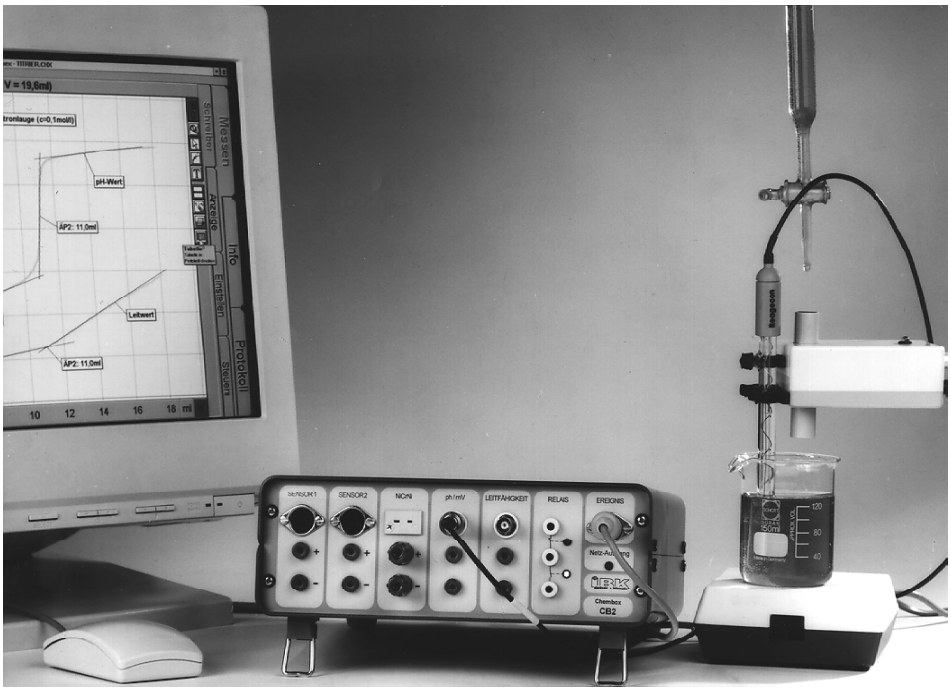
## Chembox / Chemex

# Chemistry
# Teaching and experimental system

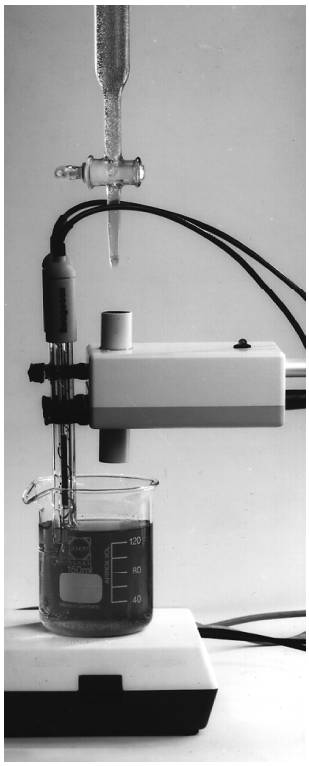
Using external sensors to collect the data, the universal interface Chembox CB2 converts analog and digital input signals to computer language for the PC. It operates exclusively in dialog mode. The Chemex CE1 processing software displays the information on the PC screen in easily understood numeric tables, graphs, diagrams, etc. With a single key stroke, results of an experiment may be copied to a word processing document, additional information may be added, and the document may be printed on any PC printer. Both the experienced and the inexperienced user will appreciate the graphic screens and on-line help which provide quick and easy operations in educational and industrial production enviroments.
With low cost and high performance, Chembox is the preferred tool for chemical applications of data collection.

- Connection to a serial interface does not require PC modification.
- Electronically and mechanically robust with metal case.
- Five independent devices combined into a single unit
- Operator-friendly software with Windows* user interface.
- Operation as x/y or y/t recorder.
- Automatic plotting of titration curves
- PC-autocalibration




*Computers are now an indispensable tool in all business environments, compelling young students to become familiar with the PC and its various applications. In cooperation with educators, IBK has developed a computer system with software and sensor technology for chemistry and related educational branches.*

# Chembox



***Titration by dropper***

*Sensor technology:*
*Dropper Type: DTZ*
*pH probe Type: DPH*
*Conductivity probe Type: DLS*

## Input and output specifications

### Input: Sensor (2x)

| | |
|---|---|
| Measuring range | 8 measuring ranges from 0 to 0.25/0.5/1/2/4/8/16 and 32V |
| Measuring range switching | automatically (autoranging) |
| Resolution | 10 bits |
| Scanning rate | 0 ... 50Hz (with Chemex) |
| Calibration | Zero point and amplification - through PC autocalibration |
| Differential measurement | potential-free |
| - Common-mode voltage | 0 ... ± 40V |
| - Common-mode rejection | 70 dB DC |
| - Input resistance | 300 kΩ |
| Input - intelligent sensors | 7-pole DIN female connector (analog input, 0V - GND; ±15V; clock signal; digital input/output - bidirectional TTL); |
| Analog input | 2 banana female connectors, parallel to analog input in 7-pole DIN |

