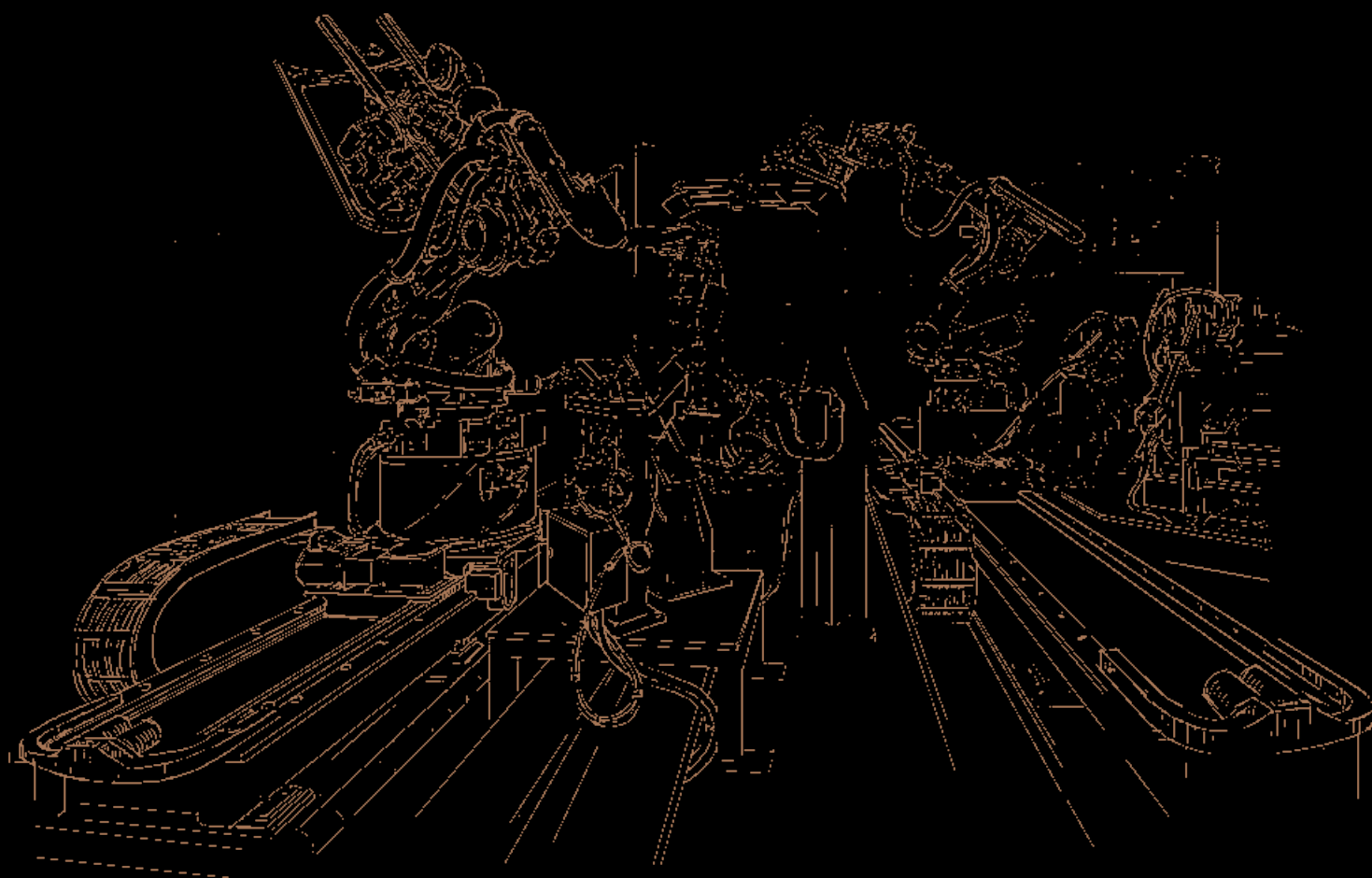


Torsion-Resistant Cables for Robotic Applications

HELUKABEL ROBOTICS

Ed. 1 // EN



**(Channeling
POWER)** 

Icons

Approvals / Standards



UL



CSA



HAR



VDE REG Number



SPAIN



EAC



CCC



CE



DNV



IPA



DESINA

Properties / Applications



Halogen-Free



UV Radiation



Robust



Drag Chain



Torsion



Wind-Offshore



Meter Marking



In Feet

Explanation of the icons used in the brochure:

The icons are intended to provide a general overview of material properties and certifications. Please refer to the data sheets for further detailed information.

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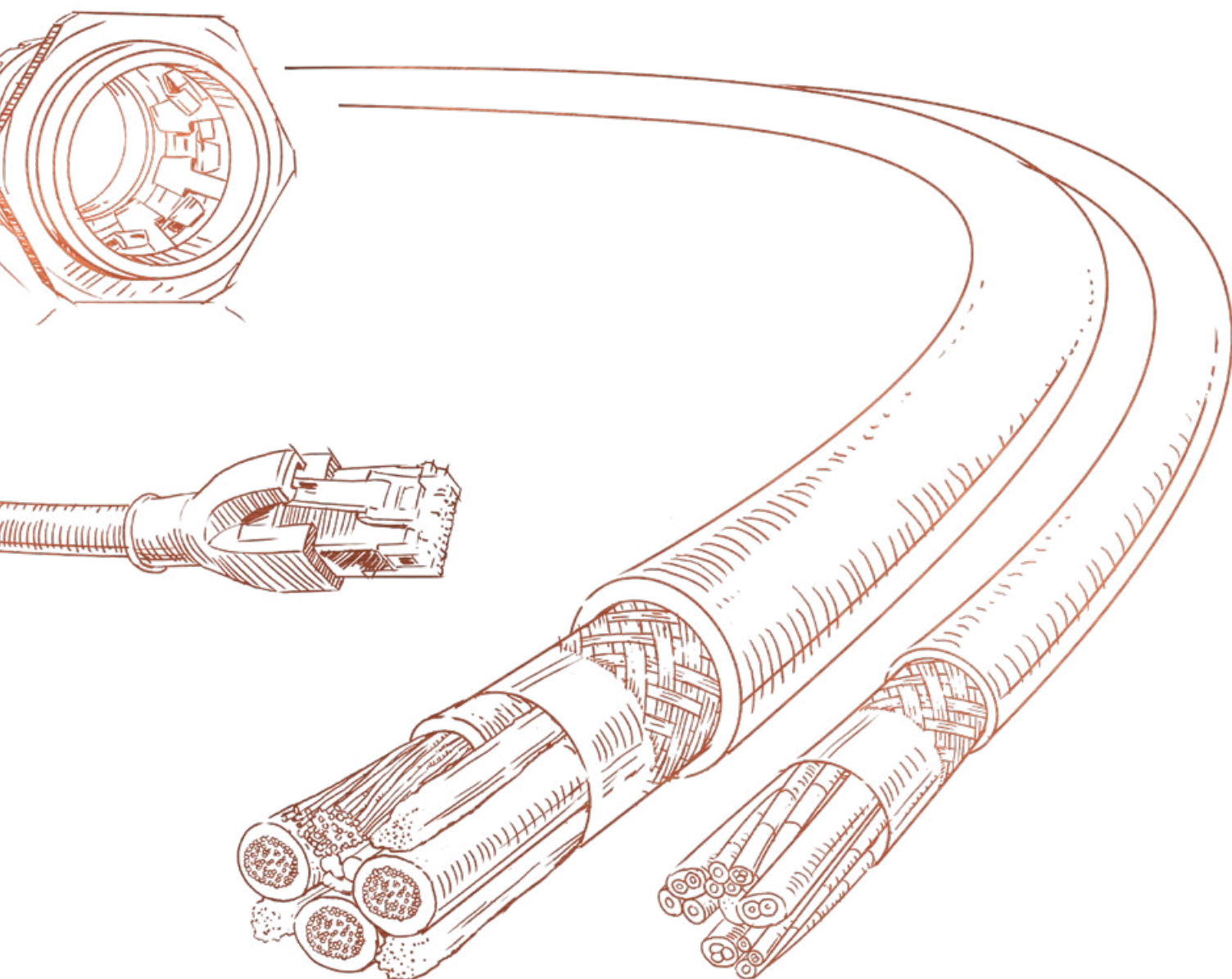
(Channeling POWER)

Cables are the vital supply lines of complex machines, plants, and systems. Whether operating under extreme mechanical stress, in the middle of the Arctic Ocean, in the scorching heat, or in the vastness of space – such conditions demonstrate what top-of-the-line cables can achieve.

We at HELUKABEL have made it our mission to bring energy and communication to our customers' destinations reliably and consistently at all times, and to make the impossible, possible!

Over 2,500 employees located at 69 sites across 40 countries work towards this common goal. We see it as our challenge to find the right cable solution for you every day, giving you the time to concentrate on more important things than cables and wires. This is where our products truly create value for you and your application.

"Channeling Power" succinctly summarizes this mission and is our commitment to customers.

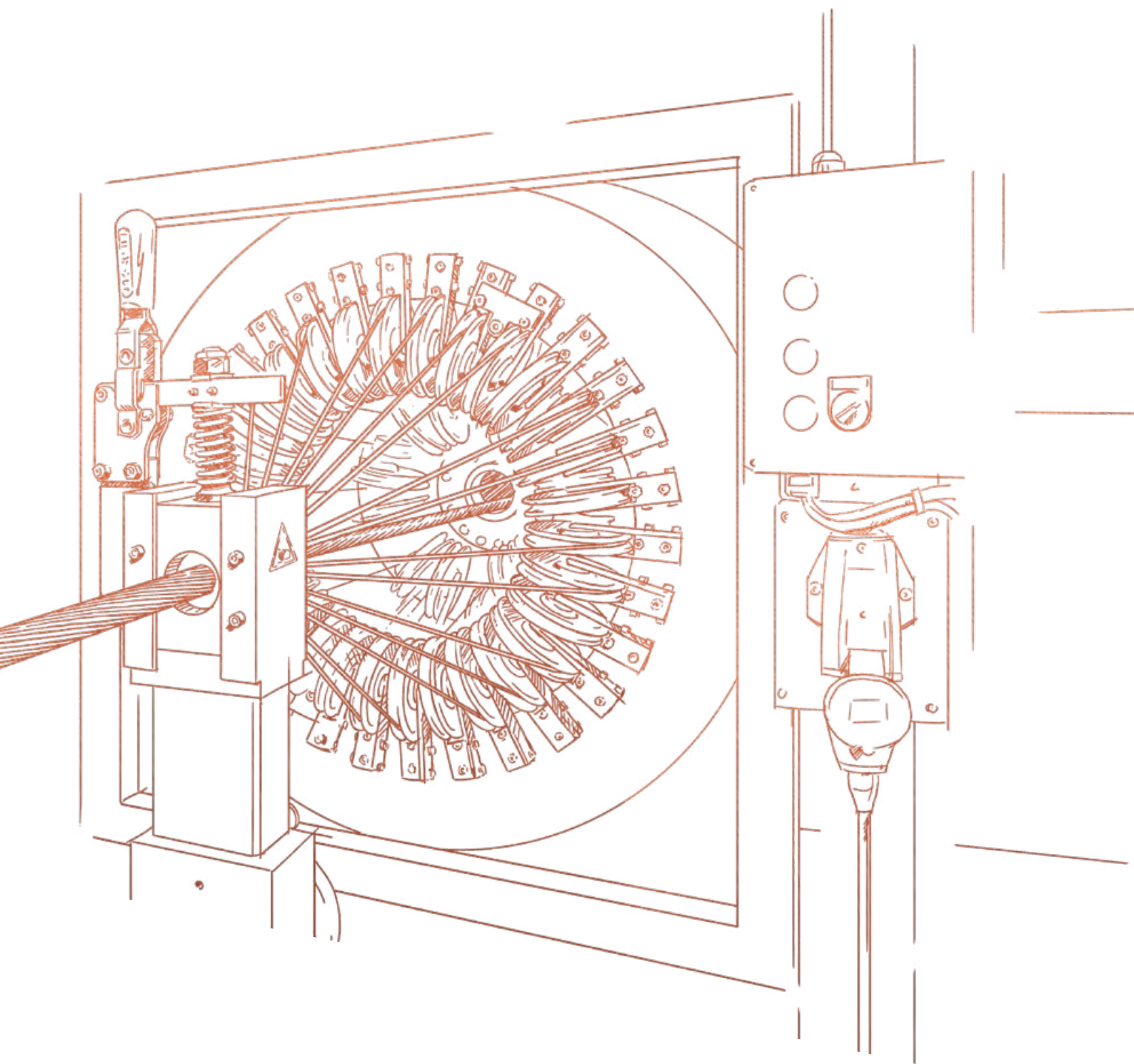


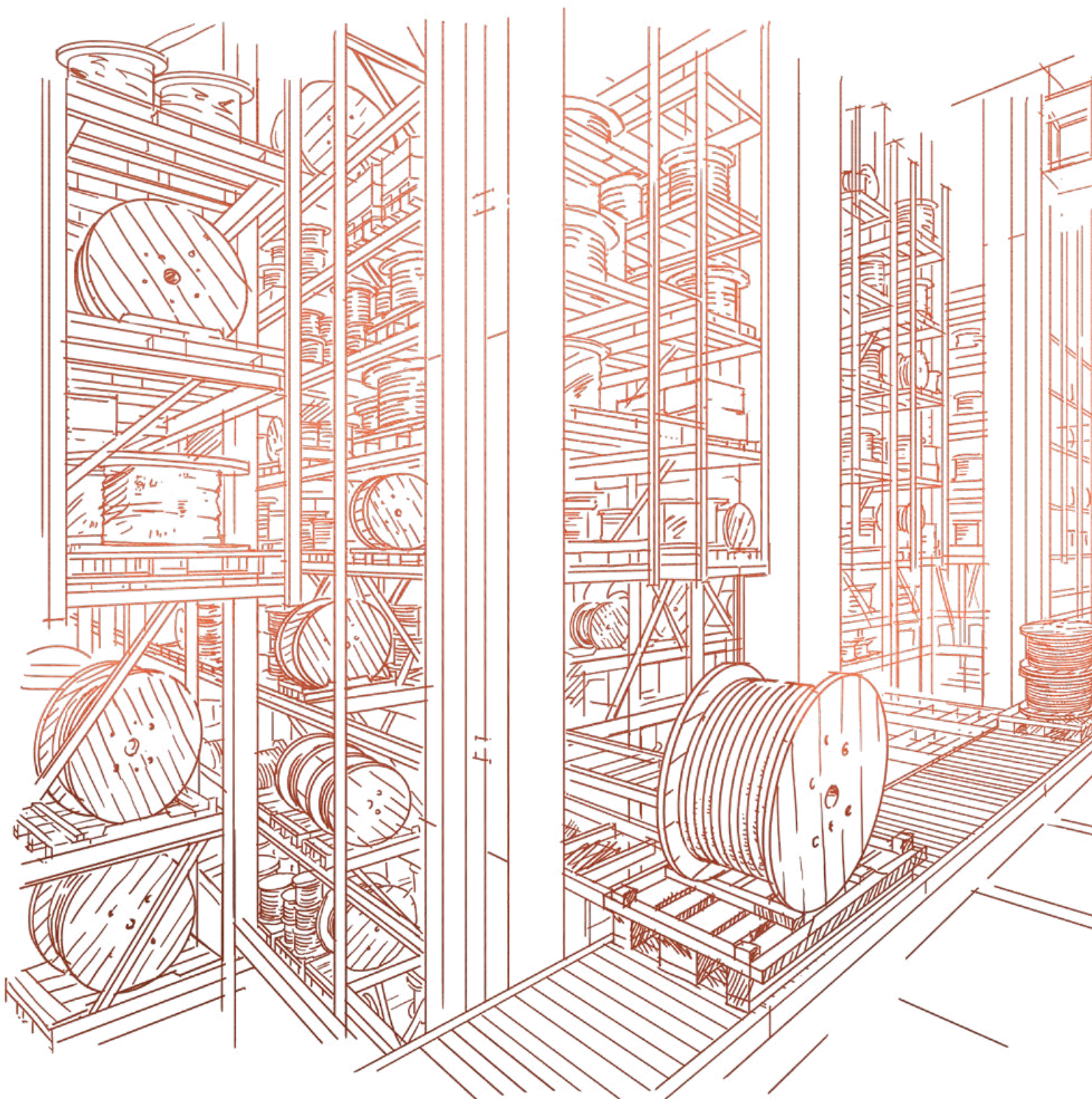
(Channeling INNOVATION)

A cable is only as good as the minds that ask the right questions before it's made. We have a lot of bright minds at HELUKABEL who spend every day searching for intelligent answers.

