# THE WORLD OF LAPP

## Renewable Energy


LAPP GROUP


# Welcome

Please come in and look around. Irrespective of which cable, line, plug and accessory you require for your particular application, you will find exactly what you need here. We have more than 40,000 different standard articles in stock. We also deliver within 24 or 48 hours. Special tasks demand special solutions. In this case too, you need look no further than our company. In addition to the comprehensive range of standard Lapp products, we can also offer you individual cable assemblies and the engineering involved.

You should also be aware of the following: Lapp is one of the leading international system providers. Our brands are used in the most varied of applications, branches and global markets. One of our principles states: when striving for perfection we should rely on no-one but ourselves. This is why we manufacture everything in our own production sites. We also have numerous sales companies and logistics centres around the world, which enable us to be close to our customers. We're somewhere near you too!

To contact your local Lapp Group representative please visit
**www.lappgroup.com/worldwide**

# Content







# Ideas that make the world go round

**Since 1957 we have registered more than 100 patents, and we carry a delivery programme of more than 40,000 products, which are used wherever electrical energy is used to power, drive, light or control things. Most of this also happens out of sight. For example inside the Cheops pyramid in El Gîza. ÖLFLEX® cables are used there to safeguard smooth operation of the air-conditioning units. We also equipped the K2 base camp at an altitude of 5100 metres. At -46° Celsius, we also clearly demonstrated that our products work even at the lowest of temperatures.**

You will discover Lapp in up to 200 m long paper-making machines and in the 178 m high Singapore Flyer, the world's most spectacular big wheel. We are also on-board the Transrapid train in Shanghai and in navy submarines diving deep below the sea. At the opera house in Beijing we made everyone very happy, and we toured the world recently with the Rolling Stones. We equipped international airports in London, Sofia and Munich with hundreds of kilometres of lines and we are out there listening inside one of the world's largest radio telescopes, well beyond the frontiers of our own solar system. And we play our part in using sun, wind and other green energy sources more efficiently – in the meantime Lapp is one of the leading partners to companies in the application fields of photovoltaics, wind power, biomass and fuel-cell technology.

## In use worldwide

Wherever you wish to realise your photovoltaic project – you can count on the performance of our products. For example, in Bovera, Spain over 5,000 solar modules have been installed over an area of 24,700 m$^2$. Here ÖLFLEX® SOLAR cables with a total length of 20 km ensure perfect operation. But we are not only glad to be your partner for big projects, you can also count on us for smaller systems.

## Quality counts

A wealth of characteristics make the components so popular among users: They are not only UV resistant, but also extremely weatherproof and temperature resistant. In a nutshell – the brand products demonstrate their top performance in diverse applications around the world.

# Solar products from Lapp – System competence for photovoltaics:

Put your trust in a partner who offers you perfect system competence from a single source for cables, plugs and connectors for photovoltaics. With Lapp brand products you are fully equipped for your individual project if you place importance on excellent quality and services.

# Brand products for your solar units

**The following products are used in the solar energy sector:**

ÖLFLEX® SOLAR XLR/XLR TF

ÖLFLEX® SOLAR XLS

ÖLFLEX® SOLAR XLSv

ÖLFLEX® SOLAR V4A

ÖLFLEX® SOLAR XL multi

NYY-J, NYY-O

EPIC® SOLAR 4

EPIC® SOLAR Module Box

EPIC® SOLAR 4 THIN pre-assembled

EPIC® SOLAR M pre-assembled

EPIC® SOLAR M field mountable M12

EPIC® SOLAR M G5 built in plug

EPIC® SOLAR FMM Y-Splitter

EPIC® SOLAR Crimp tool

KS 20 cable shears

Universal strip stripping and cutting tool

SKINTOP® CLICK / SKINTOP® CLICK-R

SKINTOP® ST-M /
SKINTOP® STR-M

SILVYN®RILL PA 6

SILVYN® FPAS

Twist Tail™ cable tie



# EPIC® SOLAR 4 THIN

## Super-slim, super-effective, super-durable

Functional reliability and durability are two essential quality criteria for wiring systems in photovoltaics. The SOLAR brand components from Lapp Group are UV resistant, waterproof and temperature resistant. They are used worldwide and ensure durable connections with effective energy transmission in major projects, as well for small solar plants.

Backed up by in-depth expertise and decades of experience in the use of cable systems under extreme environmental conditions – heat and cold, as well as mechanical and chemical stresses.

**Made in Germany:**
**Zero-resistance cable connection for super-effective energy transmission.**

Zero-resistance cable connection by virtue of an innovative welded joint

High packing density with a super-flat 12 mm

Conductor cross-sections from 1.5 mm² to 6 mm²


## Practical all round – EPIC® SOLAR 4 for on-site assembly

- 4 mm connector system with double hook
- Easy to assemble with a crimp connection
- Broad spectrum of applications with conductor cross-sections of 2.5 mm² to 6 mm²

## EPIC® SOLAR 4 THIN puts the focus on panel producers' quality requirements:

- No warming of the connector and therefore little aging and durable functional reliability
- Plug and cable preassembled. Every part is tested!
- Development according to international TÜV and UL standards

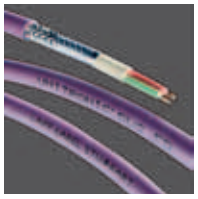

## Module box made to measure!

When it comes to customer-orientation and flexibility, the sun always shines at Lapp Group. For instance, we offer EPIC® SOLAR connection boxes for weatherproof wiring, also as a customised solution for your solar panels. **Just ask us!**

# Brand quality from Stuttgart

## ÖLFLEX®
## Power- and control cables

The world's first brand cable is available in the most varied of versions to match maximum requirements.
**Key features:** Oil-resistant, flexible and available to match almost any requirement or environmental condition – also free of halogens.
**Fields of application:** Multipurpose. Special variants are more and more in demand in the area of renewable energies.



## UNITRONIC®
## Data communication systems

The ideal brand for fast, trend-setting and reliable data transfer.
**Key features:** UNITRONIC® are not only data lines, but also bus lines, which together with active sensor/actuator modules or gateways provide a perfect system for automation.
**Fields of application:** Measurement, control, regulation, bus or LAN networks.

## HITRONIC®
## Optical transmission systems

The brand for split-second, fault-free, intercept-free data transport.
**Key features:** The HITRONIC® product range includes fibre optic cables in the most varied of versions, along with suitable accessories such as splice boxes, wall distributors or couplings.
**Fields of application:** Office and industrial sector.

## SKINTOP®
## Cable glands

The brand for multipurpose cable entries in line with the following: quickly fastened, centred and hermetically sealed.
**Key features:** Large clamping areas, optimum strain reliefs, the most diverse of versions such as SKINTOP® CLICK, COLD or CUBE.
**Fields of application:** Everywhere, where cables must be fastened reliably and quickly.

## SILVYN®
## Protective cable conduit- and cable carrier systems

The brand for all-round cable protection.
**Key features:** The product range includes SILVYN® cable protection hoses for perfect protection against mechanical and chemical loads, along with SILVYN® CHAIN energy supply chains for highly-dynamic applications.
**Fields of application:** Everywhere that cables have to be additionally protected or routed.

## EPIC®
## Industrial connectors

The brand for strong and reliable connections.
**Key features:** Robust square and circular connectors. Flexible system consisting of housings, inserts, contacts and accessories – for every requirement, the tailor-made solution. Similarly, EPIC® SOLAR plugs for photovoltaics are also part of the extensive product range.
**Fields of application:** Mechanical and systems engineering, and drive technology.

## ETHERLINE®
## Data communication systems for ETHERNET-Technology

The brands for network solutions, safety systems and firewalls in the industrial networking sector.
**Key features:** Integral system consisting of hardware (switches, routers, cables, plugs etc.), software, consulting, network design and support.
**Fields of application:** Factory automation.

## FLEXIMARK®
## Cable marking products

The brand for permanent, clearly-arranged cable markings.
**Key features:** Comprehensive range – from manual labelling solutions onto digital identification. Withstands high chemical, thermal and mechanical loads.
**Fields of application:** All cables.

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New

# ÖLFLEX® SOLAR XLR/XLR TF

## The latest solar cable generation according to PV1-F design

**Info**

- According to DKE requirements specification PV1-F
- TÜV Type Approved (2PfG 1169/08.07)


### Benefits

- High thermal capacity for long lasting operation of the PV system at all seasons
- Reduced spreading of fire source and formation of toxic combustion gases in event of fire
- Variously coloured core insulations simplify on demand the differentiation of the polarity during installation
- High thermal capacity for long lasting operation of the PV system at all seasons
- Exact quantity control during installation by meter marking on the cable sheath

### Application range

- For cabling of solar modules among themselves and as extension cable between the individual module strings or DC/AC inverter
- Gable and flat roof photovoltaic systems
- Open land solarfield plants

### Product features

- Excellent weather-, temperature- and UV resistance
- Good notch and abrasion resistance
- Good heat pressure resistance
- Halogen-free and flame-retardant.
- Resistant against oxalic acid and sodium hydroxide

### Approvals (Norm references)

CE RoHS

- TÜV Type Approved (2PfG 1169/08.07)
- Halogen-free according to EN 50267-2–1/-2, EN 60684-2
- Ozone resistant according EN 50396
- Weather-/UV resistant according HD 605/A1
- Acid-/Brine resistant according EN 60811-2-1

### Design

- Conductor: Fine wired tinned copper strands
- Core insulation: Electron beam cross-linked copolymer
- Core insulation colour: Black, red or blue
- Outer sheath: Electron beam cross-linked Copolymer
- Outer sheath colour black

### Technical data

**Approvals**
PV1-F (TÜV Type approved according 2 PfG 1169/08.2007)

**Conductor stranding**
Fine wire in accordance to VDE 0295 Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Fixed installation: 4 x cable diameter

**Rated voltage**
AC $U_0$/U : 600/1000 V
DC $U_0$/U : 900/1500 V
Max. permissible operating voltage: DC 1800 V

**Test voltage**
AC 6500 V

**Range of temperature**
-40° C up to +120° C max. conductor temperature

| Part number | Conductor cross section in mm² | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **Core insulation: black / Outer sheath: black** | | | | |
| **ÖLFLEX® SOLAR XLR** | | | | |
| 0025908 | 6.0 | 7.1 | 57.6 | 102.0 |
| 0025909 | 10.0 | 8.9 | 96.0 | 163.0 |
| 0025910 | 16.0 | 9.8 | 153.6 | 225.0 |
| **ÖLFLEX® SOLAR XLR TF** | | | | |
| 0025905 | 1.5 | 5.4 | 14.4 | 43.0 |
| 0025923 | 2.5 | 5.4 | 24.0 | 51.0 |
| 0025943 | 4.0 | 6.0 | 38.4 | 70.0 |
| **Core insulation: red / Outer sheath: black** | | | | |
| **ÖLFLEX® SOLAR XLR** | | | | |
| 0025914 | 6.0 | 7.1 | 57.6 | 102.0 |
| 0025915 | 10.0 | 8.9 | 96.0 | 163.0 |
| 0025916 | 16.0 | 9.8 | 153.6 | 225.0 |
| **ÖLFLEX® SOLAR XLR TF** | | | | |
| 0025911 | 1.5 | 5.4 | 14.4 | 43.0 |
| 0025926 | 2.5 | 5.4 | 24.0 | 51.0 |
| 0025946 | 4.0 | 6.0 | 38.4 | 70.0 |
| **Core insulation: blue / Outer sheath: black** | | | | |
| **ÖLFLEX® SOLAR XLR** | | | | |
| 0025920 | 6.0 | 7.1 | 57.6 | 102.0 |
| 0025921 | 10.0 | 8.9 | 96.0 | 163.0 |
| 0025922 | 16.0 | 9.8 | 153.6 | 225.0 |
| **ÖLFLEX® SOLAR XLR TF** | | | | |
| 0025917 | 1.5 | 5.4 | 14.4 | 43.0 |
| 0025927 | 2.5 | 5.4 | 24.0 | 51.0 |
| 0025947 | 4.0 | 6.0 | 38.4 | 70.0 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil 100 m; Drum (500; 1000) m

### Comparable products

- ÖLFLEX® SOLAR XL multi see page 13
- ÖLFLEX® SOLAR XLS see page 10

### Accessories

- EPIC® SOLAR see main catalogue 2010/11 page 627 – 631

# Power and control cables

## Special applications

### Photovoltaic

solar energy

# ÖLFLEX® SOLAR XLS

## Electrobeam cross-linked solar cable


**Info**

- Temperature range -40°C up to +100°C

### Benefits

- Robust against mechanical impact
- Reduced spreading of fire source and formation of toxic combustion gases in event of fire
- Exact quantity control during installation by meter marking on the cable sheath

### Application range

- For cabling of solar modules among themselves and as extension cable between the individual module strings or DC/AC inverter
- Gable and flat roof photovoltaic systems
- Open land solarfield plants

### Product features

- Weathering-, abrasion and UV resistant
- Good heat pressure resistance
- Halogen-free and flame-retardant.
- Resistant against oxalic acid and sodium hydroxide and other chemical media
- On request and considering economic minimum lenghts also available with red and blue outer sheath

### Approvals (Norm references)

CE RoHS

- Flame retardant according to IEC 60332-1-2
- Halogen-free according to EN 50267-2–1/-2, EN 60684-2
- Ozone resistant according EN 50396
- Weather-/UV resistant according HD 605/A1
- Acid-/Brine resistant according EN 60811-2-1

### Design

- Conductor: Fine wired tinned copper strands
- Core insulation: Electron beam cross-linked copolymer
- Core insulation colour: Black, red or blue
- Outer sheath: Electron beam cross-linked Copolymer
- Outer sheath colour black

### Technical data

**Conductor stranding**
Fine wire in accordance to VDE 0295 Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Fixed installation: 4 x cable diameter

**Rated voltage**
AC $U_0$/U : 600/1000 V
DC $U_0$/U : 900/1500 V
Max. permissible operating voltage:
DC 1800 V

**Test voltage**
AC 6500 V

**Range of temperature**
Fixed installation:
-40° C up to +100 °C

| Part number | Conductor cross section in mm² | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® SOLAR XLS - Core insulation: black / Outer sheath: black** | | | | |
| 0025800 | 1.5 | 5.4 | 14.4 | 29.0 |
| 0025805 | 2.5 | 5.4 | 24.0 | 45.0 |
| 0025810 | 4.0 | 6.0 | 38.4 | 72.0 |
| 0025815 | 6.0 | 7.1 | 57.6 | 102.0 |
| 0025820 | 10.0 | 8.9 | 96.0 | 159.0 |
| 0025825 | 16.0 | 9.8 | 153.6 | 247.0 |
| **ÖLFLEX® SOLAR XLS - Core insulation: red / Outer sheath: black** | | | | |
| 0025801 | 1.5 | 5.4 | 14.4 | 29.0 |
| 0025806 | 2.5 | 5.4 | 24.0 | 45.0 |
| 0025811 | 4.0 | 6.0 | 38.4 | 72.0 |
| 0025816 | 6.0 | 7.1 | 57.6 | 102.0 |
| 0025821 | 10.0 | 8.9 | 96.0 | 159.0 |
| 0025826 | 16.0 | 9.8 | 153.6 | 247.0 |
| **ÖLFLEX® SOLAR XLS - Core insulation: blue / Outer sheath: black** | | | | |
| 0025802 | 1.5 | 5.4 | 14.4 | 29.0 |
| 0025807 | 2.5 | 5.4 | 24.0 | 45.0 |
| 0025812 | 4.0 | 6.0 | 38.4 | 72.0 |
| 0025817 | 6.0 | 7.1 | 57.6 | 102.0 |
| 0025822 | 10.0 | 8.9 | 96.0 | 159.0 |
| 0025827 | 16.0 | 9.8 | 153.6 | 247.0 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil 100 m; Drum (500; 1000) m

### Comparable products

- ÖLFLEX® SOLAR XL multi see page 13

### Accessories

- EPIC® SOLAR - Industrially injection overmoulded and field mountable solar connectors for safe connection of PV modules
- SKINTOP® ST / SKINTOP® CLICK - Approved cable glands for use for PV junction boxes, electric meters and DC/AC converters

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# ÖLFLEX® SOLAR XLSv

## Robust solar cable with big conductor cross sections


**Info**

- For high electrical power loads
- Suitable for direct burial

### Benefits

- Reinforced outer sheath protects well against mechanical stress
- High thermal capacity for long lasting operation of the PV system at all seasons
- Reduced spreading of fire source and formation of toxic combustion gases in event of fire
- Considering universally valid installation guidelines also suitable for direct burial
- Exact quantity control during installation by meter marking on the cable sheath

### Application range

- For cabling of individual module strings as well as for fixed solar generators and moved tracking systems
- Open land solarfield plants
- Big conductor cross-sections are used as collecting main to transmit high power loads between the individual panel-strings and as connection to the DC/AC inverter of huge PV plants respectively solar fields

### Product features

- Excellent weather-, abrasion-, temperature- and UV resistance
- Good heat pressure resistance
- Halogen-free and flame-retardant.

### Approvals (Norm references)

CE RoHS

- Weather-/UV resistant according HD 605/A1
- Flame retardant according to IEC 60332-1-2
- Halogen free in accordance with IEC 60754-1
- Ozone resistant according EN 50396
- Acid-/Brine resistant according EN 60811-2-1

### Design

- Conductor: Fine wired tinned copper strands
- Core insulation: Electron beam cross-linked copolymer
- Outer sheath: Electron beam cross-linked Copolymer
- Outer sheath colour black

### Technical data

**Core identification code**
Black

**Conductor stranding**
Fine wire in accordance to VDE 0295
Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Fixed installation: 4 x cable diameter

**Rated voltage**
AC $U_0$/U : 600/1000 V
DC $U_0$/U : 900/1500 V
Max. permissible operating voltage:
DC 1800 V

**Test voltage**
AC 6500 V

**Range of temperature**
Fixed installation:
-40° C up to +100 °C

| Part number | Conductor cross section in mm² | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® SOLAR XLSv** | | | | |
| 0027110 | 4.0 | 8.0 | 38.4 | 104.0 |
| 0027111 | 6.0 | 9.1 | 57.6 | 141.0 |
| 0027112 | 10.0 | 10.5 | 96.0 | 201.0 |
| 0027113 | 16.0 | 11.9 | 153.6 | 280.0 |
| 0027114 | 25.0 | 13.2 | 240.0 | 386.0 |
| 0027115 | 35.0 | 14.5 | 336.0 | 502.0 |
| 0027116 | 50.0 | 17.7 | 480.0 | 698.0 |
| 0027117 | 70.0 | 19.7 | 672.0 | 921.0 |
| 0027118 | 95.0 | 22.0 | 912.0 | 1,210.0 |
| 0027119 | 120.0 | 23.8 | 1,152.0 | 1,475.0 |
| 0027120 | 150.0 | 28.0 | 1,440.0 | 1,868.0 |
| 0027121 | 185.0 | 31.0 | 1,776.0 | 2,299.0 |
| 0027122 | 240.0 | 34.0 | 2,304.0 | 2,910.0 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil 100 m; Drum (500; 1000) m
Considering economic minimum lenghts we produce on request versions with red respectively blue core insulation colour or an imprinted code stripe on the black outer sheath as distinctive feature

### Accessories

- SKINTOP® ST / SKINTOP® CLICK - Approved cable glands for use for PV junction boxes, electric meters and DC/AC converters see page 23

# Power and control cables

## Special applications

### Photovoltaic

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# ÖLFLEX® SOLAR V4A

## High-grade steel armoured solar cable

**Info**

- **Protected against martens, rodents and termites**

### Benefits

- Stainless high-grade (class V4A) steel wire braiding protects very effective against martens, rodents and even termites
- Robust against mechanical impact
- Reduced spreading of fire source and formation of toxic combustion gases in event of fire

### Application range

- For the use in PV systems for instance on stable and barn roofs in densely forested areas and farmsteads
- Gable and flat roof photovoltaic systems
- Open land solarfield plants

### Product features

- Weathering-, abrasion and UV resistant
- Halogen-free and flame-retardant.
- Good heat pressure resistance

### Approvals (Norm references)

CE RoHS

- Flame retardant according to IEC 60332-1-2
- Halogen-free according to EN 50267-2–1/-2, EN 60684-2
- Weather-/UV resistant according HD 605/A1

### Design

- Conductor: Fine wired tinned copper strands
- Core insulation: Cross-linked polymer
- Outer sheath: special polymer
- Outer sheath colour black
- Armouring: high-grade stainless steel wire braiding (V4A)

### Technical data

**Core identification code**
Black

**Conductor stranding**
Fine wire in accordance to VDE 0295 Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Fixed installation: 5 x cable diameter

**Rated voltage**
AC $U_0$/U : 600/1000 V
DC $U_0$/U : 900/1500 V
Max. permissible operating voltage: DC 1800 V

**Test voltage**
AC 6500 V

**Range of temperature**
Fixed installation:
-40° C up to +100 °C

| Part number | Conductor cross section in mm² | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® SOLAR V4A stainless steel** | | | | |
| 0025960 | 4.0 | 7.0 | 38.4 | 98.0 |
| 0025961 | 6.0 | 8.0 | 57.6 | 158.0 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil 100 m; Drum (500; 1000) m

### Accessories

- EPIC® SOLAR - Industrially injection overmoulded and field mountable solar connectors for safe connection of PV modules
- SKINTOP® ST / SKINTOP® CLICK - Approved cable glands for use for PV junction boxes, electric meters and DC/AC converters

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# ÖLFLEX® SOLAR XL multi

## UL/CSA approved solar cable

**Info**

- **For the North American market**


### Benefits

- The c(UL)us listings enable the use for wiring of PV systems in whole North America. According the NEC (National Electrical Code) only especially for outdoor purposes listed cables are permited in the USA for PV installations
- High thermal capacity for long lasting operation of the PV system at all seasons
- Reduced spreading of fire source and formation of toxic combustion gases in event of fire
- Exact quantity control during installation by meter marking on the cable sheath

### Application range

- For cabling of solar modules among themselves and as extension cable between the individual module strings or DC/AC inverter
- Gable and flat roof photovoltaic systems
- Open land solarfield plants

### Product features

- Excellent weather-, abrasion-, temperature- and UV resistance
- Weatherproof according to ISO 4892-2 respectively UL 1581 Section 1200
- Halogen-free and flame retardant (IEC 60332-1-2)

### Approvals (Norm references)

- UL/CSA listed

### Design

- Conductor: Fine wired tinned copper strands
- Core insulation: special polyolefin, cross-linked
- Outer sheath: Cross-linked copolymer
- Outer sheath colour black

### Technical data

**Approvals**
c(UL)us listed according
UL USE-2 “SUNLIGHT RESISTANT”
cUL RWU90 “SUNLIGHT RESISTANT”

**Conductor stranding**
Fine wire in accordance to VDE 0295 Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Fixed installation: 4 x cable diameter

**Rated voltage**
AC $U_0/U$ : 600/1000 V
DC $U_0/U$ : 900/1500 V
Max. permissible operating voltage: DC 1800 V
Conforms to UL/CSA standard: 600 V

**Test voltage**
4000 V

**Range of temperature**
Fixed installation:
-40 °C up to +120 °C

| Part number | Conductor cross section in mm² | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® SOLAR XL multi - UL / cUL approved** | | | | |
| **Outer sheath colour black** | | | | |
| 0026585 | 2.5 | 5.6 | 24.0 | 45.0 |
| 0026586 | 4.0 | 6.0 | 38.4 | 72.0 |
| 0026587 | 6.0 | 7.1 | 57.6 | 102.0 |
| 0026588 | 10.0 | 8.5 | 96.0 | 159.0 |
| 0026589 | 16.0 | 9.9 | 153.6 | 247.0 |
| **Outer sheath colour black - coded** | | | | |
| 0026590 | 2.5 | 5.6 | 24.0 | 45.0 |
| 0026591 | 4.0 | 6.0 | 38.4 | 72.0 |
| 0026592 | 6.0 | 7.1 | 57.6 | 102.0 |
| 0026593 | 10.0 | 8.5 | 96.0 | 159.0 |
| 0026594 | 16.0 | 9.9 | 153.6 | 247.0 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis‘ and ‚Metal index‘ see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

### Comparable products

- ÖLFLEX® SOLAR XLS see page 10

### Accessories

- EPIC® SOLAR - Industrially injection over-moulded and field mountable solar connectors for safe connection of PV modules
- SKINTOP® ST / SKINTOP® CLICK - Approved cable glands for use for PV junction boxes, electric meters and DC/AC converters

# Power and control cables

## Building Installation

### Cables for direct burial

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## NYY-J, NYY-O

**Fixed, buried PVC cable with different application areas**


### Application range

- As a fixed installation power and control cable for the following applications:
- For indoor- and outdoor use
- Direct burial
- In concrete
- In water

### Product features

- Flame retardant according to IEC 60332-1-2
- Power rating acc. to HD 603 part 3G for outdoor laying and as per VDE 0298 part 4 (see also main catalogue 2010/11 appendix T12) for laying in and on buildings

### Approvals (Norm references)

CE VDE RoHS

### Design

- Conductor of bare copper wires
- Core insulation: Based on PVC
- Filling compound over the core assembly
- PVC based outer sheath

### Technical data

**Core identification code**
Up to 5 cores: according to VDE 0293-308 (see main catalogue 2010/11 appendix T9)
Starting at 6 cores: Black with white numbers

**Approvals**
VDE 0276 Part 603 (for 1-5 cores)
VDE 0276 Part 627 (from 7 cores)

**Conductor stranding**
Single or multi-wire

**Minimum bending radius**
Single core: 15 x outer diameter
multi-core: 12 x outer diameter

**Rated voltage**
$U_0$/U: 0,6/1,0 kV

**Test voltage**
4000 V

**Range of temperature**
For installation: +5°C up to +50°C
Fixed installation: -40°C up to +70°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **NYY-J** | | | | |
| 15500773 | 4 x 95,0 sm | 40.0 | 3,648.0 | 4,746 |
| 15500783 | 4 x 120,0 sm | 43.0 | 4,608.0 | 5,813 |
| 15500793 | 4 x 150,0 sm | 48.0 | 5,760.0 | 7,263 |
| 15500803 | 4 x 185,0 sm | 53.0 | 7,104.0 | 8,905 |
| 15500813 | 4 x 240,0 sm | 60.0 | 9,216.0 | 11,430 |

Copper price basis: Excluding Copper; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

## NAYY-J

**Fixedly installed, buried PVC cable with solid aluminium conductors**


### Application range

- As a fixed installation power and control cable for the following applications:
- For indoor- and outdoor use
- Direct burial
- In concrete
- In water

### Product features

- Flame retardant according to IEC 60332-1-2
- Maximum tensile load for aluminium conductors is 30 N/mm²
- Power rating acc. to HD 603 part 3G for outdoor laying and as per VDE 0298 part 4 (see also main catalogue 2010/11 appendix T12) for laying in and on buildings

### Approvals (Norm references)

CE VDE RoHS

### Design

- Conductor of aluminium
- Core insulation: Based on PVC
- Filling compound over the core assembly
- PVC based outer sheath

### Technical data

**Core identification code**
According to VDE 0293-308 (table T9)

**Approvals**
VDE 0276 Part 603

**Conductor stranding**
Single wire

**Minimum bending radius**
Fixed installation: 12 x outer diameter

**Rated voltage**
$U_0$/U: 0,6/1,0 kV

**Test voltage**
4000 V

**Range of temperature**
For installation: +5°C up to +50°C
Fixed installation: -30°C up to +70°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Alu index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **NAYY-J** | | | | |
| 1552014 | 4 x 120,0 se | 41.9 | 1,392.0 | 2,655 |
| 1552015 | 4 x 150,0 se | 45.6 | 1,740.0 | 3,150 |
| 1552016 | 4 x 185,0 se | 50.8 | 2,146.0 | 3,925 |
| 1552017 | 4 x 240,0 se | 59.6 | 2,784.0 | 4,880 |

Aluminium price basis: Excluding Aluminium; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

solar energy

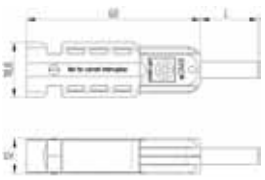
RoHS

New

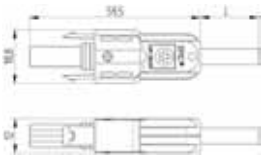
# EPIC® SOLAR 4 THIN M pre-assembled

**Info**

- 4mm connector system with double hook
- Unresistant cable connection



# EPIC® SOLAR 4 THIN F pre-assembled



## Benefits

- Unresistant cable connection for efficient power transmission
- Innovative, patented pending contact system, current leaves the connection cool
- High reliability and longevity by welded bonding
- Extra Thin 12mm for high density packing

## Application range

- Pre-assembled connector cables for weather proof cabling of Photovoltaic systems

## Product features

- 4mm connector system with double hook
- Pre-assembled with 100% automatic control
- Wide range of wire sizes from 1.5mm² up to 6mm²
- EPIC® SOLAR 4 THIN isn't compatible with EPIC® SOLAR
- TÜV Rheinland and UL in preparation

## Technical data

**Rated voltage in V**
1000 V AC/DC
**Rated impulse Voltage**
8 kV
**Pollution degree**
3
**Contact resistance**
< 0.2 mOhm
IP **Degree of protection**
IP68 (10h / 1m)
**Protection class**
II
**Cycle of mechanical operation**
100
**Range of temperature**
-40 °C ... +105 °C

| Part number | Article designation | Cross-section in mm² | Rated current in A | Length in m | Copper index kg/1000 pcs. | Pieces / PU |
|---|---|---|---|---|---|---|
| **EPIC® SOLAR 4 THIN male with cable ÖLFLEX® SOLAR XLR** | | | | | | |
| 44428100 | EPIC® SOLAR 4 THIN M XLR TF 1,5mm² 1m | 1.5 | 16.0 | 1.0 | 14.4 | 100 |
| 44428101 | EPIC® SOLAR 4 THIN M XLR TF 2.5mm² 1m | 2.5 | 21.0 | 1.0 | 24.0 | 100 |
| 44428102 | EPIC® SOLAR 4 THIN M XLR TF 4mm² 1m | 4 | 24.0 | 1.0 | 38.4 | 100 |
| 44428103 | EPIC® SOLAR 4 THIN M XLR 6mm² 1m | 6 | 29.0 | 1.0 | 57.6 | 100 |
| **EPIC® SOLAR 4 THIN male with cable ÖLFLEX® SOLAR XL multi** | | | | | | |
| 44428108 | EPIC® SOLAR 4 THIN M XL multi 2.5mm² 1m | 2.5 | 21.0 | 1.0 | 24.0 | 100 |
| 44428109 | EPIC® SOLAR 4 THIN M XL multi 4mm² 1m | 4 | 24.0 | 1.0 | 38.4 | 100 |
| 44428110 | EPIC® SOLAR 4 THIN M XL multi 6mm² 1m | 6 | 29.0 | 1.0 | 57.6 | 100 |
| **EPIC® SOLAR 4 THIN female with cable ÖLFLEX® SOLAR XLR** | | | | | | |
| 44428104 | EPIC® SOLAR 4 THIN F XLR TF 1,5mm² 1m | 1.5 | 16.0 | 1.0 | 14.4 | 100 |
| 44428105 | EPIC® SOLAR 4 THIN F XLR TF 2.5mm² 1m | 2.5 | 21.0 | 1.0 | 24.0 | 100 |
| 44428106 | EPIC® SOLAR 4 THIN F XLR TF 4mm² 1m | 4 | 24.0 | 1.0 | 38.4 | 100 |
| 44428107 | EPIC® SOLAR 4 THIN F XLR 6mm² 1m | 6 | 29.0 | 1.0 | 57.6 | 100 |
| **EPIC® SOLAR 4 THIN female with cable ÖLFLEX® SOLAR XL multi** | | | | | | |
| 44428111 | EPIC® SOLAR 4 THIN F XL multi 2.5mm² 1m | 2.5 | 21.0 | 1.0 | 24.0 | 100 |
| 44428112 | EPIC® SOLAR 4 THIN F XL multi 4mm² 1m | 4 | 24.0 | 1.0 | 38.4 | 100 |
| 44428113 | EPIC® SOLAR 4 THIN F XL multi 6mm² 1m | 6 | 29.0 | 1.0 | 57.6 | 100 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of 'Metal price basis' and 'Metal index' see main catalogue 2010/11 Appendix T17
Other legths and cable end versions on request.

