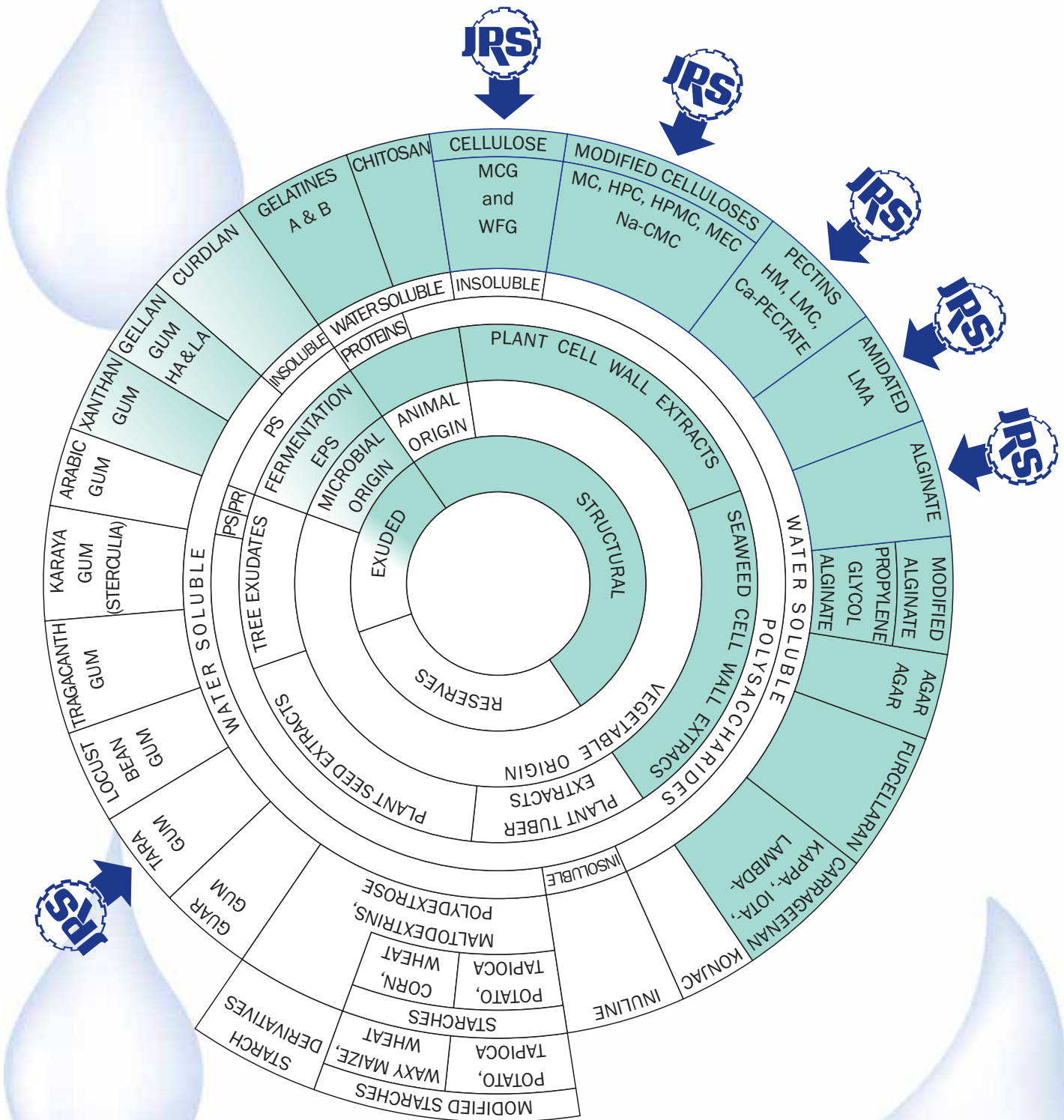


# JRS Hydrocolloids



**Innovations based on  
renewable resources**

## Overview of Hydrocolloids



# Hydrocolloids



JRS-Hydrocolloids are based on natural, regrowing raw materials such as celluloses, fruits and algae. We develop and produce these sustainable additives at various locations worldwide.

Depending on our customers demand we offer a broad portfolio of different hydrocolloids and rheological agents.

JRS-Hydrocolloids are dry powders or granules for easy handling, which develop their functionality and benefits after activation in water based systems.

Main functionalities are thickening effects, adjustment of rheological behaviors, gel formation, surface activity & many more.

