labworld*soft*® manual V 4.5

http://www.ika.de

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General information, starting and exiting program

The labworldsoft program is operated with the mouse or the keyboard in the same manner as all Windows applications.

If labworldsoft is to be started whenever Windows is started, then copy or drag the "labworldsoft " application icon into the "Auto start" window.

Close other programs running in the background so that labworldsoft can function without sacrificing speed during operation.

Starting program

- Proceed as follows:

1. Switch on the connected laboratory instruments.
2. Switch on the computer.
3. Start Windows.
4. Start the program by double clicking on the **labworld*soft*** application symbol.
   After the opening screen, which appears for approx. 5 seconds, the main application window of the **labworld*soft*** program appears.

Exiting program

- Proceed as follows:

- Press the key combination "Alt" + "F4" or
- Select the "Exit" command in the File menu (menu bar) or
- Double click on the system control menu box in the upper left-hand corner of the main application window.
-
- After carrying out one of the above possibilities, the program can be exited properly. An on-going measurement is ended and the current setting is saved in the file *.ini. Following a new start, the last valid parameters are available again.
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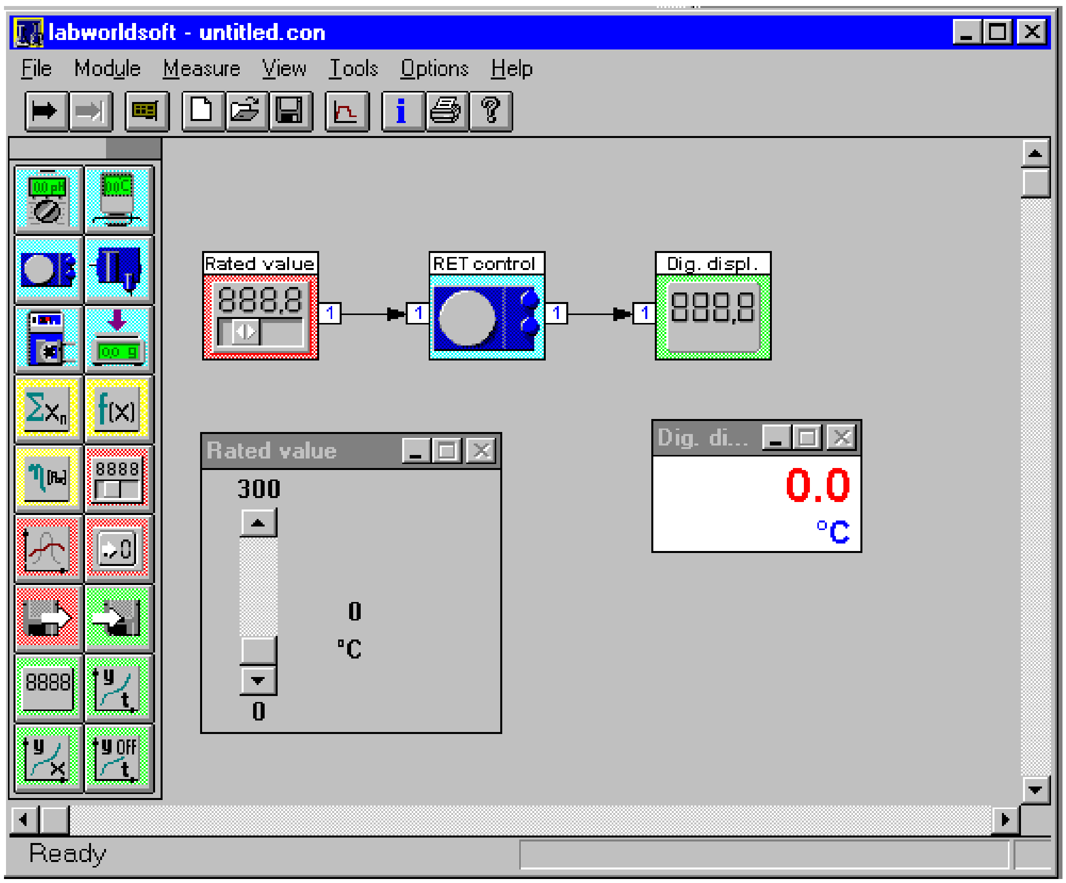
labworldsoft main application window

After starting the program the main application window always appears. It contains both standardized Windows operating elements (menu bar, icon bar) and the labworldsoft -specific elements, such as the tool bar and the working area. The working area is initially empty and is used to display the signal flow chart , which can be generated in accordance with your requirements.



Header bar

The header bar contains the name of the program " labworldsoft " and any application which may be loaded. When User Management is activated the group assignment for the current user is displayed here. After the program is started, "Untitled" generally appears (application without a name).

As long as the user works in the main application window, the header bar is highlighted in color. After opening another application window, the highlighting color changes.

Control menu

The control menu generally contains Windows commands for managing the window.
After double clicking on the control menu box, the window is closed and the labworldsoft program exited.

"Minimize" action button

For reducing the window to an icon.

"Maximize" action button

For increasing the window to its maximum size.

Menu bar and pulldown menus

The menu bar offers alternative setting possibilities for the tool bar and icon bar and makes additional functions available via the pulldown menus:

File	For managing the configuration files (signal flow charts)
Laboratory Instruments	For selecting the Laboratory Instruments (alternative setting possibilities to the tool bar)
Module	For selecting the functional units (alternative setting possibilities to the tool bar)
Measure	For controlling the measurement sequence
View	For displaying or concealing the icon bar and status display
Tools	For defining the ramp function for the control unit concerned
Options	For user-specific design of the operating interface, coloration etc.
Help	For opening the online help

Selecting a menu item

- Proceed as follows:

with the mouse

1. Click on the menu that contains the desired command.
   A pulldown menu opens.
2. Click on the desired command.
3. with the keyboard

1. Activate the menu bar with the "Alt" key.
2. To select the pulldown menu, use the "arrow right/left" keys.
3. To select a command, use the "arrow up/down" keys.
4. Press the "Enter" key

   or

1. Activate the menu bar with the "Alt" key.
2. Press the key of the underlined letter of the menu you want to select.
3. Press the key of the underlined letter of the command you want to select.

Icon bar

The icon bar contains a number of action buttons (Windows standard symbols) for direct selection of the following functions:

- Start or stopp measurement,
- Configure interface card ,
- Create, open or store configuration file ,
- Define ramp function ,
- Enter file information ,
- Print signal flow chart,
- Display info on **labworld*soft***.

Note:

- The functions can also be set with the menu bar .
- The icon bar can be displayed and concealed by clicking on **Function bar** in the "View" pulldown menu (marked with check mark).

To activate a function directly

- Click on the corresponding action button in the icon bar with the mouse.

Tool bar

The tool bar contains action buttons for directly selecting the elementary functional units required for the current application. All available functional units are represented with icons and combined in groups color coded according to their assignment. This enables faster access to all functional units:

Blue:	Functional units of the physically present laboratory instruments (hardware)
Yellow	Functional units for averaging and for arithmetic operations
Red:	Functional units for manual or automatic control of the instruments or for loading a control file
Green:	Functional units for displaying results : numerical or graphical displays and automatic saving of results

Note:

The functional units can also be activated in the "Module" pulldown menu .

To directly select a functional unit

- Click on the corresponding action button of the tool bar with the mouse.

Laboratory instrument

Symbol for a laboratory instrument.

Control unit

Symbol of the "Rated Value" control unit.

Control window

Control window for operating the control unit, e.g. slide controller.

Result unit

Symbol of "Digital Display" result unit.

Result window

Result window for displaying the measuring result, e.g. speed display.

Scroll bars

The scroll bars are used to scroll the display area in the vertical or horizontal direction. This makes it possible to display parts of the display window which are not visible at the moment.

Status display

The status display shows information on the active window and marked commands. When the "Ready" message appears, entries can be made.

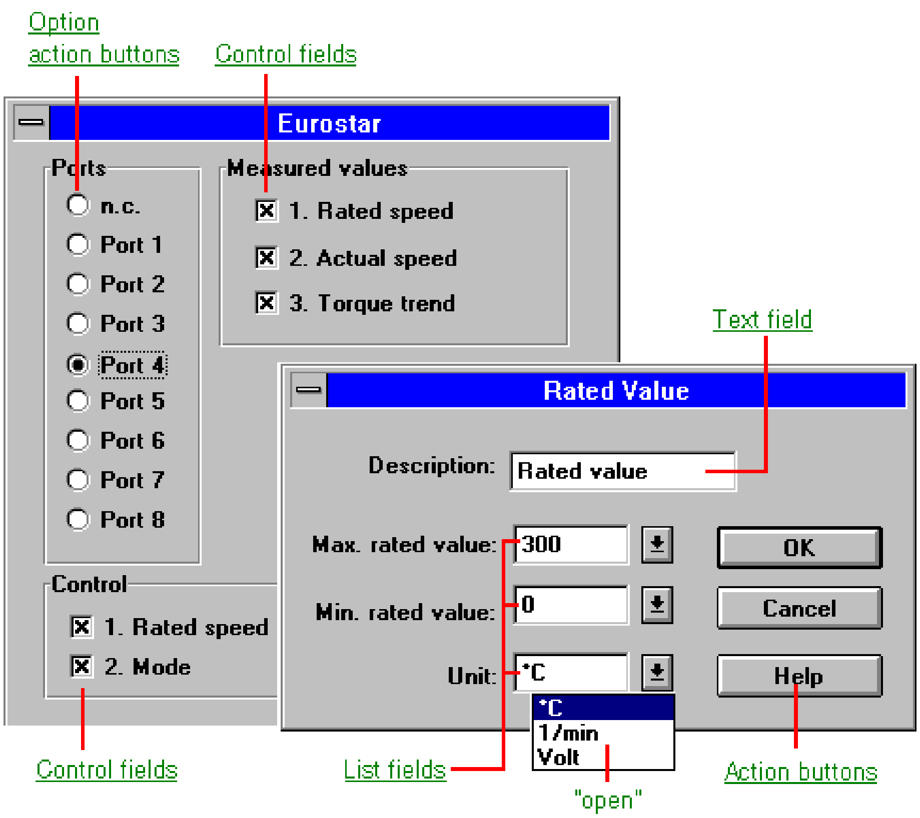
> ***Note:***
>
> The status display is displayed and concealed by clicking on **Status bar** in the "View" pulldown menu (marked with a check mark).

Setting parameters with dialog box

The following illustration shows typical dialog boxes of labworldsoft

▶ Proceed as follows:

- Click on the green underlined texts next to the illustration.
  A short description is displayed.



Option action buttons

Option action buttons are combined in two groups. Only one action button from each group can be activated.

The selected option is marked with a black dot.

Selecting option

▶ Proceed as follows:

- Click on the Options action button

  or

- Use the "Tab" key to reach the desired option group.
  Press the "space bar".

Control fields

Certain options can be switched on or off with control fields. The selected option is marked with an "X".

Selecting or clearing options

▶ Proceed as follows:

- Click on an empty control field to select the option.
  Click on the control field again to clear the option.

  or

- Use the "Tab" key to reach the desired control field.

  or

- Press the "space bar" to mark the control field with an X.

Note:
Unavailable options are faded out.

Text fields

Normally, the test fields contain standard designations which, for example, describe a function. To distinguish between several functional units of the same type on the working area, the texts may be replaced with individual descriptions.

List fields

A list field first appears as one line and contains the current selection, e.g. "rpm" when the unit of rotational speed is concerned. The menu generally also contains other units, such as °C or Ncm. The available selection possibilities in the list are opened when the arrow to the right of the field is clicked.

Some list fields can also be supplemented with individual entries, e.g. with user-specific parameter values (floating point numbers). Make sure that the new entry does not exceed the specified value range. If the value lies outside the upper or lower limits, a fault message appears.

Selecting list entry

▶ Proceed as follows:

- Click on the scroll arrow until the desired element appears in the list field.
  Click on the element to be selected.

  or

- Use the "Arrow" keys to reach the desired element.
  Press the "Enter" key to adopt the selection.

Action buttons

Action buttons directly initiate an action. In labworldsoft a number of different action buttons are provided from which the following three versions are particularly common:

OK	Activates settings carried out in the dialog box. The action button is equivalent to the "Enter" key.
Cancel	Closes the dialog box without activating the settings. The action button is equivalent to the "Esc" key.
Help	Calls up information on the parameters contained in the dialog boxes.

Note:

Action buttons with dots (...) open additional dialog boxes.

Basic operating sequence

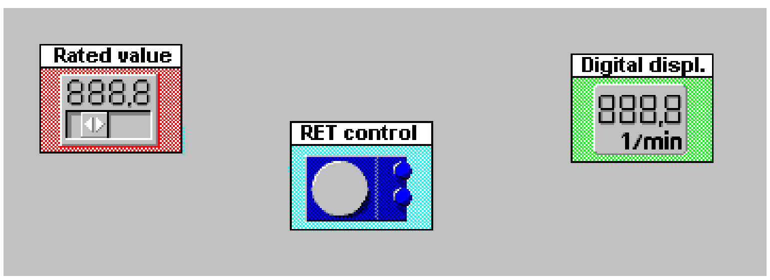
Generating signal flow chart

The main components of the signal flow chart are generally the laboratory instruments, which are initially displayed in the working area with blue functional units. Depending on the measuring task, the laboratory instruments can be supplemented with virtual functional units (red, green, yellow) for control, result display etc. Other components of the signal flow chart are the arrow connections, which specify the signal flow between the respective functional units. The steps required to generate a signal flow chart are listed below.

The basic operating sequence of the labworldsoft control and evaluation program is presented in the following. Here a simple flow chart for a magnetic stirrer (e.g. RET control) is to be generated in which the speed can be controlled and the actual measured value can be displayed. Following the measurement the configuration is saved for later applications and printed out.

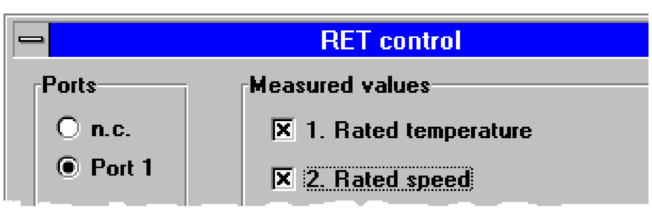
Selecting and positioning functional units

In the first step the functional units are pulled from the tool bar to the working area. In addition to the laboratory instrument (blue), other functional units "slide controllers" (red) and "digital display" (green) are also required. For the arrow connections (signal flow) later, functional units must also be suitably positioned. Usually, a signal flow from left to right is selected.



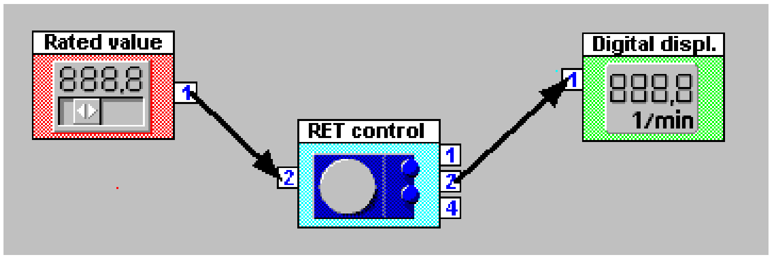
Setting parameters

In the second step the parameters of the functional units are set in the respective parameter window. These include the port number (laboratory instrument only) for the RS-232 interface and the input and output paths for the controlling variable or result type. After closing the parameter window, the paths set appear as number fields on the related symbol of the working area. These act as anchor points for the arrow connections.



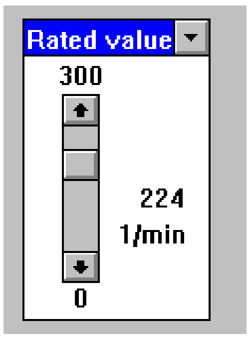
Connecting functional units

In the third step the signal flow is defined by connecting the input and output paths. This completes the signal flow chart.



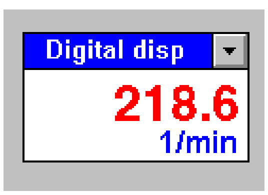
Opening control window

For speed control the control window for the slide controller must be opened, which is initially shown as an icon at the lower edge of the screen.



Opening result window

To display the measured value, the result window (digital display) must be opened, which is initially shown as an icon at the lower edge of the screen.



Saving signal flow chart

The signal flow chart can be saved in a configuration file for repeated applications. Pressing the action button opens a standard Windows window for file entry.

Signal flow chart

The basis for the control, measuring and evaluation operations on the screen is the signal flow chart, in which the physically present laboratory instruments are shown as functional units. Other virtual functional units for control , measured value calculation and result display can be integrated and interconnected depending on the measuring task.

⚠

Creation or modification of a measurement sequence schedule may be limited by activated User Managment!

The following topics can be selected for the generation, configuration, execution and archiving of the signal flow charts:

(In this document the terms "configuration" or "configuration file" are used in places. They should be understood in the same way as measurement sequence schedule.)

General information on generating signal flow charts

Usually, the functional units are positioned so that a horizontal signal flow results from left to right. This means that the control functions (red functional units) are to be arranged on the left-hand of the working area and the result displays (green functional units) more on the right-hand side. Therefore, the "laboratory instruments" (blue functional units), by which the set-up of the signal flow chart usually begins, should be placed as close to the center of the working area as possible. The yellow functional units for averaging and arithmetical operations must be positioned between the laboratory instruments and the result displays.

With this basic structure, any complex signal flow charts containing up to eight laboratory instruments (blue functional units) can be generated with labworldsoft.

Selecting functional units from the tool bar

- Carry out the following actions with the **left mouse button**:

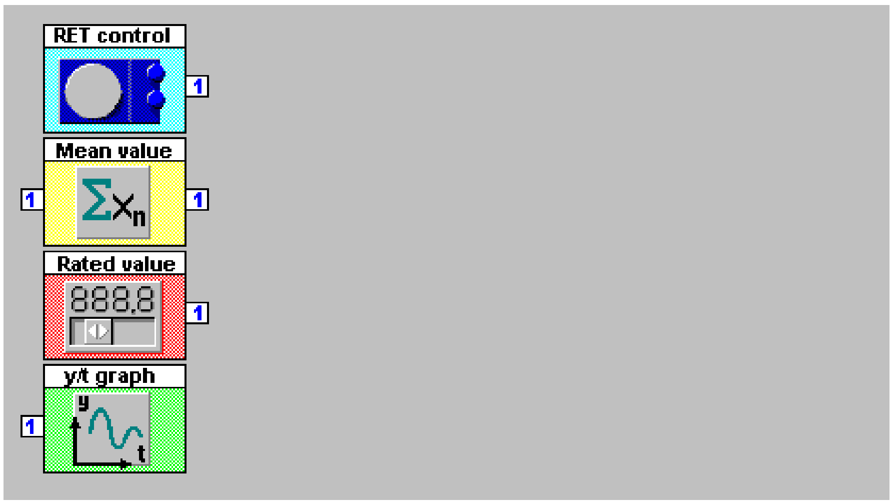
1. Select the first functional unit in the blue field, e.g. **Laboratory instrument RET control**: The enlarged symbol for the magnetic stirrer RET control appears in the upper left-hand corner of the working area. A number field is located on the right-hand side which corresponds to an origin path for a measuring result (basic setting).
2. Select the second functional unit in the yellow field, e.g. for **Averaging**: The enlarged symbol appears under the laboratory instrument RET control. Number fields representing an input and an output are located on the left and right-hand side (basic setting).
3. Select the third functional unit in the red field, e.g. Control unit for **rated value settings**. The enlarged symbol of the control unit (slide controller) appears in the working area. A number field representing the output path for the controlling variable is located on the right-hand side.
4. Select the fourth functional unit in the green field, e.g. Result unit for **graphic display**. The enlarged symbol of the graph display appears in the working area. A number field is located on the left-hand side which corresponds to an input path for a measuring variable (basic setting).

