



Here you will find:

-
- Standard LabKit™ Laboratory Reactor Systems
-
- HiClave™ high-pressure autoclaves
-
- Multilab™ Parallel Reactor Systems
-
- LabKit™-ed Small Reactor Systems for Training Purposes
-
- Laboratory Clarification Unit
-
- Microreaction Technology
-

Note:

Custom made plants can be found in the chapter „Plant Construction and Miniplant Technology“.

Standard Laboratory Reactor Systems

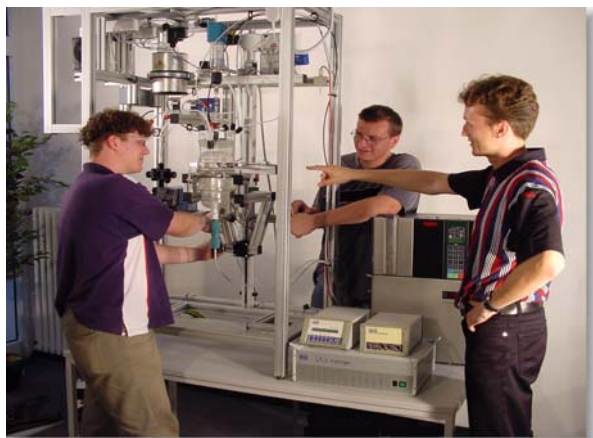
Automated laboratory reaction systems are an absolute necessity for today's product and process development and optimisation. Due to the much more intensive utilisation of the laboratory resources and the relief of the laboratory staff from routine activities, they pay off very quickly. They are a save way to achieve maximum reproducibility as well as an increase in quality and to gain new knowledge.

Conventional laboratory reactor automation systems are limited to simple syntheses and are therefore no longer able to meet today's requirements.

The fully-automated HiTec Zang laboratory reactor systems are available as single and parallel reactor plants. Apart from the standard configurations, you can choose the set-up of the plant which accords to your demands from our LabKit program.

Advantages:

- easy to handle open system
- NAMUR-conform automation with LAB-manager/LabVision/HiBatch/HiLIMS
- continuously expandable
- space saving installation
- electrically sinkable reactor vessel
- optimal usage of the laboratory's capacity by operating 24 hours
- best reproducibility
- increase in quality
- relief from routine jobs
- reduction of the risk of accidents
- GLP-compliant documentation
- accessible via network, e.g. from the office
- remote maintenance (dial-up by customer)



Last fine-tuning before delivery



HiTec Zang ALR-Systems are suited for the

- Development of products and procedures
- Optimisation of procedures
- Safety-related tests
- Scale-Up tests
- Reaction calorimetry etc.

The assembly of a laboratory reactor system out of individual components, e.g. out of a pH-controller, a dosing control, a vacuum controller, data collection, a control element, etc. used to be considered the best possible assembly. The capacity limits of such a conventional assembly are clearly demonstrated by LabKit due to its NAMUR-conform automation based on the LAB Manager System.

Sophisticated details, such as the lowerable reactor tank, facilitate work.

Options, Extensions

Sensors for filling level, opacity, flow, pH, redox etc., coupling of analysers etc., out of the chapter "Process Analytics and Sensors", in-situ analytics, coupled multiple reactor systems, customer-specific machines out of the chapter "Customised Equipment and Miniplants" – the offered possibilities are virtually limitless.

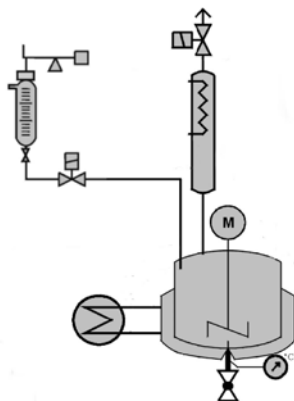
Standard systems

The following depicted standard systems LabKit-alr1, LabKit-alr2, LabKit-rcf, LabKit-rcb, LabKit-ed, and HiClave are complete, ready-to-use Automatic Laboratory Reactor Systems (ALR). They are suited for deployment in laboratories, pilot plants and mini-plants. They can be aligned according to spacial conditions and upgraded by auxiliary modules.

LabKit™-alr1 Standard-ALR-System

Automatic lab reactor system in the basis version.
Suitable for syntheses in a temperature range reaching from -10 to +130 °C with reflux distillation.

The system can be expanded with components from the LabKit-Construction Systems.



LabKit-alr1 ALR-standard system

Specification

Rack	Square section anodised aluminium profile.
Reactor	1 litre plane ground container DN100, cylindrical with heating jacket and manual PTFE base drain. Plane ground cover with centre neck NS29 for stirrer, side necks 2xNS29 slanted and 1xNS29 straight, Seal DN120 Silicon/FEP, plane ground connector.
Stirrer	ViscoPakt-35 torque measuring stirrer, rotational speed 60..800 rpm, maximum torsion 35 Ncm, including the optional RS232 interface. Accessories: light and high-strength stirrer coupling made of POM, standard agitator closure, glass propeller stirrer.
Heating/Cooling System	Heating/ cooling thermostat, working temperature range -25..150 °C in jacket, heating output 1 kW, refrigerating capacity 0.21 kW at 0 °C. Accessories: isolated heating tubes, heating connection adaptors, wide range tempering oil -40..165 °C.
Dosing System	A GraviDos Dosing System for liquids (regulated dropping funnel), 500 ml receiver tank, dosing valve (ETFE/Kalrez) controlled gravimetrically.
Reflux cooling	Intensive reflux cooler made of borosilicate glass, 250 mm long, NS29/32, Shutting valve for cooling water.
Ventilation	Air valve PVDF/Kalrez).
Sensors	Temperature sensor: Reactor internal temperature, thermostat bath temperature.
Automation	LabBox 1 with the following interfaces: 4 Pt100 temperature measurement inputs, 4 analogue inputs (current and voltage), 8 digital outputs, Sensor-/Actor power supply 24 V 2.5 A, 2 RS232 interfaces. User PC : 1 CG-ABK1 HiTec display and control elements with premium 20" TFT monitor.
Materials	Mainly borosilicate glass, PFA, PTFE, ETFE, PVDF. Seals in contact with media made of Kalrez, high-grade steel material 1.4571 (modifications possible).

Order Code	Description
VL-LABKITALR1	Automatic Laboratory Reactor System, Basic Design

Recommended software package

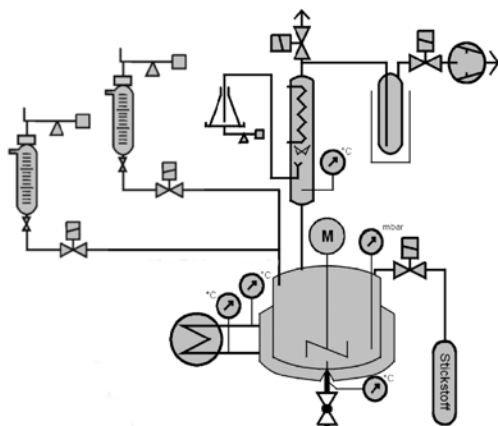
Order Code	Description
SL-LABVIPBATL	Software Package for LabBox1 and 2 to control small Batch Processes
SF-PID4	Controller module with 4 PID- and application oriented controllers

Recommended datapoint amount: 100

LabKit™-alr2 Standard-ALR-System

Automatic Lab Reactor System in extended configuration. Suitable for syntheses in the temperature range from -20 to +180 °C with reflux distillation via programmable reflux separators.

The system can be expanded with components from the LabKit-Construction Systems.



