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# Process and Chemical Engineering

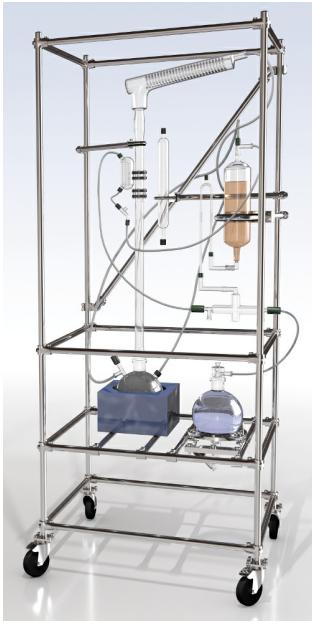
## Process Trainers with digital controllers



### **Process Trainers with digital controllers**

Teach a basic understanding of process engineering using our process training systems. The four essential processes of *batch distillation*, *solid-liquid extraction*, *batch reaction* and *absorption* can be conveyed in clear and educationally logical fashion with the help of our Industrial Process Trainers (IPT).

## IPT 22 Extraction liquid/solid



### IPT 22 Extraction liquid/solid

Solid-liquid extraction is a physical separating method to dissolve a valuable substance out of a solid substance with the help of a suitable solvent. In many processes, the solubility is improved by increasing the temperature of the process. The solvent is prepared in such a way that the valuable substance is concentrated and the solvent itself can be fed back into the process.

The basics of this process can be clearly demonstrated using the process trainer ***IPT 22 Solid/liquid extraction*** and users can work through the technique themselves in a way that closely mirrors industrial practice. The use of high-quality, industrial borosilicate glass 3.3, such as that used in the chemical industry, also offers the users an inimitable visual experience. The overall package is rounded off with an interactive e-learning course.

#### Education objectives:

- Overflow-, Soxhlet- and Pass-through-Extraction
- Hot- and Cold-Extraction
- Integrated Solvent Recovery (Distillation)

Basic equipment set, consisting of:

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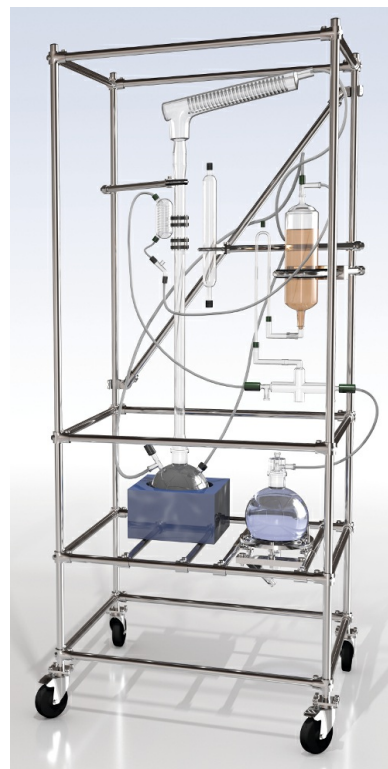
Pos.	Product name	Bestell-Nr.	Anz.
1	IPT22 Extraction, liquid/solid	LM3220	1

**Apparatus:**

- Extraction column DN50, with manual Reflux divider, filled with glass Raschig Rings 8 mm
- Extraction vessel with removable glass basket
- Evaporator vessel 6 l
- Collection vessel 6 l
- Heating mantle with stainless steel mantle 1.5 kW, 2 Heating circles
- Condenser 0.3 m<sup>2</sup>
- Product cooler 0.03 m<sup>2</sup>
- 5 Temperature sensors Pt100, 1 separate Temperature display, 2 temperature display at the temperature controller

**Dimensions:**

height x width x depth: 2500 x 1130 x 900 mm



Media:



Pos.	Product name	Bestell-Nr.	Anz.
2	Interactive Lab Assistant: solid/liquid extraction	SO2806-1D	1

Multimedia experiment software with instructions and documentation for the process trainer "Extraction solid/liquid".



## Additionally recommended

Pos.	Product name	Bestell-Nr.	Anz.
3	Lab table SybaPro, 1600x800x760mm, Process and chemical engineering	ST8031-1Q	1

It is an exemplary equipment. We manufacture your laboratory according to your wishes and requirements!

