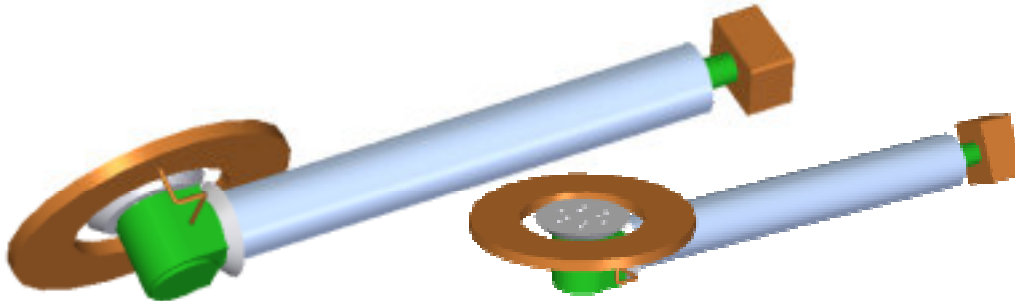


# Rotational Moulding Intelligent Process Control



## FREQUENTLY ASKED QUESTIONS

### 1. What is K-Kontrol™ Export Pack

**K-Kontrol™ Export Pack** is an integrated full time mould temperature measurement system, which can continuously and simultaneously measure the real temperature of moulds on all arms of a rotational moulding machine. This gives a map of the process for the purposes of production, scheduling, diagnostics or R&D. Note that there is no cyclic cooling or changing of coolant packs needed. This is a full time, fit and forget product.

### 2. What technology is K-Kontrol™ Export Pack based upon?

**K-Kontrol™ Export Pack** uses slipring technology. Over an R&D period of five years, and several design and prototype iterations a set of sliprings capable of operating in high temperatures was created. A combination of expertise from Electric, Thermal and Mechanical Engineering backgrounds ensured a successful outcome in the search for mould temperature based control.

### 3. How can K-Kontrol™ Export Pack help us to take control?

The rotational moulding process lacks basic mould temperature control; moreover, it relies largely on time and oven temperature for control. So, since a rotomoulded part's quality and properties are highly affected by its processing temperature, it is important that mould temperature is considered when trying to optimise the process.

It is also known that cycle time optimisation, based on mould temperature measurements, has resulted in up to 25% reduction in cycle times. (Further reductions of up to 20% can be achieved through the use of mould pressurisation, measured using K-Paq™).

For a long time the process has thrived on the forgiving nature of polyethylene, however if it is to succeed in an increasingly competitive market then it is crucial that it starts to develop its use of other materials. To do this, rotomoulding machinery needs to move to the level where the material can dictate the processing conditions and not the machinery controls limiting the material choice.

**493K Ltd.** specialises in the improvement of the rotational moulding process through the use of high technology products. This improvement and optimisation begins with the measurement of mould temperatures in real time. The moulder is then able to accurately measure and react to real and significant temperatures and no longer is reliant on the 'Black Art of Rotomoulding'. A lack of process control has led rotomoulding to depend much on skilled labour and in-house expertise - this is good, but what happens when your in-house expertise leaves?

The introduction of **K-Kontrol™ Export Pack** into rotomoulding machines and into the Quality and R&D departments will address this skills problem, material issues and machinery limitations.

# 493K

Taking Control of Rotational Moulding

#### 4. Who will benefit? – Addressing the skills, material and machinery issues.

**K-Kontrol™ Export Pack** will benefit the moulders, the machinery manufacturers, the material suppliers and Research Centres.

##### **Moulders**

The *moulders* will benefit from **K-Kontrol™ Export Pack** as a means to reduce the number of rejected parts, to optimise part & process fault identification, to control & improve their process through R&D, to potentially save energy through more frugal processing and to move towards automation. Customers who would particularly benefit from **K-Kontrol™ Export Pack** include:

- Moulders with gas fired hot air biaxial rotating machines (straight arms or offset).
- Moulders who are especially interested in continual product development within their own plant.
- Custom moulders – those with a high turnover of different types of products who need to minimise the set-up costs.

##### • **Machinery Manufacturers**

The rotomoulding *machinery manufacturers* are dominated by a few key companies and so there exists much head on competition between each manufacturer. Typically a number of manufacturers will be vying for the same order. **K-Kontrol™ Export Pack** is an attractive add-on to new machines and gives manufacturers that much needed advantage of market share especially when integrated fully into the PLC controls. Control based on time and oven temperature is not *process* control but merely *machine* control.

##### ▪ **Material Suppliers**

The *material suppliers* are concerned with the performance of their material in the mould and ultimately of the finished product. **K-Kontrol™ Export Pack** enables them to test the material prior to supply and ensure that it will do exactly as specified. Suppliers will be able to replicate the same processing conditions as the moulder in order to reconstruct the suspected problem and get to the solution sooner – note that a simple comparison of moulder's and supplier's oven temperatures, cooling bay fan speeds, and rotation speeds is not enough.

##### ▪ **Research Centres**

In order for analysis of the process, it is essential for researchers to understand the temperatures of the polymer, mould and process under investigation.

#### 5. How is K-Kontrol™ Export Pack installed?

The installation is done in house and can either be scheduled between production or even at the weekends. With the comprehensive installation manual plus the telephone support of a **493K Ltd.** Engineer it means that the whole upgrade process can be delivered with minimum upset to manufacturing.

#### 6. How long does K-Kontrol™ Export Pack take to install?

After the machine is prepared for installation with the cables correctly routed, the attachment and wiring of the sliprings takes 2-3 days for a 4 arm machine.

