SYSTAG

Your Partner in Chemical Development

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Situation

SYSTAG

Is situated in the historical centre of Rüschlikon, close to the railway station. Rüschlikon, a village 8 km from Zurich downtown, is located in the beautiful landscape of lake Zurich. The picture above shows the building with the construction, development and final assembly departments to the left and the building with administration and sales department to the right.

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SYSTAG - Your Partner

Editorial

SYSTAG, System Technik AG has been the preferred partner of the chemical industry since 1965, thanks to its consistent solutions which encompass all phases from development to piloting and process control engineering.

Our objective is to offer our customers conceptual and solution-orientated automation solutions & services from a single provider, addressing all chemical process development aspects, associated thermal safety inspections and scale-up. In addition to supplying turnkey applications, SYSTAG also frequently integrates existing peripheries or develops customized solutions for a variety of special applications in cooperation with its partners.

Our products are subject to continuous development based on the latest technological knowledge and cognitions, thus generating a high degree of added value for our clientele. We guarantee investment protection through sustainability and integration.

As an international player, we endeavour at all times to provide optimised solutions characterised by economic practicability, flexibility and a capacity for expansion. SYSTAG continuously develops necessary hardware & software components with this in mind.

Whether you need a "turn-key" solution conceptually matched to your specific needs from a single source, or whether you want us to integrate existing equipment and peripherals into a conceptually convincing solution - we listen, understand and deliver. Our typically Swiss attributes of reliability, innovation and quality guarantee our customers high added value and investment protection, true to our motto - automatically better

CLR – stands for „Controlled Lab Reactors“ and encompasses conventional single reactor systems (ALR's) and multi-reactor applications for parallel process optimisation. SYSTAG products in the CLR business division support personnel in chemical development laboratories and enable the realisation of more efficient and practice-orientated trials and logging. Integration of diverse analytical methods (also provided by other manufacturers) or special process techniques complement the CLR segment.

TPS – the „Thermal Process Safety“ business division is dedicated exclusively to the inspection and qualification of the thermal risk potential in a chemical process.

SYSTAG reaction calorimetry delivers the reaction output and heat of a synthetic reaction, whereas SYSTAG thermal analysis with FlexyTSC identifies further data on undesired decomposition reactions (including storage & transportation tests) of chemicals and their products.

The combination of reaction calorimetry and thermal analysis employed delivers part of the thermal risk analysis from time to time.

PCS – „Plant Control Systems“ are specific customer solutions involving automated kilo-lab & pilot plants up to 250 l reactor volume. Consistency from development to production improves the knowledge transfer and understanding of the process. Turnkey plants from a single provider enable us to provide support from engineering and professional system integration to IQ/OQ and assistance during validation.

Why not try us too! We look forward to a successful collaboration!