# EPIC® Industrial connectors

## Solar connectors

### EPIC® SOLAR

solar energy

## EPIC® SOLAR Module Box

## EPIC® SOLAR Module Box with cables

### Benefits

- Junction boxes for weather proof cabling of Photovoltaic systems

### Application range

- The Module Box is used to glue on the back-side of the solar modules. The ribbon bands are terminated in the Module Box
- For further cabling the pre-assembled solar cables, like EPIC® SOLAR 4 THIN or EPIC® SOLAR are terminated at the Module Box

### Product features

**EPIC® SOLAR Module Box**

- Rugged junction boxes for cabling of the solar modules with solar cables, like OLFLEX® SOLAR
- Dimensions (WxHxD): 118 x 28,5 x 109 mm
- Housing material: PPO/PPS
- UL: in preparation

**EPIC® SOLAR Module Box with cables**

- These junction boxes are available with pre-assembled cables EPIC® SOLAR 4 THIN and EPIC® SOLAR in different cross sections
- Dimensions (WxHxD): 118 x 28,5 x 109 mm
- Cable length: 1m
- UL: in preparation

### Suitable cables

**EPIC® SOLAR Module Box**

- ÖLFLEX® SOLAR XLS page 10
- ÖLFLEX® SOLAR XLR TF page 9
- ÖLFLEX® SOLAR XLR page 9

### Technical data

**Rated voltage in V**
1000 V AC/DC

**Rated current in A**
13 A

**Contact resistance**
< 5 mOhm

**Contacts**
Copper alloy, tin plated

**Number of contacts**
2

**Termination methods**
Terminal clamp for ribbon bands: up to 7mm wide (folded 10mm)
Plug-in connection for solar cables with multi-lam plug Ø 3mm

IP **Degree of protection**
IP 65

**Protection class**
II

**Range of temperature**
-40 °C up to +90 °C

| Part number | Article designation | Connection type | Cross-section in mm² | Cable clamping range, mm | Length in m | Pieces / PU |
|---|---|---|---|---|---|---|
| **EPIC® SOLAR Modul Box** | | | | | | |
| 44428043 | EPIC® SOLAR ST200 3D | assembled with 3 Bypass-diodes | max. 6 | 3.7 - 7.1 | | 100 |
| 44428044 | EPIC® SOLAR ST200 6D | assembled with 6 Bypass-diodes | max. 6 | 3.7 - 7.1 | | 100 |
| **EPIC® SOLAR Modul Box with cable and plug EPIC® SOLAR** | | | | | | |
| 44428045 | EPIC® SOLAR ST200 XL multi 4mm² 1m | pre-assembled with solar cables | 4 | | 1.0 | 100 |
| 44428046 | EPIC® SOLAR ST200 XL multi 6mm² 1m | pre-assembled with solar cables | 6 | | 1.0 | 100 |
| **EPIC® SOLAR Modul Box with cable and plug EPIC® SOLAR 4 THIN** | | | | | | |
| 44428062 | EPIC® SOLAR ST200 4 THIN XLR TF 4mm² 1m | pre-assembled with solar cables | 4 | | 1.0 | 100 |
| 44428063 | EPIC® SOLAR ST200 4 THIN XLR 6mm² 1m | pre-assembled with solar cables | 6 | | 1.0 | 100 |

Other construction designs/lengths on request

solar energy

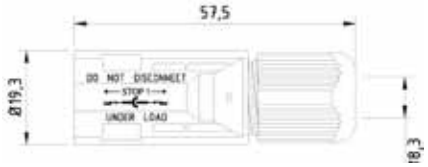
RoHS

New

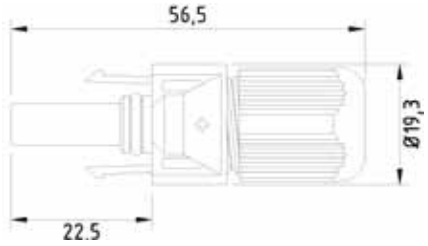
# EPIC® SOLAR 4 M

**Info**

- 4mm connector system with double hook
- Field mountable Solar connector




# EPIC® SOLAR 4 F




## Benefits

- Low contact resistance for efficient power transmission
- Crimp connection for field mounting
- Suitable for different ÖLFLEX® SOLAR cables

## Application range

- Photovoltaic plants
- Crystalline and thin film constructions
- Solartracker

## Product features

- 4mm connector system with double hook
- Crimp connection for field mounting
- EPIC® SOLAR 4 THIN isn't compatible with EPIC® SOLAR

## Suitable cables

- ÖLFLEX® SOLAR XL multi page 13
- ÖLFLEX® SOLAR XLS page 10
- ÖLFLEX® SOLAR XLR TF page 9
- Suitable tool EPIC® SOLAR 4 Crimptool page 22

## Technical data

**Rated voltage in V**
1000 V AC/DC
**Rated impulse Voltage**
6 kV
**Pollution degree**
2
**Contact resistance**
< 0.25 mOhm
IP **Degree of protection**
IP68 (1h / 1m)
**Protection class**
II
**Range of temperature**
-40 °C up to +90 °C

| Part number | Article designation | Cross-section in mm² | Cable clamping range, mm | Rated current in A | Pieces / PU |
|---|---|---|---|---|---|
| **EPIC® SOLAR 4 Male field mountable** | | | | | |
| 44428200 | EPIC® SOLAR 4 M 2.5mm² | 2.5 | 4.5 - 7.8 | 36.0 | 50 |
| 44428201 | EPIC® SOLAR 4 M 4mm² | 4 | 4.5 - 7.8 | 45.0 | 50 |
| 44428202 | EPIC® SOLAR 4 M 6mm² | 6 | 4.5 - 7.8 | 52.0 | 50 |
| **EPIC® SOLAR 4 female field mountable** | | | | | |
| 44428203 | EPIC® SOLAR 4 F 2.5mm² | 2.5 | 4.5 - 7.8 | 36.0 | 50 |
| 44428204 | EPIC® SOLAR 4 F 4mm² | 4 | 4.5 - 7.8 | 45.0 | 50 |
| 44428205 | EPIC® SOLAR 4 F 6mm² | 6 | 4.5 - 7.8 | 52.0 | 50 |

# EPIC® Industrial connectors

## Solar connectors

### EPIC® SOLAR

## EPIC® SOLAR M pre-assembled

RoHS

**Info**

- New versions with new solar cable ÖLFLEX® SOLAR XLR

## EPIC® SOLAR F pre-assembled

RoHS

**Info**

- New versions with new solar cable ÖLFLEX® SOLAR XLR

### Benefits

- The LAPP GROUP uses its competence here as a cable and connector manufacturer and moulds OLFLEX® SOLAR cables with the EPIC® SOLAR connectors. This distinguishes EPIC® SOLAR from other assembled systems. The injection moulding technology is extraordinarily robust, achieves maximum tensile strength and is unbeatably tight. The injection moulding is made in an industrial process and continuously tested, resulting in products of a consistently high quality.

### Application range

- Pre-assembled injection moulded solar cables for weather proof cabling of Photovoltaic systems

### Product features

- These one-side pre-assembled cables with EPIC® SOLAR connectors are available as a male (M) and female (F) version in combination with OLFLEX® SOLAR XLR in different cross sections.
- Other lengths and cable end versions on request

### Technical data

**Rated voltage in V**
1000 V AC/DC
**Rated impulse Voltage**
8 kV
**Rated current in A**
30 A
**Pollution degree**
3
**Contact resistance**
< 2 mOhm
IP **Degree of protection**
IP68 (10h / 1m)
**Protection class**
II
**Range of temperature**
-40 °C ... +105 °C

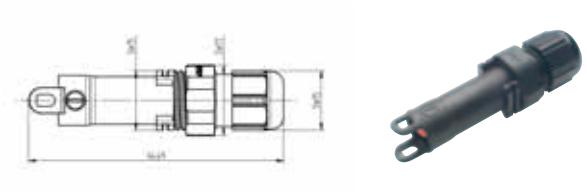
| Part number | Article designation | Cross-section in mm² | Length in m | Copper index kg/1000 pcs. | Pieces / PU |
|---|---|---|---|---|---|
| **EPIC® SOLAR with cable OLFLEX® Solar XL multi** | | | | | |
| 44428002 | EPIC® SOLAR M XL multi 2,5 mm² 1m | 2.5 | 1.0 | 24.6 | 100 |
| 44428007 | EPIC® SOLAR M XL multi 4,0 mm² 1m | 4.0 | 1.0 | 39.4 | 100 |
| 44428009 | EPIC® SOLAR M XL multi 6,0 mm² 1m | 6.0 | 1.0 | 59.0 | 100 |
| **EPIC® SOLAR male with cable OLFLEX® Solar XLR** | | | | | |
| 44428052 | EPIC® SOLAR M XLR 2,5 mm² 1m | 2.5 | 1.0 | 24.6 | 100 |
| 44428053 | EPIC® SOLAR M XLR 4,0 mm² 1m | 4.0 | 1.0 | 39.4 | 100 |
| 44428054 | EPIC® SOLAR M XLR 6,0 mm² 1m | 6.0 | 1.0 | 59.0 | 100 |
| **EPIC® SOLAR with cable ÖLFLEX® Solar XL multi** | | | | | |
| 44428014 | EPIC® SOLAR F XL multi 2,5 mm² 1m | 2.5 | 1.0 | 24.6 | 100 |
| 44428018 | EPIC® SOLAR F XL multi 4,0 mm² 1m | 4.0 | 1.0 | 39.4 | 100 |
| 44428019 | EPIC® SOLAR F XL multi 6,0 mm² 1m | 6.0 | 1.0 | 59.0 | 100 |
| **EPIC® SOLAR female with cable ÖLFLEX® Solar XLR** | | | | | |
| 44428049 | EPIC® SOLAR F XLR 2,5 mm² 1m | 2.5 | 1.0 | 24.6 | 100 |
| 44428050 | EPIC® SOLAR F XLR 4,0 mm² 1m | 4.0 | 1.0 | 39.4 | 100 |
| 44428051 | EPIC® SOLAR F XLR 6,0 mm² 1m | 6.0 | 1.0 | 59.0 | 100 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Other legths and cable end versions on request.

### Comparable products

- EPIC® SOLAR FMM Y-Splitter see page 21
- EPIC® SOLAR MFF Y-Splitter see page 21
- The complete range of EPIC® SOLAR products are shown in the current Main Catalogue and in the online catalogue at www.lappkabel.de

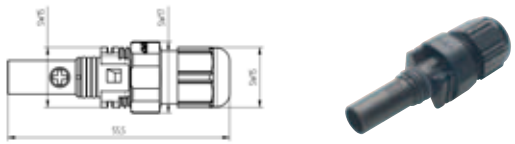
# EPIC® SOLAR M field mountable M 12



**Info**

- Simple and safe assembly with SKIN-TOP® gland

# EPIC® SOLAR F field mountable M 12



**Info**

- Simple and safe assembly with SKIN-TOP® gland

## Benefits

- EPIC® SOLAR connector field mountable is pre-assembled and consists of only two components - the connector part and the SKINTOP® gland. SKINTOP® has proven its stability and robustness for many years in millions of applications and it is in an EPIC® SOLAR connector the first choice for photo-voltaic systems. The contact is crimped and the plastic components are simply screwed together. The cable outlet is suitable for cable diameters from 4.5 mm up to 7.3 mm.

## Application range

- Filed mountable connector for easy assembly, SKINTOP® cable gland integrated

## Suitable cables

- ÖLFLEX® SOLAR XLS page 10
- ÖLFLEX® SOLAR XLR TF page 9
- ÖLFLEX® SOLAR XLR page 9

## Suitable tools

- EPIC® SOLAR Crimp tool see page 22
- Universal strip stripping and cutting tool see page 22

## Technical data

**Rated voltage in V**
1000 V AC/DC
**Rated impulse Voltage**
8 kV
**Rated current in A**
30 A
19 A at 85 °C
**Pollution degree**
3
**Contact resistance**
< 2 mOhm
**Degree of protection**
IP68 (10h / 1m)
**Protection class**
II
**Range of temperature**
-40 °C ... +105 °C

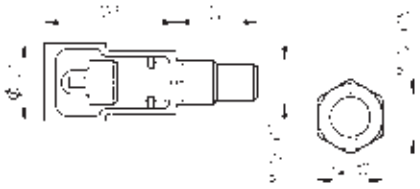
| Part number | Article designation | Cross-section in mm² | Pieces / PU |
|---|---|---|---|
| **Plug field mountable male** | | | |
| 44428020 | EPIC® SOLAR M 2,5 - 4,0mm² M12 | 2.5 - 4.0 | 50 |
| 44428021 | EPIC® SOLAR M 6,0mm² M12 | 6.0 | 50 |
| **Plug field mountable female** | | | |
| 44428022 | EPIC® SOLAR F 2,5 - 4,0mm² M12 | 2.5 - 4.0 | 50 |
| 44428023 | EPIC® SOLAR F 6,0mm² M12 | 6.0 | 50 |

# EPIC® Industrial connectors

## Solar connectors

### EPIC® SOLAR

## EPIC® SOLAR M G5 built in plug

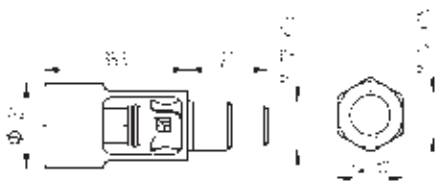


RoHS

**Info**

- TÜV Rheinland: certified

## EPIC® SOLAR F G5 built-in plug



RoHS

**Info**

- TÜV Rheinland: certified

## EPIC® SOLAR protection cap

RoHS

### Benefits

**EPIC® SOLAR M G5 built in plug**

- Built in plugs serve for fast, sample connection of cables to inverters and junction boxes. For cables up to 6 mmØ.

**EPIC® SOLAR F G5 built-in plug**

- Built in plugs serve for fast, sample connection of cables to inverters and junction boxes. For cables up to 6 mmØ.

**EPIC® SOLAR protection cap**

- The protective cap prevents the penetration of dirt and offers enhanced touch protection (IP65).

### Application range

**EPIC® SOLAR M G5 built in plug**

- Built in plugs for connection to inverters and junction boxes. M12-mounting

**EPIC® SOLAR F G5 built-in plug**

- Built in plugs for connection to inverters and junction boxes. M12-mounting

### Technical data

**Rated voltage in V**
**EPIC® SOLAR M G5 built in plug**
1000 V AC/DC
**EPIC® SOLAR F G5 built-in plug**
1000 V AC/DC

**Rated impulse Voltage**
**EPIC® SOLAR M G5 built in plug**
8 kV
**EPIC® SOLAR F G5 built-in plug**
8 kV

**Rated current in A**
**EPIC® SOLAR M G5 built in plug**
30 A
19 A at 85°C
**EPIC® SOLAR F G5 built-in plug**
30 A
19 A at 85°C

**Pollution degree**
**EPIC® SOLAR M G5 built in plug**
3
**EPIC® SOLAR F G5 built-in plug**
3

**Contact resistance**
**EPIC® SOLAR M G5 built in plug**
< 2 mOhm
**EPIC® SOLAR F G5 built-in plug**
< 2 mOhm

IP

**Degree of protection**
**EPIC® SOLAR M G5 built in plug**
IP68 (10h / 1m)
**EPIC® SOLAR F G5 built-in plug**
IP68 (10h / 1m)

**Protection class**
**EPIC® SOLAR M G5 built in plug**
II
**EPIC® SOLAR F G5 built-in plug**
II

**Range of temperature**
**EPIC® SOLAR M G5 built in plug**
-40 °C ... +105 °C
**EPIC® SOLAR F G5 built-in plug**
-40 °C ... +105 °C

### Product features

- Rugged, UV- resistant and weatherproof

| Part number | Article designation | Cross-section in mm² | Rated current in A | Pieces / PU |
|---|---|---|---|---|
| **Built in plug Male** | | | | |
| 44420505 | EPIC® SOLAR M G5 | 2.5 - 4.0 | 30.0 | 100 |
| **Built in plug Female** | | | | |
| 44420506 | EPIC® SOLAR F G5 | 2.5 - 4.0 | 30.0 | 100 |
| **Protection cap** | | | | |
| 44420507 | EPIC® SOLAR protection cap | | | 100 |

solar energy

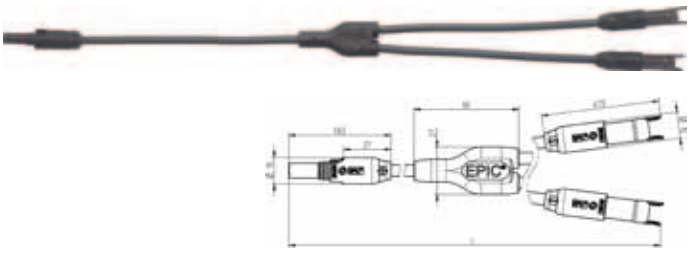
New

# EPIC® SOLAR FMM Y-Splitter

RoHS

**Info**

- New versions with new solar cable ÖLFLEX® SOLAR XLR



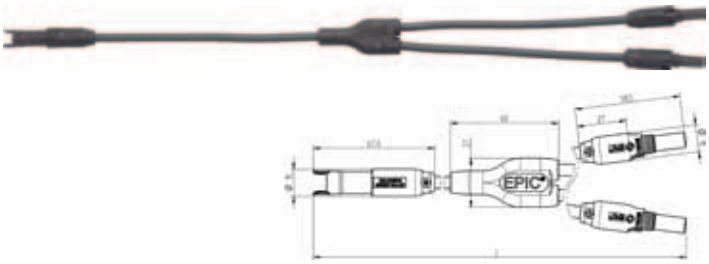
New

# EPIC® SOLAR MFF Y-Splitter

RoHS

**Info**

- New versions with new solar cable ÖLFLEX® SOLAR XLR



## Benefits

- Y-splitters makes possible the parallel connection of solar modules.The EPIC® SOLAR Splitter is installed behind solar panels or behind facades. Maximum reliability achieved through industrial injection overmolding of the Y-Splitter with OLFLEX® SOLAR cables.

## Application range

- Y-splitters for fast and simple parallel cabeling

## Product features

- Rugged, UV- resistant and weatherproof
- TÜV Rheinland: in preparation
- 100% tested cable sets with lowest transfer resistance for maximum power transmission

## Technical data

**Rated voltage in V**
1000 V AC/DC
**Rated impulse Voltage**
8 kV
**Rated current in A**
30 A
19 A at 85°C
**Pollution degree**
3
IP **Degree of protection**
IP68 (10h / 1m)
**Protection class**
II
**Range of temperature**
-40 °C ... +105 °C

| Part number | Article designation | Cross-section in mm² | Length in m | Pieces / PU |
|---|---|---|---|---|
| **EPIC® SOLAR FMM Y-Splitter** | | | | |
| 44428055 | EPIC® SOLAR FMM XLR 4,0mm² 0,5m | 4.0 | 0.5 | 10 |
| 44428056 | EPIC® SOLAR FMM XLR 6,0mm² 0,5m | 6.0 | 0.5 | 10 |
| **EPIC® SOLAR MFF Y-Splitter** | | | | |
| 44428057 | EPIC® SOLAR MFF XLR 4,0mm² 0,5m | 4.0 | 0.5 | 10 |
| 44428058 | EPIC® SOLAR MFF XLR 6,0mm² 0,5m | 6.0 | 0.5 | 10 |

## Comparable products

- EPIC® SOLAR M pre-assembled see page 18
- EPIC® SOLAR F pre-assembled see page 18
- The complete range of EPIC® SOLAR products are shown in the current Main Catalogue and in the online catalogue at www.lappkabel.de

# EPIC® Industrial connectors

## Solar connectors

### EPIC® SOLAR

## EPIC® SOLAR Crimp tool

**Benefits**

- Crimping tool serves for a high and reliable crimping of the EPIC® SOLAR products in the field. Different cross sections are possible with the tool in the marked crimping profile. The locator keeps the connector save, your hand is free to insert the cable into the connector.

**Application range**

- Crimping tool for easy assembly of EPIC® SOLAR products

**Suitable contacts**

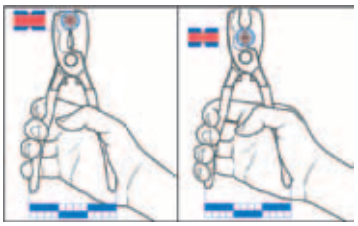
- EPIC® SOLAR 4
- EPIC® SOLAR field mountable M12
- EPIC® SOLAR G5 built in plug

**Product features**

- The crimping tool is delivered with the crimping dies for wire cross sections of 2.5mm², 4mm² and 6mm².

| Part number | Article designation | Pieces / PU |
|---|---|---|
| 44428001 | EPIC® SOLAR CRIMPTOOL | 1 |
| 11147002 | EPIC® SOLAR 4 CRIMPTOOL | 1 |

## KS 20 cable shears

KS 20 cable shears

**Benefits**

- Adjustable screw joint
- Easy, clean cut when operating with one hand
- Low force due to favourable transmission ratio and new blade geometry

**Application range**

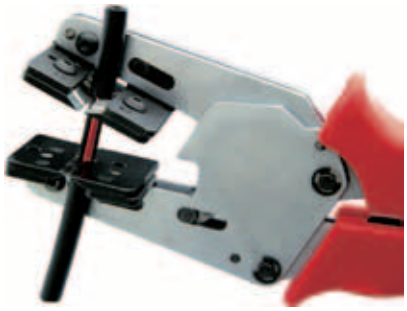
- Cuts copper and aluminium cables up to 20 mm outer diameter
- Cutting with precision grinding

**Product features**

- Material: Special tool steel, forged, head burnished
- Pre and after cut (1st and 2nd blade) allows cables with an external outer diameter up to 20 mm to be cut
- Not suitable for steel wire and hard-drawn copper conductors

| Part number | Article designation | For outer diameter mm | Weight kg | Length in mm | Pieces / PU |
|---|---|---|---|---|---|
| 62120045 | KS 20 | 20 | 0.300 | 200 | 1 |

## Universal strip stripping and cutting tool



**Benefits**

- Special pliers for high quality, damage-free stripping of sheath and insulation from all single wires and possibly multiwire cables from 0.03 to 16 mm²
- Applicable with a great variety of insulations differing in hardness and dimension
- Exchangeable knives for different cable cross sections

**Application range**

- Universal stripping pliers with exchangeable stripping blades for cross sections 0.03 to 16 mm²
- Suitable for Fluoropolymer & PVC cores, AS-I, Solar, POF cables

**Product features**

- Model: chrome-plated with plastic handle cover
- Exchangeable knives for different cable cross sections

**Design**

- Additional stripping knives on request
- No pinching/deformation of cable ends

**Scope of delivery**

- Tool and length stop

| Part number | Article designation | for mm² | Stripping of | Length in mm | Weight kg | Pieces / PU |
|---|---|---|---|---|---|---|
| 21920120 | Universal Strip Solar | 1.5 - 6 | | | | 1 |

**Accessories**

- Additional stripping knives on request

solar energy

New

# SKINTOP® CLICK / SKINTOP® CLICK-R

**Info**

- **The most innovative cable insertion system on the market for very fast, highly flexible assembly. Simply click in - turn to left - turn to right - finished. Result: fixed, centred, strain reliefed and maximum protection class in seconds.**

SKINTOP® CLICK

SKINTOP® CLICK-R

## Benefits

**SKINTOP® CLICK**

- Fewer parts, counter nut no longer needed
- Up to 70% time saving due to innovative CLICK system
- Simple, free assembly in any position
- Vibration protection
- No thread required

**SKINTOP® CLICK-R**

- Benefits see SKINTOP® CLICK

## Application range

**SKINTOP® CLICK**

- Automation technology
- Solar applications
- Switch cabinet building
- Measurement, control and electrical applications
- Air conditioning technology

**SKINTOP® CLICK-R**

- With reducing seal insert, to seal cables with smaller outer diameters.

## Approvals (Norm references)

## Scope of delivery

- Disassembly tool contained in the delivery scope

## Technical data

RAL **Colour delivered**
RAL 7001 silver-grey
RAL 7035 light grey
RAL 9005 black / UV resistant

**Material**
Body: special polyamide
Seal: special elastomer

IP **Degree of protection**
**SKINTOP® CLICK**
IP 68 - 4 bar (M12)
IP 68 - 5 bar (M16 - M32)

**Range of temperature**
-20°C up to +100°C

| Part number | Part designation / size | Clamping range ØF mm | M (hole mm) | SW1 / SW2 mm | Overall length C mm | Thread length D mm | S (wall thickness mm) | Pieces / PU |
|---|---|---|---|---|---|---|---|---|
| **SKINTOP® CLICK light grey** | | | | | | | | |
| 53112692 | CLICK 12 | 3.5 - 7 | 12,3 (-0,2) | 15 / 18 | 40.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112686 | CLICK 16 | 5 - 9 | 16,3 (-0,2) | 19 / 22 | 42.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112687 | CLICK 20 | 7 - 13 | 20,3 (-0,2) | 25 / 27 | 45.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112688 | CLICK 25 | 9 - 17 | 25,3 (-0,2) | 30 / 34 | 48.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112694 | CLICK 32 | 11 - 21 | 32,3 (-0,2) | 36 / 40 | 55.0 | 8.0 | 1.0 - 4.0 | 25 |
| **SKINTOP® CLICK silver grey** | | | | | | | | |
| 53112921 | CLICK 12 | 3.5 - 7 | 12,3 (-0,2) | 15 / 18 | 40.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112876 | CLICK 16 | 5 - 9 | 16,3 (-0,2) | 19 / 22 | 42.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112877 | CLICK 20 | 7 - 13 | 20,3 (-0,2) | 25 / 27 | 45.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112878 | CLICK 25 | 9 - 17 | 25,3 (-0,2) | 30 / 34 | 48.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112922 | CLICK 32 | 11 - 21 | 32,3 (-0,2) | 36 / 40 | 55.0 | 8.0 | 1.0 - 4.0 | 25 |
| **SKINTOP® CLICK black** | | | | | | | | |
| 53112923 | CLICK 12 | 3.5 - 7 | 12,3 (-0,2) | 15 / 18 | 40.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112882 | CLICK 16 | 5 - 9 | 16,3 (-0,2) | 19 / 22 | 42.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112883 | CLICK 20 | 7 - 13 | 20,3 (-0,2) | 25 / 27 | 45.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112884 | CLICK 25 | 9 - 17 | 25,3 (-0,2) | 30 / 34 | 48.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112924 | CLICK 32 | 11 - 21 | 32,3 (-0,2) | 36 / 40 | 55.0 | 8.0 | 1.0 - 4.0 | 25 |
| **SKINTOP® CLICK-R light grey** | | | | | | | | |
| 53112925 | CLICK-R 12 | 1 - 5 | 12,3 (-0,2) | 15 / 18 | 40.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112689 | CLICK-R 16 | 4 - 7 | 16,3 (-0,2) | 19 / 22 | 42.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112690 | CLICK-R 20 | 5 - 10 | 20,3 (-0,2) | 25 / 27 | 45.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112691 | CLICK-R 25 | 6 - 13 | 25,3 (-0,2) | 30 / 34 | 48.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112926 | CLICK-R 32 | 7 - 15 | 32,3 (-0,2) | 36 / 40 | 55.0 | 8.0 | 1.0 - 4.0 | 25 |
| **SKINTOP® CLICK-R silver grey** | | | | | | | | |
| 53112927 | CLICK-R 12 | 1 - 5 | 12,3 (-0,2) | 15 / 18 | 40.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112879 | CLICK-R 16 | 4 - 7 | 16,3 (-0,2) | 19 / 22 | 42.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112880 | CLICK-R 20 | 5 - 10 | 20,3 (-0,2) | 25 / 27 | 45.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112881 | CLICK-R 25 | 6 - 13 | 25,3 (-0,2) | 30 / 34 | 48.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112928 | CLICK-R 32 | 7 - 15 | 32,3 (-0,2) | 36 / 40 | 55.0 | 8.0 | 1.0 - 4.0 | 25 |
| **SKINTOP® CLICK-R black** | | | | | | | | |
| 53112929 | CLICK-R 12 | 1 - 5 | 12,3 (-0,2) | 15 / 18 | 40.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112885 | CLICK-R 16 | 4 - 7 | 16,3 (-0,2) | 19 / 22 | 42.0 | 8.0 | 1.0 - 4.0 | 50 |
| 53112886 | CLICK-R 20 | 5 - 10 | 20,3 (-0,2) | 25 / 27 | 45.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112887 | CLICK-R 25 | 6 - 13 | 25,3 (-0,2) | 30 / 34 | 48.5 | 8.0 | 1.0 - 4.0 | 25 |
| 53112931 | CLICK-R 32 | 7 - 15 | 32,3 (-0,2) | 36 / 40 | 55.0 | 8.0 | 1.0 - 4.0 | 25 |

## Accessories see main catalogue 2010/11

**SKINTOP® CLICK**

- SKINTOP® DIX-M see page 662
- SKINTOP® DIX-M AUTOMATION see page 663
- SKINTOP® SDV-M ATEX see page 664
- SKINTOP® SD-M see page 665
- SKINTOP® DV-M see page 665

**SKINTOP® CLICK-R**

- SKINTOP® SDVR-M ATEX see page 664

# Cable glands

## SKINTOP® cable glands polyamide metric

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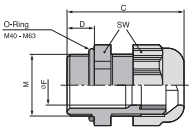
# SKINTOP® ST-M / SKINTOP® STR-M





SKINTOP® ST-M

SKINTOP® STR-M

**Info**

- **Now with IP 69 K approval! Proven functionality also during hardest cleaning procedures at industrial machinery with high-pressure cleaners and hot water!**

### Benefits

**SKINTOP® ST-M**

- Increased oil resistant for maximum reliability
- Permanent vibration protection
- Large, variable clamping ranges
- Optimal strain relief
- Various accessories (e. g. multiple sealing inserts)

**SKINTOP® STR-M**

- Benefits see SKINTOP® ST-M

### Application range

**SKINTOP® ST-M**

- Everywhere where cables must be safely inserted into housings.
- Machine and apparatus construction
- Photovoltaic
- Automation technology
- Mobile off shore units, equipment and ship yards

**SKINTOP® STR-M**

- With reducing seal insert, to seal cables with smaller outer diameters.

