



AUTOMATION



CONTINUOUS FLEXING CABLES FOR MOTION CONTROL

Easy Order Options



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ABOUT TECNIKABEL AND TK GROUP

Introduction

TK USA is the US headquarters of Italian TK Group operating several production facilities in Italy, Germany, China, and USA. TK USA provides industrial cables, connectors, and cable assemblies.

TecniKabel (TK) is one of the leading manufacturers for motion control cables in continuous flexing applications. Advanced manufacturing technologies and a strong focus on engineering enable TK to develop custom cables, made to order, for many applications with very high quality, as well as standard cables for typical motion control applications.

Icotronix connectors, part of TK group, are the perfect complement for many of the TK cables. Icotronix M23 connectors are engineered and made in Germany to meet the toughest industrial requirements with less parts to assemble than other solutions.

TK Group's assembly facilities offers industrial cable assemblies for automation applications. Assemblies can be made with a large range of connector options from various manufacturers to accommodate the customer requirement.

TKFF390 Cables for Motion Control

Our TKFF390 range of trailing cables is the premium solution for moving applications on machinery and equipment using cable drag chains.

All cables have been rigorously tested to withstand continuously flexing up to 20 million cycles, depending on application parameters. By applying extraordinary design principles, premium materials, and the latest manufacturing technologies, our cables can greatly improve equipment uptime in continuously flexing applications.

Due to our modern equipment and streamlined manufacturing processes, we can offer an excellent quality product at a very attractive price.

Our "Easy Order" options give you easy access to our most popular products for motion control applications.

Control Cables Unshielded

TKFF390 unshielded multi conductor control cable is used in control, monitoring, and instrumentation applications. These cables are suitable for trailing applications in drag chain including machine tools, CNC equipment, material handling, packaging machinery, aerial lifts, boom extensions, and many more.

The layered multi-conductor design is optimized to achieve small cable diameters for confined spaces and permits small bending radii. The extra robust Polyurethane jacket is designed to withstand harsh industrial environments and is resistant to washdown. The cable is halogen free.



Technical data			
Conductor:	bare copper IEC 60228 class 6	Jacket:	Polyurethane 11Y
Insulation:	Polyolefin	Bending radius:	5x OD static, 7.5 OD Dynamic
Identification:	Black & numbered + YE/GN	Temperature range:	-40 °C to +90 °C
Shield:	None	Jacket Color:	Gray

Part#	Conductor configuration	OD [mm]	OD "	Min radius - Dynamic [mm]	Weight [kg/km]
0.5mm2 AWM 21209 UL 90°C 300V – CSA AWM I/II A/B 90°C 300V					
330TKFF39002	3G0.5/3C AWG21	5.4	0.213	40.5	51.2
330TKFF39003	4G0.5/4C AWG21	5.9	0.232	44.3	61.8
330TKFF39004	5G0.5/5C AWG21	6.1	0.240	45.8	72.6
330TKFF39005	7G0.5/7C AWG21	7.5	0.295	56.3	93.4
330TKFF39006	12G0.5/12C AWG21	8.8	0.346	66	147
330TKFF390L1	18G0.5/18C AWG21	10	0.394	75	184
330TKFF390L2	25G0.5/25C AWG21	12	0.472	90	245
1.0mm2 AWM 21209 UL 90°C 300V – CSA AWM I/II A/B 90°C 300V					
340TKFF39001	2x1.0/2C AWG18 *no ground	5.6	0.220	42	48.4
340TKFF39002	3G1.0/3C AWG18	6.1	0.240	45.8	74.9
340TKFF39003	4G1.0/4C AWG18	6.5	0.256	48.8	85.8
340TKFF39004	5G1.0/5C AWG18	7.0	0.276	52.5	98.3
340TKFF39005	7G1.0/7C AWG18	8.3	0.327	62.3	130
340TKFF39006	12G1.0/12C AWG18	10.8	0.425	81	186
340TKFF390L1	18G1.0/18C AWG18	11.6	0.457	87	265
340TKFF390L2	25G1.0/25C AWG18	14.5	0.571	108.8	402
1.5 mm2 / AWG16 AWM 21209 UL 90°C 1000V – CSA AWM I/II A/B 90°C 1000V					
345TKFF39002	3G1.5/3C AWG16	7.7	0.303	57.8	85
345TKFF39003	4G1.5/4C AWG16	8.2	0.323	61.5	104
345TKFF39004	5G1.5/5C AWG16	8.9	0.350	66.8	124
345TKFF39005	7G1.5/7C AWG16	11	0.433	82.5	162
345TKFF39006	12G1.5/12C AWG16	13	0.512	97.5	267
345TKFF390L1	18G1.5/18C AWG16	15.2	0.598	114	326
345TKFF390L2	25G1.5/25C AWG16	19.2	0.756	144	450
2.5 mm2 / AWG14 AWM 21209 UL 90°C 1000V – CSA AWM I/II A/B 90°C 1000V					
355TKFF39002	3G2.5/3C AWG14	9.2	0.362	69	117
355TKFF39003	4G2.5/4C AWG14	10	0.394	75	145
355TKFF39004	5G2.5/5C AWG14	11	0.433	82.5	175
355TKFF39005	7G2.5/7C AWG14	13.5	0.531	101.3	231
4 mm2 AWM 21209 UL 90°C 1000V – CSA AWM I/II A/B 90°C 1000V					
365TKFF39003	4G4 / 4C AWG12	11.8	0.465	88.5	214