Designing the tool bar customer-specifically

The tool bar can be assigned as required with all of the function blocks available in labworld*soft*.

Clicking with the right mouse button on the function block to be replaced gives you a dropdown list of all available function blocks. The selected block is then automatically accepted into the tool bar.

Multiple application-specific tool palettes can be defined and saved under the menu item **Edit Toolbar**. In addition, the basic setting can be restored at any time with **Edit Default setting**.

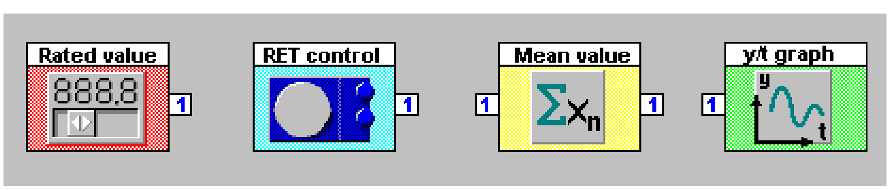


Note:
After selecting a functional unit not all possible input and output paths (number fields) are shown at first, but instead a minimum configuration is activated. This configuration corresponds to the basic setting after starting the program. Required paths for generating the signal flow chart must be activated in the parameter window if necessary. It is generally possible to select several inputs and outputs or channels via the parameter window.

Positioning functional units

- Carry out the following actions with the left mouse button:

1. Click on the functional unit with the mouse.
2. Hold down the mouse button and move the functional block to the desired position. During moving the mouse pointer changes its symbol (---> crossed double arrow).
3. Release the mouse button.
4. Click on the next functional unit (averaging) and move it etc.
5.



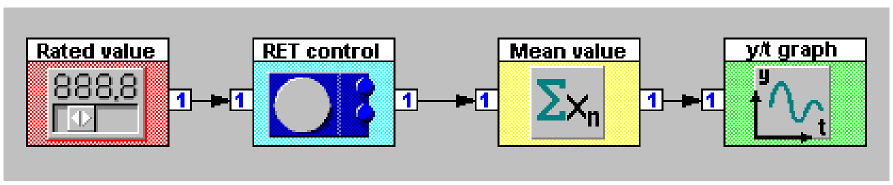
Note:

- The number fields are used as anchor points for the connections (arrows). Each output path (right-hand number field) of a functional unit is assigned to an input path (left-hand number field) in another functional unit and vice-versa. This situation must be observed when positioning the functional units.
- If several functional units of one type are required, these can be pulled into the working area by selecting the symbol from the tool box again. A maximum of eight laboratory instruments can be selected.
- Observe "left ---> right" signal flow.

Connecting functional units

▶ Carry out the following actions with the left mouse button:

1. Click on the output path or the number field of the left-hand functional unit (the symbol of the mouse pointer changes ---> hand with writing instrument).
2. Press the mouse button and drag the tip of the arrow to the number field of the functional unit (right) to be connected.
3. Release the mouse button; the connection is created.
4. Create other connections.
5.



Note:
The position of the individual functional units can be changed later by moving the symbol with the mouse (hold down left mouse button). The arrow connections are retained in the process.

Removing functional units and connections

If incorrect or too many functional units have been placed in the working area or incorrect connections have been laid, these can be removed again (i.e. deleted).

Removing functional units

▶ Carry out the following actions with the **right mouse button**:

1. Double click on the symbol in the working area to be removed. A dialog box opens asking whether the functional unit is to be deleted.
2. Answer the question with **Yes**. The dialog box closes and the symbol is removed from the working area.

Removing connections

▶ Carry out the following actions with the **right mouse button**:

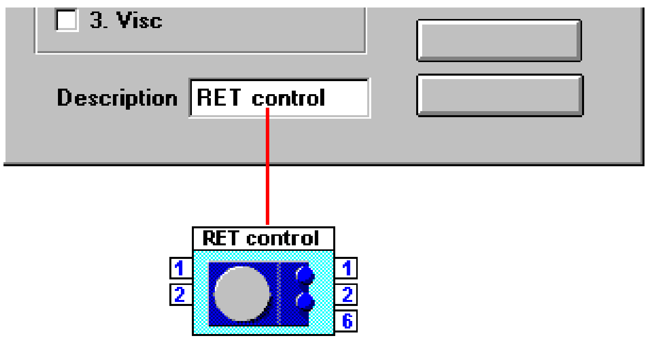
1. Double click on the number field of the connection input path to be deleted. A dialog box opens asking whether the connection is to be deleted.

2. Answer the question with **Yes**. The dialog box closes and the connection arrow is removed from the working area.

Setting parameters

Labelling functional units

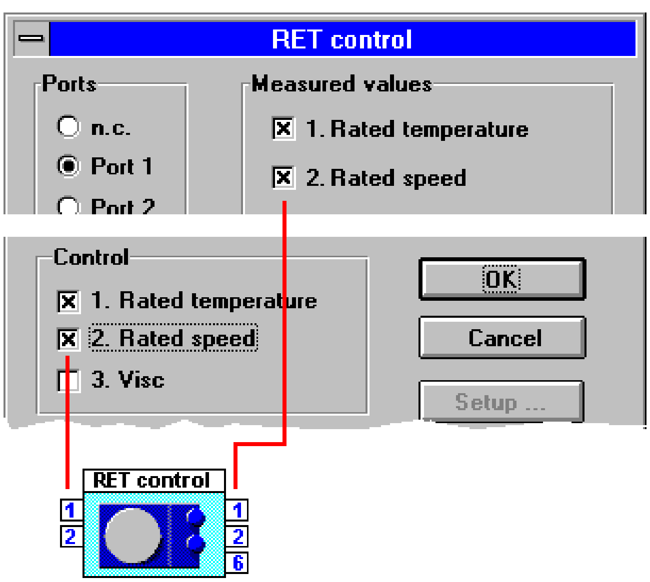
Specific descriptions with a maximum of 13 characters can be entered in the corresponding text field of the parameter window for the clear marking of the functional units. To distinguish between several functional units of the same type, individual names can be assigned or the standard description can be expanded with sequential numbers. The standard designation appears after selecting the functional unit from the tool bar (basic setting).



Activating input and output paths for connections

In addition to the port code for the remote control operation, the input and output paths of the signal flow chart can also be activated for the laboratory instruments (blue functional units) in the parameter window. Output paths are used for laboratory instruments to acquire various results. The paths in the parameter window are marked with numbers for clear identification. After closing the parameter window, the corresponding number fields appear at the respective functional units.

The path of the upstream and downstream functional units Control "red" and Result display "green" can also be activated via the corresponding parameter windows.

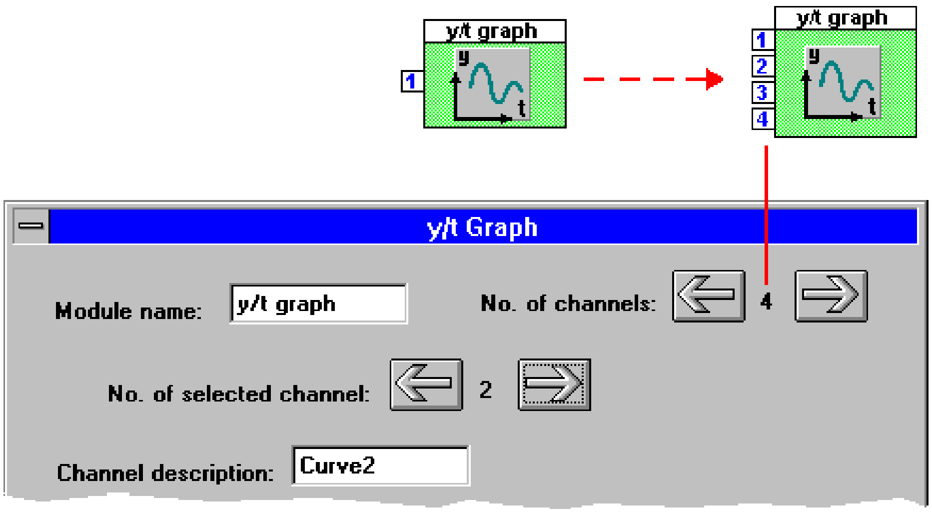


Setting and labelling channel number

The "Averaging" and "Arithmetic" functional units and part of the result units can operate several channels simultaneously. This is interesting for comparative measurements with several laboratory instruments or several measuring variables of one laboratory instrument.

To ensure a clear assignment of the measured values for the result display, the activated channels can be labelled individually. They are already assigned a standard label and are distinguished with consecutive numbering.

To define the channels the parameter windows of the named functional units have the same entry field, which is marked with arrow keys (action buttons).



The setting of the number of channels is divided into the following steps.

Displaying control and result windows

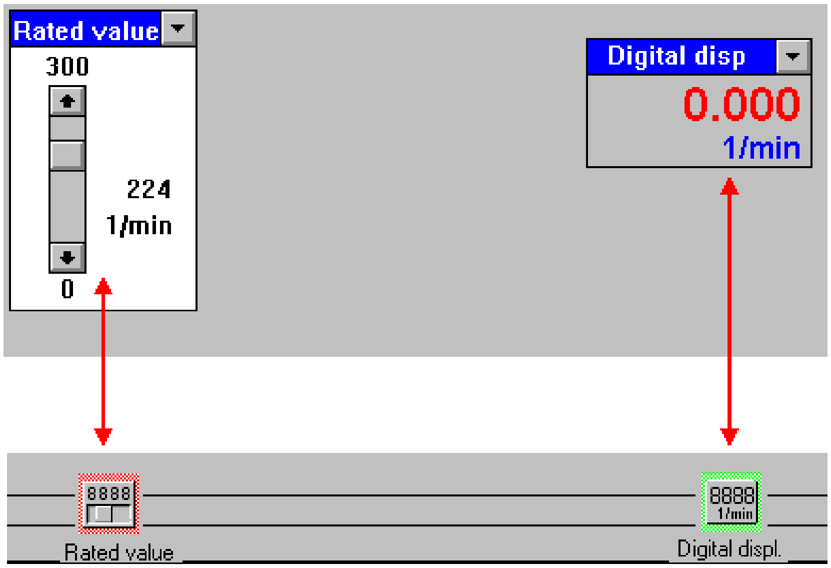
Control windows

Actual control takes place in special windows. Depending on the control unit (red) selected, various control windows are provided for manual or automatic processes (see slide controller in illustration). The sequences over time are displayed for automatic control via so-called ramp functions.

Result windows

After starting the measurement the results can be displayed in special windows. Depending on the result unit (green) selected, various result windows are provided for the numerical and graphical display or for result recording.

For clarity reasons the control and result windows are not initially visible, but are instead reduced to symbols (icons) at the lower edge of the screen and can be displayed or concealed.



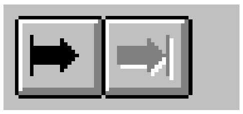
Opening control or result window

- Proceed as follows:
  - Double click on the symbol of the window to be opened.
  - Reducing control or result window to icon size
- Proceed as follows:
  - Click on the "Minimize" action button of the window to be reduced to symbol size (icon).

Controlling measurement sequence

Starting and stopping measurement

The measuring sequence can either be controlled manually with the Start/Stop action buttons or automatically with a timer.



Starting and stopping measurement at specified time

Measurement sequences can be automated with the timer function of labworldsoft by specifying the starting and stopping times. In addition, semi-automatic measurement sequences can be defined in which only one time is effective. For example, a manually triggered measurement can be stopped at a specified stopping time. It is also possible to manually end an automatically started measurement.

Specifying starting and stopping time

- Proceed as follows:

  1. Open the dialog box by clicking on the menu command **Start/Stop timing...** in the "Measure" pulldown menu.
     The related dialog box is opened. The last valid starting and stopping times are displayed in the list fields. Both times are initially inactive (empty control fields).
  2. Enter the new **starting time** at which the measurement is to begin in the list fields.
  3. Switch on the starting time with the related control field.
  4. Enter the new **stopping time** at which the measurement is to end in the list fields.
  5. Switch on the stopping time with the related control field.
  6. Confirm the entries with **OK**.

Note:

– The current time is entered in the fields "Hours - Minutes - Seconds" (absolute time). The calendar day (value range: 1 to 31) must be entered in the "Days" field.

– The measurement duration is entered for the stop time (relative time). The number of days, starting from today, must be entered in the "Days" field:
00 if the measurement is to be stopped today,
01 if the measurement is to be stopped tomorrow,
etc.

– Only one time is active for semi-automatic sequences. The corresponding control field must be marked.

Setting sampling time

To evaluate the resulting measured values, the data quantities must be known or estimable. This is particularly important for automatic result recording when results from several channels are written to data carriers. The parameters "Sampling time" and "Measurement duration" are decisive for the resulting data quantities.

For example, in the basic setting with a measurement duration of 30 min. and a sampling time of 500 ms (two values per second) a total of 3,600 measured values result, which are saved during automatic result recording.

▶ Proceed as follows:

1. Open the dialog box by clicking on the **Measuring Setup...** menu command in the "Measure" pulldown menu.
2. Enter the sampling time (in milliseconds).
3. Confirm the entry with **OK.**

Note:

– The setting range of the sampling time is 100 ms to 360,000 ms (6 min.).
– Hints for setting the sampling time:
  Longer sampling times **> 500 ms** for long-term measurements over several hours.
  Basic setting **500 ms** for typical measurement duration of approx. 30 minutes.
  Short sampling times **< 500 ms** for measurement times of less than 30 minutes and for measurement variables with a relatively high change speed.

Managing signal flow chart

Setting parameters

The functional units are configured with a special parameter windows in the form of dialog boxes. Normally, all parameters required for a specific application can be set from here.

Dialog boxes of the result units (green) and arithmetical units (yellow) contain specific parameter sets with which versatile evaluation and display possibilities can be configured; for example, these also include multi-channel operating modes.

Important:

Setting channel number (upper arrow buttons)

▶ Proceed as follows:

- Press "arrow right" button repeatedly to increase (increment) the number of channels (starting with 1). By pressing repeatedly, the number of channels can be set between 1 and 8. The number between the arrow buttons indicates the current number of channels.
- Press "arrow left" button to decrease (decrement) the number of channels.

Labelling channels (lower arrow buttons)

▶ Proceed as follows:

1. Select the first channel by pressing the arrow buttons. The number between the arrow buttons indicates the current channel number.
2. Enter the description of the selected channel in the text field below (e.g. Curve 2).
3. Select the next higher channel by pressing the "arrow right" button or the next lower channel by pressing the "arrow left" button.
4. Enter the description of the selected channel in the text field below.

5. etc.

Note:
After opening the dialog box, Channel 1 is already set for entering the description.

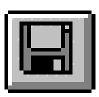
Controlling measurement sequence

After setting the parameters, the measurement can be started with a mouse click. The measured values are continually read out and processed further or displayed by the result unit. The number of available measured values can be set via the sampling time. In the basic setting two measured values are made available per second, which corresponds to a sampling time of 500 ms.

The measurement sequence can be controlled manually or automatically:

- manually with a mouse click
- in accordance with a specified time window
- All functions related to measurement sequence control are accessible via the Measure pulldown menu (menu bar). Action buttons are provided in the icon bar for frequently used functions.
- The main steps for controlling a measurement sequence are described with the following points.

Saving file



To save the configuration files, a path has already been created on the hard disk which can be expanded; e.g. c:\labworld\data\ ... (the current drive is dependent on the program installation).

To differentiate from other files managed by labworldsoft (e.g. ramp files), the configuration files have the extension *.con.

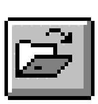
The files are managed via a standard dialog box for file selection.

▶ Proceed as follows:

1. Click on the "Save Document" (Windows standard symbol) action button. A dialog box for entering the file name opens.
2. Enter individual **File name** under which the current configuration is to be managed.
3. Confirm the entry with **OK**. The file name appears in the header bar of the main **labworld*soft*** window.

Note:
The "Save Document" action button corresponds to the menu command **Save as...** in the "File" pulldown menu.

Opening file



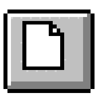
If a new signal flow chart is to be generated, previously saved configurations can also be used. By saving the old configuration under a new name and specifically changing functional units or parameters, a new signal flow chart can generally be produced with minimum operating effort. Naturally, the effort required depends on how similar the new signal flow chart is to the old one.

▶ Proceed as follows:

1. Click on the "Open Document" action button (Windows standard symbol). A dialog box for selecting the configuration files is opened.
2. Click on the desired configuration file in the list.
3. Confirm the selection with **OK**.
   The dialog box closes and the selected configuration (signal flow chart) appears in the working area. The file name appears in the header bar of the main **labworld*soft*** window.

Note:
The "Open Document" action button corresponds to the menu command **Open** in the "File" pulldown menu.

Creating new file



A directory has already been set up on the hard disk for creating new configuration files (e.g. c:\labworld\data\...).

▶ Proceed as follows:

1. Click on the "New Document" (Windows standard symbol) action button. A dialog box for entering the file name opens.
2. Enter an individual **file name** under which the current configuration is to be managed.
3. Confirm the entry with **OK**.

Note:
The "New Document" action button corresponds to the menu command **New** in the "File" pulldown menu

File Manager

The File Manager is an expanded dialog box for searching and opening a previously saved measurement sequence schedule.

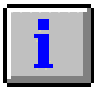
Since file names in the present version have to comply with the usual DOS conventions (maximum 8 + 3 characters) it is not always easy to find a particular measurement sequence schedule in large directories.

The File Manager not only displays files and directories on the hard disk, but also the information stored under Summary Info Summary Info when you are accessing a **labworld*soft*** measurement sequence schedule.

In this way a particular measurement sequence schedule can be identified without the file name being known or having to first load it into **labworld*soft***..

In order to be able to make optimal use of this function it is advisable to fill in the corresponding Information Fields in the measurement sequence schedules before saving the file.

File info

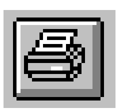


The configuration files can be provided with a user-specific log. Text fields in the File info window are available for individual entries for this purpose.

- Proceed as follows:
  1. Click on the action button with the info symbol (Windows standard symbol). The "File Info" dialog box opens.
  2. Enter the individual texts.
  3. Confirm the entries with **OK**.

Printing out signal flow chart

The signal flow chart can also be printed out for archiving purposes. Pressing the action button opens a standard Windows window for printer control.



User Management

labworld*soft* makes it possible to specify various hierarchical groups for access to the measurement sequence schedules via user management.