LabKit-alr2 ALR-Standard System with optional Modules

Specification

Rack	Square anodised aluminium profile, electrical fixture for lowering the reactor vessel, catch pan made of high-grade steel.
Reactor	2 litre reactor with double jacket DN150, Duran glass, PTFE base drain with integrated PT100 sensor, plane ground cover, seals Silicon/FEP, plane ground connector
Stirrer	Torque measuring stirrer ViscoPakt-rheo-57, rotational speed 50..2000 rpm, maximum torsion 57 Ncm, including the optional RS232 interface Accessories: light and high-strength stirrer coupling made of POM, standard agitator closure, glass propeller stirrer
Heating/Cooling System	Heating/cooling thermostat especially for tempering of external systems, working temperature range -40..200 °C in the jacket, heating output 1.5/3 kW, cooling capacity 0.7 kW at 0 °C Accessories: isolated heating tubes, heating connection adaptors, wide range tempering oil -90..200 °C
Vacuum	Laboratory vacuum system with chemical resistant vacuum pump < 8 mbar abs., volume flow rate 1 m³/h, suction side separator, pressure side intensive cooler, safety valve
Reflux Cooling	Intensive reflux cooler out of borosilicate glass, 250 mm long, NS29/32 Shutting valve for the cooling Monitoring of cooling water with floating-element meter
Distillation	distillate collecting scales, instrument read-out 0.01 g, weighing range 1510 g 2/2- way stop cock to shut off distillate collecting container and the pressure compensation. Optional: Glass reflux separator with vacuum jacket, silver-plated with viewing window, NSH+K 29/32 with PT100 connector GL14, discharge GL14
Ventilation	Air escape valve (ETFE/Kalrez)
Inerting	Inerting valve (ETFE/Kalrez), pressure regulator from maximum 16bar to 0..1bar
Dosing System	A GraviDos Dosing System for liquids (regulated dropping funnel), 500 ml receiver tank, dosing valve (ETFE/Kalrez) controlled gravimetrically

Sensors	Temperatures: reactor interior space, thermostat, flow, return flow, steam dosing medium Reactor interior pressure, pH-value
Automation	LABbox2 with the following interfaces: 8 Pt100 temperature measurement inputs, 8 analogue inputs (Current & Voltage) of which 1 pH, 3 RS232, 4 GraviDos (DMS) Interfaces, 4 digital inputs, 8 digital outputs, 2 of which for 230 V connected sockets. Sensor power supply 24 V 1,5 A, actor power supply 24 V 3 A. User pc, 1 CG-ABK2 HiTec display and control element with premium 22" TFT monitor, uninterrupted power supply and UPS management system
Materials	Mainly borosilicate glass, PFA, PTFE, ETFE, seals in contact with media made of Kalrez, high grade steel material 1.4571 (modifications possible)
Dimensions	D x W x H: 56 x 80 x 150 cm

Order Code	Description
VL-LABKITALR2	Automatic Laboratory Reactor System, 2 Dosing Circuits, Reflux Boiling, Vacuum Distillation, Vacuum Control, Inerting, Stirrer Torque Measurement
VL-LABKITALR2-AWE	Collection plate made of high-grade steel
VL-LABKITALR2-RFT	Column and magnetic glass-reflux separator with vacuum jacket

Recommended Software Package

Order Code	Description
SL-LABVIPBATE	Economy software package for LabBox2 and LabManager1 for batch operation
SF-PID8	Controller module with 8 PID- and application oriented controllers

Recommended datapoint amount: 100

HiClave™ High Pressure Reactor Systems



HiClave 200ml Duplex-Reactor-System with controlled Gassing

For high pressure reaction, in particular at multi-phase systems, the HiClave laboratory pressure reactor systems have proven themselves to be a suited solution.

They cover the volume range from 10 to 250 ml at a maximum pressure up to 300 bar and a maximum temperature of up to 300°C. Due to the pure metal cover gasket, the system is able to reach a tightness which enables highly precise gas consumption measurements. Up to 7 reactor connections are possible. At the reactors as of 100 ml content, the

connections can partially or completely be passed to the circumference of the flange. This enables improved handling and voluminous peripheral devices. Various different cooling/heating systems, magnetic stirrers or magnet-coupled overhead stirrers, as well as the various gas and liquid supply systems are available.

They can be set up as individual and parallel reactor plant. Next to the standard configurations, you also have the option to have a plant constructed especially to your individual requirements and specifications.

The Advantages:

- Seal-less Cover
- Open upgradeable System
- Easy Handling
- Cooling Option

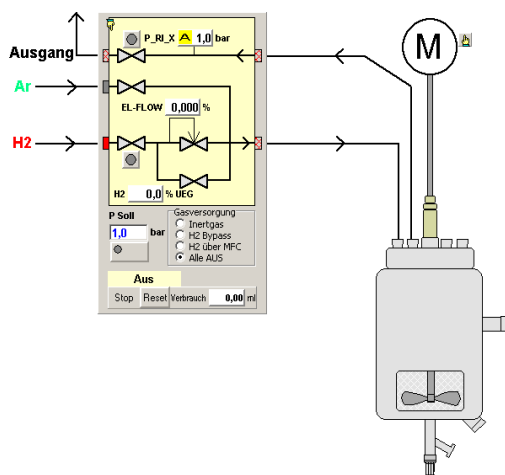
HiTec Zang Pressure Reaction Systems are suited for

- Hydrogenation
- Oxidations
- Carbonylation
- Polymerisation

and further processes.

Standard Systems

HiClave plants dispose of a modular construction. The standard systems depicted in the following represent the basis for pressure reaction systems suited for a multitude of applications. They are adjustable to the respective requirements and can be equipped with the offered additional modules and components.



Pressure Reactor System with Gassing and Balancing

10 ml and 20 ml Reactors



The 10 ml and 20 ml reactors have a cover with cap nut and a central media connection with four-way connector. The middle connection of the four-way connector is allocated with the interior temperature sensor, the lateral ones usually with media connection and the manometer.

The reactors tempered with a magnetic heating stirrer with heating block and agitated by a kinetic stirring rod.

Equipment

- Simple heating and stirring via a magnetic heating stirrer and a heating block attachment
- Temperature Sensor (Pt100)



Pressure Reactor 20 ml, heated and agitated with Magnetic Stirrer; on the right: Reactor with fibre-optic ATR Sensor

Connection Options

- 1 x Temperature Sensor
- 1 x Pressure Gauge
- 1 x Media Connection

Options

- Other Connection Assignments

50 ml Reaktor



The 50 ml reactor a cover with cap nut and 3 connections. One of these can be equipped with a magnetic stirrer drive. The stirrer is passed through eccentrically. The other two connections are for the thermal sensor and the media feed. If the stirrer drive is omitted in favour of magnetic stirrer, the now free connection can now be freely assigned.

The reactors are heated via a heating sleeve and stirred overhead. In this case, the cooling can be conducted via a plate cooler. Alternatively, it is possible to heat and

stir with a magnetic heating stirrer and heating block.

Equipment:

- Heating via Heating Sleeve
- Stirring via Magnetic Stirring Head
- Temperature Sensor (Pt100)

Connection Options

- 1 x Temperature Sensor
- 1 x Stirrer overhead, alternatively also free moving
- 1 x Media Connection

Options

- Unassigned Stirrer Connection
- Plate Cooler for controlled Cooling
- Other Connection Configurations
- Heating Block or Heating Sleeve

100...250 ml Reactor



The 100...250 ml reactor have a flange cover with 7 connections bolted by extension bolts. For better access, three of these connections have been placed on the outer side of the cover. The central nozzle is assigned with the magnetic stirrer head. The reactor is available in a high grade steel or Hastelloy version.

The reactors are heated via a heating sleeve and can optionally be cooled by either a plate heater or an internal cooling circuit. The stirring is conducted with a magnetic stirring head, optionally either with a maximum torque of 20 Ncm or 50 Ncm. The

according fitting kits are available in high grade steel 1.4571 (SS 316Ti) or in Hastelloy C4.