Marcel Haugg, CEO

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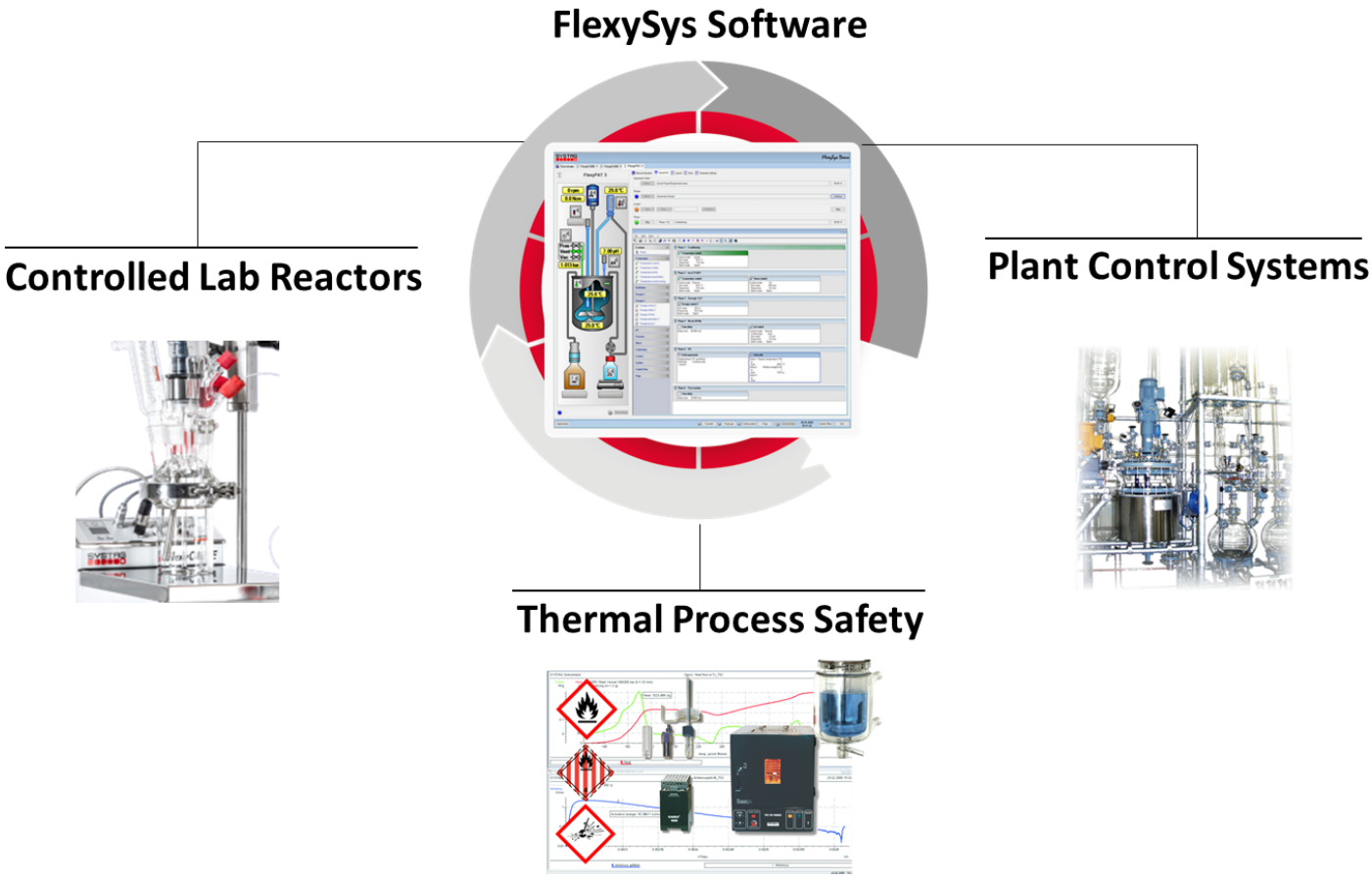
FlexyConcept



FlexyConcept - developed with our customers for our customers

FlexyConcept - a name that represents structured consistency and a sophisticated automation concept in the laboratory and during piloting

Whether conventional laboratory reactors, multi-reactor systems or reaction calorimetry applications are involved, all SYSTAG applications can be integrated and combined within the FlexyConcept platform with a few clicks of the mouse. A standard reactor is transformed in next to no time into a heat flow calorimeter, or a single reactor system converted into a multi-reactor application for process optimisation and DoE (design of experiments).

However, the concept and, consequently, the method of operation remain the same. No additional training is necessary. Durability and investment protection are once again guaranteed.

The core element of FlexyConcept is the FlexySys software. Implemented options, such as distillation, pressure/vacuum controls and many more can be imported with ease into new applications. FlexyConcept enables you to transform yesterday's application into a future-orientated solution.

- Modular structure for changing requirements
- Easy planning of human resources
- Complete documentation
- Highest possible flexibility
- Intuitive and therefore quickly ready for use

Your advantage is reflected in consistent laboratory automation of process development, from kilo-lab to pilot plant.

See for yourself…

…and enthuse and inspire your colleagues!

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FlexySys –Add-on's

Preparation of your experiment

- **EductX:** Automated integration of reactant specific data from an ELN (data base).
- **OperX:** Create your recipe wherever from you want.
- **SamX:** Your assistant to switch peripherical devices easily.

Compliance, comfort and safety

- **SecureX:** Makes your software GMP compliant (CFR 21 part 11).
- **RemoteX:** Control your reactor from wherever you want.
- **MessageX:** Your email alert.

Data Management

- **ChartX:** Graphical view (trend) of your experiment.
- **e-Journal:** Automatic generated lab journal of your experiment.
- **CollectX:** Automatic data transfer to an ELN, LIMS, cloud etc.

