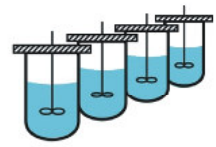


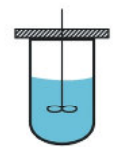
SYSTAG

Your Partner in Chemical Development

Controlled
Lab Reactors

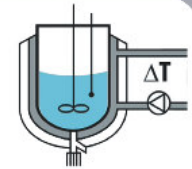


FlexyCUBE



FlexyPAT

Thermal
Process Safety



Calo2310

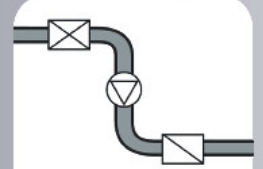


FlexyTSC

Process
Control Systems



FlexyPlant



Automation

SYSTAG

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.

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.

We identify with our customers in the most varied markets and enjoy close collaboration with our partners which has been carefully cultivated over many years. A partnership of over 45 years duration with the chemical industry, the know-how gained and typical Swiss quality awareness all vouch for maximum reliability from the planning phase to commissioning.

Our close collaboration over many years with the pharmaceutical industry in particular has crystallised into the following 3 business divisions:

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.

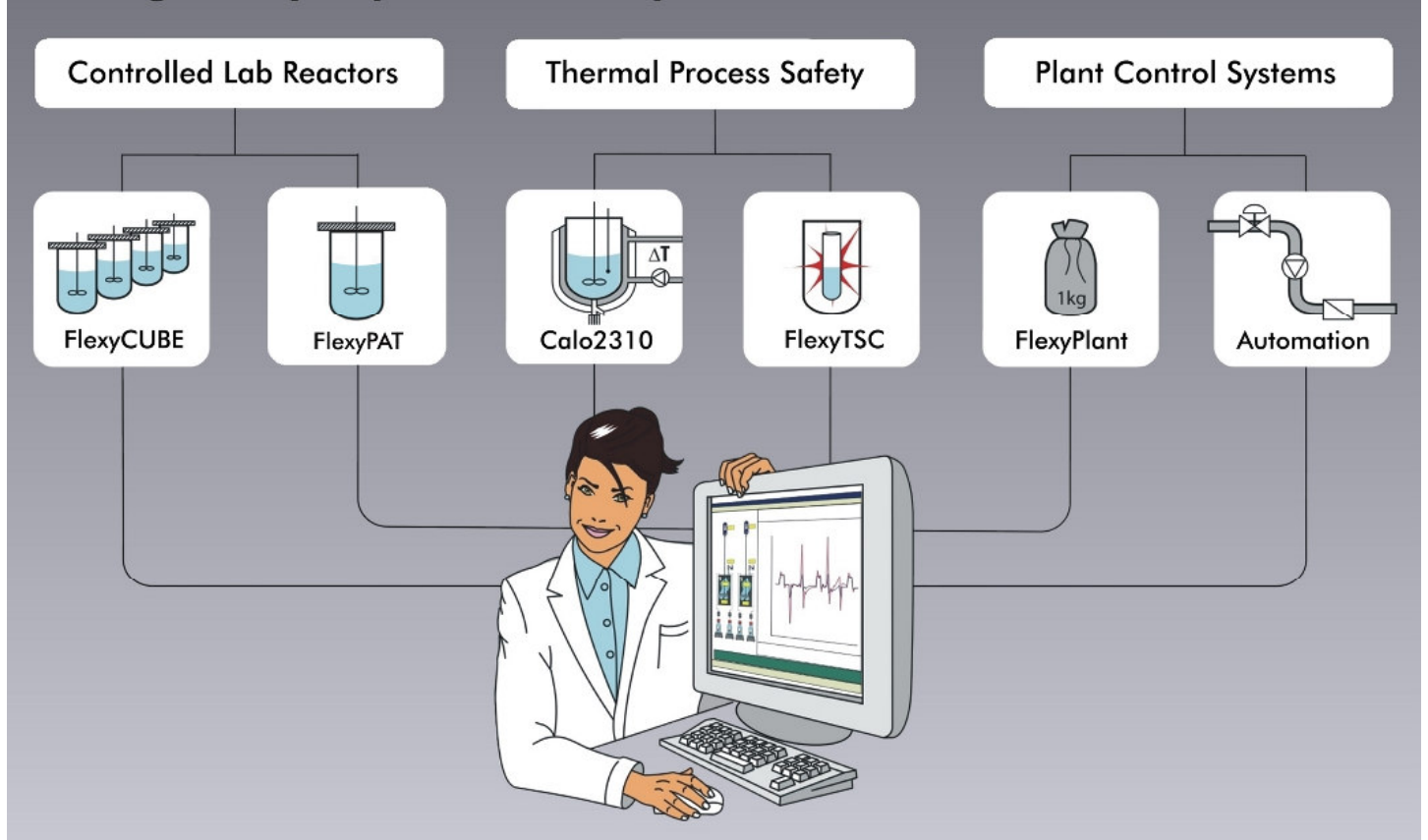
Why not try us too! We look forward to a successful collaboration!