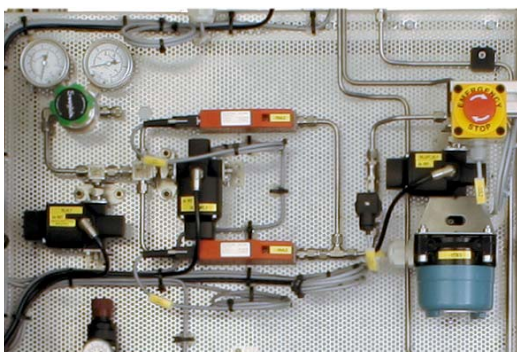
Connection Options

- 1 x Immersion Pipe for Temperature Sensor
- 1 x Stirrer
- 1 x Burst Disc made of metal for the safe limitation of the maximum pressure
- 1 x Pressure Gauge
- 1 x Valve for Pressure Release
- 2 x freely assignable, e.g. for gas or liquid sampling

Options

- Hydrogenation/Gassing Module
- Liquid and/or Gas Sampling
- Cooling via Plate Cooler or Cooling Circuit
- Hastelloy Version

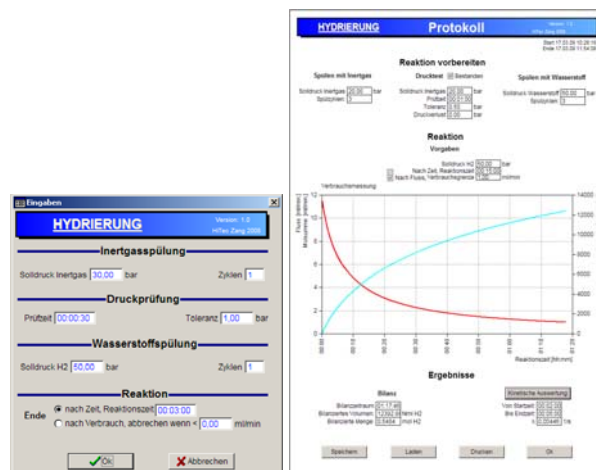
Hydrogenation Module



The Hydrogenation Module VL-HICLAVE-HYDR enables the realisation of the complete hydrogenation process, including the inert gas rinsing and leak test of the reactor, without manual intervention. For this reason, there is no need for anyone to be in the risk area of the reactor while the same is under pressure. For this purpose, the reactor is charged with up to regulable pressure with inert gas and subsequently vented. This rinsing process can be repeated as often as required. Subsequently, a pressure test with inert gas will be conducted. The testing period and tolerance for passing the test must be entered.

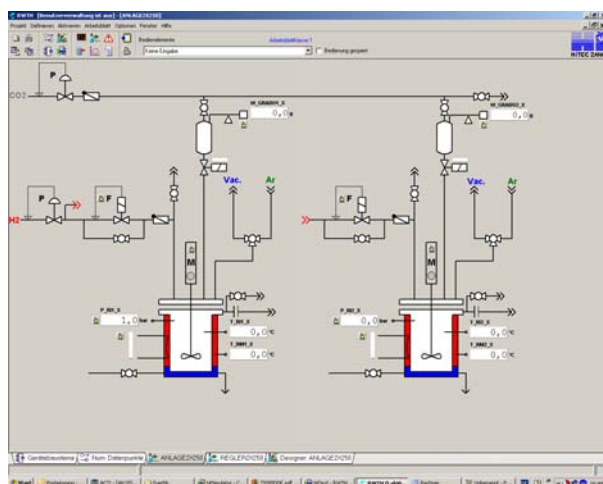
Only if the pressure test has been passed, will the reaction gas – in the upper example hydrogen – be released. Otherwise, the reactor is vented. In the next step, a rinsing with reaction gas is conducted, the setpoint pressure is established, and the reaction is started.

A gas consumption measurement for the capture of kinetic data is integrated. The gas consumption can also be utilised as an abort criteria, i.e. the reaction is interrupted if the consumption has decreased below a predefined rate.



a.) Parameter Template for Pressure Reactions b.) Protocol of a Pressure Reaction. Evaluation after a Pseudo First Order Kinetic.

Automation



The plant is monitored and operated via a self-explanatory user interface. The measurement data are automatically captured and recorded in a

protocol. If a gas consumption measurement has been conducted, it is also possible to realise a kinetic evaluation of the consumption curve.

Versions

Frame	Square aluminum profile, anodised. High Grade Steel Platform.
Reactor	10...250 ml- High Grade Steel Reactor (opt. Hastelloy), 300 bar, 300°C. Optional 450°C
Stirrer	Stirrer with magnetic coupling, Speed: 200..1500 rpm, Maximum Torque:20/50 Ncm, including analogue interface (Reactors ≥ 50ml). Or: Magnetic Heating Stirrer with Heating Block and Magnetic Stir Bar (Reactors ≤ 50 ml)
Heating /Cooling System	Heating Sleeve/ Plate Cooler (alternatively Cooling Circuit), Operating Temperature Range:40..350°C in Jacket, Heating Output 700W. Or: Magnetic Heating Stirrer with Heating Block
Sampling	Manual with Sampling Valve
Gassing	Reaction gas pressure-controlled via MFC, including gas consumption measurement, by-pass valve.
Inertisation	Inert gas pressure-controlled. Exhaust via high pressure magnetic valve, burst disc.
Dosing System, gravimetrically controlled	GraviDos High Pressure Dosing System. Optional High Pressure Pump and Scales.
Sensorics	Temperatures: Reactor Interior Temperature, Jacket Temperature, Reactor Interior Pressure, Speed, ATR-FTIR.
Automation	Example for two Autoclaves: LabBox2 with the following Equipment: Interfaces: 4 Pt100 Temperature Measurement Inputs, 4 analogue Inputs (current and voltage), 4 RS232 Interfaces (Stirrer, Hydrogenation Module), 4 GraviDos Connections, 8 digital Outputs, of these 2 for Power Sockets switched to 230 V. Sensor Power Supply24V 1,5 A, Actor Power Supply 24V 3A. 2 Safety Temperature Monitors. Workstation: 1 CG-ABK1 HiTec Display and Operating Component with high quality 20" TFT Monitor, Uninterrupted Power Supply and UPS Management System. This automation system is able to control 2 reactors. The extension to 4 reactors is possible.
Materials	Mainly High Grade Steel1.4571, other High Grade Steels, Hastelloy.

Order Code	Description
VL-HICLAVE-SC-n	Frame for HiClave Pressure Reactors, Piping, Sensorics, wiring, pressure sensor
VL-HICLAVE-ws-vol	HiClave Pressure Reactor, Manometer, PT100 sensor, according to Specification ws-vol
VL-HICLAVE-HEABAN-vol	Heating Sleeve, 230V AC, 500 Watt, Duplex Temperature Sensor, Temperature watchdog
VL-HICLAVE-COOLP	Plate Cooler for Mains Water or Thermostat Connection, with magnetic valve 24V
VL-HICLAVE-STIRR-20	Magnet-coupled Overhead Stirrer, 20Ncm
VL-HICLAVE-STIRR-50	Magnet-coupled Overhead Stirrer, 50Ncm
VL-HICLAVE-MAGHEAT	Magnetic Stirrer with Plate Heating
VL-HICLAVE-HYDR	Hydrogenation and Gassing Module for HiClave Pressure Reactors with Mass Flow Controller
VL-HICLAVE-GRAVI150	gravimetr. Dosing Unit 150ml for HiClave Pressure Reactors
VL-HICLAVE-ABKPNK1	Automation Unit with 20" Monitor and Workstation and SL-LABVIPEASY Software Package 30 DP, for one HiClave Unit with gravimetric Dosing, Dosing, Tempering, Hydrogenation
VL-HICLAVE-ABKPNK2	Automation Unit with 20" Monitor and Workstation and SL-LABVIPEASY Software Package 100 DP, for two HiClave Units with gravimetric Dosing, Dosing, Tempering, Hydrogenation
VL-HICLAVE-ABKPNK4	Automation Unit with 20" Monitor and Workstation and SL-LABVIPEASY Software Package, 300 DP for four HiClave Units with gravimetric Dosing, Dosing, Tempering, Hydrogenation

n (= Number of Reactors): 1 to 8

ws (= Material): High Grade Steel 1.4571 (SS 316TI): e, Hastelloy C4: h, Special Material s

vol (=Operating Volume): 10, 20, 50, 100, 150, 250 accordingly 10, 20, 50, 100, 150 or 250 ml

Special Designs, e.g. other volumes, connections, materials etc. are available upon request. Alternative dosing units can be found under the Section „Dosing Systems and Pumps“.

See HP-SITEMPBEG for appropriate secure temperature limiters.

Do you have Questions? Do not hesitate to ask! Our project engineers will gladly help!

Parallel Reactor Systems

Reaching Objectives faster with the automated Parallel Synthesis



The pressure to maximise productivity in the laboratory is consistently growing. At the same time, however, the demands on quality are also increasing.

Standardised and client-specifically customised HiTec Zang parallel reactor systems are the answer to the increasing demands:

- Shortened „Time to Market“
- Improved Quality
- Increased Reproducibility
- Lower Costs

You can ensure these advantages by:

- Eliminating shortages through parallel operation
- 24-hour, 7 day operation
- Relief from routine activities
- Optimal documentation and protocolling

The HiTec Zang parallel reactor systems MultiLab and MiniLab significantly support and expedite research and development processes in the chemical and pharmaceutical industry. The flexibility of the parallel reactor systems overcomes the throughput restrictions of today's research and development processes.