We offer these products in different quality grades to suit the various areas of applications, ranging from technical via food & cosmetic to pharmaceutical industries.

	HPMC	MCG	Pectin	Alginate
<b>Viscosity Range</b>	Broad	Medium	Narrow	Broad
<b>Dosage up to</b>	10%	4%	3%	10%
<b>pH Stability ****</b>	3 - 11	4 - 10	2.5 - 5.5 (7)	4 - 8
<b>Sprayability</b>	■ ■ ■ ■ ■ *	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■ *
<b>Film Forming</b>	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
<b>Suspending</b>	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
<b>Emulsifying</b>	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
<b>Thickening</b>	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■ ***	■ ■ ■ ■ ■
<b>Transparency</b>	■ ■ ■ ■ ■ **	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■
<b>Acts with</b>	Alone	Alone	Acid, Sugar, Calcium	Calcium
<b>Gelling</b>	Firm gels	Smooth, thixotropic gels	Smooth to firm gels	Smooth to firm gels
<b>Main Function</b>	Film Forming, Adhesion, Heat induced gelling	Suspending	Gelling, Moisturizing, Interaction with Protein	Gelling under cold conditions with Calcium

\* Sprayability depends on viscosity | \*\* Transparent in the non-gelled status | \*\*\* E.g. thickening in yoghurt. Depends on Calcium reactivity and matrix.  
 \*\*\*\* pH stability depends on grade

## HPMC



**HPMC - Hydroxypropyl methylcellulose** is a cellulose ether produced in our state of the art factory located in Zacapu Mexico.

Cellulose is a substantial structural component of the cell wall of plants and can be considered as one of the most important biopolymers in nature. It is insoluble in water. By modifying the cellulose, water-soluble derivatives are achieved. Besides methylcellulose and others, HPMC is one of most commonly used derivatives for many different applications.



Room Temperature

Heating

Re-cooling

### Properties

HPMC forms clear solutions in water. In comparison to other hydrocolloids, aqueous solutions of HPMC become a gel when heated to temperatures specific for each grade.

The **reversibility of the thermal gelation** is a special property of HPMC.

Gelation points are depending on different factors such as e.g. degree of substitution which is adjusted by our modern production technology.

Another key property of HPMC is the ability to form **transparent films**. In other applications, HPMC can also be used to achieve stickiness.

HPMC is compatible with other natural and synthetic polymers such as e.g. starch, xanthan, casein, polyvinyl alcohol, cellulose- and guar ethers, and is also tolerant towards salts even in higher concentrations.

The functionalities of HPMC are accessible among a very **broad pH range**.



We offer a broad variety of functional HPMC products, which mainly differ in their viscosity, gelation point & gel strength.

Our HPMC is available in food and pharmaceutical quality but also as technical grade under the brand names **ARBOCEL®**, **VIVAPUR®** and **VIVAPHARM®**.

### Applications Standards

- Thickener
- Adhesive
- Binder
- Suspension agent
- Film forming agent
- Water retention agent
- Protective colloid
- Stabilizer

### European Production Standards

- HACCP
- ISO 9001
- Kosher and Halal certified
- GMA-SAFE

### Key Properties

- Reversible thermal gelation
- Film formation



HPMC gel

## MCG



**MCG** – microcrystalline cellulose gel is a gel forming agent which is co-processed from microcrystalline cellulose (MCC) and a water soluble thickener such as e.g. carboxymethyl cellulose (CMC) or xanthan. Microcrystalline cellulose is a specially treated cellulose where the amorphous parts of cellulose are removed. The water soluble thickener in combination with the MCC ensures an easy dispersibility and prevents the re-aggregation of the MCC particles in water. To activate the MCG and form a gel, high shear mixing is necessary. After activation in water, MCG forms a 3-D elastic gel-network of insoluble cellulose fibrils.

This so called **thixotropic behavior** allows e.g. ideal **pumpability** and outstanding **sprayability** of dispersions. Additionally the opaque MCGs are **freeze-thaw stable** and **heat resistant**.

They are persistent over a wide **pH range** and additionally **avoid syneresis**.

We offer a broad product portfolio of different MCG products with the brand name **VIVAPUR®**, **VITACEL®** and **ARBOCEL®**. Depending on the customers' demands, we can adjust the most important parameters such as viscosity & stabilizing effects.

Our MCGs are available in food, cosmetic & pharmaceutical quality but also as technical grades, providing all necessary documentations.



