sites in different locations working on the same process.



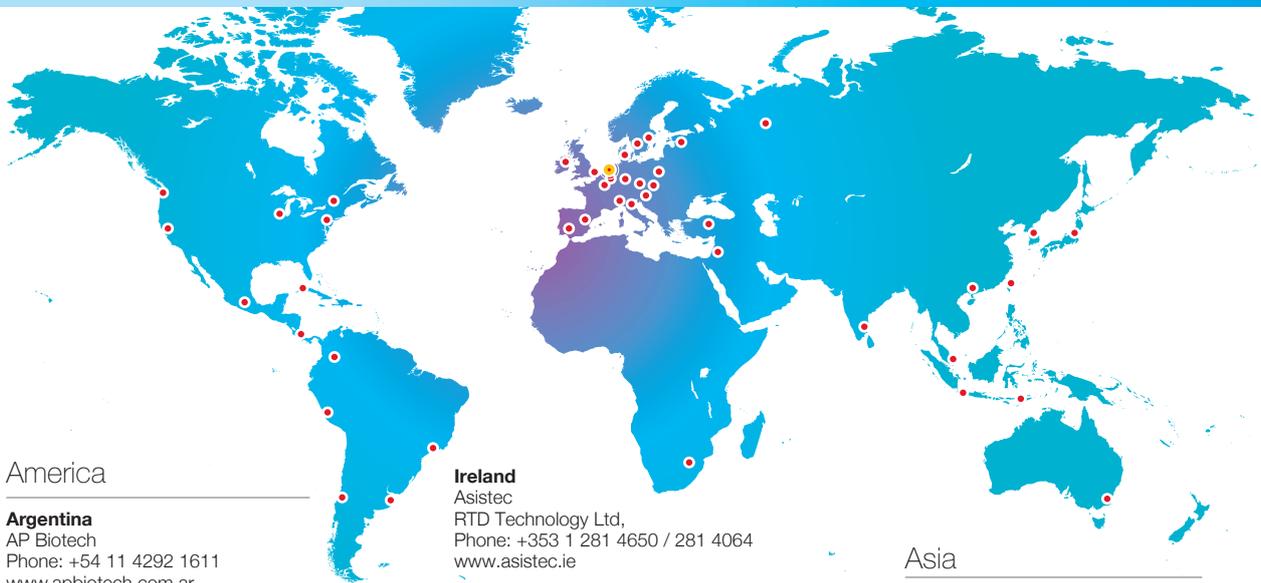
Lucullus PIMS: Turning Data into Information

Specifications

Operating system	See table			
Computer Hardware	no specific demands			
Specifications	Lucullus Lite	Lucullus Standard	Lucullus Advanced	Lucullus Expert
General				
Operating system	Linux, Windows 7 (64-bit), Windows 10			
Communication drivers include	my-Control, in-Control, ez2-Control, i-Control, SUB-Control			
Optional Controller drivers	no	Sartorius controllers, Eppendorf Controllers, NBS controllers, Infors Controllers, Siemens PLC, AMBR, Shaker/Incubators		
Optional drivers for analytical instruments	no	Vicell, Nova Flex, Nove pHox, Flownamics and more		
Design of Experiments	no	no	yes	yes
Media preparation planning	no	no	no	yes
Analysis planning	no	no	no	yes
Resource planning (reactors)	no	no	yes	yes
Material Management	no	no	no	yes
Lot preparation	no	no	no	yes
Filling	no	no	no	yes
Storage management	no	no	no	yes
Data Acquisition	yes	yes	yes	yes
Process Control	no	yes	yes	yes
Monitoring and Alarms	no	yes	yes	yes
Sampling planning and management	no	no	yes	yes
Data Retrieval from Analytical Devices	no	yes	yes	yes
Interactive Data Analysis	no	yes	yes	yes
Performance Analysis	no	yes	yes	yes
Automatic report generation	no	yes	yes	yes
21 CFR part 11 compliant	no	optional	optional	optional
GAMP compliant	yes	yes	yes	yes
ISA S88 standard	yes	yes	yes	yes
Password protection	no	no	yes	yes
User definable access rights	no	yes	yes	yes
Remote Access	no	yes	yes	yes
Interactive Synoptic	no	yes	yes	yes

Specifications

	Lucullus Lite	Lucullus Standard	Lucullus Advanced	Lucullus Expert
Data management				
Data storage system	Oracle database	Oracle database	Oracle database	Oracle database
Minimum sampling frequency	1 second	1 second	1 second	1 second
Sample frequency selectable per parameter	yes	yes	yes	yes
Data reduction definable per parameter	yes	yes	yes	yes
Data export to Excel	yes	yes	yes	yes
Data export in ASCII format	yes	yes	yes	yes
Graph export in graphics format	yes	yes	yes	yes
Dynamic Data Link to other programs	no	yes	yes	yes
On-line calculations				
using on-line and off-line data	no	yes	yes	yes
Data display				
Line graphs	yes	yes	yes	yes
Maximum number of y-axes per graph	8	8	8	8
Synoptic (P&I diagram)	no	yes	yes	yes
Procedure flow chart	no	yes	yes	yes
Combination of current and historic data in graphs	yes	yes	yes	yes
Combination of different active batches in graphs	yes	yes	yes	yes
Measured data table display	yes	yes	yes	yes
Scatter plots	yes	yes	yes	yes
Storage of predefined graph settings	yes	yes	yes	yes
Supervisory control				
Programming of time based actions	no	yes	yes	yes
Programming of event based actions	no	yes	yes	yes
Profiling of setpoints	no	yes	yes	yes
Manual setting of local control setpoints	no	yes	yes	yes
Recipe definition	no	yes	yes	yes
Other				
Notebook for process and equipment remarks	yes	yes	yes	yes
Event viewer for system comments	yes	yes	yes	yes
Audit trail	no	optional	optional	optional



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