

Laboratory Products Focus

Distillation – Automatic and Fast

Rotary evaporators have a long established place when it comes to sample preparation in the laboratory. A new system promises significantly improved results with features such as an integrated solvent library and the use of volume controlled distillation processes.

Rotary evaporators were developed around 50 years ago to allow safe, automatic distillation. Things have come a long way since then, particularly in the area of automation. With its new system, the RV 10 control, IKA brings us a high-end model that not only provides fully-automated distillation to ensure a safe laboratory environment, but that can also automatically set all required parameters as soon as the user selects the solvent to be used. This system tops off the RV 10 range of devices, which has been on the market for the last year.

INFRARED DATA TRANSFER



Figure 1: The RV 10 control tops off the RV 10 range from IKA, which comprises three rotary evaporators.

Until now, automatic distillation systems have predominantly been controlled by an automatic pump stand using differential pressure measurements. The new IKA system works on a different principle. Included in the RV 10 control is an infrared interface for bi-directional data transfer between the heating bath and the drive unit. This means that the heating bath can be moved to a safe position directly by the drive unit if a fault is detected. IKA has also

implemented several configuration options for the heating bath itself. There are three different operating modes. Mode A allows the temperature to be set to a safe temperature limit (SafeTemp) during the start-up process. In Mode B, the safe temperature limit set in Mode A is carried over automatically, with the operator able to select the target temperature within the pre-configured range. This setting becomes active the next time the system is switched on. Mode C does offer a secure operating mode that prevents the user from changing any settings. The heating bath is a water-oil heating bath with integral carrying handles. Water mode or oil mode is set automatically according to the temperature range that has been selected.

DIFFERENTIAL TEMPERATURE MEASUREMENT

Automatic distillation is controlled using measurements of the differential Temperature between the cooling water inflow and outflow, as well as the measured cooling water flow rate. This data is used as the basis for measuring the instantaneous condenser loading, which allows the maximum condenser load factor to be determined and overloading prevented. There is therefore no need for additional sensors to be installed on the glassware. To allow reliable user interaction with the device, the drive unit comes equipped with a large-format, graphical TFT colour display.

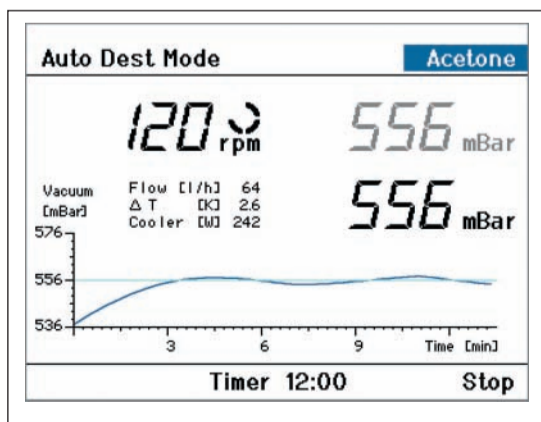


Figure 2: The graphical display allows distillation processes to be continuously monitored and controlled.

The display also provides an interface for the two-position vacuum controller that is integrated into the RV 10 control. The integrated solvent library can be added to by direct input into the device itself or via the labworldsoft® software.

LIBRARY BASED DISTILLATION CONTROL

Customers have a choice of two procedures here. The first of these is volume-controlled distillation, which is particularly advantageous when the sample should not completely dried out during the extraction process. In this mode, the user can choose automatic distillation based on either volume or weight. The specified quantity is then distilled off from the initial volume. Alternatively, the second method provides a so-called 'hundred percent' distillation, which by contrast is ideally suited for use with processes that require complete drying.

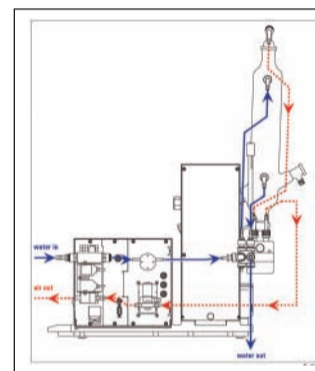


Figure 3: The new vacuum and water hose system gives the RV 10 improved, faster controllability.

Both processes are activated in automatic distillation mode by selecting the solvent from the solvent library and then choosing the desired method. Once activated, the system carries out a series of comprehensive system parameter checks. This ensures that the cooling water supply is checked in advance and that the distillation is only started when a sufficient supply of

cooling water is present. The heating bath then starts to heat up to the target temperature provided by the library. When all parameters are in the correct operating range, the drive unit is moved into the heating bath, the evaporation flask begins to rotate at the predefined speed, and the vacuum is applied. If distillation is halted, then the drive unit moves out of the heating bath, the flask stops rotating, and the system is vented automatically. The heating bath is switched off.

If the operator has chosen to use the optional cooling water valve on the cooling water supply line, then the water flow will also be cut off via the solenoid valve if distillation is interrupted. It is advisable to make use of a filter and a regulator valve when working with a mains water system.

DIRECT INPUT DURING DISTILLATION

It is also possible to run an automatic distillation using user-defined parameters. In manual mode, the operator can change the values for rotary speed and vacuum level - while a distillation is running - in order to allow the precise parameters for the corresponding process to be stored later. Up to ten different sequences can be recorded and recalled as automatic distillations at a future date. Distillation curves are shown graphically on the display and can be edited directly.

All of the functionality available with the RV 10 control can be controlled via the graphical display. Among the controllable features are: the interval for changing between clockwise and anticlockwise rotation during drying processes; smooth start above 100 rpm; adjustable end position recognition to protect glassware from breakage; speed range from 20 to 270 rpm; timer function for time lapse control; and a push-off mechanism for releasing tightly fitting flasks. Menus are available in English, French, German, and Spanish. It is also possible to verify parameter settings when no distillation is running.

Use of a vacuum valve is necessary with the RV 10 control. The system is suitable for connection to an existing central vacuum system, a laboratory vacuum system, or to any commercially available membrane pump designed for use in chemistry applications. This ensures the greatest possible degree of flexibility.

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