Control Cables Shielded

TKFF390 shielded multi conductor control cable is used in control, monitoring, and instrumentation applications. These cables are suitable for trailing applications in drag chain including machine tools, CNC equipment, material handling, packaging machinery, aerial lifts, boom extensions, and many more.

The layered multi-conductor design offers small cable diameters for confined spaces and permits small bending radii. The extra robust Polyurethane jacket is designed to withstand harsh industrial environments and is resistant to washdown. The cable is halogen free.



Technical data			
Conductor:	bare copper IEC 60228 class 6	Jacket:	Polyurethane 11Y
Insulation:	Polyolefin	Bending radius:	5x OD static, 7.5 OD Dynamic
Identification:	Black & numbered + YE/GN	Temperature range:	-40 °C to +90 °C
Shield:	Tinned copper braid ≥ 85%	Jacket Color:	Gray

Part#	Conductor configuration	OD [mm]	OD "	Min radius - Dynamic [mm]	Weight [kg/km]
0.5 mm² AWM 21209 UL 90°C 300V – CSA AWM I/II A/B 90°C 300V					
530TKFF39008	(3G0.5)/(3C AWG21)	5.8	0.228	43.5	61.5
530TKFF39009	(4G0.5)/(4C AWG21)	6.3	0.248	47.3	83.5
530TKFF39010	(5G0.5)/(4C AWG21)	6.7	0.264	50.3	94.7
530TKFF39011	(7G0.5)/(4C AWG21)	8	0.315	60	118
530TKFF39012	(12G0.5)/(4C AWG21)	9.4	0.370	70.5	181
1.0 mm² AWM 21209 UL 90°C 300V – CSA AWM I/II A/B 90°C 300V					
540TKFF39013	(2x1.0)/(2C AWG18) *no ground	6.1	0.240	45.8	67.9
540TKFF39014	(3G1.0)/(3C AWG18)	6.4	0.252	48	85.5
540TKFF39015	(4G1.0)/(4C AWG18)	7.0	0.276	52.5	102
540TKFF39004	(5G1.0)/(5C AWG18)	7.5	0.295	56.3	113
540TKFF39005	(7G1.0)/(7C AWG18)	8.7	0.343	65.3	150
540TKFF39006	(12G1.0)/(12C AWG18)	11.4	0.449	85.5	240
1.5 mm² AWM 21209 UL 90°C 1000V – CSA AWM I/II A/B 90°C 1000V					
545TKFF39018	(3G1.5)/(3C AWG16)	8	0.315	60	105
545TKFF39015	(4G1.5)/(4C AWG16)	8.7	0.343	65.3	126
545TKFF39004	(5G1.5)/(5C AWG16)	9.5	0.374	71.3	149
545TKFF39005	(7G1.5)/(7C AWG16)	11.6	0.457	87	192
545TKFF39006	(12G1.5)/(12C AWG16)	13.6	0.535	102	304
2.5 mm² AWM 21209 UL 90°C 1000V – CSA AWM I/II A/B 90°C 1000V					
555TKFF39010	(3G2.5)/(3C AWG14)	10.2	0.402	76.5	138
555TKFF39011	(4G2.5)/(3C AWG14)	10.9	0.429	81.8	167
555TKFF39004	(5G2.5)/(3C AWG14)	11.6	0.457	87	204
555TKFF39005	(7G2.5)/(3C AWG14)	13.6	0.535	102	260

Bus and Network

TKFF390 shielded bus and network cable for communication in industrial network and bus systems. These cables are suitable for trailing applications in drag chain including machine tools, CNC equipment, material handling, packaging machinery, aerial lifts, boom extensions, and many more.

The cables are made with finely stranded bare copper and color codes follow their respective system specific conductor identification. The extra robust Polyurethane jacket is designed to withstand harsh industrial environments and is resistant to washdown. The cable is halogen free.