This is important because the challenges faced by modern cables and wires are multifaceted: for example, moving applications with more than ten million cycles, exposure to extreme mechanical and chemical loads, tricky bending radii and space-saving hybrid solutions. For each situation, HELUKABEL has answers to help you.

To ensure there are no issues during use, all newly developed products undergo rigorous testing at our R&D centre in Windsbach, near Nuremberg. Here we bend, pull, grind and ignite the cable for all it's worth. Our special aging ovens are time machines that simulate a cable's life cycle and far beyond. Our cables are tested to comply with national and international standards, and all results are signed and sealed.







(Channeling LOGISTICS)



Where there's no cable there's no data nor electricity. When everything's going according to plan, cables are of little interest to anyone; but inevitably the day comes when a machine starts malfunctioning or a missing cable is holding up the completion of a project task. Whatever the situation in which problems occur, the time can be tense and critical for everyone involved.

At HELUKABEL, we try to remove the stress you're experiencing as quickly as possible. To this end, we built the biggest distribution centre for cable products

in Europe. With over 33,000 products stored in a fully automated, high-bay warehouse, we're ready to act upon your needs quickly and ship you the right cable at a moment's notice. Our "known shipper" status with the Federal Office of Civil Aviation means that your goods are checked in and pass security control directly at our warehouse, which speeds up the shipment process.

On top of this, we have 33 additional warehouses on 5 continents so you can order your cables in Spanish, French, Chinese or in 24 other languages.

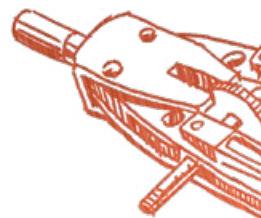
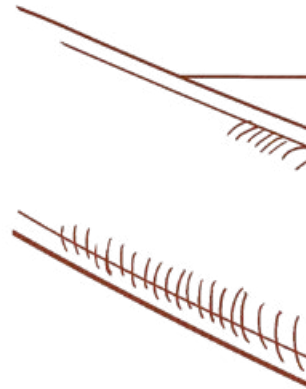
Channeling (KNOW-HOW)[®]

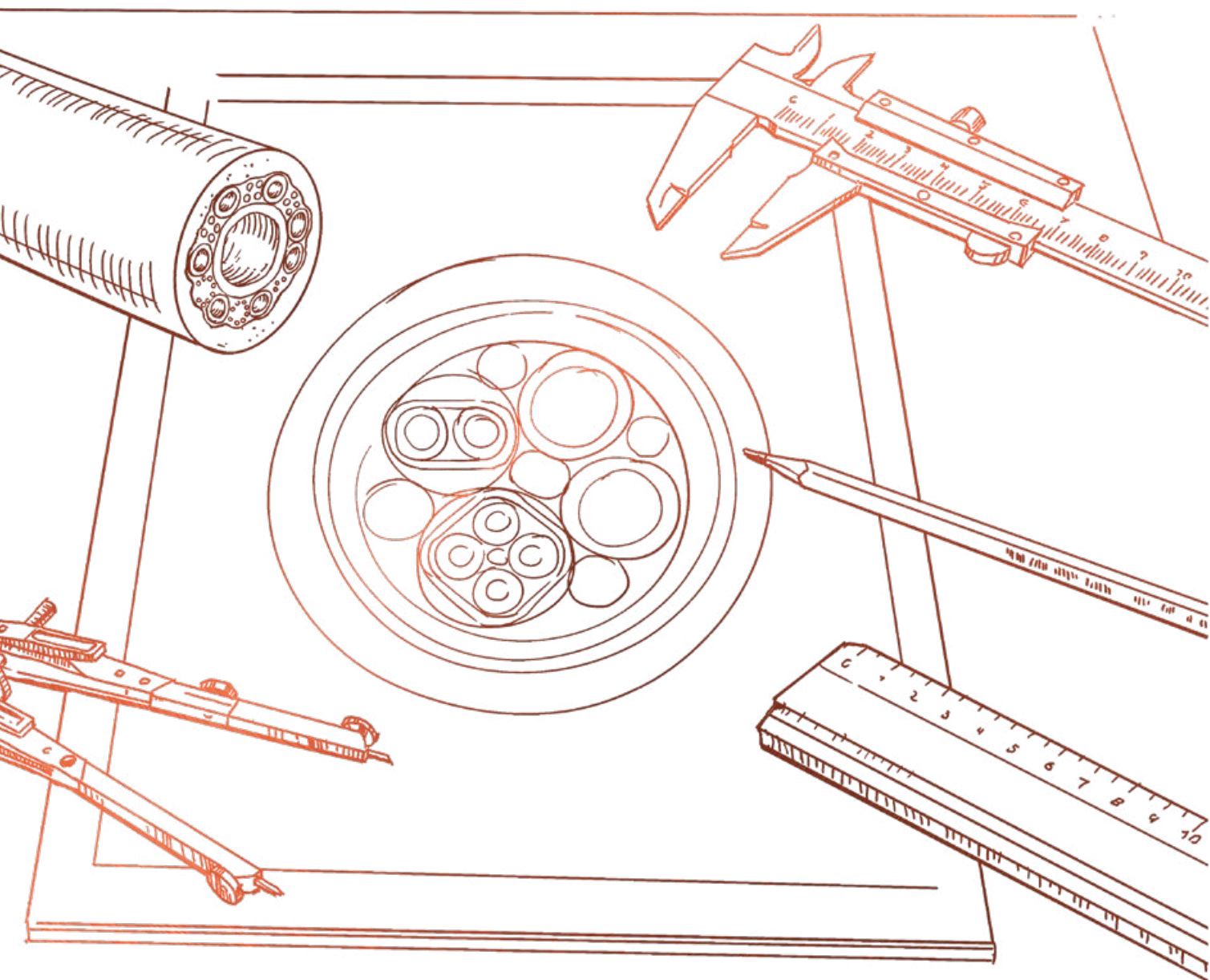
We are mighty proud of our portfolio of more than 40,000 stock items - and yet, among all these products, it still happens that a customer does not find the right solution for a specific application. Luckily, we have a strong backup plan for cases like these: HELUKABEL has in-house experienced specialists who can develop the optimum connection solution precisely tailored to your needs.

Depending on which electrical, chemical and mechanical properties your cable must fulfil in practice, we carefully determine all the parameters: from the cross-section of the conductor and its structure to the insulation and arrangement of the individual elements in the cable, to the shielding

and outer sheath. Only when a special cable truly meets all requirements are our engineers fully satisfied - so that you will be too. It's with this approach that we develop reliable solutions together with our customers, even for complex and unusual situations.

In such instances, the results range from small and inconspicuous to great and spectacular: special cables from HELUKABEL can be found, for example, in aerial ladders on fire engines, in sewer robots, tunnel boring machines, on oil platforms or in wind power and biogas plants. After all, when it comes to cables, wires and accessories, there's almost nothing we can't do.





Wires for Robotics

Robots are an essential part of highly dynamic manufacturing industries around the world, and it is difficult to imagine these industries without them. Robots and cobots can be found operating and interacting in close proximity with humans on production lines, but they also perform tasks independently. Modern industrial robots move in three-dimensional space and are able to carry out a great variety of tasks. In doing so, the robot arm repeats a sequence of movements millions of times. It completes repetitive work processes with continuous precision while maintaining consistent quality – without daily variations or signs of fatigue.

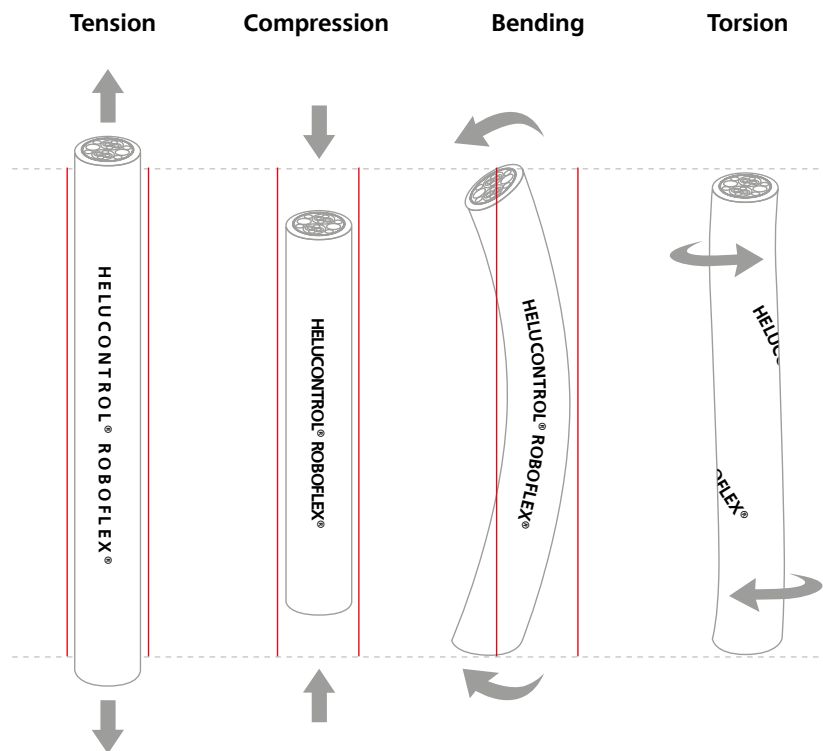
In order to be able to do this, the cables in the robots must meet the highest of standards. Rapid acceleration and deceleration, tensile loads as well as combined bending and torsional movements are just a few of the operating conditions taken into account during cable design. At the same time – and depending on the application – space-saving solutions are needed to feed the cables into or along the robot arm whilst maintaining the greatest possible freedom of movement. Mechanical stress as well as chemical and thermal factors often play a role here too.

With our Roboflex® brand of cables, we have the right solution for a wide variety of applications. Resistance to oil, abrasion, notch and welding beads or extreme bending radii are just some of the requirements fulfilled by our cables.

HELUKABEL's assortment of cables for robotic applications includes control and motor cables of many different dimensions, hybrid cables and cables for the sensor and data, network and bus technology sectors. In addition to high levels of stock availability, HELUKABEL also offers bespoke solutions and develops cables tailored to your application.

We are also able to provide customised, assembled and ready-to-install dresspacks through our one-stop shop supplier and subsidiary, Robotec-Systems GmbH.

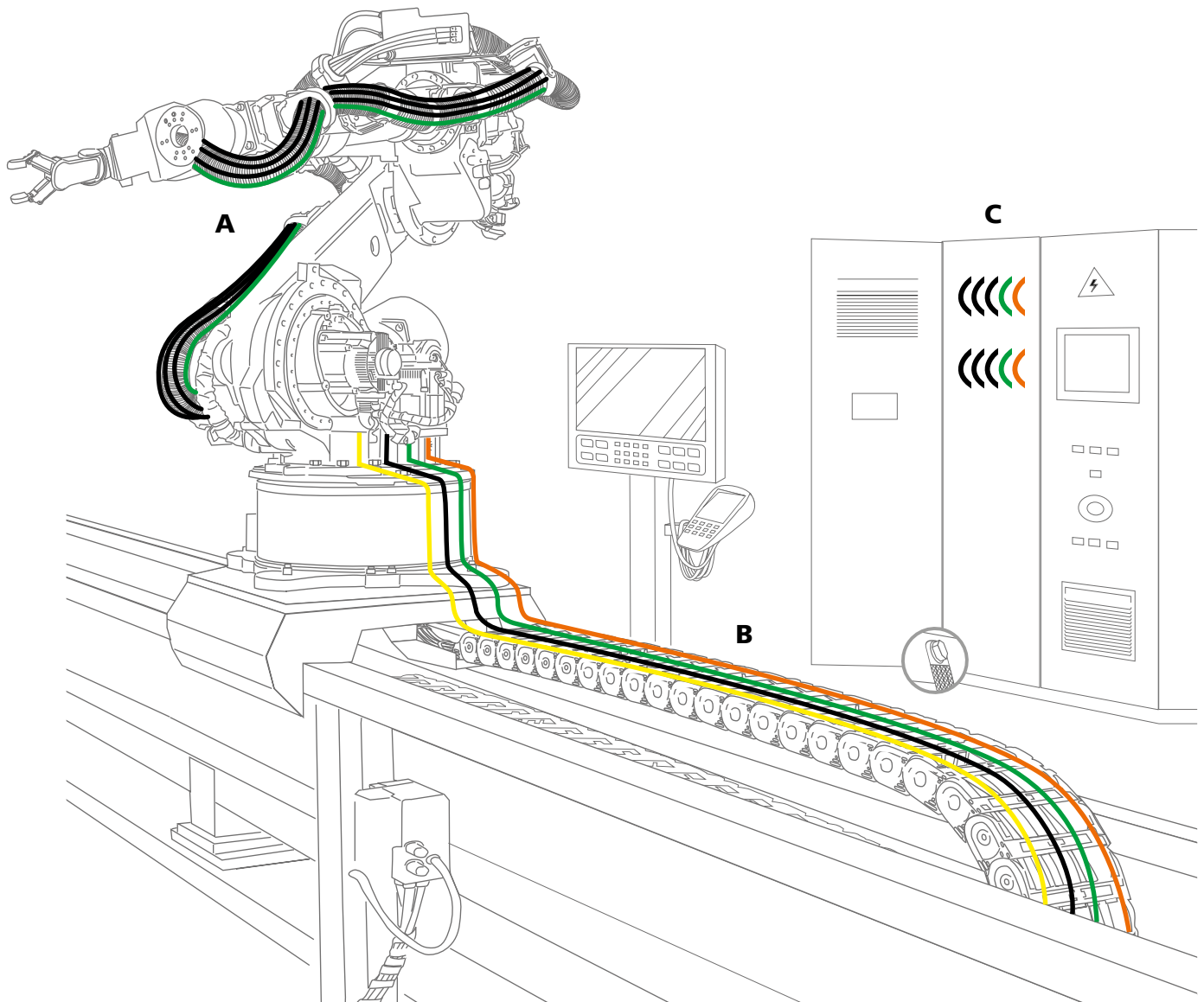
FORCES ACTING ON CABLES AND WIRES IN ROBOTICS



The cables and wires used in robotics are subject to a variety of forces: the millions of repetitive bending and torsional movements cause high compression and tensile loads, putting considerable strain on the cables. Cable design must also take

into account rapid accelerations and decelerations which make high abrasion, notch and tear resistance essential. The high temperatures often encountered in the applications are an additional stress factor.

