



SPECIAL CABLES FOR INDUSTRIAL APPLICATIONS

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KROSCHU AT A GLANCE

Kromberg & Schubert Group



> 2 bn EUR
turnover



approx. 50,000
employees



family-run
company



50 locations
worldwide

Kromberg & Schubert GmbH Cable & Wire



> 70 m EUR
turnover



approx. 200
employees



120 years of experience in
development & production



Customised cable
solutions



200,000 km annual
production volume



Short distances thanks
to locations in
China & South Africa



Production in Rhede,
Germany



Accredited,
in-house laboratory

MATERIAL OVERVIEW

RESISTANCES & TEMPERATURES

Designation	Material designation according to DIN EN ISO 1043 and 18064		Abrasion	Flame resistance
Thermoplastics				
Y	PVC	Polyvinyl chloride	++	++
2Y	PE	Polyethylene	++	_*
02Y	Zell-PE	Polyethylene, foamed	-	-
4Y	PA	Polyamide	+++	+*
5Y	PTFE	Polytetrafluorethylene, mod.	+	+++
51Y	PFA	Perfluoralkoxy - Copolymer	++	+++
6Y	FEP	Tetrafluorethylene/Hexafluorpropylene-Copolymer	++	+++
7Y	ETFE	Ethylenetetrafluorethylene-Copolymer	+++	+++
9Y	PP	Polypropylene	++	_*
09Y	Zell-PP	Polypropylene, foamed	-	-
Thermoplastic Elastomers				
11Y	TPU	Polyurethane (PUR)	+++	+*
11Y	TPU	Polyurethane (HT-PUR)	+++	+
13Y	TPE-E	Polyesterelastomer	+++	+*
13Y	TPC-ES	Thermoplastic HT Co-Polyester	++	++
31Y	TPS	Styrene-Block-Copolymer	+	_*
91Y	TPV	Thermoplastic Polyolefin - Elastomer	++	_*
Cross-linked Substances				
2G	SIR	Silicone - Rubber	+	+*
3G	EPR	Ethylene - Propylene - Rubber	+	_*
35G	AEM	Ethylene - Methylacrylate - Terpolymer	++	+++
4G	EVM	Ethylene vinyl acetate	+	+*
5G	CR	Chloroprene-Rubber	+++	++
53G	PE-C	Chlorinated Polyethylene	++	++
41X	VTPE-O	KROTHERM Flex 10	++	++
2X	PE-X	Polyethylene, cross-linked	++	++

Fuel	Oil	Weathering	Temperature range in °C (20,000 hrs.)		
++	++	++	-40		+90
+	+	+	-50		+70
+	+	+	-40		+70
++	+++	++	-40		+70
+++	+++	+++	-190		+260
+++	+++	+++	-190		+260
+++	+++	+++	-100		+180
+++	+++	+++	-80		+135
++	++	+	-40		+90
+	+	+	-40		+80
++	+++	+++	-50		+90
++	+++	+	-40		+120
++	+++	++	-50		+90
++	+++	++	-40		+130
++	++	++	-65		+90
+	+	++	-40		+90
+	+	+++	-70		+180
+	+	++	-65		+90
+++	+++	+++	-40		+120
++	++	++	-40		+110
++	++	+++	-40		+70
++	++	+++	-30		+90
++	++	+++	-40		+120
++	++	+	-40		+90

+++ Excellently suited

++ Well suited

+ Conditionally well suited

- Moderately suited

* Flame retardant setting possible

AUTOMATION & ROBOTICS

The growth dynamics of automation and robotics in production continue to increase. The intelligent interaction between human and machine will be indispensable in automation and an important topic in the future.

Automation technology

Automation technology deals with the measurement, control and regulation of automatically operated machines and production plants and is used in industries such as mechanical engineering, the automotive sector or in the electrical and energy industries. Reliable and cost-efficient connections with cables according to international approvals such as UL, cUL and CSA are used here by KROSCHU.

Data transmission in robots

Data has to flow and be transmitted from the robot to the tool used. The exact torque and the path are reported back. The resulting flood of data requires maximum data security at high transmission frequencies. In KROSCHU cables these properties are achieved by special stranding and shielding techniques.