### Laboratory bench

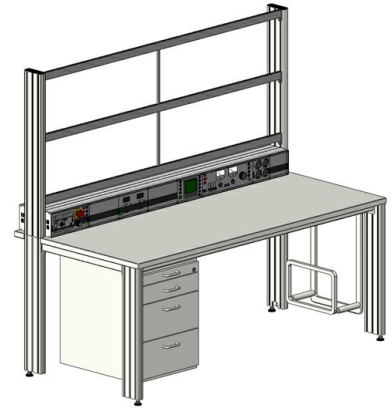
Highly-compressed 30mm-thick multi-layered fine chipboard conforming to German Industrial Standard (DIN) EN 438-1

- Colour grey RAL 7035, slightly textured 0.8mm-thick coating on both sides conforming to German Industrial Standard (DIN) 16926
- The border of the table top is a solid, impact-resistant protective trim made of 3mm-thick grey RAL 7047 coloured plastic
- The coating is resistant to a wide variety of chemicals and reagents such as dilute acid and alkaline solutions. Furthermore it is heat resistant even to liquid solder or the hot spots resulting from soldering irons and lit cigarettes, for example.
- Sturdy, continuous rectangular-tube frame with all necessary slots for fitting table legs and under-table cabinets, with approx. 0.8µm-thick acid-resistant epoxy resin coating
- 2 table legs, extruded aluminium profile, 705mm
- 2 table legs, extruded aluminium profile, 730mm
- 8 identical grooves in the extruded aluminium profile (3 grooves on each broad side and 1 on each narrow side)
- Grooves for mounting standard industrial brackets
- Two separate internal cable channels for wiring
- Integrated height-adjustable feet to compensate for uneven flooring
- Height of table top: 750mm
- Dimensions 1600 x 800 x 750mm (WxDxH)

#### Utensil drawer

- 3 drawers 2 HU
- 1 drawer 4 HU
- Usable width 330mm, Usable depth: 480mm
- Central locking
- Metal drawers with surrounding row of slots
- Body made of 19mm-thick, highly-compressed, multi-layered fine chipboard with grade E1 plastic coating on both sides
- Dimensions: 430 x 588 x 560mm (WxHxD)

#### Power ducting



for 1600-mm wide SybaPRO tables to accommodate 19", 3-HU inserts and panels

- To accommodate up to 25 x 12-PU (294 PU) 3-HU modules
- Can be fitted as console or as table-top ducts
- Pre-wired with power supply bus system for 3 HU inserts or panels
- Terminal strips for connection to existing power supply
- Base and lid made of anodised E6/EV1 extruded aluminium profiles
- Sides made of painted sheet steel (colour (RAL7047)
- High power quick-release IP20 safety plugs conforming to DIN EN 61984:2009
- External dimensions: 1530 x 133 x 230mm (WxHxD)

### Exemplary equipment for the power ducting

- 230V/50Hz AC power supply insert for supply of power and fuse protection
- socket panel unit 5x230V
- socket unit 2x 230V/16A for supplying power to computer equipment
- RJ45 patch panel for networking PCs
- Multimedia terminal panel insert for PC

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#### 4 FL1703 Recirculating Cooler

LM3920

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### Recirculating Cooler/Chiller for environmentally friendly cooling

The FL series offers a new generation of chillers for routine cooling applications within the laboratory and industry. The temperature stability of the PID control is  $\pm 0.5^{\circ}\text{C}$ . All units can easily be cleaned and are provided with a splash water proof keypad with LED temperature indication. On the front of the units there is an RS232 interface as well as an alarm shutdown. The filling port is easily accessible placed on the top under a lift-up cover. Another hinged tray serves as a file for the operating manual or other documents concerning the installation. The removable venting grid allows an easy cleaning of the condenser, the drain tap is easily accessible behind the grid. All models include an easily visible level indication. Another advantage is the venting slots are on the front and rear and therefore the units can be placed directly one beside the other (space saving).

#### Your advantages

- Ergonomic design and easy operation
- Splash-proof keypad with integrated mains switch
- Large, bright LED display
- Reliable Microprocessor PID temperature control
- Filling level indicator
- Powerful immersion pumps, suitable for continuous operation
- Permissible temperature in return line  $+80^{\circ}\text{C}$



- Easy filling from the top with hinged protective lid
- Low liquid level protection with optical and audible alarm signal
- Integrated stainless steel bath tanks
- Removable venting grid for cleaning of the condenser
- Front drain
- No side vents
- RS232 interface for PC-connection
- IP class according to IEC 60529: 21
- Alarm output, potential-free change-over contact (max. 30 VA)
- Pressure Indicator
- By-pass valve to adjust pump pressure

#### Technical Data

- Working temperature range (°C): -20 ... +40
- Temperature stability (°C): ±0.5
- Setting / display resolution: 0.1 °C
- Temperature Display: LED
- Cooling capacity (Medium Ethanol) °C / kW :  
20/1.7; 10/1.4; 10/1.4; 0/1; -10/0.75, -20/0.3
- Pump capacity flow rate (l/min): 40
- Pump capacity flow pressure (bar): 0.5-3.0
- Pump connections: G3/4"
- Barbed fittings diameter (inner dia. / mm): 3/4"
- Filling volume (liters): 12 ... 17
- Refrigerant: R404A
- Digital interfaces: RS232, Optional Profibus
- Ambient temperature: 5...40 °C
- Dimensions W x L x H (cm): 50 x 76 x 64
- Weight (kg): 91
- Suitable fluids: water, water-glycol mixture, JULABO Thermal bath fluids
- Included with each unit: 2 barbed fittings for tubing 3/4" inner dia. (pump connections G3/4" male)
- Cooling of compressor: Air