ÖLFLEX® VFD

Products for Variable Frequency Drive Applications

make the right connection

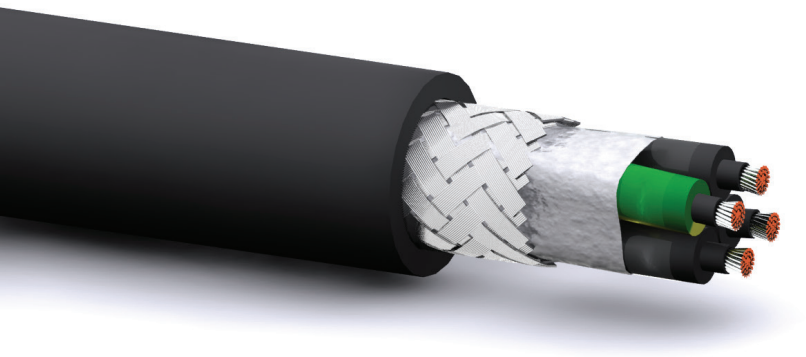
LAPP GROUP

make the right connection

Connectivity solutions that keep you moving.

Variable Frequency Drives (VFDs) are devices that adjust both motor speed and torque in electronic and electrical appliances. Maintaining control over system speed in this way ensures optimum output and increased efficiency. Increases in global energy demand and consumption have resulted in global initiatives to save energy. Strict regulations by the governments of North America and Europe have made VFDs mandatory in industries such as foundry, mining, and manufacturing. Other industries including textiles and paper have also started using VFDs. VFDs are used in a wide array of major applications: pumps, fans, compressors, conveyors, elevators, extruders, mixers, and more. Low-voltage and medium-voltage drives are most common in these applications.

For a reliable solution in these demanding applications, Lapp Group offers a full range of ÖLFLEX® VFD cables and EMC-optimized cable glands. Make the right connection by using Lapp products to reduce downtime and increase performance.



Our cables stand out from the noise.

Variable speed drives have been used in industrial applications for years because of their ability to provide precise control and the resulting energy savings. Environments that contain VFDs are often heavy with noise: electromagnetic interference (EMI) and radio frequency interference (RFI), which are a serious concern among VFD manufacturers.

The noise emitted by VFD systems can negatively affect instrumentation, sensors, alarms, and other equipment, ultimately impacting the overall life of the machine. Electrical noise can destroy electronic components, network cabling, and other sensitive wiring found in most modern industrial facilities. In order to reduce this issue, VFDs need to be installed with compliant power cables considering these factors:

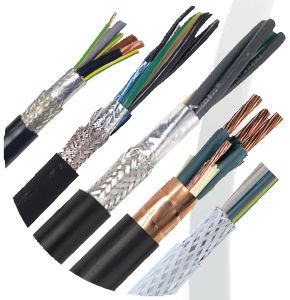
- Ample grounding configuration and termination
- Proper shielding to contain noise
- Sturdy insulation for superior electrical performance
- Appropriate stranding
- Industrial hardening
- Using manufacturer's recommended cable

EMI problems can be minimized by using a shielded power cable to connect the VFD to the motor. VFDs are very popular in the current market, making EMI and RFI a critical issue. Lapp Group offers excellent VFD cables and glands specially designed to minimize EMI and downtime, saving you time and money by increasing your machine's overall efficiency.

make the right connection

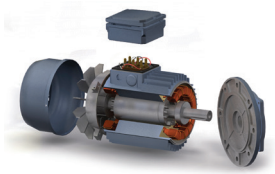
contents

ÖLFLEX® Variable Frequency Drive Cables



SKINTOP® Strain Relief Cable Glands

Technical Data



ÖLFLEX® VFD 2XL

Flexible VFD Cable; 600V/1000V/2000V; UL & c(UL) TC Approval

ÖLFLEX® VFD 2XL is a robust oil- and UV-resistant shielded motor cable for VFD drives. The XLPE (plus) insulation with enhanced electrical properties can withstand twice the dielectric voltage test, provides extended performance, and is suitable for 2kV applications.

Recommended Applications

VFD drive and motor connections; pumps; compressors; conveyors; elevators; extruders; presses; HVAC; any on/off, slow down/speed up applications using VFD drives and motors

Approvals

Construction

Conductors: Finely stranded tinned copper
Insulation: XLPE (plus)
Shielding: Barrier tape; triple layer foil tape (100% coverage); tinned copper braid (85% coverage); tinned copper drain wire
Jacket: Specially formulated thermoplastic elastomer (TPE); black

Application Advantage

- One cable for applications up to 2kV
- Low capacitance design
- Industrial grade phthalate-free jacket designed for harsh environments
- UL TC-ER & c(UL) CIC/TC approved
- Reduces space and weight in tray
- No conduit required due to TC-ER rating

Use our Cable VFD Selection Guide, page 18

Cable Attributes, page 16

OR-03	FR-03	FL-01	MP-03
OIL	FLAME	MOTION	MECHANICAL

Similar Cables

- ÖLFLEX® VFD SLIM

Complete the Installation

SKINTOP® Strain Relief

SKINTOP® MS-M BRUSH

Technical Data

Minimum Bend Radius: 7.5 x cable diameter

Temperature Range:
- UL/CSA TC: -25°C to +90°C
- for stationary use: -40°C to +105°C
- for flexible use: -25°C to +105°C

Nominal Voltage:
- UL TC: 600V/2000V
- UL Flexible Motor Supply: 1000V
- c(UL) CIC/TC: 600V
- cRU AWM: 1000V

Test Voltage: 6000V

Conductor Stranding:
- 16 - 6 AWG: Class 5 fine wire
- 4 - 2 AWG: Class K fine wire

Color Code: Black with white numbers, plus green/yellow ground

Approvals:
UL: TC-ER per UL 1277
Attributes: UL Oil Res I/II, 90°C Wet or Dry, -40°C Cold Bend; -25°C Cold Impact, Sunlight Resistant, Direct Burial, NFPA 79 2015
NEC: Class 1 Division 2 per NEC Articles 336, 501
Canada: c(UL) CIC/TC FT4, cRU AWM I/II A/B FT4
Additional: CE (50V - 1kV) & RoHS

Part Number	Number of Conductors (incl. ground)	Nominal Outer Diameter (in)	Nominal Outer Diameter (mm)	Copper Weight (lbs/mft)	Approx. Weight (lbs/mft)	SKINTOP® MS-SC PG Thread	SKINTOP® MS-M BRUSH Metric Thread
16 AWG (1.5 mm²)							
700700	4 + drain	0.509	12.9	70	160	53112240	53112676
14 AWG (2.5 mm²)							
700701	4 + drain	0.582	14.8	100	196	53112250	53112676
12 AWG (4 mm²)							
700702	4 + drain	0.656	16.7	144	258	53112250	53112677
10 AWG (6 mm²)							
700703	4 + drain	0.707	18.0	199	320	53112260	53112677
8 AWG (10 mm²)							
700704	4 + drain	0.887	22.5	298	575	53112260	53112678
6 AWG (13.5 mm²)							
700705	4	1.022	25.9	518	885	53112270	53112678
4 AWG (21 mm²)							
700706	4	1.158	29.4	642	1055	53112270	53112679
2 AWG (33.7 mm²)							
700707	4	1.332	33.8	980	1460	–	53112679

Recommended SKINTOP® assumes minimal OD variance. Additional configurations are available, please see our SKINTOP® section. Photographs are not to scale and are not true representations of the products in question. For current information go to our website. If not otherwise specified, all values relating to the product are nominal values.