### Approvals (Norm references)

### Design

- Metric connection thread acc. to EN 50262

### Note

**SKINTOP® ST-M**

- For suitable accessories see SKINTOP® metric accessories
- Counter nut to be used SKINTOP® GMP-GL-M
- SKINTOP® ST M ISO types have a extralong connection thread
- Versions SKINTOP® ST M ISO with extra long connection thread, see table, have no DNV approval

**SKINTOP® STR-M**

- For suitable accessories see SKINTOP® metric accessories
- Counter nut to be used SKINTOP® GMP-GL-M
- SKINTOP® STR M ISO types have a extralong connection thread
- Versions SKINTOP® STR M ISO with extra long connection thread, see table, have no DNV approval

### Suitable cables

- For IP 69 K applications we recommend to use the following cables:
  ÖLFLEX® ROBUST 200
  H07RN8-F

### Suitable tools

**SKINTOP® ST-M**

- SKINMATIC® QUICK Set 1 see main catalogue 2010/11 page 703
- SKINMATIC® RZ see main catalogue 2010/11 page 704

### Technical data

**Caution**
Installation dimensions and tightening torques see main catalogue 2010/11 Appendix T21

**Colour delivered**
RAL 7001 silver-grey
RAL 7035 light grey
RAL 9005 black / UV resistant

**Material**
Body: Polyamide
Seal: CR

**Tests**
GGVS: TÜ.EGG.020-95

**Degree of protection**
IP 68 - 5 bar
IP 69 K

**Range of temperature**
Static: -40°C up to +100°C
Dynamic: -20°C up to +100°C

| Part number | Part designation / size | Clamping range ØF mm | SW mm | Overall length C mm | Thread length D mm | Pieces / PU |
|---|---|---|---|---|---|---|
| **SKINTOP® ST-M silver grey** | | | | | | |
| 53111000 | ST-M 12 x 1,5 | 3,5-7 | 15 | 30.0 | 8.0 | 100 |
| 53111010 | ST-M 16 x 1,5 | 4,5-10 | 19 | 34.0 | 8.0 | 100 |
| 53111020 | ST-M 20 x 1,5 | 7-13 | 25 | 37.0 | 9.0 | 100 |
| 53111030 | ST-M 25 x 1,5 | 9-17 | 30 | 40.0 | 10.0 | 50 |
| 53111040 | ST-M 32 x 1,5 | 11-21 | 36 | 47.0 | 10.0 | 25 |
| 53111050 | ST-M 40 x 1,5 | 19-28 | 46 | 52.0 | 10.0 | 10 |
| 53111060 | ST-M 50 x 1,5 | 27-35 | 55 | 62.0 | 12.0 | 5 |
| 53111070 | ST-M 63 x 1,5 | 34-45 | 66 | 71.0 | 12.0 | 5 |
| **SKINTOP® ST-M black** | | | | | | |
| 53111200 | ST-M 12 x 1,5 | 3,5-7 | 15 | 30.0 | 8.0 | 100 |
| 53111210 | ST-M 16 x 1,5 | 4,5-10 | 19 | 34.0 | 8.0 | 100 |
| 53111220 | ST-M 20 x 1,5 | 7-13 | 25 | 37.0 | 9.0 | 100 |
| 53111230 | ST-M 25 x 1,5 | 9-17 | 30 | 40.0 | 10.0 | 50 |
| 53111240 | ST-M 32 x 1,5 | 11-21 | 36 | 47.0 | 10.0 | 25 |
| 53111250 | ST-M 40 x 1,5 | 19-28 | 46 | 52.0 | 10.0 | 10 |
| 53111260 | ST-M 50 x 1,5 | 27-35 | 55 | 62.0 | 12.0 | 5 |
| 53111270 | ST-M 63 x 1,5 | 34-45 | 66 | 71.0 | 12.0 | 5 |
| **SKINTOP® ST-M light grey** | | | | | | |
| 53111400 | ST-M 12 x 1,5 | 3,5-7 | 15 | 30.0 | 8.0 | 100 |
| 53111410 | ST-M 16 x 1,5 | 4,5-10 | 19 | 34.0 | 8.0 | 100 |
| 53111420 | ST-M 20 x 1,5 | 7-13 | 25 | 37.0 | 9.0 | 100 |
| 53111430 | ST-M 25 x 1,5 | 9-17 | 30 | 40.0 | 10.0 | 50 |
| 53111440 | ST-M 32 x 1,5 | 11-21 | 36 | 47.0 | 10.0 | 25 |
| 53111450 | ST-M 40 x 1,5 | 19-28 | 46 | 52.0 | 10.0 | 10 |
| 53111460 | ST-M 50 x 1,5 | 27-35 | 55 | 62.0 | 12.0 | 5 |
| 53111470 | ST-M 63 x 1,5 | 34-45 | 66 | 71.0 | 12.0 | 5 |
| **SKINTOP® ST M ISO silver-grey (with long metric connecting thread)** | | | | | | |
| 53017010 | ST M 16 x 1,5 | 3,5-8 | 19 | 40.0 | 12.0 | 100 |
| 53017030 | ST M 20 x 1,5 | 5-12 | 24 | 45.0 | 13.0 | 100 |
| 53017040 | ST M 25 x 1,5 | 9-14 | 27 | 47.0 | 13.0 | 50 |

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| Part number | Part designation / size | Clamping range ØF mm | SW mm | Overall length C mm | Thread length D mm | Pieces / PU |
|---|---|---|---|---|---|---|
| **SKINTOP® ST M ISO black (with long metric connecting thread)** | | | | | | |
| 53017210 | ST M 16 x 1,5 | 3,5-8 | 19 | 40.0 | 12.0 | 100 |
| 53017230 | ST M 20 x 1,5 | 5-12 | 24 | 45.0 | 13.0 | 100 |
| 53017240 | ST M 25 x 1,5 | 9-14 | 27 | 47.0 | 13.0 | 50 |
| **SKINTOP® STR-M silver grey** | | | | | | |
| 53111100 | STR-M 12 x 1,5 | 1-5 | 15 | 30.0 | 8.0 | 100 |
| 53111110 | STR-M 16 x 1,5 | 2-7 | 19 | 34.0 | 8.0 | 100 |
| 53111120 | STR-M 20 x 1,5 | 5-10 | 25 | 37.0 | 9.0 | 100 |
| 53111130 | STR-M 25 x 1,5 | 6-13 | 30 | 40.0 | 10.0 | 50 |
| 53111140 | STR-M 32 x 1,5 | 7-15 | 36 | 47.0 | 10.0 | 25 |
| 53111150 | STR-M 40 x 1,5 | 15-23 | 46 | 52.0 | 10.0 | 10 |
| 53111160 | STR-M 50 x 1,5 | 22-29 | 55 | 62.0 | 12.0 | 5 |
| 53111170 | STR-M 63 x 1,5 | 28-39 | 66 | 71.0 | 12.0 | 5 |
| **SKINTOP® STR-M black** | | | | | | |
| 53111300 | STR-M 12 x 1,5 | 1-5 | 15 | 30.0 | 8.0 | 100 |
| 53111310 | STR-M 16 x 1,5 | 2-7 | 19 | 34.0 | 8.0 | 100 |
| 53111320 | STR-M 20 x 1,5 | 5-10 | 25 | 37.0 | 9.0 | 100 |
| 53111330 | STR-M 25 x 1,5 | 6-13 | 30 | 40.0 | 10.0 | 50 |
| 53111340 | STR-M 32 x 1,5 | 7-15 | 36 | 47.0 | 10.0 | 25 |
| 53111350 | STR-M 40 x 1,5 | 15-23 | 46 | 52.0 | 10.0 | 10 |
| 53111360 | STR-M 50 x 1,5 | 22-29 | 55 | 62.0 | 12.0 | 5 |
| 53111370 | STR-M 63 x 1,5 | 28-39 | 66 | 71.0 | 12.0 | 5 |
| **SKINTOP® STR-M light grey** | | | | | | |
| 53111500 | STR-M 12 x 1,5 | 1-5 | 15 | 30.0 | 8.0 | 100 |
| 53111510 | STR-M 16 x 1,5 | 2-7 | 19 | 34.0 | 8.0 | 100 |
| 53111520 | STR-M 20 x 1,5 | 5-10 | 25 | 37.0 | 9.0 | 100 |
| 53111530 | STR-M 25 x 1,5 | 6-13 | 30 | 40.0 | 10.0 | 50 |
| 53111540 | STR-M 32 x 1,5 | 7-15 | 36 | 47.0 | 10.0 | 25 |
| 53111550 | STR-M 40 x 1,5 | 15-23 | 46 | 52.0 | 10.0 | 10 |
| 53111560 | STR-M 50 x 1,5 | 22-29 | 55 | 62.0 | 12.0 | 5 |
| 53111570 | STR-M 63 x 1,5 | 28-39 | 66 | 71.0 | 12.0 | 5 |
| **SKINTOP® STR M ISO silver-grey (with long metric connecting thread)** | | | | | | |
| 53017110 | STR M 16 x 1,5 | 2-6 | 19 | 40.0 | 12.0 | 100 |
| 53017130 | STR M 20 x 1,5 | 4-9 | 24 | 45.0 | 13.0 | 100 |
| 53017140 | STR M 25 x 1,5 | 6-12 | 27 | 47.0 | 13.0 | 50 |
| **SKINTOP® STR M ISO black (with long metric connecting thread)** | | | | | | |
| 53017310 | STR M 16 x 1,5 | 2-6 | 19 | 40.0 | 12.0 | 100 |
| 53017330 | STR M 20 x 1,5 | 4-9 | 24 | 45.0 | 13.0 | 100 |
| 53017340 | STR M 25 x 1,5 | 6-12 | 27 | 47.0 | 13.0 | 50 |

## ■ Accessories see main catalogue 2010/11

**SKINTOP® ST-M**

- SKINTOP® DIX-M see page 662
- SKINTOP® GMP-GL-M see page 660
- SKINTOP® DIX-M AUTOMATION see page 663
- SKINTOP® SDV-M ATEX see page 664
- SKINTOP® SD-M see page 665
- SKINTOP® DV-M see page 665

**SKINTOP® STR-M**

- SKINTOP® GMP-GL-M see page 660
- SKINTOP® SDVR-M ATEX see page 664
- SKINTOP® SD-M see page 665

# Protective Cable Conduit Systems and Cable Carrier Systems

## Protective cable conduit systems parallelly corrugated

**SILVYN® RILL**

solar energy

# SILVYN® RILL PA 6

SILVYN® RILL PA 6


**Info**

- **Highest safety in case of fire**

### Benefits

- Dimensionally stable
- Flexible 24 mm
- Highly flame-retardant and self-extinguishing in accordance with UL94 V0
- Compreshion resistant
- Slim weight
- Abrasion resistant
- Increased resistance against oil, petrol, acids and other chemicals

### Application range

- Mechanical engineering
- Public utilities
- Railway applications / vehicle construction
- Flexible application
- Outdoor application (in black colour)

### Approvals (Norm references)

- UL FILENUMBER E308201

### Design

- Fine profil corrugated polyamide 6 conduit

### Note

- UV and weather resistant in black

### Technical data

**Approvals**
UR File No. E308201
VDE, KEMA, DNV,
Rail:
GGVS, DB, SNCF
UNDERGROUND

**Colour delivered**
Grey
Black, UV-resistant

**Material**
PA 6
Silicon free
Halogen free
UL94 V0

**Range of temperature**
-40°C up to +115°C

### Product features

- Halogen and cadmium-free

| Part number | Article designation | Part IØ x AØ mm | Bending radius mm | Suitable for SILVYN® KLICK-GM/WM | Suitable for SILVYN® KLICK-GP/WP | Suitable for SILVYN® KLICK-GPZ-M/GPZ | PU ring in m |
|---|---|---|---|---|---|---|---|
| **SILVYN® RILL PA 6 grey** | | | | | | | |
| 61746939 | 7 | 6.5 x 10.0 | 13 | 10 x 1,0 | 7/- | 12 x 1,5/7 | 50 |
| 61746940 | 9 | 10.0 x 13.0 | 20 | 12 x 1,5/16 x 1,5 | 9/9 | 16x1,5/9 | 50 |
| 61746950 | 11 | 12.0 x 15.8 | 35 | 16 x 1,5/20 x 1,5 | 11/11 | 20x1,5/11 | 50 |
| 61747010 | 13,5 | 14.3 x 18.5 | 40 | | 13,5/13,5 | -/13,5 | 50 |
| 61746960 | 16 | 16.5 x 21.2 | 45 | 20 x 1,5 | 16/16 | 25x1,5/16 | 50 |
| 61746970 | 21 | 23.0 x 28.5 | 55 | 25 x 1,5 | 21/21 | 32x1,5/21 | 50 |
| 61746980 | 29 | 29.0 x 34.5 | 65 | 32 x 1,5 | 29/29 | 40x1,5/29 | 25 |
| 61746990 | 36 | 36.0 x 42.5 | 90 | 40 x 1,5 | 36/ - | 50x1,5/36 | 25 |
| 61747000 | 48 | 48.0 x 54.5 | 100 | 50 x 1,5 | 48/- | 63x1,5/48 | 25 |
| **SILVYN® RILL PA 6 black** | | | | | | | |
| 61746935 | 7 | 6.5 x 10.0 | 13 | 10 x 1,0 | 7/- | 12 x 1,5/7 | 50 |
| 61746945 | 9 | 10.0 x 13.0 | 20 | 12 x 1,5/16 x 1,5 | 9/9 | 16x1,5/9 | 50 |
| 61746955 | 11 | 12.0 x 15.8 | 35 | 16 x 1,5/20 x 1,5 | 11/11 | 20x1,5/11 | 50 |
| 61747015 | 13,5 | 14.3 x 18.5 | 40 | | 13,5/13,5 | -/13,5 | 50 |
| 61746965 | 16 | 16.5 x 21.2 | 45 | 20 x 1,5 | 16/16 | 25x1,5/16 | 50 |
| 61746975 | 21 | 23.0 x 28.5 | 55 | 25 x 1,5 | 21/21 | 32x1,5/21 | 50 |
| 61746985 | 29 | 29.0 x 34.5 | 65 | 32 x 1,5 | 29/29 | 40x1,5/29 | 25 |
| 61746995 | 36 | 36.0 x 42.5 | 90 | 40 x 1,5 | 36/ - | 50x1,5/36 | 25 |
| 61747005 | 48 | 48.0 x 54.5 | 100 | 50 x 1,5 | 48/- | 63x1,5/48 | 25 |

### Comparable products see main catalogue 2010/11

- SILVYN® RILL PA 12 see page 781

### Accessories see main catalogue 2010/11

- SILVYN® KLICK-GM see page 782
- SILVYN® KLICK 90°-M see page 783
- SILVYN® KLICK GPZ-M see page 784
- SILVYN® KSE see page 785
- SILVYN® KLICK-GP see page 786
- SILVYN® KLICK 90° PG see page 788
- SILVYN® KLICK-GPZ see page 787
- SILVYN® KLICK-Y see page 789
- SILVYN® KLICK-Y (TPE) see page 789
- SILVYN® KLICK-S see page 790
- SILVYN® KLICK-D see page 790
- SILVYN® KLICK-V see page 790
- SILVYN® KLICK-RH see page 791
- SILVYN® K-EM see page 792

solar energy

New

# SILVYN® FPAS


SILVYN® FPAS

## Benefits
- Dimensionally stable
- Flexible 24 mm
- Flame retardant and self-extinguishing in accordance with UL94 V2
- High compression resistant
- Impact resistant

## Application range
- Mechanical engineering
- Plant engineering
- Railway applications / vehicle construction
- Flexible application
- Outdoors application

## Product features
- Halogen and cadmium-free
- Abrasion resistant
- Increased resistance against oil, petrol, acids and other chemicals

## Approvals (Norm references)
- UNDERGROUND

## Design
- Fine profil corrugated polyamide 6 conduit

## Note
- UV resistant and weather proof

## Technical data
**Colour delivered**
Black, UV-resistant
grey, RAL 7031

**Material**
PA 6
Halogen-free

**Range of temperature**
-40°C up to +120°C static
-20°C up to +100°C dynamic

| Part number | Article designation | Internal Ø x External Ø in mm | Bending radius mm | Inner Ø in mm | PU ring in m |
|---|---|---|---|---|---|
| SILVYN® FPAS black | | | | | |
| 61754005 | 10 | 6.3 x 10.0 | 15 | 6.3 | 50 |
| 61754015 | 13 | 9.8 x 13.0 | 25 | 9.8 | 50 |
| 61754025 | 16 | 11.8 x 15.8 | 40 | 11.8 | 50 |
| 61754275 | 18 | 14.2 x 18.5 | 40 | 14.2 | 50 |
| 61754035 | 21 | 16.7 x 21.2 | 45 | 16.7 | 50 |
| 61754045 | 28 | 22.8 x 28.5 | 50 | 22.8 | 50 |
| 61754055 | 34 | 28.1 x 34.5 | 60 | 28.1 | 25 |
| 61754065 | 42 | 35.5 x 42.5 | 70 | 35.5 | 25 |
| 61754075 | 54 | 47.2 x 54.5 | 80 | 47.2 | 25 |
| 61754305 | 67 | 56.3 x 67.2 | 130 | 56.3 | 10 |

## Accessories see main catalogue 2010/11
- SILVYN® FPAG-M see page 799
- SILVYN® FPAX-M see page 800
- SILVYN® FPAHW-M see page 799
- SILVYN® FPAW-M see page 801
- SILVYN® KSE-M see page 806
- SILVYN® FPAG see page 804
- SILVYN® FPAW see page 804
- SILVYN® FCL see page 805
- SILVYN® FPAC see page 806
- SILVYN® FLEXILOK M see page 802
- SILVYN® FLEXILOK PG see page 802
- SILVYN® FLEXILOK 90° M see page 803
- SILVYN® FLEXILOK 90° PG see page 803

# Cable Accessories

## Binding, Bundeling, Fixing

### Cable ties

New

# Twist Tail™ cable tie

**Info**

- No special tool needed
- Worked in the twinkling of an eye

## Twist Tail™ cable tie

### Benefits

- Round, flat, edge-free tie heads allow assembly without catching and protect against injury and damage at adjoining cables and components.
- The cable tie can be gripped securely and therefore tightened more easily.
- In addition, the safety gripping butt prevents the tie from slipping out during assembly and secures it before tightening it by hand.

### Application range

- Industry cable ties for quick and secure assembly.
- General purpose applications, indoor and outdoor

### Approvals (Norm references)

RoHS

### Design

- Wrap the cable tie around a bundle of cables, bend the excess tail in two directions and twist. The tail breaks right off, leaving no sharp edges to scratch your hands or your cables.
- Available in 3 different lengths and 2 colours (white and UV-resistant black)

### Technical data

**General**
Tensile strength: 133N

**Approvals**
Flammability Class: UL 94 V-2

**Note**
halogen-free
silicone free

**Colour delivered**
Black, RAL 9005, UV-resistant
white

**Material**
Polyamid 6.6

**Range of temperature**
-40°C up to +85 °C

| Part number | Part description | Approval UL | Length in mm | Max. bundle Ø approx. in mm | Pieces / PU |
|---|---|---|---|---|---|
| white | | | | | |
| 61832007 | TWIST TAIL TT-7-30-9-L | yes | 181 | 45.0 | 50 |
| 61832009 | TWIST TAIL TT-11-30-9-L | yes | 282 | 76.0 | 50 |
| 61832011 | TWIST TAIL TT-14-30-9-L | yes | 358 | 102.0 | 50 |
| Black, RAL 9005, UV-resistant | | | | | |
| 61832008 | TWIST TAIL TT-7-30-0-L | yes | 181 | 45.0 | 50 |
| 61832010 | TWIST TAIL TT-11-30-9-L | yes | 282 | 76.0 | 50 |
| 61832012 | TWIST TAIL TT-14-30-0-L | yes | 358 | 102.0 | 50 |

TWIST TAIL™ is a registered trademark of Thomas & Betts

# Product overview solar energy



| Product | Page main catalogue 2010/11 |
|---|---|
| **ÖLFLEX® – Power- and control cables** | |
| ÖLFLEX® FD 90 | 123 |
| ÖLFLEX® ROBOT 900 P | 131 |
| ÖLFLEX® ROBOT 900 DP | 132 |
| ÖLFLEX® TORSION FRNC/ÖLFLEX® TORSION D FRNC | 152 |
| Ground Straps/Flat Ground Straps | 239 |
| **UNITRONIC® – Data communication systems** | |
| UNITRONIC® Li2YCY (TP) | 276 |
| UNITRONIC® Li2YCYv (TP) | 276 |
| J-H(ST)H ...BD Fire Alarm Cable | 288 |
| UNITRONIC® BUS CAN | 319 |
| **ETHERLINE® – Data communication systems for ETHERNET-Technology** | |
| ETHERLINE® CAT5 / CAT 5e | 397 |
| **HITRONIC® – Optical transmission systems** | |
| HITRONIC® HQN Outdoor Cable | 429 |
| Duplex Jumper/Patchkabel Multimode | 438 |
| Duplex Jumper/Patchkabel Singlemode | 439 |

**Please order our new main catalogue 2010/11:**
**www.lappkabel.com/service**

Photo: PowerWind GmbH/J. Meier

Photo: PowerWind GmbH/J. Meier

# Lapp brings a breath of fresh air for wind turbines

Wind energy plays an important role in the Lapp Group. To reflect the importance of this industry, the SBU Wind (Strategic Business Unit Wind) has been set up, and specialises in products and services for the industry.

Our customers can rely on 50 years of experience, marked by the very highest levels of quality and innovation. A range of over 40,000 items worldwide is available to our customers and shows Lapp's all-round expertise, not just in the wind energy sector. No matter which cables our customers choose for their wind turbines, they can count on the very highest standards in terms of function, reliability and service life every time.

Many of the products from Lapp's standard range have already proved their worth in wind energy. For example, the ÖLFLEX® CLASSIC 110 has been in continuous use in the drip loop for more than 10 years. The high quality that Lapp demands from all its products meant that it has withstood the extreme requirements in the drip loop until this very day and is still doing its job.


# The Lapp Group – Your system supplier

**As a recognised supplier for the wind industry, we offer you outstanding products and services for every area.**

**EPIC®**
**Industrial connectors**

**Application, e.g.:**
pitch systems, frequency converters, top & bottom box, motor connections, slip rings

**Products:**
- EPIC® rectangular H series
- EPIC® CIRCON round connectors with colour coding

**ÖLFLEX®**
**Power- and control cables**

**Application, e.g.:**
torsion-proof power, supply and data cables for the loop

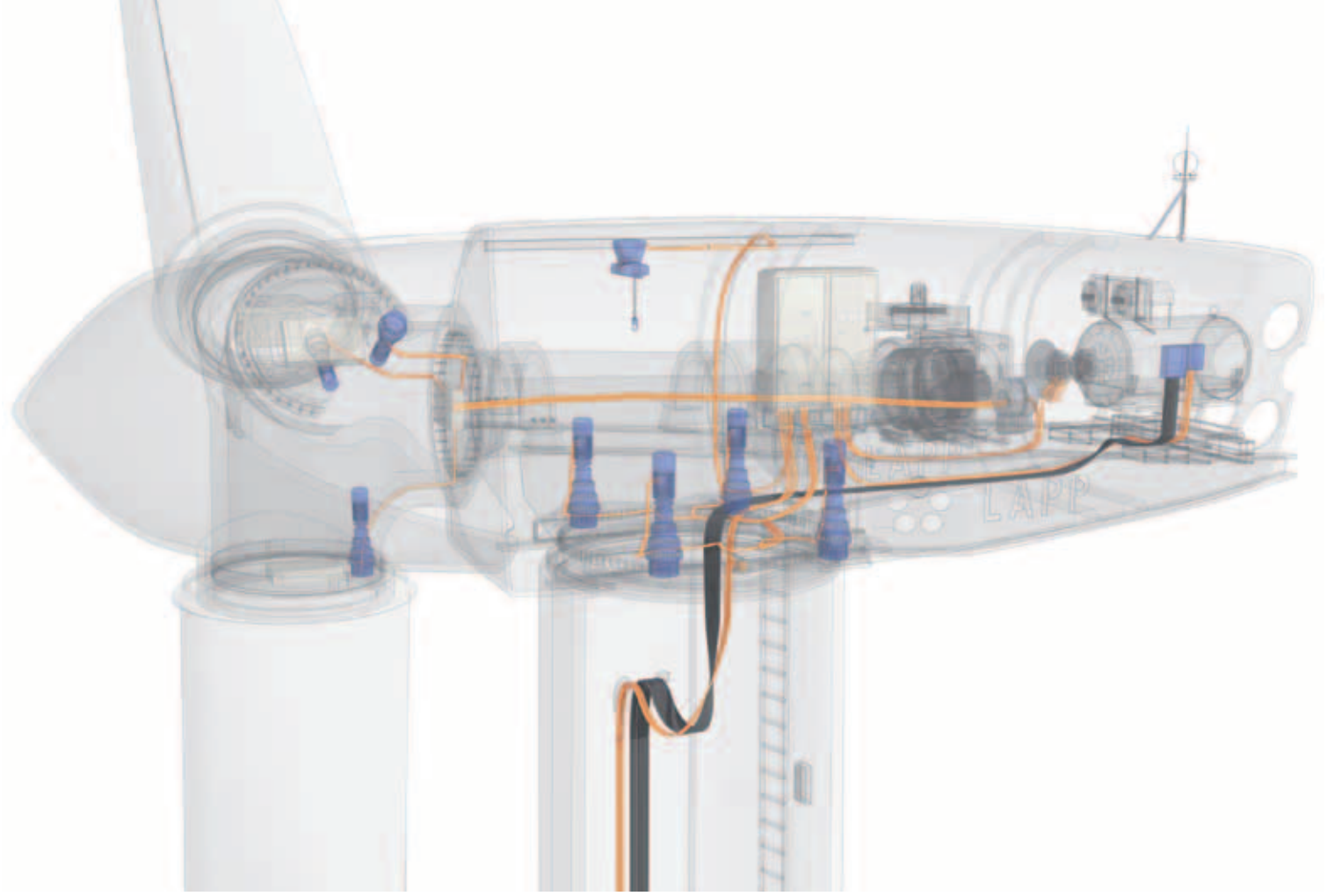
**Products:**
Power cables
- ÖLFLEX® H07BN4-F Cl. 5 & 6
- H07RN-F
- NYY/NAYY

Control lines
- ÖLFLEX® Classic
- ÖLFLEX® Torsion
- ÖLFLEX® Fortis UL/CSA

**HITRONIC®**
**Optical transmission systems**

**Application, e.g.:**
in the loop

**Products:**
- UL/CSA listed
- MIL Listing



**SKINTOP®**
**Cable glands**

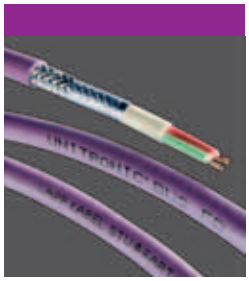
**Application, e.g.:**
on every cable

**Products:**
- SKINTOP® ST-M
- SKINTOP® Click
- SKINTOP® Brush
- SKINTOP® Cube
- SKINTOP® BS-M
- SKINTOP® BT-M

**FLEXIMARK®**
**Cable marking products**

**Application, e.g.:**
hub box, top box, bottom box, transmission, generator

**Products:**
- Plastic/stainless steel
- Bonded or Clip ON
- UL or VDE/DIN

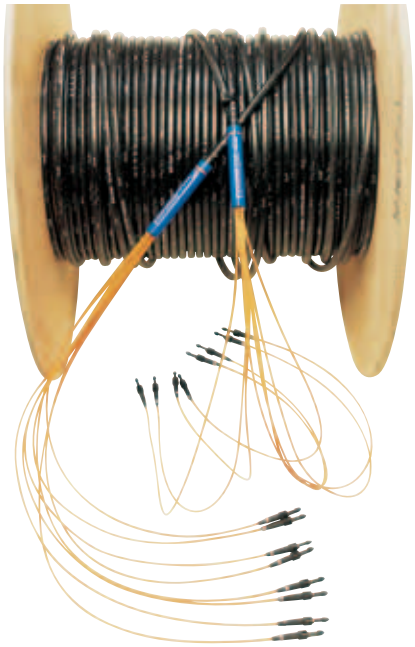


**UNITRONIC®**
**Data communication systems**

**Application, e.g.:**
slip rings, pitch systems

**Products:**
- LIYCY
- CAN BUS

# Windpark communication – Lapp as your system supplier



The Lapp Group offers you a wide range of products and services for establishing windparks to facilitate a smooth workflow:

## Products:

**HITRONIC® HQN outdoor cables for laying in the ground**

- Single mode 9/125 µm
- Multi mode 50/125 & 62,5/125 µm

**For the connection between wind turbines and the customer installation**

- Duplex jumpers/patch cables multimode 50 & 62.5 µm SC or ST connector-combinations
- Duplex jumper/patch cable single mode 9 µm with SC or ST connector combinations
- Pigtails single and multimode ST or SC connector
- Splice boxes for SC and ST
- Fibre optic cable adapters

## Service:

Pre-assembled fibre optic cables
**The Lapp Fiberlink trunk system**

**The benefits to you:**
Take advantage of the benefits of using a trunk system:

- No costs of special equipment
- No need for highly qualified personnel
- Consistent quality thanks to manufacture under laboratory conditions
- Quick installation - therefore low costs
- No longer necessary to measure the cable run, comes with OTDR test certificate!
- Fan-out elements also available in IP67

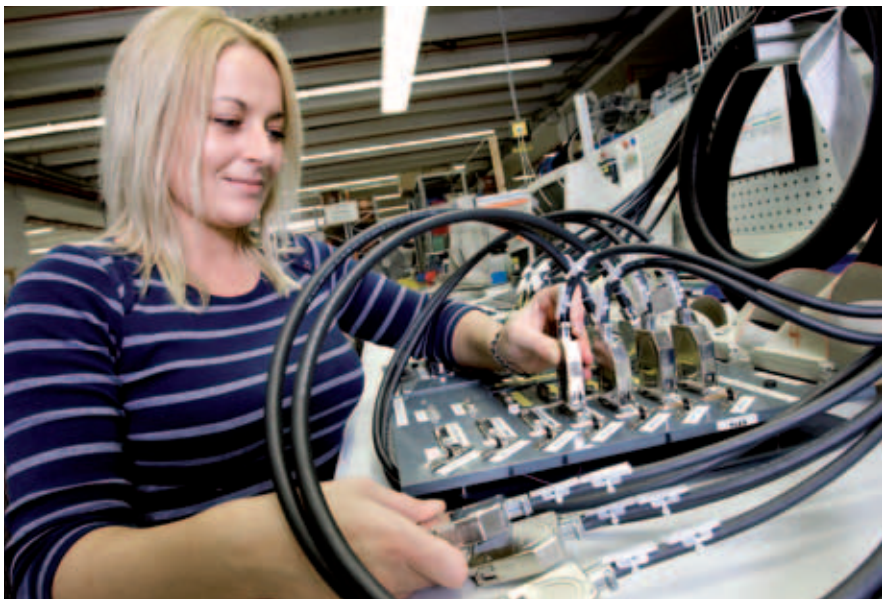
**The requirements:**
The following data are needed to produce your tailor-made trunk system:

- Length of the cable run (effective run reserve on either side)
- Fibre type (SM 9 µm, MM 50 µm or 62.5 µm)
- Number of fibres (2, 4, 6, 8 ... to 48 fibres)
- Plug type (ST, SC, DIN, E-2000 ... including mixed)
- Cable type (indoor, outdoor, rodent protection ...)
- Special versions on request

# Preassembled fibre optic cables and cable preassembly from Lapp

As your supply chain partner, Lapp Systems offers you everything from a single source – from advice to project management, engineering or documentation through to production, testing, logistics and service

With 211 employees at its sites in Stuttgart, Much near Cologne and Holesov in the Czech Republic, Lapp Systems GmbH is your partner also in a position to master major challenges.