SYSTAG - automatically better

Mike Mandlehr, Managing Director

FlexyConcept

Your gateway to process development



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

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

See for yourself...

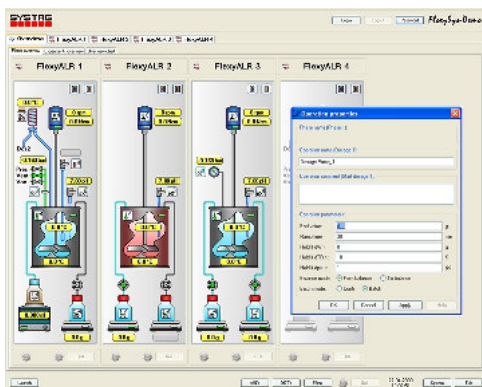
...and enthuse and inspire your colleagues!

FlexySys

Uniform Software Platform



Operation, Recipe, Protocol

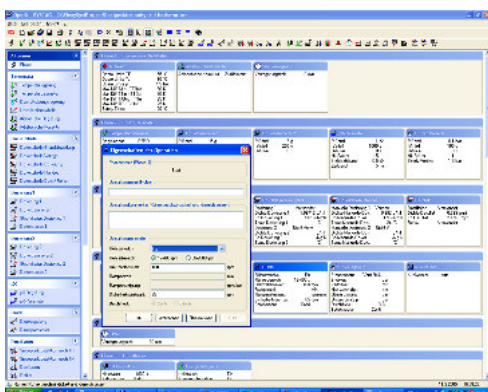


Synoptic Presentation

The illustration on the left shows the system diagram together with the most important system values in the yellow fields. On the right (partially covered by two operating windows) freely selectable graphics are provided. graphics are provided to allow the user a full view of the operation and the graphics display.

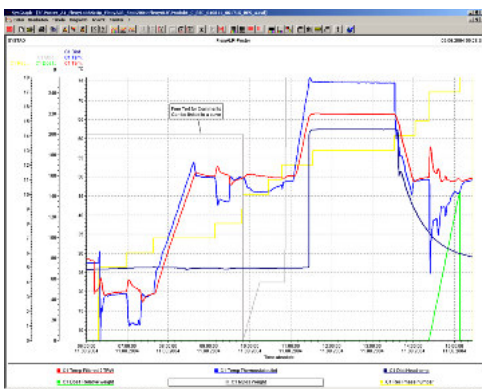
Manual Operation

The keys in the main display window will open a number of additional windows; temperature control and Dosing 1 are currently displayed. Through these windows, complete groups can be manually operated, includ-



Recipe Control

The required operational steps can be obtained from Basic Operations (left illustration). They can be opened with a double-click, parameters are set similar to a manual operation.



Graphic Presentations and Evaluations

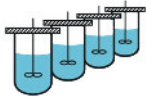
Graphic presentations and calculations can be prepared after the completion of experiments. They can be exported into the protocol.