Dresspack

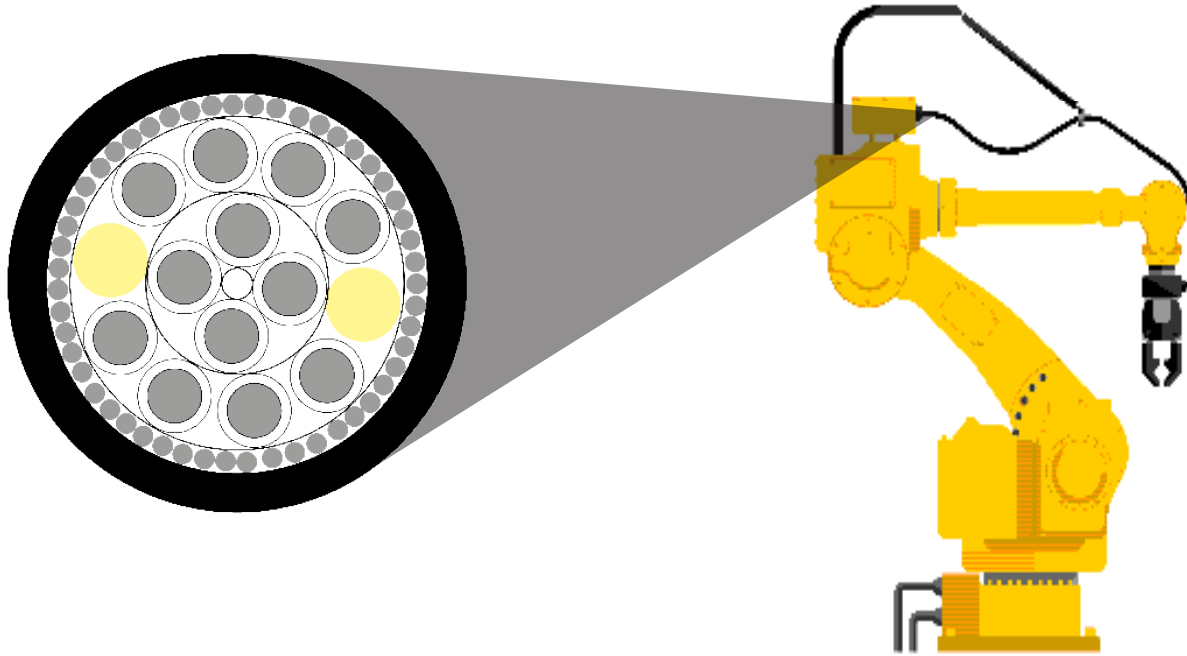
Also known as „hose guidance“, the dresspack is used for production processes that are highly complex and in which the wrist movements of the robot are carried out precisely. Therefore, flexibility, easy handling of the cable and high resistance to mechanical and chemical stresses are required here at the same time.

Lifetime cabling

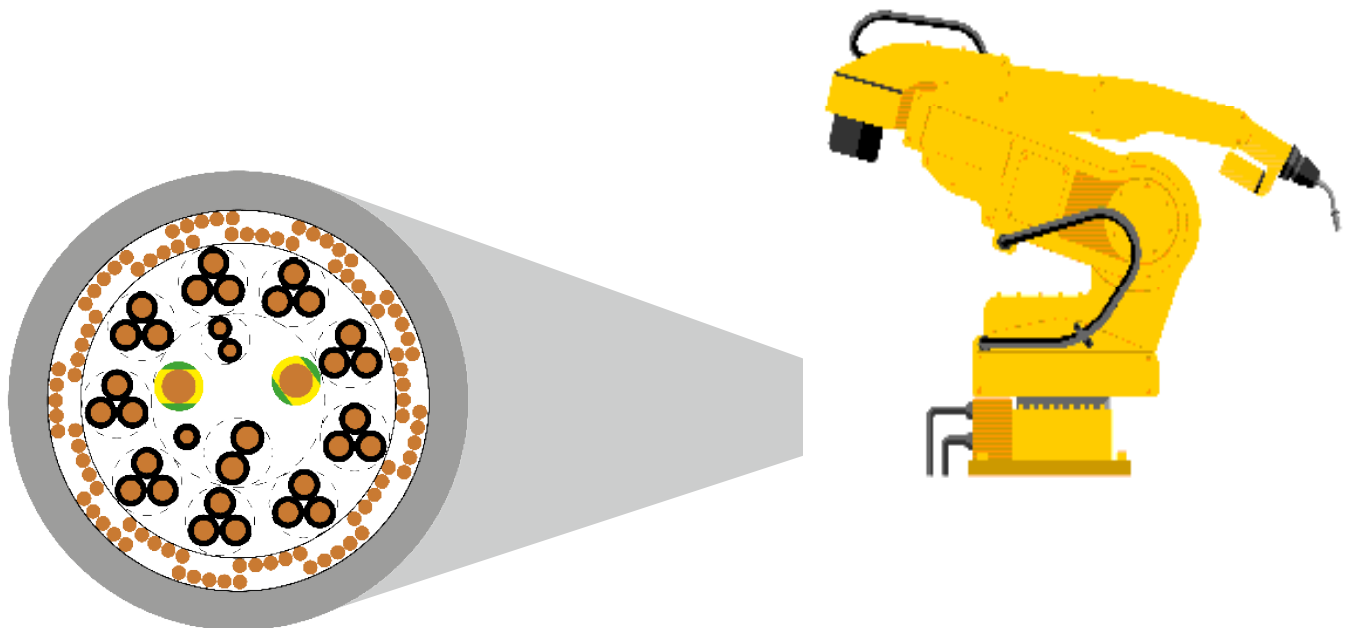
Energy is conducted through the entire robot up to the last moving axis. Cables are often laid inside the robot chassis. Replacement would therefore be very complex and extremely expensive. Sliding properties and abrasion behaviour of the cable used play an essential role.