Our Product Portfolio for the Industrial Automation



A) Tube Dresspacks

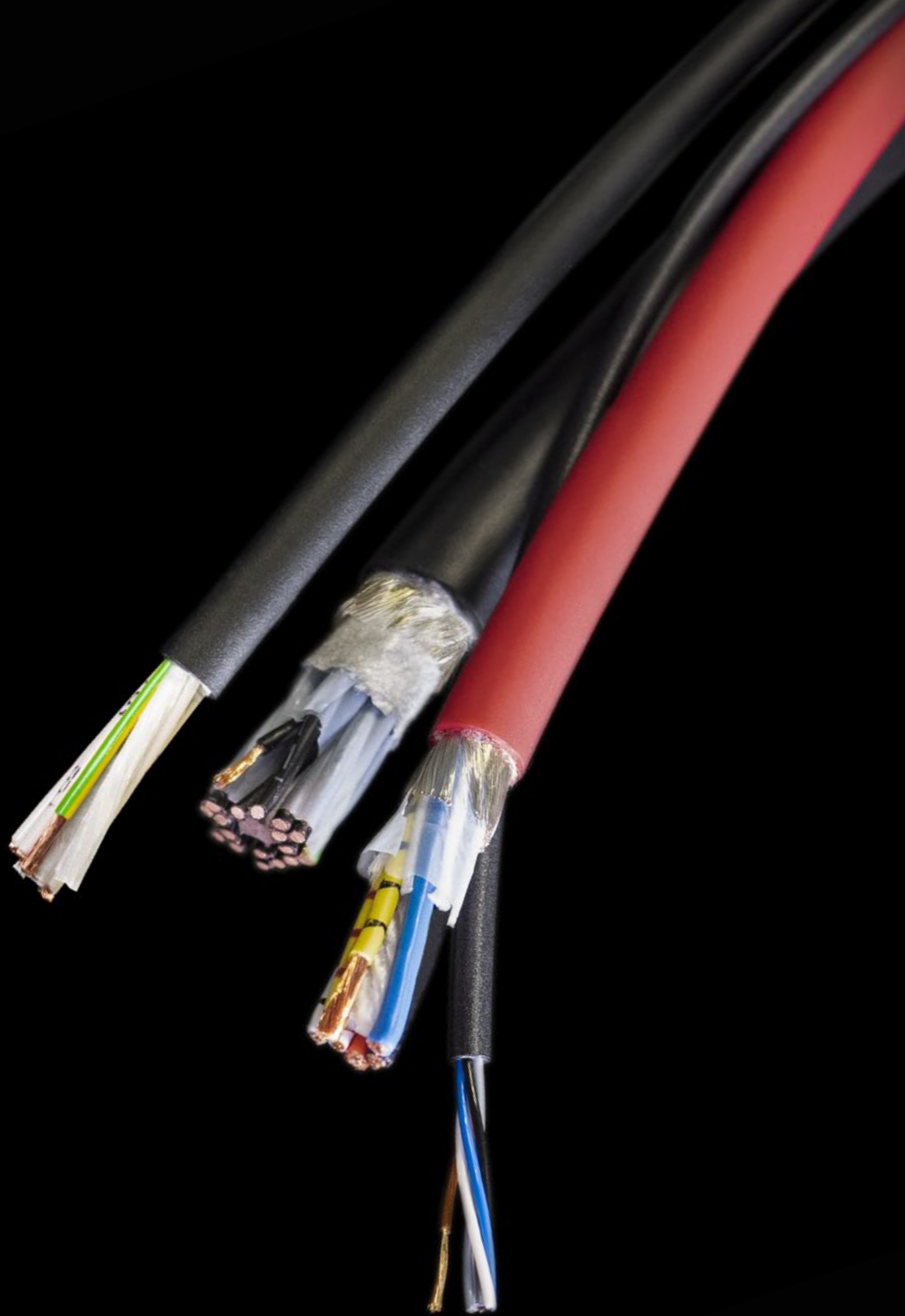
HELUCONTROL® ROBOFLEX®-D
 HELUDATA® ROBOFLEX®-PAIR-D
 HELUPOWER® ROBOFLEX®
 HELUKAT® 100 T Tordierflex
 PROFinet Type R
 600 S PROFinet Torsion, SF/FTP, Cat. 7
 HELUcond PA12 Corrugated tube

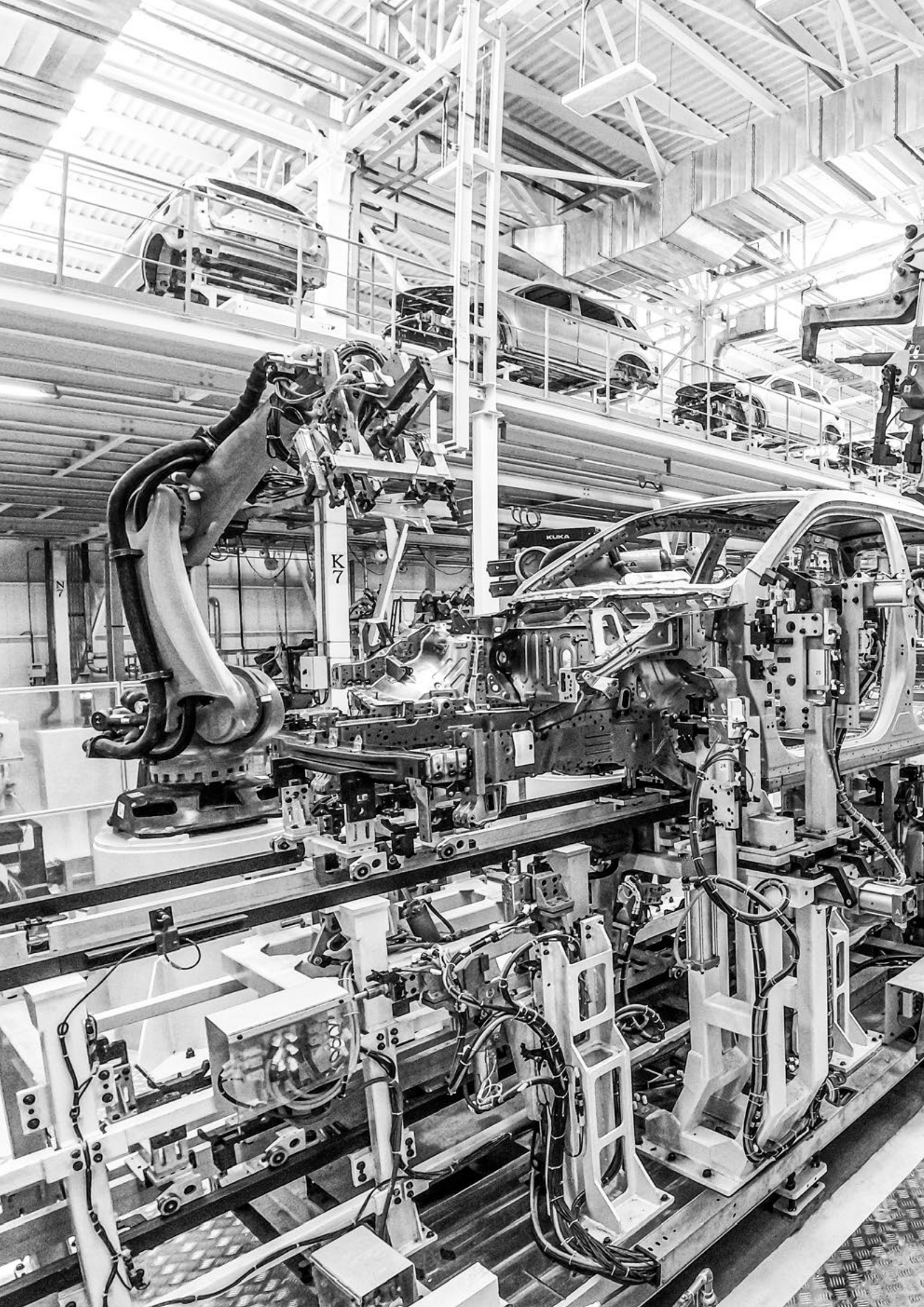
B) Drag chain - Axis 7

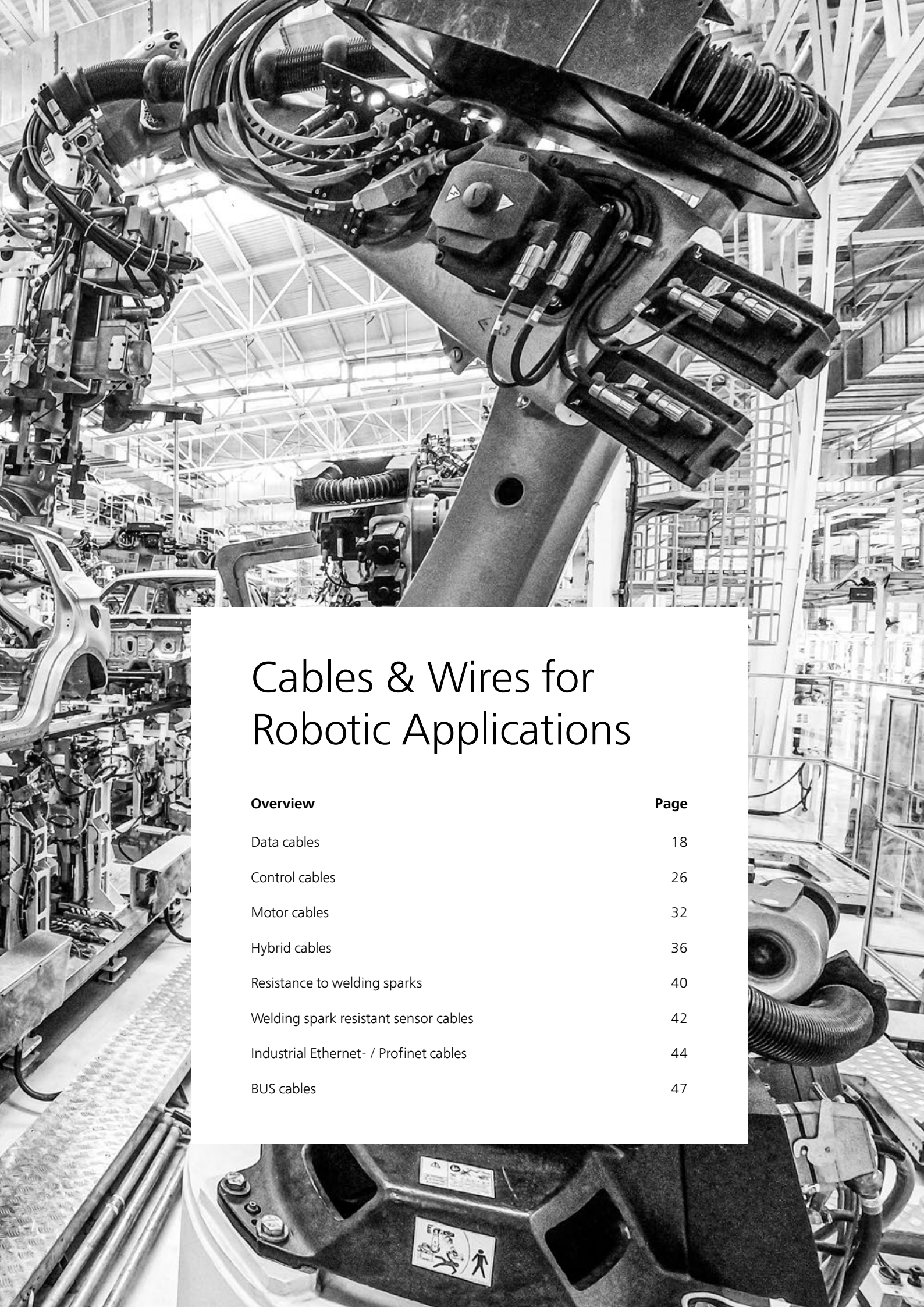
TOPSERV® Hybrid PUR
 TOPGEBER 512 PUR
 HELUDATA® ROBOFLEX®-recycle
 MULTISPEED® 500-PUR UL/CSA
 PROFinet Type C
 HELUTOP® MS-EP4 EMV cable gland

C) Switch cabinet

H07V-K / 07V-K
 FIVENORM
 PROFinet Type A or B
 Cu-Earthing strap
 Patch Cables







Cables & Wires for Robotic Applications

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HELUDATA® ROBOFLEX® PUR UL/CSA

Data cable



HELUDATA® ROBOFLEX® PUR UL/CSA 7x0,25 QMM E170315 AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 300/300 V UL (AWM) AC 300 V
Test voltage core/core	2000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

■ CABLE STRUCTURE

- Copper wire bare, extra finely stranded
- Wire structure:
 - 0.25 mm²: approx. 32 x 0.1 mm
 - 0.34 mm²: approx. 42 x 0.1 mm
- Core insulation: PP
- Core identification acc. to DIN 47100, colour coded
- x = without protective conductor
- Stranding:
 - 2 - 7 core(s): cores stranded into one layer with an optimally matched lay length
 - 12 - 25 core(s): cores stranded into bundles with optimally matched lay lengths; bundles stranded together around a tensile core
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: black (RAL 9005)
- Length marking: in metres

■ PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
 - Acceleration (max.): 60 °/s²
 - Velocity (max.): 180 °/s
 - Minimum bending radius: 10x Outer-Ø
 - Torsional stress up to +/- 180 °/m: 10 Mio. Cycles (min.)
 - Torsional stress up to +/- 360 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
 - Acceleration (max.): 10 m/s²
 - Velocity (max.), unsupported: 3 m/s
 - Velocity (max.), gliding: 2 m/s
 - Traverse path (max.): 10 m
 - Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
 - Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
 - Bending cycles (min.): 10 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

■ TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

■ APPLICATION

Data cable to transmit data and monitoring signals specifically designed for combined torsion and bending movements; for use in assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience.

■ NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only
- for use in energy supply systems:
 - 1) the assembly instructions must be observed
 - 2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUDATA® ROBOFLEX® PUR UL/CSA

Data cable



Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022005	7 x 0.25	24	6.3	17.1	49.0
11022007	12 x 0.25	24	8.6	30.8	82.0
11022008	25 x 0.25	24	11.7	64.3	151.0
11022009	2 x 0.34	22	4.9	6.4	27.0

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022010	3 x 0.34	22	5.1	9.6	32.0
11022013	7 x 0.34	22	6.6	22.4	57.0
11022014	12 x 0.34	22	9.1	40.5	96.0

HELUDATA® ROBOFLEX®-D PUR UL/CSA

Data cable, EMC-preferred type



HELUDATA® ROBOFLEX®-D PUR UL/CSA 10x0,14 QMM E170315 AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 300/300 V UL (AWM) AC 300 V
Test voltage core/core	2000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

CABLE STRUCTURE

- Copper wire bare, extra finely stranded
- Wire structure:
 - 0.14 mm²: approx. 18 x 0.1 mm
 - 0.25 mm²: approx. 32 x 0.1 mm
 - 0.34 mm²: approx. 42 x 0.1 mm
- Core insulation: PP
- Core identification acc. to DIN 47100, colour coded
- x = without protective conductor
- Stranding:
 - 10 core(s): cores stranded into one layer with an optimally matched lay length
 - 12 - 25 core(s): cores stranded into bundles with optimally matched lay lengths; bundles stranded together around a tensile core
- Fleece wrapping
- Screen: helically wound tinned copper wires, approx. coverage 90%
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: black (RAL 9005)
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
 - Acceleration (max.): 60 °/s²
 - Velocity (max.): 180 °/s
 - Minimum bending radius: 10x Outer-Ø
 - Torsional stress up to +/- 180 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
 - Acceleration (max.): 10 m/s²
 - Velocity (max.), unsupported: 3 m/s
 - Velocity (max.), gliding: 2 m/s
 - Traverse path (max.): 10 m
 - Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
 - Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
 - Bending cycles (min.): 5 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

APPLICATION

Data cable to transmit data and monitoring signals specifically designed for combined torsion and bending movements; for use in assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience. EMC = Electromagnetic Compatibility; in order to optimise EMC properties, we recommend a double-sided and all-round large contact area of the D-screen.

NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only
- for use in energy supply systems:
 - 1) the assembly instructions must be observed
 - 2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUDATA® ROBOFLEX®-D PUR UL/CSA

Data cable, EMC-preferred type



Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022427	10 x 0.14	26	7.8	32.1	80.0
11022428	12 x 0.14	26	8.3	39.1	89.0
11022429	18 x 0.14	26	9.7	50.8	119.0
11022430	25 x 0.14	26	11.0	66.6	149.0
11022431	12 x 0.25	24	9.1	54.5	112.0

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022432	18 x 0.25	24	10.7	74.1	151.0
11022433	25 x 0.25	24	12.2	99.5	194.0
11022434	12 x 0.34	22	9.6	66.3	128.0
11022435	18 x 0.34	22	11.3	93.8	177.0
11022436	25 x 0.34	22	13.0	121.6	227.0

HELUDATA® ROBOFLEX®-PAIR-D PUR UL/CSA

Data cable, EMC-preferred type



HELUDATA® ROBOFLEX®-PAIR-D PUR UL/CSA 4x2x0,25 QMM E170315 AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 300/300 V UL (AWM) AC 300 V
Test voltage core/core	2000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

CABLE STRUCTURE

- Copper wire bare, extra finely stranded, 0.5 mm²: acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Wire structure:
 - 0.14 mm²: approx. 18 x 0.1 mm
 - 0.25 mm²: approx. 32 x 0.1 mm
 - 0.34 mm²: approx. 42 x 0.1 mm
- Core insulation: PP
- Core identification acc. to DIN 47100 (paired stranding), colour coded
- x = without protective conductor
- Cores stranded in pairs with optimal lay lengths
- Fleece wrapping of the pairs
- Pairs stranded in layers with optimal lay lengths
- Fleece wrapping
- Screen: helically wound tinned copper wires, approx. coverage 90%
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: black (RAL 9005)
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
 - Acceleration (max.): 60 °/s²
 - Velocity (max.): 180 °/s
 - Minimum bending radius: 10x Outer-Ø
 - Torsional stress up to +/- 180 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
 - Acceleration (max.): 10 m/s²
 - Velocity (max.), unsupported: 3 m/s
 - Velocity (max.), gliding: 2 m/s
 - Traverse path (max.): 10 m
 - Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
 - Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
 - Bending cycles (min.): 5 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

APPLICATION

Data cable to transmit data and monitoring signals specifically designed for combined torsion and bending movements; for use in assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience. EMC = Electromagnetic Compatibility; in order to optimise EMC properties, we recommend a double-sided and all-round large contact area of the D-screen.

NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only
- for use in energy supply systems:
 - 1) the assembly instructions must be observed
 - 2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUDATA® ROBOFLEX®-PAIR-D PUR UL/CSA

Data cable, EMC-preferred type



Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022463	3 x 2 x 0,14	26	6,8	25,6	58,0
11022464	4 x 2 x 0,14	26	6,9	31,7	62,0
11022465	3 x 2 x 0,25	24	7,8	34,0	77,0
11022466	4 x 2 x 0,25	24	8,1	42,1	85,0
11022467	6 x 2 x 0,25	24	9,8	55,7	120,0
11022468	8 x 2 x 0,25	24	11,3	74,3	160,0

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022469	10 x 2 x 0,25	24	13,1	91,7	188,0
11022470	3 x 2 x 0,34	22	8,2	41,5	87,0
11022471	4 x 2 x 0,34	22	8,8	51,5	103,0
11022472	5 x 2 x 0,34	22	9,6	60,9	122,0
11022473	8 x 2 x 0,34	22	12,0	87,8	180,0
11022474	5 x 2 x 0,5	20	11,4	90,1	177,0



HELUDATA® ROBOFLEX® 2001 3x0,34 QMM / 25462 CE

TECHNICAL DATA

PUR robot cable in alignment with DIN VDE 0250, DIN VDE 0285-525-1 / DIN EN 50525-1

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Peak operating voltage	350 V (not for high power current installation purposes)
Test voltage core/core	1500 V
Mutual capacitance core/core	at 800 Hz, approx. 100 pF/m
Inductance	approx. 0.69 mH/km
Minimum bending radius	flexible 7.5x Outer-Ø fixed 4x Outer-Ø

CABLE STRUCTURE

- Copper wire bare, extra finely stranded
- Wire structure:
0.25 mm²: approx. 19 x 0.13 mm
0.34 mm²: approx. 19 x 0.15 mm
- Core insulation: PP
- Core identification acc. to DIN 47100, colour coded
- x = without protective conductor
- Stranding:
2 - 7 core(s): cores stranded into one layer with an optimally matched lay length
12 - 25 core(s): cores stranded into bundles with optimally matched lay lengths; bundles stranded together around a tensile core
- Central filler or bundles with PTFE wrapping, depending on the part number
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane acc. to DIN VDE 0207-363-10-2 / DIN EN 50363-10-2 (compound type TGPU)
- Sheath colour: black (RAL 9005)
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use
- torsion rated
- Torsion parameters
Torsional stress up to +/- 360 °/m: 10 Mio. Cycles (min.)

TESTS

- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

APPLICATION

This robotic cable is particularly designed for torsion and bending stresses in robots and handling tools.

NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only

Part no.	No. cores x cross-sec. mm ²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
25459	7 x 0.25	24	5.4	16.8	48.0
25439	12 x 0.25	24	7.6	28.8	71.0
25460	25 x 0.25	24	10.6	60.0	143.0
25461	2 x 0.34	22	4.0	6.6	28.0

Part no.	No. cores x cross-sec. mm ²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
25462	3 x 0.34	22	4.0	9.8	34.0
25440	7 x 0.34	22	5.7	22.8	51.0
25449	12 x 0.34	22	8.3	39.2	69.0



HELUDATA® ROBOFLEX® 2001-D 18x0,25 QMM / 25492 CE

TECHNICAL DATA

PUR robot cable in alignment with DIN VDE 0250, DIN VDE 0285-525-1 / DIN EN 50525-1

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Peak operating voltage	350 V (not for high power current installation purposes)
Test voltage core/core	1500 V
Mutual capacitance core/core	at 800 Hz, approx. 100 pF/m
Mutual capacitance core/screen	at 800 Hz, approx. 120 pF/m
Inductance	approx. 0.69 mH/km
Minimum bending radius	flexible 7.5x Outer-Ø fixed 4x Outer-Ø

CABLE STRUCTURE

- Copper wire bare, extra finely stranded
- Wire structure:
 - 0.14 mm²: approx. 18 x 0.1 mm
 - 0.25 mm²: approx. 19 x 0.13 mm
 - 0.34 mm²: approx. 19 x 0.15 mm
- Core insulation: PP
- Core identification acc. to DIN 47100, colour coded
- x = without protective conductor
- Stranding:
 - 10 core(s): cores stranded into one layer with an optimally matched lay length
 - 12 - 25 core(s): cores stranded into bundles with optimally matched lay lengths; bundles stranded together around a tensile core
- Central filler or bundles with PTFE wrapping, depending on the part number
- PTFE and fleece wrapping
- Screen: helically wound tinned copper wires, approx. coverage 90%
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane acc. to DIN VDE 0207-363-10-2 / DIN EN 50363-10-2 (compound type TMPU)
- Sheath colour: black (RAL 9005)
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use
- torsion rated
- Torsion parameters
Torsional stress up to +/- 180 °/m: 5 Mio. Cycles (min.)

TESTS

- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

APPLICATION

This robotic cable is particularly designed for torsion and bending stresses in robots and handling tools. EMC = Electromagnetic Compatibility; in order to optimise EMC properties, we recommend a double-sided and all-round large contact area of the D-screen.

NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only

Part no.	No. cores x cross-sec. mm ²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
25539	10 x 0.14	26	7.8	34.2	62.0
25488	12 x 0.14	26	7.8	42.1	95.0
25489	18 x 0.14	26	9.7	54.5	120.0
25490	25 x 0.14	26	10.9	69.0	158.0
25491	12 x 0.25	24	8.3	59.5	126.0

Part no.	No. cores x cross-sec. mm ²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
25492	18 x 0.25	24	10.1	80.0	164.0
25493	25 x 0.25	24	11.1	103.0	215.0
25494	12 x 0.34	22	8.8	78.0	160.0
25495	18 x 0.34	22	10.8	101.0	210.0
25496	25 x 0.34	22	12.0	158.0	305.0

HELUCONTROL® ROBOFLEX® PUR UL/CSA

Control cable



HELUCONTROL® ROBOFLEX® PUR UL/CSA 4G1,5 QMM E170315, AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 300/500 V UL (AWM) AC 600 V
Test voltage core/core	2000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

■ CABLE STRUCTURE

- Copper wire bare, extra finely stranded acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Core insulation: PP
- Core identification acc. to DIN VDE 0293-334, black cores with consecutive labeling in white digits
- G = with protective conductor GN-YE
- Stranding:
 - 3 - 7 core(s): cores stranded into one layer with an optimally matched lay length
 - 12 - 25 core(s): cores stranded into bundles with optimally matched lay lengths; bundles stranded together around a tensile core
- Fleece wrapping
- Screen: helically wound tinned copper wires, approx. coverage 90%
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: black (RAL 9005)
- Length marking: in metres

■ PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
 - Acceleration (max.): 60 °/s²
 - Velocity (max.): 180 °/s
 - Minimum bending radius: 10x Outer-Ø
 - Torsional stress up to +/- 180 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
 - Acceleration (max.): 10 m/s²
 - Velocity (max.), unsupported: 3 m/s
 - Velocity (max.), gliding: 2 m/s
 - Traverse path (max.): 10 m
 - Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
 - Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
 - Bending cycles (min.): 5 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

■ TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

■ APPLICATION

Control cable to transmit control signals specifically designed for combined torsion and bending movements; for use in assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience. EMC= Electromagnetic compatibility; to optimize the EMC features we recommend a large round contact of the D-screen on both ends.

■ NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only
- for use in energy supply systems:
 - 1) the assembly instructions must be observed
 - 2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUCONTROL® ROBOFLEX® PUR UL/CSA

Control cable



Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022017	12 G 0.5	20	10.9	60.7	141.0
11022018	16 G 0.5	20	12.6	81.0	181.0
11022019	18 G 0.5	20	13.1	91.1	200.0
11022022	25 G 0.5	20	15.1	126.5	260.0
11022024	4 G 0.75	19	6.8	28.8	63.0
11022026	7 G 0.75	19	8.6	50.4	104.0
11022039	12 G 0.75	19	12.0	91.1	184.0
11022040	14 G 0.75	19	13.1	106.3	210.0
11022041	2 x 1	18	6.5	19.2	51.0
11022042	3 G 1	18	6.8	28.8	63.0
11022043	4 G 1	18	7.4	38.4	78.0
11022044	7 G 1	18	9.3	67.2	129.0

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022045	12 G 1	18	13.0	121.4	220.0
11022046	18 G 1	18	15.6	182.2	321.0
11022047	25 G 1	18	18.4	253.0	435.0
11022048	34 G 1	18	22.7	344.1	600.0
11022049	41 G 1	18	25.0	414.9	724.0
11022050	3 G 1.5	16	7.5	43.2	84.0
11022051	4 G 1.5	16	8.1	57.6	102.0
11022052	5 G 1.5	16	8.8	72.0	125.0
11022053	8 G 1.5	16	11.1	115.2	191.0
11022054	12 G 1.5	16	14.6	182.2	300.0
11022055	18 G 1.5	16	18.2	273.2	463.0
11023004	25 G 1.5	16	21.4	379.5	628.0

HELUCONTROL® ROBOFLEX®-D PUR UL/CSA

Control cable, EMC-preferred type



HELUCONTROL® ROBOFLEX®-D PUR UL/CSA 7G0,75 QMM E170315 AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 300/500 V UL (AWM) AC 600 V
Test voltage core/core	2000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

■ CABLE STRUCTURE

- Copper wire bare, extra finely stranded acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Core insulation: PP
- Core identification acc. to DIN VDE 0293-334, black cores with consecutive labeling in white digits
- G = with protective conductor GN-YE
- Stranding:
 - 3 - 7 core(s): cores stranded into one layer with an optimally matched lay length
 - 12 - 25 core(s): cores stranded into bundles with optimally matched lay lengths; bundles stranded together around a tensile core
- Fleece wrapping
- Screen: helically wound tinned copper wires, approx. coverage 90%
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: black (RAL 9005)
- Length marking: in metres

■ PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
 - Acceleration (max.): 60 °/s²
 - Velocity (max.): 180 °/s
 - Minimum bending radius: 10x Outer-Ø
 - Torsional stress up to +/- 180 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
 - Acceleration (max.): 10 m/s²
 - Velocity (max.), unsupported: 3 m/s
 - Velocity (max.), gliding: 2 m/s
 - Traverse path (max.): 10 m
 - Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
 - Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
 - Bending cycles (min.): 5 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

■ TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

■ APPLICATION

Control cable to transmit control signals specifically designed for combined torsion and bending movements; for use in assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience. EMC= Electromagnetic compatibility; to optimize the EMC features we recommend a large round contact of the D-screen on both ends.

■ NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only
- for use in energy supply systems:
 - 1) the assembly instructions must be observed
 - 2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUCONTROL® ROBOFLEX®-D PUR UL/CSA

Control cable, EMC-preferred type



Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022437	12 G 0.5	20	11.5	94.0	184.0
11022438	18 G 0.5	20	13.6	131.4	255.0
11022439	25 G 0.5	20	15.7	173.7	331.0
11022440	4 G 0.75	19	7.4	46.0	86.0
11022441	5 G 0.75	19	8.0	54.0	102.0
11022442	7 G 0.75	19	9.1	75.6	133.0
11022443	12 G 0.75	19	12.5	126.6	228.0
11022444	18 G 0.75	19	15.0	185.1	320.0

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022445	25 G 0.75	19	17.4	243.7	417.0
11022446	3 G 1	18	7.3	45.9	84.0
11022447	12 G 1	18	13.5	164.0	271.0
11022448	18 G 1	18	16.2	233.1	386.0
11022449	25 G 1	18	19.0	310.6	509.0
11022450	12 G 1.5	16	15.2	226.8	358.0
11022451	18 G 1.5	16	19.0	335.2	550.0
11022452	25 G 1.5	16	22.0	495.0	763.0



HELUCONTROL® ROBOFLEX® 2001 12G0,5 QMM / 25463 CE

TECHNICAL DATA

PUR robot cable in alignment with DIN VDE 0250, DIN VDE 0285-525-1 / DIN EN 50525-1

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	AC U ₀ /U 300/500 V
Test voltage core/core	3000 V
Minimum bending radius	flexible 7.5x Outer-Ø fixed 4x Outer-Ø

CABLE STRUCTURE

- Copper wire bare, extra finely stranded acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Core insulation: PP
- Core identification acc. to DIN VDE 0293-334, black cores with consecutive labeling in white digits
- G = with protective conductor GN-YE,
x = without protective conductor
- Stranding:
2 - 8 core(s): cores stranded into one layer with an optimally matched lay length
12 - 41 core(s): cores stranded into bundles with optimally matched lay lengths; bundles stranded together around a tensile core
- Central filler, cores with PTFE wrapping, bundles with PTFE wrapping; depending on the part number
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane acc. to DIN VDE 0207-363-10-2 / DIN EN 50363-10-2 (compound type TMPU)
- Sheath colour: black (RAL 9005)
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use
- torsion rated
- Torsion parameters
Torsional stress up to +/- 360 °/m: 10 Mio. Cycles (min.)

TESTS

- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

APPLICATION

This robotic cable is particularly designed for torsion and bending stresses in robots and handling tools.

NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only

Part no.	No. cores x cross-sec. mm ²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
25463	12 G 0.5	20	10.4	57.8	90.0
25519	16 G 0.5	20	11.6	76.8	277.0
25464	18 G 0.5	20	12.7	86.4	121.0
25465	25 G 0.5	20	14.2	120.0	256.0
25466	4 G 0.75	19	6.0	28.8	63.0
25450	7 G 0.75	19	7.9	50.4	96.0
25467	12 G 0.75	19	11.5	84.4	171.0
25468	14 G 0.75	19	12.8	100.8	200.0
25469	2 x 1	18	5.5	19.2	48.0
25470	3 G 1	18	6.0	29.0	60.0
25471	4 G 1	18	6.3	38.4	78.0
25472	7 G 1	18	8.5	67.2	131.0
25473	12 G 1	18	12.5	115.2	216.0
25474	18 G 1	18	15.4	172.8	306.0
25475	25 G 1	18	17.4	240.0	432.0
25476	34 G 1	18	21.3	326.4	569.0
25477	41 G 1	18	23.2	393.6	694.0

Part no.	No. cores x cross-sec. mm ²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
25520	3 G 1.5	16	6.9	43.2	94.0
25529	4 G 1.5	16	7.9	57.6	107.0
25559	5 G 1.5	16	8.5	72.0	121.0
25509	8 G 1.5	16	11.1	115.2	292.0
25478	12 G 1.5	16	15.5	172.8	356.0
25479	18 G 1.5	16	19.3	259.2	445.0
25480	25 G 1.5	16	21.8	360.0	636.0
25481	3 G 2.5	14	8.4	72.0	136.0
25482	4 G 2.5	14	9.1	96.0	170.0
25483	3 G 4	12	10.3	116.0	227.0
25530	4 G 4	12	11.2	153.6	261.0
25510	4 G 6	10	14.1	230.4	341.0
25484	3 G 10	8	16.5	288.0	518.0
25485	3 G 16	6	19.5	460.8	722.0
25486	3 G 25	4	22.9	720.0	1180.0
25487	3 G 35	2	27.3	1008.0	1600.0



HELUCONTROL® ROBOFLEX® 2001-D 3G1 QMM / 705462 CE

TECHNICAL DATA

PUR robot cable in alignment with DIN VDE 0250, DIN VDE 0285-525-1 / DIN EN 50525-1

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	AC U ₀ /U 300/500 V
Test voltage core/core	3000 V
Minimum bending radius	flexible 7.5x Outer-Ø fixed 4x Outer-Ø

CABLE STRUCTURE

- Copper wire bare, extra finely stranded acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Core insulation: PP
- Core identification acc. to DIN VDE 0293-334, black cores with consecutive labeling in white digits
- G = with protective conductor GN-YE,
x = without protective conductor
- Stranding:
3 core(s): cores stranded into one layer with an optimally matched lay length
12 - 25 core(s): cores stranded into bundles with optimally matched lay lengths; bundles stranded together around a tensile core
- Central filler or bundles with PTFE wrapping, depending on the part number
- PTFE and fleece wrapping
- Screen: helically wound tinned copper wires, approx. coverage 90%
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane acc. to DIN VDE 0207-363-10-2 / DIN EN 50363-10-2 (compound type TMPU)
- Sheath colour: black (RAL 9005)
- Length marking: in metres

Part no.	No. cores x cross-sec. mm ²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
25497	12 G 0.5	20	11.2	117.0	175.0
25498	18 G 0.5	20	13.6	160.0	231.0
25499	25 G 0.5	20	14.8	255.0	347.0
25500	12 G 0.75	19	11.8	155.0	220.0
25501	18 G 0.75	19	15.0	210.0	305.0
25502	25 G 0.75	19	16.6	275.0	415.0
705462	3 G 1	18	6.3	76.0	90.0

PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use
- torsion rated
- Torsion parameters
Torsional stress up to +/- 180 °/m: 5 Mio. Cycles (min.)

TESTS

- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

APPLICATION

This robotic cable is particularly designed for torsion and bending stresses in robots and handling tools. EMC = Electromagnetic Compatibility; in order to optimise EMC properties, we recommend a double-sided and all-round large contact area of the D-screen.

NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only

Part no.	No. cores x cross-sec. mm ²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
25503	12 G 1	18	13.0	190.0	265.0
25504	18 G 1	18	16.1	245.0	390.0
25505	25 G 1	18	18.1	345.0	540.0
25506	12 G 1.5	16	16.2	260.0	345.0
25507	18 G 1.5	16	20.3	370.0	485.0
25508	25 G 1.5	16	22.5	498.0	710.0



HELUPOWER® ROBOFLEX® PUR UL/CSA 4G2.5 QMM E170315 AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 600/1000 V UL (AWM) AC 1000 V
Test voltage core/core	3000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

■ CABLE STRUCTURE

- Copper wire bare, extra finely stranded acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Core insulation: PP
- Core identification acc. to DIN VDE 0293-334, black cores with consecutive labeling in white digits
- G = with protective conductor GN-YE
- Cores stranded with optimally matched lay lengths
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: see table
- Length marking: in metres

■ PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
Acceleration (max.): 60 °/s²
Velocity (max.): 180 °/s
Minimum bending radius: 10x Outer-Ø
Torsional stress up to +/- 180 °/m: 10 Mio. Cycles (min.)
Torsional stress up to +/- 360 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
Acceleration (max.): 10 m/s²
Velocity (max.), unsupported: 3 m/s
Velocity (max.), gliding: 2 m/s
Traverse path (max.): 10 m
Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
Bending cycles (min.): 10 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

■ TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

■ APPLICATION

Power supply cable designed for combined torsion and bending movements; for use in assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience.

■ NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only
- for use in energy supply systems:
 - 1) the assembly instructions must be observed
 - 2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUPOWER® ROBOFLEX® PUR UL/CSA



Sheath color: black (RAL 9005)

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022415	3 G 2.5	14	9.4	72.0	132.0
11022416	4 G 2.5	14	10.3	96.0	167.0
11022417	3 G 4	12	10.5	115.2	184.0
11022418	4 G 4	12	11.5	156.6	234.0
11022419	4 G 6	10	14.0	234.0	351.0
11022420	3 G 10	8	15.8	294.4	429.0
11022421	3 G 16	6	18.3	467.2	630.0
11022422	3 G 25	4	22.9	729.6	986.0
11022423	3 G 35	2	26.3	972.7	1295.0
11022424	3 G 50	1	30.9	1459.1	1895.0

Sheath colour: yellow (RAL 1021)

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022425	3 G 25	4	22.9	729.6	986.0

Sheath colour: orange (RAL 2003)

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022426	3 G 35	2	26.3	972.7	1295.0

HELUPOWER® ROBOFLEX®-D PUR UL/CSA

EMC-preferred type



HELUPOWER® ROBOFLEX®-D PUR UL/CSA 4G2,5 QMM E170315 AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 600/1000 V UL (AWM) AC 1000 V
Test voltage core/core	3000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

CABLE STRUCTURE

- Copper wire bare, extra finely stranded acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Core insulation: PP
- Core identification acc. to DIN VDE 0293-334, black cores with consecutive labeling in white digits
- G = with protective conductor GN-YE
- Cores stranded with optimally matched lay lengths
- Fleece wrapping
- Screen: helically wound tinned copper wires, approx. coverage 90%
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: see table
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
Acceleration (max.): 60 °/s²
Velocity (max.): 180 °/s
Minimum bending radius: 10x Outer-Ø
Torsional stress up to +/- 180 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
Acceleration (max.): 10 m/s²
Velocity (max.), unsupported: 3 m/s
Velocity (max.), gliding: 2 m/s
Traverse path (max.): 10 m
Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
Bending cycles (min.): 5 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

APPLICATION

Power supply cable designed for combined torsion and bending movements; for use in assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience. EMC= Electromagnetic compatibility; to optimize the EMC features we recommend a large round contact of the D-screen on both ends.

NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only
- for use in energy supply systems:
 - 1) the assembly instructions must be observed
 - 2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUPOWER® ROBOFLEX®-D PUR UL/CSA

EMC-preferred type



Sheath color: black (RAL 9005)

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022453	3 G 1.5	16	8.0	62.2	106.0
11022454	4 G 1.5	16	8.8	81.0	133.0
11022455	3 G 2.5	14	10.0	96.9	163.0
11022456	4 G 2.5	14	11.0	126.1	207.0
11022457	4 G 4	12	12.3	188.6	282.0
11022458	4 G 6	10	14.5	292.5	412.0

Sheath colour: grey (RAL 7001)

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022459	4 G 1.5	16	8.8	79.9	133.0
11022460	4 G 2.5	14	11.0	126.1	207.0
11022461	4 G 4	12	12.3	188.6	282.0
11022462	4 G 6	10	14.5	292.5	412.0

HELUPOWER® ROBOFLEX® HYBRID PUR UL/CSA

Hybrid cable



HELUPOWER® ROBOFLEX® HYBRID PUR UL/CSA 5G1+(2x1)D Q/M E170315 AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B, in alignment with DIN VDE 0285-525-1 / DIN EN 50525-1

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 600/1000 V UL (AWM) AC 1000 V
Test voltage core/core	3000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

■ CABLE STRUCTURE

- Copper wire bare, 0,5 - 2,5 mm²: extra finely stranded acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Wire structure: 0,25 mm²: ca. 32 x 0,1 mm
- Core insulation: PP
- Core identification acc. to DIN VDE 0293-334, black cores with consecutive labeling in white digits
Identification: 0.25 mm²: acc. to DIN 47100 (paired stranding); details on request
- G = with protective conductor GN-YE,
x = without protective conductor
- Cores stranded with optimal lay lengths in pairs, triads or bundles
- Fleece wrapping of the pairs, triads or bundles
- Part number 11022543: static screen (St) of plastic-coated aluminium foil
- Screening element: pairs, triads or bundles in () D please refer to table; screen: helically wound tinned copper wires, approx. coverage 90 %, fleece wrapping
- Cores, pairs, triads or bundles stranded with optimal lay lengths
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: black (RAL 9005)
- Length marking: in metres

■ PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
Acceleration (max.): 60 °/s²
Velocity (max.): 180 °/s
Minimum bending radius: 10x Outer-Ø
Torsional stress up to +/- 180 °/m: 10 Mio. Cycles (min.)
Torsional stress up to +/- 360 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
Acceleration (max.): 10 m/s²
Velocity (max.), unsupported: 3 m/s
Velocity (max.), gliding: 2 m/s
Traverse path (max.): 10 m
Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
Bending cycles (min.): 5 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

■ TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

■ APPLICATION

Hybrid cable designed for combined torsion and bending movements consisting of components for power supply and the transmission of control signals; for use in robot control devices, assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience.

■ NOTES

- for use in energy supply systems:
1) the assembly instructions must be observed
2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUPOWER® ROBOFLEX® HYBRID PUR UL/CSA

Hybrid cable



Part no.	No. cores x cross-sec. mm²	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022537	2 x 0.5 + (2 x 0.5) D	9.9	39.0	101.0
11022538	5 G 1 + (2 x 1) D	11.4	87.0	164.0
11022539	6 x 0.75 + (3 x 0.75) D	10.9	85.0	166.0
11022540	2 x 3 x 0.75 + (3 x 0.75) D	11.9	86.0	200.0
11022541	7 G 1 + (2 x 0.5) D	10.6	94.0	171.0
11022542	16 G 1 + (2 x 1) D	15.9	197.0	343.0
11022543	17 x 1 + (2 x 1) St-D	16.2	248.0	412.0
11022544	23 G 1 + (2 x 1) D	18.4	270.0	450.0
11022545	(2 x 1) D + (3 x 1) D + 1 x 1	11.4	96.0	168.0
11022546	13 x 0.5 + 3 x 1 + (2 x 0.5) D	14.7	127.0	255.0
11022547	2 x 0.5 + 2 x 4 x 0.5 + 3 x 0.5 + 2 x (3 x 0.5) D	14.6	134.0	263.0
11022548	5 x 2.5 + (6 x 1.5) D + 4 x (2 x 0.25) D	17.2	307.0	474.0

HELUPOWER® ROBOFLEX® HYBRID-D PUR UL/CSA

Hybrid cable, EMC-preferred type



HELUPOWER® ROBOFLEX® HYBRID-D PUR UL/CSA 4G1,5+(2x0,5)D E170315 AWM STYLE 21209 CE

TECHNICAL DATA

PUR robot cable acc. to UL-Std. 758 (AWM) Style 21209, CSA-Std. C22.2 No. 210 - AWM I/II A/B, in alignment with DIN VDE 0285-525-1 / DIN EN 50525-1

Temperature range	flexible -30°C to +90°C fixed -40°C to +90°C
Nominal voltage	VDE AC U ₀ /U 600/1000 V UL (AWM) AC 1000 V
Test voltage core/core	3000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

CABLE STRUCTURE

- Copper wire bare, 0.5 - 6 mm²: extra finely stranded acc. to DIN VDE 0295 Class 6 / IEC 60228 Class 6
- Wire structure: 0.25 mm²: approx. 32 x 0.1 mm
- Core insulation: PP
- Core identification acc. to DIN VDE 0293-334, black cores with consecutive labeling in white digits;
Identification of control pairs:
0.25 mm²: acc. to DIN 47100 (paired stranding)
0.5 - 1.5 mm²: 1 pair - numbers 5+6; 2 pairs - numbers 5+6, 7+8
- G = with protective conductor GN-YE,
x = without protective conductor
- Control cores stranded in pairs with optimal lay lengths
- Fleece wrapping of the pairs
- Screening element: control pairs, helically wound tinned copper wires, approx. coverage 90%, Fleece wrapping
- Control pairs and power cores stranded with optimally matched lay lengths
- Fleece wrapping
- Screen: helically wound tinned copper wires, approx. coverage 90%
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: black (RAL 9005)
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- smooth, high-quality core insulation for eased sliding and optimized core stranding ensure long service-life within applications that request combined bending and torsion movements
- for outdoor use

- torsion rated
- suitable for use in drag chains
- Torsion parameters
Acceleration (max.): 60 °/s²
Velocity (max.): 180 °/s
Minimum bending radius: 10x Outer-Ø
Torsional stress up to +/- 180 °/m: 5 Mio. Cycles (min.)
- Drag chain parameters
Acceleration (max.): 10 m/s²
Velocity (max.), unsupported: 3 m/s
Velocity (max.), gliding: 2 m/s
Traverse path (max.): 10 m
Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
Bending cycles (min.): 5 Mio.
- halogen-free
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, UL VW-1, CSA FT1
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

APPLICATION

Hybrid cable designed for combined torsion and bending movements consisting of components for power supply and the transmission of control signals; for use in robot control devices, assembly and welding robots, in material handlings and automation centres, in transport and conveyor systems, on rotary and swivel tables and wherever a defined cable routing with only alternating bending movements is not applicable, but 3D-movements and torsional load have an impact on the cable; for applications with the highest requirements on mechanical, chemical and thermal resilience. EMC = Electromagnetic Compatibility; in order to optimise EMC properties, we recommend a double-sided and all-round large contact area of the D-screen.

NOTES

- Part no. 11022491: Power cores stranded in pairs; identification: number 1+2, number 3+GN-GE
- for use in energy supply systems:
1) the assembly instructions must be observed
2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUPOWER® ROBOFLEX® HYBRID-D PUR UL/CSA



Hybrid cable, EMC-preferred type



Part no.	No. cores x cross-sec. mm²	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022484	(4 G 1.5 + (2 x 0.5)D)D	10.3	111.0	185.0
11022485	(4 G 2.5 + (2 x 0.5)D)D	12.4	156.0	256.0
11022486	(4 G 2.5 + (2 x 1)D)D	12.8	171.0	279.0
11022487	(4 G 4 + (2 x 0.5)D)D	13.5	216.0	329.0
11022488	(4 G 4 + (2 x 0.75)D)D	14.0	225.0	346.0
11022489	(4 G 4 + (2 x 1)D)D	14.0	233.0	348.0
11022490	(4 G 6 + (2 x 1)D)D	15.9	330.0	455.0
11022491	(4 G 1.5 + 2 x (2 x 1.5)D)D	14.4	203.0	314.0
11022492	(4 G 2.5 + 2 x (2 x 0.75)D)D	14.0	200.0	322.0
11022493	(4 G 2.5 + 2 x (2 x 1.5)D)D	15.4	241.0	385.0
11022494	(4 G 4 + 4 x (2 x 0.25)D)D	16.3	216.0	329.0



Resistance to Welding Sparks

Nowadays industrial robots are in a position to take over the broadest diversity of manufacturing tasks. Welding has always been one of the classic applications. Here, as in many other areas of production, the topic of "precision" is decisive: robots always deliver the same quality weld seam – and that's with shorter cycle times, without high temperatures and without the emission of toxic gases and fumes that pose a risk to health. However, the benefits of highly automated processes can only be fully exploited if the reliability of all the components is also guaranteed.

