

**FUCHS Industrial Lubricants**

## **Innovative Lubricants**

### **Need Experienced Application Engineers**

Consultation with an experienced Application Engineer should precede every lubricant change-over. This guarantees that the optimum lubricant system is selected. Our experienced FUCHS engineers will be glad to advise on products for the application in question but also inform you about our comprehensive range of lubricants.



Please contact:



**FUCHS Industrial Lubricants**

**MEDICAL**



## **Production Fluids for the Medical Sector**

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FUCHS EUROPE SCHMIERSTOFFE GMBH

# YOUR STRONG GLOBAL PARTNER FOR INDUSTRIAL LUBRICANTS



## HOW WE EXCEL

We are a German company which manufactures and markets a wide range of lubricants and derived specialties. The company, which was founded in 1931 as RUDOLF FUCHS, is located in Mannheim and is a 100 % subsidiary of FUCHS PETROLUB AG, which is the largest independent lubricants manufacturer worldwide.

Our company's degree of specialisation and innovation is way above the industrial average in this field. The full product line includes almost 2,000 lubricants and derived specialties for all walks of life, industrial processes and applications. Our customer's success is also our success, because partnership to us means passing-on benefits.

The advantage of a strong market presence: FUCHS is the largest independent manufacturer of lubricants in the world. The benefit of premium, innovative products from a full-line manufacturer: With a complete product line as well as tailor-made special solutions, FUCHS has a product for every application. The benefits of reliability: Certified according to DIN EN ISO 9001:2000 and ISO/TS 16949:2002, FUCHS has been continuously upgrading its highly specialised lubricants for decades.

And naturally, partnership for us also means providing our customers with competent support, with comprehensive marketing, with high-performance logistics, with the development of successful service concepts, and qualified consulting, because together, we can achieve more.

## WHAT INCREASES THE VALUE OF OUR PRODUCTS

**We develop lubricants: application-specific and tailor-made for our customer's processes.** Together we look for the best lubricants for our customers. This cooperation is unique in terms of its form, scope and intensity. We call it development partnership. The success of our development partnerships is based on an important fact: FUCHS is not one of the oil-giants.

FUCHS is a multinational, independent lubricant manufacturer. Our independence is the difference. We are open to new solutions, open for visions – the prerequisites for innovations. Innovation is the defining characteristic of FUCHS, 70 % of our products are less than five years old and the great majority of our products are individual solutions. Challenge us and see!



DIN EN ISO 9001:2000  
ISO/TS 16949:2002  
DIN EN ISO 14001:2004  
REG.NR. 2476



## Lubricant Specialists for Medical Applications.

## Tested and Used by Leading Medical Engineering Companies.

The constant increase in life-expectancy in industrial countries is leading to an ever greater demand for implants and medical appliances. As these implants may remain in the body for 15 years or longer and are subject to constant cyclic stresses, high demands are made on the quality of materials used as well as on their internal and external surface structures.

High-tensile metals such as stainless steels, cobalt alloys and above all, titanium alloys but also special ceramics are used. All of these materials are difficult and costly to machine.

Also light-weight magnesium will soon gain popularity as an absorbable implant material for medical applications.

However, this material poses a challenge during machining because of the development of hydrogen when water-miscible cutting fluids are used.

### Highest Lubricant Performance.

Cutting fluids in the medical sector along with the manufacturing and final cleaning processes are all part of component approval. This means that every alteration must be checked to establish if the life of the component or its sterility is influenced.