APPLICATION EXAMPLES

Movable control cable for wiring in the robot



Control cable for laying as a supply cable to the robot



ENERGY & INFRASTRUCTURE

Innovative and efficient cables for active environmental protection

Renewable energies are the future! Investments in this sector are steadily increasing, both in the individual economic sectors and in private households. This environmentally friendly way of generating energy requires special cables that transmit the generated energy sustainably and usefully.

KROSCHU has designed and developed cables precisely adapted to the respective tasks, which guarantee optimal functionality.

Cost-efficient power

Industrial motors have to be supplied with power reliably and safely. KROSCHU's portfolio includes special cables with international approvals such as UL, cUL and CSA, which meet high technical requirements. Preferably, PVC-sheathed cables are used for this purpose.

Wind energy

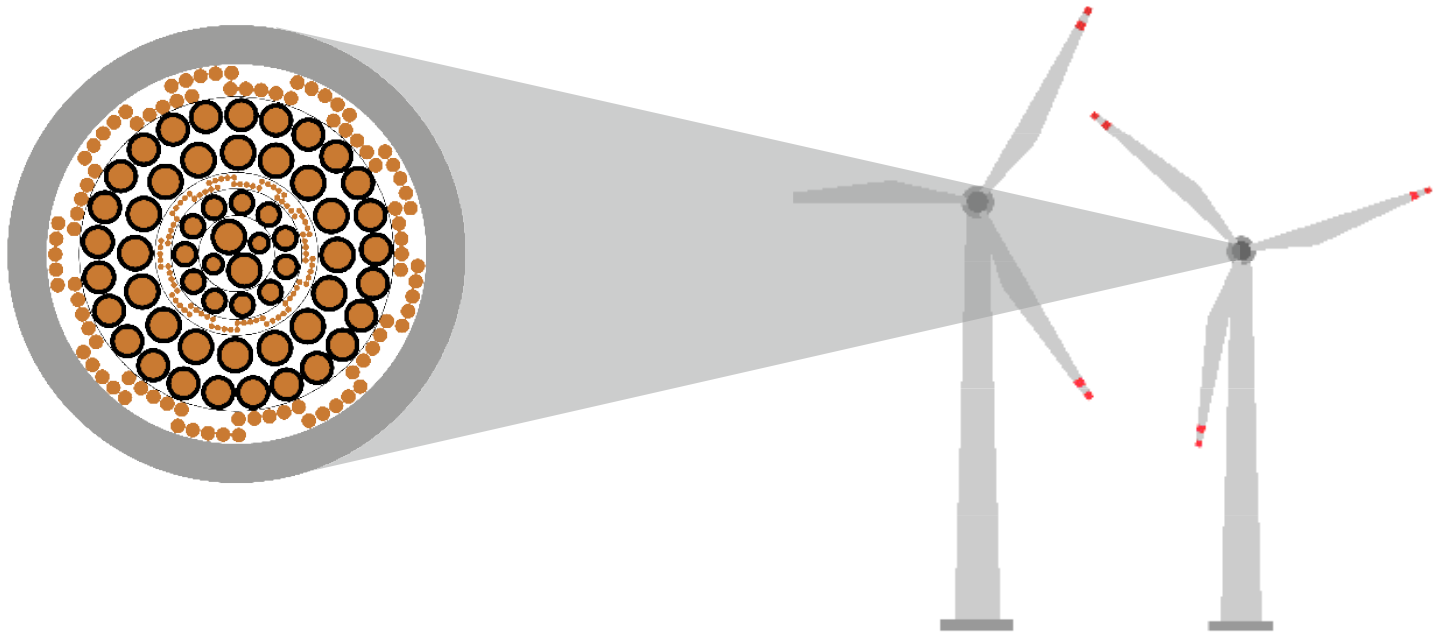
Wind turbines secure the electrical power supply in an environmentally friendly way. Halogen-free control and data cables make a decisive contribution to the safe and effective operation of these systems. KROSCHU cables offer an optimal combination of being halogen free, flame retardant and flexible. Recyclability and environmental compatibility are a matter of course with such cables!