They help in shortening the “time-to-market” by expediting the optimisation processes for synthesis and alignment via the parallelisation of experiments and sophisticated automation and software solutions. Due to the possibility of unattended operation, the efficiency and the instrument utilisation is raised. All devices support batch, semi-batch, continuous and multistage processes.

With the parallel reactor systems, you are able to repeatedly and in parallel conduct experiments in great numbers and, consequently, decisively expedite the work process. By this, you save time, increase the efficiency and the capacity of your laboratory.

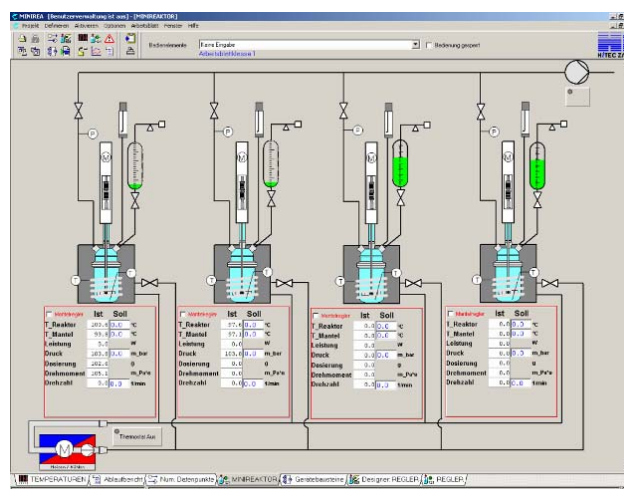
The test conditions, such as temperature, pressure and pH-value may differ for every reactor.

In case of the innovative tempering systems of the MultiLab and MiniLab, the otherwise usual tempering block for multi-reactor systems was intentionally omitted. Both systems allow a clear view into the reactor.

The systems are suited for

- Synthesis
- Polymerisation
- Distillation
- Extraction
- Crystallisation etc.

Automation



They neither restrict the creativity, nor do they require a specialist to operate. The user has full control over all system parameters all the time.

All labour-intensive steps, from the planning of the experiment to the evaluation and documentation of the experimental data, are supported or completely automated. Even complex recipes can be established in a few minutes by combining the basis operations with the graphic HiBatch Recipe Editor.

A recipe can be allocated to several reactors and individually parameterised. Due to this, the time and work expenditure even remains minimal when extensive parallel experiments are conducted.

MultiLab™ Multi-Reactor System

MultiLab is a miniaturised fully automated laboratory reactor system. Therefore, any reaction that is usually conducted on the litre scale can now be carried out in the 250 or 400 ml MultiLab reactor under realistic plant conditions, fully automated and controlled independently by a HiTec Zang LabManager with the leading LabVision laboratory automation software.

MultiLab is a modular system and still flexible. It is available in a great variety ranging from the manually operated basis version to the individually configurable fully automated multi-reactor system. Even complex processes with educt pre-treatment, synthesis, reaction monitoring, and product post-processing, as well as automatic sample drawing is possible.

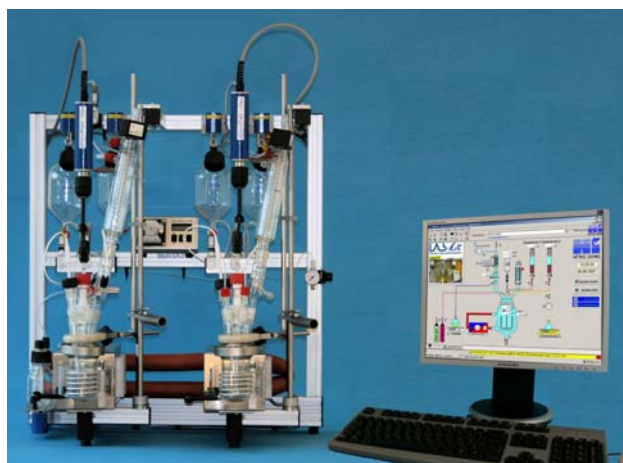
The special characteristic of the MultiLab parallel reactor system is its innovative tempering system. A high-grade steel spiral/coil holds the reactor temperature and cools, respectively heats the same, if necessary.

MultiLab is suitable for all common processes:

- Synthesis
- Polymerisation
- Distillation
- Extraction
- Crystallisation etc.

Features

- **Modular compact design**
- **Convenient and fast handling (exchange of a reactor in less than one minute)**
- **Independent control of each reactor**
- **Proprietary groundbreaking tempering system enables unhindered sight into the reactor**
- **Only one chiller for multiple individually tempered reactors**
- **Multiple dosing options (liquid, solid and gaseous, gravimetric and volumetric)**
- **Automated sampling options**
- **Fully automated control of reactor conditions like feed rates, temperature, pressure, pH and agitation**
- **Multiple systems controlled by a single PC with a LAB Manager, LabVision and HiBatch recipe control software**
- **24 hour unattended operation**
- **Inert construction materials: glass, PTFE**
- **Individually expandable and upgradeable**



Easy Handling

The exchangeable reactors of the MultiLab enable fast reaction to changing requirements. The unique and innovative heating/cooling system offers essential benefits. The glass vessel is electrically heated or cooled by a flow of cooling liquid out of a reservoir.



Exchange of a reactor

The reactor is released by actuating the release lever and can be removed after lifting the complete head construction.

The temperature of the coil is registered and controlled and, in addition, can be limited, if necessary. For reactor volumes ranging from 75 to 250 ml, the MiniLab System is alternatively available.

Options

- Distillation
- Controlled reflux
- Solid and gaseous dosing
- Electric bottom outlet valve
- Phase detection and separate bottling of organic/inorganic phase
- ATR-FTIR online Monitoring
- Automatic sampling and many more options
- further options available upon request

Module Description

Module	Basic Unit Equipment (common components of all reactors)	Components per Reactor (one unit required for each reactor)	Alternatives (other or extended features without specification)
Basic Module		Tempering unit, rack with reactor lift, glas cover, 1 x NS29, 4 x NS19, high-grade steel quick release fastener, GL25 connection, anker or tilted blade stirrer, cardan shaft, sealing, vacuum-sealed, max. temperature 250 °C (monitor cooling media!), min. temperature dependant of thermostat. inside temperature sensor PT100 PTFE coated, cables for stirrer and thermostat	Reactor 400 ml base drain, manual base drain, electrical sensor sockets, electrical reactor lift, ViscoPakt -mini-rheo-35 precision measurement stirrer, magnetic stirrer closure, propeller or impeller stirrer made of high-grade steel, glass thermometer, etc.
Vessel		Reactor 250 ml, DN60, borosilicate glass, sealing silicone/FEP-coated	Reactor 400 ml
Standard Cooling Unit	Cooling thermostat -20 °C (flow temperature)		Cooling thermostat -40 °C. low temperature equipment : Cooling thermostat -60 °C, removable isolation jacket (per reactor)
Reflux cooling	Cooling water valve Cooling water monitor	Dimroth cooler	
Distillation		Distilling bridge Pt100 for steam temperature Collecting container for distillate	Distillate weighing Additional cooler for reflux cooling
Rectification		Hempel column 200 mm Micro column head according to Dr. Kaminski, magnetically actuated Pt100 column head Dimroth cooler Collecting container for distillate	Vacuum jacket Distillate weighing Pt100 in column Filling material/Packages
Vacuum	Chemical-resistant vacuum pump	Vacuum regulating valve Pressure sensor 0-1,6 bar Pressure relief valve	Stronger vacuum pump
Inerting	Pressure regulator 16 bar to 0-1 bar	Inerting valve, pressure relief valve 1,3 bar	
Dosing		Hanging scales Grado1000 Weighing container 500 ml lateral refilling feed pipe Regulating valve	Automatic refill Mounting panel for LabManager (useful in case of more than 3 modules) Other container sizes
Volumetric Dosing		Peristaltic pump	Diaphragm, piston pumps, etc.
Solid Dosing		Solid doser SoliDos connection socket on to NS19	Inerting connection Inert gas heating
pH-Measurement		PH gel electrode pH 0-14 lead-through 12 mm measuring amplifier pH	Cover with sensor socket
Redox-Potential		Redox-electrode reference electrode lead-through 12 mm measuring amplifier mV	Cover with special sensor socket (necessary at anchor stirrer!)
Phase Limit Detection		automatic base drain valve with Pt100 PhaDec phase limit detector regulating valve	Temperature measurement with same Pt100
Gas Dosing	Pressure regulator 16 bar to 0-1 bar	Mass flow regulator Pressure relief valve 1,3 bar	