Technical data			
Conductor:	bare copper IEC 60228 class 6	Jacket:	Polyurethane 11Y
Insulation:	Polyolefin	Bending radius:	5x OD static, 7.5 OD Dynamic
Identification:	Color coded	Temperature range:	-40 °C to +90 °C
Shield:	Tinned copper braid ≥ 85%	Jacket Color:	Purple or Green

Part#	Conductor configuration	OD [mm]	OD "	Min radius - Dynamic [mm]	Weight [kg/km]	Color
PROFIBUS 0.25mm / AWG24 AWM 21209 UL 90°C 300V - CSA AWM I/II A/B 90°C 300V						
518TKFF39032	(2x0.25mm²) 1TP AWG24 GN, RD	7.8	0.307	58.8	70.4	Purple
DEVICENET Drop AWG24 +AWG22 AWM 21209 UL 90°C 300V - CSA AWM I/II A/B 90°C 300V						
518TKFF39033	((2xAWG22) + (2xAWG24)) RD, BK, BU, WH	7.1	0.280	53.3	74.7	Purple
PROFINET/ETHERCAT AWG22 SF/UTQ AWM 21209 UL 90°C 1000V - CSA AWM I/II A/B 90°C 1000V						
524TKFF39106	(4xAWG22) WH, YE, BU, OR	6.5	0.256	48.3	65	Green
CAT5e AWG24 SF/UTP AWM 21209 UL 90°C 300V - CSA AWM I/II A/B 90°C 300V						
518TKFF39037	(4x2xAWG24) BU - WH/BU, OR - WH/OR, GN - WH/GN, BN - WH /BN	7.2	0.283	54	68	Green
CAT6A AWG24 SF/UTP AWM 21209 UL 90°C 1000V - CSA AWM I/II A/B 90°C 1000V						
512TKFF39111	(4x2xAWG24) BU - WH/BU, OR - WH/OR, GN - WH/GN, BN - WH /BN	7.4	0.291	55.5	68	Green

Servo Motor and VFD Cable

TKFF390 shielded small diameter servo motor and VFD cable to supply power to 3-phase AC motors. These cables include several different conductor configurations for a broad range of servo motors. These cables are suitable for trailing applications in drag chain including machine tools, CNC equipment, material handling, packaging machinery, aerial lifts, boom extensions, and many more.

Our specially formulated insulation material offers low capacitance for efficient energy transfer, very high insulation break through resistance and low friction for optimal flexing. The extra robust Polyurethane jacket is designed to withstand harsh industrial environments and is resistant to washdown. The cable is halogen free.



Technical data			
Conductor:	bare copper IEC 60228 class 6	Jacket:	Polyurethane 11Y
Insulation:	Polyolefin	Bending radius:	5x OD static, 7.5 OD Dynamic
Identification:	Black & numbered + YE/GN 1 pair: black, white. 2 pairs: numbered 5, 6 and 7, 8	Temperature range:	-40 °C to +90 °C
Shield:	Tinned copper braid ≥ 85%	Jacket Color:	Orange

Part#	Conductor configuration	OD [mm]	OD "	Min radius - Dynamic [mm]	Weight [kg/km]
4-Conductor VFD and Servo Applications - AWM 21209 UL 90°C 1000V - CSA AWM I/II A/B 90°C 1000V					
540TKFF39001	(4G1.0)/4C AWG18	7.6	0.299	57	92
545TKFF39001	(4G1.5)/4C AWG16	8.7	0.343	65.3	131
555TKFF39001	(4G2.5)/4C AWG14	10.8	0.425	81	198
565TKFF39001	(4G4)/4C AWG12	12.2	0.480	91.5	276
570TKFF39001	(4G6)/4C AWG10	14	0.551	105	376
580TKFF39001	(4G10)/4C AWG8	17.6	0.693	132	567
585TKFF39001	(4G16)/4C AWG6	21.2	0.835	159	885
4-Conductor + 1 TSP VFD and Servo Applications - AWM 21209 UL 90°C 1000V - CSA AWM I/II A/B 90°C 1000V					
540TKFF39002	(4G1+(2x0.5))/4C AWG18 + 1TSP AWG21	9.6	0.378	72	137
545TKFF39016	(4G1.5+(2x1.5))/4C AWG16 + 1TSP AWG16	11.6	0.457	87	221
555TKFF39009	(4G2.5+(2x1.5))/4C AWG14 + 1TSP AWG16	13	0.512	97.5	264
565TKFF39004	(4G4+(2x1.5))/4C AWG12 + 1TSP AWG16	14.7	0.579	110.3	315
570TKFF39002	(4G6+(2x1.5))/4CAWG10 + 1 TSP AWG16	16.2	0.638	121.5	480
580TKFF39002	(4G10+(2x1.5))/4CAWG8 + 1 TSP AWG16	19.7	0.776	147.8	774
585TKFF39002	(4G16+(2x1.5))/4CAWG6 + 1 TSP AWG16	23.6	0.929	177	1043
4-Conductor + 2 TSP VFD and Servo Applications AWM 21209 UL 90°C 1000V - CSA AWM I/II A/B 90°C 1000V					
540TKFF39003	(4G1+2x(2x0.75)) 4CAWG18 + 2TSP AWG19	12.2	0.480	91.5	216
545TKFF39003	(4G1.5+2x(2x0.75)) 4C AWG16 + 2TSP AWG19	12.8	0.504	96	259
555TKFF39012	(4G2.5+2x(2x1)) 4C AWG 14 + 2TSP AWG18	14.2	0.559	106.5	320
565TKFF39003	(4G4+(2x1)+(2x1.5)) 4C AWG12 + 1TSP AWG18 + 1TSP AWG16	16.3	0.642	122.3	439
570TKFF39003	(4G6+(2x1)+(2x1.5)) 4C AWG10 + 1TSP AWG18 + 1TSP AWG16	18	0.709	135	594