This function is designed to protect existing and tested measurement sequence schedules from inadvertent changes in an environment where several people are working.

Persons may be assigned to the following user groups:

- **Administrator:**

  The Administrator is the only one who is authorized to create, remove or register new users in the system. The Administrator activates or deactivates User Management and is the only person with access to the menu item Options|User|User Management.

  There is only one Administrator and he or she exercises all of the rights in the system.

- **Programmers:**

  Programmers may create measurement sequence schedules or the modules, change their parameters and the links to existing measurement sequence schedules as well as save the modified schedules. They have access to all of the parameters that may be accessed by double clicking on the respective module. In addition, they can change global parameters such as scanning rate, activation and configuration of the Multiserial cards, autostart/-stop, Summary Info, etc.

- **Users:**

  Users are able to load measurement sequence schedules and perform measurements with these configurations. The parameters of the measurement sequence schedules are not able to be modified. (Exception: the file name in the Write Data module.) Users are not able to create new measurement sequence schedules.

User management is deactivated after initial installation of **labworld*soft***. The following steps have to be performed in order to active User Management:

- In the Options menu select the menu item User|User Management.
- Mark the "Use Management Active" selection box.
- If no Administrator has been specified then the "New User" dialog window will appear.
- Enter a name abbreviation and a password. This user is then the Administer and is the only one who is authorized to deactivate User Management.
- You can now set up any number of persons as programmers or users.
- The corresponding passwords are specified by the Administrator at first and may be modified later by the respective programmer or user via the menu Options|User|Password Modification.

If User Management is activated a dialog box in which the abbreviated name and password have to be entered will appear each time **labworld*soft*** is started. The user group assigned to the respective persons appears in the program headline.

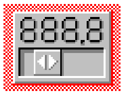
The names and passwords are encoded by **labworld*soft*** and saved by in a special file. As a function of its significance in terms of safety the encoded algorithm is not very complicated and is capable of being decoded by an expert with a small amount of effort.

For this reason the Administrator should point out to all of the other users that no other passwords that are used anywhere else should be used instead together with **labworld*soft***. (No passwords for access to networks, online services, etc.)

Control units

The following chapter contains a detailed description of the control units with all parameter settings. In addition to units for manual control (slide controllers, push buttons), the red area of the tool bar also contains a so-called ramp function with which automatic control sequences can be programmed with individual time curves. The "Read files" control unit makes use of already existing result files, in particular for continuously recurring control tasks.

"Rated value" control unit

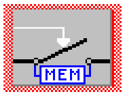


The Rated value control unit represents a slide controller with which the controlling variables, such as temperature, speed etc., can be manually set. During measuring the rated value within a specified value range can be continuously changed, while the effects can be observed in the result unit . The slide controller can be operated with the mouse.

▶ Proceed as follows:

1. Call up the parameter window by double clicking on the symbol.
2. If necessary, enter the **Name** of the slide controller in the 'Description' text field.
3. Enter or select the maximum and minimum **Rated value** or **Unit** (e.g. °C) in the list fields.
4. Confirm the entries with **OK**. The control window appears as a symbol (icon) at the bottom edge of the screen.
5. Open the control window by double clicking on the icon.
6. The slide controller can be adjusted with the mouse while the current value is displayed.

"Latch" control unit



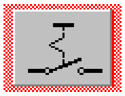
Latch

The latch can be used to freeze values in place. If a High level (5) is present on the control input of the latch, the measurement value from Input 2 is switched through to the output. If the level on the control input switches from High to Low (0), the measurement value at this point in time is frozen and switched to the output. The frozen value continues to be switched to the output until a High level is present on the control input and the current measurement values are switched through again.

The latch can be given a user-defined designation (max. 13 characters).

- Proceed as follows:
  1. Open the parameter window by double clicking on the symbol.
  2. If necessary, enter the **Name** of the Latch in the ’Designation’ text field.

"Switch button" control unit

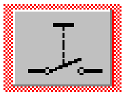


Functions can be reset or switched over with the **Switcher**. This includes, for example, the switching over of the Relais control unit.The switcher can be individually labelled (maximum of 13 characters).

- Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
2. If necessary, enter the **Name** of the push button in the ’Designation’ text field.
3. Close the parameter window with **OK**. The designated control window appears as a symbol (icon) at the lower edge of the screen.
4. Open the control window by double clicking on the icon.
5. The push button can be actuated by pressing the **0** action button; this resets or switches over functions.

"Push button" control unit

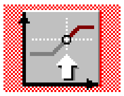


Functions can be reset or switched over with the Push button. This includes, for example, the switching over of the EUROSTAR- display (stirrer) from speed to torque. The push button can be individually labelled (maximum of 13 characters).

- Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
2. If necessary, enter the **Name** of the push button in the ’Designation’ text field.
3. Close the parameter window with **OK**. The designated control window appears as a symbol (icon) at the lower edge of the screen.
4. Open the control window by double clicking on the icon.
5. The push button can be actuated by pressing the **0** action button; this resets or switches over functions.

"Trigger" control unit



The trigger type and the limits of the range to be monitored may be specified using the trigger range.

With the range trigger set to absolute values the incoming data are directly compared with the limits values which have been set.

- If "in" is selected then a trigger signal is generated if a value is recognised which is within the limits set - including the limit values themselves.
- If "out" is selected the signal has to be greater than the upper or smaller than the lower limit value in order to activate a trigger.

After the measurement is started the respective input signal is monitored for the trigger conditions which have been set and once such conditions occur and depending on the selection - start or stop trigger - the state of the output signal switched over.
A TTL-compatible is signal value is issued for each incoming data value. For the start trigger this value corresponds to the value TTL-low (numerical value 0) before occurrence of the trigger conditions and the value TTL-high (numerical value 5) after occurrence of the trigger conditions. In the case of the stop trigger the TTL-output level reacts in an exactly reverse fashion.

▶ Perform the following steps:

1. Call up the parameter window by double-clicking the icon.
2. If necessary enter the **Name** of the trigger in the text field labelled ’Designation’.
3. Set range and type (Start / Stop Trigger, In / Out of Range) of trigger. Close parameter window with **OK**.

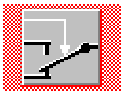
Multiple Channel Operation
For multiple channel operation the channels have to be identifiable in the results window. They are capable of being marked.

▶ Perform the following steps:

1. Set **Channel Number** by clicking the upper arrow keys.
2. Select channel by clicking the lower arrow keys.
3. Enter **Channel Designation** into the text field, i.e. entry is made for each channel selected.
4. Confirm with **OK**.

The trigger control block may be used together with the "relay" control block in order to control operations as a function of measured values.

"Relais" control unit



The module switches an input to an output as a function of a control input or interrupts the signal flow.

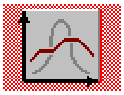
The module may be provided with a short description for documentation purposes.
The relay has a switching input (TTL level) and a data input and output. Values present as the data input are allowed "to pass" (output value corresponds to the input value), if the switching input is set at High, and rejected (output value is 0) if the switching input is set at Low.
Input path 1 is the connection for the control signal, input path 2 the data input, output path 1 is the data output.

▶ Perform the following steps:

1. Call up the parameter window by double-clicking the icon. The parameter window then appears.
2. Enter a short description into the field labelled module name.

The relay module is best used in combination with the "trigger" control block.

"Ramp function" control unit



With the Ramp function variables such as temperature, speed etc. can be automatically controlled. For example, the temperature can be increased slowly to a rated value and then held at a constant value. The time curve of such control procedures can be stored in special Ramp files (*.rmp). Depending on the application, ramp functions can be realized with a maximum measurement duration of one month.

Ramp functions for the control units are generated in a special Ramp editor and saved in ramp files. New ramp functions can be generated or created by modifying already saved ramps.

The control window is used to control the measurement sequence, whereby a pointer (vertical line) indicates the current measuring time. In addition to the graphic display, the current values (controlling variable and time) are also displayed numerically.

▶ Proceed as follows:

1. Open the parameter window by double clicking on the symbol. The parameter window appears.
2. Call the ramp files with the **File** action button. The window for file selection with the available ramp functions appears.
3. Select the desired ramp file and confirm it with **OK**. The file name appears in the parameter window.
4. Close the parameter window with **OK**. The control window appears as a symbol (icon) at the lower edge of the screen. In addition, the symbol is provided with a number field for linking it with the functional unit to be controlled.
5. Open the control window by double clicking on the icon.
6. To generate the ramp function, select the ramp editor

Control input:

- Trigger input: you can start the ramp, time or event-driven, by switching the trigger input from low to high. You can repeat this step as often as you wish. The trigger event can be produced by any control unit (push button, switchj, trigger, timer,…). If the trigger input is not in use, the ramp control will start when measuring begins.

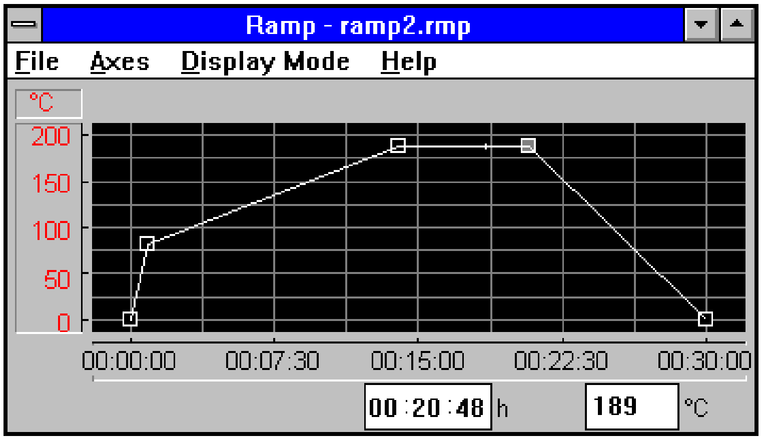
▶ Open ramp editor:

- Click on the action button for the ramp function in the icon bar (**labworld*soft*** main application window).

Ramp editor

The illustration shows the ramp editor window with the graph field and the current scale. The ramp function represents a temperature curve over a period of 30 minutes (basic setting). The y-axis can assume various controlling variables (speed, temperature) with the corresponding value ranges, while the time axis can be set over a broad range up to a maximum of one month.

A ramp is defined by a number of support points (small boxes) linked with lines. At the start of ramp editing only the support points of the starting and stopping times are defined (linked with a straight line). Other support points can be entered with graphic or numeric editing.



The parameter settings of the ramp editor are described under the following topics:

Specifying scale

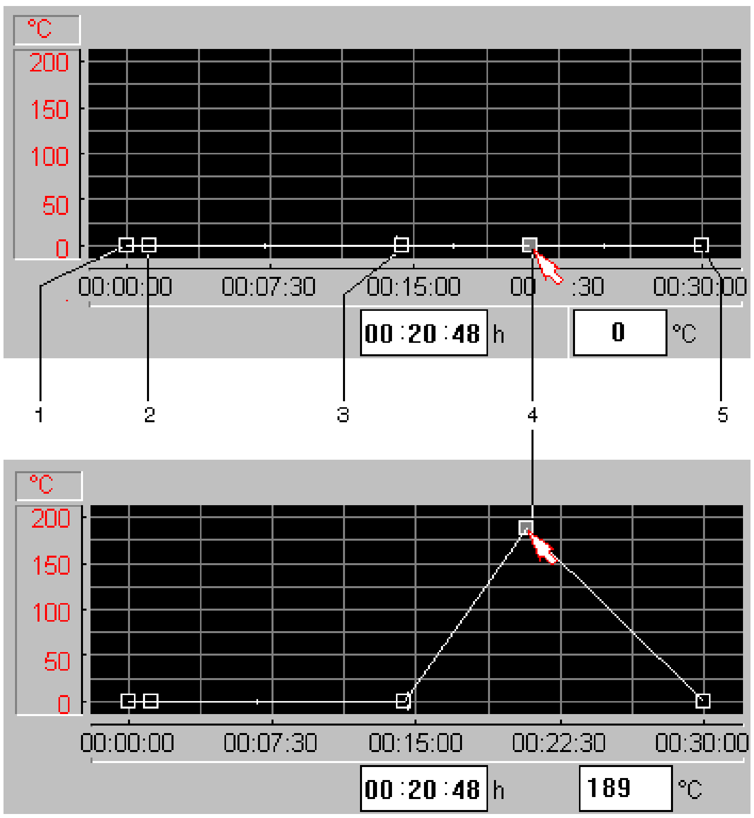
- Proceed as follows:

1. Open **Axes** pulldown menu in the menu bar.
2. Click on **Time scale...** to open the dialog box for time entry.
3. Enter the desired sequence duration for the ramp function and confirm it with **OK**. The entry is made in minutes (basic setting is 30 min.). The time scale appears in the format: hh : mm : ss (hours, minutes, seconds).
4. Click on **Y-scale...** to open the dialog box for the controlling variable (temperature, speed etc.) and the value range.
5. Enter the controlling variable by indicating the **Unit** in the appropriate field (e.g. °C for temperature).
6. Enter the upper and lower **range limits** in the corresponding fields **y_max**, **y_min**.
7. Confirm the entry with **OK**.
8. The graph field is scaled with the current parameters.

Entering support points graphically

- Proceed as follows:

1. Specify the **Time position** of the new support points (2):
   Position the mouse pointer on the original straight line (between the starting and stopping support points 1, 5) and click on it. The small box for the support point is displayed.
2. Specify the **Position** of the new support point (3) etc.
3. Specify the **Y-value** of support point 4: Click on box 4 with the mouse and move it vertically
4. Set the **Y-values** of support points 2 and 3 in the same manner.



Deleting support points

- Proceed as follows:

1. Position the mouse pointer in the box of the support point to be deleted.
2. Double click it with the right mouse button. The box disappears and the neighboring support points are directly connected.

Moving support points

▶ Proceed as follows:

1. Position the mouse pointer in the box of the support point to be moved.
2. Move the box to the desired position. The connection (straight lines) to the neighboring support points are retained.

Editing support points numerically

For ramp functions which cover longer periods and demonstrate close neighboring support points, a discrete entry is advisable due to the limited graphic resolution. The ramp function can be displayed and edited as a list for this purpose.

1. Open the **Display mode** pulldown menu in the menu bar.
2. Click on **List...** to display a list of the support points. A dialog box opens: First the time and y-values of the support points already present appear.
3. Below the list there is a window for displaying and entering the current (marked) support point. The support points can be edited with the action buttons on the right:

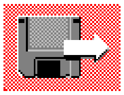
Close	Save the support points and return to the ramp editor.
Enter	Enter the current support point in the list.
Delete	Delete the marked support point from the list.
Confirm	Add the current entry to the list.

Defining ramp function colors

▶ Assign colors:

1. Open the **Display mode** pulldown menu in the menu bar.
2. Click on **Colors and lines...** to open the dialog box for color entry.
3. Click on the desired element in the parameter list for which the color is to be changed.
4. Open the color palette and click on the **Color** action button. Additional dialog boxes with color palettes are opened (basic colors, mixed colors).
5. Select the desired color and confirm it with **OK**.

"Read files" control unit

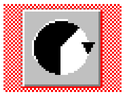


With the Read files control unit complex measurement sequences can be displayed repeatedly in a simple manner or the data displayed offline. The control data are present as files on the computer's hard disk. They have been generated with the "Write files" result unit . To differentiate them from other files (e.g. ramp files, configuration files), the control files have the extension *.ika.

- Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
2. Open the window for selecting the control files with the **Path** action button. The file selection window appears with the available control files.
3. Select the desired **control file** and confirm it with **OK**. The file name appears in the parameter window.
4. Close the parameter window with **OK**. The control window appears as a symbol (icon) at the lower edge of the screen. In addition, the symbol is provided with a number field for connection with the functional unit to be controlled.
5. Open the control window by double clicking on the icon.

"Timer" Control Block



The **Timer** control block generates up to 8 control signals with TTL-Pegel (0V / 5V).

The amount of time for the change of the output signal is specified with the times set under **Phase 1** and **Phase 2**.

Under **Start/Stop** you can specify whether Phase 1 is started with TTL-High (5V) or TTL-Low (0V).

This is where the number of cycles (1 cycle = 1 x Phase 1 & 1 x Phase 2) can be stipulated.

If the number of cycles is set to 0 then the timer will continue to run as long as the current measurement is being performed.

- Carry out the following instructions:

1. Call up the parameters window by double clicking on the icon.
2. If necessary, enter the **Name** of the timer into the "Module Name" text field.
3. Enter the time defaults for the two **Phases** and the **Start or Stop Conditions.**
4. Specify the number of **Cycles** run through.

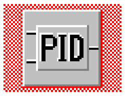
Multichannel Operation

The ports should identifiable for multichannel operation. The ports may be identified for this purpose.

- Carry out the following instructions:

1. Set the **Channel Count** by clicking the upper arrow keys.
2. Select the channel by clicking the lower arrow keys.
3. Enter the **Channel Designation** into the text field, i.e. make an entry for each channel selected.
4. Set the **Phases**, **Start or Stop Conditions** and the **Cycle Count** for the channel selected.

"PID Controller" Control Block



The **PID Controller** control block is a regulator circuit with an input for the **Set Value**, an input for **Actual Value** and an **Output**.

In contrast to the two-position controller (which may be emulated under **labworld*soft*** with a trigger module), which only recognizes the two states of "ON" and "OFF" the PID controller is a **constant** controller (the manipulated variable is constantly changed) with which much better controller results may be obtained.

The same applies to information which is available to the controller. The two-position controller only recognizes three different input signals: the actual value is either too large, too small or lies within the permissible range. This information does not make it possible to use a continuous manipulated variable range because it is too imprecise. Instead it is a quantitative measure for the deviation of the actual value from the set value. **$e = w - y$** serves as such a system deviation**.**

A controller is a transmission element and thus completely determines when the resulting manipulated variable **$u(t)$** is provided for each possible system deviation **$e(t)$**. The relationship is referred to as the **Control Algorithm**. An algorithm which has been tried and proven in many cases shows **P**roportional, **I**ntegral and **D**ifferential behavior and is thus called a **PID** controller.

The algorithm contains the three free constants

P (proportionality factor)

I (Integration time constant or reset time) and

D (Differential time constant or rate time),

which have to be correspondingly adapted to the entry fields in the controller parameter window and the process which is to be controlled.

Effects of the constants on the control process.

The larger the proportionality factor **P** is the faster the system deviation **e** is settled. However **P** may not be too large because the regulator circuit would otherwise oscillate.

A remaining minimal system deviation **e** is lowered through the integral proportion **I**. The reset time may be too small because otherwise the regulator circuit would become unstable.

The controller dynamic is significantly improved by the differential proportion **D.** The proportionality factor **P** may be greater than for a pure **P** or **PI** controller without the regulator circuit becoming unstable.

In most cases several practical tests are required in order to find the optimal factor settings for a specific regulatory circuit.

The behavior of the controller can be tested with two control blocks "Set Value" and a result block digital display.

A **Maximum and/or Minimum Output Value** can be specified via the **Manipulated Variable Limit**. These values are not exceeded or undershot, even if the control algorithm would generate this result.