Order Code	Description
VL-MULTILAB-BU	MultiLab multi reactor base module with tempering and stirrer unit and cover
IR-VIPA-MINI-RHEO-35	ViscoPakt-rheo stirrer drive, 35 Ncm
VL-MULTILAB-GRV250	MultiLab reaction vessel 250 ml, DN60, borosilcate glass, sealin silicon/FEP covered
VL-MULTILAB-GRV400	MultiLab reaction vessel 400 ml, DN60, borosilcate glass, sealin silicon/FEP covered
IR-RDFMAG8	Magnetic stirrer closing for 8 mm agitator
VL-MULTILAB-CHILL-20	MultiLab cooling thermostat flow temperature -20 °C
VL-MULTILAB-CHILL-40	MultiLab cooling thermostat flow temperature -40 °C
VL-MULTILAB-CHILL-60	MultiLab cooling thermostat flow temperature -60 °C
VL-MULTILAB-RFC	MultiLab intensive reflux cooler
VL-MULTILAB-DEST	MultiLab distillation bridge, Pt100 for fume temperature, catchment tank for distillate
VL-MULTILAB-REKT	MultiLab rectification attachment, Hempel-column 200 mm, micro column head magnetically activated, Pt100 column head, Dimroth-cooler
VL-MULTILAB-VAKU	MultiLab vacuum control unit with vacuum control valve, pressure sensor 0-1,6 bar, pressure relief valve
IP-B-V1-1200L-PTFE/FPM	Chemical vacuum pump with alternating current motor 120W, 230V AC, 1200 l/h, end vacuum 8 mbar, material PTFE/FFKM
VL-MULTILAB-INERT	MultiLab inerting unit with inerting valve and pressure control valve 1,3 bar
IV-DRUMIN16/1	Pressure reducer 16 bar to 0-1 bar
VL-MULTILAB-GRAVI500ml	Gravimetric dosing module with hanging balance 1000g, weighing vessel 500 ml, lateral refill nozzle, control valve, cable
VL-MULTILAB-ABKPNK1	Automation unit with 22" user terminal and LABVIPBAT and MULTIBATCH software package, 100 data points for 1 MultiLab unit with 2 gravimetric dosing circuits, vacuum control, inerting, distillation/rectification
VL-MULTILAB-ABKPNK2	Automation unit with 22" user terminal and LABVIPBAT and MULTIBATCH software package, 100 data points for 2 MultiLab units with 2 gravimetric dosing circuits each, vacuum control, inerting, distillation/rectification
VL-MULTILAB-ABKPNK4	Automation unit with 22" user terminal and LABVIPBAT and MULTIBATCH software package, 180 data points for 4 MultiLab units with 2 gravimetric dosing circuits each, vacuum control, inerting, distillation/rectification
VL-MULTILAB-ABKPNK6	Automation unit with 22" user terminal and LABVIPBAT and MULTIBATCH software package, 300 data points for 6 MultiLab units with 2 gravimetric dosing circuits each, vacuum control, inerting, distillation/rectification
VL-MULTILAB-ABKPNK8	Automation unit with 22" user terminal and LABVIPBAT and MULTIBATCH software package, 560 data points for 8 MultiLab units with 2 gravimetric dosing circuits each, vacuum control, inerting, distillation/rectification

The VL-MULTILAB-ABKPNK automation unit is a complete set of Windows XP or Vista operating system, installed LabVision software package and an uninterruptable power supply.

The automation unit can be built individually from our LabManager-, UI- and LabVision program.

Further extensions:

Solid dosing (SoliDos), gas dosing, volumetric dosing (LabDos) pH- a. redox measurement (pHAmp) and controlling, clouding measurement, phase separation (PhaSep), autosampling device (AutoSam) and other hard- and software options from our LabKit and LabVision program.

Recommended software package at individual selection:

Order Code	Description
SL-LABVIPBAT	Standard package "Batch" for LabManager1
SL-MULTIBATCH	HiBatch extension for parallel synthesis

Recommended datapoint modules: 50 per MultiLab unit.

Recommended PI-modules

Recommended controller amount: 4 per MultiLab unit

Order Code	Description
SF-PID4	Controller module with 4 PID- and application oriented controllers

Should you have any queries, our sales experts will gladly help you!

MiniLab™ mini reactor system

The HiTec Zang MiniLab parallel reactor system distinguishes itself by its particularly small „foot-print“. It offers high-performance at minimal required space and best reproducibility due to automatic operation mode.



MiniLab-Module with GraviDos Liquid Doser and ViskoPakt-MINI stirring drives.

The downsizing of reactor mixtures offers the opportunity to accelerate development processes by parallel operation of experiments. At the same time, precious reactants and expensive laboratory space are saved. Very small mixtures can however be a problem in regard to reproducibility. For this reason, volumes of 75-250 ml are ideal for initial optimisations.



MiniLab is based on a compact heating/cooling system. Unlike conventional hot plates, the tempering plate is also able to cool. The low thermal mass makes quick temperature changes possible. In the course of this, several stations can be supplied with cooling agent by one common cryostat. Reactors with different reaction volumes can be used in any combination.

MiniLab is suitable for all common processes:

- Synthesis
- Polymerisation
- Distillation
- Extraction
- Solidification etc.

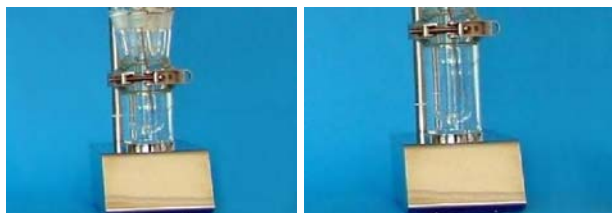
Features

- **Particularly favourable geometry for dipping sensors**
- **Individual temperature control for each individual reactor with only one cryostat**
- **Reactor size optional 75, 125, or 250 ml**
- **Low expenditure of reactants**
- **Multiple upgrading possibilities**
- **Can also be used as Single Reactor System**
- **High-capacity and easy to handle automation**
- **Mini reactor systems controlled by a single PC with a LabManager, LabVision, and HiBatch multi recipe control**
- **Fully-automated control of reactor conditions like feed rates, temperature, pressure, pH, and agitation**
- **Multiple dosing options (liquid, solid and gaseous, gravimetric and volumetric)**
- **Automated sampling options**
- **Easy and fast handling**
- **Inert construction materials: Glass, PTFE**
- **Proprietary groundbreaking tempering system enables unhindered sight into the reactor**
- **Modular compact design**
- **Individually expandable and upgradeable**

The exchangeable reactor of the MiniLab enables fast reaction to changing requirements. The unique and innovative heating/cooling system offers essential benefits. The glass is situated on a heating/cooling plate. The same is electrically heated or cooled by a flow of cooling liquid out of a reservoir.

Modular and flexible

MiniLab is a miniaturised fully-automated laboratory reactor system. Every process which is normally conducted in a reactor with greater volume can also run in the 75 to 250 ml reactors of the MiniLab under realistic conditions; fully automated and individually controlled for each reactor by the leading laboratory automation software LabVision and HiBatch.



125 ml Reaktor

250 ml Reaktor

MiniLab is available in a great variety reaching from the manually operated basis version to the individually configurable fully-automated multi-reactor system.

Even complex operating sequences with reactant pre-treatment, synthesis, reaction monitoring, and product finishing treatment, as well as sample drawing, are possible.