Solar & Photovoltaics

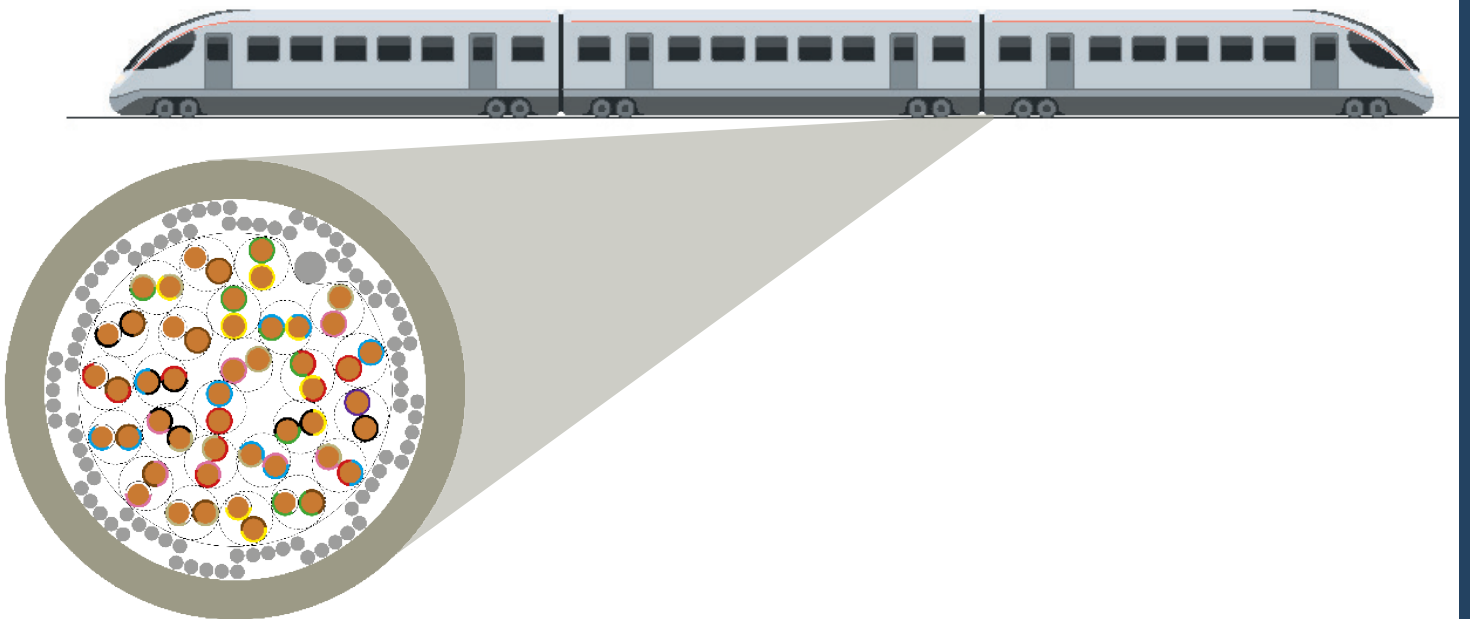
More and more private individuals, but also companies, are relying on energy generation through solar energy. The photovoltaic and solar cables developed by KROSCHU are made exclusively from cross-linked insulation with good reason! Thermoplastic materials have the melting point of the material as their temperature limit. Cross-linking extends the short-term operating temperature range and the material does not melt when overheated.