Specification of a maximum and/or minimum manipulated variable is always the absolutely imperative if exceeding or undershooting of a certain manipulated variable might result in a hazardous situation (e.g. the speed of a stirring motor may not exceed a specific maximum value in order to prevent the medium from being sprayed or to avoid damage to the stirring vessel).

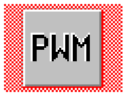
In this case ascertain the speed at which your test set-up will safely function and set this value as the maximum manipulated variable.

▶ Carry out the following instructions:

1. Call up the parameters window by double clicking on the icon.
2. If necessary, enter the **Name** of the PID controller into the "Designation" text field.
3. Enter the PID controller parameters (as described above) into the entry fields.
4. If necessary, specify the upper and/or lower manipulated variable limit.

The PID controller is suitable in connection with the "PWM" control block for precise temperature control with a heating mushroom (controlled by means of the Data Control IO) or for stirring motor speed control as a function of the medium viscosity (measured with a VISCOKLICK VK 600).

"PWM" Control Block



The **PWM** control block is a pulse spacing modulator with which data values can be digitized IO-Modul) and displayed.

A data value of 0 - 100 available at the input is converted to a frequency (mit TTL-Pegel), the on/off time ratio of which is the percentage equivalent of the data value.

The **frequency** of the output signal is given in the parameter window and can lie in the range of 0.01 to 0.1 Hz.

Examples:

If a data value of **0** is present at the input then the output value will also be **0**.

If a data value of **25** is provided to the input then the output value will be a rectangular pulse signal with the defaulted **frequency** and an On / Off ratio of 1:3 (**25% of the Time On**, 75% of the time off).

If a data value of **50** is provided to the input then the output value will be a rectangular pulse signal with the defaulted **frequency** and an On / Off ratio of 1:1 (**50% of the Time On**, 50% of the time off).

If a data value of **75** is provided to the input then the output value will be a rectangular pulse signal with the defaulted **frequency** and an On / Off ratio of 3:1 (**75% of the Time On**, 25% of the time off).

If a data value of **100** is present at the input then the output value will be TTL High.

The **PWM** control block is primarily used in order to control devices via the digital outputs (IKA Laboratory Technology IO Module) such as heating plates, heating mushrooms and others with the help of the control block "PID Controller".

In this fashion virtually any heating device can be equipped with a modern, precision temperature control.

- Carry out the following instructions:

1. Call up the parameters window by double clicking on the icon.
2. If necessary, enter the **Name** of the module into the "Designation" text field.
3. Select **Frequency**.
4. Confirm entries with **OK**.

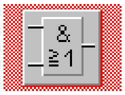
Multichannel Operation

The ports should identifiable for multichannel operation. The ports may be identified for this purpose.

▶ Carry out the following instructions:

1. Set the **Channel Count** by clicking the upper arrow keys.
2. Select the channel by clicking the lower arrow keys.
3. Enter the **Channel Designation** into the text field, i.e. make an entry for each channel selected.
4. Select **Frequency**.

"Boolean Functions" Control Block



With the Boolean control block links, Boolean mathematical calculations can be carried out with input signals in the TTL-Pegel-Bereich. The control block links two input signals together and uses them to generates an output signal.

At the inputs, analog signals can also be present without error messages being issued by the control block. In this case, values greater than 2 volts are interpreted as TTL-High and values smaller than 0.8 volts as TTL-Low.

The following links are available:

Channel1 AND Channel 2:

Channel 1	Channel 2	Output
Low	**Low**	**Low**
High	**Low**	**Low**
Low	**High**	**Low**
High	**High**	**High**

Channel1 NAND (not AND) Channel 2:

Channel 1	Channel 2	Output
Low	**Low**	**High**
High	**Low**	**High**
Low	**High**	**High**
High	**High**	**Low**

Channel1 OR Channel 2:

Channel 1	Channel 2	Output
Low	**Low**	**Low**
High	**Low**	**High**
Low	**High**	**High**
High	**High**	**High**

Channel1 NOR (not OR) Channel 2:

Channel 1	Channel 2	Output
Low	**Low**	**High**
High	**Low**	**Low**
Low	**High**	**Low**
High	**High**	**Low**

If the same data value is provided at both inputs for a **NAND** or **NOR** module then the module will function as an inverter.

▶ Carry out the following instructions:

1. Call up the parameters window by double clicking on the icon.
2. If necessary, enter the **Name** of the module into the "Designation" text field.
3. Select Boolean link **AND, NAND, OR** or **NOR**.
4. Confirm entries with **OK**.

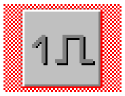
Multichannel Operation

The ports should identifiable for multichannel operation. The ports may be identified for this purpose.

▶ Carry out the following instructions:

1. Set the **Channel Count** by clicking the upper arrow keys.
2. Select the channel by clicking the lower arrow keys.
3. Enter the **Channel Designation** into the text field, i.e. make an entry for each channel selected.
4. Select Boolean link **AND, NAND, OR** or **NOR**.

Monoflop Control Block



The **Monoflop** control block is a **timer which is triggerable (startable) via a control input.** If a change of the logic level from TTL-Low to TTL-High arises at the control input (**Positive Slope**) or the opposite (**Negative Slope**), the level of the output for the **Hold Time** is switched.

The level of the output signal depends on the **Level for Hold Time** setting. If **High** is selected, the level is in the untriggered state TTL-Low, and during the hold time TTL-High; if **Low** is selected, the level is in the untriggered state TTL-High, and changes during the hold time to TTL-Low.

If the **Retriggering** option is activated, a new trigger pulse leads to a new start of the hold time; i. e. if the hold time is greater than the spacing of the trigger pulse, the output remains permanently set. In this way, it is possible, for example, to monitor a periodically occurring signal.

If **Retriggering** is not activated, incoming trigger pulses are ignored during the **Hold Time**. The Monoflop can first be retriggered after expiration of the **Hold Time.**

- Carry out the following instructions:

1. Call up the parameters window by double clicking on the icon.
2. If necessary, enter the **Module Name** of the control block into the "Designation" text field.
3. Select **Trigger** on **Positive** or **Negative Slopes.**
4. Enter **Hold Time.**
5. Select **Hold Time Level.**
6. Select **Retriggering** if required.

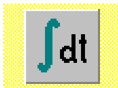
Multichannel Operation

The ports should identifiable for multichannel operation. The ports may be identified for this purpose.

- Carry out the following instructions:

1. Set the **Channel Count** by clicking the upper arrow keys.
2. Select the channel by clicking the lower arrow keys.
3. Enter the **Channel Designation** into the text field, i.e. make an entry for each channel selected.
4. Select **Trigger** on **Positive** or **Negative Slopes.**
5. Enter **Hold Time.**
6. Select **Trigger** on **Positive** or **Negative Slopes.**
7. Enter **Hold Time.**
8. Confirm entries with **OK.**

Numerical Block "Derivative / Integral"



The **Derivative / Integral** control block is used to integrate data or for calculation of increases in a measurement data operation.

Calculation of the output values is carried out in accordance with the following formulas:

Derivation (increase):

$$Y_n = \frac{X_n - X_{n-1}}{dist}$$

Integral (area):

$$Y_n = (X_0 + \ \dots \ + X_n) * dist$$

where **dist** is the respective time spacing between two consecutive measured values.

The two functions derivation and integral are implemented in such a way that one after the other they

are applied to a signal and are then canceled.

- Carry out the following instructions:

1. Call up the parameters window by double clicking on the icon.
2. If necessary, enter the **Module Name** of the control block into the "Module Name" text field.
3. Select the **Derivative** or **Integral** function.
4. Confirm entries with **OK**.

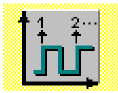
Multichannel Operation

The ports should identifiable for multichannel operation. The ports may be identified for this purpose.

- Carry out the following instructions:

1. Set the **Channel Count** by clicking the upper arrow keys.
2. Select the channel by clicking the lower arrow keys.
3. Enter the **Channel Designation** into the text field, i.e. make an entry for each channel selected.
4. Select **Derivative** or **Integral** for the channel selected.

Counter Function Block



The **Counter** function block can perform counting functions for input signals in the TTL-Bereich such as **positive/negative slopes** or **On- / Off times**.

The counter is automatically set to 0 at the start of a new measurement.

The following counting functions are available:

Count function	**Output signal**
Positive slopes:	Number of changes of the input signal from TTL-Low to TTL-High.
Negative slopes:	Number of changes of the input signal from TTL-High to TTL-Low.
Time High Level:	Seconds since the start of the measurement with a data value greater than TTL-High (2.0) of the input signal.
Time Low Level:	Seconds since the start of the measurement with a data value less than TTL-High (0.8) of the input signal.

▸ Carry out the following instructions:

1. Call up the parameters window by double clicking on the icon.
2. If necessary, enter the **Module Name** of the control block into the "Designation" text field.
3. Select **Positive / Negative Slopes** function or **On / Off Time**.
4. Confirm entries with **OK**.

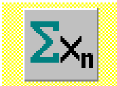
Multichannel Operation

The ports should identifiable for multichannel operation. The ports may be identified for this purpose.

▸ Carry out the following instructions:

1. Set the **Channel Count** by clicking the upper arrow keys.
2. Select the channel by clicking the lower arrow keys.
3. Enter the **Channel Designation** into the text field, i.e. make an entry for each channel selected.
4. Select **Positive / Negative Slopes** or **On / Off Time** for the channel selected.

Functional unit for averaging



With the Averaging functional unit, resulting result values xi can be averaged with two different methods:

as an arithmetical mean

$$x_A = \frac{x_1 + x_2 + \ldots + x_n}{n}$$

as a root mean square

$$x_Q = \sqrt{\frac{x_1^2 + x_2^2 + \ldots + x_n^2}{n}}$$

The number n of the values to be averaged must be entered in the parameter window.

In addition, averaging can be divided into

To set the averaging method

- Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
2. If necessary, enter the **name** of the averaging unit in the 'Description' text field. For several averaging units, it is advisable to assign names.
3. Set the **averaging method** by clicking on the appropriate option action button. Left: Arithmetical averaging, right: Root mean square.
4. Set the **number** of values to be averaged per unit

Multi-channel operation

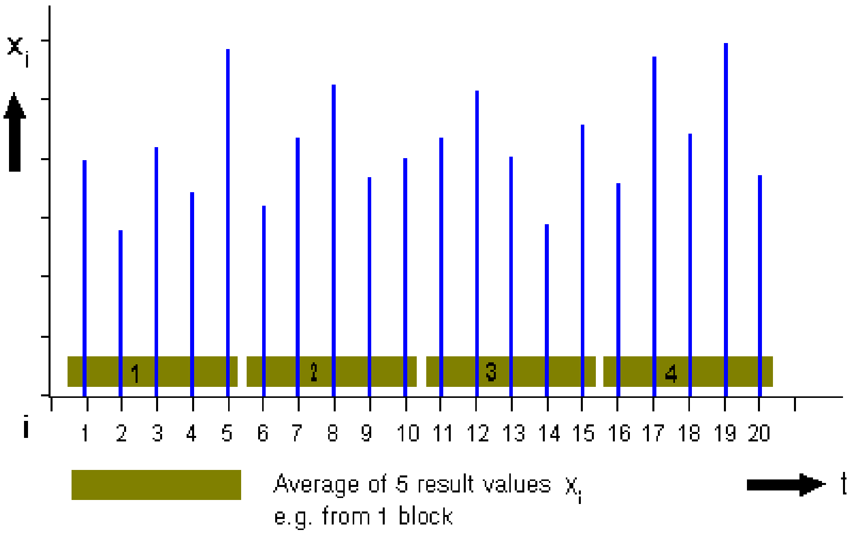
In the case of multi-channel operation, the channels must be identifiable in the result window. The channels can be labelled for this purpose.

- Proceed as follows:

1. Set the **number of channels** by clicking on the upper arrow buttons.
2. Select the channel by clicking on the lower arrow buttons.
3. Enter the **channel description** in the text field, i.e. make an entry for each channel selected.
4. Confirm the entries with **OK**.

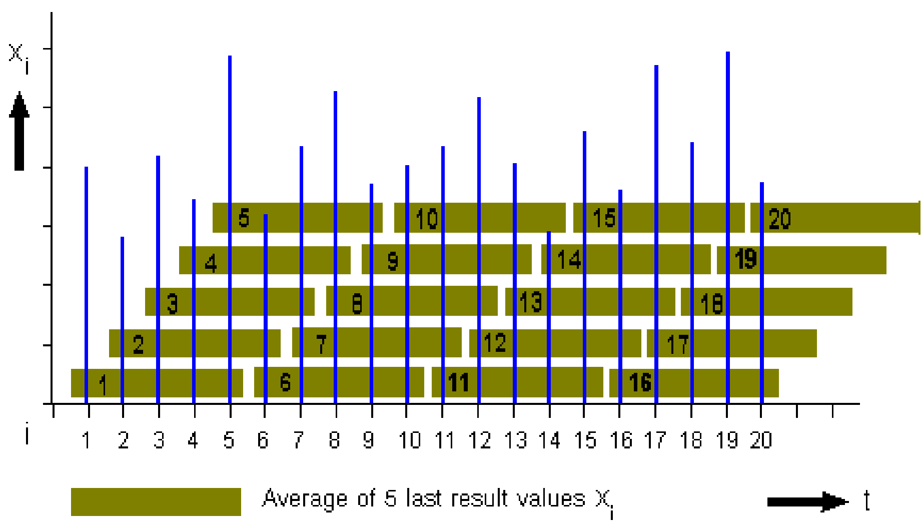
Block-by-block averaging

Mean values from n consecutive result values xi are generated, for example, for n = 5 of i = 1 to 5, i = 6 to 10, i = 11 to 15 etc.



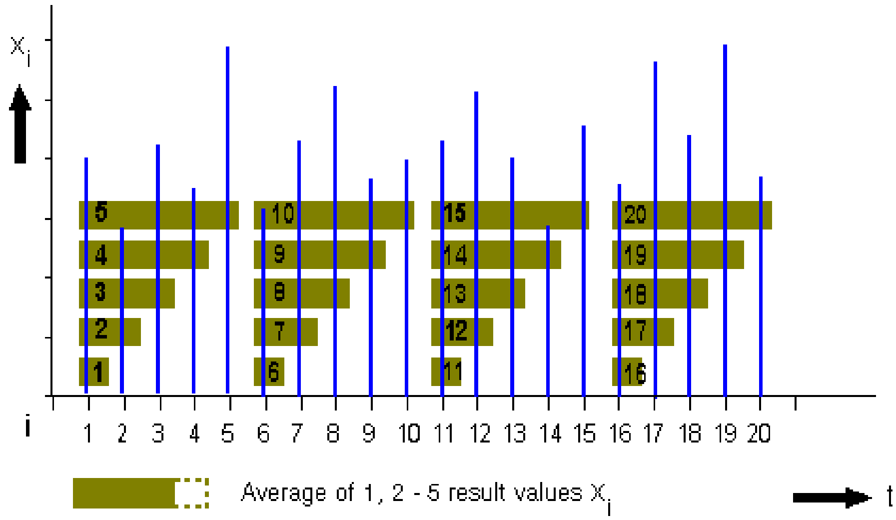
Sliding averaging

Mean values are generated from n result values xi, whereby overlapping units are formed. Mean values form, for example, for n = 5 from the result values i = 1 to 5, i = 2 to 6, i = 3 to 7 etc. After each result value a mean value is also output.



Increasing averaging

Mean values are generated from growing units. The smallest unit consists of one result value, the largest unit of n result values.



X_i
i
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Average of 1, 2 - 5 result values X_i
t

Functional unit for arithmetic

With the Arithmetic functional unit three function groups are available:

- Arithmetic operations with **one** operand
- Arithmetic operations with **one** operand and **constant**
- Arithmetic operations with **two** operands

Arithmetic operations with one operand

Channel-by-channel operations are possible with this function group:

Input value (operand)	Output value	Meaning
x_i	$\frac{1}{x_i}$	Reciprocal value
x_i	x_i^2	Square
x_i	$\sqrt{x_i}$	Square root
x_i	$\lvert x_i \rvert$	Absolute value
x_i	e^{x_i}	Exponential value
x_i	$\ln x_i$	Natural logarithm

▶ Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
2. If necessary, enter the **Module name** in the text field. In the case of several arithmetical units, it is advisable to assign names.

Multi-channel operation

For multi-channel operation, the channels in the result window must be identifiable. The channels can be labelled for this purpose.

▶ Proceed as follows:

1. Set the **Number of channels** with the upper arrow buttons.
2. Select the channel **Number** with the lower arrow buttons.
3. Select the desired **Type of operation** by clicking on the appropriate option action button.

4. Enter the **Channel name** in the text field, i.e. make an entry for each channel selected.
5. Confirm the entries with **OK**.

Arithmetic operations with one operand and constant

Channel-by-channel operations with a constant c are possible with this function group:

Input value (operand)	Output value	Meaning
x_i	c	Constant
x_i	$x_i + c$	Addition
x_i	$x_i - c$	Subtraction
x_i	$x_i * c$	Multiplication
x_i	$\frac{x_i}{c}$	Division

- Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
2. If necessary, enter the **Module name** in the text field. For several arithmetical units, it is advisable to assign names.
3. Select the desired **Type of operation** by clicking on the appropriate option action button.
4. Enter the **Constant** (floating-point number).

Multi-channel operation

- Proceed as follows:

1. Set the **Number of channels** by clicking on the upper arrow buttons.
2. Select the channel by clicking on the lower arrow buttons.
3. Enter the **Channel description** in the text field, i.e. make an entry for each channel selected.
4. Confirm the entries with **OK**.

Arithmetic operations with two operands

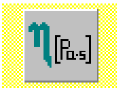
With this function group arithmetic operations are possible with two input channels xi and yi. This means, for example, the difference between the torques of two laboratory instruments (VISCOKLICK VK 250/600) can be determined.

Operand 1	Operand 2	Output value	
x_i	y_i	$x_i + y_i$	Addition
x_i	y_i	$x_i - y_i$	Subtraction
x_i	y_i	$x_i * y_i$	Multiplication
x_i	y_i	$\frac{x_i}{y_i}$	Division

▶ Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
2. If necessary, enter the **Module name** in the text field. For several arithmetical units, it is advisable to assign names.
3. Select the desired **Type of operation** by clicking on the appropriate option action button.
4. Confirm the entries with **OK**.

Function block viscosity



This functional group allows calculation of the viscosity.

The viscosity is derived from

- the speed [rpm] Input 1,

- the torque [Ncm] Input 2,

- the selected stirring element,

- the density of the medium,

- and the bearing friction.

Proceed as follows:

1. Call up the parameter window by double-clicking the symbol.
2. If necessary, enter the Module name in the text box. It is advisable to assign names if several viscosity blocks are used.
3. Select the desired stirring element by clicking the appropriate item from the list.
4. Enter the density of the medium [g/cm^3].
5. Select the appropriate bearing friction curve.
6. Confirm the entries with OK.

Definition of stirring element

A mathematical model (performance characteristic) of the stirring element described by the parameters a0, b0, a1, b1 is used to calculate the viscosity.