Module Description

Module	Basic Unit Equipment (common components of all reactors, only one necessary per Parallel Reactor System)	Components per Reactor (if necessary, one unit required for each unit)	Alternatives (other or expanded properties or specifications)
Basic Module		Tempering unit, rack, reactor 75...250 ml, seal ring Silicon/FEP clad, high-grade steel quick release fastener, high-grade steel cover, 1 x NS29, 5 x NS19 stirrer drive of Mini-Stirrer, flexible shaft, GL25 connection, stirrer sealing, vacuum-sealed, anchor or tilted blade stirrer, max. temperature 250 °C (monitor cooling media !), min. temperature dependent of thermostat. Inside temperature sensor PT100 PTFE coated with stirrer and wiring for stirrer and thermostat.	ViscoPakt-mini-rheo35 precision measurement stirrer, magnetic stirrer closure, propeller or impeller stirrer made of high-grade steel, glass thermometer etc.
Vessel		Reactor 250 ml, DN60, borosilicate glass, sealing silicone/FEP-coated	Reactor vessels 75 ml and 125 ml with vacuum jacket for deep temperature applications
Standard Cooling Unit	Cooling thermostat -20 °C (flow temperature)		Cooling thermostat -45 °C. low temperature equipment: Cooling thermostat -83 °C, removable isolation jacket (per reactor)
Reflux Cooling	Cooling water valve Cooling water monitor	Dimroth cooler	
Distillation		Distilling bridge Pt100 for steam temperature Collecting container for distillate	Distillate weighing Additional cooler for reflux cooling

With the MiniLab parallel reactor system you can conduct experiments in parallel repeatedly in great numbers and therefore accelerate the work process significantly. This will save you time, increase the efficiency and the capacity of your laboratory.

The test conditions such as temperature, pressure, pH etc., may differ for every reactor and are simultaneously controlled in all reactors.

The vessel can be easily removed or installed after lifting up the complete top construction. Hereby, all reactor sizes can be deployed. Up to six sockets situated on the reactor cover permit flexible equipping with additional devices.

The temperature of the plate is registered and controlled. It is possible to set a limit for the temperature.

Options

- Distillation
- Rectification with Reflux Separation
- Solid Dosing
- Gaseous Dosing
- ATR-FTIR online Monitoring
- Magnet Stirrer Drive
- Automatic Sampling
- more options available upon request

Continued: MiniPlant Module Description

Module	Basic Unit Equipment (common components of all reactors, only one necessary per Parallel Reactor System)	Components per Reactor (if necessary, one unit required for each unit))	Alternatives (other or expanded properties or specifications)
Rectification		Hempel column 200 mm Micro column head according to Dr. Kaminski, magnetically actuated Pt100 column head Dimroth cooler Collecting container for distillate	Vacuum jacket Distillate weighing Pt100 in column Vigreux column Filling material/Packages
Vacuum	Chemical-resistant vacuum pump	Vacuum regulating valve Pressure sensor 0-1,6 bar Pressure relief valve	Stronger vacuum pump
Inerting	Pressure regulator 16 bar to 0-1 bar	Inerting valve, pressure relief valve 1,3 bar	
Gravimetric Dosing		Hanging scales Grado1000 Weighing container 250 ml, lateral refilling feed pipe Regulating valve	Automatic refill Mounting panel for LabManager (useful in case of more than 3 modules) Other container sizes
Volumetric Dosing		Peristaltic pump	Diaphragm, piston pumps, etc.
Solid Dosing		Solid doser SoliDos connection socket on to NS19	Inerting connection Inert gas heating
pH Measurement		PH gel electrode pH 0-14 lead-through 12 mm measuring amplifier pH	Cover with special sensor socket
Redox Potential		Redox-electrode reference electrode lead-through 12 mm measuring amplifier MA	Cover with special sensor socket (necessary at anchor stirrer!)
Reaction Calorimetry		Reactor with vacuum jacket Calorimetry evaluation module	
Gas Dosing	Pressure regulator 16 bar to 0-1 bar	Mass flow regulator Pressure relief valve 1,3 bar	

Order Code	Description
VL-MINILAB-BU	MiniLab multi reactor base module with tempering and stirrer unit and cover
IR-VIPA-MINI-RHEO-35	ViscoPakt-rheo stirrer drive, 35 Ncm
VL-MINILAB-GRV75	MiniLab reactor vessel 75 ml, DN60, borosilicate glass, gasket silicone/FEP covered
VL-MINILAB-GRV125	MiniLab reactor vessel 125 ml, DN60, borosilicate glass, gasket silicone/FEP covered
VL-MINILAB-GRV250	MiniLab reactor vessel 250 ml, DN60, borosilicate glass, gasket silicone/FEP covered

Further extensions:

MiniLab can be extended with MultiLab system modules. There you will find suitable dosing systems, automation hard- and software, user interfaces and thermostats.

Should you have any queries, our sales experts will gladly help you!

LabKit™- Small Reactor Systems for Education



Since 2002, laboratory automation, process control technology, and the basis operations of chemical-process engineering are included in the examination-relevant curriculum of chemical technicians and laboratory assistants. These topics should also not be omitted in the vocational training for chemists and process technicians. HiTec Zang systems are already being used by numerous institutions for training, because they can be comprehended quickly.

With LabKit-ed the substantial topics of modern laboratory practice can be conveyed, e.g.:

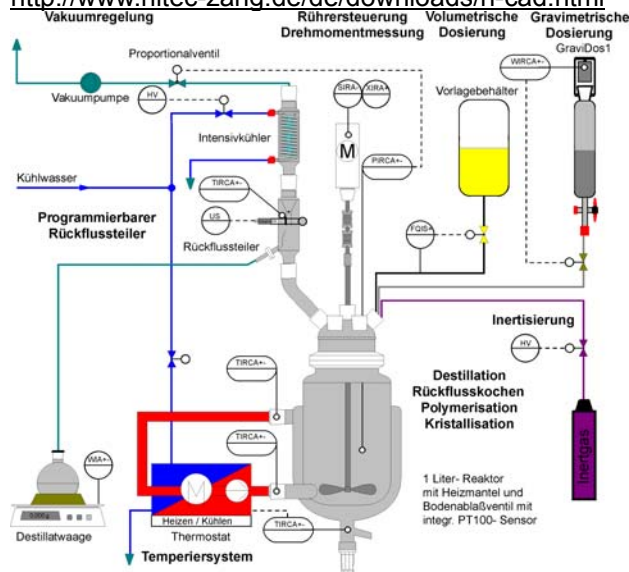
- Chemical Process Engineering, Basis Operations
- Control (monitoring, regulation)
- Process Measuring and Control
- Automation, Basic Functions
- Batch, Semi-Batch and continuous Processes
- Reaction Calorimetry
- Recipe Control

The system already becomes active at the planning stage. The P&ID editor supports the standard-conform establishment of P&ID flow diagrams in accordance with EN ISO 10628 (DIN28004) which are initially marked with the process and measuring control identifications according to DIN/EN19227.

Specification

Rack	anodised aluminium rack
Reactor	<ul style="list-style-type: none"> - 1 glass Reactor DN100 with heating jacket and base discharge valve with integrated Pt 100 sensor manual - Glass cover with FEP-O-Ring silicone core - Stirrer shaft lead-through vacuum for 10 mm shaft, NS29 - 2 tube connections for thermostats DN15 on to M16*1 with integrated Pt100-sensor - 1 glass propeller stirrer
GraviDos (Gravimetric Dosing System)	1 GraviDos dosing System: the system consists of a glass storage container, which is suspended on a weighing system. The weight difference is registered and then the discharge regulated via valve. The system disposes of an integrated 1000 g load cell, a 500 ml receiver tank, and a 2/2-way valve.
Stirrer	<ul style="list-style-type: none"> - 1 ViskoPakt torque stirrer, max. torque: 27 Ncm Dissolution: 0.07 Ncm, reproducibility: 1.5 Ncm, min. rotational speed: 150 rpm, max. rotational speed: 2000 rpm, standard stirrer lead-through (max 800 rpm).

A free version of RI-CAD, restricted to training purposes, can be requested on our website under: <http://www.hitec-zang.de/de/downloads/ri-cad.html>



The P&ID flow sheet can be used later as the background picture for the displaying of control pictures (process pictures).

In addition, the measurement and control system plan (MSR) and the circuit diagrams can be established with the same editor. It must be emphasised that the system is easy to comprehend and the handling can be comprehended in a very short period of time.

The system is structured on a modular basis and can be adapted according to your special requests.

With the optional Simulation Module, applications can be developed and pre-tested offline.

We also train teachers in these fields of expertise. We will gladly forward you our proven teaching material (introduction manuals, exercises with solutions)!

In case of interest, please ask us for further information on LabKit-ed.