# On Site Hub from Lapp

**Do you know this problem?**

“Always the same – we start to install our wind field, but we miss important items like cable, switches and connectors.”

**The solution from the Lapp Group:**

One container full with your needed products, just in time delivered to the construction place. The wind turbine installation will be in time, no expensive delay or expansive special deliveries to the construction.

**Everything in place – Everything in the container – Everything from the Lapp Group**

It doesn’t matter what do you need in the construction place, sent us the information in advance and we organize the container, put the products inside and deliver it to your installation address. If you like to have we label the container according your specifications.

# A strong connection is the best protection against vibrations!

**The subject of reliability and servicing strategies for wind turbines with a view to raising availability has become increasingly important over recent years.**

Data are collected and evaluated by external institutions in order to get to the bottom of failures without identifiable causes. Potential factors may be lightning strikes, shocks or vibration, for example.

Vibrations occur during the operation of a wind turbine which should not be underestimated and, depending on age and wear of the turbine, can grow in intensity and progressively stress the individual components of the turbine.

The cable connection is a factor which is often neglected. Vibrations subject a cable, even with a small cross-section, to considerable stress.

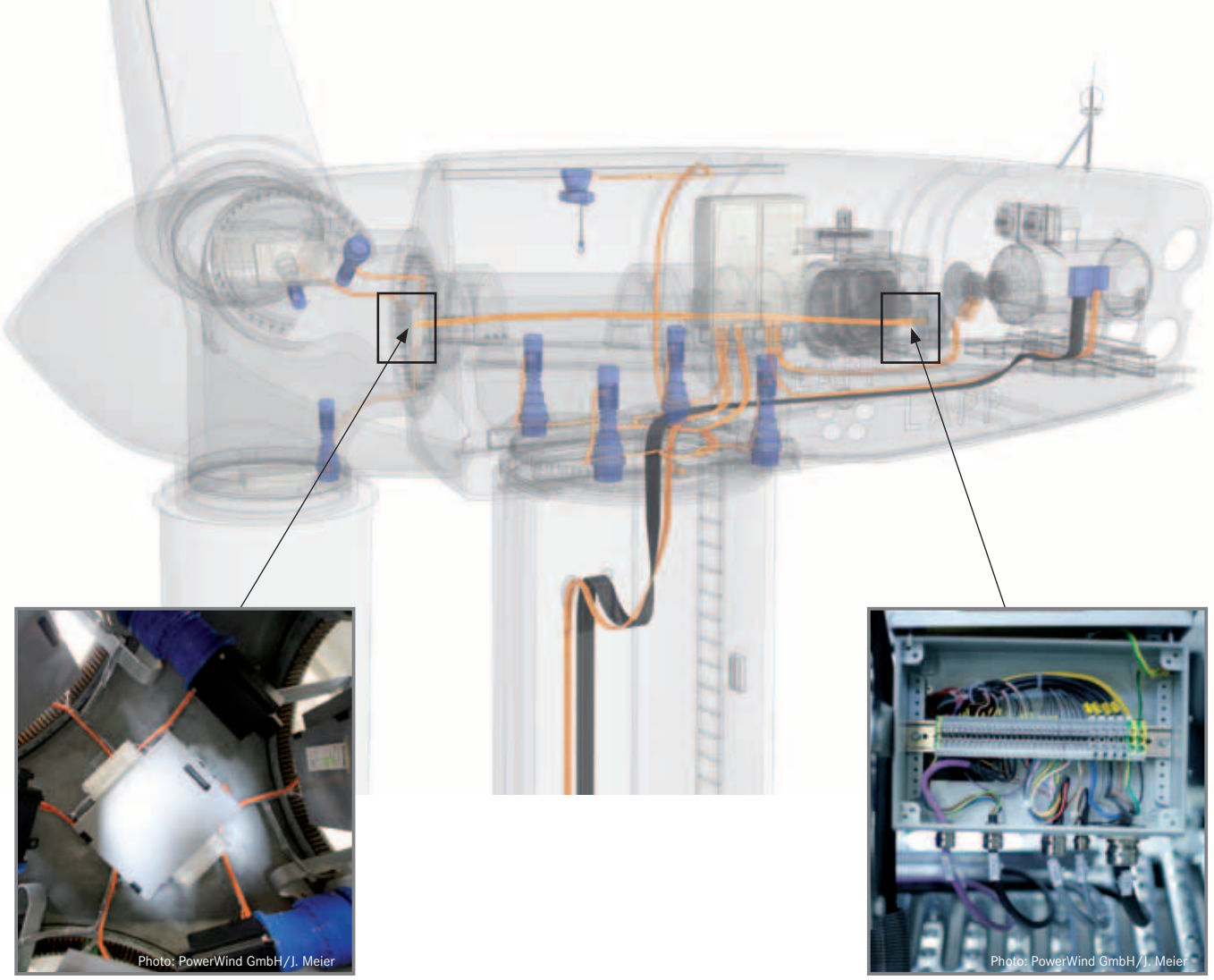
The following faults can occur in a wind turbine due to vibrations:

- Loosened screw connections
- Visible single cores with completely loosened domed cap nut.
- Fully tightened screw connections that can be loosened by hand.
- Too small bending radii.
- Defective shielding because the cable has detached.

All these faults can be avoided by using optimised product systems from the Lapp Group. Our SKINTOP® screw connection is a product with:

- Patented vibration protection
- Optimal strain relief
- Insulation compliant with IP 68

and the best matched cable to go with it.






Pitchsystem




Terminal box: slip ring

# Fast data transfer at every temperature

The connection from the slip ring to the pitch system starts with the transmission, goes through the hollow shaft, through the transmission rotor shaft and ends in the hub in the central control unit of the pitch system.

This connection places demands on the cable and lines, which can withstand extremes of temperature:

| | |
|---|---|
| **Transmission:** | **Hot zone.** Temperatures up to 105°C |
| **Rotor shaft:** | **Medium zone.** Nacelle ambient |
| **Hub:** | **Cold zone.** Temperatures down to -40°C |

**Example:**

**Slip ring to the pitch system**

- UNITRONIC® Bus CAN – hub box CAN communication
- UNITRONIC® LIYCY – data/ hub box signal communication
- UNITRONIC® LIYCY – data/ hub box signal communication
- ÖLFLEX® CLASSIC 100 – hub box supply

**Hub box – pitch drive**

- Thermistor
- Pitch drive supply
- Battery charger
- Battery temperature monitoring
- Lubrication systems

**Hub Box – pitch drive**

- Blade limit switch (0° – 90/100°)
- Rotary encoder
- Light
- Pulse generator
- Brake supply

Photo: PowerWind GmbH/J. Meier

# Cable preassembly for wind turbines nacelle and tower cable harnesses

Send us your specifications: We will generate a parts list with the products you have selected, preassemble them and supply them just in time according to your wishes.

Speed, reliability, cost-effectiveness and high quality – these are Lapp's main drivers.

# UL/CSA – North America is different!

**North America is different** – All wind energy manufacturers contend with this situation if they plan to export to the USA or Canada or to produce in these countries.

North America is one of the two most important markets for the wind industry. Wind turbine manufacturers which export their systems to North America have to take a variety of safety requirements and product liability risks into account.

**Changes are already on their way:**
**NFPA 79**, part of NEC, was passed in 2007 and makes new demands. Conversion/implementation has been completed in 30 federal states and has taken place locally in 10 federal states, however with many different interpretations. What happens once NFPA 79 (NEC) is implemented in all the federal states?

The new **UL Outline 6140** is to be passed before the end of this year! The Outline speaks of sweeping changes for the cables and lines to be used for wind turbines. What consequences will this have for turbine manufacturers and component suppliers inside and outside the North American market?

The American standards and legal requirements are not always comprehensible for European wind turbine manufacturers, which is why the Lapp Group already offers you production and expertise. You will find the Lapp Group on the North American market with its own production and UL certified laboratory, as well as in Europe and Asia with further production sites and laboratories.

You are in the right hands with the Lapp Group when it comes to product and application expertise.

You will find additional information on our North American subsidiaries on the Lapp USA and Canada homepage.

www.lappusa.com

LAPP GROUP

Photo: PowerWind GmbH/J. Meier

# Proper “North Americans”

The UL Outline contains new terms and standards for the cables and line used for wind turbines. One of them is:

**WTTC 1000 V** =
**W**ind **T**urbine **T**ray **C**able 1000 V

This is already part of our product range and therefore offers absolute certainty for the North American market:

**The following products have WTTC & ER (Exposed Run)**

- ÖLFLEX® CONTROL M
- ÖLFLEX® CONTROL TM + TM CY
- ÖLFLEX® TRAY II + II CY
- ÖLFLEX® TC 600 + TC 600 S
- ÖLFLEX® CONTROL COLD
- ÖLFLEX® POWER MULTI
- ÖLFLEX® AUTO-I
- ÖLFLEX® VFD SYMMETRICAL

**New from Lapp:**
**UL listed torsion-proof control cables**

- ÖLFLEX® FORTIS
  Temp. flexible: -40°C to + 90°C
  fixed installation: -55°C to + 90°C
  (AWM +105°C)
  Torsion resistant up to ± 150°/mtr
  FT4, OIL RES I & OIL RES II

# Power and control cables

## Harsh use conditions

### Increased mechanical and chemical resistance

wind energy

New

# ÖLFLEX® FORTIS

**Robust, cold flexible and increased oil resistant cable - multiple UL listed**


**WTTC-Approval**

**Info**

- **Increased oil resistance, flexible down to -40°C**
- **According to NFPA 79 Edition 2007 "Electrical Standard for Industrial Machinery" USA**
- **Flexible application in Wind Turbines**

### Benefits

- Broad application range due to multiple approvals
- Cost saving, easy installation due to re-nouncement of closed raceways (suitable for open wiring)
- For worldwide use
- The high flexibility and the good dismantle and stripping properties enable easy space-saving cable installation and fast processing

### Application range

- Industrial machinery; plant engineering
- Machine tools UL MTW (Machine Tool Wiring) conforming
- Direct usage inside metal processing cabins of machine tools due to increased oil- and wet rating
- TC-ER (Tray Cable Exposed Run) approval for open wiring between cable tray and industrial machines/plants acc. to NEC 336.10(7)
- Meets WTTC (UL2277) requirements

### Product features

- Flame retardant according to CSA FT4 UL Vertical-Tray Flame Test
- Increased oil resistant according to UL OIL RES I and UL OIL RES II
- Water resistant UL Wet Approval 75 °C
- Cold flexible
- Torsion-resistant up to 150° / mtr.

### Approvals (Norm references)

- Multi standard cables have conductor strands with nominal sizes in mm²**or** AWG/kcmil nominal sizes. The master size is mentioned in the table below, the equivalent size of the other system can be found in the main catalogue 2010/11 appendix T16. For this related secondary size the conductor cross-section mostly works out greater than the specified nominal value.

### Design

- Fine strands of bare copper wires
- Insulation: PVC with nylon jacket (PA skin)
- Outer sheath of abrasion resistant TPE, black

### Technical data

**Core identification code**
black with white numbers + GN/YE ground

**Approvals**
UL listed according:
Type TC-ER (Exposed Run)
Type MTW or UL AWM, NPFA 79 2007
CSA listed according:
c(UL) Type TC and CIC FT-4 -40° C
CSA AWM I/II A/B FT-4 -40° C

**Conductor stranding**
Fine wire in accordance to VDE 0295 Class 5 / IEC 60228 Class 5

**Minimum bending radius**
5 x cable diameter

**Rated voltage**
UL/CSA: 600 V (TC, MTW, CIC), WTTC 1000V
HAR $U_0$/U: 300/500 V

**Test voltage**
2000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Occasional flexing: -40°C to + 90°C (AWM +105°C)
Fixed installation: -55°C up to +90 °C (AWM +105°C)

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® FORTIS** | | | | |
| 331803 | 3 G 1 | 7.5 | 28.8 | 85 |
| 331804 | 4 G 1 | 8.1 | 38.4 | 98 |
| 331805 | 5 G 1 | 8.8 | 48.0 | 115 |
| 331807 | 7 G 1 | 9.5 | 67.0 | 149 |
| 331809 | 9 G 1 | 10.9 | 87.0 | 167 |
| 331812 | 12 G 1 | 12.1 | 115.0 | 255 |
| 331818 | 18 G 1 | 14.9 | 173.0 | 365 |
| 331825 | 25 G 1 | 17.2 | 240.0 | 479 |
| 331603 | 3 G 1.5 | 8.3 | 43.0 | 103 |
| 331604 | 4 G 1.5 | 8.9 | 58.0 | 124 |
| 331605 | 5 G 1.5 | 9.7 | 72.0 | 146 |
| 331607 | 7 G 1.5 | 10.5 | 101.0 | 189 |
| 331609 | 9 G 1.5 | 12.1 | 130.0 | 255 |
| 331612 | 12 G 1.5 | 14.4 | 173.0 | 328 |
| 331616 | 16 G 1.5 | 15.8 | 230.4 | 403 |
| 331618 | 18 G 1.5 | 16.6 | 259.0 | 431 |
| 331625 | 25 G 1.5 | 18.8 | 360.0 | 592 |
| 331403 | 3 G 2.5 | 9.2 | 72.0 | 130 |
| 331404 | 4 G 2.5 | 10.0 | 96.0 | 159 |
| 331405 | 5 G 2.5 | 10.8 | 120.0 | 191 |
| 331407 | 7 G 2.5 | 11.8 | 168.0 | 252 |
| 331409 | 9 G 2.5 | 14.5 | 216.0 | 335 |
| 331412 | 12 G 2.5 | 16.2 | 288.0 | 459 |
| 331418 | 18 G 2.5 | 18.7 | 432.0 | 654 |
| 331425 | 25 G 2.5 | 22.5 | 600.0 | 874 |
| 331204 | 4 G 4 | 11.7 | 153.0 | 226 |
| 331205 | 5 G 4 | 12.8 | 192.0 | 279 |
| 331207 | 7 G 4 | 14.8 | 269.0 | 384 |
| 331004 | 4 G 6 | 14.7 | 231.0 | 394 |
| 331005 | 5 G 6 | 16.0 | 288.0 | 472 |
| 331007 | 7 G 6 | 17.4 | 405.0 | 661 |
| 330804 | 4 G 10 | 17.9 | 384.0 | 615 |
| 330805 | 5 G 10 | 19.6 | 480.0 | 771 |
| 330604 | 4 G 16 | 22.8 | 615.0 | 864 |
| 330605 | 5 G 16 | 24.9 | 768.0 | 1,080 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired make-up (e.g. 1 x 610 m drum or 8 x 76 m coils)

wind energy

New

# ÖLFLEX® TORSION

## Power and control cables for flexible application under torsional load - 0,6/1 kV

**Info**

- Torsion resistant and very flexible
- Cable-loop application


### Benefits

- Cost-effective alternative in comparison to the halogen free, highly flame retardant and enhanced oil resistant ÖLFLEX® TORSION FRNC version with improved characteristics in case of fire
- The special construction compensates reliably the permanent torsional movements inside of windmills between the nacelle and the tower
- The high flexibility and the good dismantle and stripping properties enable easy space-saving cable installation and fast processing

### Application range

- For fixed, flexible as well as for torsional moved applications in the field of machinery building and wind power plant engineering
- Especially for the drip loop installation between the rotating nacelle and the stationary windmill tower to connect the generator and control units
- As torsional moved cable for application in North America with UL WTTC Listing (Wind Turbine Tray Cable) we recommend ÖLFLEX® FORTIS which complies to the NFPA 79 standard resp. UL 2277 and UL 6140 outline

### Product features

- Torsion-resistant up to ±150 °/mtr
- Good UV resistance
- Flame retardant according to IEC 60332-1-2
- UL certification in preparation

### Approvals (Norm references)

CE RoHS

### Design

- Extra fine wired conductor of plain copper
- Core insulation of special PVC compound
- Cores torsion optimized twisted into layers
- Special PVC based outer sheath

### Technical data

**Core identification code**
Up to 5 cores: colour coded according VDE 0293-308, see main catalogue 2010/11 Appendix T9
Starting at 6 cores: Black with white numbers

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Extra fine wire in acc. to VDE 0295 Cl.6 / IEC 60228 Cl.6

**Minimum bending radius**
Flexible use: 10 x outer diameter
Fixed installed: 6 x outer diameter

**Rated voltage**
nach VDE: $U_0$/U 0,6/1,0 kV

**Test voltage**
C/C: 4000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Flexible use: -30°C up to +90°C
Fixed installation: -40°C up to +90°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® TORSION** | | | | |
| 1150465 | 12 G 0.75 | 12.4 | 86.4 | 222 |
| 1150466 | 14 G 0.75 | 13.0 | 100.8 | 272 |
| 1150467 | 18 G 0.75 | 14.6 | 129.6 | 304 |
| 1150468 | 25 G 0.75 | 17.8 | 180.0 | 450 |
| 1150469 | 41 G 0.75 | 22.4 | 295.2 | 701 |
| 1150470 | 50 G 0.75 | 24.2 | 360.0 | 835 |
| 1150479 | 12 G 1 | 13.2 | 115.2 | 258 |
| 1150480 | 16 G 1 | 14.8 | 153.6 | 368 |
| 1150485 | 3 G 1.5 | 9.0 | 43.2 | 122 |
| 1150486 | 4 G 1.5 | 9.7 | 57.6 | 146 |
| 1150487 | 5 G 1.5 | 10.6 | 72.0 | 172 |
| 1150488 | 7 G 1.5 | 12.6 | 100.8 | 238 |
| 1150489 | 12 G 1.5 | 15.3 | 172.8 | 365 |
| 1150490 | 19 G 1.5 | 18.3 | 273.6 | 530 |
| 1150491 | 25 G 1.5 | 22.8 | 360.0 | 790 |
| 1150492 | 32 G 1.5 | 24.5 | 460.8 | 942 |
| 1150495 | 3 G 2.5 | 10.4 | 72.0 | 170 |
| 1150496 | 4 G 2.5 | 11.3 | 96.0 | 227 |
| 1150497 | 5 G 2.5 | 12.4 | 120.0 | 244 |
| 1150498 | 7 G 2.5 | 15.0 | 168.0 | 352 |
| 1150499 | 12 G 2.5 | 18.9 | 288.0 | 540 |
| 1150500 | 16 G 2.5 | 20.8 | 384.0 | 760 |
| 1150501 | 19 G 2.5 | 23.9 | 456.0 | 879 |
| 1150502 | 25 G 2.5 | 26.8 | 600.0 | 1,126 |
| 1150505 | 3 G 4 | 11.9 | 115.2 | 240 |

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| 1150506 | 4 G 4 | 13.0 | 153.6 | 297 |
| 1150507 | 5 G 4 | 14.3 | 192.0 | 352 |
| 1150508 | 3 G 6 | 12.9 | 172.8 | 322 |
| 1150509 | 4 G 6 | 14.4 | 230.4 | 384 |
| 1150510 | 5 G 6 | 16.0 | 288.0 | 466 |
| 1150511 | 3 G 10 | 16.6 | 288.0 | 530 |
| 1150512 | 4 G 10 | 18.4 | 384.0 | 631 |
| 1150513 | 5 G 10 | 20.5 | 480.0 | 768 |
| 1150514 | 3 G 16 | 19.2 | 460.8 | 794 |
| 1150515 | 4 G 16 | 22.2 | 614.4 | 1,017 |
| 1150516 | 5 G 16 | 24.4 | 768.0 | 1,147 |
| 1150517 | 3 G 25 | 24.5 | 720.0 | 1,133 |
| 1150518 | 3 X 25 | 24.5 | 720.0 | 1,133 |
| 1150519 | 4 G 25 | 26.9 | 960.0 | 1,471 |
| 1150520 | 5 G 25 | 29.9 | 1,200.0 | 1,815 |
| 1150521 | 3 G 35 | 27.1 | 1,008.0 | 1,521 |
| 1150522 | 3 X 35 | 27.1 | 1,008.0 | 1,521 |
| 1150523 | 4 G 35 | 30.1 | 1,344.0 | 1,952 |
| 1150524 | 5 G 35 | 33.7 | 1,680.0 | 2,438 |
| 1150525 | 3 G 50 | 32.1 | 1,440.0 | 2,235 |
| 1150526 | 3 X 50 | 32.1 | 1,440.0 | 2,235 |
| 1150527 | 4 G 50 | 35.7 | 1,920.0 | 2,866 |
| 1150528 | 5 G 50 | 39.5 | 2,400.0 | 3,583 |
| 1150529 | 3 G 70 | 37.0 | 2,016.0 | 3,150 |
| 1150530 | 3 X 70 | 37.0 | 2,016.0 | 3,150 |
| 1150531 | 4 G 70 | 41.4 | 2,688.0 | 4,112 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

### Comparable products

- ÖLFLEX® TORSION FRNC see page 44
- ÖLFLEX® FORTIS see page 42

# Power and control cables

## Special applications

### Windmills

wind energy

New

# ÖLFLEX® TORSION FRNC

**Cold- and oil resistant cables for flexible application under torsional load, halogen free - 0,6/1 kV**


**Info**

- Torsion resistant and very flexible
- Improved characteristics in case of fire
- Approved for the USA and Canada

# ÖLFLEX® TORSION D FRNC

**Screened cold- and oil resistant cables for flexible application under torsional load, halogen free - 0,6/1 kV**

**Info**

- Copper screened version

## Benefits

- The special construction compensates reliably the permanent torsional movements inside of windmills between the nacelle and the tower
- The high flexibility and the good dismantle and stripping properties enable easy space-saving cable installation and fast processing
- Saltwater resistant for On- and Off-Shore application
- **FRNC** = **F**lame **R**etardant **N**on **C**orrosive
  - Reduction of flame propagation and density and toxicity of smoke gases in event of fire
  - Minimisation of damage to buildings and production facilities
  - Safety for maintenance staff resp. in areas with high personnel concentration
- The copper wrapping of the screened D version protects against electromagnetic interference

## Application range

- For fixed, flexible as well as for torsional moved applications in the field of machinery building and wind power plant engineering
- Especially for the drip loop installation between the rotating nacelle and the stationary windmill tower to connect the generator and control units
- As torsional moved cable for application in North America with UL WTTC Listing (Wind Turbine Tray Cable) we recommend ÖLFLEX® FORTIS which complies to the NFPA 79 standard resp. UL 2277 and UL 6140 outline

## Product features

- Torsion-resistant up to ±150 °/mtr
- Good weather-, abrasion-, temperature- and UV resistance
- Resistant against a multitude of oils
- Halogen free and flame retardant
- Considering economic minimum quantities also customized designs are possible

## Approvals (Norm references)

CE cULus RoHS

- UL AWM Style 21288 / cUL AWM II A/B
- Fire behaviour :
  - Halogen free (IEC 60754-1)
  - Corrosivity of gases (IEC 60754-2)
  - Smoke density (IEC 61034-2)
  - Flame retardant (IEC 60332-1-2)
  - No flame propagation (IEC 60332-3-24 resp. IEC 60332-3-25)
- Oil resistant acc. to VDE 0473 part 811-2-1 and UL OIL RES I and UL OIL RES II
- UV-resistant according ISO 4892-2
- Ozone resistant according EN 50396

## Design

- Extra fine wired conductor of plain copper
- Core insulation of LS0H polyolefin polymer
- Cores torsion optimized twisted into layers
- Optional screening (D) of helically tinned copper wire wrapping
- Outer sheath of halogen free special compound, colour black (RAL 9005)

## Technical data

**Core identification code**
Control and connection cables:
Colour coded according to VDE 0293-308, see main catalogue 2010/11 Appendix T9
Starting at 6 cores: Black with white numbers
Paired signal cables: DIN 47100

**Approvals**
UL AWM Style 21288
cUL AWM II A/B

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Extra fine wire in acc. to VDE 0295 Cl.6 / IEC 60228 Cl.6
(For matching US conductor sizes according AWG please see technical table T16)

**Minimum bending radius**
Flexible use: 10 x outer diameter
Fixed installed: 6 x outer diameter

**Rated voltage**
nach VDE: $U_0$/U 0,6/1,0 kV
Working voltage acc. UL: 1000V

**Test voltage**
**ÖLFLEX® TORSION FRNC**
C/C: 4000 V
**ÖLFLEX® TORSION D FRNC**
C/C: 4000 V
C/S: 2000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Flexible use: -40°C up to +90°C (UL +80°C)
Static use: -40°C up to +90°C (UL +80°C)


| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® TORSION FRNC** | | | | |
| 1150199 | 12 G 0.75 | 12.4 | 86.4 | 237 |
| 1150377 | 14 G 0.75 | 13.0 | 100.8 | 291 |
| 1150201 | 18 G 0.75 | 14.6 | 129.6 | 323 |
| 1150204 | 25 G 0.75 | 17.8 | 180.0 | 480 |
| 1150208 | 50 G 0.75 | 24.2 | 360.0 | 886 |
| 1150373 | 12 G 1 | 13.2 | 115.2 | 274 |
| 1150378 | 16 G 1 | 14.8 | 153.6 | 392 |
| 1150271 | 3 G 1.5 | 9.0 | 43.2 | 131 |
| 1150272 | 4 G 1.5 | 9.7 | 57.6 | 156 |
| 1150273 | 5 G 1.5 | 10.6 | 72.0 | 183 |
| 1150275 | 7 G 1.5 | 12.6 | 100.8 | 253 |
| 1150279 | 12 G 1.5 | 15.3 | 172.8 | 386 |
| 1150280 | 18 G 1.5 | 18.3 | 259.2 | 563 |
| 1150374 | 25 G 1.5 | 22.8 | 360.0 | 837 |
| 1150375 | 32 G 1.5 | 24.5 | 460.8 | 994 |
| 1150311 | 3 G 2.5 | 10.4 | 72.0 | 181 |
| 1150312 | 4 G 2.5 | 11.3 | 96.0 | 242 |
| 1150313 | 5 G 2.5 | 12.4 | 120.0 | 258 |
| 1150315 | 7 G 2.5 | 15.0 | 168.0 | 372 |
| 1150319 | 12 G 2.5 | 18.9 | 288.0 | 567 |
| 1150322 | 19 G 2.5 | 23.9 | 456.0 | 925 |
| 1150376 | 25 G 2.5 | 26.8 | 600.0 | 1,183 |
| 1150350 | 3 G 4 | 11.9 | 115.2 | 254 |
| 1150351 | 4 G 4 | 13.0 | 153.6 | 313 |
| 1150352 | 5 G 4 | 14.3 | 192.0 | 370 |
| 1150355 | 3 G 6 | 12.9 | 173.0 | 338 |
| 1150356 | 4 G 6 | 14.4 | 230.4 | 401 |
| 1150357 | 5 G 6 | 16.0 | 288.0 | 486 |
| 1150360 | 3 G 10 | 16.6 | 288.0 | 556 |
| 1150361 | 4 G 10 | 18.4 | 384.0 | 658 |
| 1150362 | 5 G 10 | 20.5 | 480.0 | 799 |
| 1150366 | 4 G 16 | 22.2 | 614.4 | 1,061 |
| 1150367 | 5 G 16 | 24.4 | 768.0 | 1,188 |
| 1150371 | 4 G 25 | 26.9 | 960.0 | 1,526 |
| 1150372 | 5 G 25 | 29.9 | 1,200.0 | 1,881 |
| 1150369 | 5 G 35 | 33.7 | 1,680.0 | 2,520 |
| 1150379 | 5 G 50 | 39.5 | 2,400.0 | 3,710 |
| 1150363 | 3 G 70 | 37.0 | 2,016.0 | 3,590 |
| **ÖLFLEX® TORSION D FRNC - screened** | | | | |
| 1150111 | 4 x 2 x 0.5 | 11.9 | 71.0 | 205 |
| 1150115 | 12 x 2 x 0.5 | 18.3 | 188.0 | 518 |
| 1150121 | 4 x 2 x 0.75 | 12.7 | 90.0 | 232 |
| 1150125 | 12 x 2 x 0.75 | 19.8 | 258.0 | 603 |
| 1150221 | 18 G 0.75 | 15.2 | 180.0 | 402 |
| 1150228 | 50 G 0.75 | 24.9 | 470.0 | 1,079 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

# Power and control cables

## Harsh use conditions

### Rubber cables

wind energy

New

# H07BN4-F Wind Class5 & Class6

**Highly torsion-resistant, harmonised Wind Energy Cable with two available conductor classes**


**Info**

- **Class6 formerly: ÖLFLEX H07BN4-F**
- **Torsion resistant and very flexible**
- **Harmonised (HAR)**

## Benefits

- Special design for torsion use in windmill towers

## Application range

- Recommended for the use in windmills - designed for windmill constructors' expectations
- Mobile use as well as fixed installation possible
- In dry and wet environment

## Product features

- Flame retardant according to IEC 60332-1-2
- Torsion-resistant up to ±150 °/mtr
- Oil resistant to most transmission oils
- Abrasion- and cut-resistant, cold-flexible
- Ozone-resistant according to HD 22, EN 60811-2-1 and EN 50396-8.1.3

## Approvals (Norm references)

CE <HAR> RoHS

## Design

- Strands of bare copper wires
- 2 conductor strandings available: Class 5 (H07BN4-F Wind Class5) or Class 6 (H07BN4-F Wind Class6)
- Core insulation: Rubber Type EI 7
- Outer jacket of special rubber compound based on EM 7

## Technical data

**Approvals**
VDE 0282 Part 12 / HD 22.12

**Conductor stranding**
H07BN4-F Wind Class5: fine-wired/class 5 acc. VDE 0295/ IEC 60228
H07BN4-F Wind Class6: extra-fine wired/class 6 acc. VDE 0295/ IEC 60228

**Minimum bending radius**
Flexible use: 6 x outer diameter
Fixed installation: 5 x outer diameter

**Rated voltage**
U0/U: 450/750 VAC,
in protected and fixed installations:
U0/U: 600/1000 V

**Test voltage**
2500 V

**Current rating**
According to VDE 0298 Part 4
HD 516

**Range of temperature**
Flexible use: -15°C up to +90°C
Wind energy: -35°C up to +90°C
Fixed installation: -35°C up to +90°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **H07BN4-F Wind Class5** | | | | |
| 1600751 | 1 X 95 | 22.9 | 912.0 | 1,300 |
| 1600752 | 1 X 120 | 24.4 | 1,152.0 | 1,500 |
| 1600753 | 1 X 150 | 27.2 | 1,440.0 | 1,850 |
| 1600754 | 1 X 185 | 29.5 | 1,776.0 | 2,200 |
| 1600755 | 1 X 240 | 33.3 | 2,304.0 | 2,900 |
| 1600756 | 1 X 300 | 36.1 | 2,880.0 | 3,400 |
| 1600757 | 1 X 400 | 40.0 | 3,840.0 | 4,400 |
| **H07BN4-F Wind Class6** | | | | |
| 1600715 | 1 X 95 | 22.4 | 912.0 | 1,230 |
| 1600716 | 1 X 120 | 24.3 | 1,152.0 | 1,490 |
| 1600717 | 1 X 150 | 27.2 | 1,440.0 | 1,875 |
| 1600718 | 1 X 185 | 29.3 | 1,776.0 | 2,190 |
| 1600719 | 1 X 240 | 32.6 | 2,304.0 | 2,900 |
| 1600720 | 1 X 300 | 36.0 | 2,880.0 | 3,400 |
| 1600721 | 1 X 400 | 40.0 | 3,840.0 | 4,400 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths

## Accessories

- V 1311 pressing pliers, hydraulic see main catalogue 2010/11 page 935
- STAR STRIP stripping tool see main catalogue 2010/11 page 908
- Cable shears KT 4 and KT 5 see main catalogue 2010/11 page 904

wind energy

# ÖLFLEX® CONTROL TM

**Info**

- **According to NFPA 79 Edition 2007 “Electrical Standard for Industrial Machinery” USA**


**WTTC-Approval**

## Benefits

- Broad application range due to multiple approvals
- Cost saving, easy installation due to renouncement of closed raceways (suitable for open wiring)

## Application range

- Industrial machinery; plant engineering
- Machine tools UL MTW (Machine Tool Wiring) conforming
- TC-ER (Tray Cable Exposed Run) approval for open wiring between cable tray and industrial machines/plants acc. to NEC 336.10(7)
- Wind Turbines: USA Wind Turbine Tray Cable (WTTC)
- Class 1, Div. 2 per NEC “National Electrical Code” Art. 336, 392, 501

## Product features

- Flame retardant according to CSA FT4 UL Vertical-Tray Flame Test
- Oil resistant according to UL OIL RES I
- Water resistant UL Wet Approval 75 °C

## Approvals (Norm references)

- Multi standard cables have conductor strands with nominal sizes in mm²**or** AWG/kcmil nominal sizes. The master size is mentioned in the table below, the equivalent size of the other system can be found in the main catalogue 2010/11 appendix T16. For this related secondary size the conductor cross-section mostly works out greater than the specified nominal value.