The parameters are determined empirically for various calibration liquids and are only valid for the defined viscosity range as well as the recommended speed range of the stirring element.

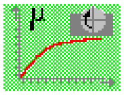
User-specific stirring elements can also be entered in this list.

VLV	= Very Low Viscosity	1 to	100 mPas	Aqueous media
LV	= Low Viscosity	100 to	1 000 mPas	Light oil
MV	= Medium Viscosity	1 000 to	10 000 mPas	Heavy oil
HV	= High Viscosity	10 000 to	100 000 mPas	Pastes, creams
VHV	= Very High Viscosity	100 000 to	500 000 mPas	Tar, dough

- Proceed as follows:

1. Call up the parameter window by clicking the **Stirring element configuration** ... command in the "Tools" pulldown menu.
2. Enter the parameters a0, b0, a1, b1.
3. Enter the diameter of the stirring element.
4. Enter the diameter of the stirring element.
5.
6. Configuring other stirring elements and storing list
7. 1. Configure other stirring elements in the way described above.
8. Store the configuration list by clicking the Close button.
9.

Bearing friction curve



Speed-dependent bearing friction (e.g. laboratory reactor LR 2000) should be eliminated in order to ensure precise torque measurement and viscosity determination. For this purpose, the torque behavior must be recorded in no-load operation (without medium) across the entire speed range. This basic system-related bearing friction is then subtracted from the measured torque when the viscosity is determined.

Using the Bearing friction files event block, the correlation between speed and torque can be continuously written to a preconfigured directory on the master computer's hard disk (e.g.: c:\labworld\data\...). The stored results are used at a later stage for eliminating the bearing friction when the viscosity is calculated. The bearing files have the extension *.lag to distinguish them from other files. Step width determines the gap between the speed steps at which the pertaining torque value is recorded.

▸ Proceed as follows:

1. Call up the parameter window for the result block by double-clicking the appropriate symbol.
2. Enter the step width for the speed values.
3. Confirm the entries in the parameter window with **OK.**

TTL Level

TTL (**T**ransistor-**T**ransistor-**L**ogic) levels define the voltage values for distinguishing a logic level 0 from a logic level 1.

The voltage range of the TTL logic is from 0 - 5V (corresponding to a numerical value of 0 - 5 in **labworld*soft***) while values from 0 - 0.8V correspond to the logic level 0, and values from 2 - 5V correspond to the logical level 1. The range of 0.8 - 2V is the hysteresis between the levels (if a signal is recognized as Low, the value must rise to above 2 in order to be recognized as High; if High is recognized, the value must drop to below 0.8 in order to be recognized as Low).

As a rule, where TTL output or input levels within **labworld*soft*** are concerned, **Numerical Values** of 0 or 5 are meant.

Result units

The following chapter contains a detailed description of the result units with all their parameter settings. In addition to the units purely for display purposes (digital or graphic), the green area of the tool bar also contains a "Write files" result unit with which results can be recorded and used for control purposes.

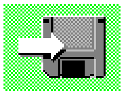
Selecting result units

- Proceed as follows:
  - Select the result unit via the tool bar by clicking on the desired symbol (green area).

    or
  - Select the functional unit via the **Module** pulldown menu by clicking on

Files	**Write**
	Bearing friction curve
Visualization	**y/t Graph**
	Offline Graph
	y/x Graph
	Digital Instrument

Writing files



With the Write files result unit results from one or more channels can be continuously written to a specified directory on the hard disk of the control computer (e.g.: c:\labworld\data\...). The saved results are used at a later time for controlling laboratory instruments . To distinguish them from other files, the result files have the extension *.ika. Other files are generated with the result file, i.e.:

A result file in ASCII format with the extension *.txt. The file is used in particular for further processing in spread sheet programs.

The control field **Also save data in Excel file** opens Excel at the start of the measuring process and also directly writes the measurements into an Excel sheet.

A text file with the extension *.doc for logging purposes.

The generation of the ASCII file can be switched off and on via a control field in the parameter window. The text file is used for storing a result log, which the user can design individually in the result window.

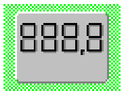
- Proceed as follows:

1. Open the parameter window of the result unit by double clicking on the appropriate symbol.
2. Set the **Number of channels** with the upper arrow buttons (e.g. 4).
3. Select the channels with the lower arrow buttons and configure them with **Descriptions** and **Units**.
4. Open the window for entering the result files with the **Path** action button. The file entry window appears.
5. Enter the file name in the current directory and confirm it with **OK**. The file name appears in the parameter window.
6. Confirm the entries in the parameter window with **OK**. The result window appears as a symbol (icon) at the lower edge of the screen.
7. Open the result window by double clicking on the icon. Individual text entries can be made in the **Log field**.

Control input:

Trigger input: you can start data acquisition, time or event-driven, by switching the trigger input from low to high. The trigger event can be produced by any control unit (push button, switch, trigger, timer, …). If the trigger input is not in use, data acquisition will start when measuring begins.

Digital display



With the digital display the results of a channel can be displayed with variable resolution (decimal places). For the "Individual value" option all result values are displayed, while for the "Minimum value" (or "Maximum value") option only the smallest (or largest) value within the observation period is displayed. A value range can be defined by entering a lower and upper marking (threshold). Result values which lie outside the marking are shown in red. The size of the numbers and their fonts can be individually specified.

▶ Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
2. If necessary, enter the name of the digital display in the 'Description' text field.
3. Select the **Display mode** with the option action button.
4. Enter the lower and upper **Marking** in the list field.
5. Select a **Unit** from the list field (e.g. rpm).
6. Select the number of **Decimal places** from the list field.
7. If desired, change the fonts for the result value or for the unit:
   Click on the **Digital font** or **Unit font** action button. The font editor appears.
8. If desired, change the background color of the display: Click on the **Background** action button. The color definition editor appears.
9. Close the parameter window with **OK**. The result window appears as a symbol (icon) at the lower edge of the screen.
10. Open the result window by double clicking on the icon.

Setting background color

After selecting the Background action button in the parameter window of the digital display, the editor for setting the background color appears. You can select from a palette of 40 basic colors (standard) or define the desired color with an additional editor.

- Proceed as follows:

1. Click on the rectangle with the desired color.
2. Confirm the entry with **OK**.

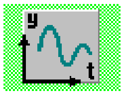
Setting font

- Proceed as follows:

1. After selecting the "Digital font" or "Unit font" action buttons in the parameter window of the digital display, the editor for setting the font appears.
2. Select the desired **Font** in the appropriate list field (e.g. Arial).
3. Select the desired **Font style** in the appropriate list field (e.g. bold-italics).
4. Select the desired **Font size** in the appropriate list field (e.g. 23 pt).
5. Select the desired **Font color** in the appropriate list field (e.g. carmine red).
6. Confirm the entries with **OK**.

Note:
With the scroll bars on the side, parts of the list fields can be displayed which cannot currently be seen.

Graph display



With the graph display the results of a maximum of eight channels can be displayed over time simultaneously. The number of channels and their units are set in the parameter window. Channel labels are provided to be able to differentiate in the case of later scale assignment (yi), (e.g. Curve 1, 2, etc.). In addition, the y-axis can be limited to the value range of interest (ymax, ymin scale).

The coloration of the graph display can be selected individually, while the line width of the measuring curve can also be changed.

- Proceed as follows:

1. Open the parameter window of the result unit by double clicking on the appropriate symbol.
2. If required, enter the **Module name** in the 'Description' text field.
3. Set the **Number of channels** with the upper arrow buttons.
4. Select the channels with the lower arrow buttons.
5. Enter the **Description**, **Unit** (e.g. rpm) and **Minimum** and **Maximum** value of the Y-scale for each channel.
6. **Activate** the channel with the control field so that results appear in the result window.
7. Close the parameter window with **OK**. The result window appears as a symbol (icon) at the bottom of the screen.
8. Open the result window by double clicking on the icon. The result window appears in the normal size with the current scale.

Control input:

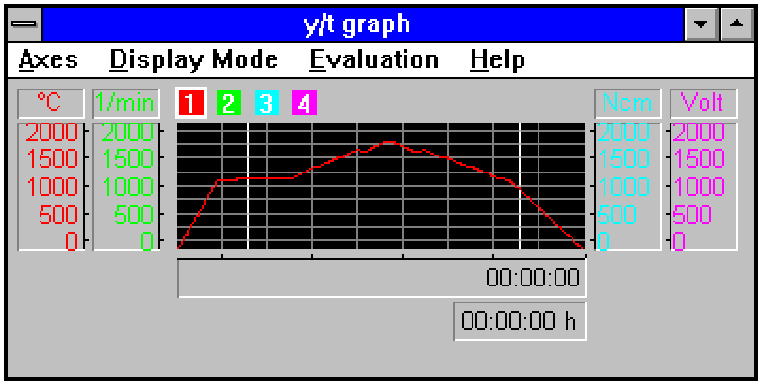
Trigger input: you can start data acquisition, time or event-driven, by switching the trigger input from low to high. The trigger event can be produced by any control unit (push button, switch, trigger, timer, …). If the trigger input is not in use, data acquisition will start when measuring begins.

The scale parameters can be individually set depending on the measuring variables and the number of channels to be displayed:

Defining time and Y-scales

The time axis is dependent on the current measurement duration and must be set separately (menu bar of result window). The y-axis can be assigned with a maximum of four scales in accordance with the selected number of channels. For better clarity the scales have the same color as the related measuring curves.

Two cursor lines, which can be moved over the time axis, are used to evaluate the curves.



The individual setting of the scales is described under the following points.

Scaling time axis

- Proceed as follows:

1. Open the **Axes** pulldown menu in the menu bar of the result window.
2. Open the window for entering the time by clicking on **Time scale...** in the pulldown menu.
3. Enter the desired **Time** (in minutes) in the text field and confirm it with **OK**.

Note:
In the basic setting the time axis is set to 30 minutes. The value can be changed if necessary.

Scaling Y-axis

Depending on the measuring variables and the number of channels to be displayed, the scale parameters can be set individually.

- Proceed as follows:

1. Open the **Axes** pulldown menu in the menu bar of the result window.
2. Open the Y-scale window by clicking on **Y-scale...** in the pulldown menu.

Specify the scale for the first channel.

3. Select Curve1 in the ’Channel’ field by clicking on the appropriate list entry.
4. If necessary, change the **Name** of the channel in the ’Description’ text field.
5. Enter the desired **Unit** (e.g. °C, Ncm etc.) in the text field.
6. Enter the **Maximum** and **Minimum** value of the y-scale in the list fields.

Note:
In the basic setting the Y-axis is assigned the unit rpm (speed) with a value range from 0 to 2,000. In addition, the channel is provided with a standard label (Curve1).

Defining scale for other channels

▶ Proceed as follows:

1. Select Curve2 in the ’Channel’ field by clicking on the appropriate list entry.
2. If necessary, change the **name** of the channel in the ’Description’ text field.
3. Enter the desired **Unit** (e.g. °C, Ncm etc.) in the text field.
4. Repeat steps 1 to 3 for channels 3 and 4.
5. Close the dialog box with **OK** and return to the result window.

Assigning scales to curves (multi-channel display)

In the basic setting only one curve or Channel 1 is assigned a scale. In the case of a multi-channel display the other channels must be assigned the scales still available with a dialog box. To be able to differentiate, scales and the related measuring curve have the same color in the result window.

Scales and curves can be assigned as desired; the order, e.g. Curve1 to first scale, is not mandatory.

▶ Proceed as follows:

1. Open the **Axes** pulldown menu in the result window.
2. Open the scale assignment window by clicking on **Scale Assignment...** in the pulldown menu.

Assign first curve

▶ Proceed as follows:

3. Select the first curve in the 'Channel name' field by clicking on the appropriate list entry.
4. Select the desired scale by clicking on the appropriate arrow button. The name of the first curve appears in the window at the right.

Assign second curve

▶ Proceed as follows:

5. Select the second curve in the 'Channel name' field by clicking on the appropriate list entry.
6. Select the desired scale by clicking on the appropriate arrow button. The name of the second curve appears in the window at the right.
7. Repeat steps 5 to 6 for channels 3 and 4.
8. Close the dialog box with **OK** and return to the result window.

Curve evaluation with cursor

The result window can be switched over to its maximum size for detailed evaluations and multi-channel representations so that the entire screen is available.

Measured values can be read out at any point on the curve with vertical cursor lines. The left-hand cursor line forms the intersection (y1/t1) with the curve, while the right-hand cursor line forms the intersection (y2/t2). The intersections are displayed numerically and the differential values y2 – y1 and t2 – t1 appear.

- Proceed as follows:

1. Switch the result window from its normal size to its maximum size.
2. Switch on the cursor lines with the **Evaluation** pulldown menu. Two vertical lines appear.
3. Select the curve the cursor is to act on:
   Click on the **Box** with the **Color** of the curve to be examined. The numerical value of the current intersection appear below the graph field.
4. Grab the cursor with the mouse (click on it and hold down the mouse button) and move it to the desired position. The numerical values of the current cursor position are displayed continuously.

Specifying colors and line width

- Proceed as follows:

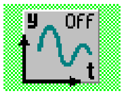
Specify colors

1. Open the **Display mode** pulldown menu in the menu bar.
2. Click on **Colors and lines...** to open the dialog box for entering colors.
3. Click on the desired element for which the color is to be changed in the list of parameters.
4. Open the color palette by clicking on the **Color** action button. Additional dialog boxes with color palettes are opened (basic colors, mixed colors).
5. Select the desired color and confirm it with **OK**.
6. Click on the next element in the parameter list ... continue with Point 4.

Specify line width of measuring curve

1. Click on the element **Input 1** (for Measuring Curve 1) in the parameter list.
2. Set the number in the 'Line width' entry field in accordance with the desired line width:
   1: narrowest line width (basic setting)
   9: broadest line width
3. Confirm the entries with **OK**.

"Offline" graph display



With the "Offline" graph display result unit controlling variables can be recorded "offline", i.e. without the usual laboratory instrument environment. This makes it possible to test and optimize the behavior of the control sequences over time with a simulation prior to the actual measurement with the real laboratory instrument. The signal flow for such a test consists of the "Offline graph display" and the "Read files" control unit .

The display possibilities of the "Offline graph display" result unit are basically the same as those of the normal graph display . In addition, supplementary display functions are also available.

- A **Zoom function** for magnifying interesting curve sections.
- A **Scroll bar** for scrolling the curve over the time axis. This is of interest for long control sequences.

▶ Proceed as follows:

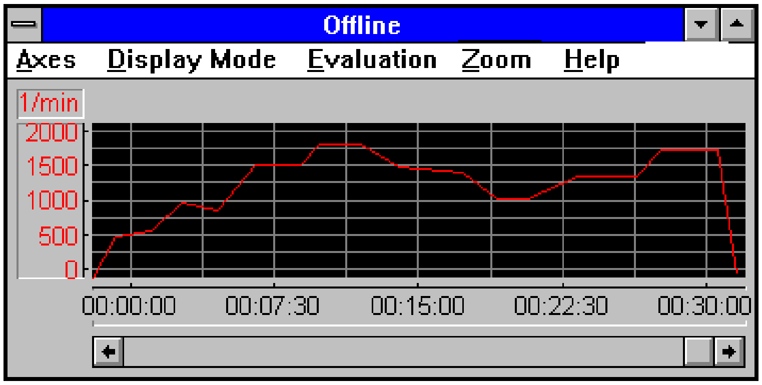
1. Open the parameter window of the result unit by double clicking on the appropriate symbol.
2. If required, enter the **Module name** in the 'Description' text field.
3. Set the **Number of channels** with the upper arrow buttons.
4. Select the channels with the lower arrow buttons.
5. Enter the **Description**, **Unit** (e.g. rpm) and **Minimum** and **Maximum** value of the Y-scale for each channel.
6. **Activate** the channel with the control field so that results appear in the result window.
7. Close the parameter window with **OK**. The result window appears as a symbol (icon) at the bottom of the screen.
8. Open the result window by double clicking on the icon. The result window appears in the normal size with the current scale.

The individual setting of the graph display is described under the following topics:

Defining Y-scale

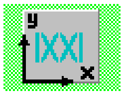
The Y-axis can be assigned a maximum of four scales in accordance with the selected number of channels. To improve clarity, the scales have the same color as the related measuring curves.

Two cursor lines, which can be moved via the time axis, are used to evaluate the curves.



The individual setting of the scales is described under the following points.

Y/X graphic display



Measuring data for completed measurement cycles can be displayed using the Y/X graphic display result block. This allows measuring data to be displayed not only for time but also for any physical variables. Correlations, e.g. increase in speed resulting from an increase in speed, become more distinct. The measuring sequence plan for such a test comprises the "Y/X graphic display" and the "Read files" control unit . The display possibilities of the "Y/X graphic display" result block are the same as those for the standard graph display .

▶ Proceed as follows:

1. Call up the parameter window for result block by double-clicking the appropriate symbol.

2. If necessary, enter a Module name in the "Name" text box.

3. Assign the channels to the Y and X axes.

4. Enter the Name, Unit (e.g. rpm) for each input.

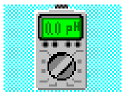
5. Close the parameter window with OK. The result window is visible as a symbol (icon) at the bottom of the screen.

6. Display the result window by double-clicking the icon. The result window appears in normal size with the current scaling.

Information concerning configuration of the graphic display can be found under the following topics:

Laboratory devices

Ahlborn Almemo



The **Ahlborn Almemo** is a all-purpose measuring instrument which, depending on the type, accommodates up to 10 different sensing devices.

In over 50 measuring ranges practically all of the sensors which are used in the laboratory may be recorded in addition to voltages, currents and resistance.
Configuration of the individual inputs is carried out on the unit, in **labworld*soft*** only the assigned channels are activated.
The corresponding output paths are marked by means of digit fields. In the basic setting output path 1 is for reading out the first measurement channel.

Measured values

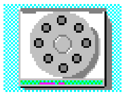
1. Depending on the type of unit up to 10 freely configurable channels with various measured quantities.

NOTE:
Detailed information on the measuring instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: RTS/CTS.

Christ Rotary Vacuum Concentrator



Microprocessor controlled centrifuge with cooling and vacuum operation.

Control

1. Input path for set temperature.
2. Input path for set speed.
3. Input path for set vacuum.

Measured values

1. Set temperature in °C
2. Actual temperature in °C
3. Set speed in 1/min.
4. Actual speed in 1/min.
5. Set vacuum in mbar.
6. Actual vacuum in mbar.

If the **Time Control by labworldsoft** option is activated, then the internal time default of the centrifuge is deactivated, i.e. the duration of the current measurement determines the centrifuge running time.

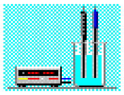
If the **Open Cover After Completed Measurement** option is activated then the cover is automatically opened when the measurement has been completed in **labworld*soft*** (after running out).

NOTE:
Detailed information on the centrifuge features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Corning pH/ion meter 450



pH meter for two independent measuring points with temperature compensation.