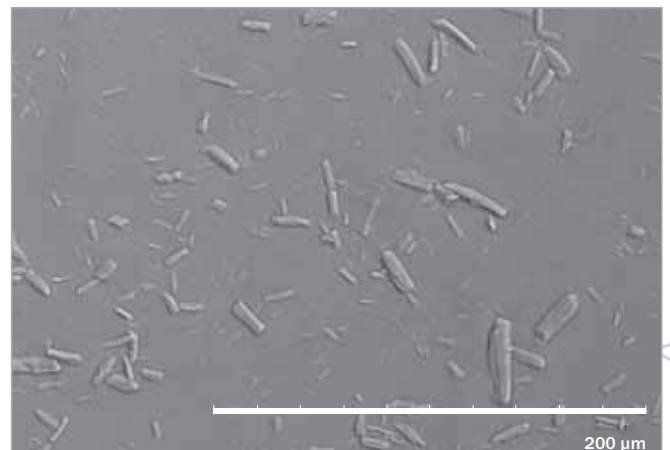
Room Temperature

Heating

Re-cooling

### Properties

The 3 D network provides a permanent **stabilization of dispersions** without significantly increasing the viscosity. Upon agitation MCG dispersions show a time and shear dependent decrease in viscosity. The viscosity increases again after a resting period without agitation.



SEM Picture of **ARBOCEL® P 4000**



### Applications

- Thickener
- Dispersion aid
- Emulsifier
- Spraying agent

### European Production Standards

- Stringent quality standards
- ISO 9001, FSSC 22000
- Kosher and Halal certified

### Key Properties

- Anti-settling agent
- Thixotropy
- Heat resistance



MCG gel

## Pectin



Pectin is a versatile biopolymer which is found in the cell walls of fruits, especially citrus fruits and apples. Pectins are complex polysaccharides that chemically consists of partial methyl esters of polygalacturonic acid and their salts (sodium, potassium, calcium and ammonia).

Our pectin products are produced by JRS Silvateam Ingredients in southern Italy, where the pectins are extracted from selected citrus fruit peel leftovers of the juice and essential oil industries.

Our product portfolio includes high methoxyl pectin (**HM**), low methoxyl conventional pectin (**LMC**) and methoxyl amidated pectin (**LMA**). **LMC** pectins are defined as pectins with less than 50 % methoxyl groups, whereas pectins with methoxyl groups of more than 50 % are classified as high methoxyl pectins.

### Properties

Pectin is usually standardized with sugar and/or buffer salts to control gelation. **HM** pectins can form a gel under acidic conditions in the presence of high sugar concentrations, while **LMC** and **LMA** form gels by interaction with divalent cations e.g. calcium ions. Heating is necessary to fully solubilize pectins.

While **LMC** have a small calcium concentration range for an optimum gel strength, the concentration range for **LMA** is wider. Another difference is, that the gel formed with **LMA** are thermoreversible. In contrast **LMC** and **HM** gels are irreversible.



Room Temperature   Heating   Re-cooling  
LMA Pectin Gel



Room Temperature   Heating   Re-cooling  
LMC and HM gels





**HM** – high methoxyl pectin

**LMC** – low methoxyl conventional pectin

**LMA** – methoxyl amidated pectin

We offer a broad product portfolio of different pectins with the brand name **VIVAPUR®** and **VIVAPHARM®**.