APPLICATION EXAMPLES

Torsion-resistant control cable for wind turbines



Cable for wiring the railway industry



MEDICAL TECHNOLOGY

Efficient high-performance cables with high demands

Cables and wires for medical technology have to perform great feats and also always have to fulfil a multitude of requirements at the same time. These include, for example:

- Hygiene
- Desinfecting effect
- Permanent sterility
- Autoclavability
- Reliability
- High data transfer rates (Gigabit LAN)
- Safety
- Dermatological compatibility
- Biocompatibility
- Haptics

Thanks to our decades of experience and knowledge in this sector (whether in the operating theatre, the laboratory or in dental technology), we at Kromberg & Schubert are always the ideal partner at your side as developer and manufacturer.

Interference-free data transmission

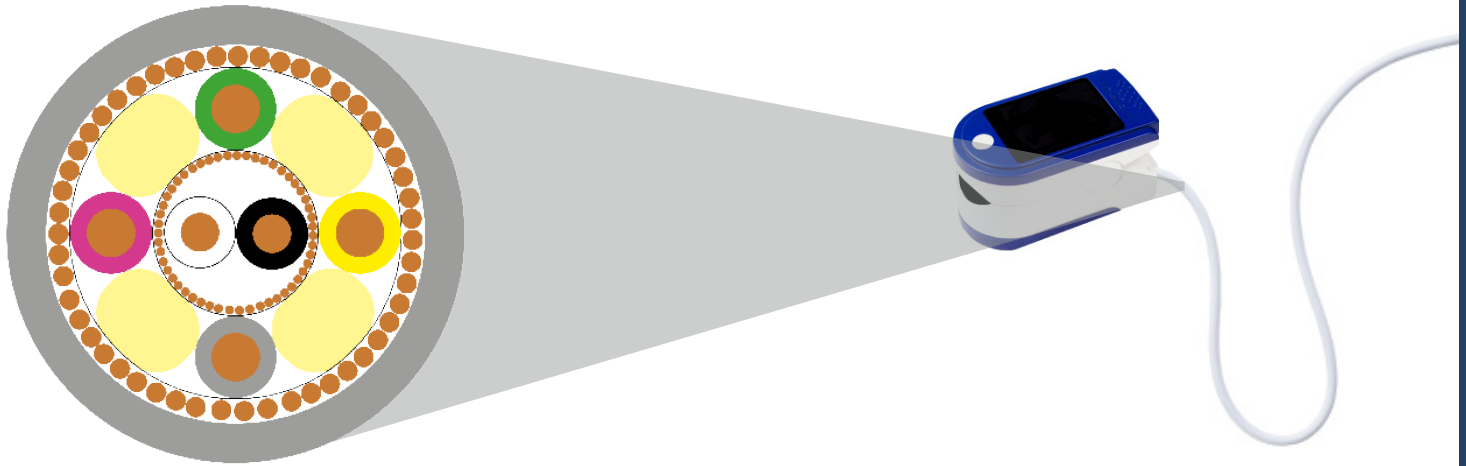
Energy and data must be transmitted safely and without interference. For the defined and interference-free transmission of data and sensor signals with the highest frequencies and minimum amplitude, KROSCHU supplies special cables with optimised high-frequency behaviour.