Measured values

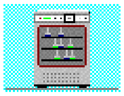
1. pH value measuring sensor A
2. pH value measuring sensor B
3. Compensation temperature in °C

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

⚠
For proper communication the transmission parameters of the unit serial interface have to be set to the following values:
Baud rate: 9600 Baud.
In addition, the **System | Data logger** function must be set to **on-print only**.

⚠
The response times of this device is 2200 ms for each activated measured value. If all outputs are activated then the minimum possible measuring rate increases to 6600 ms. If a lower scanning rate has been selected by the user, then it is automatically corrected when the measurement is started with **labworld*soft***.

Ehret Laboratory controller grado 9x1/ PR2



The laboratory automatic controllers grado 9x1 / PR2 are used for device control in various laboratory instruments of the Ehret company. Assignment of the correcting variables and/or the actual values depends on the type of laboratory instrument.

The corresponding input and output paths are marked by means of digit fields.

grado 9x1

Control

1. Input path for set value (in general, depending upon device set speed / set temperature, etc.).

Measured values

1. Set value. (in general, depending upon device actual speed / actual temperature, etc.).
2. Actual value. (in general, depending upon device actual speed / actual temperature, etc.).
3. Interrupt output, 1st limit value.
4. Interrupt output, 2nd limit value.
5. Control variable.

PR2

Control

1. Input path for set temperature.
2. Input path for set humidity.
3. Light ON/OFF.

Measured values

1. Set temperature in °C.
2. Actual temperature in °C
3. Set humidity in %.
4. Actual humidity in %.
5. Light ON/OFF

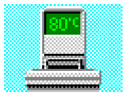
NOTE:
Detailed information on the corresponding laboratory device features may be found in the separate operating manual.

⚠

For proper communication the transmission parameters of the unit serial interface have to be set to

the following values:
grado 9x1:
4800 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none
An RS485-RS232 converter is also required in order to operate grado 9x1 with **labworld*soft***!
PR2:
4800 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Eyela Bath, Circulator or Freezer NCB/NTB/PCC/MPF



Highly precise, processor-controlled Bath, Circulator or Freezer for temperature control.

Control

1. Input path for the target temperature.

Measurement values

1. Target temperature in ℃
2. Actual temperature in ℃

Setting temperature range

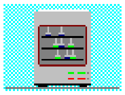
MODEL	setting range
Programmable Low Temp.Precision Bath (NCB-3100,3200,3300)	−30～ 80℃
Programmable Precision Bath（NTB-221）	(Room temperature +10℃) ～ 200℃
Crystallized Constant Temp.Circulator（PCC-7000）	−30～ 80℃
Programmable Freezer（MPF-1000）	−40～ 30℃

Note:
For detailed properties of the device, please refer to each Operating Instruction.

To ensure correct communication, the transfer parameters of the serial interface of the device must be set to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

EYELA Oven,Incubator or Furnace WFO/NDO/VOS/LTI



Highly precise, processor-controlled Oven, Incubator or Furnace

Control

1. Input path for the target temperature.

Measurement values

1. Target temperature in ℃
2. Actual temperature in ℃

Setting temperature range

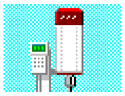
MODEL	setting range
Forced Air Flow Oven（WFO-451SD、601SD、1001SD）	40～200℃
Convection Oven（NDO-451SD、601SD）	40～250℃
Vacuum Oven（VOS-601SD）	40～200℃
Vacuum Oven（VOS-201SD、301SD、451SD）	40～240℃
Programmable Electric Furnace（TMF-1200、2200、3200）	200～1150℃
Low Temp. Incubator（LTI-601SD、1001SD）	－10～60℃
Low Temp. Incubator（LTI-601ED-N、601ED、1001ED）	4～60℃

Note: For detailed properties of the device, please refer to each Operating Instruction.

To ensure correct communication, the transfer parameters of the serial interface of the device must be set to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Fluid FL300MS



The **FL300MS** is a stirring motor with a powerful torque for use up to the "high viscosity" range. The maximum torque at the chuck amounts to 60 Ncm and the speed lies between 50 and 2000 1/min.

Control

1. Input path for set speed.

Measured values

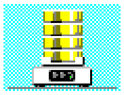
1. Set speed in 1/min.
2. Actual speed in 1/min.

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 2 stop bit, parity none, handshake: none.

Fritsch Analysette 3 Pro



Vertically oscillating laboratory sieving device for precise separation and classification of grain fractions.

Control

1. Input path for set amplitude.
2. Input path for interval period.

Measured values

1. Set amplitude in mm.
2. Actual amplitude in mm.
3. Interval time in min/sec.

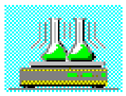
The "Micro-sieving" option push-button corresponds to the "Micro" button on the device control panel.

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Gerhardt Shaker Laboshake LS2, RO2; Laboshake LS5, RO5



Gerhardt Shaker

Control

1. Input path for set speed.

Measurement values

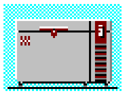
1. Set speed in 1/min.
2. Actual speed in 1/min.

NOTE:
Detailed information on the shaker features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

GFL Freezer/freezing cabinet



GFL sub-zero freezing cabinets with from 30 to 500 liters of effective space, and GFL sub-zero freezers with from 300 to 500 liters of effective space in a temperature range of from +/-0 to -40℃ and from -50℃ to -85℃ for long-term storage of sensitive substances.

Control

1. Input path for the target temperature.

Measurement values

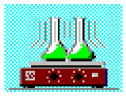
1. Target temperature in ℃
2. Actual temperature in ℃

Note:
or detailed features of the device, please refer to the separate Operating Instructions.

To ensure correct communication, the transfer parameters of the serial interface of the device must be set to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

GFL Shaker



GFL-Shaker

Control

2. Input path for set speed.

Measurement values

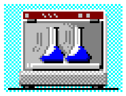
3. Set speed in 1/min.
4. Actual speed in 1/min.

NOTE:
Detailed information on the shaker features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

GFL Shaking Incubator



Circular shaker in incubation cabinet.

Control

1. Input path for set speed.
2. Input path for set temperature.

Measured values

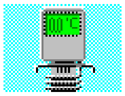
1. Set temperature in °C.
2. Actual temperature in °C
3. Set speed in 1/min.
4. Actual speed in 1/min.

NOTE:
Detailed information on the shaker features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Haake Thermostat



Highly precise, processor-controlled laboratory thermostat for direct and indirect thermostating.

Control

1. Input path for set temperature.

Measured values

1. Set temperature in °C
2. Actual temperature in °C
3. External actual temperature in °C

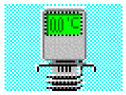
NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

⚠

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: RTS/CTS.

Haake Thermostats DC/DL series



Highly precise, processor-controlled laboratory thermostat for direct and indirect thermostating.

Control

1. Input path for set temperature.

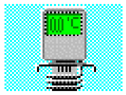
Measured values

1. Set temperature in °C
2. Actual temperature in °C

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:
4800 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: RTS/CTS.

Haake Thermostat Phoenix Line



Highly precise, processor-controlled laboratory thermostat for direct and indirect thermostating.

Control

1. Input path for set temperature.

Measured values

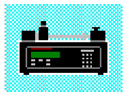
1. Set temperature in °C
2. Actual temperature in °C
3. External actual temperature in °C

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none‘

Harvard Syringe Pump PHD2000 Infusion/Model11/Model22



High precision syringe pump for low to medium backflow pressures.

Control

1. Flow rate
2. Volume dosage
3. Start/Stop

Measurements

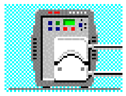
1. Flow rate
2. Current dose volume
3. Volume dosage

Please select the relevant syringe type in the **Syringe Ø** box.

Note:
Please see separate operating instructions for more details of appliance properties.

To ensure correct communication, you must set the transfer parameters in the appliance's serial interface to the following values:
9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Heidolph Pumps 5201/5206



Peristaltic pumps are used as dosing, feed or suction pumps in all laboratory fields.

A large selection of interchangeable heads makes it possible to process gaseous, liquid, solids-bearing, aggressive or abrasive media.

Sterile work is ensured through the use of sterile hoses.

A large selection of hoses makes it possible to perform dosing tasks over a large range.

The corresponding input and output paths are marked by means of digit fields.

Control

1. Input path for speed/flow rate.
   The set value for the speed (1/min.) or the flow rate (ml/min.) is provided here as a function of the selection fields setting: dosing 1/min. or dosing ml/min.

   The range: "Flow rate as a function of......." the dialog provides an overview of the flow rates which may be expected as a function of the pump head and speed.

   Select the corresponding combination from the field "HeadID / HoseID" in order to obtain information about the flow rates which may be expected.

2. Volumetric feeding

3. Starting volumetric feeding.

Measured values

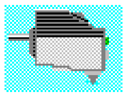
1. Actual speed or Actual flow rate in 1/min. or ml/min.

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Heidolph Laboratory Stirrer RZR 2051/2052/2102 control



Electronic laboratory stirrers

- Constantly high torque over entire speed range
- Constant speed, even when viscosity changes
- Excellent mixing results, even with highly viscose media
- Target speed displayed in stop mode
- Illuminated digital speed and torque display
- Torque calibration at beginning of application
- Measurement of relative torque change during application
- Designed for reproducible results
- Integrated serial interface and analogue output

Control

1. Target speed (1/min)
2. Mode (set zero reference for torque output)

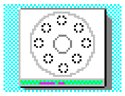
Measurements

1. Target speed (1/min)
2. Actual speed (1/min)
3. Torque (Nmm)

Note:
Please see separate operating instructions for more details of appliance properties.

To ensure correct communication, you must set the transfer parameters in the appliance’s serial interface to the following values:
9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Hermle Centrifuges



Microprocessor controlled centrifuges from the Hermle company:

Control

1. Input path for set temperature.
2. Input path for set speed.

Measured values

1. Set temperature in °C (only for cooled version).
2. Actual internal temperature in °C (only for cooled version).
3. Set speed in 1/min.
4. Actual speed in 1/min.

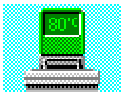
NOTE:
Detailed information on the centrifuge features may be found in the separate operating manual.

⚠

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: none.

Huber Laboratory Thermostats



Highly precise, processor-controlled laboratory thermostats for direct and indirect tempering.

Control

1. Input path for set temperature.

Measured values

1. Set temperature in °C
2. Actual temperature in °C
3. External actual temperature in °C

Via two option push-buttons control can be switched between the internal sensor and an external sensor.

Monitoring the temperature control

1. Watchdog active/ not active
2. Time-out time for the watchdog
3. Time-out actions.

As an additional piece of safety equipment, laboratory thermostats from Huber offer device-internal monitoring with labworldsoft or from the attached computer. If the control software or computer fails (crash, loss of power, etc.), this system is able to turn off the thermostat or to switch it over to a safe temperature range. The thermostat's Parameters dialog box is used to activate the watchdog, to set the time window and to set actions to be initiated in the event of a fault.

The Time-out time of the watchdog must be selected so that is greater than the current sampling rate of the measurement by a factor of at least 5.The features for safety monitoring are not available until after the control path for the target temperature has been activated.

This feature is supported beginning with a specific delivery date of the thermostat. If your device does not support this feature, an appropriate error message will be generated before the beginning of the measurement. As a basic rule, models that were delivered before January 1 1999 do not support this feature.

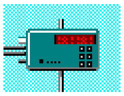
NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

⚠

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Ilmvac Vacuumcontroller VCZ 324



Vaccumcontroller is used to control pressure of membrane pumps.

Control

1. Input path for set vacuum [mbar]
2. Hysteresis [mbar]

Measured values

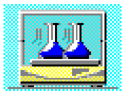
1. Actual vacuum [mbar]
2. Actual voltage [V]

Notes:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

19200 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Infors Minitron



Shaker with incubation hood

Control

1. Input path for set speed [1/min]
2. Input path for set temperature [°C]
3. Input path for light On/Off . (The value 5 is equivalent to light On / The value 0 is equivalent to light Off)
4. Input path for set humidity [%]
5. Input path for set CO_2 [%]

Measured values

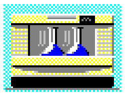
1. Actual speed [1/min]
2. Actual temperature [°C]
3. Light On/Off
4. Actual humidity [%]
5. Actual CO_2 [%]

Notes:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 baud, 1 start bit, 8 data bits, 2 stop bit, parity none, handshake: none.

Infors Multitron 2 Upper-, Middle-, Lower- Unit



Shakers with up to three independently controllable shaker levels with tempering.

Control

1. Input path for set speed [1/min]
2. Input path for set temperature [°C]
3. Input path for light On/Off . (The value 5 is equivalent to light On / The value 0 is equivalent to light Off)
4. Input path for set humidity [%]
5. Input path for set CO_2 [%]

Measured values

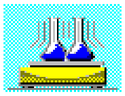
1. Actual speed [1/min]
2. Actual temperature [°C]
3. Light On/Off
4. Actual humidity [%]
5. Actual CO_2 [%]

Notes:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 baud, 1 start bit, 8 data bits, 2 stop bit, parity none, handshake: none.

Infors Shaker



Shakers with up to three independently controllable shaker levels and tempering via an incubation hood.

Control

1. Input path for set speed (1x each per level).
2. Input path for set temperature (1x each per level).
3. Input path for light ON/OFF (1x each per level / only for Multitron).

Measured values

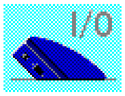
1. Actual speed in 1/min (1x each per level).
2. Actual temperature in °C (1x each per level).
3. Light ON/OFF (1x each per level / only for Multitron).

NOTE:
Detailed information on the measuring instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 2 stop bit, parity none, handshake: none.

IKA Werke Datacontrol IO 2



The IO 2 (**I**nput - **O**utput) module from the IKA Laboratory Technology company provides for 8 digital inputs (TTL-Pegel) and 8 digital outputs (potential-free relay contacts/make contacts).

Inputs:

8 independent inputs (with common ground terminal).

Either voltage outputs (0-24V) or direct switching contacts (e.g. limit switches) may be connected, where voltages < 0.8 V or closed contacts correspond to the TTL-level and voltages > 2.0 V or open contacts correspond to the TTL level 1 .

Input resistance > 100 k.

The IO module only differentiates between logical 0 and logical 1 input signals. If the voltage is also to be recorded then the Datacontrol DC2 has to be used.

Activated inputs are shown on the right side of the module.

Outputs:

8 independent, potential-free relay contacts (make contacts), each with a switching capacity of 30 V / 1 A.

In order to switch mains voltage or high currents a power switch with a grounding pin is available as an accessory.

The IO module only transmits output signals between logical 0 and logical 1. If the voltage is to be displayed as well then the Datacontrol DA2 has to be used.

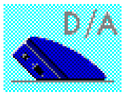
Activated outputs are shown on the left side of the module.

The 8 inputs or outputs can be activated and selected or evaluated independently of each other.

For safety reasons only low voltages in accordance with EN 61 010 (IEC 1010) may be used in the input and output voltage range!

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

IKA Werke Datacontrol DA 2



With **DA 2** from the IKA Laboratory Technology company laboratory devices with analog inputs can be integrated into the **labworld*soft*** control and evaluation system; in the following these devices are referred to as **analog devices** for short.

DA 2 converts the digital control signal that is supplied by **labworld*soft*** via the serial interface into analog current or voltage signals which are capable of being interpreted by the various analog devices.

DA 2 is able to convert practically all of the signals provided by upstream functional blocks into the corresponding analog current or voltage signals.

Outputs:

Port 1	Four switchable output ranges (optional)	0-1V, 0-10V, 0-20mA and 4-20mA
Port 2	Four switchable output ranges (optional)	0-1V, 0-10V, 0-20mA and 4-20mA
Port 3	A fixed output range	0-5V
Port 4	A fixed output range	0-5V

A maximum of four analog devices (or four control inputs from one analog device) can be triggered at the same time via **DA 2.** The input paths or analog ports are capable of being activated in the parameters window. Assignment of the analog devices to the **DA 2** ports is performed in a downstream window.

Classification of the analog devices into certain current and voltage ranges is carried out in a separate window for device configuration. This configuration has to be performed in an advance operation.

– Make certain to note the available **DA 2** current and voltage ranges of the before you connect the analog devices.

– Analog devices that you use in **labworld*soft*** have to be included in the device configuration selection list.

– A maximum of four devices may be assigned to each **DA 2** via the corresponding designations.

The **DA 2** parameter settings may be found under the following topics:

Device configuration (analog devices)

labworld*soft* device configuration makes it possible to integrate laboratory devices with analog inputs or outputs into your measurement sequence schedules.

With the DC2 the laboratory device output signals are evaluated and the DA2 provides analog signals in order to trigger the inputs of a laboratory device.

Both devices provide different current and voltage ranges of up to 20 mA or 10 volts.

The configuration is made up of the following parameters:

– Designation of the analog device for identification in the DC2/DA2 selection list.

– Current or voltage range (two current ranges and three voltage ranges available).

– Unit of measurement of the measuring or control value (1/min, °C, etc.).

– Measuring or control value which corresponds to the maximum analog voltage (or current).

– Measuring or control value which corresponds to the minimum analog voltage (or current).

▶ Carry out the following instructions:

- Call up the parameter window by clicking the **Device Configuration...** command and the corresponding submenu in the pull-down menu "Tools".

Configuring the First Analog Device

1. Define the device current or voltage class by clicking on the corresponding option push-button in the "Output" or "Input" field.
2. Enter the device **Designation** into the text field.
3. Enter the **Unit** of measurement or control value into the text field, e.g. 1/min.
4. Enter the **Measuring or Control Value** which corresponds to the maximum analog voltage (or current).
5. Enter the **Measuring or Control Value** which corresponds to the minimum analog voltage (or current).
6. **Confirm** the entry by clicking on the push-button with the same name. The analog device is included in the list.

Configuring Additional Analog Devices and Saving the List

1. Additional analog devices may be configured in the same manner as described above.
2. Save the configuration list by clicking on the **Close** push-button.

Configuring DA 2

Specifying Analog Ports

▶ Carry out the following instructions:

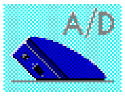
1. Call up the parameters window by double clicking on the icon.
   The parameter window then appears. In the basic setting analog port 1 is activated.
2. Set general parameters (port code, designation of the digital/analog converter).
3. Activate additional analog ports by clicking the corresponding control fields.

Assigning Analog Devices

- Carry out the following instructions:

1. Call of downstream parameter window by clicking **Setup**. The parameter window then appears.
2. Select the desired analog device from the list by clicking the list entry. The selected list entry will appear in inverse format.
3. Assign the analog device to a port which is not in use by clicking the corresponding arrow key. The designation of the analog device appears in the adjacent window.
4. Assign additional analog devices in the same manner.
5. Use **OK** to confirm the entries and close the two parameter windows.

IKA Werke Datacontrol DC 2



With the Datacontrol DC 2 laboratory instruments or instruments of other manufacturers with analog output signals can be integrated in the labworldsoft control and evaluation program; these instruments will be called analog instruments for short in the following.