With our HELUDATA® ROBOFLEX®-recycle cable, we offer you the right solution for usage in welding robots. The material was developed and tested at our

production facility in Windsbach and its verification complies with the latest version of the standard developed by the Volkswagen Group for measuring the resistance of cables to welding sparks.

With this innovative material – which doesn't use crosslinking – we achieve excellent resistance to welding sparks. At the same time, it's completely recyclable – unlike conventional cross-linked thermoplastic elastomers which contaminate our environment to a large extent. This will be of particular interest to customers with a DIN EN ISO 14001 compliant environmental management system and therefore place great value on the use of recyclable materials.

An overview of the benefits of HELUDATA® ROBOFLEX®-recycle:

- saves money over cross-linked cables
- halogen-free
- heat-resistant from -40°C bis 105°C
- good resistance to oil, chemicals and welding sparks
- UL and CSA approval
- suitable for drag chains and robots, tested with 10 million changing bending and torsion cycles

HELUDATA® ROBOFLEX®-recycle PUR UL/CSA

welding spark resistant sensor cable



HELUDATA® ROBOFLEX®-recycle PUR UL/CSA 4x0,34 QMM E170315 AWM STYLE 20233 C E

TECHNICAL DATA

Robot cable acc. to UL-Std. 758 (AWM) Style 20233, CSA-Std. C22.2 No. 210 - AWM I/II A/B

Temperature range	flexible -30°C to +105°C fixed -40°C to +105°C UL (AWM) to +80°C
Nominal voltage	VDE AC U ₀ /U 300/300 V UL (AWM) AC 300 V
Test voltage core/core	2000 V
Minimum bending radius	fixed 5x Outer-Ø flexible: see properties

■ CABLE STRUCTURE

- Copper wire bare, extra finely stranded
- Wire structure:
0.34 mm²: approx. 42 x 0.1 mm
- Core insulation: TPE
- Core identification:
3 core(s): brown, blue, black
4 core(s): brown, blue, black, white
5 core(s): brown, blue, black, white, grey
- x = without protective conductor
- Cores stranded with optimally matched lay lengths
- Fleece wrapping
- Outer sheath: Special grade of full polyurethane
- Sheath colour: see table
- Length marking: in metres

■ PROPERTIES

- resistant to: oil, UV radiation, ozone, oxygen, weathering effects, hydrolysis, microbes, coolants, hydraulic fluids, acids, alkalis, greases, seawater and wastewater, welding sparks
- highly abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- for outdoor use
- torsion rated

- suitable for use in drag chains
- Torsion parameters
Acceleration (max.): 60 °/s²
Velocity (max.): 180 °/s
Minimum bending radius: 10x Outer-Ø
Torsional stress up to +/- 360 °/m: 10 Mio. Cycles (min.)
- Drag chain parameters
Acceleration (max.): 10 m/s²
Velocity (max.), unsupported: 3 m/s
Velocity (max.), gliding: 2 m/s
Traverse path (max.): 10 m
Minimum bending radius (Traverse path ≤ 3m): 10x Outer-Ø
Minimum bending radius (Traverse path > 3m): 12.5x Outer-Ø
Bending cycles (min.): 10 Mio.
- halogen-free
- recyclable
- the materials used during manufacturing are cadmium-free, contain no silicone and are free from substances harmful to the wetting properties of lacquers

■ TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2
- oil-resistant acc. to DIN VDE 0473-811-404 / DIN EN 60811-404 / IEC 60811-404
- UV-resistant acc. to DIN EN ISO 4892-2
- weather-resistant acc. to DIN EN ISO 4892-2

■ APPLICATION

Welding spark and oil-resistant sensor cable for use in robots (torsional load) as well as in drag chains (dynamic load); for applications in automation technology, machine and plant engineering, assembly and welding robots, machine tools, foundries and rolling mills. Temperature resistance of up to 105°C enables use in environments close to engines and other areas with increased heat radiation. Highly abrasion and notch resistant outer sheath ensures long service life and economy. Recyclable jacket material offers advantages in operational environmental protection management.

■ NOTES

- the conductor is metrically (mm²) constructed, AWG numbers are approximated, and are for reference only
- for use in energy supply systems:
1) the assembly instructions must be observed
2) for special applications, we recommend contacting us and using our data entry form for energy supply systems

HELUDATA® ROBOFLEX®-recycle PUR UL/CSA

welding spark resistant sensor cable



Sheath color: black (RAL 9005)

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022475	3 x 0.34	22	5.1	9.6	32.0
11022476	4 x 0.34	22	5.4	12.8	38.0
11022477	5 x 0.34	22	5.9	16.0	46.0

Sheath colour: grey (RAL 7001)

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022478	3 x 0.34	22	5.1	9.6	32.0
11022479	4 x 0.34	22	5.4	12.8	38.0
11022480	5 x 0.34	22	5.9	16.0	46.0

Sheath colour: yellow (RAL 1021)

Part no.	No. cores x cross-sec. mm²	AWG, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11022481	3 x 0.34	22	5.1	9.6	32.0
11022482	4 x 0.34	22	5.4	12.8	38.0
11022483	5 x 0.34	22	5.9	16.0	46.0

HELUKAT® PROFinet R+ CAT.5e SF/UTP PUR ROBOTIC

PROFinet Type R, flame-retardant



TECHNICAL DATA

Industrial Ethernet cable / Cat. 5e acc. to ISO/IEC 11801, DIN EN 50173, IEC 61156-6, UL-Std. 758 (AWM) Style 21209

Temperature range	flexible -30°C to +90°C fixed installation -40°C to +90°C
Peak operating voltage	UL (AWM) to +90°C 125 V (not for high power current installation purposes)
Test voltage core/core	2000 V
Conductor resistance at 20°C	max. 60.0 Ohm/km
Loop resistance at 20°C	max. 120.0 Ohm/km
Insulation resistance	min. 0.5 GOhm x km
Mutual capacitance core/core	at 800 Hz, approx. 50 pF/m
Rel. Velocity of Propagation	approx. 66%
Characteristic impedance	at 1 to 100 MHz, 100 Ohm ± 15 Ohm
Caloric load	approx. 0.55 MJ/m
Minimum bending radius	flexible 10x Outer-Ø fixed installation 5x Outer-Ø

- Outer sheath: PUR
- Sheath colour: green
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, hydrolysis, microbes, greases
- abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- halogen-free
- flame-retardant

TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2, CSA FT1

APPLICATION

HELUKAT® PROFinet R+ CAT.5e SF/UTP PUR ROBOTIC offers excellent transmission characteristics with double shielding and is designed for applications with torsion loads, e.g. in robots. The cable listed here corresponds to the classification for continuous movement.

NOTES

- Conductor sizes are based on the AWG measurement system, metric conductor sizes (mm²) are approximated and are for reference only
- UL Voltage Rating: 1000 V

CABLE STRUCTURE

- Copper wire tinned, AWG sizes
- Core insulation: Polyolefin
- Core identification: white, yellow, blue, orange
- Cores twisted into a star quad with optimal lay lengths
- Foil wrapping
- 1. Screen: plastic-coated aluminium foil (St)
- 2. Screen: braided screen of tinned copper wires

TYPICAL VALUES

Frequency (MHz)	1	10	16	20	62.5	100
Attenuation (dB/100m)	2.1	6.0	7.6	9.0	16.0	21.0
NEXT (dB)	80.0	70.0	65.0	63.0	55.0	50.0
ACR (dB/100m)	77.9	64.0	57.4	54.0	39.0	29.0

Part no.	No. cores x AWG-No.	Cross-sec. mm², approx.	Conductor Ø mm, approx.	Core Ø mm, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
11007800	2 x 2 x AWG 22 / 19	0.38	0.8	1.5	7.2	33.0	63.0

HELUKAT® 100T CAT.5 SF/UTP PUR TORSION

flame-retardant



TECHNICAL DATA

Industrial Ethernet cable / Cat. 5 acc. to ISO/IEC 11801, DIN EN 50173, IEC 61156-6, DIN EN 50288-2-2, UL-Std. 758 (AWM) Style 21161

Temperature range	flexible -30°C to +70°C fixed installation -40°C to +80°C UL (AWM) to +80°C
Peak operating voltage	125 V (not for high power current installation purposes)
Test voltage core/core	2000 V
Conductor resistance at 20°C	max. 140.0 Ohm/km
Loop resistance at 20°C	max. 280.0 Ohm/km
Insulation resistance	min. 5.0 GOhm x km
Mutual capacitance core/core	at 800 Hz, approx. 50 pF/m
Rel. Velocity of Propagation	approx. 67%
Characteristic impedance	at 1 to 100 MHz, 100 Ohm ± 15 Ohm
Caloric load	approx. 1.23 MJ/m
Minimum bending radius	flexible 8x Outer-Ø fixed installation 4x Outer-Ø

CABLE STRUCTURE

- Copper wire bare, AWG sizes
- Core insulation: PP
- Core identification: colour coded, pairs:
 - No. 1: white-blue / blue
 - No. 2: white-orange / orange
 - No. 3: white-green / green
 - No. 4: white-brown / brown
- Cores stranded in pairs with optimal lay lengths
- Pairs stranded in layers with optimal lay lengths
- 1. Screen: plastic-coated aluminium foil (St)
- 2. Screen: braided screen of tinned copper wires

- Outer sheath: PUR
- Sheath colour: green
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation
- abrasion-resistant, notch-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- torsion rated
- halogen-free
- flame-retardant

TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2
- certifications and approvals: EAC

APPLICATION

HELUKAT 100T CAT.5 SF/UTP PUR TORSION is designed for applications with torsion loads, e.g. in robots, and characterized by high reserve capacity and outstanding performance, even after exposure to extreme conditions. Thanks to the clever structure, it is also possible to achieve a long service life mechanically.

NOTES

- Conductor sizes are based on the AWG measurement system, metric conductor sizes (mm²) are approximated and are for reference only

TYPICAL VALUES

Frequency (MHz)	10	16	62.5	100
Attenuation (dB/100m)	9.5	12.1	17.1	32.0
NEXT (dB)	50.3	47.2	38.4	35.3
ACR (dB/100m)	40.8	35.1	21.3	3.3

Part no.	No. cores x AWG-No.	Cross-sec. mm², approx.	Conductor Ø mm, approx.	Core Ø mm, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
800067	4 x 2 x AWG 26 / 19	0.15	0.48	1.04	7.5	29.5	74.0

HELUKAT® 600T CAT.7 SF/FTP PUR TORSION

CC-Link IE Field certified



TECHNICAL DATA

Industrial Ethernet cable / Cat. 7 acc. to ISO/IEC 11801, DIN EN 50173, IEC 61156-6, DIN EN 50288-4-2, UL-Std. 444 (CMX), CSA-Std. C22.2 No. 214 - CMX, UL-Std. 758 (AWM) Style 20940

Temperature range	flexible -30°C to +70°C fixed installation -40°C to +80°C UL (CMX) to +75°C UL (AWM) to +80°C
Peak operating voltage	125 V (not for high power current installation purposes)
Test voltage core/core	750 V
Conductor resistance at 20°C	max. 87.6 Ohm/km
Loop resistance at 20°C	max. 175.2 Ohm/km
Insulation resistance	min. 5.0 GOhm x km
Mutual capacitance core/core	at 800 Hz, approx. 45 pF/m
Rel. Velocity of Propagation	approx. 77%
Characteristic impedance	at 1 to 100 MHz, 100 Ohm ± 15 Ohm at 101 to 600 MHz, 100 Ohm ± 20 Ohm
Caloric load	approx. 0.80 MJ/m
Minimum bending radius	flexible 15x Outer-Ø fixed installation 8x Outer-Ø

- Screening element: pairs, plastic-coated aluminium foil (St)
- Pairs with optimal lay lengths stranded around a central cross-shaped filler
- 1. Screen: metallised conductive fleece
- 2. Screen: braided screen of tinned copper wires
- Outer sheath: PUR
- Sheath colour: green
- Length marking: in metres

PROPERTIES

- resistant to: oil, UV radiation, hydrolysis, microbes, greases
- abrasion-resistant, tear-resistant, cut-resistant, wear-resistant, low adhesion
- torsion rated
- halogen-free
- flame-retardant

TESTS

- halogen-free acc. to DIN VDE 0482-754-1 / DIN EN 60754-1 / IEC 60754-1
- flame-retardant acc. to DIN VDE 0482-332-1-2 / DIN EN 60332-1-2 / IEC 60332-1-2

APPLICATION

HELUKAT® 600T CAT.7 SF/FTP PUR TORSION Cable is designed for use in robots. It provides excellent transmission characteristics under extremely difficult conditions.

NOTES

- Conductor sizes are based on the AWG measurement system, metric conductor sizes (mm²) are approximated and are for reference only
- UL Voltage Rating: 600 V

CABLE STRUCTURE

- Copper wire tinned, AWG sizes
- Core insulation: Foam PE
- Core identification: colour coded, pairs:
 - No. 1: white / blue
 - No. 2: white / orange
 - No. 3: white / green
 - No. 4: white / brown
- Cores stranded in pairs with optimal lay lengths

TYPICAL VALUES

Frequency (MHz)	10	16	62.5	100	200	300	600
Attenuation (dB/100m)	7.0	9.0	17.5	22.5	36.0	50.0	58.5
NEXT (dB)	100.0	100.0	100.0	100.0	97.0	90.0	89.0
ACR (dB/100m)	93.0	91.0	82.5	77.5	61.0	40.0	30.5

Part no.	No. cores x AWG-No.	Cross-sec. mm², approx.	Conductor Ø mm, approx.	Core Ø mm, approx.	Outer Ø mm, approx.	Cu factor per km	Weight kg/km, approx.
805828	4 x 2 x AWG 24 / 7	0.22	0.6	1.3	8.7	46.0	95.0

BUS Cables

HELUKABEL® BUS Cables Profibus L2 Torsion



Type

Cable structure

Inner conductor diameter:
Core insulation:
Core colours:
Stranding element:
Separator:
Shielding 1:
Total shielding:
Outer sheath material:
Cable external diameter:
Outer sheath colour:

Torsional applications

1x2x0.80 mm (stranded)

Copper, bare (AWG 22/19)
Foam-skin-PE
rd, gn
2 cores + filler
Polyester foil over stranded bundle
Al-Foil
Cu braid, tinned
PUR
app. 8,0 mm ± 0,4 mm
Violet similar to RAL 4001

Electrical data

Characteristic impedance:
Conductor resistance, max.:
Insulation resistance, min.:
Loop resistance:
Mutual capacitance:
Test voltage:
Relative propagation velocity:
Attenuation:

150 Ohm ± 10 %
57,6 Ohm/km
5 GOhm x km
115,2 Ohm/km max.
30 nF/km nom.
1,5 kV
-
9,6 kHz < 2,5 dB/km
38,4 kHz < 3,0 dB/km
4 MHz < 25,0 dB/km
16 MHz < 49,0 dB/km

Technical data

Weight:
bending radius, repeated:
Operating temperature range min.:
Operating temperature range max.:
Caloric load, approx. value:
Copper weight:

app. 66 kg/km
120 mm
-30°C
+70°C
0,89 MJ/m
32,00 kg/km

Norms

Applicable standards:

Profibus acc. to DIN 19245 T3 and EN50170
Halogen-free acc. to 60754-1
Flame-retardant acc. to IEC 60332-1-2
CMX 75°C (shielded)

UL Style:

CSA standard:

Application

HELUKABEL® Profibus Torsion is used in mobile applications in robots. The special torsion construction allows this cable to be twisted (torsioned) and is halogen-free thanks to use PU sheath. The Festoon version is used for hanging/moving loads in garland applications.

Part no.