Automatic Protocol

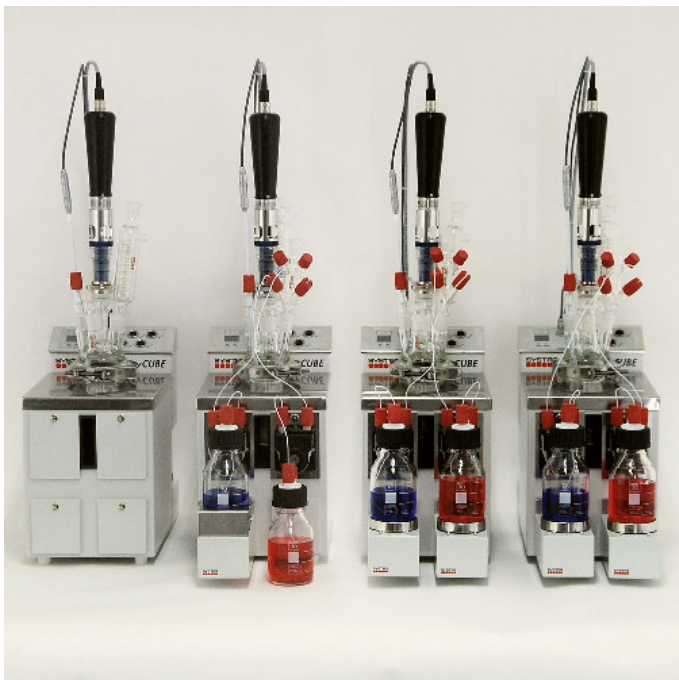
All important steps of an experiment (selection and templates are user selectable) can be entered and printed as Word documents.

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 10 ml to 400 ml
- Manual and recipe modes

Standard Functions

- Gravimetric or volumetric dosage capabilities available
- 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 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 thermostat type

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 Optionen

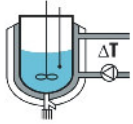
- Distillation with Reflux Splitter
- Pressure and Vacuum measurement and Control
- Hydrogenation capabilities
- Isothermal Heat Flow Calorimetry
- Turbidity measurement, midIR FTIR Integration
- Particle size measuring instruments can be integrated
- pH Control
- CFR21 part 11

Operating Several Reactors

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

Calo2310

Thermal Process Safety



The new Calo Family to meet all Requirements



- The "Blue Window" provides a real-time online view of process behaviour

On-Line Evaluation			
	Power	Heat	
HF	-0,1 W	33,1	kJ
HB	-1,1 W	27,9	kJ
Ref	0,0 W		
Cal	0,0 W	34,1	kJ
mass	635,0 g	cp	2,42 J/g·K
A (t)	0,0440	A (t-1)	0,0440 m ²
U (t)	153,05	U (t-1)	122,75 W/m ²
cp (t)	2,91	cp (t-1)	1,92 J/g·K
Integration ON		Calibration ON	
Reset Values			

- Three classes of instruments can be supplied. Each one is suitable for Safety Evaluations and for Scale-Up procedures

The New Generation of Reaction Calorimeters

Calo2310 eco

The classic economical Heat Flow instrument

An Isothermal heat flow calorimeter, the best available at entry-level for safety evaluations and Scale-up operations. Complete with online display of A, U, cp utilising the "Blue Window" facility.

Calo2310 base

The powerful Heat Flow Calorimeter

Universally applicable, non-isothermal Heat Flow calorimeter with automatic base line capability for the experienced user suitable for complex tasks. Incorporates online display of output and heat from Heatflow, as well as A, U, cp display in the "Blue Window".