The Datalogger converts the analog signal, e.g. in the range between 0 and 1 V into a proportional standard signal which can be interpreted by **labworld*soft***.
The signals digitalized in the DC 2 can generally be used for further processing in downstream functional units, e.g. for result display or arithmetic evaluation.
Several current and voltage classes are available for the analog instruments:

- 0 to 20 mA
- 4 to 20 mA
- 0 to 1 V
- 0 to 5 V
- 0 to 10 V
- Measuring variables from a maximum of four analog instruments can be output simultaneously via the DC2. The output paths or analog channels can be activated in the parameter window. In the subsequent parameter window the analog instruments are assigned to the channels of the DC2.
- The analog instruments are classified into certain current and voltage ranges in a separate window of the instrument configuration. This configuration must take place in a prior step.
- Important:
- Note the permissible current and voltage ranges of the Datacontrol DC2 before connecting the analog instruments.
- Analog instruments used in **labworld*soft*** must be recorded in the selection list of the instrument configuration.
- A maximum of four instruments per Datacontrol can be assigned via the appropriate labels.

The parameter settings of the Datacontrol can be found under the following topics:

Configuring Datacontrol DC 2

Defining analog channels

▶ Proceed as follows:

1. Open the parameter window by double clicking on the symbol.
   The parameter window appears. In the basic setting the analog channel No. 1 is activated.
2. Set the general parameters (port code, Datalogger label).
3. Activate other analog channels by clicking on the corresponding control fields.

Assigning analog instruments

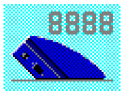
▶ Proceed as follows:

1. Call up the subsequent parameter window by clicking on **Setup**. The parameter window

appears.

2. Select the desired analog instrument from the list by clicking on the list entry. The selected list entry appears inverted.
3. Assign the instrument to an unassigned channel by clicking on the appropriate arrow button. The instrument description appears in the window to the right.
4. Assign other analog instruments in the same way.
5. Confirm the entries by closing the two parameter windows with **OK**.

IKA Werke DTM11



The DTM 11 made by IKA Labortechnik is an all-purpose PT-100 resistance thermometer with a measuring range from -100 to +850 °C. Standard stainless steel temperature probes and borosilicate glass cladded probes are available with four-pole Lemo plug-in connectors.

Measured values

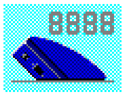
1. Temperature in °C

NOTE:
Detailed information on the measuring instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

1200 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: DTR/DSR.

IKA Werke DZM control

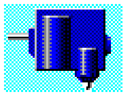


The DZM control is intended for a wide range of speed measuring tasks. The instrument operates either according to the principle of the reflex photoelectric barrier or according to the Hall effect and can measure speeds in the range from 5 to 50,000 rpm. The speed is digitally displayed and is also available as an analog signal (voltage, frequency) for further processing.

In the parameter window of the DZM the output path (1) for reading out the speed can be switched on and off (double click on the symbol). In the basic setting the output path 1 is switched on.

Note:
Please see the separate operating instructions for a description of the detailed characteristics of the revolution counter.

IKA Werke EUROSTAR POWER control-visc



The EUROSTAR POWER control-visc is a high-torque stirrer for use up to the high-viscosity range. The maximum torque at the chuck is 60 Ncm and the speed ranges between 50 and 2,000 rpm.

In the parameter window of the EUROSTAR POWER control-visc the desired controlling variables and the readable measured values can be activated. The corresponding input and output paths are marked with number fields. In the basic setting the output path 1 is set for reading out the rated speed.

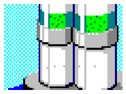
Control

1. Input path for rated speed.
2. "Mode" input path for switching between the speed and torque display. The torque display is reset to 0.
3. Measured values

1. Rated speed in rpm.
2. Real speed in rpm.
3. Torque trend, relative in Ncm.

Note:
Please see the separate operating instructions for a description of the detailed characteristics of the stirrer.

IKA Werke fexIKA



The solids extractor is a device used to extract all types of solid matter quickly and fully automatically. It is based on the IKA Labortechnik RET control visc . Apart from the magnetic stirrer, the extractor also has a valve which can be actuated from the computer. This valve allows a heating/cooling block on the magnetic stirrer to be cooled.

In the "fexIKA" parameter window, it is possible to make the following settings:

Ports: Here, you can select the port to which the fexIKA device to be configured is connected.

Measured values: Here, you can specify which measured values provided by the magnetic stirrer you want to output and which are to be included in the experiment plan.

Speed: Here, you can preselect the speed which is to be maintained for the duration of the experiment.

Adjust to: If the heating plate temperature option is selected, the setpoint "Heating" temperature entered in the "Cycles" window refers to the heating plate temperature of the magnetic stirrer. If the cooling sensor option is selected, the temperature refers to the measured PT100 value. (This is particularly advisable if the experiment is performed under a vacuum and at low temperatures (down to a block temperature of 0°C)).

The status box: When you activate an fexIKA device, a small icon which opens a status box when double-clicked appears at the bottom of the screen. The status box tells you whether extraction has been started (green dot after "Extraction"), whether heating or cooling is being performed (red or blue dot after "Heating/cooling"), and which cycle the process has reached.

You start general configuration in the usual way using the Start button (top left). You must then start each individual fexIKA process from the status box. In this way, you can control each fexIKA individually and independently from each other if more than one system is operated.

In an emergency, you can switch the cooling unit on and off at any time from the status box. This stops the process currently being performed.

fexIKA principle

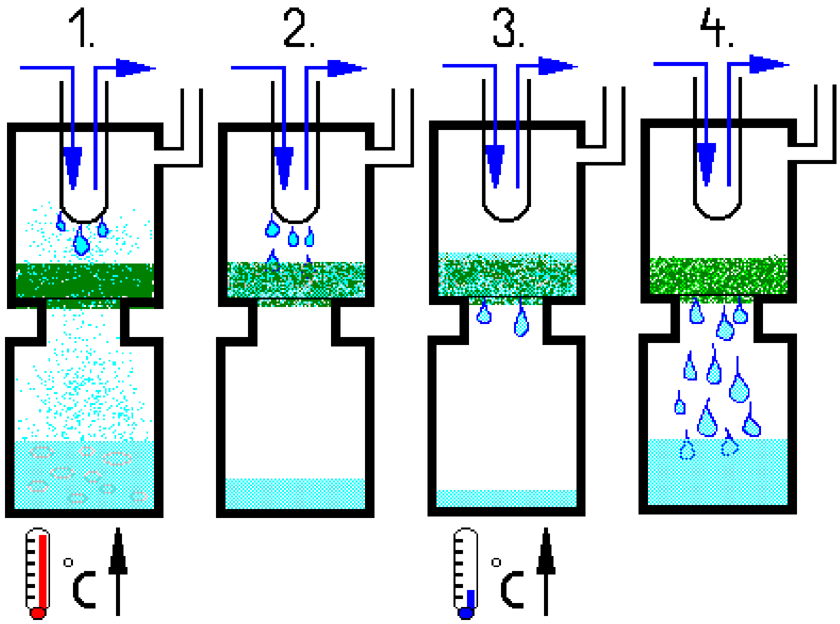
Fluidized bed solids extraction:

1. The solvent is heated up and flows as a vapor through the sample (the fluidization of the sample caused by the hot vapor gives the process its name). The solvent then condenses and drops back into the sample.

2. If most of the solvent has evaporated and has accumulated in the sample, the heating is switched off and cooling switched on.

3. The rapid cooling of the heating/cooling block causes the basic vessel to cool down rapidly. The solvent vapor pressure drops and a vacuum is created.

4. This vacuum causes the solvent in the sample to be drawn through a filter and back into the basic vessel. The process can then start again.



Cycles

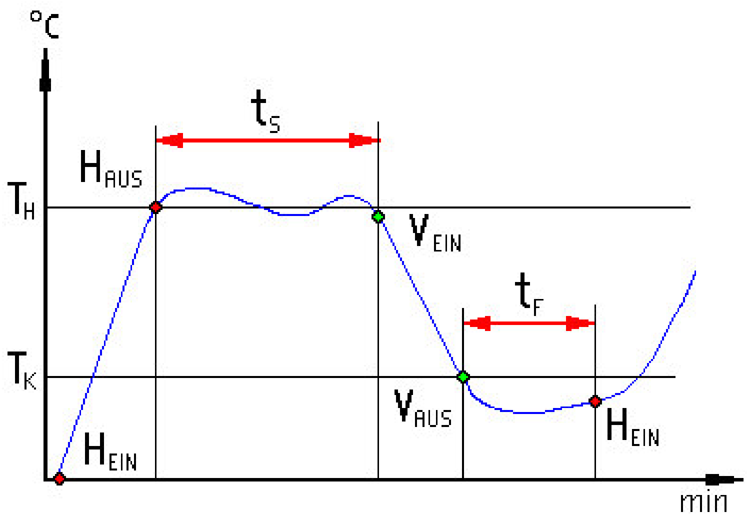
1. n=Number of operating cycles: Here, you can enter how often the process described above is to be repeated in the experiment sequence.

2. Setp. temp./heating (TH): This is the temperature (or PT100 temperature) up to which the heating plate is to be heated in the first step. Normally, a temperature of between 20 to 40°C above the solvent's boiling point is selected to ensure that the solvent is evaporated.

3. Boiling time (tS): This is the time in minutes which is to elapse, after the setpoint temperature/heating has been reached, before the heating/cooling block is cooled. As shown in step 2, the solvent must be evaporated during this time and accumulate in the extraction material. (For the initial experiments, it is advisable to determine this time empirically since it depends on the quantity of solvent and the properties of the sample and can vary considerably.)

4. Setp. temp./cooling (TK): This temperature is the temperature to which the heating/cooling block is to be cooled in step 3 in order to achieve the reaspiration effect. The temperature that you select must not be too low! If the cooling water is not cold enough for the temperature in the block to be reached, the process will stop at this point. Furthermore, energy is wasted if the block is cooled to a lower temperature than is necessary since this thermal energy will have to be supplied again for the following heating process.

5. Filtration time (tF): Here, you enter the time which is to elapse, after the setpoint temperature/cooling has been reached, to allow the reaspiration process to be performed completely. Generally, this process is performed rapidly and therefore a short time is sufficient. However, if the sample is very dense, a longer time must be set.



The illustration explains the fexIKA processing sequence:

Legend:

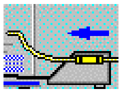
TH, TK, tS, tF:	See the above text
HEIN, HAUS:	Switch-on and switch-off point for heating
VEIN, VAUS:	Switch-on and switch-off point for valve

The parameters 2 to 5 can be entered three times:

You can make separate settings for the first cycle, the last cycle, and the intermediate cycle. This is advisable if, in the first cycle, you mix the sample with the solvent before pouring it into the extraction vessel and if only a small quantity of solvent is present in the basic vessel in order to achieve the reaspiration effect during cooling. A much shorter boiling time can be selected for the 1st cycle than would otherwise be required if all of the solvent had to be evaporated beforehand.

The last cycle can be controlled separately so that, at the end of the process, a specific temperature can be maintained or longer cooling can be performed to carry the residual heat away from the system.

IKA Werke KHS 1



The KHS makes it possible to operate the fexIKA (solid-fluid serial extractor) not only as a unit with fixed cycles, but also as a cooling (KHS1) and heating (RET control visc) control combination. Thus user-specific control of heating and/or cooling cycles operations is possible since both devices can be controlled independently of each other.

The corresponding input and output paths are marked by means of digit fields.

Control

1. Input path for solenoid valve ON/OFF.

Measured values

The device does not make any measured values available.

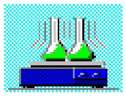
NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

⚠

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

No special settings are required for this device.

IKA Werke Shaker KM 250



Processor controlled horizontal shaker.

Control

1. Input path for set speed.

Measured values

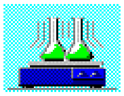
1. Set speed in 1/min.
2. Actual speed in 1/min.

NOTE:
Detailed information on the shaker features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: RTS/CTS.

IKA Werke KS125/ KS250/ KS 500 control



Family of processor-controlled horizontal shakers with different maximum loading and speed ranges of 30 - 800 1/min.

Control

1. Input path for set speed.

Measured values

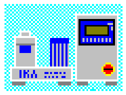
1. Set speed in 1/min.
2. Actual speed in 1/min.

NOTE:
Detailed information on the shaker features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

No special settings are required for this device.

IKA Werke Laboratory Pilot



The laboratory pilot primarily consists of a single-stage high-performance device for the continual dispersal of liquids. Dispersal is based on the rotor-stator principle whereby an extremely fast rotor (up to 13790 min^{-1}) with very narrow crevices rotates in a stator. This produces great shear power between the rotor and the stator. The system, which comprises a rotor and stator, is also known as a generator. The appliance can be adapted to the respective dispersal task by using generators with teeth of varying thicknesses. The different generators must always be used in pairs.

Control

1. Speed [%]
2. Start / Stop

Measurements

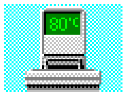
1. Speed [1/min]
2. Temperature [°C]
3. Power consumption of motor [A]

Note:
Please see the separate operating instructions for more details of the appliance properties.

To ensure correct communication, you must set the transfer parameters in the appliance's serial interface to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity even, handshake: none

Thermostat LT5 Control



Highly precise, processor-controlled laboratory thermostat for direct and indirect thermostating.

Control

1. Input path for set temperature.

Measured values

1. Set temperature in °C
2. Actual internal temperature in °C
3. External actual temperature in °C

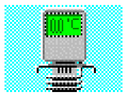
Via two option push-buttons control can be switched between the internal sensor and an external sensor (only High-Tech and MH).

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

4800 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: RTS/CTS.

IKA Werke LT6



Highly precise, processor-controlled laboratory thermostats for direct and indirect tempering.

Control

1. Input path for set temperature.

Measured values

1. Set temperature in °C
2. Actual temperature in °C
3. External actual temperature in °C

Via two option push-buttons control can be switched between the internal sensor and an external sensor.

Monitoring the temperature control

4. Watchdog active/ not active
5. Time-out time for the watchdog
6. Time-out actions.

As an additional piece of safety equipment, laboratory thermostats from IKA offer device-internal monitoring with labworldsoft or from the attached computer. If the control software or computer fails (crash, loss of power, etc.), this system is able to turn off the thermostat or to switch it over to a safe temperature range. The thermostat's Parameters dialog box is used to activate the watchdog, to set the time window and to set actions to be initiated in the event of a fault.

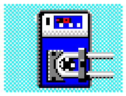
The Time-out time of the watchdog must be selected so that is greater than the current sampling rate of the measurement by a factor of at least 5.The features for safety monitoring are not available until after the control path for the target temperature has been activated.

This feature is supported beginning with a specific delivery date of the thermostat. If your device does not support this feature, an appropriate error message will be generated before the beginning of the measurement. As a basic rule, models that were delivered before January 1 1999 do not support this feature.

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:
9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

IKA Werke PA digital



Peristaltic pumps are used as dosing, feed or suction pumps in all laboratory fields.

A large selection of interchangeable heads makes it possible to process gaseous, liquid, solids-bearing, aggressive or abrasive media.

Sterile work is ensured through the use of sterile hoses.
A large selection of hoses makes it possible to perform dosing in the range of 0.0006 ml/min up to more than 50 ml/min

The corresponding input and output paths are marked by means of digit fields.

Control

1. Input path for speed/flow rate.
   The setpoint for the speed (1/min) or the flow rate (ml/min) is provided here as a function of the selection fields setting: dosing 1/min or dosing ml/min

Measured values

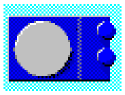
1. Actual speed or Actual flow rate in 1/min or ml/min
2. Total volume

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: no H.S.

IKA Werke RET control-visc



The RET control-visc is a magnetic stirrer with heating function and viscosity trend recognition. The instrument is suitable for precise temperature control (0 to 300 °C) of substances in containers placed on the hot plate. The integrated stirring drive enables simultaneous stirring of the substances with a magnetic rod in the container (0 to 1,100 rpm). The mixing intensity is dependent on the motor speed and the size of the magnetic rod.

In the parameter window of the IKA Labortechnik RET control-visc, the desired controlling variables and the readable measured values can be activated. The corresponding input and output paths are marked with number fields. In the basic setting the output path 1 is set for reading out the rated temperature.

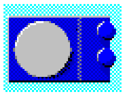
Control

1. Input path for rated temperature.
   The rated temperature is based on the medium when the temperature measuring sensor PT 100 is inserted. If no temperature sensor is inserted the rated temperature is based on the hot plate.
2. Input path for rated speed.
3. Viscosity trend measurement on/off.
   The viscosity trend display is reset.
4. Measured values

1. Rated temperature in °C.
2. Rated speed in rpm.
3. Real temperature of measuring sensor PT 100 in °C.
4. Real temperature of hot plate in °C.
5. Safety temperature in °C.
   If the rated temperature specification is greater than the safety temperature, the rated value is ignored.
6. Real speed in rpm.
7. Viscosity trend, relative in % (corresponds to the change in the motor power consumption).

Note:
Please see the separate operating instructions for a detailed description of the characteristics of the magnetic stirrer.

IKA Werke RET control visc *safety control*



The **RET control-visc** *safety control* magnetic stirrer by IKA Werke is a magnetic stirrer with heating function and viscosity trend recognition. The appliance is ideal for accurately and safely maintaining the temperature (0 to 340 °C) of substances placed onto the hot plate in vessels. The integrated stirrer drive allows you to simultaneously stir the substances using a magnetic rod located in the vessel (0 to 1500 min^{-1}). The mixing intensity depends on the motor speed and the size of the magnetic rod.

The required control quantities and the measurements to be read out can be activated in the parameters window of the magnetic stirrer. The relevant input and output paths are marked with digit fields. The default setting for output path 1 is the target temperature read-out.

Control

1. Input path for target temperature.
   The target temperature refers to the medium when an external temperature sensor is connected. If there is no temperature sensor connected, the target temperature refers to the hot plate.
2. Input path for hot plate target temperature (only active when input path 1, target temperature of medium, is also activated). This control should only be used for critical controlled systems, e.g. for extremely large volumes – for sub-optimal control types in the case of single control of the medium's target temperature.
3. Input path for target temperature.
4. Viscosity trend measurement on/off. (e.g. use switch module for control)
   The viscosity trend display will be reset.

Measurements

1. Target temperature in °C. The target temperature refers to the medium when an external temperature sensor is connected. If there is no temperature sensor connected, the target temperature refers to the hot plate.
2. Target temperature of hot plate in ° C.
3. Target speed in 1/min.
4. Actual temperature of medium sensor in °C.
5. Actual temperature of heat carrier sensor in °C. When operated with a 2*Pt1000 temperature sensor.
6. Actual temperature of hot plate in °C.
7. Safety temperature of hot plate in °C.
   If the specified target temperature is higher than the safety temperature, the target value will be ignored.
8. Safety temperature of external temperature sensor in °C.
   If the specified target temperature is higher than the safety temperature, the target value will be ignored.
9. Actual speed in 1/min.
10. Relative viscosity trend in % (corresponds to change in motor power input).