## Design

- Fine strands of bare copper wires
- Insulation: PVC with nylon jacket (PA skin)
- Special blended PVC outer sheath, grey (RAL 7001)

## Technical data

**Core identification code**
Black with white numbers

**Approvals**
UL MTW, TC-ER, WTTC 1000V, BUS DROP
c(UL) Type TC and CIC FT4
CSA AWM I/II A/B FT4

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Finely stranded bare copper wires

**Minimum bending radius**
6 x cable diameter

**Rated voltage**
UL/CSA: 600 V (TC, MTW, CIC), WTTC 1000V
UL/CSA: 1000 V (AWM)
HAR $U_0$/U: 300/500 V

**Test voltage**
2000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Fixed installation: -40°C up to +90°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® CONTROL TM** | | | | |
| 281803 | 3 G 1 | 7.4 | 28.8 | 82 |
| 281804 | 4 G 1 | 8.0 | 38.4 | 95 |
| 281805 | 5 G 1 | 8.6 | 48.0 | 112 |
| 281807 | 7 G 1 | 9.3 | 67.0 | 144 |
| 281812 | 12 G 1 | 12.0 | 115.0 | 247 |
| 281818 | 18 G 1 | 14.9 | 173.0 | 365 |
| 281825 | 25 G 1 | 16.7 | 240.0 | 464 |
| 281602 | 2 X 1.5 | 7.3 | 28.8 | 74 |
| 281603 | 3 G 1.5 | 8.1 | 43.0 | 100 |
| 281604 | 4 G 1.5 | 8.8 | 58.0 | 119 |
| 281605 | 5 G 1.5 | 9.5 | 72.0 | 141 |
| 281607 | 7 G 1.5 | 10.3 | 101.0 | 183 |
| 281609 | 9 G 1.5 | 11.9 | 129.6 | 247 |
| 281612 | 12 G 1.5 | 14.2 | 173.0 | 328 |
| 281618 | 18 G 1.5 | 16.2 | 259.0 | 403 |
| 281625 | 25 G 1.5 | 18.6 | 360.0 | 464 |
| 281403 | 3 G 2.5 | 9.1 | 72.0 | 125 |
| 281404 | 4 G 2.5 | 9.8 | 96.0 | 155 |
| 281405 | 5 G 2.5 | 10.7 | 120.0 | 185 |
| 281407 | 7 G 2.5 | 11.6 | 168.0 | 244 |
| 281203 | 3 G 4 | 10.6 | 115.0 | 165 |
| 281204 | 4 G 4 | 11.5 | 154.0 | 220 |
| 281205 | 5 G 4 | 12.6 | 192.0 | 269 |
| 281207 | 7 G 4 | 14.6 | 269.0 | 482 |
| 281004 | 4 G 6 | 14.5 | 231.0 | 382 |
| 281005 | 5 G 6 | 15.8 | 288.0 | 457 |
| 280804 | 4 G 10 | 19.5 | 384.0 | 615 |
| 280805 | 5 G 10 | 22.6 | 480.0 | 771 |
| 280604 | 4 G 16 | 22.8 | 615.0 | 864 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis‘ and ‚Metal index‘ see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired make-up (e.g. 1 x 610 m drum or 8 x 76 m coils)

## Comparable products

- ÖLFLEX® TRAY II see main catalogue 2010/11 page 47
- ÖLFLEX® CONTROL M see main catalogue 2010/11 page 69

## Accessories

- SKINTOP® MS-M see main catalogue 2010/11 page 650
- SKINTOP® ST-M see main catalogue 2010/11 page 641

# Power and control cables

## Wide range use

### PVC sheath, approved

wind energy

# ÖLFLEX® CONTROL TM CY


**WTTC-Approval**

**Info**

- **According to NFPA 79 Edition 2007 "Electrical Standard for Industrial Machinery" USA**
- **EMC compliant**

## Benefits

- Broad application range due to multiple approvals
- Cost saving, easy installation due to re-nouncement of closed raceways (suitable for open wiring)

## Application range

- Industrial machinery; plant engineering
- Machine tools UL MTW (Machine Tool Wiring) conforming
- TC-ER (Tray Cable Exposed Run) approval for open wiring between cable tray and industrial machines/plants acc. to NEC 336.10(7)
- Wind Turbines: USA Wind Turbine Tray Cable (WTTC)
- Class 1, Div. 2 per NEC "National Electrical Code" Art. 336, 392, 501

## Product features

- Flame retardant according to CSA FT4 UL Vertical-Tray Flame Test
- Oil resistant according to UL OIL RES I
- Water resistant UL Wet Approval 75 °C
- High coverage degree of the screen low transfer impedance (max. 250 Ω/km at 30 MHz)

## Approvals (Norm references)

- Multi standard cables have conductor strands with nominal sizes in mm²**or** AWG/kcmil nominal sizes. The master size is mentioned in the table below, the equivalent size of the other system can be found in the main catalogue 2010/11 appendix T16. For this related secondary size the conductor cross-section mostly works out greater than the specified nominal value.

## Design

- Fine strands of bare copper wires
- Insulation: PVC with nylon jacket (PA skin)
- Aluminum-plated foil
- Tinned copper braid
- Special blended PVC outer sheath, grey (RAL 7001)

## Technical data

**Core identification code**
Black with white numbers

**Approvals**
UL MTW, TC-ER, WTTC 1000V, BUS DROP
c(UL) Type TC and CIC FT4
CSA AWM I/II A/B FT4

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Finely stranded bare copper wires

**Minimum bending radius**
Fixed installed: 6 x outer diameter

**Rated voltage**
UL/CSA: 600 V (TC, MTW, CIC), WTTC 1000V
UL/CSA: 1000 V (AWM)
HAR $U_0$/U: 300/500 V

**Test voltage**
2000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Fixed installation: -40°C up to +90°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® CONTROL TM CY** | | | | |
| 281803CY | 3 G 1 | 8.1 | 49.5 | 119 |
| 281804CY | 4 G 1 | 8.6 | 60.2 | 137 |
| 281805CY | 5 G 1 | 9.3 | 81.4 | 149 |
| 281807CY | 7 G 1 | 10.0 | 101.1 | 193 |
| 281812CY | 12 G 1 | 12.8 | 161.4 | 330 |
| 281818CY | 18 G 1 | 15.5 | 228.2 | 438 |
| 281825CY | 25 G 1 | 17.5 | 326.4 | 574 |
| 281602CY | 2 X 1.5 | 8.3 | 49.7 | 115 |
| 281603CY | 3 G 1.5 | 8.8 | 65.0 | 144 |
| 281604CY | 4 G 1.5 | 9.4 | 81.9 | 173 |
| 281605CY | 5 G 1.5 | 10.2 | 99.1 | 189 |
| 281607CY | 7 G 1.5 | 11.1 | 140.4 | 246 |
| 281612CY | 12 G 1.5 | 15.0 | 225.2 | 426 |
| 281618CY | 18 G 1.5 | 17.2 | 321.7 | 552 |
| 281625CY | 25 G 1.5 | 19.4 | 453.6 | 750 |
| 281403CY | 3 G 2.5 | 9.7 | 105.7 | 180 |
| 281404CY | 4 G 2.5 | 10.4 | 135.6 | 223 |
| 281405CY | 5 G 2.5 | 11.5 | 160.3 | 268 |
| 281407CY | 7 G 2.5 | 12.4 | 213.0 | 327 |
| 281204CY | 4 G 4 | 12.3 | 198.5 | 315 |
| 281205CY | 5 G 4 | 14.2 | 242.7 | 388 |
| 281207CY | 7 G 4 | 15.3 | 323.4 | 499 |
| 281004CY | 4 G 6 | 15.3 | 284.6 | 552 |
| 281005CY | 5 G 6 | 16.7 | 348.8 | 613 |
| 280804CY | 4 G 10 | 18.5 | 458.4 | 857 |
| 280604CY | 4 G 16 | 22.9 | 723.6 | 1,208 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired make-up (e.g. 1 x 610 m drum or 8 x 76 m coils)

## Comparable products

- ÖLFLEX® TRAY II CY see main catalogue 2010/11 page 48

## Accessories

- SKINTOP® MS-SC-M see main catalogue 2010/11 page 657

wind energy

# ÖLFLEX® TRAY II


**Info**

- **According to NFPA 79 Edition 2007 "Electrical Standard for Industrial Machinery" USA**

## Benefits

- Broad application range due to multiple approvals
- Cost saving, easy installation due to re-nouncement of closed raceways (suitable for open wiring)

## Application range

- Industrial machinery; plant engineering
- TC-ER (Tray Cable Exposed Run) approval for open wiring between cable tray and industrial machines/plants acc. to NEC 336.10(7)
- Wind Turbines: USA Wind Turbine Tray Cable (WTTC)
- Class 1, Div. 2 per NEC "National Electrical Code" Art. 336, 392, 501
- Outdoor use suitable

## Product features

- Flame retardant according to CSA FT4 UL Vertical-Tray Flame Test
- Oil resistant according to UL OIL RES I
- Water resistant UL Wet Approval 75 °C
- UV resistant UL SUN RES

## Approvals (Norm references)

- Multi standard cables have conductor strands with nominal sizes in mm²**or** AWG/kcmil nominal sizes. The master size is mentioned in the table below, the equivalent size of the other system can be found in the main catalogue 2010/11 appendix T16. For this related secondary size the conductor cross-section mostly works out greater than the specified nominal value.

## Design

- Fine strands of bare copper wires
- Insulation: PVC with nylon jacket (PA skin)
- Special blended PVC outer sheath, black (RAL 9005)

## Technical data

**Core identification code**
Black with white numbers

**Approvals**
UL MTW, TC-ER, WTTC 1000V, BUS DROP
c(UL) Type TC and CIC FT4
CSA AWM I/II A/B FT4

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Fine copper wire strands

**Minimum bending radius**
5 x cable diameter

**Rated voltage**
UL/CSA: 600 V (TC, MTW, CIC), WTTC 1000V
UL/CSA: 1000 V (AWM)
HAR $U_0$/U: 300/500 V

**Test voltage**
2000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Fixed installation: -40°C up to +90°C

| Part number | Number of cores and mm² per conductor | AWG | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|---|
| **ÖLFLEX® Tray II** | | | | | |
| 221803 | 3G1 | | 7.5 | 28.8 | 85.0 |
| 221804 | 4G1 | | 8.1 | 38.4 | 98.0 |
| 221805 | 5G1 | | 8.9 | 48.0 | 115.0 |
| 221807 | 7G1 | | 9.5 | 67.0 | 149.0 |
| 221809 | 9G1 | | 11.1 | 87.0 | 167.0 |
| 221812 | 12G1 | | 12.1 | 115.0 | 255.0 |
| 221818 | 18G1 | | 14.8 | 173.0 | 365.0 |
| 221825 | 25G1 | | 17.0 | 240.0 | 479.0 |
| 221603 | 3G1,5 | | 8.1 | 43.0 | 103.0 |
| 221604 | 4G1,5 | | 8.7 | 58.0 | 124.0 |
| 221605 | 5G1,5 | | 9.5 | 72.0 | 146.0 |
| 221607 | 7G1,5 | | 10.2 | 101.0 | 189.0 |
| 221608 | 8G1,5 | | 11.0 | 116.0 | 203.0 |
| 221609 | 9G1,5 | | 11.8 | 130.0 | 255.0 |
| 221612 | 12G1,5 | | 13.3 | 173.0 | 328.0 |
| 221618 | 18G1,5 | | 16.2 | 259.0 | 431.0 |
| 221625 | 25G1,5 | | 18.7 | 360.0 | 592.0 |
| 221641 | 41G1,5 | | 24.5 | 591.0 | 931.0 |
| 221650 | 50G1,5 | | 25.7 | 720.0 | 1,132.0 |
| 221403 | 3G2,5 | | 8.8 | 72.0 | 130.0 |
| 221404 | 4G2,5 | | 9.6 | 96.0 | 159.0 |
| 221405 | 5G2,5 | | 10.4 | 120.0 | 191.0 |
| 221407 | 7G2,5 | | 11.3 | 168.0 | 252.0 |
| 221409 | 9G2,5 | | 13.1 | 216.0 | 335.0 |
| 221412 | 12G2,5 | | 15.5 | 288.0 | 459.0 |
| 221418 | 18G2,5 | | 17.8 | 432.0 | 654.0 |
| 221425 | 25G2,5 | | 20.5 | 600.0 | 874.0 |
| 221204 | 4G4 | | 11.4 | 153.0 | 226.0 |
| 221205 | 5G4 | | 12.5 | 192.0 | 279.0 |
| 221207 | 7G4 | | 14.5 | 269.0 | 384.0 |
| 221004 | 4G6 | | 15.1 | 231.0 | 394.0 |
| 221005 | 5G6 | | 16.5 | 288.0 | 472.0 |
| 221007 | 7G6 | | 17.9 | 405.0 | 661.0 |
| 220804 | 4G10 | | 19.5 | 384.0 | 615.0 |
| 220805 | 5G10 | | 22.6 | 480.0 | 771.0 |
| 220604 | 4G16 | | 22.8 | 615.0 | 864.0 |
| 220605 | 5G16 | | 24.9 | 768.0 | 1,080.0 |
| 220404 | 4 G | 4 | 27.7 | 960.0 | 1,418.0 |
| 220204 | 4 G | 2 | 32.0 | 1,344.0 | 2,077.0 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired make-up (e.g. 1 x 610 m drum or 8 x 76 m coils)

## Comparable products

- ÖLFLEX® CONTROL TM see main catalogue 2010/11 page 45
- ÖLFLEX® CONTROL M see main catalogue 2010/11 page 69

## Accessories

- SKINTOP® MS-M see main catalogue 2010/11 page 650
- SKINTOP® ST-M see main catalogue 2010/11 page 641

# Power and control cables

## Expanded ambient temperatures

### Silicone cables (-50°C up to +180°C)

wind energy

New

# ÖLFLEX® HEAT 180 C MS

**Screened and approved silicone cables for Noth America (AWM)**


**Info**

- **MS = Multi Standard**
  **For the use in the USA and in Canada**
- **UL AWM Style 4476 (150°C/600V)**
- **Formerly ÖLFLEX® HEAT 180 C UL/CSA**

## Benefits

- Approved for the USA and Canada for export-oriented appliance and apparatus builders
- Thicker cable design meets the requirements of the**FT-1flametest** and is thus also approved for installation in accordance with UL **outside** of apparatus and appliances
- Good flexibility ease the installation where space is limited
- Copper braiding assures EMC and screens against electromagnetic interference

## Application range

- Areas with high ambient temperatures where insulating and sheath materials of conventional cables will embrittle after a short while
- Typical fields of application
  - Steel-, cement-, ceramic and iron works
  - Bakery equipment and industrial furnaces
  - Electric motor industry
  - Sauna/solarium construction
  - Thermal and heating elements
  - Lighting technology
  - Ventilator engineering
  - Air conditioning technology
  - Galvanization technology
  - Polymer processing
  - Generator and transformer building
  - Wind turbine engineering

## Product features

- Metric flexible conductor design
- Halogen-free and flame retardant (IEC 60332-1-2)
- Reduced smoke density
- Good hydrolysis and UV resistance
- Resistant against a multitude of oils, alcohols, vegetable and animal fats and chemical media

## Approvals (Norm references)

CE cULus RoHS

- UL AWM 4476 and cUL AWM II A/B
- Also available on request as special product with AWM rating 200°C/600 V
- Multi-conductor Type AWM cables (Appliance Wiring Material) shall be permitted for industrial machinery (US) when part of a listed assembly suitable for the intended use only. NFPA 79 Edition 2007 §12.2.7.3

## Design

- Fine strands of tinned copper wires
- Silicone based core insulation
- Cores twisted together
- Tinned copper screen braiding, interleaved plastic foil wrapping
- Silicone based outer sheath, colour black (RAL 9005)

## Technical data

**Core identification code**
Colour coded according to VDE 0293-308, see main catalogue 2010/11 Appendix T9
Starting at 6 cores: Black with white numbers

**Approvals**
UL AWM Style 4476 (Construction B)
cUL AWM II A/B (Canada)

**Specific insulation resistance**
>200 GOhm x cm

**Conductor stranding**
Fine wire in accordance to VDE 0295 Class 5 / IEC 60228 Class 5
(For matching US conductor sizes according AWG please see technical table T16)

**Minimum bending radius**
Occasional flexing: 20 x cable diameter
Fixed installation: 6 x cable diameter

**Rated voltage**
VDE $U_0$/U: 300/500 V
Working voltage UL: 600 V

**Test voltage**
2000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
According VDE: -50 °C up to +180 °C
According to UL-Style: up to +150 °C
(adequate ventilation provided)

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® HEAT 180 C MS** | | | | |
| 0046701 | 3 G 0.5 | 8.6 | 43.4 | 100.0 |
| 0046702 | 4 G 0.5 | 9.3 | 55.4 | 122.0 |
| 0046703 | 5 G 0.5 | 10.0 | 60.2 | 137.0 |
| 0046708 | 2 X 1 | 9.0 | 48.2 | 104.0 |
| 0046709 | 3 G 1 | 9.5 | 65.0 | 131.0 |
| 0046710 | 4 G 1 | 10.2 | 74.6 | 152.0 |
| 0046711 | 5 G 1 | 11.0 | 91.5 | 181.0 |
| 0046712 | 7 G 1 | 11.9 | 117.9 | 228.0 |
| 0046716 | 2 X 1.5 | 9.6 | 65.0 | 126.0 |
| 0046717 | 3 G 1.5 | 10.1 | 79.4 | 152.0 |
| 0046718 | 4 G 1.5 | 10.9 | 101.1 | 186.0 |
| 0046719 | 5 G 1.5 | 11.8 | 122.7 | 222.0 |
| 0046720 | 7 G 1.5 | 12.8 | 158.7 | 281.0 |
| 0046721 | 12 G 1.5 | 16.9 | 245.2 | 431.0 |
| 0046723 | 18 G 1.5 | 19.6 | 346.1 | 600.0 |
| 0046724 | 25 G 1.5 | 23.9 | 495.7 | 833.0 |
| 0046728 | 3 G 2.5 | 11.0 | 115.5 | 197.0 |
| 0046729 | 4 G 2.5 | 11.9 | 146.7 | 244.0 |
| 0046730 | 5 G 2.5 | 12.9 | 177.9 | 291.0 |
| 0046734 | 3 G 4 | 12.3 | 165.9 | 261.0 |
| 0046735 | 4 G 4 | 13.4 | 211.5 | 325.0 |
| 0046736 | 5 G 4 | 14.9 | 257.2 | 389.0 |
| 0046740 | 4 G 6 | 17.2 | 302.8 | 482.0 |
| 0046741 | 5 G 6 | 18.7 | 367.6 | 580.0 |
| 0046742 | 4 G 10 | 22.8 | 508.4 | 802.0 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

## Comparable products

- ÖLFLEX® HEAT 180 MS see main catalogue 2010/11 page 175
- ÖLFLEX® HEAT 180 EWKF C see main catalogue 2010/11 page 178

wind energy

# UNITRONIC® BUS CAN

**Info**

- CAN = Controller Area Network


# UNITRONIC® BUS CAN FD P


## Application range

**UNITRONIC® BUS CAN**

- Stationary application

**UNITRONIC® BUS CAN FD P**

- For highly flexible applications.

## Product features

**UNITRONIC® BUS CAN**

- Maximum bit rate: 1 Mbit/s for 40 m segment length
- Larger conductor crosssection necessary with increasing length
  See Table below (reference values from ISO 11898).
- For the segment length, cable cross-section and bit rate, ISO 11898 makes recommendations
- Flame retardant according to IEC 60332-1-2

**UNITRONIC® BUS CAN FD P**

- Halogen free
- Maximum bit rate: 1 Mbit/s for 40 m segment length
- Larger conductor crosssection necessary with increasing length
  See Table below (reference values from ISO 11898).
- For the segment length, cable cross-section and bit rate, ISO 11898 makes recommendations
- Flame retardant according to IEC 60332-1-2

## Approvals (Norm references)

c UL us RoHS

- Standardised internationally in ISO 11898
- UL/CSA type CMX (UL 444)

## Design

**UNITRONIC® BUS CAN**

- Stranded 7-wire bare copper conductor
- Colour coded in accordance with DIN 47100
- Copper braid
- PVC outer sheath
- Colour: violet (RAL 4001)

**UNITRONIC® BUS CAN FD P**

- Stranded bare copper conductor
- Screen braiding made from copper wire
- PUR outer sheath
- Colour: violet (RAL 4001)
- UV-resistant (but colour change after some time possible)

## Technical data

**Mutual capacitance**
**UNITRONIC® BUS CAN**
(800 Hz): max. 40 nF/km
**UNITRONIC® BUS CAN FD P**
(800 Hz): max. 60 nF/km

**Peak working voltage**
**UNITRONIC® BUS CAN**
(not for power purposes) 250 V
**UNITRONIC® BUS CAN FD P**
250 V (not for power applications)

**Conductor resistance**
**UNITRONIC® BUS CAN**
(loop):
max. 186 Ohm/km
**UNITRONIC® BUS CAN FD P**
(loop): max. 159.8 Ohm/km

**Minimum bending radius**
**UNITRONIC® BUS CAN**
Fixed installation: 8 x cable diameter
**UNITRONIC® BUS CAN FD P**
Flexing: 15 x cable diameter

**Test voltage**
Core/core: 1500 V

**Range of temperature**
**UNITRONIC® BUS CAN**
Static:
-30°C up to +80°C
Flexing: -5°C up to +70°C
**UNITRONIC® BUS CAN FD P**
Fixed installation: -40°C up to +80°C
Flexing: -30°C up to +70°C

**Characteristic impedance**
120 ohms

| Part number | Article designation | Number of pairs / conductor cross-section in mm² | Outer diameter mm | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|---|
| **For fixed installation** | | | | | |
| 2170260 | UNITRONIC® BUS CAN | 1 x 2 x 0,22 | 5.7 | 16.7 | 42.0 |
| 2170261 | UNITRONIC® BUS CAN | 2 x 2 x 0,22 | 7.6 | 34.8 | 68.0 |
| 2170263 | UNITRONIC® BUS CAN | 1 x 2 x 0,34 | 6.8 | 22.1 | 55.0 |
| 2170264 | UNITRONIC® BUS CAN | 2 x 2 x 0,34 | 8.5 | 46.4 | 88.0 |
| 2170266 | UNITRONIC® BUS CAN | 1 x 2 x 0,5 | 7.5 | 41.6 | 90.0 |
| 2170267 | UNITRONIC® BUS CAN | 2 x 2 x 0,5 | 9.7 | 59.4 | 106.0 |
| 2170269 | UNITRONIC® BUS CAN | 1 x 2 x 0,75 | 8.7 | 52.7 | 108.0 |
| 2170270 | UNITRONIC® BUS CAN | 2 x 2 x 0,75 | 11.5 | 80.6 | 142.0 |
| **For highly flexible application (power chains, frequently moved machine parts)** | | | | | |
| 2170272 | UNITRONIC® BUS CAN FD P | 1 x 2 x 0,25 | 6.4 | 17.5 | 40.0 |
| 2170273 | UNITRONIC® BUS CAN FD P | 2 x 2 x 0,25 | 8.4 | 28.0 | 65.0 |
| 2170275 | UNITRONIC® BUS CAN FD P | 1 x 2 x 0,34 | 6.8 | 32.8 | 60.0 |
| 2170276 | UNITRONIC® BUS CAN FD P | 2 x 2 x 0,34 | 9.6 | 52.4 | 88.0 |
| 2170278 | UNITRONIC® BUS CAN FD P | 1 x 2 x 0,5 | 8.0 | 41.9 | 74.0 |
| 2170279 | UNITRONIC® BUS CAN FD P | 2 x 2 x 0,5 | 10.8 | 59.4 | 100.0 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

## Accessories

**UNITRONIC® BUS CAN**

- Multipurpose shears A and B see main catalogue 2010/11 page 902
- SMARTSTRIP stripping tool see main catalogue 2010/11 page 909

**UNITRONIC® BUS CAN FD P**

- SILVYN® CHAIN
- Multipurpose shears A and B see main catalogue 2010/11 page 902
- SMARTSTRIP stripping tool see main catalogue 2010/11 page 909

# Optical transmission systems

## For communication technology

### GOF cables

wind energy

# HITRONIC® HQN Outdoor Cable

**Info**

- Outdoor cable with central buffer tube
- UV light resistant
- halogen-free

## Benefits

- F.O. Glass Fibre Optical cable for outdoor with nonmetalic Glass yarn strength members
- Easy to install due to compact structure, high flexibility, robust sheath and small bending radius
- Methods of Deployment: empty plastic pipes, ducts and trays
- Suitable for direct burial

## Application range

- For outdoor use
- Campus backbone
- Direct burial
- WAN applications
- Industrial environment

## Product features

- Central loose tube with up to 24 fibres
- Robust and halogen-free PE outer sheath
- Longitudinal watertight
- Protection against rodent
- High permissible tensile force

## Approvals (Norm references)

RoHS

## Design

- Fibres with primary coating
- Gel-filled loose tube
- Glass yarns with water-blocking tape
- PE outer sheath
- Colour: black (similar to RAL 9005)

## Technical data

**Standard designation**
A-DQ(ZN)B2Y

**Range of temperature**
Operation: -20°C up to +60°C
Installation: 0°C up to +50°C
Storage: -25°C up to +70°C (HQN1000)
-40°C up to +70°C (HQN1500, HQN2500)

**Permissible bending radius**
With tensile:
20 x cable diameter
Without tensile:
15 x cable diameter

**Permissible tensile force**
1.000 N to 2.500 N

| Part number | Article designation | Fibre type | Number of fibres | Tension load capacity in N | Outer diameter in mm max. |
|---|---|---|---|---|---|
| **HITRONIC® HQN1000 Multimode G 50** | | | | | |
| 2760041 | HITRONIC® HQN1000 4G 50/125 | 50/125 | 4 | 1,000 | 6.5 |
| 2760081 | HITRONIC® HQN1000 8G 50/125 | 50/125 | 8 | 1,000 | 6.5 |
| 2760121 | HITRONIC® HQN1000 12G 50/125 | 50/125 | 12 | 1,000 | 6.5 |
| 2760241 | HITRONIC® HQN1000 24G 50/125 | 50/125 | 24 | 1,000 | 6.8 |
| **HITRONIC® HQN1000 Multimode G 62.5** | | | | | |
| 2761041 | HITRONIC® HQN1000 4G 62.5/125 | 62,5/125 | 4 | 1,000 | 6.5 |
| 2761081 | HITRONIC® HQN1000 8G 62.5/125 | 62,5/125 | 8 | 1,000 | 6.5 |
| 2761121 | HITRONIC® HQN1000 12G 62.5/125 | 62,5/125 | 12 | 1,000 | 6.5 |
| 2761241 | HITRONIC® HQN1000 24G 62.5/125 | 62,5/125 | 24 | 1,000 | 6.8 |
| **HITRONIC® HQN1000 Singlemode E 9** | | | | | |
| 2762041 | HITRONIC® HQN1000 4E 9/125 | 9/125 | 4 | 1,000 | 6.5 |
| 2762081 | HITRONIC® HQN1000 8E 9/125 | 9/125 | 8 | 1,000 | 6.5 |
| 2762121 | HITRONIC® HQN1000 12 E9/125 | 9/125 | 12 | 1,000 | 6.5 |
| 2762241 | HITRONIC® HQN1000 24E 9/125 | 9/125 | 24 | 1,000 | 6.8 |
| **HITRONIC® HQN1500 Multimode G 50** | | | | | |
| 276004 | HITRONIC® HQN1500 4G 50/125 | 50/125 | 4 | 1,500 | 7.5 |
| 276008 | HITRONIC® HQN1500 8G 50/125 | 50/125 | 8 | 1,500 | 7.5 |
| 276012 | HITRONIC® HQN1500 12G 50/125 | 50/125 | 12 | 1,500 | 7.5 |
| **HITRONIC® HQN1500 Multimode G 62.5** | | | | | |
| 276104 | HITRONIC® HQN1500 4G 62.5/125 | 62,5/125 | 4 | 1,500 | 7.5 |
| 276108 | HITRONIC® HQN1500 8G 62.5/125 | 62,5/125 | 8 | 1,500 | 7.5 |
| 276112 | HITRONIC® HQN1500 12G 62.5/125 | 62,5/125 | 12 | 1,500 | 7.5 |
| 276124 | HITRONIC® HQN1500 24G 62.5/125 | 62,5/125 | 24 | 1,500 | 7.8 |
| **HITRONIC® HQN1500 Singlemode E 9** | | | | | |
| 276208 | HITRONIC® HQN1500 8E 9/125 | 9/125 | 8 | 1,500 | 7.5 |
| 276212 | HITRONIC® HQN1500 12E 9/125 | 9/125 | 12 | 1,500 | 7.5 |
| 276224 | HITRONIC® HQN1500 24E 9/125 | 9/125 | 24 | 1,500 | 7.8 |
| **HITRONIC® HQN2500 Multimode G 50** | | | | | |
| 276304 | HITRONIC® HQN2500 4G 50/125 | 50/125 | 4 | 2,500 | 9.6 |
| 276308 | HITRONIC® HQN2500 8G 50/125 | 50/125 | 8 | 2,500 | 9.6 |
| 276312 | HITRONIC® HQN2500 12G 50/125 | 50/125 | 12 | 2,500 | 9.6 |
| 276324 | HITRONIC® HQN2500 24G 50/125 | 50/125 | 24 | 2,500 | 9.8 |
| **HITRONIC® HQN2500 Multimode G 62.5** | | | | | |
| 276404 | HITRONIC® HQN2500 4G 62.5/125 | 62,5/125 | 4 | 2,500 | 9.6 |
| 276408 | HITRONIC® HQN2500 8 G 62.5/125 | 62,5/125 | 8 | 2,500 | 9.6 |
| 276412 | HITRONIC® HQN2500 12G 62.5/125 | 62,5/125 | 12 | 2,500 | 9.6 |
| **HITRONIC® HQN2500 Singlemode E 9** | | | | | |
| 276508 | HITRONIC® HQN2500 8E 9/125 | 9/125 | 8 | 2,500 | 9.6 |
| 276512 | HITRONIC® HQN2500 12E 9/125 | 9/125 | 12 | 2,500 | 9.6 |

The cables can also be supplied as cut-to-measure LWL trunks. Special multimode fibres (50/125 OM3) for 10 Gigabit Ethernet operation on request.