800109, Profibus L2

Plastic-fibre cable PROFInet POF/PA

HELUCOM® I-V4Y(ZN)Y (B) and I-V4Y(ZN)11Y (C)

HELUCOM®

I-V4Y(ZN)Y (type B), I-V4Y(ZN)11Y (type C)



Cable structure

Fibre type: POF 980/1000
Fibre cladding: PA

Optical characteristic

Refractive index core: 1,492
Refractive index cladding: 1,419
Numerical aperture: 0,5
Attenuation see table

Temperature range

Laying, min.: -10°C
Laying, max.: +50°C
Operating, min.: -30°C
Operating, max.: +70°C

Designation	Outer sheath material	Sheath colour	Outer Ø app. mm	Max. tensile force N	Min. stat. bending radius mm	Fibre attenuation	Oil-resistant	Acc. to DESINA®	Weight kg / km	Part no.
HELUCOM® I-V4Y(ZN)Y 2P980/1000, PROFInet B	PVC	Green	7,8	100	100,0	160A1	yes	no	59,0	805686
HELUCOM® I-V4Y(ZN)11Y 2P980/1000, PROFInet C	PUR	Green	8,0	200	120,0	230A1	yes	no	60,0	805838

Dimensions and specifications may be changed without prior notice.

Application

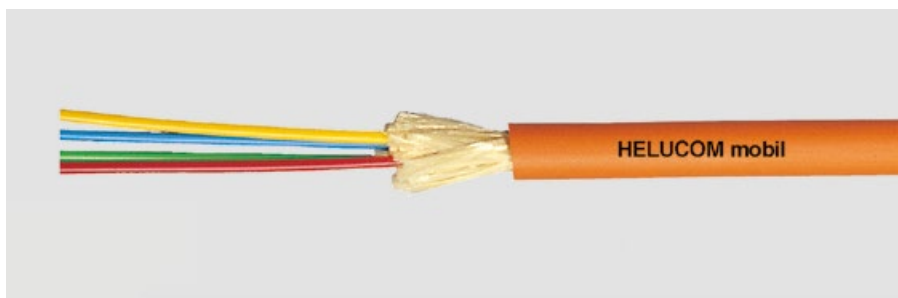
Signal wire as plastic optical fibre. The use of these transmission systems significantly reduces the number of different cables in a planned bus installation in machine tools operations. Furthermore, possible EMC problems are prevented by the metal-free construction. The main fields of these cables are in machine construction and automobile industry. Installations for example in fixed installed rough areas (type B) or in drag chains (type C) are possible. The types on this page are especially constructed for communication within PROFInet systems.

Fibre Optic Cable, mobile, trailing

A-V(ZN)11Y

HELUCOM®

A-V(ZN)11Y



Cable structure

Core type: Tight buffer
Strain relief elements: Aramide
Outer sheath colour: Orange

Temperature range

Laying, min.: +5°C
Laying, max.: +50°C
Operating, min.: -30°C
Operating, max.: +70°C

Other data

Max. tensile force: 650 N
Max. transverse pressure: 40 N / cm
UV-resistant
Resistant to hammer impact acc. to IEC 60794-1-2-E4
Bending cycles acc. to IEC 60794-1-2-E6: 500.000
Oil-resistant

Designation	Number of Fibres	Fibre type	Fibre category	Outer Ø app. mm	Outer sheath material	Min. stat. bending radius mm	halogen-free	UL	Weight kg / km	Part no.
Fibre-optic cable	2	Multimode G50/125	OM2	5,0	PUR	75	yes	no	20	80382
Fibre-optic cable	2	Multimode G62.5/125	OM1	5,0	PUR	75	yes	no	20	80363
Fibre-optic cable	4	Multimode G50/125	OM2	5,8	PUR	90	yes	no	31	80534
Fibre-optic cable	4	Multimode G62.5/125	OM1	5,8	PUR	90	yes	no	31	81036
Fibre-optic cable	4	Single-mode E9/125	ITU-T G.652d	5,8	PUR	90	yes	no	31	801727
Fibre-optic cable	8	Multimode G50/125	OM2	7,0	PUR	105	yes	no	47	81037
Fibre-optic cable	8	Multimode G62.5/125	OM1	7,0	PUR	105	yes	no	47	81038

Dimensions and specifications may be changed without prior notice.

Application

These HELUCOM® cables were designed as mobile field cables. They are easily wound up on a drum and are very tension-proof. As the outer sheath is tightly anchored on the aramid braiding, it is especially suitable for mobile use. The advantage of these cables is evident especially where mobile fibre-optic lines are to be installed, such as for drag chains, TV transmission, supervision of protected areas, etc.



A black and white photograph of a large industrial robotic arm in a factory. The arm is white and grey, with various cables and hoses attached. It is positioned in the center of the frame, reaching towards the right. The background shows the complex metal structure of the factory, including beams and pipes. The lighting is bright, coming from above.

Cable Accessories for Robotic Applications

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TECHNICAL DATA

PA plastic cable gland

Temperature range	-20°C to +100°C short term -30°C to +150°C
Protection class	IP 68 - 5 bar / IP 66

■ STRUCTURE

- Material: Polyamide (PA) 6
- Seal: Chloroprene rubber (CR)

■ PROPERTIES

- phosphor-free
- silicone-free
- cadmium-free
- optimum strain relief through clamping lamella
- easy to assemble, time and cost savings
- watertight, dust-tight
- large clamping areas
- with vibration protection

■ TESTS

- Test standard EN 62444

■ APPLICATION

- Machine and plant construction
- Robotics
- Automation technology
- Vehicle construction and shipbuilding
- Railway technology
- Installation technology
- Control cabinet construction

■ NOTES

- Legend:
Dimensions
TD - Thread Diameter
TL - Thread Length
SZ - Spanner Size

metric thread

Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)	grey (RAL 7035)	grey (RAL 7001)	black (RAL 9005)
					Part no.	Part no.	Part no.
M12 x 1.5	3.0 - 6.5	8.0	15	100	93908	93923	93937
M16 x 1.5	4.0 - 8.0	8.0	19	50	93909	93924	93938
M16 x 1.5	5.0 - 10.0	8.0	19	50	907275	907276	907277
M16 x 1.5	5.0 - 10.0	10.0	22	50	92667	92668	92669
M20 x 1.5	6.0 - 12.0	10.0	24	50	93910	93925	93939
M25 x 1.5	11.0 - 17.0	8.0	29	50	93911	93926	93940
M32 x 1.5	15.0 - 21.0	10.0	36	25	93912	93927	93941
M40 x 1.5	18.0 - 28.0	10.0	46	20	93913	93928	93942
M50 x 1.5	30.0 - 38.0	18.0	60	10	93914	93929	93943
M63 x 1.5	34.0 - 44.0	18.0	65	10	93915	93930	93944

metric thread - with reducing seal

Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)	grey (RAL 7035)	grey (RAL 7001)	black (RAL 9005)
					Part no.	Part no.	Part no.
M12 x 1.5	2.0 - 5.0	8.0	15	100	903532	903542	903552
M16 x 1.5	2.0 - 6.0	8.0	19	50	903533	903543	903553
M20 x 1.5	5.0 - 9.0	10.0	24	50	903534	903544	903554
M25 x 1.5	9.0 - 13.0	8.0	29	50	903535	903545	903555
M32 x 1.5	11.0 - 15.0	10.0	36	25	903536	903546	903556
M40 x 1.5	16.0 - 23.0	10.0	46	20	903537	903547	903557
M50 x 1.5	25.0 - 31.0	18.0	60	10	903538	903548	903558
M63 x 1.5	29.0 - 35.0	18.0	65	10	903539	903549	903559

PG thread

Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)	grey (RAL 7035)	grey (RAL 7001)	black (RAL 9005)
					Part no.	Part no.	Part no.
PG 7	3.0 - 6.5	8.0	15	100	99300	99310	99320
PG 9	4.0 - 8.0	8.0	19	50	99301	99311	99321
PG 11	5.0 - 10.0	8.0	22	50	99302	99312	99322
PG 13.5	6.0 - 12.0	10.0	24	50	99303	99313	99323
PG 16	10.0 - 14.0	10.0	27	50	99304	99314	99324
PG 21	13.0 - 18.0	11.0	33	25	99305	99315	99325
PG 29	18.0 - 25.0	11.0	42	20	99306	99316	99326
PG 36	22.0 - 32.0	13.0	53	10	99307	99317	99327
PG 42	30.0 - 38.0	13.0	60	10	99308	99318	99328
PG 48	34.0 - 44.0	14.0	65	10	99309	99319	99329

NPT thread

Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)	grey (RAL 7035)	grey (RAL 7001)	black (RAL 9005)
					Part no.	Part no.	Part no.
NPT 3/8"	5.0 - 10.0	15.0	22	50	92780	92790	92800
NPT 1/2"	6.0 - 12.0	15.0	24	50	92781	92791	92801
NPT 1/2"	10.0 - 14.0	15.0	27	50	92782	92792	92802
NPT 3/4"	13.0 - 18.0	15.0	33	25	92783	92793	92803
NPT 1"	18.0 - 25.0	18.0	42	20	92784	92794	92804



TECHNICAL DATA

Nickel plated brass cable gland

Temperature range	-20°C to +100°C short term -40°C to +150°C
Protection class	IP 68 - 5 bar / IP 66

■ STRUCTURE

- Material: Brass, nickel plated
- Clamp: Polyamide (PA) 6
- Seal: Chloroprene rubber (CR)
- O-ring: Nitrile butadiene rubber (NBR)

■ PROPERTIES

- optimum strain relief through clamping lamella
- easy to assemble, time and cost savings
- watertight, dust-tight
- large clamping areas

■ TESTS

- Test standard EN 62444

■ APPLICATION

- Machine and plant construction
- Robotics
- Automation technology
- Vehicle construction and shipbuilding
- Railway technology
- Installation technology
- Control cabinet construction

■ NOTES

- Legend:
Dimensions
TD - Thread Diameter
TL - Thread Length
SZ - Spanner Size

metric thread

Part no.	Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)
90760	M12 x 1.5	3.0 - 6.5	6.0	14	50
99960	M16 x 1.5	5.0 - 10.0	7.0	20	50
90762	M20 x 1.5	6.0 - 12.0	8.0	22	50
99961	M25 x 1.5	11.0 - 17.0	8.0	27	25
94624	M32 x 1.5	15.0 - 21.0	8.0	34	10
99962	M40 x 1.5	19.0 - 28.0	9.0	43	10
99963	M50 x 1.5	27.0 - 38.0	9.0	58	5
90767	M63 x 1.5	34.0 - 44.0	10.0	64 / 68	5
906199	M63 x 1.5	37.0 - 53.0	10.0	75	5

metric thread - with reducing seal

Part no.	Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)
903560	M12 x 1.5	2.0 - 5.0	6.0	14	50
903561	M16 x 1.5	2.0 - 6.0	7.0	17 / 18	50
903562	M20 x 1.5	5.0 - 9.0	8.0	22	50
903563	M25 x 1.5	7.0 - 12.0	8.0	24 / 27	25

Part no.	Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)
903564	M32 x 1.5	9.0 - 16.0	9.0	30 / 34	10
903565	M40 x 1.5	12.0 - 20.0	9.0	40 / 43	10
903566	M50 x 1.5	20.0 - 26.0	9.0	50 / 55	5
903567	M63 x 1.5	29.0 - 35.0	14.0	64 / 68	5

PG thread

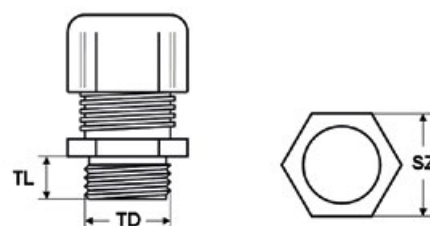
Part no.	Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)
90750	PG 7	3.0 - 6.5	6.0	14	50
90751	PG 9	4.0 - 8.0	6.0	17	50
90752	PG 11	5.0 - 10.0	6.0	20	50
90753	PG 13.5	6.0 - 12.0	6.5	22	50
90754	PG 16	10.0 - 14.0	6.5	24	25
90755	PG 21	13.0 - 18.0	7.2	30	25
90756	PG 29	18.0 - 25.0	8.0	40	10
90757	PG 36	22.0 - 32.0	9.0	50	5
90758	PG 42	30.0 - 38.0	12.0	58	5
90759	PG 48	34.0 - 44.0	14.0	64	5

NPT thread

Part no.	Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)
99965	NPT 3/8"	4.0 - 8.0	11.5	17 / 19	50
99966	NPT 1/2"	6.0 - 12.0	13.0	22	50
99967	NPT 3/4"	13.0 - 18.0	13.0	30	25
99968	NPT 1"	18.0 - 25.0	13.0	40 / 43	10

HELUTOP® MS-EP4

Contact system patented



TECHNICAL DATA

Nickel plated brass EMC cable gland

Temperature range -20°C to +100°C
Protection class IP 68 - 5 bar

■ STRUCTURE

- Material: Brass, nickel plated
- Contact system: Copper-Beryllium
- Clamp: Polyamide (PA) 6
- Seal: Chloroprene rubber (CR)
- O-ring: Nitrile butadiene rubber (NBR)
- with integrated contact system

■ PROPERTIES

- optimum strain relief through clamping lamella
- easy to assemble, time and cost savings
- watertight, dust-tight
- excellent vibration resistance

- large clamping areas
- automatic secure connection when closed
- excellent screening attenuation and current discharge

■ TESTS

- Test standard EN 62444

■ APPLICATION

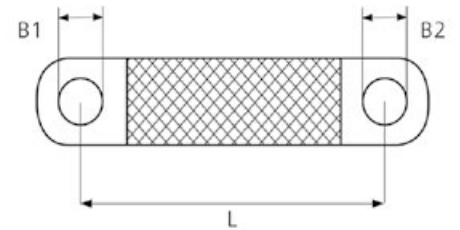
- Machine and plant construction
- Robotics
- Automation technology
- Vehicle construction and shipbuilding
- Railway technology
- Installation technology
- Control cabinet construction

■ NOTES

- Legend:
Dimensions
TD - Thread Diameter
TL - Thread Length
SZ - Spanner Size

metric thread

Part no.	Size	Cable Ø from / to mm	Thread length mm	Spanner size mm	Packaging unit (in pc.)
905181	M12 x 1.5	3.0 - 6.5	6.0	14	50
905182	M16 x 1.5	5.0 - 10.0	6.0	20	50
905183	M20 x 1.5	6.0 - 12.0	6.0	22	50
905184	M20 x 1.5	7.5 - 14.0	8.0	24	50
905185	M25 x 1.5	10.0 - 18.0	8.0	30	25
905186	M32 x 1.5	16.0 - 25.0	9.0	40	10
905187	M40 x 1.5	22.0 - 32.0	9.0	50	5
905188	M50 x 1.5	30.0 - 38.0	9.0	58	5
905189	M63 x 1.5	34.0 - 44.0	14.0	64 / 68	5
905248	M63 x 1.5	37.0 - 53.0	10.0	75	5



TECHNICAL DATA

Cu Earthing Strap

Temperature range	-20°C to +125°C
individual strand size	0.2 mm

■ STRUCTURE

- Material: copper tinned

■ PROPERTIES

- rounded contacts
- contact areas made of seamless, pressed ferrules

■ APPLICATION

- automobile industry
- robots
- Control cabinet construction
- for EMC applications (interference elimination)

■ NOTES

- other lengths and inner diameters available on request
- Legend:
 - Dimensions
 - B1 - Stud hole
 - B2 - Stud hole
 - L - Length