Coax cable

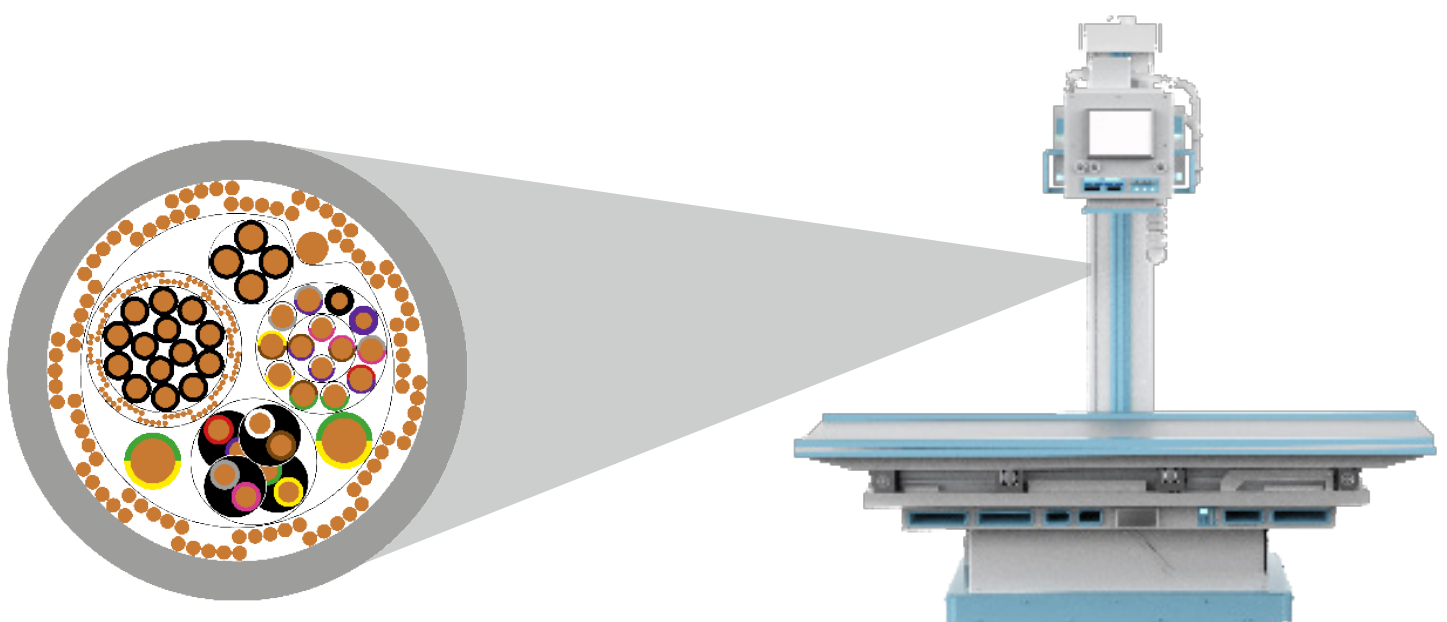
Coaxial cables, or coax cables for short, are single-pole cables. They consist of an inner conductor that is surrounded by a hollow cylindrical outer conductor at an even distance. The outer conductor has the task of shielding the inner conductor from interference radiation. The structure of the cable determines the resistance of the supply waves and the attenuation of the cable, which depends on the frequency.

APPLICATION EXAMPLES

SPO₂ sensor cable for finger clips to determine the partial oxygen saturation in the blood



Complex combination cable for control and data transmission within an X-ray unit



SENSOR TECHNOLOGY

Sensors and measurement technology are the keys to modern technology. There is hardly an industrial sector where sensors are not used for testing. Among others, our cable solutions are used in the following areas:

Exhaust gas measuring technology

In order to prevent the escape of certain gases such as carbon monoxide or nitrogen oxides, an exhaust gas measurement has to be carried out. The measuring range and the accuracy of the concentration of the respective gas also depend, among other things, on the condition of the sensors as well as the exhaust gas analyser. The measurement is taken directly from the warm exhaust gas stream. Therefore, temperature-resistant cables are indispensable for the analyser to be used.

Chemical resistant sensors

Energy and data have to be transmitted safely and without interference. For interference-free transmission of data and sensor signals with the highest frequencies and minimum amplitude, KROSCHU supplies cables with optimised high-frequency behaviour. Especially in food production, hygiene is the top priority. Regular contact with cleaning agents and disinfectants is a challenge for every material.

Avoidance of microphony effect

Temperature sensors analogue to frequency convert changes in temperature directly or indirectly into changes in frequency. This has advantages in simple digital measurability and low-interference transmissibility.

Inductive sensors

Inductive sensors usually always operate with an open coil. This creates a magnetic field and the object converts the field. This allows angles, distances or speeds to be measured without contact and without wear. They are used in environments with high solvent concentrations or for monitoring ventilation systems in case of fire.