Control monitoring:

1. Watchdog active/not active
2. Watchdog time-out time

3. Time-out actions

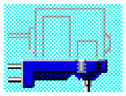
The **RET control-visc** *safety control* magnetic stirrer by IKA Werke offers internal monitoring by labworldsoft® or the connected computer as an additional safety feature. If the control software or the computer fails (crash/power failure etc.) this can switch off the heating and stirring function or switch to a safe temperature and speed. You can activate the watchdog, specify the time slot and set the action to be triggered in the event of a fault in the shaker’s parameters pop-up window.

The watchdog time-out must be at least 20 times greater than the active sample rate of the measurement.

The safety monitoring functions are only available once the target speed control path has been activated.

Note:
Please see the separate operating instructions for more details of the magnetic stirrer properties.

IKA Werke VISCOKLICK VK 250/600

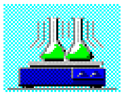


With the VISCOKLICK VK 250/600 stirrers can be expanded to torque measuring instruments. The viscosity of a substance can be determined by measuring absolute torque values in the range from 0 to 300 Ncm and 0 to 600 Ncm.

The output path (1) for reading out the torque value can be switched off and on in the parameter window of the VISCOKLICK VK 250/600. In the basic setting the output path 1 is switched on.

Note:
Please see the separate operating instructions for a description of the detailed characteristics of the torque measuring instrument.

IKA Werke VXR control



Processor-controlled horizontal shaker with speed range up to 2000 1/min.

Control

1. Input path for set speed.

Measured values

1. Set speed in 1/min.
2. Actual speed in 1/min.

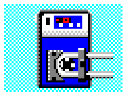
Set parameters

NOTE:
Detailed information on the shaker features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

No special settings are required for this device.

Ismatec Pumps



Peristaltic pumps are used as dosing, feed or suction pumps in all laboratory fields.

A large selection of interchangeable heads makes it possible to process gaseous, liquid, solids-bearing, aggressive or abrasive media.

Sterile work is ensured through the use of sterile hoses.
A large selection of hoses makes it possible to perform dosing in the range of 0.0006 ml/min up to more than 50 ml/min

The corresponding input and output paths are marked by means of digit fields.

Control

1. Input path for speed/flow rate.
   The setpoint for the speed (1/min) or the flow rate (ml/min) is provided here as a function of the selection fields setting: dosing 1/min or dosing ml/min

Measured values

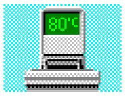
1. Actual speed or Actual flow rate in 1/min or ml/min
2. Total volume

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: no H.S.

Julabo Laboratory Thermostats



Highly precise, processor-controlled laboratory thermostats for direct and indirect tempering.

Control

1. Input path for set temperature.

Measured values

1. Set temperature in °C.
2. Actual temperature in °C:
3. Actual external temperature in °C (only for the High-Tech and MH series).

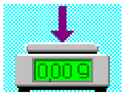
Via two option push-buttons control can be switched between the internal sensor and an external sensor (only for the High-Tech and MH series).

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

4800 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: RTS/CTS.

Kern Balances



Precision laboratory balances from the Kern company.

Control

1. The balance does not have any control inputs.

Measured values

1. Weight in g

Setting parameters

NOTE:
Detailed information on the balance features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

Kern 43 ...

2400 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Kern 47 ...

4800 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Kern 572/E .../K ...

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Kern 770/G ...

9600 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: none.

Kern 8 ..

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

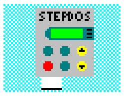
Kern KK ...

4800 Baud, 2 start bit, 7 data bits, 1 stop bit, parity none, handshake: none.

It should also be taken into account that:

The balance may transmit data only when requested by a PC, data have to be sent even if the balance has not yet reached a state of rest.

KNF Flodos STEPDOS 03/08 RC



A Stepdos pump is a microprocessor-controlled membrane dosing pump for liquids. It is used for the quasi-continuous and consistently neutral or aggressive dosing of liquid (depending on the pump model).

The pumps have two different operating modes:

- Run mode — Operating function for volume flow rate dosing
- Dispense mode — Operating function for infinitely variable batch dosing

Control

In run mode

1. Volume flow rate [ml/min]
2. Calibrator input [g]
5. Start / Stop

In dispense mode

3. Dispense volume [ml]
4. Dispense time [s]
5. Start / Stop

Measurements

In run mode

1. Volume flow rate [ml/min]

In dispense mode

2. Dispense volume [ml]

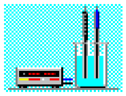
Automatic calibration is activated when scales are connected to the calibrator input (2). You can specify how often calibration should take place per hour in the input fields. During calibration the set volume flow rate is determined with the actual change in weight on the scales and the pump is automatically readjusted.

Note:
Please see separate operating instructions for more details of appliance properties.

To ensure correct communication, you must set the transfer parameters in the appliance's serial interface to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, RS 232 communication

K Knick Conductometer 703



The laboratory conductometer 703 from the Knick company is used for electrolytic conductivity measurement in laboratories.

The device may be optionally operated with 2-pin or 4-pin measuring cells and offers a measuring range from < 1.00 uS/cm to > 1000 mS/cm.

Either PT 100 or PT 1000 temperature sensors may be used for measuring temperature.

Measured values

1. Temperature in °C
2. Conductivity in S/cm.

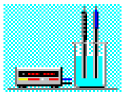
NOTE:
Detailed information on the measuring instrument features may be found in the separate operating manual.

⚠

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: none.

Knick pH – Meter 765



The laboratory pH Meter 765 is used to measure pH and Redox.

Measured values

1. pH value in pH.
2. Electrode voltage in volts.
3. Temperature in °C

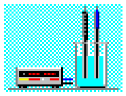
NOTE:
Detailed information on the measuring instrument features may be found in the separate operating manual.

⚠

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: none.

Knick Portamess 913 Cond



The Conductometer Portamess 913 Cond is used to measure condcutivity.
The device may be optionally operated with 2-pin or 4-pin measuring cells.

Measured values

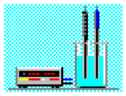
1. Temperature in °C.
2. Conductivity in S/cm.

Notes:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

4800 baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake

Knick Portamess 913 Oxy



The Oxymeter Portamess 913 Oxy is used to measure oxygen concentration.

Measured values

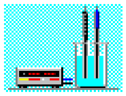
1. Temperature in °C.
2. Oxygen concentration [mg/l]
3. Saturation index [%]

Notes:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

4800 baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: none

Knick Portamess 913 pH



The pH Meter Portamess 913 pH is used to measure pH

Measure values

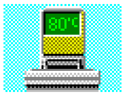
1. pH value
2. Electrode potential [V]
3. Temperature PT100/PT1000 [°C]

Notes:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

4800 baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: none

Lauda Laboratory Thermostats



Highly precise, processor-controlled laboratory thermostats for direct and indirect tempering.

Control

1. Input path for set temperature.
2. Input path for set pump output (only for Ecoline).

Measured values

1. Set temperature in °C.
2. Actual temperature in °C:
3. Actual external temperature 1 in °C (only for the P series).
4. Actual external temperature 2 in °C (only for the P series).
5. Actual pump output as a numerical value (only for Ecoline).

Via three option push-buttons control for P thermostats can be switched between the internal sensor and two external sensors.

Ecoline thermostats also make it possible to deactivate the device keypad via remote operation.

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

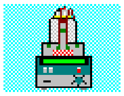
<u>Lauda P Laboratory Thermostats</u>

9600 Baud, 2 start bit, 8 data bits, 1 stop bit, parity none, handshake: RTS/CTS.

<u>Lauda Ecoline Thermostats</u>

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: RTS/CTS.

Metrohm Dosimat 765



Dosing device for pulse-free dispensing and exact pipetting.

Operation in three different modes:

DOS: Dosing
Dosimat is dosing as long as line 'Start Dosing' is activated, e.g. by a 'push-button'.

DIS C: Dispensing, cumulative
Dosimat is dosing a stored dispensing volume. The dispensed volume remains displayed and is cumulated during following dosing steps.

DIS R: Dispensing, repetitive
Dosimat is dosing a stored dispensing volume. The burette cylinder is refilled and the display is reset to 0.000 mL.

Control

1. Volume [mL] (not in Mode DOS)
The dosing volume can be set from 0.001 mL to 999.999 mL.

2. Dosing rate [mL/min]
The dosing rate can be set depending on the volume of exchange unit:

1 mL:	0.001	to	3.0 mL/min
5 mL:	0.005	to	15.0 mL/min
10 mL:	0.010	to	30.0 mL/min
20 mL:	0.020	to	60.0 mL/min
50 mL:	0.050	to	150.0 mL/min

3. Filling rate [mL/min]
The filling rate of the exchange unit can be set according to the dosing rate.

4. Start dosing
In modes DIS C and DIS R dosing of preset volume is started when this line is activated. In mode DOS the dosing continues as long this line is activated.

5. Start filling
When this line is activated, the cylinder is refilled and the display is set to 0.000 mL. Running dosing tasks are stopped before.

Measured values

1. Volume [mL]
The volume, which has been dispensed, is given on this line.

Notes:

Please see Metrohm Instructions for Use for a detailed description of the instrument.

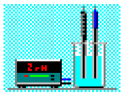
For proper communication, the Dosimat must be connected using a suitable RS232 cable (Metrohm order No.: 6.2124.050). The RS232 settings at the Dosimat must be set to the following parameters:

baud rate 9.6K, send RS232 off, RS232 HSHK full,

These are default values of the 765 Dosimat; see also Instructions for Use, p. 18.

The Dosimat RS232 settings (data bit: 7, stop bit: 1, parity: even) are fix.

Metrohm 713 pH Meter



pH Meter with automatic temperature compensation.
Determination of a primary measured value together with current temperature.

Measured values

1. pH – value
2. Temperature [°C]
3. Potential [mV]

Notes:
Please see Metrohm Instructions for Use for a detailed description of the instrument.

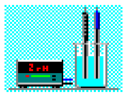
For proper communication, the pH Meter must be connected using a suitable RS232 cable Metrohm order No.: 6.2125.010). The RS232 settings at the pH Meter must be set to the following parameters:

baud rate: 9600, data bit: 8, stop bit: 1, parity: none, handshake: HWs, RS control: ON

These are default values of the pH Meter configuration under: *CONFIG/RS232 settings*

The response time of this instrument is 100 ms for each activated measured value. If both channels are activated, the minimum sampling time is increased to 200 ms. If a lower sampling time was chosen by the user, this value will be automatically adjusted by labworldsoft with the beginning of the measurement.

Metrohm 692 pH/Ion Meter



pH/Ion Meter with automatic temperature compensation.
Determination of a primary measured value together with current temperature.

Measured values

1. pH – value
2. Temperature [°C]
3. Potential [mV]
4. Concentration

Notes:
Please see Metrohm Instructions for Use for a detailed description of the instrument.

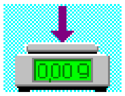
For proper communication, the pH/Ion Meter must be connected using a suitable RS232 cable (Metrohm order No.: 6.2125.010). The RS232 settings at the pH/Ion Meter must be set to the following parameters:

baud rate: 9600, data bit: 8, stop bit: 1, parity: none, handshake: HWs, RS control: ON

These are default values of the pH/Ion Meter configuration under: *CONFIG/RS232 settings*.

The response time of this instrument is 100 ms for each activated measured value. If both channels are activated, the minimum sampling time is increased to 200 ms. If a lower sampling time was chosen by the user, this value will be automatically adjusted by labworldsoft with the beginning of the measurement.

Mettler Toledo Balances



Precision laboratory balances from the Mettler-Toledo company.

Control

1. The balance does not have any control inputs.

Measured values

1. Weight in g

NOTE:
Detailed information on the balance features may be found in the separate operating manual.

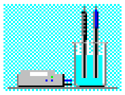
For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: DTR/CTS.

In addition, the following settings have to be made:

The balance self-calibration function may not be activated, the balance may transmit data only when requested by a PC, data have to be sent even if the balance has not yet reached a state of rest.

Mettler-Toledo Conductometer MC 126



The Conductometer MC 126 is used to measure condcutivity.

Measured values

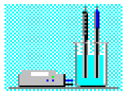
1. Conductivity
2. Temperature in °C.

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

1200 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Mettler-Toledo Conductometer MC 226



The Conductometer MC 226 is used to measure condcutivity.

Measured values

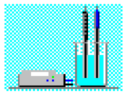
1. Conductivity
2. Temperature in °C.

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

2400 baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: none

Mettler-Toledo Oxygen Meter MO128



The Oxygen-Meter MO 128 is used to measure oxygen concentration.

Measured values

Oxygen concentration [mg/l]

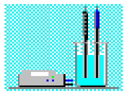
Temperature in °C.

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

1200 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Mettler-Toledo pH Meter MP 123, MA 130



The laboratory pH-Meter MP 123 is used to measure pH

The laboratory pH-Meter MA 130 is used to measure pH-, redox-, ion concentration and temperature.

Measured values

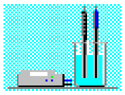
1. pH-value in pH....
2. Temperature in °C.

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

1200 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Mettler-Toledo pH Meter MP 225, MP 227, MP 230



The laboratory pH-Meter MP 225, MP 227, MP 230 are used to measure pH.

Measured values

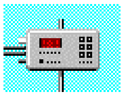
1. pH-value in pH....
2. Temperature in °C.

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

2400 baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: none.

MLT Vacuum controller PVK650



Vacuum controller for accurate and ecological control of vacuum pumps and water jet units.

Control

1. Input path for set vacuum.
2. Input path for hysteresis (mBar/ %)

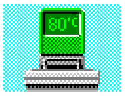
Measured values

1. Actual vacuum in mbar.
2. Actual temperature in °C

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:
1200 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: Xon/ Xoff.

Neslab Thermostat RTE-111, 211, 221



Highly precise, processor-controlled laboratory thermostat for direct and indirect thermostating.

Control

1. Input path for set temperature

Measured values

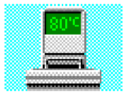
1. Set temperature in °C
2. Actual temperature in °C
3. External actual temperature in °C

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

PolyScience Thermostat DTC



Highly precise, processor-controlled laboratory thermostats for direct and indirect tempering.

Control

1. Input path for set temperature.

Measured values

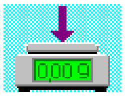
1. Set temperature in °C
2. Actual temperature (internal / external, depending upon selection of the control sensor) in °C

Via two option push-buttons control can be switched between the internal sensor and an external sensor.

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:
9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Sartorius Balances



Precision laboratory balances from the Sartorius company.

Control

1. The balance does not have any control inputs.

Measured values

1. Weight in g

NOTE:
Detailed information on the balance features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

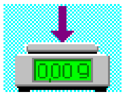
Length of dataword: 16 char.

9600 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: DTR/CTS.

In addition, the following settings have to be made:

The balance self-calibration function may not be activated, the balance may transmit data only when requested by a PC, data have to be sent even if the balance has not yet reached a state of rest.

Scaltec Balances



Precision laboratory balances from the Scaltec company.

Control

2. The balance does not have any control inputs.

Measured values

2. Weight in g

NOTE:
Detailed information on the balance features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

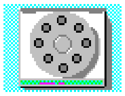
Length of dataword: 16 char.

9600 Baud, 1 start bit, 7 data bits, 1 stop bit, parity even, handshake: DTR/CTS.

In addition, the following settings have to be made:

The balance self-calibration function may not be activated, the balance may transmit data only when requested by a PC, data have to be sent even if the balance has not yet reached a state of rest.

Sigma Centrifuges



Microprocessor controlled centrifuge available in an non-cooled and cooled version.

Control

1. Input path for set temperature (only for cooled version).
2. Input path for set speed.

Measured values

1. Set temperature in °C (only for cooled version).
2. Actual internal temperature in °C (only for cooled version).
3. Set speed in 1/min.
4. Actual speed in 1/min.

If the **Time Control by labworldsoft** option is activated, then the internal time default of the centrifuge is deactivated, i.e. the duration of the current measurement determines the centrifuge running time.

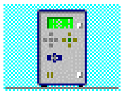
If the **Open Cover After Completed Measurement** option is activated then the cover is automatically opened when the measurement has been completed in **labworld*soft*** (after running out).

NOTE:
Detailed information on the centrifuge features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 Baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none.

Telab Pumps



Microprocessor-controlled diaphragm metering pump for liquids and gases.
The corresponding input and output paths are marked by means of digit fields.

Control

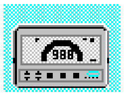
1. Input path for nominal frequency.
2. Input path for nominal working volume.
3. Input path for set temperature (only 10000 S/H).
4. Cyclic online calibration may be performed in order to eliminate non-conformities which may be caused by ageing of the hoses or production tolerances.

Measured values

1. Actual frequency.
2. Actual working volume
3. Actual temperature for PTFE lines (only 10000 S/H).
4. Actual pumping chamber temperature (only 10000 S/H).

NOTE:
Detailed information on the instrument features may be found in the separate operating manual.

Vacuubrand Vacuumcontroller CVC 2000



The vacuumcontroller CVC 2000 is used to control precise vacuum of membrane pumps.

Control

1. Input path for set pressure [mbar]
2. Input path for set speed [Hz]
3. Venting On/Off (The value 5 is equivalent to venting On / The value 0 is equivalent to venting Off)

Measured values

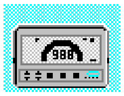
1. Actual pressure [mbar]
2. Actual speed [Hz]

NOTE:
Detailed information on the laboratory thermostat features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Vacuubrand vacuum gauge DVR 5



The DVR 5 is a fully electronic, versatile vacuum gauge for a wide range of measurements from 1100 to 0.1 mbar.

Measurements

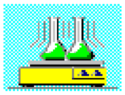
1. Actual pressure [mbar]

Note:
Please see the separate operating instructions for more details of the appliance properties.

To ensure correct communication, you must set the transfer parameters in the appliance's serial interface to the following values:

9600 baud, 1 start bit, 8 data bits, 1 stop bit, parity none, handshake: none

Yellowline Shaker



Family of processor-controlled horizontal shakers with different maximum loading and speed ranges of 30 - 800 1/min.

Control

1. Input path for set speed.

Measured values

1. Set speed in 1/min.
2. Actual speed in 1/min.

Monitoring the speed control:

1. Watchdog active/ not active
2. Time-out time for the watchdog
3. Time-out actions.

As an additional piece of safety equipment, laboratory shakers from IKA offer device-internal monitoring with labworld*soft*® or from the attached computer. If the control software or computer fails (crash, loss of power, etc.), this system is able to turn off the shaker or to switch it over to a safe speed range. The shaker's Parameters dialog box is used to activate the watchdog, to set the time window and to set actions to be initiated in the event of a fault.

The Time-out time of the watchdog must be selected so that is greater than the current sampling rate of the measurement by a factor of at least 5.
The features for safety monitoring are not available until after the control path for the target speed has been activated.

NOTE:
Detailed information on the shaker features may be found in the separate operating manual.

For proper communication the transmission parameters of the unit serial interface have to be set to the following values:

No special settings are required for this device.

Automatic adjustment of the scanning rate

Under normal conditions the minimum scanning rate per activated device measured value amounts to 100 ms; however, this may - depending on the laboratory instrument used - increase to up to 2200 ms per measured value.

If a lower scanning rate has been selected by the user, then it is automatically corrected when the measurement is started with **labworld*soft***.

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