Tempering System	<ul style="list-style-type: none"> - 1 circulation thermostat: with water pipes cooling coil, temperature range: 35..200 °C, heating output: 2000 W, bath content: 3 litres, control via RS232, - 2 isolated metal tubes for thermostats, 150 cm - 1 2/2- way valve for cooling water supply to the thermostat
Inerting	<ul style="list-style-type: none"> - 1 binary valve for inert gas pipe - 1 pressure regulator from max. 16 bar suction pressure to 0.1..1 bar
Venting/Deairing	<ul style="list-style-type: none"> - 1 dead open binary valve - 1 Relief valve 0.1 bar made of glass for NS 29/32
Instruments	All sensors/actors including necessary fixtures and cables for connection to the HiTec PI.
Automation	<p>LabBox2-complete unit with integrated 24 V 1 A power supply sensors and and 24 V 3 A power supply for actors.</p> <p>HiTec display and operation component including uninterrupted power supply and Power-Management-System for HiTec Zang PIs CG-ABK1.</p> <p>20" TFT Monitor.</p> <p>LabVision software package for training purposes with the following equipment: basic package with 300 data points, HiText – multitasking control and online evaluation, HiBatch Recipe Control, dialogue and protocol templates, online graphics, analogue chart recorder, event plotter, phase plotter, monitoring and messaging, Designer, P&ID-Editor, graphics library, data export, access monitoring and user administration, controller module with 4 P-, PI-, PID-, PD- or pH controller, NAMUR driver for serial interfaces, basic operations: charging, tempering, stirring, dosing, inerting, wait, start, stop.</p>
Simulation	<p>LabVision-ed simulation version for training (VL-EDSIM) enables learning and training of automation technology and the process control by merely using a PC without PI and plant. It contains all essential LabVision modules, such as recipe control according to IEC and NAMUR, process visualisation, monitoring and messaging, online evaluation, etc.</p> <p>Basic operations such as dosing, temperature ramping, pressure and vacuum control, pH control, etc., can be established and tested. In order to avoid unnecessary waiting periods, the process simulation can be conducted in fast motion. The established applications can be transmitted to a LabKit-ed and tested under real conditions. Executable without PI under Windows 2000, XP and Vista.</p>

Optional equipment is available.

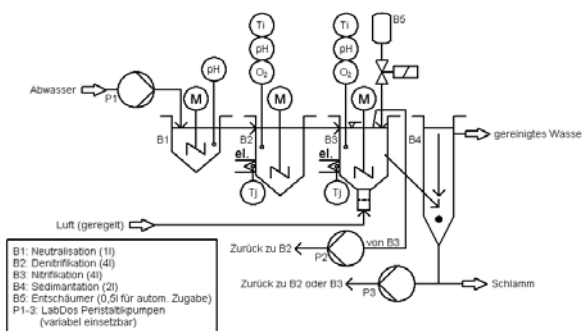
Order Code	Description
VL-LABKITED	Automatic Laboratory Reactor System for training, hard and software configuration according to table
VL-EDDEST	Expansion by distillation, reflux cooler, electronically controllable reflux separator, head temperature measurement and distillate scales, HiBatch basis operation distilling.
VL-EDDOSFL	LabKit-ed expansion by a volumetric dosing, a suspended receiver tank with a flowmeter and a pulse frequency controlled binary valve, HiBatch basis operation, volumetric dosing
VL-EDVAK	<ul style="list-style-type: none"> - vacuum control with the following components: -1 vacuum pump, flow rate: 20l/min, vacuum 100...1000 mbar absolute - activation via the power socket switched by the HiTec PI - 1 pressure sensor 0..1,6 bar absolute - HiBatch basis operation vacuum, 1 vacuum control valve , material: ETFE / Kalrez
VL-EDDOSPU	<p>Expansion of a LabKit-ed by a volumetric and gravimetric dosing with pump and scales consisting of:</p> <ul style="list-style-type: none"> - 1 scales, weighing range 3000 g, reproducibility 0.1 g, RS232 interface, - 1 magnetic diaphragm dosing pump 0.74 l/h (alternatively 1,1 or 2,1 l/h) - parts in contact with medium: PTFE - 1 dosing valve, material: ETFE, - HiBatch basis operation gravimetric dosing
VL-EDSIM	PI and process simulation package for one work station. Enables project establishment, parameterisation, programming, and simulation of the LabKit-ed without PI and plant.
VL-EDUQUIP	Case with training equipment such as Current and voltage transmitter, controlled loop simulator etc.

Further information about training systems and didactic material can be found in the chapter Services & Didactics.

Automated Laboratory Clarification Unit



The Laboratory Clarification Unit LabKit™-sp enables the systematic investigation of the biological degradability of various liquid waste content substances. It consequently provides the basis information for the establishment of strategies for liquid waste purification. The unit enables the reproduction of clarification processes of large plants on a laboratory scale. It is also possible to conduct tests regarding the determination of the biological degradability according to OECD301A.



The Unit comprises four levels:

1.) Neutralisation with automated pH-Control, with ViscoPakt Stirrer, LabDos- Pump for the Feed, Overflow to the Denitrification.

2.) Denitrification with O₂-Measurement, pH-Measurement, ViscoPakt Stirrer, Interior Temperature Control (through electrical Heating with Heating Jacket), Overflow to the Nitrification.

3.) Nitrification with O₂-Control (through regulated Air Supply via a Base Frit), pH-Measurement, ViscoPakt-Stirrer, Interior Temperature Control (through electrical Heating with Heating Jacket), Foam Identification with automated Defoamer Addition, LabDos Pump for the transporting back the sludge into the Denitrification, Outlet into the Settling Tank.

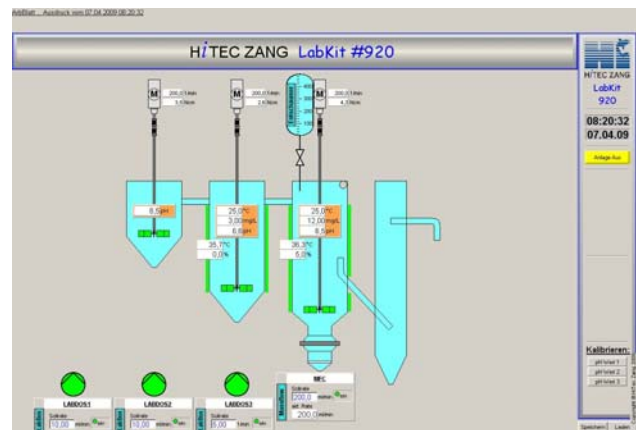
4.) Settling Tank with Overflow, Discharge Valve, LabDos Pump for the transporting back the sludge into the Denitrification.

The Laboratory Clarification Unit is fully automated with a LabBox System and LabVision. It can naturally also be run manually.

pH-Value, Temperature and Oxygen Concentration and further Measurement Variables are collected., stored in the data base and graphically presented.

The automation enables unattended operation and reproducibility at any given time.

The permanent data recording leads to a consistent documentation of all process sequences.



Neutralisation, Denitrification, Activation and Final Clarification

Pilot Clarification Units deviant from this standard laboratory clarification unit, according to your specifications, are also offered by HiTec Zang.

Order Code	Description
VL-LABKIT-SP	Automated Laboratory Clarification Unit with LabBox PI and ABK1
VL-LABKIT-SP-PHCON	Automatic pH-Control
VL-LABKIT-SP-FOCON	Automatic Defoaming Control

The plant is supplied in turnkey condition together with a LabBox2 Automation System and a ABK1 Workstation with 20" Monitor.

Modular Micro-Reaction Technology



Micro-reaction technology opens up new ways to develop novel reaction processes and to construct advanced economic chemical plants. The advantages of the continuous operation mode in micro-structures are: ultra-fast mixing, highly effective heat transfer, short and controllable residence times, low system inertia for ideal process control and high safety due to extremely low hold-up.

The basic features of the micro-reaction technology for the development of new chemical processes and the production, both in the fine and mass chemical sector, offer significant potential for innovation and amortisation. Micro-modules can also be integrated into conventional plants without any problem.

The micro-reaction technology enable to exactly control complex or critical reactions of fine chemistry (special products, agricultural and pharmaceutical chemicals), which considerably increases the operational safety of the chemical production.

Economically attractive application possibilities have also been detected for bulk chemicals and polymers.

The future technology of customised materials is not imaginable without micro-technology, as well. Micro-reactors allow the selective generation of nano-particles for micro-electronics, the development of drug delivery systems for human medicine, and the realisation of new concepts within diagnostics.

Micro-reaction modules enable basis process operations such as:

- Mixing
- Dispersing
- Gassing
- Precipitation
- Heat Exchange, etc.

HiTec Zang, in cooperation with the company Ehrfeld Mikrotechnik BTS, offers a complete package offer, which reaches from the individual module to process development and training, and as far as to engineering and the construction of ready to use fully automatic plants.