ÖLFLEX® VFD 2XL with Signal

Flexible VFD Cable with a Control Pair; 600V/1000V/2000V; UL & c(UL) TC Approval

ÖLFLEX® VFD 2XL with Signal is a robust oil- and UV-resistant shielded motor cable for VFD drives, with a pair for brake or temperature sensor. The XLPE (plus) insulation with enhanced electrical properties can withstand twice the dielectric voltage test, provides extended performance, and is suitable for 2kV applications.

Recommended Applications

VFD drive and motor connections; pumps; compressors; conveyors; elevators; extruders; presses; HVAC; any on/off, slow down/speed up applications using VFD drives and motors

Approvals

Construction

Conductors: Finely stranded tinned copper
Insulation: XLPE (plus)
Shielding: Barrier tape; triple layer foil tape (100% coverage); tinned copper braid (85% coverage)
Jacket: Specially formulated thermoplastic elastomer (TPE); black

Application Advantage

- One cable for applications up to 2kV
- Low capacitance design
- Industrial grade phthalate-free jacket designed for harsh environments
- UL TC-ER & c(UL) CIC/TC approved
- Reduces space and weight in tray
- No conduit required due to TC-ER rating

Use our VFD Cable Selection Guide, page 18

Cable Attributes, page 16

OR-03	FR-03	FL-01	MP-03
OIL	FLAME	MOTION	MECHANICAL

Similar Cables

- ÖLFLEX® VFD with Signal

Complete the Installation

SKINTOP® Strain Relief

SKINTOP® MS-M BRUSH

Technical Data

Minimum Bend Radius: 7.5 x cable diameter

Temperature Range:
- UL/CSA TC: -25°C to +90°C
- for stationary use: -40°C to +105°C
- for flexible use: -25°C to +105°C

Nominal Voltage:
- UL TC: 600V/2000V
- UL Flexible Motor Supply: 1000V
- c(UL) CIC/TC: 600V
- cRU AWM: 1000V

Test Voltage: 6000V

Conductor Stranding:
- 16 - 6 AWG: Class 5 fine wire
- 4 - 2 AWG: Class K fine wire

Color Code: Black with white numbers, plus green/yellow ground and one black pair with white numbers

Approvals:
UL: TC-ER per UL 1277
Attributes: UL Oil Res I/II, 90°C Wet or Dry, -40°C Cold Bend; -25°C Cold Impact, Sunlight Resistant, Direct Burial, NFPA 79 2015
NEC: Class 1 Division 2 per NEC Articles 336, 501
Canada: c(UL) CIC/TC FT4, cRU AWM I/II A/B FT4
Additional: CE (50V - 1kV) & RoHS

Part Number	Number of Conductors	1 Shielded Pair for Signal	Nominal Outer Diameter (in)	Nominal Outer Diameter (mm)	Copper Weight (lbs/mft)	Approx. Weight (lbs/mft)	SKINTOP® MS-SC PG Thread	SKINTOP® MS-M BRUSH Metric Thread
16 AWG (1.5 mm²)								
700710	4	18 AWG	0.652	16.6	91	200	53112250	53112677
14 AWG (2.5 mm²)								
700711	4	18 AWG	0.687	17.4	132	252	53112250	53112677
12 AWG (4 mm²)								
700712	4	18 AWG	0.752	19.1	160	294	53112260	53112677
10 AWG (6 mm²)								
700713	4	18 AWG	0.798	20.3	215	354	53112260	53112677
8 AWG (10 mm²)								
700714	4	14 AWG	0.986	25.0	334	690	53112270	53112678
6 AWG (16 mm²)								
700715	4	14 AWG	1.112	28.2	504	905	53112270	53112679
4 AWG (21 mm²)								
700716	4	14 AWG	1.259	32.0	667	1125	–	53112679
2 AWG (33.7 mm²)								
700717	4	14 AWG	1.403	35.6	1027	1580	–	53112680

Recommended SKINTOP® assumes minimal OD variance. Additional configurations are available, please see our SKINTOP® section. Photographs are not to scale and are not true representations of the products in question. For current information go to our website. If not otherwise specified, all values relating to the product are nominal values.

ÖLFLEX® VFD SLIM

Reduced-Diameter VFD Cable; 600V/1000V; UL & c(UL) TC Approval

ÖLFLEX® VFD SLIM is a reduced-diameter shielded motor cable for VFD drives. It is designed with the "Lapp Surge Guard" insulation system, which includes a semiconductive layer made to withstand nonlinear power distortions associated with VFD drives and to disperse increases in voltage caused by wave reflection, spikes, in-rush current, and harmonics.

Construction

Conductors: Finely stranded tinned copper
Insulation: "Lapp Surge Guard" insulation system
Shielding: Barrier tape; triple layer foil tape (100% coverage); tinned copper braid (85% coverage)
Jacket: Specially formulated thermoplastic polymer; black

Recommended Applications

VFD drive and motor applications; web presses; HVAC; conveyors; any on/off, slow down/speed up applications using VFD drives and motors

Application Advantage

- "Lapp Surge Guard" insulation protection
- UL TC-ER & c(UL) CIC/TC approved
- Double shielded for extra protection

Approvals

Cable Attributes, page 16

OR-03	FR-03	FL-01	MP-03
OIL	FLAME	MOTION	MECHANICAL

Similar Cables

- ÖLFLEX® VFD 2XL

Use our VFD Cable Selection Guide, page 18

Complete the Installation

SKINTOP® MS-SC
SKINTOP® MS-M BRUSH

Technical Data

Minimum Bend Radius: 7.5 x cable diameter

Temperature Range:
- UL/CSA TC: -25°C to +90°C
- for stationary use: -40°C to +105°C
- for flexible use: -25°C to +105°C

Nominal Voltage:
- UL/CSA TC: 600V
- UL WTTC: 1000V
- UL Flexible Motor Supply: 1000V
- UL/CSA AWM: 1000V

Test Voltage: 2000V

Peak Voltage: 7500V

Conductor Stranding:
- 18-6 AWG: Class 5 fine wire*
- 4-2 AWG: Class K fine wire

Color Code: Black with white numbers, plus green/yellow ground

Approvals:
UL: TC-ER per UL 1277
MTW per UL 1063
WTTC per UL 2277
AWM 20886
Attributes: UL Oil Res I/II
75°C Wet; 90°C Dry
-40°C Cold Bend; -25° Cold Impact
Sunlight Resistant
Submersible Pump (14 AWG and larger)
Direct Burial
NFPA 79 2015
NEC: Class 1 Division 2 per NEC Articles 336, 501
Canada: c(UL) CIC/TC FT4
CSA AWM I/II A/B 1000V FT4
Additional: MSHA P-07KA050013-MSHA
CE & RoHS