### Input: NiCrNi

| | |
|---|---|
| Measuring range 1 | -58°F (-50°C)..... +212°F (+100°C) - resolution 0.36°F (0.2°C) |
| Measuring range 2 | -58°F (50°C )..... +1768°F (1000°C) - resolution 3.6°F (2.0°C) |
| Characteristic curve correction | Type K |
| Calibration | Zero point and slope - through PC autocalibration |
| Input connectors | Thermocouple connector type K and 2 banana connectors (+/-) for wire element connection (parallel) |

### Input: pH/mV

| | |
|---|---|
| Measuring range 1 | 0 ... ±600mV-resolution: 1mV / 0 to 14pH -resolution 0.02pH |
| Measuring range 2 | 0 ... ±6V -resolution:10mV |
| Input resistance | > 1 TW |
| Input bias current | < 1 pA |
| Calibration | Zero point and slope - through PC autocalibration |
| Input connectors | 1 BNC female connector and 2 banana female connectors (parallel) |

### Input: Conductivity

| | |
|---|---|
| Measuring range | 16 measurement ranges: 5/10/20/50/100/200/500 µS<br>1/2/5/10/20/50/100/200/500 mS |
| Measuring range switching | automatic (autoranging) |
| Measuring method | Two-pulse measuring method (small charge consumption) |
| Scanning rate | 0....50Hz under Chemex |
| Calibration | Zero point and slope - through PC autocalibration |
| Input connectors | 1 BNC female connector amd 2 banana female connectors (parallel) |

### Input: Event

| | |
|---|---|
| Input | Absolute pulse counting (Dropper) and pulses/time unit |
| Trigger level | TTL and CMOS |
| Input - intelligent sensors | see sensor input |

### Output: Relay

| | |
|---|---|
| Contacts | 1x NC, 1x NO (switching relay) |
| Load rating | 5A / 42V |
| Status display | 2 LEDs |
| Connectors | 3 banana female connectors |

### Output: Power relay

| | |
|---|---|
| Load rating | 5A / 230V - 1100VA |
| Status display | Front panel LED |
| Output | Socket with ground, protective cover, miniature fuse 6.3AT on the rear of the device, software-controlled ON indication through front panel LED |
| Status display | ON indication through front panel LED |

### PC coupling

| | |
|---|---|
| Interface type | Serial, 19200 Baud |
| connection | PC-compatible, 25-pole Sub D connector |

### General

| | |
|---|---|
| Power supply connection | 230V ± 10%, 47...63Hz, 35VA, inlet connector for non-heating apparatus with fuse |
| Ambient temperature | +32°F to +104°F (0°C to +40°C) |

# Chemex

## Data Collection-/Experimental Software - Chemex

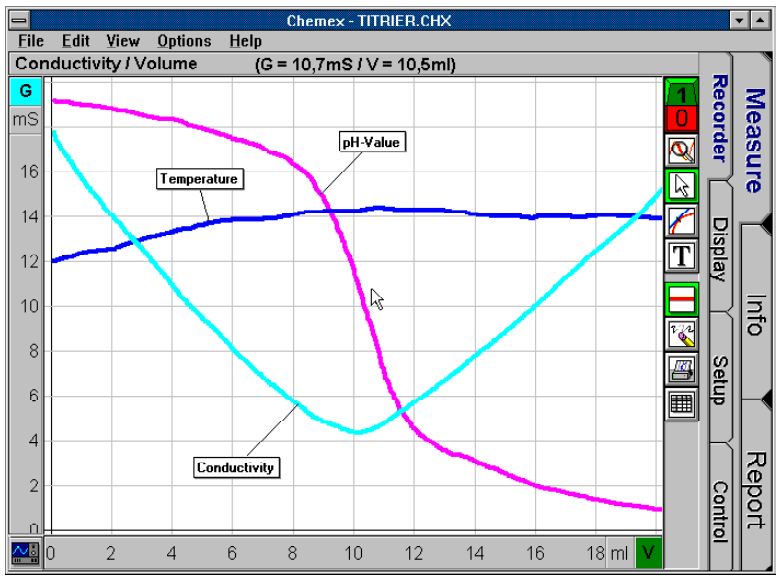
Chemex is a Windows-compatible data collection, measuring and control software used in schools and laboratories, for chemical, pharmaceutical, biological and medical applications. This simple graphics interface with active guidance allows easy operation, even by the inexperienced user. A quick double-click of the mouse on the Chemex symbol starts your program. A measuring group, an information group, and a documentation group of options are available. The measuring group contains the functions required for capturing, recording, and processing signals: recorder, digital and analog displays, as well as signal linking and control/regulation. The information group contains useful hints on preparation and structure, as well as processing and interpretation (images and texts) of a specific experiment. You may automatically add any data, curves and displays to the documentation group. Results may be displayed on the screen or output to a printer. All specific functions are independent of each other. While you are viewing the displays, the recorder is updated and the control tasks are executed in the background. For conversion, logic operations, linearization, and calibration, the signals may be processed with the signal linking function by means of mathematical formulas. Experimental configurations may be stored for later use, providing simple recall for evaluation or continuation of a project. As a special service, IBK offers fully prepared chemistry experiments on disc.