Part no.	Type	Cross-sec. mm ²	Length mm	Boring mm	Packaging unit (in pc.)
11008412	HELU-MB-CUv-6-150-4.5/6.5-R	6	150.0	4.5 / 6.5	50
11018291	HELU-MB-CUv-6-150-6.5/6.5-R	6	150.0	6.5 / 6.5	50
11008415	HELU-MB-CUv-6-300-6.5/6.5R	6	300.0	6.5 / 6.5	50
11008411	HELU-MB-CUv-6-500-6.5/6.5-R	6	500.0	6.5 / 6.5	50
11008413	HELU-MB-CUv-6-200-8.5/8.5-R	6	200.0	8.5 / 8.5	50
11008421	HELU-MB-CUv-10-200-6.5/6.5-R	10	200.0	6.5 / 6.5	50
11017752	HELU-MB-CUv-10-200-6.5/8.5-R	10	200.0	6.5 / 8.5	50
11008423	HELU-MB-CUv-10-300-6.5/6.5-R	10	300.0	6.5 / 6.5	50
11017753	HELU-MB-CUv-10-300-6.5/8.5-R	10	300.0	6.5 / 8.5	50
11008422	HELU-MB-CUv-10-200-8.5/8.5-R	10	200.0	8.5 / 8.5	50
11008424	HELU-MB-CUv-10-300-8.5/8.5-R	10	300.0	8.5 / 8.5	50
11008425	HELU-MB-CUv-10-400-8.5/8.5-R	10	400.0	8.5 / 8.5	50
11017610	HELU-MB-CUv-10-500-8.5/8.5-R	10	500.0	8.5 / 8.5	50
11021421	HELU-MB-CUv-16-150-6.5/6.5-R	16	150.0	6.5 / 6.5	50
11008443	HELU-MB-CUv-16-200-6.5/6.5-R	16	200.0	6.5 / 6.5	50
11008445	HELU-MB-CUv-16-200-6.5/8.5-R	16	200.0	6.5 / 8.5	50

Part no.	Type	Cross-sec. mm ²	Length mm	Boring mm	Packaging unit (in pc.)
11008446	HELU-MB-CUv-16-250-6.5/8.5-R	16	250.0	6.5 / 8.5	50
11008444	HELU-MB-CUv-16-300-6.5/6.5-R	16	300.0	6.5 / 6.5	50
11008447	HELU-MB-CUv-16-300-6.5/8.5-R	16	300.0	6.5 / 8.5	50
11008442	HELU-MB-CUv-16-100-8.5/8.5-R	16	100.0	8.5 / 8.5	50
11008450	HELU-MB-CUv-16-1200-8.5/8.5-R	16	1200.0	8.5 / 8.5	50
11017281	HELU-MB-CUv-16-150-8.5/8.5-R	16	150.0	8.5 / 8.5	50
11008378	HELU-MB-CUv-16-200-8.5/8.5-R	16	200.0	8.5 / 8.5	50
11017273	HELU-MB-CUv-16-300-8.5/10.5-R	16	300.0	8.5 / 10.5	50
11008379	HELU-MB-CUv-16-300-8.5/8.5-R	16	300.0	8.5 / 8.5	50
11017756	HELU-MB-CUv-16-400-8.5/6.5-R	16	400.0	8.5 / 6.5	50
11017286	HELU-MB-CUv-16-450-8.5/10.5-R	16	450.0	8.5 / 10.5	50
11008448	HELU-MB-CUv-16-500-8.5/8.5-R	16	500.0	8.5 / 8.5	50
11008449	HELU-MB-CUv-16-600-8.5/8.5-R	16	600.0	8.5 / 8.5	50
11008461	HELU-MB-CUv-25-200-8.5/8.5-R	25	200.0	8.5 / 8.5	50
11008462	HELU-MB-CUv-25-300-8.5/8.5-R	25	300.0	8.5 / 8.5	50
11017762	HELU-MB-CUv-25-500-8.5/8.5-R	25	500.0	8.5 / 8.5	50
11009170	HELU-MB-CUv-35-500-8.5/8.5-R	35	500.0	8.5 / 8.5	50
11009219	HELU-MB-CUv-50-300-10.5/10.5-R	50	300.0	10.5 / 10.5	50

HELUKAT® Data Connectors

RJ45 - Copper Connectors

Part no.	Cat.	Connector	Pins	Core Ø in mm	Cable Ø in mm	AWG solid	AWG stranded	UL	Cl.	Standard
800986	5	straight	4	max. 1.6	6,1-6,9	22-23	22-24/7	yes	IP20	PROFINet
803841		straight	4.5-8.0		22-26	22-26/7	PROFINet			
802920		straight	4.5-8.0		22-26/7		TIA 568 A/B			
804234		angled 90°	4.5-8.0		23-26	26-23/7	TIA 568 A/B			
805401		straight, metal	22-24		PROFINet					
805402		angled 90°, metal			PROFINet					
11017443		angled 145°			PROFINet					
11008569		PushPull straight, metal	6,5-9,5		22-27	22-27/7	IP67		PROFINet	
805781		straight	4.5-9.0		22-24	22-27	IP20		PROFINet	
805782		angled 45°	4.5-8.0						PROFINet	
805783	6 _A	straight	4.5-9.0		22-24	22-27			TIA 568 A/B	
11017540	6	straight	N/A		max. 8.0	24		24/7	PROFINet	
805784	6 _A	angled 45°	max. 1.6		4.5-8.0	22-24		22-27	TIA 568 A/B	
804544		straight, metal	max. 1.6		5.0-9.5	22-26		22-27/7	TIA 568 A	
11022946		straight, metal	1.0-1.6		5.5-10.0	22-24		22-24/19	TIA 568 B	
11017885		straight	1.0-1.4		6.0-7.5	26-23		26-23	TIA 568 A/B	
11017766		straight	1.0-1.4		7.0-8.5	26-23		26-23	TIA 568 A/B	
11017767	8	straight			1.4-1.65	7.0-8.5		24-22	24-22	



M12 - Copper Connectors

Part no.	Cat.	Connector	Pins	Core Ø in mm	Cable Ø in mm	AWG Dr. / Li.	UL	Cl.	Standard
803894	5	straight, metal	4	max. 1.6	4.0-8.0	22-26	yes	IP67	
805958		angled 90°, metal				22-26			
805966		straight, metal				22-26			PROFINet
806205		straight, metal		max. 2	5.0-9.7	20-24			PROFINet
805967		angled 90°, metal		max. 1.6	4.0-8.0	22-26			PROFINet
805959	6 _A	straight, metal	8	N/A		26			
806206	X-coded	straight, metal		max. 2	5.0-9.7	22-26			
805960		angled 90°, metal		N/A	4.0-8.0	26			



HELUTEC® Plugs

SERIES 623



Plug with coupling
nut M23 x 1



Plug with speedtec
quick-lock fastener

SPEEDTEC®

SERIES 923



Plug with coupling
nut M23 x 1



Plug with speedtec
quick-lock fastener

SPEEDTEC®

SERIES 940



Plug with coupling
nut M40 x 1,5



Plug with speedtec
quick-lock fastener

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the area of signal, power and
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TECHNICAL DATA

Spiral wound metallic tube acc. to DIN EN IEC 61386-23

Temperature range -50°C to +250°C
short term up to +220°C

Protection class IP 40

■ STRUCTURE

- Material: Cold strip acc. to EN 10139 DC 03, Fe/ Zn 3, galvanized
- with double-folded profile (Agraff profile)

■ PROPERTIES

- high tensile and torsional strength.

■ APPLICATION

- Machine and plant construction
- Automation technology
- Installation technology
- Control cabinet construction

■ NOTES

- Suitable connection glands: MTG-US, MTG-LI

Part no.	Inner Ø mm	Outer Ø mm, approx.	Weight kg, approx.	Packaging unit (in m)
97014	8.0	10.0	0.09	50
97015	12.0	14.0	0.155	50
97016	14.0	17.0	0.24	50
97017	16.0	19.0	0.29	50
97018	18.0	21.0	0.29	50

Part no.	Inner Ø mm	Outer Ø mm, approx.	Weight kg, approx.	Packaging unit (in m)
97019	24.0	27.0	0.38	50
97020	31.0	36.0	0.64	25
97021	40.0	45.0	0.84	25
97022	51.0	56.0	1.10	25



TECHNICAL DATA

Protection tube

Temperature range	Permanent load -55°C to +260°C Short-time load +800°C (up to approx. 20 minutes) Loading moment +1640°C (approx. 15-30 seconds)
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■ STRUCTURE

- Material: Silicone sheath (contains iron oxide)
- Interior sheath of knitted glass-fibre braid

■ PROPERTIES

- halogen-free

■ APPLICATION

- This product is extremely heat resistant.
HTP has a high insulation factor and, due to the iron oxide containing silicone sheath, is resistant to small quantities of liquid steel.
HTP also protects against burn injuries from steam tubes, hot air or hot water lines.

Inner Ø mm	Packaging unit (in m)	red Part no.
6.0	15	93630
10.0	15	93632
13.0	15	904924
19.0	15	93634
22.0	15	93635
25.0	15	93636
32.0	15	93637
38.0	15	93638
44.0	15	93639
57.0	15	93640
64.0	15	93641
76.0	15	93642
89.0	15	93643
102.0	15	93644



TECHNICAL DATA

PA Corrugated tubes

Temperature range	-40°C to +120°C short term up to +150°C
Capacity/100mm	approx. 350 N (NW: 17)

■ STRUCTURE

- Material: modified Polyamide (PA) 12
- Flammability acc. to UL 94 (HB)

■ PROPERTIES

- halogen-free
- cadmium-free

- resistant to: fuels, mineral oils, greases, weak bases, weak acids

■ APPLICATION

- Machine and plant construction
- Robotics
- Automation technology
- Railway technology
- Installation technology
- Cable protection tube for heavy-duty applications.
High flexible and high load rating

■ NOTES

- Fine or coarse profile. Suitable connection glands: HELUquick, HSSV.

PA12-F

Nominal size mm	Inner Ø mm	Outer Ø mm, approx.	Packaging unit (in m)	grey	black
				Part no.	Part no.
10.0	9.8	13.0	50	920156	920163
12.0	12.0	15.8	50	920157	920164
17.0	16.6	21.0	50	920158	920165

PA12-B

Nominal size mm	Inner Ø mm	Outer Ø mm, approx.	Packaging unit (in m)	grey	black
				Part no.	Part no.
21.0	22.0	28.5	50	920159	920166
29.0	27.5	34.5	25	920160	920167
36.0	35.2	42.5	25	920161	920168
48.0	46.5	54.5	25	920162	905796



TECHNICAL DATA

PA Corrugated tubes

Temperature range	-40°C to +120°C short term up to +150°C
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■ STRUCTURE

- Material: Polyamide (PA) 6
- Flammability acc. to UL 94 (V2)

■ PROPERTIES

- halogen-free
- resistant to: fuels, mineral oils, greases
- Trouble-free retrofitting
- high mechanical strength

- simple installation of pre-fabricated lines

■ APPLICATION

- Machine and plant construction
- Automation technology
- Vehicle construction and shipbuilding
- Railway technology
- Installation technology
- Control cabinet construction
- The dividable and reclosable cable protection tube for subsequent mechanical protection of the cables.
Repair of existing systems.

■ NOTES

- Suitable connection glands: COV

trade size mm	Inner Ø mm	Outer Ø mm, approx.	Packaging unit (in m)	black Part no.
10.0	8.8	13.5	50	90061
14.0	13.2	18.7	50	90062
20.0	20.2	25.7	50	90063
23.0	23.9	31.3	50	90064
37.0	32.5	43.2	25	90065
45.0	43.1	54.2	25	90066
70.0	67.0	79.8	10	920179



TECHNICAL DATA

PP-corrugated tubes

Temperature range -40°C to +135°C
short term up to +150°C

■ STRUCTURE

- Material: Polypropylene (PP)
- Flammability acc. to UL 94 (HB)

■ PROPERTIES

- halogen-free
- resistant to: fuels, mineral oils, greases, weak bases, weak acids

■ APPLICATION

- Machine and plant construction
- Automation technology
- Vehicle construction and shipbuilding
- Railway technology
- Installation technology
- Control cabinet construction
- The dividable and reclosable cable protection tube for subsequent mechanical protection of the cables.
Trouble-free retrofitting
High mechanical strength
Simple installation of pre-fabricated lines
Repair of existing systems

■ NOTES

- Suitable connection glands: COV

trade size mm	Inner Ø mm	Outer Ø mm, approx.	Weight kg, approx.	Bending radius mm	Packaging unit (in m)	black Part no.
10.0	8.4	13.4	1.75	70.0	50	97496
14.0	12.5	18.5	3.05	95.0	50	97134
20.0	19.2	25.3	4.10	130.0	50	97135
23.0	23.4	30.8	5.90	155.0	50	97205
37.0	31.0	41.4	4.75	205.0	25	96732
45.0	42.7	54.0	5.60	190.0	25	90054
70.0	67.5	79.8	3.55	375.0	10	920180



TECHNICAL DATA

Corrugated conduit gland

Temperature range	-40°C to +120°C short term up to +140°C
Protection class	IP 43

- resistant to: fuels, mineral oils, greases, weak bases, weak acids

■ STRUCTURE

- Material: Polyamide (PA) 6.6
- Flammability acc. to UL 94 (HB)

■ PROPERTIES

- halogen-free

■ APPLICATION

- Machine and plant construction
- Robotics
- Automation technology
- Vehicle construction and shipbuilding
- Railway technology
- Installation technology
- Control cabinet construction
- Tube gland for HELUcond CO protection tubes.
Axial fold-up and reclosable connection gland with shaped locking rods. Split nut with safety lock to prevent accidental opening.

Metric connection thread - splittable corrugated conduit gland

Size	Suitable for nominal size	Thread length mm	Spanner size mm	Packaging unit (in pc.)	black Part no.
M16 x 1.5	10.0	34.0	19	100	905031
M20 x 1.5	14.0	41.0	27	100	905032
M25 x 1.5	20.0	43.0	30	50	905033
M32 x 1.5	23.0	50.5	36	50	905034
M40 x 1.5	37.0	59.0	46	25	905035
M50 x 1.5	45.0	67.5	55	25	905036

Metric connection thread - splittable lock nut

Size	Suitable for nominal size	Thread length mm	Spanner size mm	Packaging unit (in pc.)	black Part no.
M16 x 1.5	10.0	8.0	19	100	905037
M20 x 1.5	14.0	8.0	27	100	905038
M25 x 1.5	20.0	9.0	30	50	905039
M32 x 1.5	23.0	12.0	36	50	905040
M40 x 1.5	37.0	15.0	46	25	905041
M50 x 1.5	45.0	15.0	55	25	905042

PG connection thread - splitable corrugated conduit gland with splitable lock nut

Size	Suitable for nominal size	Thread length mm	Spanner size mm	Packaging unit (in pc.)	black Part no.
PG 9	10.0	12.0	22	100	93514
PG 13.5	14.0	17.0	30	100	93515
PG 21	20.0	17.0	36	50	93516
PG 29	23.0	21.0	46	50	93517
PG 29	37.0	22.0	55	25	93518



TECHNICAL DATA

Corrugated tubes holder

Temperature range -30°C to +105°C

■ STRUCTURE

- Material: Polyamide (PA) 6
- Flammability acc. to UL 94

■ PROPERTIES

- halogen-free
- cadmium-free
- resistant to: fuels, mineral oils, greases, weak bases, weak acids

■ APPLICATION

- Machine and plant construction
- Robotics
- Automation technology
- Vehicle construction and shipbuilding
- Railway technology
- Installation technology
- Control cabinet construction
- Tube holder for dividible HELUcond CO protection tube.
Quick fastening with integrated rib, which also fixes the protection tube in an axial direction

Suitable for nominal size	Width mm	Height mm	Packaging unit (in pc.)	black Part no.
10.0	18.5	21	100	920375
14.0	24.0	25.5	100	920357
20.0	35.0	36	100	920358
23.0	42.0	43.5	50	920359
37.0	55.0	56.5	20	920360
45.0	67.0	68	20	920361

IA-KE



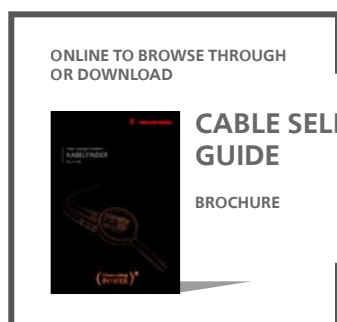
TECHNICAL DATA
Insertion aid

- **APPLICATION**
- Quick and simple insertion of lines into splitted conduits resp. cable chain openings

Part no.	Type	Cross-sec. max. mm²	Packaging unit (in pc.)
901006	KE	22.0	1

Glossary

You can find further information in our Download Center:
www.helukabel.com/download-center



NOTES

Technical modifications

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