Hybrid Servo Cable

TKFF390 hybrid servo cables are combining power and feedback elements under the same jacket for single cable servo motor applications. These cables are suitable for trailing applications in drag chain including machine tools, CNC equipment, material handling, packaging machinery, aerial lifts, boom extensions, and many more.

Hybrid cable configurations are specific to a feedback interface or drive manufacturer and all elements meet the specific electrical parameters for the respective system. The extra robust Polyurethane jacket is designed to withstand harsh industrial environments and is resistant to washdown. The cable is halogen free.



Technical data			
Conductor:	bare copper IEC 60228 class 6	Jacket:	Polyurethane 11Y
Insulation:	Polyolefin	Bending radius:	5x OD static, 7.5 OD Dynamic
Identification:	Black & numbered + YE/GN or see table Pair(s): see table	Temperature range:	-40 °C to +90 °C
Shield:	Tinned copper braid	Jacket Color:	Orange

Part#	Conductor configuration	OD [mm]	OD "	Min radius - Dynamic [mm]	Weight [kg/km]
Hiperface DSL AWM 21209 UL 90°C 1000V - CSA AWM I/II A/B 90°C 1000V					
540TKFF39D03	(4G1+(2x0.75)+(2xAWG22)) 4C AWG18 + TSP AWG19 + 1TSP AWG22 Pair 1: BU, WH, Pair 2: BK, WH	11.9	0.469	83.3	209
555TKFF39D01	(4G2.5+(2x1)+(2xAWG22)) 4C AWG14 + 1 TSP AWG18 + 1TSP AWG22 Pair 1: BU, WH, Pair 2: BK, WH	14	0.551	105	298
570TKFF39D01	(4G6+(2x1)+(2xAWG22)) 4C AWG10 + 1TSP AWG18 + 1 TSP AWG22 Pair 1: BU, WH, Pair 2: BK, WH	17.8	0.701	133.5	481
S210 with Ethernet element AWM 21209 UL 90°C 1000V - CSA AWM I/II A/B 90°C 1000V					
524V0069	(4G0.34+(2x0.34)+(4x0.20 CAT5)) 4C AWG22 + 1TSP AWG22 + 1STQ AWG25 GY, BN, BK, Y/G; WH, BK; YE, BU, GN, PK	9.8	0.386	73.5	130
535V0039	(4G0.75+(2x0.5)+(4x0.20 CAT5)) 4C AWG19 + 1TSP AWG16 + 1STQ AWG25 GY, BN, BK, Y/G; WH, BK; YE, BU, GN, PK	10.6	0.417	79.5	157
545G0191	(4G1.5+(2x1.5)+(4x0.20 CAT5)) 4C AWG16 + 1TSP AWG16 + 1STQ AWG25 GY, BN, BK, Y/G; WH, BK; YE, BU, GN, PK	12.7	0.5	95.3	252
555G0159	(4G2.5+(2x1.5)+(4x0.20 CAT5)) 4C AWG12 + 1TSP AWG16 + 1STQ AWG25 GY, BN, BK, Y/G; WH, BK; YE, BU, GN, PK	13.7	0.539	102.8	298

Feedback Cable

TKFF390 Feedback cables for communication between the servo motor and feedback device. These cables are suitable for trailing applications in drag chain including machine tools, CNC equipment, material handling, packaging machinery, aerial lifts, boom extensions, and many more.