### Applications

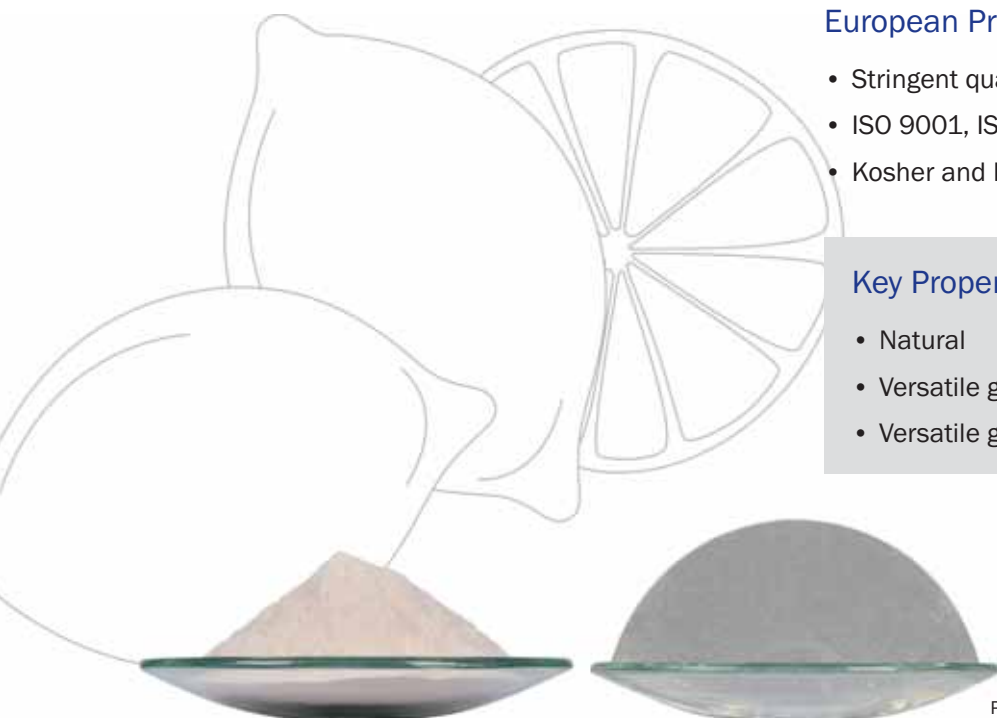
- Thickener
- Stabilizer
- Gel

### European Production Standards

- Stringent quality standards
- ISO 9001, ISO 22000, BRC
- Kosher and Halal certified

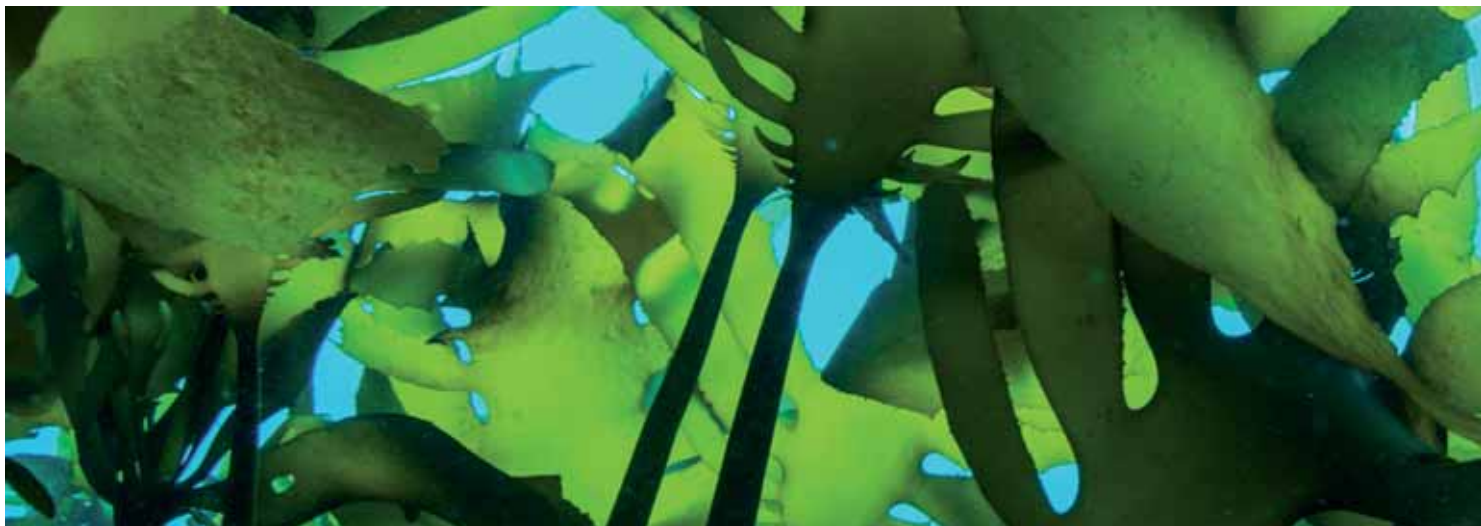
### Key Properties

- Natural
- Versatile gel properties
- Versatile gel activation



Pectin gel

## Alginate



Alginates – the salts of alginic acid. Alginic acid is a natural biopolymer extracted from different types of brown seaweed. It is manufactured at our site in Landerneau France.