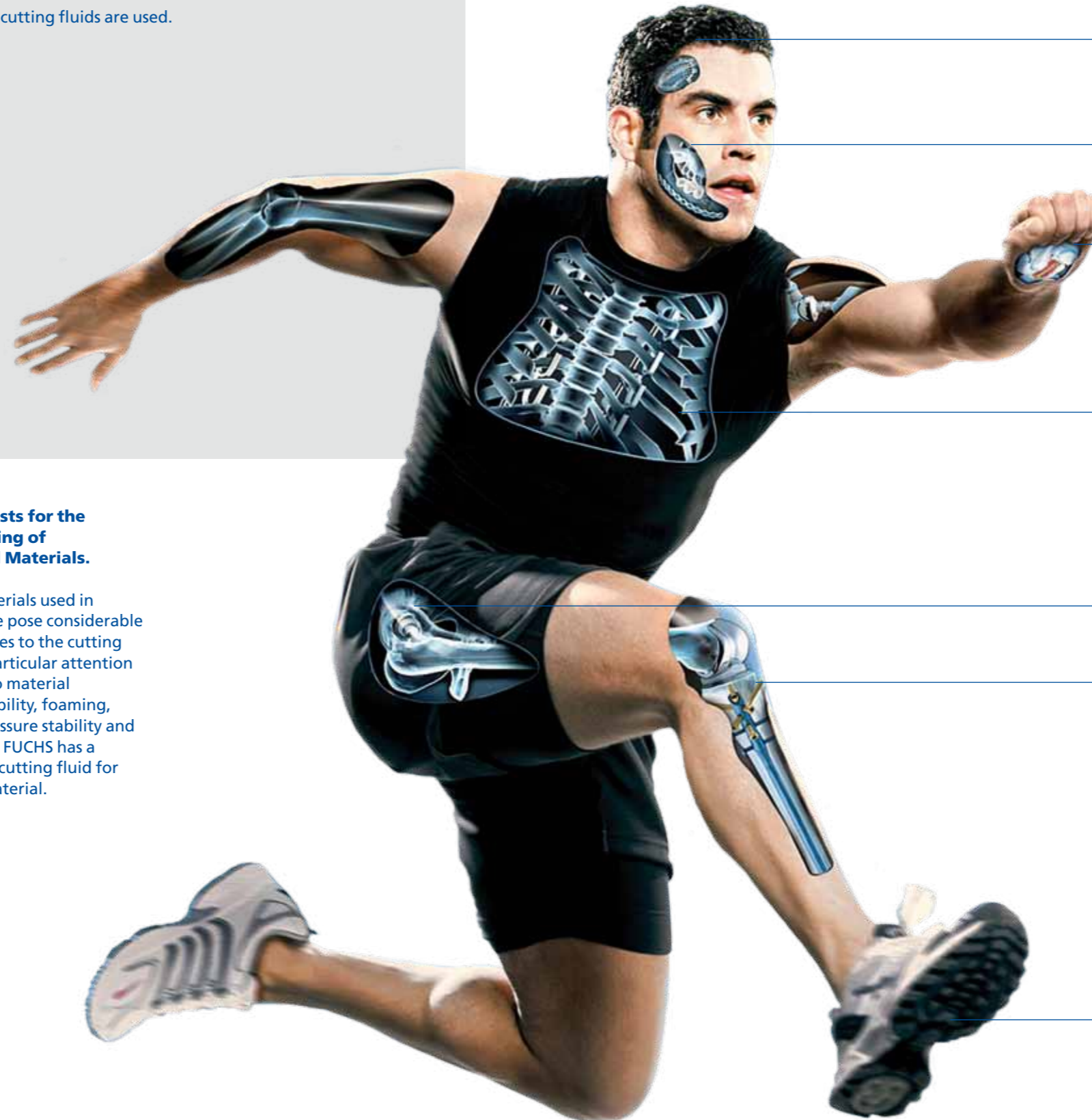
As a result, very high standards are set for lubricants and the corresponding cleaners.

### Special Requirements.

Cooperation with lubricant suppliers as early as in the development phase is vital when developing innovative solutions. On the one hand, to increase the efficiency of the process and to increase tool life and on the other, to minimize risks. One such risk, for example, is the drag-in of contaminants which could cause problems during final cleaning.

### Specialists for the Machining of Medical Materials.

The materials used in medicine pose considerable challenges to the cutting fluids. Particular attention is paid to material compatibility, foaming, high-pressure stability and lubricity. FUCHS has a suitable cutting fluid for every material.



Plates and screws:  
**ECOCOOL MEDISTAR/ECOCOOL S761**  
**PLANTO MIKRO UNI**  
**ECOCUT 7520 LE-S**

Prosthetic dentistry implants:  
**PLANTOCUT 10 SR**  
**ECOCUT 7520 LE-S**

Degradable magnesium alloy implants:  
**ECOCOOL 2516 MG-Medi** **ECOCUT MIKRO PLUS 20**

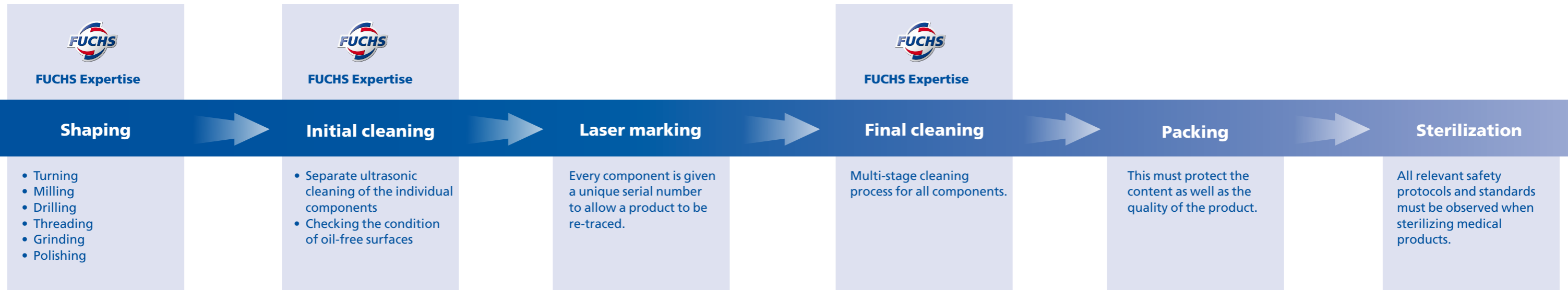
Artificial spinal discs:  
**ECOCOOL MEDISTAR/ECOCOOL S761**  
**ECOCUT 7520 LE-S**