* 18 AWG meets only the Class 5 cross section and DC resistance

Part Number	Number of Conductors (incl. ground)	Nominal Outer Diameter (in)	(mm)	Copper Weight (lbs/mft)	Approx. Weight (lbs/mft)	SKINTOP® MS-SC PG Thread	SKINTOP® MS-M BRUSH
18 AWG (1.00 mm²)							
761804	4	0.394	10.0	53	112	53112230	–
16 AWG (1.5 mm²)							
761604*	4	0.465	11.8	73	154	53112240	53112676
14 AWG (2.5 mm²)							
761404	4	0.514	13.1	100	194	53112240	53112676
12 AWG (4 mm²)							
761204	4	0.583	14.8	139	254	53112250	53112676
10 AWG (6 mm²)							
761004	4	0.697	17.7	195	346	53112260	53112677

Part Number	Number of Conductors (incl. ground)	Nominal Outer Diameter (in)	(mm)	Copper Weight (lbs/mft)	Approx. Weight (lbs/mft)	SKINTOP® MS-SC PG Thread	SKINTOP® MS-M BRUSH
8 AWG (10 mm²)							
760804	4	0.829	21.1	326	596	53112260	53112678
6 AWG (16 mm²)							
760604	4	1.002	25.5	494	785	53112270	53112678
4 AWG (21 mm²)							
760404	4	1.186	30.1	648	965	53112270	53112679
2 AWG (33.7 mm²)							
760204	4	1.395	35.4	985	1339	–	53112680

* 16 AWG cable has a drain wire.

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ÖLFLEX® VFD with Signal

Flexible VFD Cable with a Control Pair; 600V/1000V; UL & c(UL) TC Approval

ÖLFLEX® VFD with Signal is an extremely oil- and UV-resistant shielded motor power cable for VFD drives, with an additional pair for brake or temperature sensor. It is designed with the "Lapp Surge Guard" insulation system, which includes a semiconductive layer made to withstand nonlinear power distortions associated with VFD drives and to disperse increases in voltage.

Construction

Conductors: Finely stranded tinned copper
Insulation: "Lapp Surge Guard" insulation system
Shielding: Barrier tape; triple layer foil tape (100% coverage); tinned copper braid (85% coverage)
Jacket: Specially formulated thermoplastic polymer; black

Recommended Applications

VFD drive and motor connections with temperature sensors or brake mechanisms; web presses; HVAC; any on/off, slow down/speed up applications

Application Advantage

- "Lapp Surge Guard" insulation system
- UL TC-ER & c(UL) CIC/TC approved
- Double-shielded for extra protection
- Contains pair for brake or temperature sensor

Approvals

Use our VFD Cable Selection Guide, page 18

Cable Attributes, page 16


OR-03 OIL


FR-03 FLAME


FL-01 MOTION


MP-03 MECHANICAL

Similar Cables

- ÖLFLEX® VFD 2XL with Signal

Complete the Installation


SKINTOP® Strain Relief


EPIC® Connectors

Technical Data

Minimum Bend Radius: 7.5 x cable diameter

Temperature Range:
- UL/CSA TC: -25°C to +90°C
- for stationary use: -40°C to +105°C
- for flexible use: -25°C to +105°C

Nominal Voltage:
- UL/CSA TC: 600V
- UL WTTC: 1000V
- UL Flexible Motor Supply: 1000V
- UL/CSA AWM: 1000V

Test Voltage: 2000V

Peak Voltage: 7500V

Conductor Stranding:
- 18-6 AWG: Class 5 fine wire
- 4 AWG: Class K fine wire

Color Code: Black with white numbers, plus green/yellow ground and one black pair with white numbers

Approvals:
UL: TC-ER per UL 1277
MTW per UL 1063
WTTC per UL 2277
AWM 20886
Attributes: UL Oil Res I/II
75°C Wet; 90°C Dry
-40°C Cold Bend; -25°C Cold Impact
Sunlight Resistant
Direct Burial
Submersible Pump (14 AWG and larger)
Bus Drop
NFPA 79 2015
NEC: Class 1 Division 2 per NEC Articles 336, 501
Canada: c(UL) CIC/TC FT4
CSA AWM I/II A/B 1000V FT4
Additional: MSHA P-07-KA050011-MSHA
CE & RoHS

Part Number	Number of Conductors	1 Shielded Pair for Signal	Nominal Outer Diameter (in)	Nominal Outer Diameter (mm)	Copper Weight (lbs/mft)	Approx. Weight (lbs/mft)	SKINTOP® MS-SC PG Thread	SKINTOP® MS-M BRUSH Metric Thread
16 AWG (1.5 mm²)								
7416048	4	18 AWG	0.519	13.2	88	180	53112240	53112676
14 AWG (2.5 mm²)								
7414048	4	18 AWG	0.573	14.6	118	216	53112250	53112676
7414044	4	14 AWG	0.600	15.2	141	254	53112250	53112676
12 AWG (4 mm²)								
7412048	4	18 AWG	0.632	16.1	162	286	53112250	53112677
7412044	4	14 AWG	0.662	16.8	187	326	53112250	53112677
10 AWG (6 mm²)								
7410044	4	14 AWG	0.745	18.9	260	406	53112260	53112677
8 AWG (10 mm²)								
7408044	4	14 AWG	0.896	22.8	375	617	53112260	53112678
6 AWG (16 mm²)								
7406044	4	14 AWG	1.026	26.1	472	848	53112270	53112678
4 AWG (21 mm²)								
7404044*	4	14 AWG	1.324	33.6	643	1251	–	53112679

* A minimum order may apply.

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ÖLFLEX® VFD 2XL SYMMETRICAL

Symmetrical 2kV motor supply cable for large HP VFD drives; UL & c(UL) TC approval

ÖLFLEX® VFD 2XL SYMMETRICAL is a robust oil- & UV-resistant large AWG 2kV VFD cable designed with three symmetrical grounds and a helical copper tape shield.

Recommended Applications

VFD drive & motor connections for large HP applications; pumps; compressors; conveyors; elevators; extruders; HVAC; large presses; on/off, slow down/speed up applications

Approvals

Construction

Conductors: Bare stranded copper
Insulation: XLPE (plus) + 3 bare stranded copper grounds
Shielding: Helical copper tape (100% coverage)
Jacket: Specially formulated thermoplastic elastomer (TPE); black

Application Advantage

- 100% copper tape shield for EMI & RFI protection
- Low capacitance design
- UL TC-ER & c(UL) CIC/TC approved (CIC/TC approval depending on AWG)
- 3 ground design for optimal electrical performance
- Industrial grade phthalate-free jacket designed for harsh environments
- Flexible for easier routing

Cable Attributes, page 16

OR-03	FR-03	FL-01	MP-03
OIL	FLAME	MOTION	MECHANICAL

Similar Cables

- ÖLFLEX® SERVO 9YSLCY-JB

Complete the Installation

SKINTOP® MS-M BRUSH

EPIC® Connectors

Technical Data

Minimum Bend Radius:	15 x cable diameter
Temperature Range:	
- UL/CSA TC:	-25°C to +90°C
- for stationary use:	-40°C to +105°C
- for flexible use:	-25°C to +105°C
Nominal Voltage:	
- UL TC:	600/2000V
- UL WTTC:	1000V
- UL Flexible Motor Supply:	1000V
- c(UL) CIC/TC:	600V
- cRU AWM:	1000V
Test Voltage:	6000V