## Accessories

- Pigtails see main catalogue 2010/11 page 439
- DATA STRIP stripping tool see main catalogue 2010/11 page 909

wind energy

New

# SKINTOP® MS-M BRUSH

**Info**

- **Sizes SKINTOP® MS-M BRUSH 75x1,5 to 110x2 with innovative double lamella gasket for easier assembling of cables with large diameters.**
- **Formerly product name: SKINTOP® MS-SC-M BRUSH**

## Benefits

- Faster, easier screen contact
- Optimal low-resistance 360° screen contact
- Faster than any other comparable system
- Uncomplicated and reliable
- Maximum assembly and adjustment possibility

## Application range

- For EMC compliant earthing of the copper braiding and copper shaft sheath
- Automotive systems
- Conveyor technology
- High power drives
- Frequency converters

## Approvals (Norm references)

CE cULus DVE RoHS DNV

## Design

- Metric connection thread acc. to EN 50262

## Note

- For painted, anodised or powdered-coated housings, you will require our EMC counter nut SKINDICHT® SM-PE-M for best contact

## Technical data

**Caution**
Installation dimensions and tightening torques see main catalogue 2010/11 Appendix T21

**Approvals**
VDE, UL, CSA, DNV approval for size M90x2 and 110x2 pending

**Material**
Body: nickel plated brass
Insert: polyamide
Seal: special elastomer
O-ring: special elastomer

**Degree of protection**
IP 68
IP 69 K (M12 x 1,5 - M63 x 1,5)

**Range of temperature**
Dynamic: -30°C up to +100°C

| Part number | Part designation / size | Outer-Ø mm from - to | Minimum Ø above braiding in mm | SW mm | Thread length D mm | Pieces / PU |
|---|---|---|---|---|---|---|
| **SKINTOP® MS-M BRUSH** | | | | | | |
| 53112676 | 25 x 1,5 | 9.0-17.0 | 6.0 | 29 | 8.0 | 10 |
| 53112677 | 32 x 1,5 | 11.0-21.0 | 8.0 | 36 | 9.0 | 1 |
| 53112678 | 40 x 1,5 | 19.0-28.0 | 10.0 | 45 | 9.0 | 1 |
| 53112679 | 50 x 1,5 | 27.0-35.0 | 14.0 | 54 | 10.0 | 1 |
| 53112680 | 63 x 1,5 | 34.0-45.0 | 20.0 | 67 | 15.0 | 1 |
| 53112681 | 63 x 1,5 plus | 44.0-55.0 | 25.0 | 75 | 15.0 | 1 |
| 53112501 | 75 x 1,5 | 53.0-63.0 | 35.0 | 95 | 15.0 | 1 |
| 53112500 | 75 x 1,5 plus | 58.0-68.0 | 35.0 | 95 | 15.0 | 1 |
| 53112503 | 90 x 2 | 66.0-78.0 | 45.0 | 115 | 20.0 | 1 |
| 53112505 | 110 x 2 | 76.0-88.0 | 55.0 | 135 | 25.0 | 1 |
| 53112504 | 110 x 2 plus | 86.0-98.0 | 55.0 | 135 | 25.0 | 1 |

## Accessories

- SKINDICHT® SM-PE-M see main catalogue 2010/11 page 687

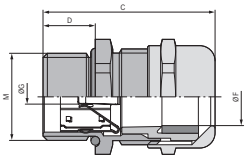
# Cable glands

## SKINTOP® cable glands nickel plated brass metric

### SKINTOP® EMC/Earthing

wind energy

## SKINTOP® MS-SC-M




SKINTOP® MS-SC-M

### Benefits

- Suitable for cables and wires with and without inner sheath
- Also suitable for continuing the cable screen to another connection
- Low resistance screen contact, optimal EMC protection
- High conductive, flexible EMC contact for clamping of various screen diameters
- Few operation steps, easy to assemble

### Application range

- For EMC compliant earthing of the copper braiding and copper shaft sheath
- Automation technology
- Tele communication
- Measurement and control technology
- Plant engineering and construction

### Approvals (Norm references)

CE cULus cULus RoHS

### Design

- Metric connection thread acc. to EN 50262

### Note

- For painted, anodised or powdered-coated housings, you will require our EMC counter nut SKINDICHT® SM-PE-M for best contact
- For suitable accessories see SKINTOP® metric accessories
- As a variant for thick wall housings we recommend SKINTOP® MS-SC-M-XL with long connection thread in the sizes M16 to M50

### Technical data

**Caution**
Installation dimensions and tightening torques see main catalogue 2010/11 Appendix T21

**Material**
Body: Nickel plated brass
Insert: Polyamide
Seal: CR
O-ring: NBR

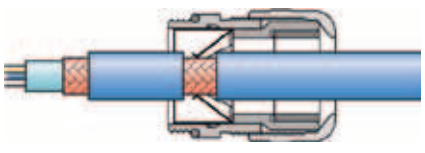
**Degree of protection**
IP 68 - 10 bar

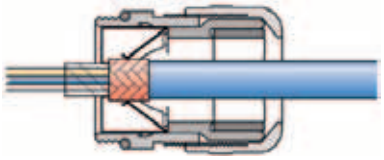
**Range of temperature**
-30°C up to +100°C

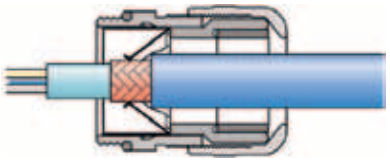
| Part number | Part designation / size | Outer-Ø mm from - to | Minimum Ø above braiding in mm | SW mm | Thread length D mm | Pieces / PU |
|---|---|---|---|---|---|---|
| **SKINTOP® MS-SC-M** | | | | | | |
| 53112610 | 12 x 1,5 | 3,5-7.0 | 2.0 | 16 | 6.5 | 50 |
| 53112620 | 16 x 1,5 | 4,5-9.0 | 4.0 | 20 | 7.0 | 50 |
| 53112630 | 20 x 1,5 | 7.0-12,5 | 5.0 | 24 | 8.0 | 25 |
| 53112640 | 25 x 1,5 | 9.0-16,5 | 7.5 | 29 | 8.0 | 25 |
| 53112650 | 32 x 1,5 | 11.0-21.0 | 9.0 | 36 | 9.0 | 25 |
| 53112660 | 40 x 1,5 | 19.0-28.0 | 15.0 | 45 | 9.0 | 10 |
| 53112670 | 50 x 1,5 | 27.0-35.0 | 21.0 | 54 | 10.0 | 5 |
| **SKINTOP® MS-SC-M-XL** | | | | | | |
| 53112625 | 16 x 1,5 | 4,5-9.0 | 4.0 | 20 | 12.0 | 50 |
| 53112635 | 20 x 1,5 | 7.0-12,5 | 5.0 | 24 | 12.0 | 25 |
| 53112645 | 25 x 1,5 | 9.0-16,5 | 7.5 | 29 | 12.0 | 25 |
| 53112655 | 32 x 1,5 | 11.0-21.0 | 9.0 | 36 | 15.0 | 25 |
| 53112665 | 40 x 1,5 | 19.0-28.0 | 15.0 | 45 | 15.0 | 10 |
| 53112675 | 50 x 1,5 | 27.0-35.0 | 21.0 | 54 | 15.0 | 5 |

### Accessories

- SKINDICHT® SM-PE-M see main catalogue 2010/11 page 687







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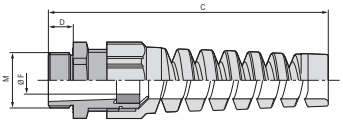
# SKINTOP® BS-M




SKINTOP® BS-M

## Benefits

- Reliable bending and antikink protection
- Conservation
- Functional reliability
- To protect flexible cables

## Application range

- Cables for electrical appliances and machinery, which are moved under normal use, must be protected against excessive bending, as required in accordance with VDE 0730.
- Hand-held equipment
- Robotics industry
- Light and sound applications
- Flexing machine parts

## Approvals (Norm references)

## Design

- Metric connection thread acc. to EN 50262

## Note

- For suitable accessories see SKINTOP® metric accessories
- Counter nut to be used SKINTOP® GMP-GL-M
- Version with reducing insert to seal smaller cable cross-sections SKINTOP® BSR-M on request
- Versions SKINTOP® BS M ISO with extra long connection thread, see table, have no DNV approval

## Technical data

**Caution**
Installation dimensions and tightening torques see main catalogue 2010/11 Appendix T21

**On request**
With reducing sealing ring

**Colour delivered**
RAL 7001 silver-grey
RAL 7035 light grey
RAL 9005 black / UV resistant

**Material**
Body: Polyamide
Seal: CR

**Degree of protection**
IP 68 - 5 bar
IP 69 K pending

**Range of temperature**
-20°C up to +100°C

| Part number | Part designation / size | Clamping range ØF mm | SW mm | Overall length C mm | Thread length D mm | Pieces / PU |
|---|---|---|---|---|---|---|
| **SKINTOP® BS-M silver grey** | | | | | | |
| 53111600 | BS-M 12x1,5 | 3,5-7 | 15 | 64.0 | 8.0 | 100 |
| 53111610 | BS-M 16x1,5 | 4,5-10 | 19 | 86.0 | 8.0 | 100 |
| 53111620 | BS-M 20x1,5 | 7-13 | 25 | 101.0 | 8.0 | 50 |
| 53111630 | BS-M 25x1,5 | 9-17 | 30 | 125.0 | 9.0 | 25 |
| 53111640 | BS-M 32x1,5 | 11-21 | 36 | 149.0 | 10.0 | 25 |
| **SKINTOP® BS-M black** | | | | | | |
| 53111700 | BS-M 12x1,5 | 3,5-7 | 15 | 64.0 | 8.0 | 100 |
| 53111710 | BS-M 16x1,5 | 4,5-10 | 19 | 86.0 | 8.0 | 100 |
| 53111720 | BS-M 20x1,5 | 7-13 | 25 | 101.0 | 8.0 | 50 |
| 53111730 | BS-M 25x1,5 | 9-17 | 30 | 125.0 | 9.0 | 25 |
| 53111740 | BS-M 32x1,5 | 11-21 | 36 | 149.0 | 10.0 | 25 |
| **SKINTOP® BS-M light grey** | | | | | | |
| 53111800 | BS-M 12x1,5 | 3,5-7 | 15 | 64.0 | 8.0 | 100 |
| 53111810 | BS-M 16x1,5 | 4,5-10 | 19 | 86.0 | 8.0 | 100 |
| 53111820 | BS-M 20x1,5 | 7-13 | 25 | 101.0 | 8.0 | 50 |
| 53111830 | BS-M 25x1,5 | 9-17 | 30 | 125.0 | 9.0 | 25 |
| 53111840 | BS-M 32x1,5 | 11-21 | 36 | 149.0 | 10.0 | 25 |
| **SKINTOP® BS M ISO silver-grey (with long metric connecting thread)** | | | | | | |
| 53017610 | BS M16 x 1,5 PG 9 | 3,5-8 | 19 | 77.5 | 12.0 | 100 |
| 53017630 | BS M 20 x 1,5 PG 13,5 | 5-12 | 24 | 102.0 | 13.0 | 50 |
| 53017640 | BS M 25 x 1,5 PG 16 | 9-14 | 27 | 114.5 | 13.0 | 50 |
| **SKINTOP® BS M ISO black (with long metric connecting thread)** | | | | | | |
| 53017810 | BS M 16 x 1,5 PG 9 | 3,5-8 | 19 | 77.5 | 12.0 | 100 |
| 53017830 | BS M 20 x 1,5 PG 13,5 | 5-12 | 24 | 102.0 | 13.0 | 50 |
| 53017840 | BS M 25 x 1,5 PG 16 | 9-14 | 27 | 114.5 | 13.0 | 50 |

# Cable glands

## SKINTOP® cable glands nickel plated brass metric

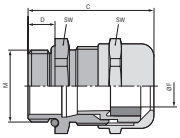
### SKINTOP® COLD

wind energy

**New**

## SKINTOP® COLD / SKINTOP® COLD-R

SKINTOP® COLD



SKINTOP® COLD-R

**Info**

- For extreme negative temperatures

### Benefits

**SKINTOP® COLD**

- Increased cold resistant
- Dynamic strain stability
- High mechanic stability
- Optimal strain relief
- Large, variable clamping ranges

**SKINTOP® COLD-R**

- Benefits see SKINTOP® COLD

### Application range

**SKINTOP® COLD**

- In areas with high demand on special mechanical stability and cold resistance.
- Air conditioning technology
- Freezing plants, cold stores
- Off shore
- Plant engineering

**SKINTOP® COLD-R**

- With reducing seal insert, to seal cables with smaller outer diameters.

### Approvals (Norm references)

CE VDE RoHS

### Design

- Metric connection thread acc. to EN 50262

### Note

- Counter nut to be used SKINDICHT® SM-M
- For suitable accessories see SKINTOP® metric accessories

### Technical data

**Caution**
Installation dimensions and tightening torques see main catalogue 2010/11 Appendix T21

**Material**
Body: Nickel plated brass
Insert: Special Polyamide
Seal: Silicone
O-ring: Silicone

**Degree of protection**
IP 68 - 10 bar

**Range of temperature**
-70°C up to +100°C

| Part number | Part designation / size | Clamping range ØF mm | SW mm | Overall length C mm | Thread length D mm | Pieces / PU |
|---|---|---|---|---|---|---|
| **SKINTOP® COLD** | | | | | | |
| 53113500 | 12 x 1,5 | 3-7 | 16 | 26.5 | 6.5 | 100 |
| 53113510 | 16 x 1,5 | 4,5-10 | 20 | 32.0 | 7.0 | 100 |
| 53113520 | 20 x 1,5 | 7-13 | 24 | 35.5 | 8.0 | 50 |
| 53113530 | 25 x 1,5 | 9-17 | 29 | 37.5 | 8.0 | 25 |
| 53113540 | 32 x 1,5 | 11-21 | 36 | 42.2 | 9.0 | 25 |
| 53113550 | 40 x 1,5 | 19-28 | 45 | 49.5 | 9.0 | 10 |
| 53113560 | 50 x 1,5 | 27-35 | 54 | 52.0 | 10.0 | 5 |
| 53113570 | 63 x 1,5 | 34-45 | 67 | 61.3 | 15.0 | 5 |
| **SKINTOP® COLD-R** | | | | | | |
| 53113600 | 12 x 1,5 | 1-5 | 16 | 26.5 | 6.5 | 100 |
| 53113610 | 16 x 1,5 | 2-7 | 20 | 32.0 | 7.0 | 100 |
| 53113620 | 20 x 1,5 | 5-10 | 24 | 35.5 | 8.0 | 50 |
| 53113630 | 25 x 1,5 | 6-13 | 29 | 37.5 | 8.0 | 25 |
| 53113640 | 32 x 1,5 | 7-15 | 36 | 42.2 | 9.0 | 25 |
| 53113650 | 40 x 1,5 | 15-23 | 45 | 49.5 | 9.0 | 10 |
| 53113660 | 50 x 1,5 | 22-29 | 54 | 52.0 | 10.0 | 5 |
| 53113670 | 63 x 1,5 | 28-39 | 67 | 61.3 | 15.0 | 5 |

SKINTOP® Cable Bushing System

wind energy

New

# SKINTOP® CUBE

**Info**

- **Innovative multi cable bushing system with variable clamping ranges for high assembling flexibility.**
- **In case of disassembling frame can remain on housing and clip module on the cable.**

SKINTOP® CUBE

SKINTOP® CUBE FRAME

SKINTOP® CUBE MODULE

## Benefits

- Various clamping range
- Vibration safe fixed modules
- Strain relief
- Oil resistance
- Simplified service due to easy assembling and disassembling

## Application range

- For installation of harnessed cables
- Everywhere where cables must be safely inserted into housings.
- Apparatus and switch cabinet construction
- Electronic installations
- Automation technology

## Approvals (Norm references)

CE RoHS

## Design

- SKINTOP® CUBE consists of SKINTOP® CUBE FRAME and the flexible clip module SKINTOP® CUBE MODULE.
- For cut-outs for industrial connectors with standard defined bore holes.
- For cut-outs for 16-pole industrial connectors (36 x 86mm)
- For cut-outs for 24-pole industrial connectors (36 x 112mm)

## Scope of delivery

- SKINTOP® CUBE FRAME including mounting material

## Suitable tools

- Kraftform Kompakt® 10

## Technical data

DIN VDE **Approvals**
UL pending

**Material**
Frame: Glas fibre reinforced polyamide
Frame seal: CR
Clip Module: Special polypropylene
Clip Module Seal: LSE 2

IP **Degree of protection**
IP 64

**Range of temperature**
-20°C up to +80°C

| Part number | Part designation / size | Clamping range ØF mm | Max. Number of executions | Pieces / PU |
|---|---|---|---|---|
| **SKINTOP® CUBE Frame** | | | | |
| 52220000 | SKINTOP® CUBE FRAME 16 | | 8 | 1 |
| 52220001 | SKINTOP® CUBE FRAME 24 | | 10 | 1 |
| **SKINTOP® CUBE Clip Module** | | | | |
| 52220002 | SKINTOP® CUBE MODULE 20x20 SMALL | 4 - 6 | | 5 |
| 52220003 | SKINTOP® CUBE MODULE 20x20 LARGE | 6 - 9 | | 5 |
| 52220004 | SKINTOP® CUBE MODULE 20x20 BLIND | | | 5 |
| 52220005 | SKINTOP® CUBE MODULE 40x40 SMALL | 9 - 12 | | 5 |
| 52220006 | SKINTOP® CUBE MODULE 40x40 LARGE | 12 - 16 | | 5 |
| 52220007 | SKINTOP® CUBE MODULE 40x40 BLIND | | | 5 |

## Comparable products

- Cable Bushing System see main catalogue 2010/11 page 667 CABLEFIX

## Accessories

- FLEXIMARK® LB-10 W

SKINTOP® CUBE

# Protective Cable Conduit Systems and Cable Carrier Systems

## Protective cable conduit systems parallelly corrugated

**SILVYN® FPAS**

wind energy

New

# SILVYN® FLEXILOK M / SILVYN® FLEXILOK PG

SILVYN® FLEXILOK M

**Info**

- Extremely economical

### Benefits

- Fast mounting
- Easy assembly
- Cost efficient conduit gland
- No losable parts
- New space-saveing design

### Application range

- Mechanic engineering
- Switch cabinet building
- Flexible application
- Applications with critical required space
- Building Installation

### Product features

- UV resistant and weather proof
- One-piece slim design
- Oil and petrol resistant
- Halogen and cadmium-free

### Approvals (Norm references)

RoHS

### Design

- Connection thread metric/PG
- One-piece body
- Special clamping system

### Note

- Removeable by a screw driver

### Suitable conduits

- SILVYN® FPAS see main catalogue 2010/11 page 798
- Corrugated plasitc conduits

### Technical data

**On request**
white

**Colour delivered**
Black, RAL 9005, UV-resistant
silver grey (RAL7031)

**Material**
PA66
Halogen-free

**Degree of protection**
IP 66

**Range of temperature**
-50°C up to +135°C

| Part number | Connection thread M | Inner Ø in mm | Thread length D mm | Suitable for SILVYN® FPAS | Suitable for conduit OØ mm | Pieces / PU |
|---|---|---|---|---|---|---|
| **SILVYN® FLEXILOK M straight** | | | | | | |
| 65500405 | 16 x 1,5 | 12.0 | 12.0 | FPAS 13 | 13,0 mm | 50 |
| 65500425 | 16 x 1,5 | 12.0 | 12.0 | FPAS 16 | 15,8 mm | 50 |
| 65500415 | 20 x 1,5 | 14.0 | 14.0 | FPAS 13 | 13,0 mm | 50 |
| 65500435 | 20 x 1,5 | 14.0 | 14.0 | FPAS 16 | 15,8 mm | 50 |
| 65500445 | 20 x 1,5 | 14.0 | 14.0 | FPAS 21 | 21,2 mm | 50 |
| 65500455 | 25 x 1,5 | 20.0 | 15.0 | FPAS 28 | 28,5 mm | 50 |
| 65500465 | 32 x 1,5 | 27.0 | 16.0 | FPAS 34 | 34,5 mm | 50 |
| **SILVYN® FLEXILOK M straight** | | | | | | |
| 65500600 | 16 x 1,5 | 12.0 | 12.0 | FPAS 13 | 13,0 mm | 50 |
| 65500420 | 16 x 1,5 | 12.0 | 12.0 | FPAS 16 | 15,8 mm | 50 |
| 65500410 | 20 x 1,5 | 14.0 | 14.0 | FPAS 13 | 13,0 mm | 50 |
| 65500430 | 20 x 1,5 | 14.0 | 14.0 | FPAS 16 | 15,8 mm | 50 |
| 65500440 | 20 x 1,5 | 14.0 | 14.0 | FPAS 21 | 21,2 mm | 50 |
| 65500610 | 25 x 1,5 | 20.0 | 15.0 | FPAS 28 | 28,5 mm | 50 |
| 65500460 | 32 x 1,5 | 27.0 | 16.0 | FPAS 34 | 34,5 mm | 50 |
| **SILVYN® FLEXILOK PG straight** | | | | | | |
| 65500475 | 9.0 | 12.0 | 10.0 | FPAS 13 | 13,0 mm | 50 |
| 65500495 | 9.0 | 12.0 | 10.0 | FPAS 16 | 15,8 mm | 50 |
| 65500485 | 11.0 | 12.0 | 10.0 | FPAS 13 | 13,0 mm | 50 |
| 65500395 | 11.0 | 15.0 | 10.0 | FPAS 16 | 15,8 mm | 50 |
| 68100055 | 13,5 | 15.0 | 10.0 | FPAS 16 | 15,8 mm | 50 |
| 68100075 | 13,5 | 16.0 | 10.0 | FPAS 21 | 21,2 mm | 50 |
| 68100065 | 16.0 | 15.0 | 11.0 | FPAS 16 | 15,8 mm | 50 |
| 68100085 | 16.0 | 18.0 | 11.0 | FPAS 21 | 21,2 mm | 50 |
| 68100095 | 21.0 | 23.0 | 12.0 | FPAS 28 | 28,5 mm | 50 |
| 68880005 | 29.0 | 31.0 | 12.0 | FPAS 34 | 34,5 mm | 50 |
| **SILVYN® FLEXILOK PG straight** | | | | | | |
| 65500470 | 9.0 | 12.0 | 10.0 | FPAS 13 | 13,0 mm | |
| 65500490 | 9.0 | 12.0 | 10.0 | FPAS 16 | 15,8 mm | 50 |
| 65500480 | 11.0 | 12.0 | 10.0 | FPAS 13 | 13,0 mm | 50 |
| 65500390 | 11.0 | 15.0 | 10.0 | FPAS 16 | 15,8 mm | 50 |
| 68100050 | 13,5 | 15.0 | 10.0 | FPAS 16 | 15,8 mm | 50 |
| 68100070 | 13,5 | 16.0 | 10.0 | FPAS 21 | 21,2 mm | 50 |
| 68100060 | 16.0 | 15.0 | 11.0 | FPAS 16 | 15,8 mm | 50 |
| 68100080 | 16.0 | 18.0 | 11.0 | FPAS 21 | 21,2 mm | 50 |
| 68100090 | 21.0 | 23.0 | 12.0 | FPAS 28 | 28,5 mm | 50 |
| 65500620 | 29.0 | 31.0 | 12.0 | FPAS 34 | 34,5 mm | 50 |

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# SHRINK MARK FCC-FK Shrink tube marking

**Info**

- **Printing service in all colours by ink-jet or print-technology of your choice.**

SHRINK MARK FCC-FK Shrink tube marking

## Benefits

- Shrinking tube segments are individually printed to customer specifications.
- Simple marking

## Application range

- Cable and component marking system
- Automotive industry
- Machine and plant construction

## Approvals (Norm references)

RoHS

## Note

- Following colours available on request: blue, red, yellow, white, transparent

## Design

- Customized data are transmitted via ASCII File or Excel File to the responsible Lapp employee by e-mail for the order.

## Technical data

**Material**
Polyolefine
**Shrinking ratio**
2:1
**Range of temperature**
-55 °C up to +125 °C

| Part number | Article designation | Colour | Ø before shrinking, mm | Ø after shrinking, mm | Number of characters | Pieces / PU |
|---|---|---|---|---|---|---|
| 83280029 | SHRINK MARK FCC-FK 3,2 | black | 3.2 | 1.6 | 1-7 | 1 |
| 83280030 | SHRINK MARK FCC-FK 3,2 | black | 3.2 | 1.6 | 8-12 | 1 |
| 83280031 | SHRINK MARK FCC-FK 3,2 | black | 3.2 | 1.6 | 13-17 | 1 |
| 83280032 | SHRINK MARK FCC-FK 4,8 | black | 4.8 | 2.4 | 1-7 | 1 |
| 83280033 | SHRINK MARK FCC-FK 4,8 | black | 4.8 | 2.4 | 8-12 | 1 |
| 83280034 | SHRINK MARK FCC-FK 4,8 | black | 4.8 | 2.4 | 13-17 | 1 |
| 83280035 | SHRINK MARK FCC-FK 6,4 | black | 6.4 | 3.2 | 1-7 | 1 |
| 83280036 | SHRINK MARK FCC-FK 6,4 | black | 6.4 | 3.2 | 8-12 | 1 |
| 83280037 | SHRINK MARK FCC-FK 6,4 | black | 6.4 | 3.2 | 13-17 | 1 |
| 83280038 | SHRINK MARK FCC-FK 9,5 | black | 9.5 | 4.7 | 1-7 | 1 |
| 83280039 | SHRINK MARK FCC-FK 9,5 | black | 9.5 | 4.7 | 8-12 | 1 |
| 83280040 | SHRINK MARK FCC-FK 9,5 | black | 9.5 | 4.7 | 13-17 | 1 |
| 83280041 | SHRINK MARK FCC-FK 12,7 | black | 12.7 | 6.3 | 1-7 | 1 |
| 83280042 | SHRINK MARK FCC-FK 12,7 | black | 12.7 | 6.3 | 8-12 | 1 |
| 83280043 | SHRINK MARK FCC-FK 12,7 | black | 12.7 | 6.3 | 13-17 | 1 |
| 83280044 | SHRINK MARK FCC-FK 19,1 | black | 19.1 | 9.5 | 1-7 | 1 |
| 83280045 | SHRINK MARK FCC-FK 19,1 | black | 19.1 | 9.5 | 8-12 | 1 |
| 83280046 | SHRINK MARK FCC-FK 19,1 | black | 19.1 | 9.5 | 13-17 | 1 |

## Accessories

- HG 2310 LCD hot-air pistol see main catalogue 2010/11 page 957

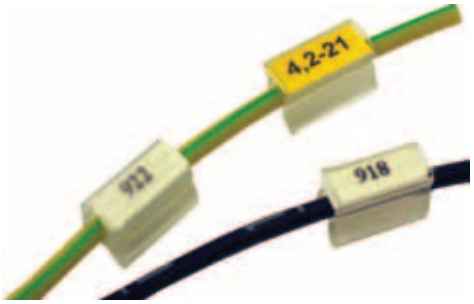
# Cable Marking Products

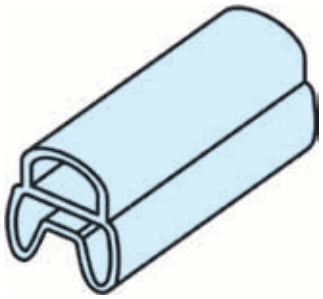
## Single core marking

### FLEXIMARK® Single core marking

wind energy

# FLEXIMARK® Collar halogenfree



FLEXIMARK® Collar halogenfree

## Benefits

- Scratch protection
- Durable application
- FLEXIMARK® collars halogen-free are provided with a marking sleeve giving an efficient scratch protection for the marking, thus resistant towards most of the strains in the environment. This collar does not release halogenous substances if burned, and is therefore used in high-risk installations.