Artificial hip joints:  
**ECOCUT HFN 5 W**  
**ECOCOOL TN 2525 HP**

Artificial knee joints:  
**ECOCUT HFN 5 W**  
**ECOCOOL TN 2525 HP**  
**ECOCUT 7520 LE-S**

**Image Source:**  
**Gildemeister AG**

## Manufacturing Process for Medical Products.



### The FUCHS Special Lubricant Program for Medical Products.

Cutting Fluid	Description	Cutting Fluid	Description	Cleaner	Description
<b>ECOCOOL MEDISTAR ECOCOOL 5761</b>	Water-miscible metalworking fluid for machining titanium at pressures up to 80 bar.	<b>ECOCUT MIKRO PLUS 20</b>	Minimum Quantity Lubricant based on fatty alcohols.	<b>RENOCLEAN MEDI WDA 4020</b>	For dip bath cleaners, also for ultrasonic cleaning baths.
<b>ECOCOOL 2516 MG-MEDI</b>	Water-miscible metalworking fluid for machining magnesium.	<b>PLANTOCUT 10 SR</b>	Neat metalworking oil for the machining of titanium and cobalt alloys and stainless steels.	<b>RENOCLEAN MEDI FDA 4030</b>	For dip bath cleaners, not suitable for ultrasonic cleaning baths.
<b>ECOCOOL TN 2525 HP</b>	Water-miscible metalworking fluid for high-pressure machining > 120 bar.	<b>PLANTO MIKRO UNI</b>	Ester-based minimum Quantity Lubricant.	<b>RENOCLEAN MEDI WSA 4040</b>	For spray cleaners, suitable for the removal of greases and lubricant films.
<b>ECOCUT HFN 5 W</b>	White oil-based coolant for the grinding of ceramics.	<b>UNIFLUID 10</b>	Multipurpose oil for machining and machine lubrication.*	<b>RENOCLEAN MEDI MSA 3001</b>	For spray cleaners, suitable for the removal of oil, grease and abraded residues.
<b>ECOCUT HFN 16 LE</b>	Neat metalworking oil for machining magnesium.	<b>UNIFLUID 32</b>	Multipurpose oil for machining and hydraulic systems.	<b>RENOCLEAN MEDI MVS 7050</b>	Synthetic, water-rinsable cleaner based on isoparaffin for final cleaning.
<b>ECOCUT 7520 LE-S</b>	Neat metalworking oil for difficult-to-machine steels and titanium.				

\* Only A10 VSO 71 BOSCH REXROTH axial piston pumps

**Maintaining the consistently high quality of medical products can only be guaranteed if the whole process, the machining products used and reliable monitoring systems are in place and fully understood.**

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. Subject to amendment. Edition 01/2010

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## Special Lubricants for the Machining of Titanium and Cobalt Alloys and Stainless Steels.

Titanium and cobalt alloys along with stainless steels are often used in implants or surgical instruments such as scalpels, scissors, etc. Biocompatibility is the reason why just these three material groups are used. The difficulty with which these materials can be machined represents a significant cost factor which is becoming increasingly more important even in the medical sector. FUCHS has gathered valuable know-how from various research and development projects in the aerospace industries which also focus on the material titanium. Its product portfolio includes a corresponding metalworking fluid for every

process stage. Ranging from non-water-miscible to neat and from high-pressure lubricants to universal oils which satisfy the demands of hydraulic systems and machining processes, FUCHS can always offer the right product. Universal oils were included in the product line with a view to contamination hazards.

### Machining of Titanium and Cobalt Alloys and Cr-Ni steels.

Product Name	Description
<b>ECOCOOL MEDISTAR ECOCOOL 5761</b>	Water-miscible metalworking fluid offering good lubricity and cooling, for pressures up to 80 bar.
<b>ECOCOOL TN 2525 HP</b>	Water-miscible metalworking fluid with excellent lubricity, high-pressure stable up to > 120 bar.
<b>ECOCUT 7520 LE-S</b>	Low-misting, neat metalworking fluid. For first-class surface finishes.
<b>UNIFLUID 32</b>	Synthetic ester-based multipurpose oil, high cutting and machining performance, also for hydraulic applications.
<b>UNIFLUID 10</b>	Synthetic ester-based multipurpose oil, good EP characteristics.
<b>PLANTOCUT 10 SR</b>	Synthetic ester based on natural raw materials with low water-pollution potential, rapidly biodegradable.