Optical sensors

Optical sensors can detect objects by means of light or laser diodes or infrared and thus cause certain control or switching functions.

Temperature-sensors

Temperature sensors are used everywhere in industry. For example, to ensure the correct temperature of a product in food production or in mechanical engineering to measure the temperature of gears and motors.

APPLICATION EXAMPLES

Special cable for flue gas probes



Special cable for food monitoring during refrigerated transport



CHARGING INFRASTRUCTURE

Charging cables for electric cars according to VDE

Electromobility combines sustainability, efficiency and driving pleasure in one. The trend towards electric vehicles is gaining more and more importance. To ensure the longest range for the car, the right charging accessories must be used.

Significant advantages of the KROSCHU charging cables!

- Made in Germany
- According to VDE EN 50620 / following IEC 62983-4-1
- Various cable diameters
- Standardised according to H07BZ5-F or according to customer specification
- Imprint and sheath colour according to customer requirements
- Single- and three-phase cable versions in the fixed range
- Suitable for any charging mode (mode 1 to 3) in the AC range

APPLICATION EXAMPLE

Charging cable for Electromobility



LOGISTICS

Industrial mobility stands for a new segment of location planning and logistical processing. Innovative and modern processes are being established to meet sustainable and social requirements for people and machines. Technical trends and designs in this area require the latest, ecologically and economically efficient cable solutions for intralogistics. For this purpose, KROSCHU develops cables made of specially compiled materials with specific properties.

Intralogistics

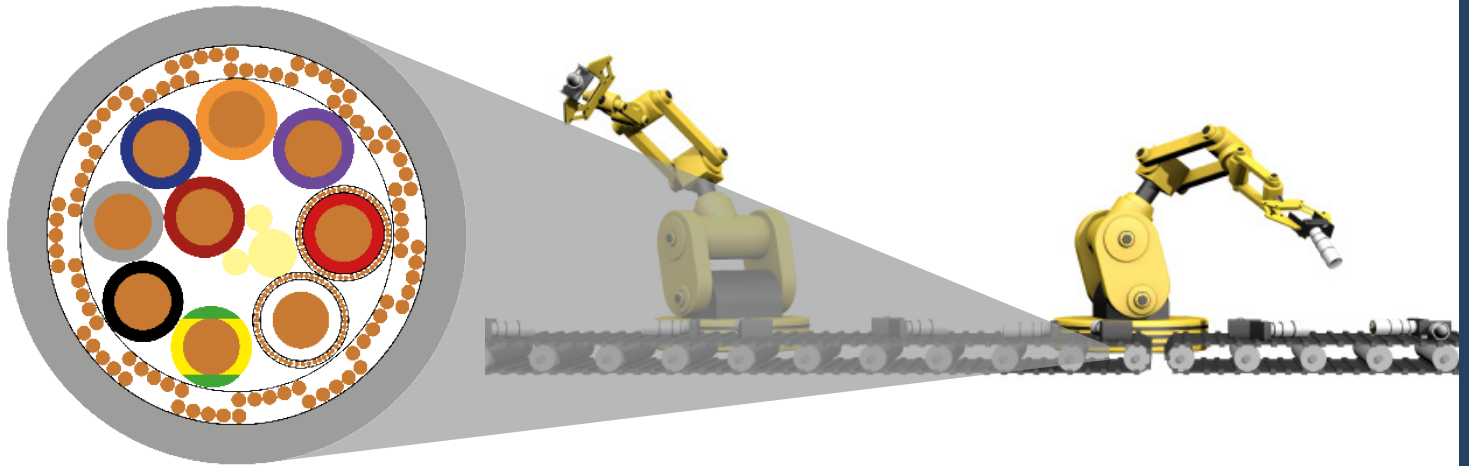
The topic of „intralogistics“ encompasses all areas of control, implementation and organisation of the material flow within a warehouse operation, such as incoming and outgoing goods or storage and conveyor systems. Due to high loads and necessary connections, cables must be made of particularly tensile and abrasion-resistant material and be torsion-proof. In order to meet these requirements, KROSCHU has developed cables with TPU sheathing that also remain flexible at high sub-zero temperatures.