The modules can flexibly be interconnected to precisely controllable reaction plants, with which a wide range of chemical syntheses can be conducted easily, quickly and cost-effective.

The modular micro-reaction System represents an unique research and development platform for the development of new processes, both in laboratory scale and small-scale production.

In addition, high flow modules are available, which also enable the mass production of chemicals.

Dependent on the reaction conditions, these modules cover a flow rate ranging from 0.1 to 100 ml/min with the modular micro-reaction system, and up to 1000 litres/hour with the high flow modules. The modular micro-reaction system represents a unique tool for researchers out of the chemical and pharmaceutical sectors, to both develop new synthesis methods for the production of new chemical compounds and to improve existing methods.

Hereby, one significant advantage is that the step from the development into production is conducted by simple „Numbering-Up“, e.g. the parallel connection of several identical sequences, instead of the expedient „Scale-Up“ procedure.



Modular Micro-reaction System: Example for a single stage synthesis for heterogeneous conversions at solid catalysts

Special Features

- Ideal ultra-fast mixing effect
- Extremely short holding times
- Avoidance of by-products
- Robust against strong exothermal reaction
- Increased operational safety
- Minimal requirements to ambient conditions
- Without scale-up in the production scale

The Micro-reaction Technology enables to conduct single-stage and multi-stage syntheses throughout the whole range of research and development right to the production of chemical substances. Hereby, it is both possible to conduct reactions in the liquid and gas phases, as well as multi-phase in heterogeneous systems in the micro-reaction modules. In addition, there are special modules for the continuous precipitation of solids into micro-structures so that it is also possible to process liquids carrying particles.

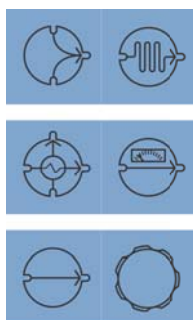
The modular micro-reaction system developed by the company BTS/Ehrfeld Micro-Technology enables the user to change the plant configuration himself. Depending on the modules, it is possible to realise pressures up to 100 bar and temperatures in the range of -20 to 200 °C. Additional modules extend this working range. The CryoReactor, for instance, enables low temperature reactions down to -100 °C.

All materials in contact with media are mainly made of stainless steels like DIN 1.4571 or 1.4401. Seals are either made of PTFE or perfluorinated elastomers, such as FFKM. Other materials like Hastelloy are available on request.

In order to run the Modular Microreaction System for laboratory-scale experiments, only some standard peripheral devices are necessary in addition. HiTec Zang will gladly assist you with advice in selecting suited devices and is able to supply individual components as well as complete ready-to-use fully-automated plants.

There are approximately 30 different modules available, e.g.:

- Mixer
- Reactors
- Heat Exchanger
- Filter
- Heating Modules
- Sensors
- Valves
- Pumps etc

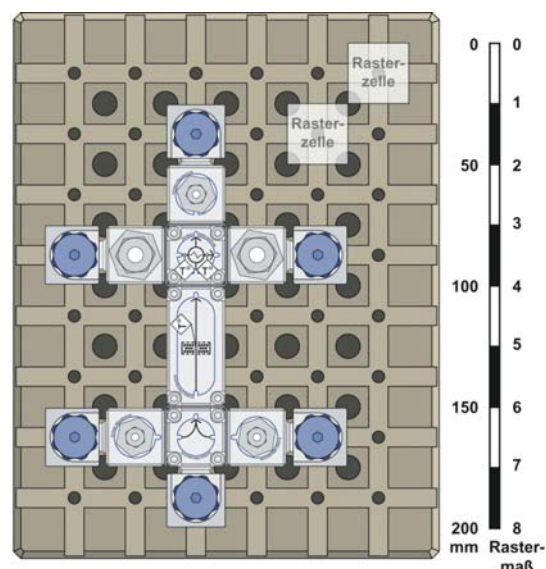


All components of the modular micro-reaction system are mounted on a base plate with a square grid. One grid cell has the a length of 25 mm. Accordingly, the smallest lateral length of a module is 25 mm, including a 1 mm strong seal disc. The height of a module depends on its specific function.

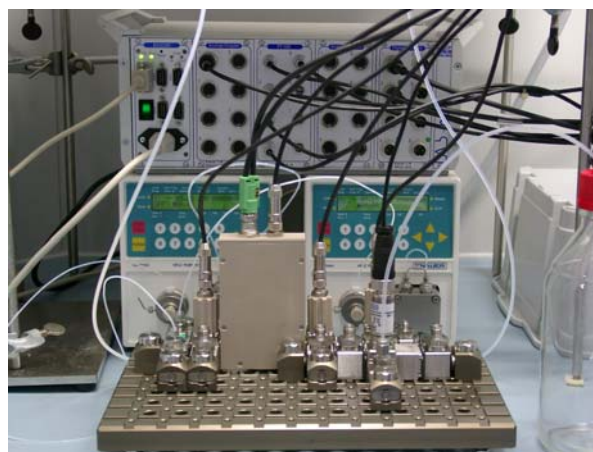
Base plates are available in the formats A3 (16x12 grid cells), A4 (12x8 grid cells) and A5 (8x6 grid cells).

Stand-alone-Module

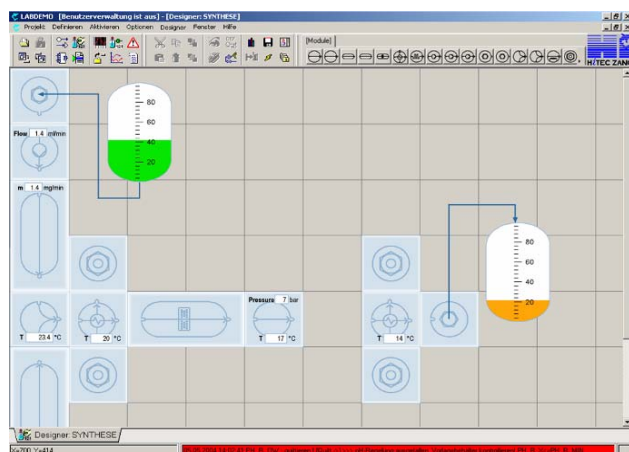
The direct connection concept of the Modular Micro-reaction System offers unique advantages. The plants can be assembled quickly and easily, and can be easily adjusted to the respective synthesis problem. Due to the consistent waiving of tube connections and screwings between the individual modules, dead storage is reduced to a minimum.



In spite of this, reactors or heat exchangers can be connected to an already existing periphery as stand-alone modules with 1/8" Swagelok fittings. The high flow modules with 1/8" Swagelok fittings are also available in such a version.



The Automation Technology




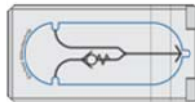


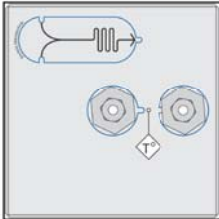
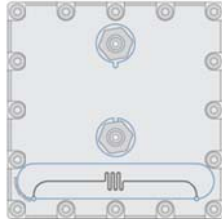


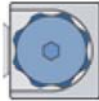
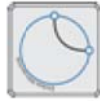


The LabManager/LabVision-System, with a special operating interface module (Ehrfeld BTS or Syntics), is very well-suited for micro-reaction plants. You can find further details on this topic in the chapter „Laboratory Automation Software“.

In combination with our Liquid-Handling-Systems, it is possible to establish fully-automated screening equipment. Samples are provided program-controlled. Test parameters are set according to plan and test samples are filled.

Would you like to know more about the possibilities of this fascinating technology?

Just give us a phone call. We will gladly advise you!

Description	Symbol	Description	Symbol
In-/Output 1/16"		Coaxial Heat Exchanger	
In-/Output 1/4"		Valve-assisted Mixer	
Heater Module		T-Sensor Device	
CryoReactor		Meander Reactor	
LH 25 Mixer HC276		Connectors 180°	
Clamping Device		Connectors 90°	

Note

Suitable **pumps** can be found in the chapter Dosing Systems and Pumps.

Suitable **sensors**, eg. low dead space pressure receivers can be found in the chapter Process Analytics and Sensors.

- Formulating Stations
- Customer specific plant
- Component for reaction calorimeters

can be found in the chapter Construction and Miniplant Technology

Reactant mixing pumps can be found in the chapter Dosing Systems and Pumps.