

# Special Edition



**Reliably Packaged Temperature Control**

# Reliably Packaged Temperature Control

## Controllers from GMC-I Gossen-Metrawatt in the Food Industry

Packaged cheese, hermetically sealed sliced meats and pre-portioned, ready to serve meals – it would be impossible to imagine the food industry without plastic packaging. And the safety of the consumer plays an important role in this respect. All of the steps within the manufacturing process must meet strict legal requirements – including the machines and plastic sheet materials used to produce the utilized packaging.

Various types of machines are used in the food packaging industry due to the great variety of inner and outer packages. The following application report describes the use of temperature controllers in a thermoforming machine. The machine consists of a thermoforming station, a sealing station and a cutting station. The tray which receives the product – for example sliced meats or cheese – is produced at the thermoforming station and is made out of a rigid plastic sheet material. A second sheet material is fused to the top of the tray at the sealing station under the influence of heat and pressure. Before sealing takes place, the oxygen is removed from the package and, depending upon the respective requirements, a protective gas or an auxiliary gas is injected. Protective gases protect the product from the natural decomposition process. Non-water-soluble nitrogen compounds thus prevent liquids from escaping within the package. Carbon dioxide is used for meats in order to preserve the product's color over a longer period of time. The packages are then cut to size at the cutting station.

VARIOVAC, manufacturer of packaging machines above all for the food industry, supports its customers from the initial concept for a new package right on up to the layout of a suitable packaging machine, or a complete packaging line. VARIOVAC's main focus is the fabrication of thermoforming machines, as well as so-called tray sealers. "We were looking for temperature controllers for our Primus and Multipower thermoforming machines which would fulfill our customers' strict requirements – because temperature plays an important role where food is concerned", reports VARIOVAC production manager Thomas Charwat. Above all the controller must maintain an accuracy level of  $\pm 2^\circ\text{C}$  when warming up the thermoforming sheet.

And VARIOVAC found what it was looking for at GMC-I Gossen-Metrawatt, a renowned manufacturer of temperature controllers. Headquartered in Nuremberg, Germany, the company supplies VARIOVAC with its system-compatible R355 multi-channel controller for this application.

The machines are used to produce plastic packaging made from rigid or non-rigid plastic sheet materials. The sheet material is drawn into the machine via large rollers, and is then warmed up with heating panels. When hot, the sheet material is soft and pliable. The material is then forced down into a mold with the help of compressed air applied at the top. A tray is thus produced from a flat section of sheet material. Other processes make use of vacuum which draws the material down into the mold from underneath, or use compressed air at the top and vacuum at the bottom.



Figure 1: Multipower

Depending upon the respective requirements, 12 to 16 temperature zones are precisely controlled. But the controller modules not only fulfill this one requirement alone, they're also distinguished by their compact design (4-channel controller), deadbeat control performance, outstanding accuracy and useful additional functions such as self-tuning, heating current monitoring and above all direct connection to the CPU at the Siemens S7-300 via the backplane bus. "VARIOVAC is justifiably proud of its comprehensive know-how in the field of packaging technology – and we're proud to be able to support this know-how", says Carsten Pilz, sales engineer at GMC-I Gossen Metrawatt.

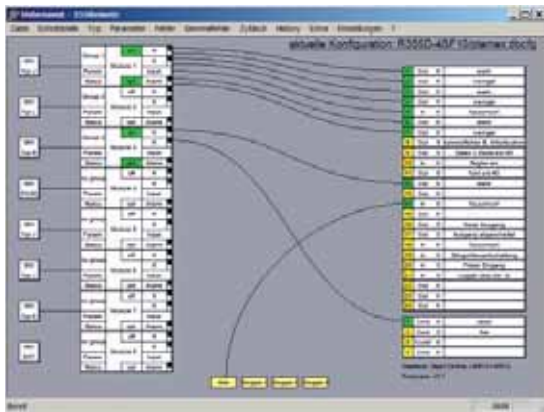
Above all two critical procedures have to be mastered within the production process, namely starting the system up and continuous load reversals. And this means that: "Thermal energy is withdrawn from the heating panels due to the cyclical production sequence, as well as repeated opening and closing of the panels. This has to be compensated for by the temperature controller. At the same time, temperature overshooting must be avoided when the machine is started up from a standstill, because the physical characteristics of the sheet material only allow for thermoforming within a tight temperature range.



The standard version of the system-compatible R355 controller module is distinguished by high levels of functionality. For example, it's equipped with an integrated data logger, an alarm history with time stamp and power limiting, and it takes several inputs into consideration for ascertaining the controlled variable. Adaptation of the control parameters can be started for each channel at any desired point in time. The module can also be used as a limit transducer, as well as a cascade, differential, ratio, pH and switching controller.

Figure 2: R355 Controller Module

Controller inputs and the assignment of outputs can be freely configured. The R355 is also equipped with hot runner control including start-up and booster circuits, as well as assignment to groups for control zones for synchronous heating. Numerous monitoring functions are also provided, for example channel and device-specific alarms, and read-back outputs. Quick and easy initial start-up is assured thanks to data, function and organization modules.



The remote maintenance, service and start-up tool, namely the 355Remote, allows for simple, complete setup and parameters configuration via the SIMATIC Step7 interface (Ethernet, MPI, Profibus-DP).

Figure 3: 355Remote – Start-Up, Remote Diagnosis and Remote Maintenance Tool

## VARIOVAC

The company was founded in 1970 as a dealership. After moving to Zarrentin in 1995 (east of Hamburg), production of vacuum packaging machines was started in 1996. In the meantime, 106 employees develop, design, manufacture and market technically advanced machines which are currently used in 46 countries to package, for the most part, meats, sliced meats and cheese. Subsidiaries in Poland, England and Scandinavia, as well as partner companies in other countries, organize sales and service in their respective territories. 80% of the machines are shipped to countries other than Germany. VARIOVAC packaging machines are distinguished by technical refinements, some of which are patented, which simplify handling and operation. And VARIOVAC provides its customers with support for the development of packages for new products as well.

### Strict Guidelines for Packaging

Food packages have various functions. They protect the goods from mechanical stressing, water, ambient influences such as temperature, atmospheric pressure, water vapor and oxygen, insects and microorganisms. They simplify handling of the goods for consumers and salesclerks. Beyond this, packaging has an informative function, for example the ingredients of the product are printed on it. Furthermore, it makes a decisive contribution to brand name development within the market, identification and differentiation from the competition. Packaging must have a pleasant appearance, and should arouse positive emotions for the consumer.

Packaging must also fulfill other various requirements depending upon the application: It must be pressure resistant, dimensionally stable, tear-proof, stackable, shock absorbing, markable, accessible from underneath, temperature resistant, corrosion protective, leak-proof and preserving. Above all, however, it must protect the health of the consumer. For this reason, various general provision and guidelines have been enacted at the EU level which apply to materials and objects which are intended to come into contact with food. It's important to assure that no hazardous substances are transferred from the packaging to the food. Packaging is thus subjected to legal limit values. The new EU hygiene law assigns more responsibility to the food industry, and requires food processing companies to implement control systems and adhere to specified temperatures and microbiological criteria. Impeccable quality of manufactured food products must be guaranteed throughout the entire production process, and traceability of food products must also be assured.

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# GOSSEN METRAWATT

Safety through Competence



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