#### 7. Where is K-Kontrol™ Export Pack installed on the arm?

**K-Kontrol™ Export Pack** is installed on the plate of the machine. It is bolted or welded around the outside of the plate, adding nothing to the height and approximately 200mm (8") to the radius. At approximately 15 kg (33lbs), it is light enough to not unbalance the arm of the machine.

#### 8. Once installed can we move K-Kontrol™ Export Pack to another machine?

Generally not without a full re-installation. **K-Kontrol™ Export Pack** is designed to be integrated into the machine. It is not portable and so measures the temperature only on the installed arm.

#### 9. How is the data transmitted from the back of the arm to the machine cabinet?

Radio telemetry is used to avoid wiring in and around the rotomoulding machine and also to reduce overall on-site installation time. The telemetry is powered by batteries, which have a life of no less than 3 months when operating under correct conditions. Furthermore the telemetry modules are on a network arrangement such that corruption of data by other systems is virtually non-existent.

The logo for 493K, with '493' in blue and 'K' in red.

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## 10. What software is supplied?

**K-Kontrol™ Export Pack** comes with stand alone software that acquires, displays and records the data measured from the sliprings. The software can be integrated into the rotational moulding machines controls although it is often easier to by-pass our software and have the radio telemetry modules send the temperature directly.

**K-Kontrol™ Export Pack** uses the latest software development suites for the user interface. The software is based around the Microsoft Windows XP operating system and is developed with the latest software platforms. The software is modular and can be easily enhanced with customer requested functions.

## 11. What types of sensors are used?

The **K-Kontrol™ Export Pack** uses k-type thermocouples to measure temperature. These types of thermocouples are robust and stable at typical rotomoulding temperatures. Their flexibility means that they can measure the mould temperature, or the polymer temperature, or indeed any point in and around the mould which is accessible to a wire. The benefit of using thermocouples is that the temperature measured is a real temperature and is not inferred.

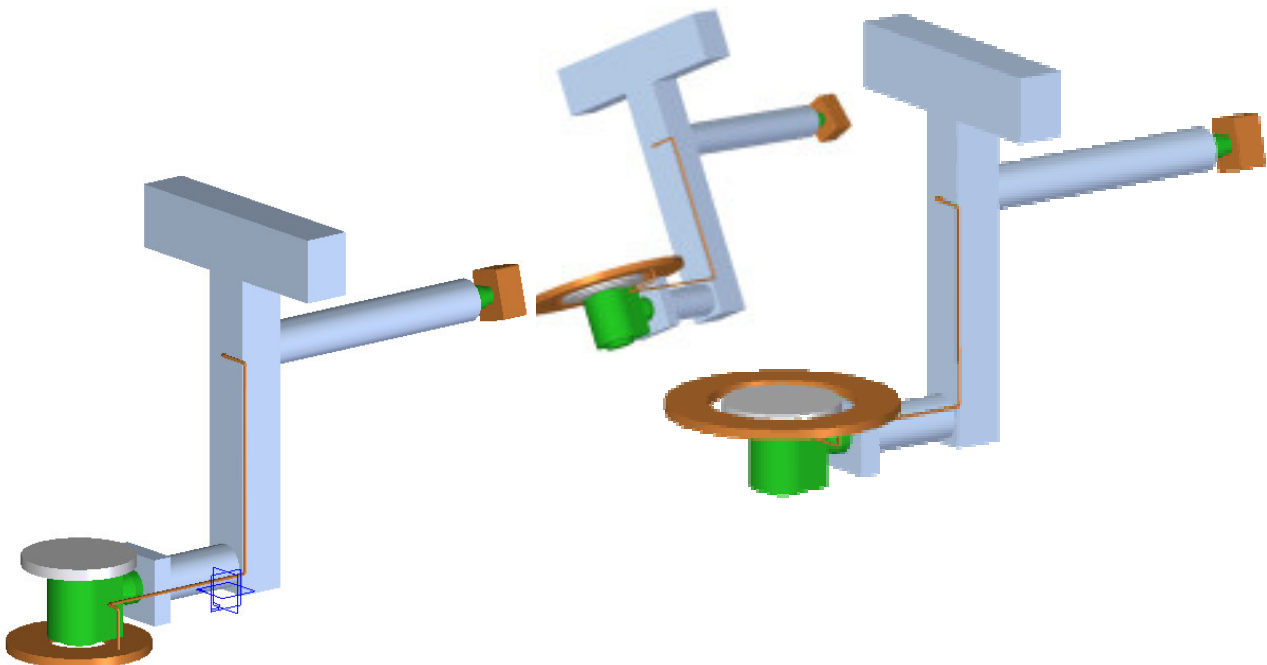
## 12. How many temperature channels does K-Kontrol™ Export Pack have?

The **K-Kontrol™ Export Pack** system provides two thermocouples channels per arm. On a four arm machine that gives a total of eight temperature measurements that can be recorded simultaneously. If more channels are needed, then there is the option to buy four per arm.

## 13. Can K-Kontrol control my machine?

**K-Kontrol™ Export Pack** measures temperature on a full time basis and can be used to feed back control information to the rotomoulding machine, to record data for quality control and to enable diagnostic analysis of machine or product problems. The data is stored on a database that enables the data to be queried or presented in daily reporting format.

The **K-Kontrol™ Export Pack** in itself does not control the machine but rather offers information to the machine, which can then choose whether or not to act upon this information.



Distributor:

# 493K

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