Conductor Stranding:	Class B stranded wire
Color Code:	black with white numbers: 1, 2, 3, plus 3 bare symmetrical grounds
Approvals:	
UL:	TC-ER per UL 1277 WTTC per UL 2277
Attributes:	UL Oil Res I/II 90°C wet or dry -40°C Cold Bend; -25°C Cold Impact Sunlight resistant Direct burial NFPA 79
NEC:	Class 1 Division 2 per NEC Article 501
Canada:	c(UL) CIC/TC FT4 (1–4/0 AWG only) cRU AWM I/II A/B FT4
Additional:	CE (50V–1kV) & RoHS

Part Number	3 Symmetrical Grounds	Nominal Outer Diameter (in)	Nominal Outer Diameter (mm)	Copper Weight (lbs/mft)	Approx. Weight (lbs/mft)	SKINTOP® MS-M BRUSH Metric Thread
1 AWG (42.4 mm²)						
700720	8 AWG	1.328	33.7	1024	1427	53112679
1/0 AWG (53.7 mm²)						
700721	6 AWG	1.396	35.5	1332	1836	53112680
2/0 AWG (67.5 mm²)						
700722	6 AWG	1.502	38.2	1592	2137	53112680
3/0 AWG (85.1 mm²)						
700723	5 AWG	1.616	41.0	1995	2609	53112680
4/0 AWG (107.2 mm²)						
700724	4 AWG	1.801	45.7	2485	3254	53112681
250 KCMIL (126.7 mm²)						
700725	2 AWG	1.996	50.7	3099	3988	53112681
350 KCMIL (177.6 mm²)						
700726	2 AWG	2.229	56.6	4051	5106	53112501
500 KCMIL (253.7 mm²)						
700727	1 AWG	1.468	62.7	5641	6886	53112500

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ÖLFLEX® FD VFD

Continuous Flex VFD Cable; 600V/1000V; UL & c(UL) TC Approval

ÖLFLEX® FD VFD is a shielded continuous flex motor supply cable. It is designed with the "Lapp Surge Guard" insulation system, which includes a semiconductive layer made to withstand nonlinear power distortions associated with VFD drives in industrial applications.

Construction

Conductors: Finely stranded bare copper
Insulation: "Lapp Surge Guard" insulation system
Shielding: Barrier tape; triple layer foil tape (100% coverage); tinned copper braid (85% coverage)
Jacket: Specially formulated thermoplastic polymer; black

Recommended Applications

VFD drives and motor connections in continuous flex applications; plastic extrusion; any on/off, slow down/speed up applications

Application Advantage

- Continuous flex rated for cable track applications
- Double-shielded for extra protection
- UL TC-ER & c(UL) CIC/TC approved

Approvals

Use our VFD Cable Selection Guide, page 18

Cable Attributes, page 16

OR-03	FR-03	CF-02	MP-03
OIL	FLAME	MOTION	MECHANICAL

Complete the Installation

 SKINTOP® MS-SC

 SKINTOP® MS-M BRUSH

Technical Data

Minimum Bend Radius:
- for flexible use: 5 x cable diameter
- for continuous flexing: 7.5 x cable diameter

Temperature Range:
- for continuous flexing: -5°C to +90°C
- for stationary use: -40°C to +105°C
- UL/CSA: -25°C to +90°C

Nominal Voltage:
- UL/CSA TC: 600V
- UL WTTC: 1000V
- UL Flexible Motor Supply: 1000V
- UL/CSA AWM: 1000V

Test Voltage: 2000V

Peak Voltage: 7500V

Conductor Stranding: Class M fine wire

Color Code: Black with white numbers, plus green/yellow ground

Approvals:
UL: TC-ER per UL 1277
MTW per UL 1063
WTTC per UL 2277
AWM 20886
Attributes: UL Oil Res I/II
75°C Wet; 90°C Dry
-40°C Cold Bend; -25°C Cold Impact
Sunlight Resistant
Direct Burial
NFPA 79 2015
NEC: Class 1 Division 2 per NEC Articles 336, 501
Canada: c(UL) CIC/TC FT4
CSA AWM I/II A/B 1000V FT4
Additional: CE & RoHS

Part Number	Number of Conductors	Nominal Outer Diameter (in)	Nominal Outer Diameter (mm)	Copper Weight (lbs/mft)	Approx. Weight (lbs/mft)	SKINTOP® MS-SC PG Thread	SKINTOP® MS-M BRUSH Metric Thread
14 AWG (2.5 mm²)							
771404	4	0.500	12.7	84	133	53112240	53112676
12 AWG (4 mm²)							
771204	4	0.575	14.6	122	180	53112250	53112676
10 AWG (6 mm²)							
771004	4	0.690	17.5	180	271	53112260	53112677

Recommended SKINTOP® assumes minimal OD variance. Additional configurations are available, please see our SKINTOP® section. Photographs are not to scale and are not true representations of the products in question. For current information go to our website. If not otherwise specified, all values relating to the product are nominal values.

ÖLFLEX® SERVO 9YSLCY-JB

Flexible Low Capacitance, Double-Shielded, Large Gauge Motor Cable for Servo & VFD Applications

ÖLFLEX® SERVO 9YSLCY-JB is a highly flexible power cable for large horsepower motors and VFD drives. It has a double shield with polypropylene-insulated conductors for optimal low-loss power transmission when compared to PVC.

Construction: 3 Power + 1 Insulated Ground

Conductors: Finely stranded bare copper
Insulation: Polypropylene
Shielding: Overall foil and tinned copper braid
Jacket: PVC; transparent

Construction: 3 Power + 3 Insulated Grounds

Conductors: Finely stranded bare copper
Insulation: Polypropylene
Shielding: Overall foil and tinned copper braid
Jacket: PVC; black

Recommended Applications

Motor connections for large motors and drives; textile; paper; chemical; machine tool; heavy industry; conveying technology

Application Advantage

- Flexible for easier routing
- UL & CSA AWM approved
- Black-jacketed version: 3 symmetrical grounds for improved EMC performance

Approvals

c UL us · FP 2015 · CE · RoHS

Cable Attributes, page 16

OR-01	FR-02	FL-01	MP-02
OIL	FLAME	MOTION	MECHANICAL

Similar Cables

- V 2000
- ÖLFLEX® SERVO 2YSLCY-JB

Complete the Installation

 SKINTOP® MS-SC

 SKINTOP® MS-M BRUSH

Technical Data

Minimum Bend Radius:	4 x cable diameter
Temperature Range:	
- for stationary use (UL/CSA):	-40°C to +80°C
- for flexible use (UL/CSA):	-5°C to +80°C
Nominal Voltage:	1000V
Test Voltage:	4000V
Conductor Stranding:	Class 5 fine wire
Color Code:	VDE 0293-308 Black, brown, gray, plus green/yellow ground(s) (1 or 3)
Approvals:	
UL:	AWM 2570 or 20886
Attributes:	VW-1 NFPA 79 2015
Canada:	cRU AWM I/II A/B 1000V FT1
Additional:	Based on VDE 0276, 0250, 0207 CE & RoHS