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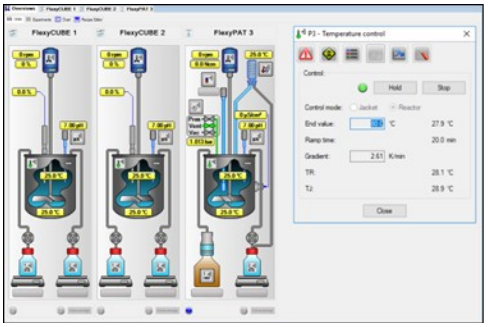
FlexySys

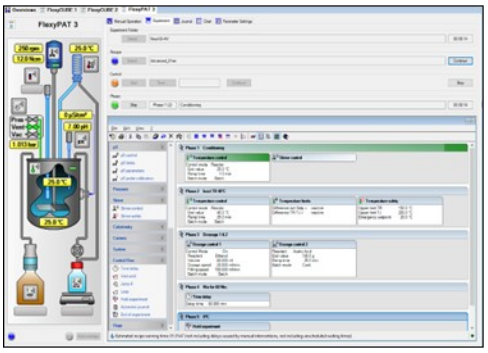
Uniform Software Platform



FlexySys — simplicity and flexibility through structured functions

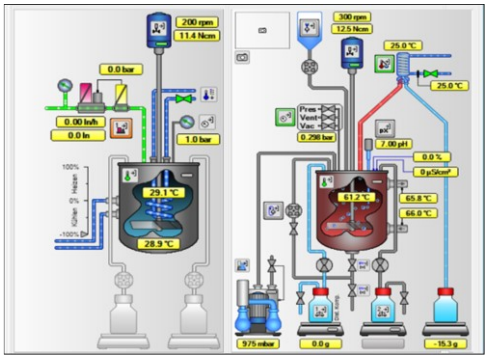
Simplicity: Thanks to intuitive functions, experiments can be carried out safely and without extensive training.

Flexibility: Thanks to a wide range of standardized functions, we can offer you a solution tailored to your own process, so that you can conduct your work as efficiently as possible. Existing equipment can also be integrated into the software. This way, you not only save money, but also increase the system's availability.



Efficiency, safety and reproducibility thanks to recipe control

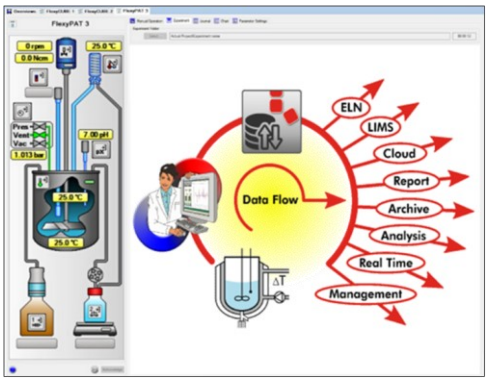
Using recipes, sub-processes such as inerting or even complete experiments can be carried out reproducibly and efficiently, even without supervision. Maximum flexibility is guaranteed by the combination of manual interventions, fully automatic recipe operation and the "edit on the fly" function. Alongside all the necessary safety limits, which the system immediately regulates into the previously defined safety state, a variety of process limits can also be defined. These include, for example, the maximum permissible temperature rise during dosing.



Customer-specific adjustments

The software can be tailored to a large number of different processes. For example, distillations, filtrations or pressure controls can be automated via the software using standardized functions, while reaction energies can be measured (calorimetry) or analysis devices such as turbidity measurements and particle size analyzers can be implemented.

Customer-specific turnkey solutions, combined with services in the field of plant design and plant qualification in the GMP environment (IQ/OQ), protect your investments, thanks to the modular way that they can be adapted.



Data management and eJournal

During an experiment, all the events and data are recorded automatically. This also applies for any integrated analytical instrument. In addition, all the data along the workflow, such as the numbers of manual weighings of solids or the batch numbers of educts, can be managed via the software. All the data and information is compiled in Word format in an automatically generated e-journal, which can then be centrally archived in higher-level data management programs (ELN or LIMS) using the "CollectX" add-on. This way, the traceability of all the experiment related data is ensured and data analysis is also guaranteed across departments.