Examples of cable types in the field of intralogistics:

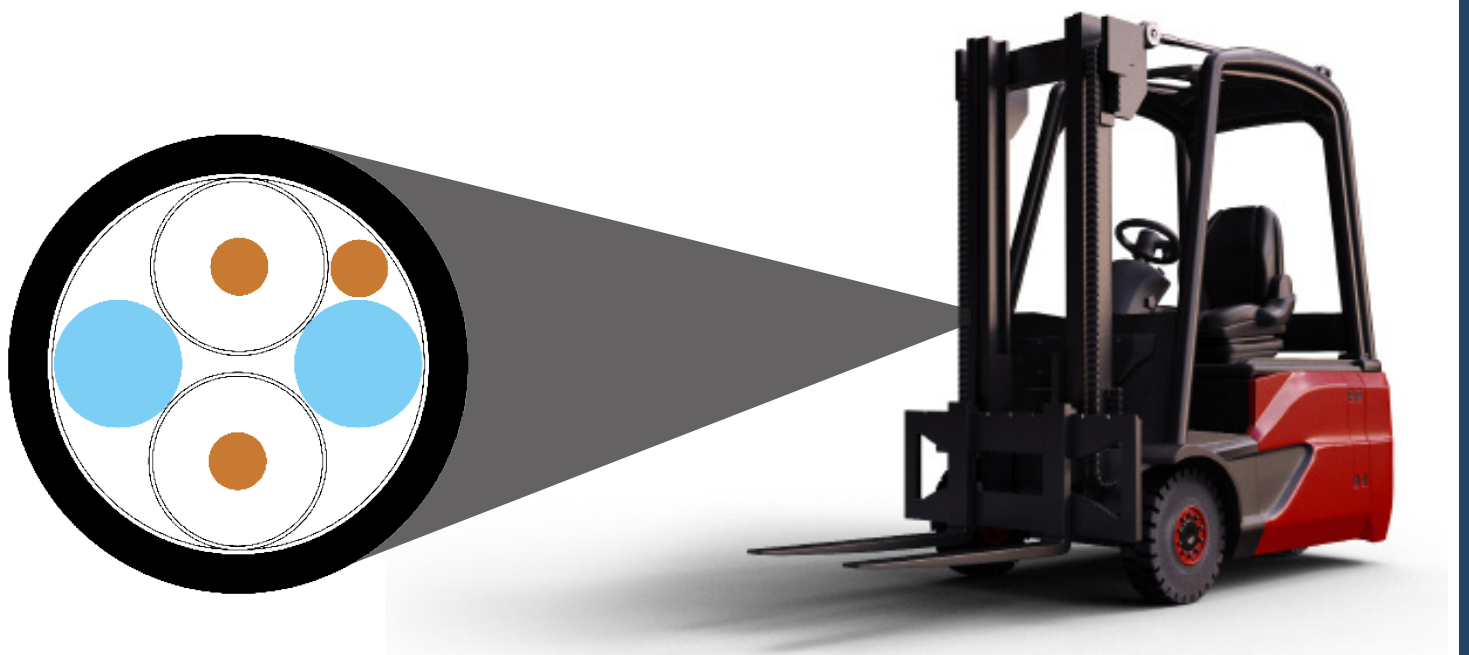
- Ground straps
- Drag chain cable
- Control cables

APPLICATION EXAMPLES

Control cable for wiring drum motors in assembly lines



Drag chain cable for electric forklift



THE RIGHT (CABLE) SOLUTION FOR EVERY CHALLENGE

We see ourselves not only as a special cable manufacturer, but also as a development and innovation partner! Together with our customers, we develop individual cable solutions for an electrified and connected world.



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Together with our customers, we develop individual high-end cables for all applications in the industrial and automotive sectors. In interdisciplinary teams, our product and process development, together with our in-house special laboratory, develop optimally matched cable solutions under the highest quality standards.

Tests of single core and sheathed cables

- ✓ Dimensional testing
- ✓ Electrical testing
- ✓ Insulation sheath testing
- ✓ Mechanical testing
- ✓ Climatic testing
- ✓ Thermal testing
- ✓ High-frequency testing

Furthermore we offer numerous non-accredited test methods.



DIN EN ISO 50001
REG.-NR. ENMS1 0118167

Compliance with national and international standards explains our claim to quality monitoring. Continuous improvements in our processes ensure the highest level of safety as well as high-quality products for our customers.

**Research
&
Development**

**DAkkS
accredited
laboratory**

**Quality
management**



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