Part Number	Jacket Color	Size / Number of Conductors Power	Ground	Nominal Outer Diameter (in)	(mm)	Copper Weight (lbs/mft)	Approx. Weight (lbs/mft)	SKINTOP® MS-M BRUSH Metric Thread
3 Power Conductors + 1 Ground								
0037008	Transparent	1 AWG/3c	1 AWG/1c	1.344	34.1	1482	1982	53112679
0037009	Transparent	2/0 AWG/3c	2/0 AWG/1c	1.611	40.9	2017	2654	53112680
0037010	Transparent	3/0 AWG/3c	3/0 AWG/1c	1.789	45.4	2691	3562	53112681
0037011	Transparent	4/0 AWG/3c	4/0 AWG/1c	1.962	49.8	3433	4435	53112681
0037012	Transparent	250 KCMIL/3c	250 KCMIL/1c	2.210	56.1	4183	4733	53112501
0037013	Transparent	350 KCMIL/3c	350 KCMIL/1c	2.419	61.4	5086	5634	53112501
0037014	Transparent	450 KCMIL/3c	450 KCMIL/1c	2.675	68.0	6680	8165	53112503
3 Power Conductors + 3 Grounds								
0037023	Black	1 AWG/3c	8 AWG/3c	1.225	31.1	1449	1612	53112679
0037024	Black	2/0 AWG/3c	8 AWG/3c	1.462	37.1	2003	2054	53112680
0037025	Black	3/0 AWG/3c	6 AWG/3c	1.576	40.0	2656	2797	53112680
0037026	Black	4/0 AWG/3c	6 AWG/3c	1.678	42.6	3250	3410	53112680
0037027	Black	250 KCMIL/3c	4 AWG/3c	1.970	50.0	3637	4118	53112681
0037028	Black	350 KCMIL/3c	2 AWG/3c	2.191	55.6	4756	5255	53112501

Recommended SKINTOP® assumes minimal OD variance. Additional configurations are available, please see our SKINTOP® section. Photographs are not to scale and are not true representations of the products in question. For current information go to our website. If not otherwise specified, all values relating to the product are nominal values.

ÖLFLEX® SERVO 2YSLCY-JB

Flexible Low Capacitance, Double-Shielded, Large Gauge Motor Cable for Servo & VFD Applications

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- For large power drive systems
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Approvals

CE RoHS

Cable Attributes, page 16

OR-01	FR-02	FL-01	MP-01
OIL	FLAME	MOTION	MECHANICAL

Similar Cables

- V 2000
- ÖLFLEX® SERVO 9YSLCY-JB

Complete the Installation

SKINTOP® MS-SC | SKINTOP® MS-M BRUSH

Technical Data

Minimum Bend Radius:	4 x cable diameter	**Conductor Stranding:**	Class 5 fine wire
Temperature Range:		**Color Code:**	VDE 0293-308
- for stationary use:	-40°C to +70°C		Black, brown, gray,
- for flexible use:	-5°C to +70°C		plus green/yellow ground(s) (1 or 3)
Nominal Voltage:	1000V	**Approvals:**	CE & RoHS
Test Voltage:	4000V		

Part Number	Jacket Color	Size / Number of Conductors		Nominal Outer Diameter		Copper Weight	Approx. Weight	SKINTOP® MS-M BRUSH Metric Thread
		Power	Ground	(in)	(mm)	(lbs/mft)	(lbs/mft)	
3 Power Conductors + 1 Ground								
0036433	Transparent	1 AWG/3c	1 AWG/1c	1.411	35.8	1576	1982	53112680
0036434	Transparent	2/0 AWG/3c	2/0 AWG/1c	1.588	40.3	2148	2654	53112680
0036435	Transparent	3/0 AWG/3c	3/0 AWG/1c	1.832	46.5	2900	3562	53112681
0036436	Transparent	4/0 AWG/3c	4/0 AWG/1c	2.096	53.2	3652	4435	53112681
0036437	Transparent	300 KCMIL/3c	300 KCMIL/1c	2.258	57.3	4296	4733	53112501
0036438	Transparent	350 KCMIL/3c	350 KCMIL/1c	2.455	62.3	5132	5634	53112500
3 Power Conductors + 3 Grounds								
0036447	Black	1 AWG/3c	8 AWG/3c	1.284	32.6	1449	1612	53112679
0036448	Black	2/0 AWG/3c	6 AWG/3c	1.434	36.4	1929	2054	53112680
0036449	Black	3/0 AWG/3c	6 AWG/3c	1.655	42.0	2656	2797	53112680
0036450	Black	4/0 AWG/3c	6 AWG/3c	1.883	47.8	3250	3410	53112681
0036451	Black	300 KCMIL/3c	4 AWG/3c	2.033	51.6	3636	4118	53112681

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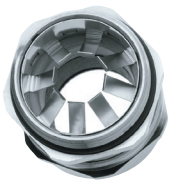
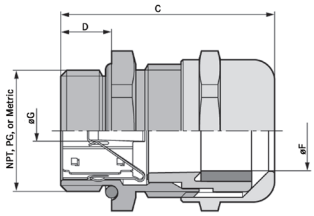
SKINTOP® MS-SC/MS-SCL

Nickel-Plated Brass Strain Relief for EMC Applications with NPT, PG & Metric Thread





Technical Data

Material:

- Body:	Nickel-plated brass
- Insert:	Polyamide
- Bushing:	CR
- O-ring:	NBR

Locknuts: Add SM-PE locknuts

Temperature Range:

- Dynamic:	-25°C to +100°C
- Static:	-40°C to +100°C

Protection: IP68, 5 bar (Exceeds NEMA 6/6P pressure rating) when used with an O-ring

SKINTOP® MS-SC-NPT: NPT Threads

Part Number	Thread Type & Size	øF Clamping Range (in)	øF Clamping Range (mm)	SW Wrenching Flats (in)	C Overall Length (in)	D Thread Length (in)	Min. ø Above Braiding (in)	Standard Pack Size
53112910	NPT ⅜”	0.177 - 0.394	4.5 - 10.0	0.788	1.564	0.591	0.158	100
53112920	NPT ½”	0.275 - 0.512	7.0 - 13.0	0.945	1.674	0.591	0.197	50
53112930	NPT ¾”	0.354 -0.669	9.0 - 17.0	1.142	1.753	0.591	0.296	25
53112940	NPT 1”	0.433 - 0.827	11.0 - 21.0	1.418	1.930	0.591	0.355	25
53112950	NPT 1¼”	0.748 - 1.103	19.0 - 28.0	1.773	2.264	0.669	0.591	10
53112960	NPT 1½”	1.063 - 1.379	27.0 - 35.0	2.127	2.423	0.669	0.827	5