## Application range

- Control cabinet wiring
- UNITRONIC® Fieldbus sensor-/actuator wiring requirements

## Product features

- FLEXIMARK® labels LMB can be used in different marking collars. These labels are on DIN A 5 sheets and can be printed easily with the FLEXIMARK® Software. These labels are halogen-free.

## Approvals (Norm references)

RoHS

## Scope of delivery

- Marking collars without labels ( please see FLEXIMARK® labels LMB - 10 pcs.DIN A 5 sheets a 46 labels)

## Technical data

**Approvals**
Flame retardant in accordance with UL94 VO

**Colour delivered**
Transparent

**Material**
PUR halogen-free

**Range of temperature**
-50°C up to +80°C

| Part number | Article designation | Colour | Length in mm | Cable Ø | Pieces / PU |
|---|---|---|---|---|---|
| 83252670 | FLEXIMARK® collar halogenfree 1.4 - 5 / 10 mm | transparent | 10.0 | 5 | 1,000 |
| 83252671 | FLEXIMARK® collar halogenfree 1.4 - 5 / 15 mm | transparent | 15.0 | 5 | 1,000 |
| 83252693 | FLEXIMARK® collar halogenfree 1.4 - 5 / 23 mm | transparent | 23.0 | 5 | 500 |
| 83252672 | FLEXIMARK® collar halogenfree 1.4 - 5 / 30 mm | transparent | 30.0 | 5 | 500 |
| 83252673 | FLEXIMARK® collar halogenfree 5.0 - 11,0 / 10 mm | transparent | 10.0 | 11 | 500 |
| 83252674 | FLEXIMARK® collar halogenfree 5.0 - 11,0 / 15 mm | transparent | 15.0 | 11 | 500 |
| 83252694 | FLEXIMARK® collar halogenfree 5.0 - 11,0 / 23 mm | transparent | 23.0 | 11 | 200 |
| 83252675 | FLEXIMARK® collar halogenfree 5.0 - 11,0 / 30 mm | transparent | 30.0 | 11 | 200 |
| **Suitable labels** | | | | | |
| 83254680 | FLEXIMARK® labels LMB 35x4,6mm | black/ yellow | 30.0 | | 460 |

## Accessories

- FLEXIMARK® Software 10.0 see main catalogue 2010/11 page 877

# Product overview wind energy



**Please order our new main catalogue 2010/11:**
**www.lappkabel.com/service**

Photo: Universität Hohenheim/Germany

# Biogas at Lapp Group

**Biogas plays an important role in the Lapp Group.**

Our customers can rely on 50 years of experience, marked by the very highest levels of quality and innovation. A range of over 40,000 items worldwide is available to our customers and shows Lapp's all-round expertise, not just in the biogas sector.

No matter which cables our customers choose for their biogas plants, they can count on the very highest standards in terms of function, reliability and service life every time.

# Lapp – The partner for biogas worldwide

There is no doubt that the industry will continue to change and will need to adapt to local markets. The answers to this challenge are provided by Lapp every day, as a global player in more than 120 countries.

Benefit from this expertise and choose a global specialist with local knowledge to ensure the cost reducing product choice on a global level. Talk to us – Cost is about more than just the price.

Photo: Universität Hohenheim/Germany


Photo: Schmack Biogas AG

## A single source for system products

- Halogen-free control and data cables
- Halogen-free cable glands
- Flexible rectangular or circular connector systems including modular systems
- Marking systems for every temperature range and application with CAD integration
- Practically tested cable systems

LAPP GROUP

biogas energy

# ÖLFLEX® ROBUST 200

**Info**
- Robust and weatherproofed
- High chemical resistance


## Benefits
- Saving effects due to a wide range of applications
- Thanks to the broad temperature range worldwide applicable
- Good combination of quality and price

## Application range
- Machine tool manufacture, medical technology, laundries, car washing equipment, chemical industry, composting plants, sewage works
- Food and beverage industry, especially for production and processing equipment of milk and meat products
- In environments where exposed to oils, fats, waxes (vegetable or animal based or synthetic) or their emulsions
- For indoor and outdoor use

## Product features
- Halogen free materials
- High dielectric strength and low mutual capacitance
- Good resistance to hot and cold water as well as to water-soluble cleaning agents (tensides, soaps,...)
- UV resistant and weather proof
- Flexible down to -40 °C

## Approvals (Norm references)
CE RoHS

## Design
- Fine strands of bare copper wires
- Core insulation: Modified PP
- Cores twisted in layers in short lay lengths
- Robust outer sheath made of special halogen-free TPE, black (RAL 9005)

## Technical data
**Core identification code**
Up to 5 cores: according to VDE 0293-308 (see main catalogue 2010/11 appendix T9)
Starting at 6 cores: Black with white numbers

**Based on**
HD 22.10 (VDE 0282 Part 10)

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Fine wire in accordance to VDE 0295 Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Occasional flexing: 10 x cable diameter
Fixed installation: 4 x cable diameter

**Rated voltage**
$U_0$/U: 450/750 V

**Test voltage**
4000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Occasional flexing: -40°C up to +80°C
Fixed installation: -50°C up to +80°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® ROBUST 200** | | | | |
| 0021800 | 2 X 1 | 8.0 | 19.2 | 65 |
| 0021801 | 3 G 1 | 8.4 | 29.0 | 79 |
| 0021802 | 4 G 1 | 9.2 | 38.4 | 96 |
| 0021803 | 5 G 1 | 10.0 | 48.0 | 113 |
| 0021805 | 2 X 1.5 | 8.6 | 29.0 | 78 |
| 0021806 | 3 G 1.5 | 9.1 | 43.0 | 97 |
| 0021807 | 4 G 1.5 | 9.9 | 58.0 | 122 |
| 0021808 | 5 G 1.5 | 10.8 | 72.0 | 146 |
| 0021809 | 7 G 1.5 | 13.5 | 101.0 | 208 |
| 0021810 | 2 X 2.5 | 9.8 | 48.0 | 114 |
| 0021811 | 3 G 2.5 | 10.4 | 72.0 | 144 |
| 0021812 | 4 G 2.5 | 11.5 | 96.0 | 181 |
| 0021813 | 5 G 2.5 | 13.1 | 120.0 | 222 |
| 0021814 | 7 G 2.5 | 15.9 | 168.0 | 312 |
| 0021816 | 3 G 4 | 12.4 | 115.2 | 215 |
| 0021817 | 4 G 4 | 14.0 | 154.0 | 273 |
| 0021818 | 5 G 4 | 15.8 | 192.0 | 333 |
| 0021822 | 4 G 6 | 15.7 | 230.0 | 378 |
| 0021823 | 5 G 6 | 17.2 | 288.0 | 463 |
| 0021825 | 4 G 10 | 19.4 | 384.0 | 570 |
| 0021826 | 5 G 10 | 21.4 | 480.0 | 770 |
| 0021828 | 4 G 16 | 22.4 | 614.0 | 885 |
| 0021829 | 5 G 16 | 24.6 | 768.0 | 1,100 |
| 0021831 | 4 G 25 | 27.0 | 960.0 | 1,365 |
| 0021833 | 4 G 35 | 29.7 | 1,344.0 | 1,773 |
| 0021836 | 4 G 50 | 36.2 | 1,920.0 | 3,454 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)
Single lengths for sizes: ≥ 4G16 max. 600m; ≥ 4G25 max. 300m; ≥ 4G50 max. 250m

## Comparable products
- ÖLFLEX® ROBUST 210 see page 66
- ÖLFLEX® ROBUST 215 C see page 67
- ÖLFLEX® FD ROBUST see page 68
- ÖLFLEX® FD ROBUST C see page 69

## Accessories
- Stainless steel - Box Starter - Set see main catalogue 2010/11 page 872
- SKINTOP® MS-M see main catalogue 2010/11 page 650
- SKINTOP® ST-HF-M see main catalogue 2010/11 page 644

# Power and control cables

## Harsh use conditions

### Increased mechanical and chemical resistance

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# ÖLFLEX® ROBUST 210


**Info**

- Robust and weatherproofed
- High chemical resistance

## Benefits

- Saving effects due to a wide range of applications
- Thanks to the broad temperature range worldwide applicable
- Good combination of quality and price

## Application range

- Machine tool manufacture, medical technology, laundries, car washing equipment, chemical industry, composting plants, sewage works
- Food and beverage industry, especially for production and processing equipment of milk and meat products
- In environments where exposed to oils, fats, waxes (vegetable or animal based or synthetic) or their emulsions
- For indoor and outdoor use

## Product features

- Halogen free materials
- High dielectric strength and low mutual capacitance
- Good resistance to hot and cold water as well as to water-soluble cleaning agents (tensides, soaps,...)
- UV resistant and weather proof
- Flexible down to -40 °C

## Approvals (Norm references)

CE RoHS

## Design

- Fine strands of bare copper wires
- Core insulation: Modified PP
- Cores twisted in layers in short lay lengths
- Robust outer sheath made of special halogen-free TPE, black (RAL 9005)

## Technical data

**Core identification code**
Black with white numbers acc. to VDE 0293

**Based on**
VDE 0250/0281

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Fine wire in accordance to VDE 0295
Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Occasional flexing: 15 x cable diameter
Fixed installation: 4 x cable diameter

**Rated voltage**
$U_0/U$: 300/500 V

**Test voltage**
4000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Occasional flexing: -40°C up to +80°C
Fixed installation: -50°C up to +80°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® ROBUST 210** | | | | |
| 0021880 | 2 X 0.5 | 4.9 | 10.0 | 27 |
| 0021881 | 3 G 0.5 | 5.2 | 15.0 | 33 |
| 0021882 | 3 X 0.5 | 5.2 | 15.0 | 33 |
| 0021883 | 4 G 0.5 | 5.8 | 19.2 | 41 |
| 0021884 | 4 X 0.5 | 5.8 | 19.2 | 41 |
| 0021885 | 5 G 0.5 | 6.3 | 24.0 | 49 |
| 0021886 | 5 X 0.5 | 6.3 | 24.0 | 49 |
| 0021888 | 7 G 0.5 | 6.9 | 33.6 | 64 |
| 0021889 | 7 X 0.5 | 6.9 | 33.6 | 64 |
| 0021890 | 10 G 0.5 | 8.8 | 48.0 | 92 |
| 0021891 | 12 G 0.5 | 9.1 | 58.0 | 106 |
| 0021892 | 18 G 0.5 | 10.8 | 86.4 | 151 |
| 0021893 | 25 G 0.5 | 12.7 | 120.0 | 210 |
| 0021897 | 2 X 0.75 | 5.5 | 14.4 | 35 |
| 0021898 | 3 G 0.75 | 5.8 | 21.6 | 43 |
| 0021899 | 3 X 0.75 | 5.8 | 21.6 | 43 |
| 0021900 | 4 G 0.75 | 6.3 | 28.8 | 49 |
| 0021901 | 4 X 0.75 | 6.3 | 28.8 | 49 |
| 0021902 | 5 G 0.75 | 6.9 | 36.0 | 66 |
| 0021903 | 5 X 0.75 | 6.9 | 36.0 | 66 |
| 0021904 | 7 G 0.75 | 7.5 | 50.0 | 85 |
| 0021905 | 7 X 0.75 | 7.5 | 50.0 | 85 |
| 0021907 | 12 G 0.75 | 10.1 | 86.0 | 144 |
| 0021908 | 18 G 0.75 | 12.0 | 130.0 | 208 |
| 0021909 | 25 G 0.75 | 14.1 | 180.0 | 288 |
| 0021910 | 34 G 0.75 | 16.3 | 245.0 | 386 |
| 0021911 | 41 G 0.75 | 17.8 | 296.0 | 464 |
| 0021912 | 50 G 0.75 | 19.6 | 360.0 | 560 |
| 0021913 | 2 X 1 | 5.8 | 19.2 | 42 |
| 0021914 | 3 G 1 | 6.1 | 28.8 | 49 |
| 0021915 | 3 X 1 | 6.1 | 28.8 | 49 |
| 0021916 | 4 G 1 | 6.6 | 38.4 | 63 |
| 0021917 | 4 X 1 | 6.6 | 38.4 | 63 |
| 0021918 | 5 G 1 | 7.3 | 48.0 | 78 |
| 0021919 | 5 X 1 | 7.3 | 48.0 | 78 |
| 0021920 | 7 G 1 | 8.1 | 67.0 | 107 |
| 0021921 | 10 G 1 | 10.4 | 96.0 | 154 |
| 0021922 | 12 G 1 | 10.7 | 115.0 | 178 |
| 0021923 | 18 G 1 | 12.9 | 173.0 | 262 |
| 0021924 | 25 G 1 | 15.0 | 240.0 | 357 |
| 0021925 | 34 G 1 | 17.5 | 326.0 | 484 |
| 0021926 | 41 G 1 | 19.2 | 394.0 | 582 |
| 0021927 | 50 G 1 | 21.0 | 480.0 | 703 |
| 0021928 | 2 X 1.5 | 6.4 | 29.0 | 56 |
| 0021929 | 3 G 1.5 | 6.8 | 43.0 | 72 |
| 0021930 | 3 X 1.5 | 6.8 | 43.0 | 72 |
| 0021931 | 4 G 1.5 | 7.4 | 58.0 | 91 |
| 0021932 | 4 X 1.5 | 7.4 | 58.0 | 91 |
| 0021933 | 5 G 1.5 | 8.3 | 72.0 | 108 |
| 0021934 | 5 X 1.5 | 8.3 | 72.0 | 108 |
| 0021936 | 7 G 1.5 | 9.0 | 101.0 | 149 |
| 0021937 | 7 X 1.5 | 9.0 | 101.0 | 149 |
| 0021938 | 10 G 1.5 | 11.8 | 143.0 | 215 |
| 0021940 | 12 G 1.5 | 12.2 | 173.0 | 234 |
| 0021941 | 18 G 1.5 | 14.6 | 259.0 | 369 |
| 0021942 | 25 G 1.5 | 17.2 | 360.0 | 510 |
| 0021943 | 34 G 1.5 | 19.8 | 490.0 | 683 |
| 0021945 | 50 G 1.5 | 24.0 | 720.0 | 999 |
| 0021946 | 2 X 2.5 | 7.6 | 48.0 | 86 |
| 0021947 | 3 G 2.5 | 8.3 | 72.0 | 115 |
| 0021949 | 4 G 2.5 | 9.0 | 96.0 | 131 |
| 0021951 | 5 G 2.5 | 10.1 | 120.0 | 178 |
| 0021953 | 7 G 2.5 | 11.2 | 168.0 | 241 |
| 0021954 | 12 G 2.5 | 15.1 | 288.0 | 405 |
| 0021963 | 3 G 4 | 10.1 | 115.0 | 180 |
| 0021964 | 4 G 4 | 11.1 | 157.0 | 228 |
| 0021965 | 5 G 4 | 12.4 | 192.0 | 280 |
| 0021966 | 7 G 4 | 13.6 | 269.0 | 377 |
| 0021967 | 4 G 6 | 13.3 | 230.0 | 332 |
| 0021968 | 5 G 6 | 14.8 | 288.0 | 407 |
| 0021969 | 4 G 10 | 16.5 | 384.0 | 541 |
| 0021970 | 5 G 10 | 18.4 | 480.0 | 620 |
| 0021971 | 4 G 16 | 18.8 | 614.4 | 806 |
| 0021972 | 4 G 25 | 23.5 | 960.0 | 1,218 |
| 0021973 | 4 G 35 | 26.4 | 1,344.0 | 1,658 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)
Single lengths for sizes: ≥ 4G16 max. 600m; ≥ 4G25 max. 300m; ≥ 4G50 max. 250m

## Comparable products

- ÖLFLEX® ROBUST 200 see page 65
- ÖLFLEX® ROBUST 215 C see page 67
- ÖLFLEX® FD ROBUST see page 68
- ÖLFLEX® FD ROBUST C see page 69

## Accessories

- Stainless steel - Box Starter - Set see main catalogue 2010/11 page 872
- SKINTOP® MS-M see main catalogue 2010/11 page 650
- SKINTOP® ST-HF-M see main catalogue 2010/11 page 644

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# ÖLFLEX® ROBUST 215 C

**Info**

- **Robust and weatherproofed**
- **High chemical resistance**
- **EMC compliant**


## Benefits

- Saving effects due to a wide range of applications
- Thanks to the broad temperature range worldwide applicable
- Good combination of quality and price

## Application range

- Machine tool manufacture, medical technology, laundries, car washing equipment, chemical industry, composting plants, sewage works
- Food and beverage industry, especially for production and processing equipment of milk and meat products
- In environments where exposed to oils, fats, waxes (vegetable or animal based or synthetic) or their emulsions
- For indoor and outdoor use
- In EMI critical environment (electromagnetic interference)

## Product features

- Halogen free materials
- High dielectric strength and low mutual capacitance
- Good resistance to hot and cold water as well as to water-soluble cleaning agents (tensides, soaps,...)
- UV resistant and weather proof
- Flexible down to -40 °C

## Approvals (Norm references)

CE RoHS

## Design

- Fine strands of bare copper wires
- Core insulation: Modified PP
- Cores twisted in layers in short lay lengths
- Halogen-free plastic foil wrapping
- Tinned copper braid
- Robust outer sheath made of special halogen-free TPE, black (RAL 9005)

## Technical data

**Core identification code**
Black with white numbers acc. to VDE 0293

**Based on**
VDE 0250/0281

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Fine wire in accordance to VDE 0295
Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Occasional flexing: 20 x cable diameter
Fixed installed: 6 x outer diameter

**Rated voltage**
$U_0/U$: 300/500 V

**Test voltage**
Core/core: 4000 V
Core/screen: 2000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Occasional flexing: -40°C up to +80°C
Fixed installation: -50°C up to +80°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® ROBUST 215 C** | | | | |
| 0022700 | 2 X 0.5 | 5.9 | 36.0 | 42 |
| 0022701 | 3 G 0.5 | 6.2 | 43.0 | 52 |
| 0022702 | 3 X 0.5 | 6.2 | 43.0 | 52 |
| 0022703 | 4 G 0.5 | 6.6 | 49.0 | 59 |
| 0022704 | 4 X 0.5 | 6.6 | 49.0 | 59 |
| 0022705 | 5 G 0.5 | 7.1 | 57.0 | 68 |
| 0022706 | 5 X 0.5 | 7.1 | 57.0 | 68 |
| 0022708 | 7 G 0.5 | 7.7 | 69.0 | 85 |
| 0022709 | 7 X 0.5 | 7.7 | 69.0 | 85 |
| 0022711 | 12 G 0.5 | 10.1 | 104.0 | 136 |
| 0022712 | 18 G 0.5 | 11.8 | 141.0 | 189 |
| 0022713 | 25 G 0.5 | 13.7 | 211.0 | 265 |
| 0022717 | 2 X 0.75 | 6.3 | 43.0 | 50 |
| 0022718 | 3 G 0.75 | 6.6 | 52.0 | 60 |
| 0022719 | 3 X 0.75 | 6.6 | 52.0 | 60 |
| 0022720 | 4 G 0.75 | 7.1 | 61.0 | 72 |
| 0022721 | 4 X 0.75 | 7.1 | 61.0 | 72 |
| 0022722 | 5 G 0.75 | 7.9 | 72.0 | 88 |
| 0022723 | 5 X 0.75 | 7.9 | 72.0 | 88 |
| 0022724 | 7 G 0.75 | 8.5 | 89.0 | 110 |
| 0022725 | 7 X 0.75 | 8.5 | 89.0 | 110 |
| 0022727 | 12 G 0.75 | 11.1 | 138.0 | 177 |
| 0022728 | 18 G 0.75 | 13.0 | 211.0 | 247 |
| 0022729 | 25 G 0.75 | 15.1 | 280.0 | 347 |
| 0022730 | 34 G 0.75 | 17.5 | 380.0 | 460 |
| 0022733 | 2 X 1 | 6.6 | 51.0 | 60 |
| 0022734 | 3 G 1 | 6.9 | 62.0 | 70 |
| 0022735 | 3 X 1 | 6.9 | 62.0 | 70 |
| 0022736 | 4 G 1 | 7.4 | 74.0 | 85 |

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| 0022737 | 4 X 1 | 7.4 | 74.0 | 85 |
| 0022738 | 5 G 1 | 8.3 | 88.0 | 103 |
| 0022739 | 5 X 1 | 8.3 | 88.0 | 103 |
| 0022740 | 7 G 1 | 8.9 | 112.0 | 131 |
| 0022742 | 12 G 1 | 11.7 | 185.0 | 213 |
| 0022743 | 18 G 1 | 14.1 | 268.0 | 321 |
| 0022744 | 25 G 1 | 16.2 | 354.0 | 425 |
| 0022748 | 2 X 1.5 | 7.2 | 65.0 | 71 |
| 0022749 | 3 G 1.5 | 7.6 | 82.0 | 90 |
| 0022750 | 3 X 1.5 | 7.6 | 82.0 | 90 |
| 0022751 | 4 G 1.5 | 8.4 | 100.0 | 114 |
| 0022752 | 4 X 1.5 | 8.4 | 100.0 | 114 |
| 0022753 | 5 G 1.5 | 9.1 | 119.0 | 136 |
| 0022754 | 5 X 1.5 | 9.1 | 119.0 | 136 |
| 0022756 | 7 G 1.5 | 10.0 | 154.0 | 177 |
| 0022757 | 7 X 1.5 | 10.0 | 154.0 | 177 |
| 0022760 | 12 G 1.5 | 13.4 | 268.0 | 290 |
| 0022761 | 18 G 1.5 | 15.8 | 373.0 | 435 |
| 0022762 | 25 G 1.5 | 18.2 | 530.0 | 579 |
| 0022763 | 34 G 1.5 | 21.2 | 683.0 | 797 |
| 0022767 | 3 G 2.5 | 9.1 | 118.0 | 134 |
| 0022768 | 4 G 2.5 | 10.0 | 147.0 | 169 |
| 0022769 | 5 G 2.5 | 11.1 | 176.0 | 207 |
| 0022770 | 7 G 2.5 | 12.0 | 253.0 | 270 |
| 0022774 | 4 G 4 | 11.9 | 190.0 | 258 |
| 0022776 | 4 G 6 | 14.5 | 290.0 | 392 |
| 0022777 | 4 G 10 | 17.5 | 458.0 | 602 |
| 0022778 | 4 G 16 | 20.2 | 736.6 | 928 |
| 0022771 | 4 G 25 | 25.1 | 1,126.7 | 1,411 |
| 0022780 | 4 G 35 | 28.0 | 1,540.0 | 1,883 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)
Single lengths for sizes: ≥ 4G16 max. 600m; ≥ 4G25 max. 300m; ≥ 4G50 max. 250m

## Comparable products

- ÖLFLEX® FD ROBUST C see page 69
- ÖLFLEX® CLASSIC 135 CH BK 0,6/1kV see main catalogue 2010/11 page 58

## Accessories

- 3M Scotch 1183 screening tape see main catalogue 2010/11 page 950
- SKINTOP® MS-SC-M see main catalogue 2010/11 page 657
- SKINTOP® MS-M BRUSH see main catalogue 2010/11 page 658

# Power and control cables

## Power chain applications

### Harsh use conditions

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# ÖLFLEX® FD ROBUST

**TPE-insulated, numbered, TPE-sheath**


**Info**

- Robust and weatherproofed
- High chemical resistance
- Temperature range: -40°C up to +105°C

## Benefits

- Well-proven, reliable
- Wide range use
- All-weather control cable
- For indoor and outdoor use

## Application range

- In power chains or moving machine parts
- Machine tool manufacture, medical technology, laundries, car washing equipment, chemical industry, composting plants, sewage works
- Food and beverage industry, especially for production and processing equipment of milk and meat products
- Especially in wet areas of machine tools and transfer lines subject to average mechanical stress
- In environments where exposed to oils, fats, waxes (vegetable or animal based or synthetic) or their emulsions

## Product features

- Low adhesive surface
- Largely resistant to oil and chemicals
- Hydrolysis resistant against warm and hot water
- In dry, damp or wet interiors under medium mechanical load conditions
- Designed for up to 5 million bending change cycles in the power chain

## Approvals (Norm references)

CE RoHS

- For travel distances up to 100 m (horizontal)
- Usage in Power Chains: Please comply with the assembly guidelines see main catalogue 2010/11 Appendix T3

## Design

- Superfine wire, tinned copper strands
- Core insulation: TPE
- Cores twisted together in extremely short lay lengths
- Nonwoven wrapping
- Robust outer sheath made of special halogen-free TPE, black (RAL 9005)

## Technical data

**Core identification code**
Black cores with printed white numbers (VDE 0293)

**Based on**
VDE 0250/0281/0282

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Extra fine wire according to VDE 0295 Class 6 / IEC 60228 Class 6

**Minimum bending radius**
For flexible applications:
7.5 x cable diameter
(at temperatures < 70 °C)
10 x cable diameter
(at temperatures max. 105°C)
Static:
4 x cable diameter

**Rated voltage**
$U_0$/U:
300/500 V

**Test voltage**
3000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Flexing: -40°C up to +105°C
Fixed installation: -50°C up to +110°C
Briefly up to +120°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® FD ROBUST** | | | | |
| 0026501 | 3 G 0.75 | 7.2 | 21.6 | 51 |
| 0026502 | 4 G 0.75 | 8.3 | 28.8 | 69 |
| 0026503 | 5 G 0.75 | 9.2 | 36.0 | 87 |
| 0026504 | 7 G 0.75 | 11.1 | 50.4 | 127 |
| 0026505 | 12 G 0.75 | 12.9 | 86.4 | 182 |
| 0026506 | 18 G 0.75 | 15.8 | 129.6 | 277 |
| 0026507 | 25 G 0.75 | 19.6 | 180.0 | 421 |
| 0026509 | 3 G 1 | 7.5 | 28.8 | 63 |
| 0026510 | 4 G 1 | 8.5 | 38.4 | 82 |
| 0026511 | 5 G 1 | 9.5 | 48.0 | 105 |
| 0026516 | 7 G 1 | 12.1 | 67.2 | 157 |
| 0026517 | 12 G 1 | 13.9 | 115.2 | 226 |
| 0026518 | 18 G 1 | 17.2 | 172.8 | 345 |
| 0026521 | 3 G 1.5 | 9.1 | 43.2 | 90 |
| 0026522 | 4 G 1.5 | 10.3 | 57.6 | 118 |
| 0026523 | 5 G 1.5 | 11.5 | 72.0 | 149 |
| 0026524 | 7 G 1.5 | 14.1 | 100.8 | 233 |
| 0026525 | 12 G 1.5 | 16.3 | 172.8 | 322 |
| 0026526 | 18 G 1.5 | 20.0 | 259.2 | 494 |
| 0026527 | 25 G 1.5 | 24.6 | 360.0 | 695 |
| 0026531 | 4 G 2.5 | 12.3 | 96.0 | 181 |
| 0026532 | 5 G 2.5 | 13.7 | 120.0 | 228 |
| 0026533 | 7 G 2.5 | 16.4 | 168.0 | 329 |
| 0026534 | 12 G 2.5 | 19.2 | 288.0 | 491 |
| 0026541 | 4 G 4 | 14.1 | 153.6 | 261 |
| 0026551 | 4 G 6 | 15.6 | 230.4 | 356 |
| 0026561 | 4 G 10 | 20.0 | 384.0 | 596 |
| 0026571 | 4 G 16 | 24.3 | 614.4 | 910 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

## Comparable products

- ÖLFLEX® FD 855 P see main catalogue 2010/11 page 119

## Accessories

- SILVYN® CHAIN Cable protection and guiding systems

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# ÖLFLEX® FD ROBUST C

## Screened, TPE -insulated, numbered,TPE-inner- and outer sheath

**Info**

- Robust and weatherproofed
- Temperature range: -40°C up to +105°C
- EMC optimised


### Benefits

- Well-proven, reliable
- Wide range use
- All-weather control cable
- EMC compliant
- For indoor and outdoor use

### Application range

- Machine tool manufacture, medical technology, laundries, car washing equipment, chemical industry, composting plants, sewage works
- Especially in wet areas of machine tools and transfer lines subject to average mechanical stress
- Food and beverage industry, especially for production and processing equipment of milk and meat products
- In environments where exposed to oils, fats, waxes (vegetable or animal based or synthetic) or their emulsions
- Assembly lines, production lines, in all kinds of machines

### Product features

- Hydrolysis resistant against warm and hot water
- Low adhesive surface
- Largely resistant to oil and chemicals
- In dry, damp or wet interiors under medium mechanical load conditions
- Designed for up to 5 million bending change cycles in the power chain

### Approvals (Norm references)

CE RoHS

- For travel distances up to 100 m (horizontal)
- Usage in Power Chains: Please comply with the assembly guidelines see main catalogue 2010/11 Appendix T3

### Design

- Superfine wire, tinned copper strands
- Core insulation: TPE
- Cores twisted together in extremely short lay lengths
- Nonwoven wrapping
- Inner sheath: TPE
- Tinned copper braid
- Robust outer sheath made of special halogen-free TPE, black (RAL 9005)

### Technical data

**Core identification code**
Black cores with printed white numbers (VDE 0293)

**Based on**
VDE 0250/0281/0282

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Extra fine wire in acc. to VDE 0295 Cl.6 / IEC 60228 Cl.6

**Minimum bending radius**
For flexible applications:
7.5 x cable diameter
(at temperatures < 70 °C)
10 x cable diameter
(at temperatures max. 105°C)