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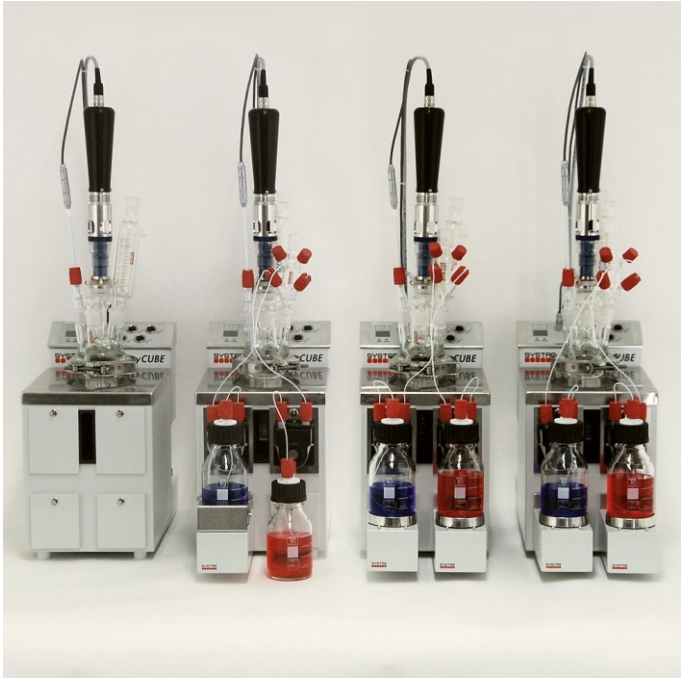
FlexyCUBE

Controlled Lab Reactors

Parallel Process Development (PPD)



- **High level of productivity, accurate experiments, ideally suitable for DoE**
- **Operating close to actual production conditions – perfect for Scale-up**
- **Robust solution for routine applications, a real workhorse**

Your trump card for rapid and quality focused process development

Our new concept for process development

- Up to 6 reactor units controllable from a single PC
- Parallel (DoE) or individual operation possible
- Compact construction
- Reactor capacity 1 ml (ScreenX) to 400 ml
- Manual and recipe modes

Standard Functions

- Gravimetric or volumetric dosage capabilities available
- Temperature control of jacket or reactor
- Control of stirrer speed
- Data capture and automatic Laboratory Report
- Remote Support and Alarm Event File

Flexibility

- pH Control, Standard single sided (acidic or alkaline)
- Expansion with additional reactor units always possible
- 70, 100, 250 or 400 ml or 4x10ml reactors
- Pressure reactors - glass or metal (SS/Hastelloy)
- Height adjustable types of stirrer seals
- Automated distillation with boiling point detection
- Isothermal Heat Flow Calorimetry, On-line Analysis
- System Qualification IQ/OQ

Temperature Range

- -80 ... 280°C,
  *Subzero range capability, dependent on chiller

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FlexyPAT

Controlled Lab Reactors

Process Automation Technology

- **Minimum Training Requirements, easy Acceptance by Personnel**
- **Incorporation of Customer-Owned Instruments**
- **Up to 6 FlexyPAT controllable from a single PC**

Flexible Automation for Syntheses, Lab Scale and Pilot Plant Applications

Functions

- Gravimetric and Volumetric Dosing facilities
- Temperature control for Jacket or Reactor
- Stirrer control includes speed and torque measurements
- pH Measurement
- Manual and Recipe Control
- Data capture and automatic Laboratory Report

Incorporation of Customer-Owned Instruments

The FlexyPAT Concept even allows the integration of existing customer-owned hardware. This will not only reduce costs dramatically but speeds up the automation process substantially.

FlexyPAT Options

- Distillation with Reflux Splitter
- Pressure and Vacuum measurement and Control
- Hydrogenation capabilities
- Isothermal Heat Flow Calorimetry
- Turbidity measurement, midIR FTIR Integration
- Particle size measuring instruments can be integrated
- pH Control
- CFR21 part 11

Operating Several Reactors

A number of ALR's can be operated from a single PC. SYSTAG will provide optimal advice.

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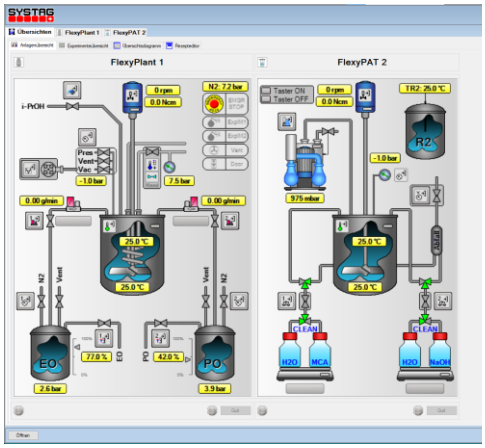
FlexyPlant

Plant Control Systems

Automated turnkey Pilot Plant

- **Specific customer solutions for the automation of kilo lab and pilot plants with reactor volumes up to 250 l**
- **FlexyPlant is a logical progression of process development – via FlexyCUBE and FlexyPAT**