Approvals

SKINTOP® MS-SC & MS-SCL: PG Threads

Part Number	Thread Type & Size	øF Clamping Range (in)	øF Clamping Range (mm)	SW Wrenching Flats (in)	C Overall Length (in)	D Thread Length (in)	Min ø Above Braiding (in)	Standard Pack Size
SKINTOP® MS-SC: Standard PG Thread								
53112210	PG 9	0.118 - 0.315	3.0 - 8.0	0.669	1.142	0.236	0.158	50
53112220	PG 11	0.157 - 0.394	4.0 - 10.0	0.787	1.260	0.236	0.158	50
53112230	PG 13	0.197 - 0.472	5.0 - 12.0	0.866	1.339	0.256	0.158	25
53112240	PG 16	0.315 - 0.551	8.0 - 14.0	0.945	1.378	0.256	0.236	25
53112250	PG 21	0.433 - 0.689	11.0 - 17.5	1.181	1.575	0.275	0.315	25
53112260	PG 29	0.630 - 0.985	16.0 - 25.0	1.575	1.890	0.315	0.512	10
53112270	PG 36	0.748 - 1.260	19.0 - 32.0	1.969	2.441	0.591	0.630	5
SKINTOP® MS-SCL: Long PG Thread								
53112310	PG 9	0.118 - 0.315	3.0 - 8.0	0.669	1.378	0.472	0.158	50
53112320	PG 11	0.157 - 0.394	4.0 - 10.0	0.787	1.496	0.472	0.158	50
53112330	PG 13	0.197 - 0.472	5.0 - 12.0	0.866	1.555	0.472	0.158	25
53112340	PG 16	0.315 - 0.551	8.0 - 14.0	0.945	1.594	0.472	0.236	25
53112350	PG 21	0.433 - 0.689	11.0 - 17.5	1.181	1.772	0.472	0.315	25
53112360	PG 29	0.630 - 0.985	16.0 - 25.0	1.575	2.047	0.591	0.512	10

Approvals

SKINTOP® MS-M-SC & MS-M-SCL: Metric Threads

Part Number	Thread Type & Size	øF Clamping Range (in)	øF Clamping Range (mm)	SW Wrenching Flats (in)	C Overall Length (in)	D Thread Length (in)	Min ø Above Braiding (in)	Standard Pack Size
SKINTOP® MS-M-SC: Standard Metric Thread								
53112610	M12 x 1.5	0.137 - 0.275	3.5 - 7.0	0.630	1.043	0.256	0.079	50
53112620	M16 x 1.5	0.177 - 0.354	4.5 - 9.0	0.788	1.299	0.275	0.158	50
53112630	M20 x 1.5	0.275 - 0.492	7.0 - 12.5	0.945	1.457	0.315	0.197	25
53112640	M25 x 1.5	0.354 - 0.650	9.0 - 16.5	1.142	1.516	0.315	0.296	25
53112650	M32 x 1.5	0.433 - 0.827	11.0 - 21.0	1.418	1.791	0.354	0.355	25
53112660	M40 x 1.5	0.748 - 1.103	19.0 - 28.0	1.773	1.890	0.354	0.591	10
53112670	M50 x 1.5	1.063 - 1.379	27.0 - 35.0	2.127	2.185	0.394	0.827	5
SKINTOP® MS-M-SCL: Long Metric Thread								
53112625	M16 x 1.5	0.177 - 0.354	4.5 - 9.0	0.788	1.496	0.472	0.158	50
53112635	M20 x 1.5	0.275 - 0.492	7.0 - 12.5	0.945	1.614	0.472	0.197	25
53112645	M25 x 1.5	0.354 - 0.650	9.0 - 16.5	1.142	1.673	0.472	0.296	25
53112655	M32 x 1.5	0.433 - 0.827	11.0 - 21.0	1.418	2.028	0.591	0.355	25
53112665	M40 x 1.5	0.748 - 1.103	19.0 - 28.0	1.773	2.126	0.591	0.591	10
53112675	M50 x 1.5	1.063 - 1.379	27.0 - 35.0	2.127	2.382	0.591	0.827	5

Approvals

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SKINTOP® MS-NPT BRUSH/MS-M BRUSH

Nickel-Plated Brass Strain Relief for EMC Applications with NPT & Metric Thread

Technical Data

Material:

- Body:	Nickel-plated brass
- Brush:	Brass
- Insert:	Polyamide
- Bushing:	Special elastomer
- O-ring:	Special elastomer

Locknuts: Add SM-PE-M locknuts

Temperature Range:

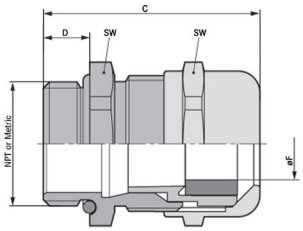
- Dynamic:	-25°C to +100°C
- Static:	-40°C to +100°C

Protection:

- M25 - M63:	IP69K
- M63 plus & larger:	IP68, 5 bar (Exceeds NEMA 6/6P pressure rating)

Part Number	Thread Type & Size	øF Clamping Range (in)	øF Clamping Range (mm)	SW Wrenching Flats (in)	C Overall Length (in)	D Thread Length (in)	Min. ø Above Braiding (in)	Standard Pack Size
SKINTOP® MS-NPT BRUSH								
53112037	NPT ¾”	0.354 - 0.669	9.0 - 17.0	1.142	1.694	0.591	0.236	10
53112047	NPT 1”	0.433 - 0.827	11.0 - 21.0	1.418	1.891	0.591	0.315	1
53112057	NPT 1¼”	0.748 - 1.103	19.0 - 28.0	1.773	2.265	0.669	0.394	1
53112067	NPT 1½”	1.063 - 1.379	27.0 - 35.0	2.127	2.323	0.669	0.551	1
53112077	NPT 2”	1.339 - 1.773	34.0 - 45.0	2.639	2.482	0.669	0.788	1
53112087	NPT 2”, plus	1.733 - 2.167	44.0 - 55.0	2.955	2.836	0.669	0.985	1
SKINTOP® MS-M BRUSH								
53112676	M25 x 1.5	0.354 - 0.669	9.0 - 17.0	1.142	1.418	0.315	0.236	10
53112677	M32 x 1.5	0.433 - 0.827	11.0 - 21.0	1.418	1.663	0.354	0.315	1
53112678	M40 x 1.5	0.748 - 1.103	19.0 - 28.0	1.773	2.344	0.354	0.394	1
53112679	M50 x 1.5	1.063 - 1.379	27.0 - 35.0	2.127	2.049	0.394	0.551	1
53112680	M63 x 1.5	1.339 - 1.773	34.0 - 45.0	2.639	2.415	0.591	0.788	1
53112681	M63 x 1.5, plus	1.733 - 2.167	44.0 - 55.0	2.955	2.719	0.591	0.985	1
53112501	M75 x 1.5	2.088 - 2.482	53.0 - 63.0	3.743	4.137	0.591	1.379	1
53112500	M75 x 1.5, plus	2.285 - 2.679	58.0 - 68.0	3.743	4.137	0.591	1.379	1
53112503*	M90 x 2.0	2.600 - 3.073	66.0 - 78.0	4.531	5.339	0.788	1.773	1
53112505*	M110 x 2.0	2.994 - 3.467	76.0 - 88.0	5.319	6.068	0.985	2.167	1
53112504*	M110 x 2.0, plus	3.388 - 3.861	86.0 - 98.0	5.319	6.068	0.985	2.167	1