Calo2310 pro

The professional Universal Calorimeter

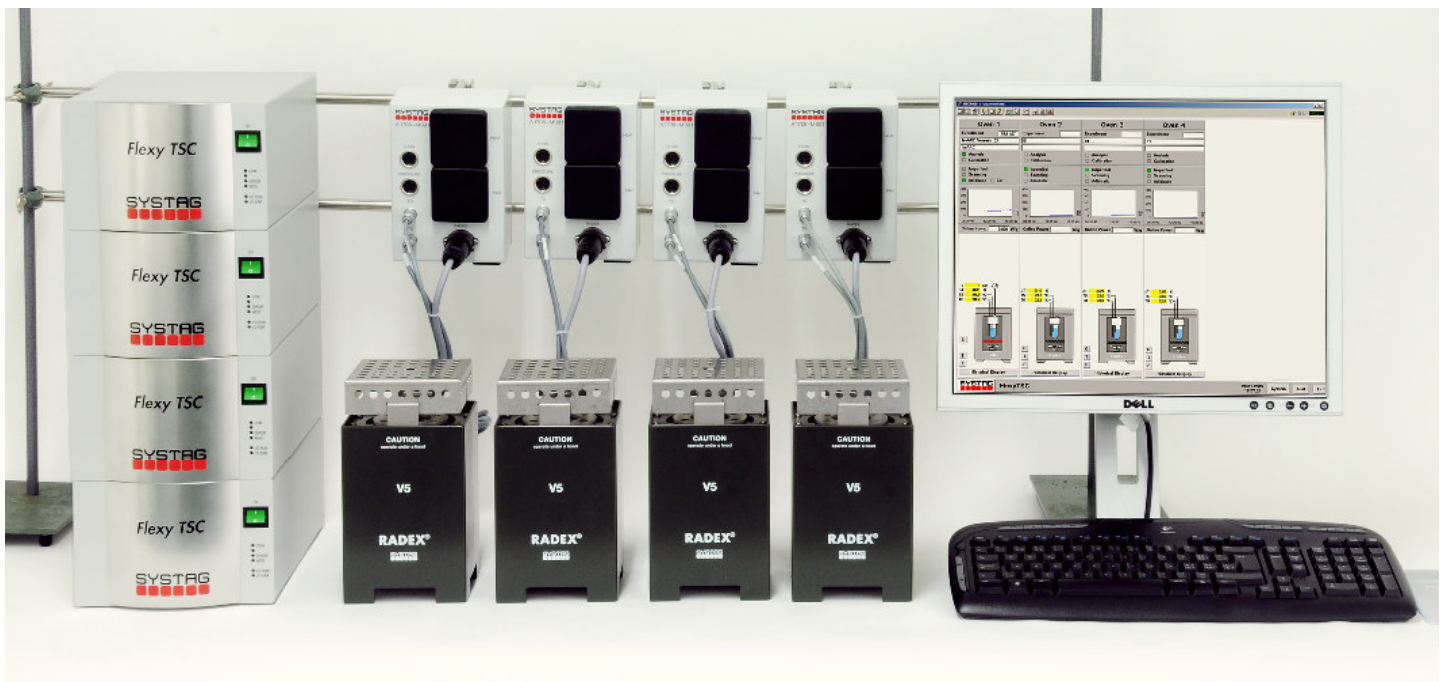
Combined Heat Flow and Heat Balance calorimeter with automatic baseline and non-isothermal operations mode. This is the professional calorimeter for all types of reactions. Online display of output and heat from heat flow and heat balance as well as A, U, and cp display via the "Blue Window".

FlexyTSC

Thermal Process Safety



Process Safety with RADEX and SEDEX



Thermal Safety Evaluations under Real Conditions

Methods

- Scanning
- Iso-peribolic
- 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

FlexyPlant

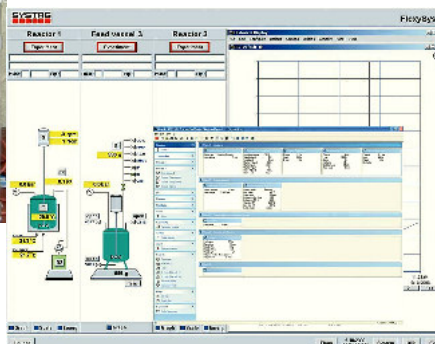
Plant Control Systems



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



Conceptual Automation of Chemical Processes

General Information:

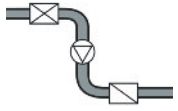
- FlexySys is an automation concept specially developed for chemical process research
- The FlexySys process control system combines the flexibility of manual operation with the reliability and reproducibility of a recipe-controlled system
- The system is also suitable for special problems encountered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

Your Advantages:

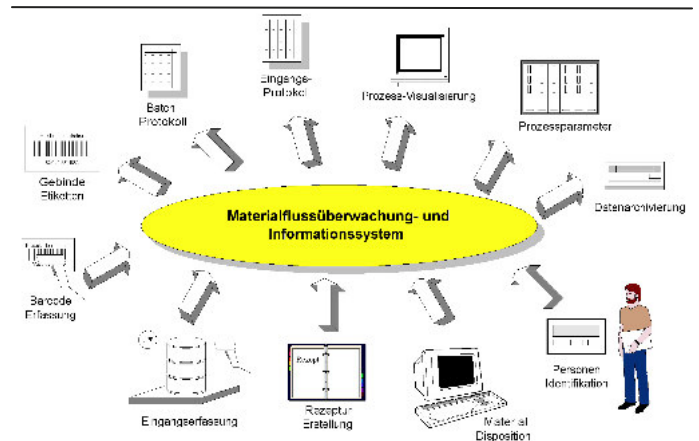
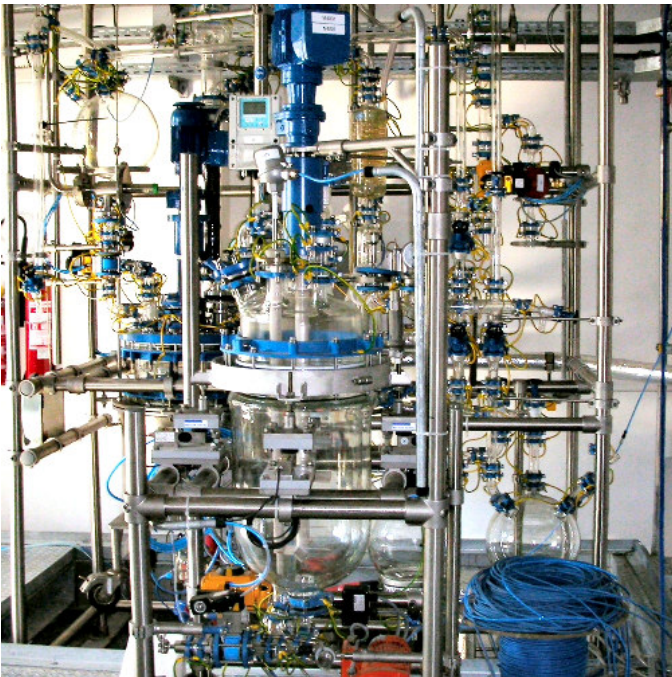
- A universal control concept from laboratory to pilot plant
- Interchangeability of recipes
- Automatic data acquisition and logging
- cGMP-compliant qualification
- Compliance with CFR 21 Part 11

Pilot/Prozess

Plant Control Systems



Flexible Production Automation



- Experience in application integration into higher level systems
- Support for FDA audits
- Solutions for complex problems using Siemens S7 PLC Systems

Conceptual Automation of Chemical Processes

Our Plant Control Systems offers:

- Continuity from development to production
- Improved technology transfer based on our philosophy of continuity
- Similar structures reduce training effort
- Unlimited parallel processes
- Customer specific, economically acceptable systems solutions
- Remote control via Modem and Internet
- Recipe control

Your Advantage:

- Everything from a single source
- Turn-key Systems
- Professional system integration
- IQ/OQ and FAT/SAT on request

Additional Benefits:

- Holistic problem coverage for optimum solutions
- Engineering from A - Z
- Individual attention during project phase, commissioning and maintenance

more highlights

FM4 - Gas Flow Meter



Gas flow measuring equipment for the smallest, as well as discontinuous flows

- Specially designed for thermo-analysis and process technique
- Capacitive measuring system
- Detection level of approx. 3 mm H₂O (0.3 mbar)
- No gas specific calibration needed

flexyclave - safe hydrogenation



The automated hydrogenation solution for laboratory and scale-up

- Easy handling
- Safe operation
- Recipe control
- High reproducibility

FilDry - filtration and drying optimisation



Laboratory Device for the investigation of filtration and drying processes for the chemical process development

- Usage as a agitated filter dryer
- Washing of the filter cake by displacement or suspending wash
- Dual purpose agitator with lift automatic
- Usage as a paddle dryer
- Drying under controlled vacuum and temperature condition
- Tracking filtration speed by weighing the mother liquid during the filtration