### Calibration

Calibration of the entire measuring chain enables this system to perform highly accurate measurements. Calibration data is stored with the experiment. In future experiments the system returns to this data, avoiding new calibration.

### Recorder

The Chemex recorder is an universal recorder which can be operated in x/y and y/t mode. The user selects between 8 measured values captured by Chembox or assigns calculated values to the axes - for example pH value, conductivity and temperature as a function of the volume added - as represented on the left diagram. Measurement ranges can be modified during the recording operation, and zero point can be shifted by displacing the scale, all just by clicking with the mouse.
The tools, located on the right, enable measurement series curves to be further processed, supplied with straight lines, and stored. By means of the documentation group, the information may then be displayed in curve or table format and printed.



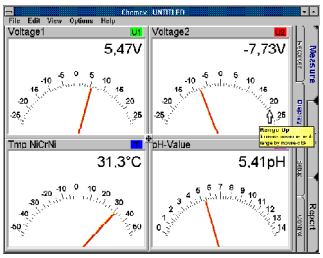

***Chemex interface***

*The index tab system is clear and ensures a simple, uncomplicated and error-free operation, even to the inexperienced user. The vertical toolbar shows additional functions: zoom, straight line, lettering etc.*

# Chembox / Chemex

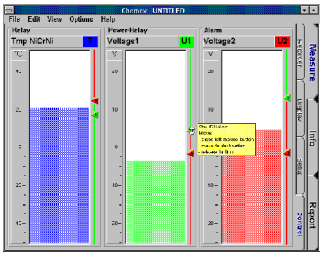
## Experimental Software - Chemex

### Display



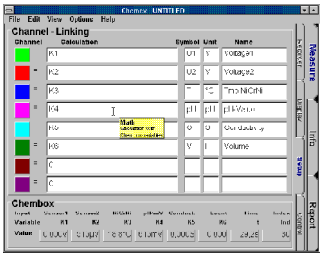

Chemex offers the user up to four display tool windows, which may all be varied in size. The measured or calculated values can be represented on an analog pointer instrument and/or on a digital display.

### Control



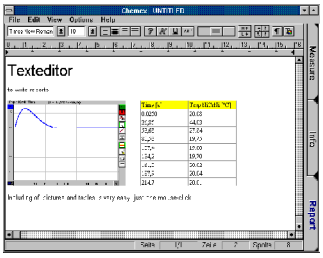
The Chemex control component allows the user to perform regulation and control operations by means of the Chembox. For example, the user can specify temperature threshold values in order to switch an immersion heater on and off, output a warning on the PC, etc.

### Signal linking



Chemex allows measured values captured by Chembox to be converted by mathematical formulas. Measured values can be displayed on screen in either their original or converted form.

### Information




The information group provides useful general information for implementation of an experiment. Using photo CD's, scanners, graphic programs, and text processing programs, important information may be added by the instructor at any time, including information such as illustration of required chemicals and dose, operating instructions and processes, texts and images of usual formats (BMP, PCX, GIF, TIFF, TARGA, WMF) etc. The Chemex-integrated word process module simplifies entry of the information.

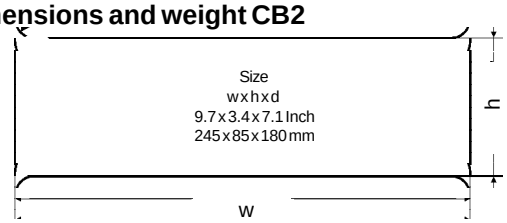
*) *Windows is a software product of Microsoft.*

## General specifications

### System requirements

Hardware: PC 486DX and up with serial interface
Software: Windows* 3.1 and later

### Dimensions and weight CB2




Weight: approx. 7.7 lb. (3.5 kg)

### Order code

| | |
|---|---|
| CB2 | Chembox Universal Interface |
| CE1 | Chemex Experimental Software |

### Schedule of parts (standard version)

Operating instruction for CB2 and CE1
Power cable, serial PC connection cable with 9/25 pole adapter.

### Special accessories

| | |
|---|---|
| CB-TB | Transport handle with 30° knurling for Chembox |
| DTZ | Dropper for volume measurements with probe fixture |
| DTF | Temperature sensor in 8mm glass tube |
| DPH | pH probe |
| DRS | Redox probe |
| DLS | Conductivity probe |
| CHV1 | Experiments CHEMISTRY 1 |

*For other sensors, see sensor data sheet!*

### Order address

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8.95 hp Data are subject to changes without notice. Errors excepted