* UL and VDE approvals pending on sizes M90 x 2.0 to M110 x 2.0

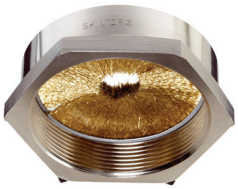


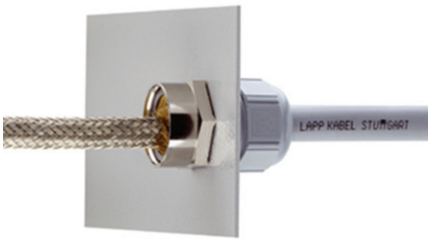
Approvals

cULus VDE DNV CE RoHS

SKINTOP® BRUSH Add-on

EMC Fitting for Polyamide Glands with Metric Thread





Technical Data

Material:

- Body:	Nickel-plated brass
- Brush:	Brass

Temperature Range: -70°C to +200°C

Approvals: UL pending

Part Number	Thread Type & Size	Minimum Ø Above Braiding (in)	Minimum Ø Above Braiding (mm)	SW Wrenching Flats (in)	Thread Length (in)	Standard Pack Size
SKINTOP® BRUSH Add-on						
54110840	M16 x 1.5	0.197	5	0.945	0.394	25
54110841	M20 x 1.5	0.197	5	0.945	0.394	10
54110842	M25 x 1.5	0.197	5	1.182	0.394	10
54110843	M32 x 1.5	0.315	8	1.536	0.472	10
54110844	M40 x 1.5	0.394	10	1.851	0.472	5
54110845	M50 x 1.5	0.551	14	2.206	0.472	5

Approvals

CE RoHS

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Oil Resistance

Level	USA	CSA*	Europe*
OR-00	Minimal oil resistance characteristics	–	–
OR-01	UL 758 In oil for 7 days @ 60°C 75% Unaged Tensile Strength 75% Unaged Elongation	C22.2 No. 49 In oil for 7 days @ 60°C 75% Unaged Tensile Strength 75% Unaged Elongation	VDE 0281 Part 1 In oil for 7 days @ 60°C ± 30% Unaged Tensile Strength ± 30% Unaged Elongation
OR-02	UL Oil Res. I In oil for 4 days @ 100°C 50% Unaged Tensile Strength 50% Unaged Elongation	C22.2 No. 230 In oil for 4 days @ 100°C 50% Unaged Tensile Strength 50% Unaged Elongation	VDE 0472 Sect. 803A In oil for 1 day @ 100°C ± 25% Unaged Tensile Strength ± 25% Unaged Elongation
OR-03	UL Oil Res. II In oil for 60 days @ 75°C 65% Unaged Tensile Strength 65% Unaged Elongation	C22.2 No. 210.2 In oil for 4 days @ 100°C 65% Unaged Tensile Strength 65% Unaged Elongation	SEV TP 20 B In oil for 30 days @ 70°C No cracking after bending
OR-04	UL AWM 21098 In oil for 60 days @ 80°C 65% Unaged Tensile Strength 65% Unaged Elongation	C22.2 No 0.3 In oil for 60 days @ 80°C 65% Unaged Tensile Strength 65% Unaged Elongation	VDE 0472 Sect. 803B In oil for 7 days @ 90°C ± 25% Unaged Tensile Strength ± 25% Unaged Elongation
OR-05	In oil for 4 weeks @ 100°C 40% Unaged Tensile Strength 40% Unaged Elongation	–	–

Note: These oil immersion standards are mentioned for purposes of reference only. Some Canadian and European test standards are not necessarily represented here as complete equivalents to the US Standards but have been referenced due to similarities in requirements. Refer to the individual standards for detailed test procedures and any comparable evaluations.

Flame Resistance

Level	USA	CSA*	Europe*
FR-01	UL 62: Horizontal Flame Test One 30-second flame application. Cable must not emit flame or glowing particles.	FT2: One 30-second flame application. Cable must not emit flame or glowing particles.	VDE 0472 Part 804 One 1-minute flame application. Cable must not ignite or emit flames.
FR-02	UL VW-1 (UL 1581): Vertical Flame Test Five 15-second flame applications. Cable must not emit flame or glowing particles.	FT1: Vertical Flame Test Five 15-second flame applications. Cable must not emit flame or glowing particles.	IEC 60332-1 Flame application time varies by cable diameter. Cable must self-extinguish.
FR-03	UL 1581: Vertical Tray Test Exposed to flame (70,000 BTU) for 20 min. Damage cannot exceed 8 feet.	FT4: Vertical Tray Test Exposed to flame for 20 min. Damage cannot exceed 5 feet.	IEC 60332-3-24 Exposed to flame for 20 min. Damage cannot exceed 8.2 feet.

Note: These flame standards are mentioned for purposes of reference only. Some Canadian and European test standards are not necessarily represented here as complete equivalents to the US Standards but have been referenced due to some similarities in requirements. Refer to the individual standards for detailed test procedures and any comparable evaluations.

Motion Type

Level	Description	Definition	Cycle Life Range
FL-01	Flexible	Can be easily installed in machines, conduit, and cable tray when applicable	—
FL-02	Highly Flexible	High flexibility with continuous flexing design attributes	—
WT-02	Wind Turbine Torsion -40°C	Designed for basic wind torsion to an angle of ± 150°/m Application temperature: -40°C	up to 2,000 cycles
CF-01	Continuous Flexing: Basic	Designed for basis continuous flexing and cable track applications Distance: chain length up to 15 feet	1-2 million cycles
CF-02*	Continuous Flexing: Moderate	Designed for continuous flexing and cable track applications Distance: chain length up to 30 feet	2 - 8 million cycles
CF-03*	Continuous Flexing: High	Designed for high cycle continuous flexing and cable track applications Distance: chain length up to 30 feet	8 - 20 million cycles
CF-04*	Continuous Flexing: High-Extended	Designed for high cycle continuous flexing and long cable track applications Distance: chain length up to 300 feet	8 - 20 million cycles
CF-04A*	Continuous Flexing: High-Extended High Acceleration (A) applications	Designed for high cycle continuous flexing and long cable track applications Distance: chain length up to 300 feet; Acceleration: up to 50m/s² for chain length up to 15 feet	8 - 20 million cycles

* When comparing cycle life data between cables, the following critical variables must be evaluated: bend radius, distance, acceleration, speed & weight

Mechanical Properties

Level	Description	Impact	Crush	Cold Impact	Cold Bend	Tensile	Elongation	Standard
MP-01	Average	–	*	*	–	1,500 psi	100%	ASTM D-412
MP-02	Good: Independent lab-tested for crush & impact	10/50 lb	1,000/ 2,000 lbf	–	-25°C	1,700 psi	175%	UL 1277 ASTM D-412
MP-03	Very Good: Rated for Exposed Run use (-ER)	10/50 lb	2,500/ 4,200 lbf	-25°C (CSA-TC)	-40°C (UL 62)	2,300 psi	275%	UL 1277 ASTM D-412
MP-05	Excellent	**	**	–	–	3,400 psi	325%	ASTM D-1457

* Impact and crush tests not applicable for intended end use of product.
** Testing is not required. If tested, these groups would meet or exceed UL 1277 impact and crush requirements by virtue of their superior mechanical properties.
*** Lapp standard.