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## Special Lubricants for the Machining of Ceramics.

FUCHS also has valuable expertise in this special area of machining. Ceramics are only machined with processes which use non-geometrically defined cutting edges. Particularly in the case of grinding aluminum-oxide ceramics which are often used for the ball joints in artificial hips but also for artificial knee joints, the lubricant plays a decisive role. Research by the Iowa State University has shown that certain neat cutting fluids lead to the formation of Al(OH)<sub>3</sub> and Me<sub>2</sub>SiO<sub>5</sub> on ceramic surfaces which is easier to remove and also leads to significantly less sub-surface structural damage.

FUCHS and leading machine tool manufacturers have already gathered very valuable and positive experience in this area with ECOCUT HFN 5 W. This white oil-based product is dermatologically highly compatible at the same time as offering good wetting, good flushing properties and low evaporation.

### Grinding ceramics.

Product Name	Description
<b>ECOCUT HFN 5 W</b>	White oil-based neat cutting fluid with good wetting and flushing properties. Low-misting and biodegradable.

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## Special Lubricants for the Machining of Magnesium and its Alloys.

The use of magnesium alloys as absorbable materials is still at the research stage. FUCHS has already begun to develop suitable metalworking fluids for such implant materials.

The absorption by the body of magnesium implants is also influenced by the geometry and the mechanical machining processes used. Such implants can be porous as well as solid. FUCHS has already gathered a great deal of experience in this field from the automotive industry. As magnesium reacts with water to form hydrogen and magnesium hydroxide, any machining process with water-miscible metalworking fluids poses a particular challenge which FUCHS can control with specially-formulated products. As the formation of hydrogen increases due to the larger surface areas when porous magnesium implants are

machined, FUCHS uses a special water-miscible metalworking fluid which effectively inhibits hydrogen formation. Neat metalworking oils based on highly-refined mineral oils and synthetic esters can also be used.

### Magnesium Machining.

Product Name	Description
<b>ECOCOOL 2516 MG-MEDI</b>	Water-miscible metalworking fluid for the machining of magnesium, good emulsion stability even with magnesium-hardened water.
<b>ECOCUT HFN 16 LE</b>	Mineral oil-based, neat metalworking oil specially formulated for the machining of magnesium.
<b>UNIFLUID 10</b>	Multipurpose oil based on synthetic esters, excellent EP characteristics.

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## Machining Medical Materials with Minimum Quantity Lubrication.

In the field of chip-forming machining, the Minimum Quantity Lubrication concept is gaining acceptance, even for extremely-difficult-to-machine metals. The reduction in metalworking fluid consumption represents significant cost savings.

Minimum Quantity Lubrication is particularly suitable for the drilling of holes in implant plates or for the micro-milling of the shape memory alloy Nitinol which displays very high adhesion forces.

Both PLANTO MIKRO UNI and ECOCUT MIKRO Plus 20 can be used. These products offer the following properties:

- Rapidly biodegradable
- Neutral odour
- Forms no deposits
- Good tool life
- Non-toxic
- Non-water polluting

PLANTO MIKRO UNI is based on esters while ECOCUT MIKRO PLUS 20 is based on fatty alcohols. Both products can be used with internal and external 1- and 2-channel feed systems.

### Minimum Quantity Lubrication.

Product Name	Description
<b>PLANTO MIKRO UNI</b>	Synthetic esters based on natural raw materials with low water pollution potential and rapidly biodegradable.
<b>ECOCUT MIKRO PLUS 20</b>	Minimum Quantity Lubricant based on fatty alcohols, excellent cooling and no residues.

## Cleaners for Optimum Process Reliability.

The final cleaning of implants and surgical instruments at the end of the manufacturing process is of decisive importance. Even contamination in the ppm region would lead to serious complications. A stable process is vital to achieving the high quality standards which medical products have to fulfill.

FUCHS offers special cleaners for the optimum intermediate cleaning of surgical implants and instruments.

### Optimum Process Reliability.

Product Name	Description
<b>RENOCLEAN MEDI WDA 4020</b>	For dip cleaning baths. Suitable for ultrasonic cleaning.
<b>RENOCLEAN MEDI FDA 4030</b>	For dip cleaning baths. Not suitable for ultrasonic cleaning.
<b>RENOCLEAN MEDI WSA 4040</b>	For spray cleaning, suitable for the removal of greases and dry film lubricants.
<b>RENOCLEAN MEDI MSA 3001</b>	For spray cleaning, suitable for the removal of oil, grease and abrasion.
<b>RENOCLEAN MEDI MVS 7050</b>	Synthetic water-rinsable cleaner (Isoparaffin), suitable for final cleaning.

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