Conceptional Automation of Chemical Processes

General Information:

- FlexySys is an automation concept specially developed for chemical process research
- The FlexySys process control system combines the flexibility of manual operation with the reliability and reproducibility of a recipe-controlled system
- The system is also suitable for special problems encountered in chemical process engineering (e.g. polymerization, hydrogenation and thermal separation)

Your Advantages:

- A universal control concept from laboratory to pilot plant
- Interchangeability of recipes
- Automatic data acquisition and logging
- cGMP-compliant qualification
- Compliance with CFR 21 Part 11

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FlexyTSC

Thermal Process Safety

Process Safety with RADEX and SEDEX

Thermal Safety Evaluations under Real Conditions

Methods

- Scanning
- Isoperibolic
- Adiabatic
- IsoArc

Vessel Types

- Glass open, also gas purged
- Glass, up to 6 bar
- Steel, to 150 bar or 200 bar
- Steel, with glass liner

Volumes

- Radex 0.5 to 2.5 ml
- Sedex 50 to 1000 ml
-

Temperature Ranges

- Standard 20 .. +400°C
- Optional -20 .. +500°C

Calibration

- Scanning calibration
- Isotherm calibration

Capabilities

- High Sensitivity
- Simple, intuitive operation
- TMR, SHR, Arrhenius plot

Options

- Control unit expandable to up to 6 systems per PC
- Each system can handle totally independent experiments
- Measurement of evolved gas volume

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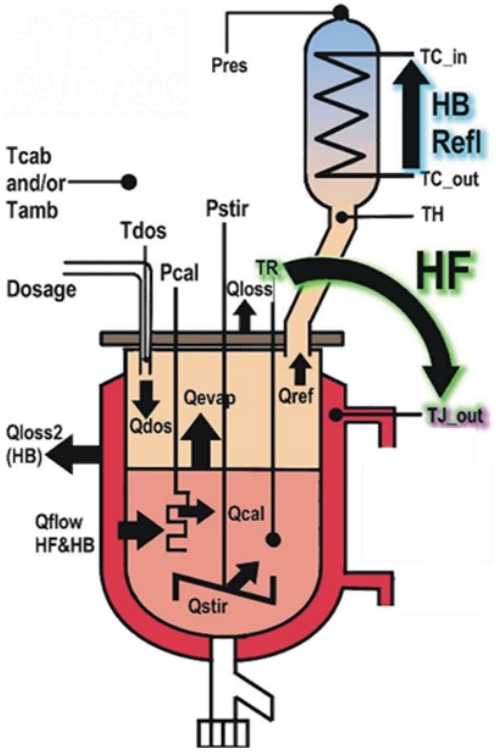
HFC-HBC

Thermal Process Safety

The reaction calorimeter for every chemist



- **All calorimeters suitable for safety investigations and scale-up**
- **Calculations of the required cooling capacity**
- **Calculation of the maximum temperature increase as part of the runaway scenario**

Thermal safety tests under real conditions

General information:

- Safety analysis to identify risks
- Safe operation of chemical reactions
- Provides reaction power (Heat of Reaction) for calculation of the required cooling power
- Theoretical maximum temperature rise (MTSR)
- True to the motto - Knowledge creates safety

Your advantages: HFC

- Well known / well studied method
- Strong signal (TR-TJ) / signal-to-noise ratio
- Reaction mass well shielded (environment)
- Insensitive to noise and temperature fluctuations

Your advantages: HBC in RF-cooler

- Measurement under reflux

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We offer more...

ePAT	Your cost-effective entry into the world of automated laboratry reactors
FlexyCLAVE	Safe automated hydrogenation solution...also mobile and not only for specialists
ePilot	Cost-effective solutions for automation in kilo lab scale
SysPUMP	Cost-effective syringe pump for small volume dosing, ideal with ScreenX
eDEST	A smart solution for your routine distillation tasks
Safety Box	Safety solution for unattended tempering of your chemistry
SysSTIR	Compact, Cost-Effective, Reliable - Stirrer Motors from SYSTAG
PPR	The compact solution for parallel pressure reactions
ScreenX	Screening tests in the FlexyCUBE - the clever Add-On
SysBAL	Space is precious - the small compact scale from SYSTAG
Maintenance	Garanteed „up-to-date“ thanks to our license and maintenance contracts

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