Note: Lapp mechanical protection test values for each level meet or exceed the requirements of the standards referenced.

Motor Properties

AWG Size Selection Chart per NEC

Drive HP	230V 3ø AWG	460V 3ø AWG	575V 3ø AWG
½ - 3	14	14	14
5	14	14	14
7 ½	10	14	14
10	8	14	14
15	6	10	12
20	4	8	10
25	2	6	8
30	1	6	8
40	2/0	4	6
50	3/0	2	4

Drive HP	230V 3ø AWG	460V 3ø AWG	575V 3ø AWG
60	4/0	1	2
75	300 KCMIL	1/0	1
100	500 KCMIL	3/0	1/0
125	–	4/0	3/0
150	–	300 KCMIL	4/0
200	–	500 KCMIL	300 KCMIL
250	–	–	500 KCMIL
300	–	–	–
350	–	–	–
400 - 500	–	–	–

Note: The above table references the suggested wire AWG to use based on horse power (HP) and the full load current (FLC) × 125% per NEC Art. 430-122 (A).
Amperes (FLC) were determined from NEC Art. 430-250:

Example:
To calculate AWG size, three factors must be known: motor HP, motor voltage, and full load current (FLC).

For a 30 HP and 460V motor, the FLC is 40A. Per NEC, FLC x 125% is required to calculate AWG size.

40A x 125% = 50 A, therefore the right AWG wire is **6 AWG** per NEC Article 310.15.

See NEC table 310.15(B)(16) on previous page. 60°C column ampacities are referenced to avoid safety hazards that can occur when the maximum allowable temperature ratings of equipment and other non-cable components have been exceeded.

ADJUSTABLE SPEED DRIVE			
REG No. LAPP MOTOR EXAMPLE			
Power Input	Volts 460V	Power Output	Power 30 HP
	Amps 40A		Volts 500V
	Hertz 60 Hz		Amps 50A
Model No. LAPP MOTOR		LAPP GROUP	
Serial No. LAPP 12345			
ML No. 4DFJKJ48DK			

Voltage Drop Factors

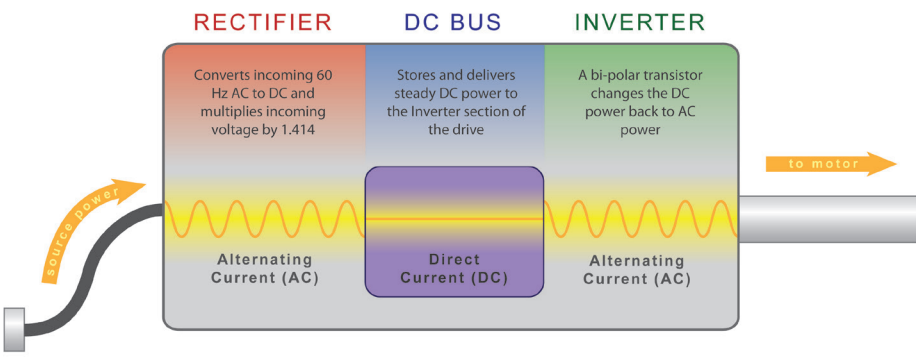
Volts at FLC @ 20°C

Drive HP	Voltage Drop Factor (Vdf)		
	230V 3ø	460V 3ø	575V 3ø
½	0.00696	0.00348	0.00285
¾	0.01013	0.00506	0.00411
1	0.01329	0.00665	0.00538
1½	0.01899	0.00949	0.00759
2	0.02152	0.01076	0.00854
3	0.03038	0.01519	0.01234
5	0.04809	0.02405	0.01930
7 ½	0.02868	0.03481	0.02848
10	0.02105	0.04430	0.03481
15	0.02009	0.02738	0.03335
20	0.01914	0.02030	0.02868

Drive HP	Voltage Drop Factor (Vdf)		
	230V 3ø	460V 3ø	575V 3ø
25	0.01575	0.01627	0.02030
30	0.01732	0.01914	0.02406
40	0.01203	0.01843	0.01962
50	0.01185	0.01506	0.01843
60	0.01125	0.01667	0.01436
75	0.00872	0.01385	0.01667
100	0.00676	0.01130	0.01429
125	–	0.01139	0.01139
150	–	0.00818	0.01052
200	–	0.00655	0.00872
250	–	–	0.00660

The above table references the voltage drop over distances. It was determined by using selection criteria of the Motor Properties Table. In order to determine the voltage drop, multiply the length by the data above.

Example:
To calculate voltage drop over a specified distance, two factors must be known: the distance to the motor and the voltage drop factor.
For a 30 HP and 460V motor, the voltage drop for a distance of 200 feet would be **200 x 0.01914 = 3.83 volts**



Size Conversion

American Wire Gauge (AWG) to mm²

AWG	mm²
30	0.05
28	0.08
26	0.14
24	0.25
22	0.34
20	0.50
19	0.75
18	1.0
16	1.5
14	2.5

AWG	mm²
12	4
10	6
8	10
6	16
4	25
2	35
1	50
1/0	50
2/0	70
3/0	95

AWG	mm²
4/0	120
250	120
300	150
350	185
400	185
450	240
500	240
600	300
750	400

mm² to American Wire Gauge (AWG)

mm²	AWG
4	12
6	10
10	8
16	6
25	4
35	2, 1
50	1/0
70	2/0, 3/0

mm²	AWG
0.14	26
0.25	24
0.34	22
0.50	20
0.75	19
1.0	18
1.5	16
2.5	14

Conversion Factors

Length			
millimeter (mm)	= inch × 25.40	inch (in)	= millimeter × 0.0394
meter (m)	= foot × 0.3048	foot (ft)	= meter × 3.281
kilometer (km)	= mile × 1.609	mile (mi)	= kilometer × 0.6214
Ω/km	= Ω/mft × 0.3048	Ω/mft	= Ω/km × 3.281

Mass			
gram (g)	= ounce × 28.35	ounce (oz)	= gram × 0.0353
kilogram (kg)	= pound × 0.4536	pound (lb)	= kilogram × 2.205
kg/km	= lb/mft × 1.488	lb/mft	= kg/km × 0.6720

Area			
sq. centimeter (cm^2)	= sq. inch × 6.452	sq. inch (in^2)	= sq. centimeter × 0.1550
sq. meter (m^2)	= sq. foot × 0.0929	sq. foot (ft^2)	= sq. meter × 10.76
sq. kilometer (km^2)	= sq. mile × 2.590	sq. mile (mi^2)	= sq. kilometer × 0.3861
circular mil	= square mil × 1.273	square mil	= circular mil × 0.7854
$mm^2 = (\text{strand mm})^2 \times (\#\ \text{strands}) \times 0.7854$			

Volume			
cu. centimeter (cm^3)	= cu. inch x 16.39	cu. inch (in^3)	= cu. centimeter x 0.0610
cu. meter (m^3)	= cu. foot x 0.0283	cu. foot (ft^3)	= cu. meter x 35.31

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