**Rated voltage**
300/500 V

**Test voltage**
3000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Flexing: -40 °C to +105 °C
Fixed installation: -50°C to +105°C
Briefly up to +120°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX FD® FD ROBUST C** | | | | |
| 0026701 | 3 G 0.75 | 9.6 | 49.6 | 110 |
| 0026702 | 4 G 0.75 | 10.8 | 60.9 | 137 |
| 0026703 | 5 G 0.75 | 11.5 | 72.8 | 160 |
| 0026704 | 7 G 0.75 | 13.9 | 107.2 | 238 |
| 0026705 | 12 G 0.75 | 15.8 | 151.5 | 312 |
| 0026706 | 18 G 0.75 | 18.8 | 205.5 | 448 |
| 0026707 | 25 G 0.75 | 22.9 | 299.1 | 657 |
| 0026709 | 3 G 1 | 9.7 | 61.1 | 125 |
| 0026716 | 7 G 1 | 14.7 | 132.3 | 278 |
| 0026717 | 12 G 1 | 16.8 | 189.1 | 370 |
| 0026721 | 3 G 1.5 | 11.4 | 79.8 | 163 |
| 0026722 | 4 G 1.5 | 13.0 | 99.2 | 210 |
| 0026723 | 5 G 1.5 | 14.3 | 129.7 | 264 |
| 0026724 | 7 G 1.5 | 17.0 | 175.2 | 370 |
| 0026725 | 12 G 1.5 | 19.3 | 257.1 | 498 |
| 0026726 | 18 G 1.5 | 23.3 | 378.9 | 749 |
| 0026727 | 25 G 1.5 | 28.4 | 555.5 | 1,042 |
| 0026731 | 4 G 2.5 | 15.1 | 161.5 | 307 |
| 0026732 | 5 G 2.5 | 16.4 | 188.3 | 361 |
| 0026733 | 7 G 2.5 | 19.6 | 252.6 | 512 |
| 0026734 | 12 G 2.5 | 22.7 | 406.5 | 730 |
| 0026741 | 4 G 4 | 17.2 | 227.3 | 412 |
| 0026751 | 4 G 6 | 18.6 | 306.7 | 519 |
| 0026761 | 4 G 10 | 23.5 | 513.6 | 853 |
| 0026771 | 4 G 16 | 28.5 | 809.6 | 1,273 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

### Comparable products

- ÖLFLEX® FD 855 CP see main catalogue 2010/11 page 120

### Accessories

- SILVYN® CHAIN Cable protection and guiding systems

# Power and control cables

## Harsh use conditions

### Increased mechanical and chemical resistance

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# ÖLFLEX® 440 P

**TPE -insulated, numbered, PUR sheath, approved**


**Info**

- All-weather control cable
- High mechanical strength
- MUD res. acc. IEC61892-4 Annex D

## Benefits

- Protected against water and dirt
- Low corrosive smoke emission
- Cold flexible
- Wear-resistant

## Application range

- Construction machinery
- Machine tools
- Especially in wet area of machine tools and transfer lines under normal mechanical stress.
- Production plants
- For indoor- and outdoor use

## Product features

- Oil resistant and adhesion-free
- Abrasion and cut resistant
- Hydrolysis resistant
- Halogen-free
- Flame retardant (IEC 60332-1-2)

## Approvals (Norm references)

CE VDE RoHS

## Design

- Fine strands of tinned copper wires
- Core insulation: TPE
- Special polyurethane sheath (PUR)
- Silver grey (RAL 7001)

## Technical data

**Core identification code**
Black with white numbers acc. to VDE 0293

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Fine wire in accordance to VDE 0295
Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Occasional flexing: 12,5 x cable diameter
Static:
4 x cable diameter

**Rated voltage**
$U_0$/U:
300/500 V

**Test voltage**
3000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Occasional flexing: -40 °C up to +90 °C
Fixed installation: -50°C up to +90°C

VDE Reg. No. 6582
4 - 6mm²: based on VDE 0281/0282

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® 440 P** | | | | |
| 0012800 | 2 X 0.5 | 5.9 | 10.0 | 39 |
| 0012801 | 3 G 0.5 | 6.2 | 14.0 | 46 |
| 0012802 | 4 G 0.5 | 6.9 | 19.0 | 53 |
| 0012803 | 5 G 0.5 | 7.4 | 24.0 | 65 |
| 0012804 | 7 G 0.5 | 9.1 | 34.0 | 92 |
| 0012805 | 12 G 0.5 | 11.3 | 58.0 | 149 |
| 0012806 | 18 G 0.5 | 13.2 | 86.0 | 207 |
| 0012807 | 25 G 0.5 | 15.0 | 120.0 | 274 |
| 0012813 | 2 X 0.75 | 6.4 | 14.0 | 48 |
| 0012814 | 3 G 0.75 | 6.8 | 22.0 | 53 |
| 0012815 | 4 G 0.75 | 7.4 | 29.0 | 67 |
| 0012816 | 5 G 0.75 | 8.6 | 36.0 | 81 |
| 0012817 | 7 G 0.75 | 10.0 | 50.0 | 119 |
| 0012818 | 12 G 0.75 | 12.4 | 86.0 | 193 |
| 0012819 | 18 G 0.75 | 14.4 | 130.0 | 269 |
| 0012820 | 25 G 0.75 | 17.2 | 180.0 | 378 |
| 0012825 | 2 X 1 | 6.8 | 19.0 | 57 |
| 0012826 | 3 G 1 | 7.2 | 29.0 | 61 |
| 0012827 | 4 G 1 | 8.2 | 38.0 | 82 |
| 0012828 | 5 G 1 | 9.0 | 48.0 | 107 |

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| 0012829 | 7 G 1 | 11.1 | 67.0 | 138 |
| 0012830 | 12 G 1 | 13.2 | 115.0 | 215 |
| 0012831 | 18 G 1 | 15.4 | 173.0 | 328 |
| 0012832 | 25 G 1 | 19.0 | 240.0 | 479 |
| 0012833 | 34 G 1 | 21.8 | 326.0 | 616 |
| 0012834 | 41 G 1 | 23.4 | 394.0 | 727 |
| 0012837 | 2 X 1.5 | 7.4 | 29.0 | 73 |
| 0012838 | 3 G 1.5 | 8.3 | 43.0 | 96 |
| 0012839 | 4 G 1.5 | 9.0 | 58.0 | 105 |
| 0012840 | 5 G 1.5 | 9.8 | 72.0 | 133 |
| 0012841 | 7 G 1.5 | 12.2 | 101.0 | 175 |
| 0012842 | 12 G 1.5 | 14.5 | 173.0 | 309 |
| 0012843 | 18 G 1.5 | 17.6 | 259.0 | 458 |
| 0012844 | 25 G 1.5 | 20.7 | 360.0 | 635 |
| 0012846 | 41 G 1.5 | 26.3 | 590.0 | 1,003 |
| 0012850 | 3 G 2.5 | 9.7 | 72.0 | 142 |
| 0012851 | 4 G 2.5 | 11.0 | 96.0 | 184 |
| 0012852 | 5 G 2.5 | 12.1 | 120.0 | 220 |
| 0012853 | 7 G 2.5 | 14.2 | 168.0 | 294 |
| 0012854 | 12 G 2.5 | 17.8 | 288.0 | 489 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

## Comparable products

- ÖLFLEX® ROBUST 210 see page 66
- ÖLFLEX® CLASSIC 400 P see main catalogue 2010/11 page 63
- ÖLFLEX® 491 P see main catalogue 2010/11 page 68

## Accessories

- SKINTOP® ST-M see main catalogue 2010/11 page 641
- Conductor end sleeves see main catalogue 2010/11 page 911

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# ÖLFLEX® 440 CP

## TPE -insulated, numbered, shielded, PUR sheath, approved

**Info**

- All-weather control cable
- High mechanical strength
- MUD res. acc. IEC61892-4 Annex D


### Benefits

- Protected against water and dirt
- Low corrosive smoke emission
- Cold flexible
- Wear-resistant
- EMC compliant

### Application range

- Construction machinery
- Machine tools
- Especially in wet area of machine tools and transfer lines under normal mechanical stress.
- Production plants
- For indoor- and outdoor use

### Product features

- Oil resistant and adhesion-free
- Abrasion and cut resistant
- Hydrolysis resistant
- Halogen-free
- Flame retardant (IEC 60332-1-2)

### Approvals (Norm references)

CE DVE RoHS

### Design

- Fine strands of tinned copper wires
- Core insulation: TPE
- Inner sheath: TPE
- Tinned copper braid
- Special polyurethane sheath (PUR)
- Silver grey (RAL 7001)

### Technical data

**Core identification code**
Black with white numbers acc. to VDE 0293

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Fine wire in accordance to VDE 0295
Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Occasional flexing: 15 x cable diameter
Fixed installation :
6 x cable diameter

**Rated voltage**
300/500 V

**Test voltage**
3000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Occasional flexing: -40 °C up to +90 °C
Fixed installation: -50°C up to +90°C

DIN VDE
VDE Reg. No. 6582
4 - 6mm²: based on VDE 0281/0282

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® 440 CP** | | | | |
| 0012901 | 3 G 0.5 | 8.3 | 44.0 | 100 |
| 0012902 | 4 G 0.5 | 8.8 | 52.0 | 120 |
| 0012903 | 5 G 0.5 | 9.7 | 61.0 | 139 |
| 0012904 | 7 G 0.5 | 11.2 | 75.0 | 175 |
| 0012906 | 12 G 0.5 | 13.7 | 131.0 | 276 |
| 0012907 | 18 G 0.5 | 15.7 | 168.0 | 376 |
| 0012908 | 25 G 0.5 | 18.5 | 212.0 | 485 |
| 0012911 | 2 X 0.75 | 8.4 | 45.0 | 104 |
| 0012912 | 3 G 0.75 | 8.7 | 52.0 | 119 |
| 0012913 | 4 G 0.75 | 9.5 | 67.0 | 126 |
| 0012914 | 5 G 0.75 | 10.2 | 75.0 | 165 |
| 0012915 | 7 G 0.75 | 11.9 | 96.0 | 210 |
| 0012917 | 12 G 0.75 | 14.5 | 160.0 | 331 |
| 0012919 | 25 G 0.75 | 20.3 | 283.0 | 596 |
| 0012925 | 2 X 1 | 8.7 | 49.0 | 117 |
| 0012926 | 3 G 1 | 9.3 | 60.0 | 132 |
| 0012927 | 4 G 1 | 9.9 | 78.0 | 163 |
| 0012928 | 5 G 1 | 10.8 | 88.0 | 187 |
| 0012929 | 7 G 1 | 12.8 | 115.0 | 255 |
| 0012931 | 12 G 1 | 15.4 | 201.0 | 419 |
| 0012932 | 18 G 1 | 17.7 | 267.0 | 546 |
| 0012933 | 25 G 1 | 21.5 | 351.0 | 738 |
| 0012934 | 34 G 1 | 23.8 | 498.0 | 972 |
| 0012940 | 2 X 1.5 | 9.5 | 68.0 | 122 |
| 0012941 | 3 G 1.5 | 9.9 | 83.0 | 140 |
| 0012942 | 4 G 1.5 | 10.8 | 102.0 | 170 |
| 0012943 | 5 G 1.5 | 11.6 | 119.0 | 200 |
| 0012944 | 7 G 1.5 | 14.2 | 186.0 | 290 |
| 0012945 | 12 G 1.5 | 16.8 | 264.0 | 423 |
| 0012946 | 18 G 1.5 | 20.0 | 379.0 | 616 |
| 0012947 | 25 G 1.5 | 23.5 | 534.0 | 804 |
| 0012949 | 41 G 1.5 | 28.9 | 803.0 | 1,360 |
| 0012950 | 3 G 2.5 | 11.4 | 121.0 | 194 |
| 0012951 | 4 G 2.5 | 12.6 | 145.0 | 307 |
| 0012952 | 5 G 2.5 | 14.0 | 205.0 | 413 |
| 0012953 | 7 G 2.5 | 16.4 | 259.0 | 533 |
| 0012954 | 12 G 2.5 | 21.0 | 407.0 | 795 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

### Comparable products

- ÖLFLEX® CLASSIC 400 CP see main catalogue 2010/11 page 64
- ÖLFLEX® FD 855 CP see main catalogue 2010/11 page 120

### Accessories

- SKINTOP® MS-SC-M see main catalogue 2010/11 page 657
- Conductor end sleeves see main catalogue 2010/11 page 911

# Power and control cables

## Wide range use

### PVC sheath and numbered cores

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# ÖLFLEX® CLASSIC 110 BLACK 0,6/1kV


**Info**

- Suitable for outdoor applications
- With U. L. approval ÖLFLEX® CONTROL TM see main catalogue 2010/11 page 46ff

## Benefits

- High electrical performance due to 4kV test voltage

## Application range

- Plant engineering and construction
  Industrial machinery
  Air conditioning installations
  Power station
  Stage technique
- Fixed installation as well as occasional flexing at free, non-continuously recurring movement without tensile load
- Outdoor use suitable considering the temperature range
- Suitable for direct burial

## Product features

- Flame retardant according to IEC 60332-1-2
- UV resistant and weather proof

## Approvals (Norm references)

CE RoHS

## Design

- Fine strands of bare copper wires
- PVC insulation LAPP P8/1
- PVC outer sheath, black (RAL 9005)

## Technical data

**Core identification code**
Black with white numbers acc. to VDE 0293

**Based on**
Cores according to VDE 0281 (H07V-K)
Sheath according to Italian standard CEI-UNEL 35755 + 35756

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Fine wire in accordance to VDE 0295
Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Occasional flexing: 15 x cable diameter
Fixed installation: 4 x cable diameter

**Rated voltage**
$U_0$/U: 600/1000 V

**Test voltage**
4000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Occasional flexing: -5°C up to +70°C
Fixed installation: -40°C up to +80°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® CLASSIC 110 BK U0/U: 600/1000 V** | | | | |
| 1120232 | 2 X 0.75 | 8.3 | 14.4 | 81 |
| 1120233 | 3 G 0.75 | 8.7 | 21.6 | 93 |
| 1120234 | 3 X 0.75 | 8.7 | 21.6 | 93 |
| 1120235 | 4 G 0.75 | 9.2 | 29.0 | 108 |
| 1120237 | 5 G 0.75 | 9.9 | 36.0 | 126 |
| 1120241 | 7 G 0.75 | 10.7 | 51.0 | 162 |
| 1120248 | 12 G 0.75 | 13.4 | 86.0 | 236 |
| 1120251 | 18 G 0.75 | 15.4 | 130.0 | 334 |
| 1120259 | 41 G 0.75 | 21.6 | 296.0 | 713 |
| 1120266 | 2 X 1 | 8.6 | 19.2 | 98 |
| 1120267 | 3 G 1 | 9.0 | 29.0 | 112 |
| 1120268 | 3 X 1 | 9.0 | 29.0 | 112 |
| 1120269 | 4 G 1 | 9.6 | 38.4 | 131 |
| 1120270 | 4 X 1 | 9.6 | 38.4 | 131 |
| 1120271 | 5 G 1 | 10.4 | 48.0 | 152 |
| 1120274 | 7 G 1 | 11.1 | 67.0 | 196 |
| 1120280 | 12 G 1 | 14.0 | 116.0 | 286 |
| 1120284 | 18 G 1 | 16.1 | 173.0 | 419 |
| 1120290 | 25 G 1 | 18.6 | 240.0 | 572 |
| 1120294 | 34 G 1 | 21.3 | 326.0 | 764 |
| 1120298 | 41 G 1 | 23.2 | 394.0 | 891 |
| 1120306 | 2 X 1.5 | 9.6 | 29.0 | 123 |
| 1120307 | 3 G 1.5 | 10.1 | 43.0 | 144 |
| 1120308 | 3 X 1.5 | 10.1 | 43.0 | 144 |
| 1120309 | 4 G 1.5 | 10.8 | 58.0 | 170 |
| 1120311 | 5 G 1.5 | 11.7 | 72.0 | 199 |
| 1120314 | 7 G 1.5 | 12.6 | 101.0 | 261 |
| 1120320 | 12 G 1.5 | 16.1 | 173.0 | 399 |
| 1120322 | 14 G 1.5 | 17.0 | 202.0 | 448 |
| 1120324 | 18 G 1.5 | 18.8 | 259.0 | 547 |
| 1120328 | 25 G 1.5 | 21.7 | 360.0 | 770 |

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| 1120330 | 34 G 1.5 | 24.9 | 490.0 | 996 |
| 1120333 | 50 G 1.5 | 29.8 | 720.0 | 1,427 |
| 1120339 | 2 X 2.5 | 10.8 | 48.0 | 147 |
| 1120340 | 3 G 2.5 | 11.3 | 72.0 | 182 |
| 1120342 | 4 G 2.5 | 12.2 | 96.0 | 225 |
| 1120343 | 4 X 2.5 | 12.2 | 96.0 | 225 |
| 1120344 | 5 G 2.5 | 13.3 | 120.0 | 266 |
| 1120346 | 7 G 2.5 | 14.4 | 168.0 | 354 |
| 1120349 | 12 G 2.5 | 18.7 | 288.0 | 540 |
| 1120350 | 14 G 2.5 | 19.8 | 336.0 | 542 |
| 1120351 | 18 G 2.5 | 22.0 | 432.0 | 788 |
| 1120353 | 25 G 2.5 | 25.8 | 600.0 | 1,094 |
| 1120360 | 4 G 4 | 13.8 | 154.0 | 324 |
| 1120361 | 5 G 4 | 15.1 | 192.0 | 385 |
| 1120362 | 7 G 4 | 16.4 | 269.0 | 513 |
| 1120366 | 4 G 6 | 15.1 | 230.0 | 442 |
| 1120367 | 5 G 6 | 16.8 | 288.0 | 526 |
| 1120368 | 7 G 6 | 18.2 | 403.0 | 705 |
| 1120370 | 4 G 10 | 18.7 | 384.0 | 707 |
| 1120371 | 5 G 10 | 20.7 | 480.0 | 881 |
| 1120374 | 4 G 16 | 21.3 | 614.0 | 1,100 |
| 1120375 | 5 G 16 | 23.6 | 768.0 | 1,600 |
| 1120376 | 7 G 16 | 26.2 | 1,075.0 | 1,890 |
| 1120378 | 4 G 25 | 26.2 | 960.0 | 1,600 |
| 1120379 | 5 G 25 | 29.0 | 1,200.0 | 2,050 |
| 1120382 | 4 G 35 | 29.1 | 1,344.0 | 2,400 |
| 1120383 | 5 G 35 | 32.5 | 1,680.0 | 2,900 |
| 1120385 | 4 G 50 | 35.6 | 1,920.0 | 3,400 |
| 1120387 | 4 G 70 | 40.7 | 2,688.0 | 5,050 |
| 1120389 | 4 G 95 | 46.8 | 3,648.0 | 6,010 |
| 1120390 | 4 G 120 | 53.5 | 4,608.0 | 7,500 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

## Comparable products

- ÖLFLEX® CLASSIC 100 BK POWER 0,6/1kV see main catalogue 2010/11 page 27
- ÖLFLEX® CLASSIC 130 H BK 0,6/1kV see main catalogue 2010/11 page 57

## Accessories

- SKINTOP® MS-M see main catalogue 2010/11 page 650
- Cable shears KT 4 and KT 5 see main catalogue 2010/11 page 904

# ÖLFLEX® CLASSIC 110 CY BLACK 0,6/1 kV


**Info**

- **Suitable for outdoor applications**
- **EMC compliant**
- **With U. L. approval ÖLFLEX® CONTROL TM CY see main catalogue 2010/11 page 47ff**

## Benefits

- Space saving installation due to small cable diameters
- High electrical performance due to 4kV test voltage

## Application range

- Plant engineering and construction
  Industrial machinery
  Air conditioning installations
  Power station
- In EMI critical environment (electromagnetic interference)
- Fixed installation as well as occasional flexing at free, non-continuously recurring movement without tensile load
- Outdoor use suitable considering the temperature range
- Suitable for direct burial

## Product features

- Flame retardant according to IEC 60332-1-2
- UV resistant and weather proof
- High coverage degree of the screen
  low transfer impedance
  (max. 250 Ω/km at 30 MHz)

## Approvals (Norm references)

CE RoHS

## Design

- Fine strands of bare copper wires
- PVC insulation LAPP P8/1
- PVC inner sheath, black
- Tinned copper braid
- PVC outer sheath, black (RAL 9005)

## Technical data

**Core identification code**
Black with white numbers acc. to VDE 0293

**Based on**
Cores according to VDE 0281 (H07V-K)
Sheath according to Italian standard =CEI-UNEL 35755 + 35756

**Specific insulation resistance**
> 20 GOhm x cm

**Conductor stranding**
Fine wire in accordance to VDE 0295
Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Occasional flexing: 20 x cable diameter
Fixed installed: 6 x outer diameter

**Rated voltage**
$U_0$/U: 600/1000 V

**Test voltage**
4000 V

**Protective conductor**
G = with protective conductor GN/YE
X = without protective conductor

**Range of temperature**
Occasional flexing: -5°C up to +70°C
Fixed installation: -40°C up to +80°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® CLASSIC 110 CY BK U0/U: 600/1000V** | | | | |
| 1121232 | 2 X 0.75 | 10.5 | 46.0 | 183 |
| 1121233 | 3 G 0.75 | 10.9 | 56.0 | 210 |
| 1121235 | 4 G 0.75 | 11.4 | 67.0 | 238 |
| 1121236 | 4 X 0.75 | 11.4 | 67.0 | 238 |
| 1121237 | 5 G 0.75 | 12.1 | 78.0 | 272 |
| 1121241 | 7 G 0.75 | 12.9 | 97.0 | 315 |
| 1121247 | 12 G 0.75 | 15.8 | 168.0 | 464 |
| 1121251 | 18 G 0.75 | 18.0 | 229.0 | 616 |
| 1121254 | 25 G 0.75 | 20.7 | 296.0 | 762 |
| 1121266 | 2 X 1 | 10.8 | 52.0 | 198 |
| 1121267 | 3 G 1 | 11.2 | 66.0 | 228 |
| 1121268 | 3 X 1 | 11.2 | 66.0 | 228 |
| 1121269 | 4 G 1 | 11.8 | 79.0 | 261 |
| 1121270 | 4 X 1 | 11.8 | 79.0 | 261 |
| 1121271 | 5 G 1 | 12.6 | 93.0 | 300 |
| 1121274 | 7 G 1 | 13.3 | 117.0 | 335 |
| 1121280 | 12 G 1 | 16.4 | 204.0 | 522 |
| 1121284 | 18 G 1 | 18.7 | 280.0 | 687 |
| 1121290 | 25 G 1 | 21.6 | 369.0 | 884 |
| 1121306 | 2 X 1.5 | 11.8 | 69.0 | 243 |
| 1121307 | 3 G 1.5 | 12.3 | 87.0 | 273 |
| 1121308 | 3 X 1.5 | 12.3 | 87.0 | 273 |
| 1121309 | 4 G 1.5 | 13.0 | 102.0 | 290 |
| 1121310 | 4 X 1.5 | 13.0 | 102.0 | 290 |
| 1121311 | 5 G 1.5 | 13.9 | 125.0 | 352 |

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| 1121314 | 7 G 1.5 | 15.0 | 180.0 | 448 |
| 1121320 | 12 G 1.5 | 18.7 | 281.0 | 690 |
| 1121324 | 18 G 1.5 | 21.8 | 391.0 | 938 |
| 1121328 | 25 G 1.5 | 25.1 | 518.0 | 1,180 |
| 1121340 | 3 G 2.5 | 13.5 | 123.0 | 354 |
| 1121342 | 4 G 2.5 | 14.6 | 168.0 | 413 |
| 1121344 | 5 G 2.5 | 15.7 | 204.0 | 515 |
| 1121346 | 7 G 2.5 | 17.0 | 265.0 | 619 |
| 1121349 | 12 G 2.5 | 21.7 | 421.0 | 936 |
| 1121360 | 4 G 4 | 16.2 | 238.0 | 587 |
| 1121361 | 5 G 4 | 17.7 | 302.0 | 689 |
| 1121362 | 7 G 4 | 19.0 | 396.0 | 828 |
| 1121367 | 4 G 6 | 17.7 | 318.0 | 715 |
| 1121368 | 5 G 6 | 19.2 | 419.0 | 862 |
| 1121369 | 7 G 6 | 21.2 | 559.0 | 1,105 |
| 1121372 | 4 G 10 | 21.7 | 574.0 | 1,188 |
| 1121373 | 5 G 10 | 23.0 | 612.0 | 1,020 |
| 1121377 | 4 G 16 | 24.3 | 809.0 | 1,656 |
| 1121378 | 5 G 16 | 26.7 | 935.0 | 1,440 |
| 1121381 | 4 G 25 | 29.8 | 1,165.0 | 2,179 |
| 1121382 | 5 G 25 | 31.6 | 1,400.0 | 2,090 |
| 1121385 | 4 G 35 | 32.7 | 1,683.0 | 2,893 |
| 1121388 | 4 G 50 | 39.6 | 2,368.0 | 4,094 |
| 1121391 | 4 G 70 | 44.5 | 3,261.0 | 5,467 |
| 1121394 | 4 G 95 | 51.0 | 4,055.0 | 5,849 |
| 1121397 | 4 G 120 | 58.1 | 5,225.0 | 7,509 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

## Comparable products

- ÖLFLEX® CLASSIC 135 CH BK 0,6/1kV see main catalogue 2010/11 page 58

## Accessories

- SKINTOP® MS-M BRUSH see main catalogue 2010/11 page 658

# Power and control cables

## Wide range use

### Intrinsically safety circuits

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# ÖLFLEX® EB

**According to DIN EN 60079-14; VDE 0165 part 1**


**Info**

- **For use in a voltage range: < 50 V AC / <75 V DC where acc. to Directive 2006/95/EC respectively 73/23/EEC the CE-mark is not mandatory!**

## Benefits

- Space saving installation due to small cable diameters

## Application range

- Installation of intrinsically safe circuits, where a special cable marking for hazard area type "i"- intrinsically safety is specified

## Product features

- Flame retardant according to IEC 60332-1-2

## Approvals (Norm references)

RoHS

- According to DIN EN 60079-14 section 12.2.2 (VDE 0165 part 1) - Electrical characteristics and marking of wires and cables

## Design

- Fine strands of bare copper wires
- PVC insulation LAPP P8/1
- PVC outer sheath, sky blue RAL 5015

## Technical data

**Core identification code**
Black with white numbers acc. to VDE 0293

**Mutual capacitance**
Core/core approx. 110 nF/km

**Based on**
HD 21.13 S1; VDE 0281 Part 13

**Specific insulation resistance**
> 20 GOhm x cm

**Inductivity**
approx. 0.65 mH/km

**Conductor stranding**
Fine wire in accordance to VDE 0295 Class 5 / IEC 60228 Class 5

**Minimum bending radius**
Occasional flexing: 15 x cable diameter
Fixed installation: 4 x cable diameter

**Rated voltage**
< 50 V AC
< 75 V DC
see Info

**Test voltage**
Core/core: 3000 V

**Range of temperature**
Occasional flexing: -5°C up to +70°C
Fixed installation: -40°C up to +80°C

| Part number | Number of cores and mm² per conductor | Outer diameter in mm approx. | Copper index kg/km | Weight kg/km approx. |
|---|---|---|---|---|
| **ÖLFLEX® EB without protective conductor GN/YE** | | | | |
| 0012420 | 2 X 0.75 | 5.4 | 14.7 | 50 |
| 0012421 | 3 X 0.75 | 5.7 | 22.1 | 60 |
| 0012430 | 4 X 0.75 | 6.2 | 29.4 | 81 |
| 0012422 | 5 X 0.75 | 6.7 | 36.8 | 88 |
| 0012423 | 7 X 0.75 | 7.3 | 51.5 | 115 |
| 0012425 | 12 X 0.75 | 9.9 | 88.2 | 185 |
| 0012427 | 18 X 0.75 | 11.7 | 132.3 | 282 |
| 0012429 | 25 X 0.75 | 13.8 | 183.8 | 393 |
| 0012440 | 2 X 1 | 5.7 | 19.7 | 57 |
| 0012441 | 3 X 1 | 6.0 | 29.6 | 73 |
| 0012443 | 5 X 1 | 7.1 | 49.4 | 105 |
| 0012444 | 7 X 1 | 8.0 | 69.1 | 138 |
| 0012446 | 12 X 1 | 10.5 | 118.4 | 231 |
| 0012448 | 18 X 1 | 12.7 | 177.7 | 331 |
| 0012401 | 2 X 1.5 | 6.3 | 29.0 | 80 |
| 0012402 | 3 X 1.5 | 6.7 | 43.0 | 105 |
| 0012403 | 4 X 1.5 | 7.2 | 58.0 | 125 |
| 0012404 | 5 X 1.5 | 8.1 | 72.0 | 139 |
| **ÖLFLEX® EB with protective conductor GN/YE** | | | | |
| 0012501 | 3 G 1.5 | 6.7 | 43.0 | 105 |
| 0012502 | 4 G 1.5 | 7.2 | 58.0 | 125 |
| 0012503 | 5 G 1.5 | 8.1 | 72.0 | 139 |
| 0012504 | 7 G 1.5 | 8.9 | 101.0 | 180 |
| 0012505 | 12 G 1.5 | 12.0 | 173.0 | 339 |
| 0012506 | 18 G 1.5 | 14.4 | 259.0 | 513 |
| 0012507 | 25 G 1.5 | 16.9 | 360.0 | 698 |

Copper price basis: EUR 150 / 100 kg; For utilization and definition of ‚Metal price basis' and ‚Metal index' see main catalogue 2010/11 Appendix T17
Please find our standard lengths at: www.lappkabel.de/en/cable-standardlengths
Packaging size: Coil ≤ 30 kg and ≤ 250 m, otherwise drum
Please specify the desired packaging size (e.g. 1 x 500 m drum or 5 x 100 m coils)

## Comparable products

- UNITRONIC® EB CY (TP) see main catalogue 2010/11 page 268
- UNITRONIC® EB JE-LiYCY...BD see main catalogue 2010/11 page 269
- UNITRONIC® EB JE-Y(ST)Y 0,8 BD see main catalogue 2010/11 page 270

## Accessories

- Stainless steel - Box Starter - Set see main catalogue 2010/11 page 872
- SKINTOP® K-M ATEX plus blue see main catalogue 2010/11 page 649

# Product overview biogas



**Please order our new main catalogue 2010/11:**
**www.lappkabel.com/service**

# Notices

Mixed Sources
Product group from well-managed forests and other controlled sources

Cert no. SGS-COC-005578
www.fsc.org
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**Safety**
Without exception our products are tested for application safety in accordance with laid down standards and our own regulations, which complement the standards. Relevant legal requirements and safety regulations are also observed. Provided due care and attention is paid, the possibility of product-specific danger to the user may thus reasonably be excluded. Where products are used carelessly or incorrectly, however, considerable danger to persons and the environment may arise. For this reason, our cables must only be processed and /or used responsibly by trained electricians or specialists. This catalogue contains general information for the application of each product. Independent of such information, the application standards DIN VDE 0298 and DIN VDE 001 for cables will apply. Excerpts from these standards, as well as complementary selection and application tables, design and installation guidelines, are contained in the tables in the appendix to our main catalogue 2010/11. Our machines and installation tools are – where necessary – designed in accordance with the machine guidelines and display the CE identification mark. It must be noted, however, that our machines and installation tools must only be used by trained specialized personnel and for the purpose for which they were designed. 

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