### Sustainable harvesting:

- under control of NGO´s
- under control of government

The macromolecule is a linear polysaccharide consisting of blocks of guluronic and mannuronic acid. Alginic acid can be transformed into water soluble salts such as e.g. sodium ( $\text{Na}^+$ ) or potassium ( $\text{K}^+$ ). These salts can be transformed into gels by addition of bivalent ions such as e.g. calcium ( $\text{Ca}^{2+}$ ).



Room Temperature

Heating

Re-cooling

## Properties

Sodium and potassium alginates are water soluble and are able to increase the viscosity of aqueous solutions.

The thickening effect depends of the chain length of the polymer. The main difference to other hydrocolloids is the property of alginates to react with calcium ions and other di- or trivalent ions by ion exchange. By this reaction the rheology changes and the state of aggregation changes from liquid to solid within seconds. **The gel setting time can be controlled** very precisely by adjusting the calcium release with sequestrants. This together with the ability to build up strong gels without heating are the key benefits.

Alginates are excellent **film forming agents**. Films with **oil barrier** properties, anti-sticking or protective coatings can be prepared. Alginates have excellent water control properties.

We are able to adjust the viscosities and particle sizes depending on our customers´ demands. Our alginates are available in food and pharmaceutical quality but also as technical grades under the brand names **VIVAPUR®**, **VIVASTAR®** and **VIVAPHARM®** and **ARBOCEL®**.

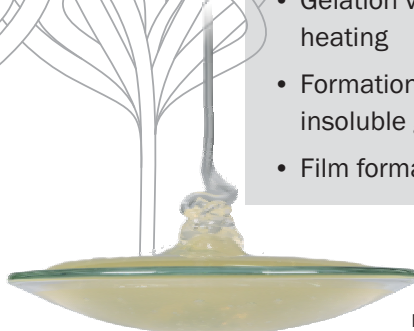


### Application Examples

- Thickener
- Film forming agent
- Liquid encapsulation

### European Production Standards

- Best in class safety practices
- Stringent quality standards
- Kosher and Halal certified
- e.g. ISO 9001, BRC, ISO 14001



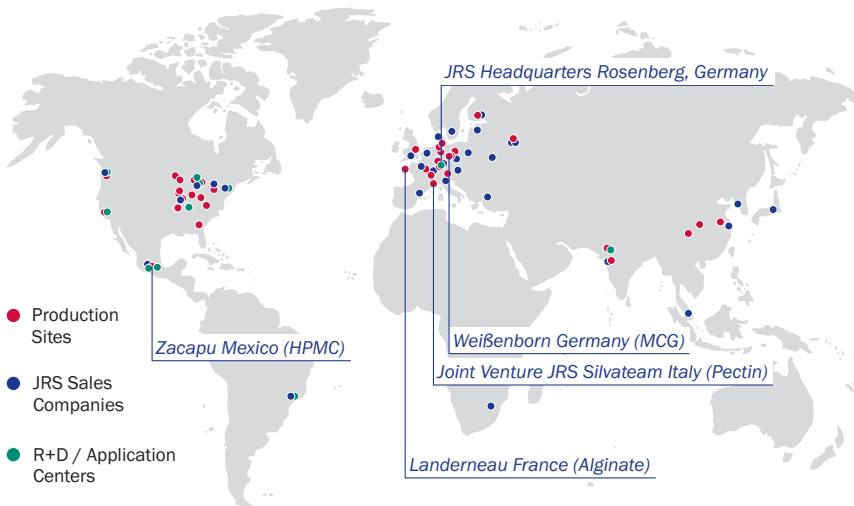
### Key Properties

- Natural & versatile
- Gelation via controlled ion-exchange without heating
- Formation of temperature stable and water insoluble gels
- Film formation

Na Alginate

## JRS – Your Competent System Partner and Solution Provider for Organic Fibers in Industry and Technology

### JRS – YOUR Qualified Partner – worldwide



- Worldwide logistics and presence
- High availability due to efficient, high-capacity production
- In-house research and development, application services
- Over 250 technical representatives around the world
- Decades of experience and comprehensive application know-how
- Quality manufacturing according to ISO 9001

Hydrocolloids from JRS are available in different types with different properties and viscosities, depending on the requirements and objectives. This opens new horizons for innovative product uses, new developments or problem solutions.

Our comprehensive application and development service supports rapid adaptation and product introduction. Specific preparations of recipes and practical application are possible in our application center.

Profit from JRS as your competent, strong system and service partner!