All feedback cables feature low friction and low capacitance insulation material to meet all mechanical and electrical performance parameters for the respective system. Color codes are either system specific or follow DIN 47100. The extra robust Polyurethane jacket is designed to withstand harsh industrial environments and is resistant to washdown. The cable is halogen free.



Technical data			
Conductor:	bare copper IEC 60228 class 6	Jacket:	Polyurethane 11Y
Insulation:	Polyolefin	Bending radius:	5x OD static, 7.5 OD Dynamic
Identification:	Color coded	Temperature range:	-40 °C to +90 °C
Shield:	Tinned copper braid	Jacket Color:	Green

Part#	Conductor configuration	OD [mm]	OD "	Min radius - Dynamic [mm]	Weight [kg/km]
SIEMENS 6FX800* compatible AWM 21209 UL 90°C 300V – CSA AWM I/II A/B 90°C 300V					
526TKFF39001	(4x2x0.38+4x0.50)	9.2	0.362	69	130
SIEMENS: 1BD21	BK/BN, RD/OG, GN/YE, BU/VT + WHBU, WHBK, WHRD, WHYE				
517TKFF39007	(8x2x0.18)	7.8	0.307	58.5	85
SIEMENS: 1BD11	WHYE/WHGN, WHRD/WHOG, WHBK/WHBN, GY/WH, BU/VT, YE/GN, RD/OG, BK/BN				
514TKFF39010	(3x(2x0.14)+4x0.14+4x0.25+2x0.50)	9.5	0.374	71.3	139
SIEMENS: 1BD51	BK/BN, RD/OG, GN/YE + BU, GY, WHBK, WHYE, +GNBK, GNRD, BNYE, BNGY + BNBK, BNRD				
514TKFF39011	(3x(2x0.14)+4x0.14+2x0.50)	8.9	0.350	66.8	101
SIEMENS: 1BD41	BK/BN, RD/OG, GN/YE + BU, GY, WHBK, WHYE, + BNBK, BNRD				
SIEMENS compatible AWM 21209 UL 90°C 30V – CSA AWM I/II A/B 90°C 30V					
518TKFF39035	(2x2xAWG24+2xAWG22)	7.3	0.287	54.8	74
SIEMENS: 2DC00	PK/BU, YE/GN, + RD/BK				
Bosch Rexroth Indramat* compatible AWM 21209 UL 90°C 300V – CSA AWM I/II A/B 90°C 300V					
522TKFF39027	(4x2x0.25 + 2x0.50)	8.7	0.343	65.3	111
INK-0448	BN/GN, GY/PK, BU/VT, RD/BK, WH, BN				
Multi-Pair Feedback AWG24 with overall shield AWM 21209 UL 90°C 300V – CSA AWM I/II A/B 90°C 300V					
522TKFF39034	(4x2x0.25)	7.3	0.287	54.8	72.2
	WH&BN, GN&YE, GY&PK, BU&RD				
522TKFF39036	(5x2x0.25)	8.2	0.323	61.5	82
	WH&BN, GN&YE, GY&PK, BU&RD, BK&VT				
522TKFF39035	(6x2x0.25)	8.8	0.346	66	96.2
	WH&BN, GN&YE, GY&PK, BU&RD, BK&VT, GR/PK&RD/BU				
Multi-Pair Resolver Cable AWG24 with individual and overall shields 21209 UL 90°C 300V – CSA AWM I/II A/B 90°C 300V					
522TKFF39008	(4x(2x0.25))	9	0.354	67.5	120
	WH&BN, GN&YE, GY&PK, BU&RD				

*SIEMENS and Bosch Rexroth Indramat® designations are registered trademarks and for reference purposes only. Affiliation is not implied by TK USA.

Handling and installation of Motion Control Cables

1. Unreel the cable straight from the reel or coil with the same bending direction as the cable was stored on the reel (Fig. 1) Be careful to avoid adding any twist to the cable during unwinding from the reel or coil. (Fig. 2)

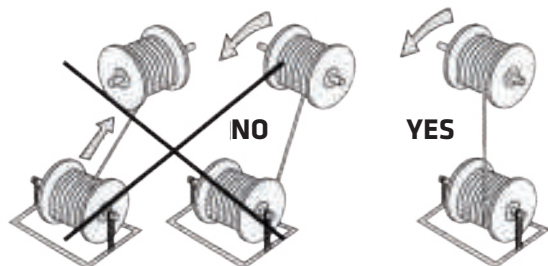


Fig.1

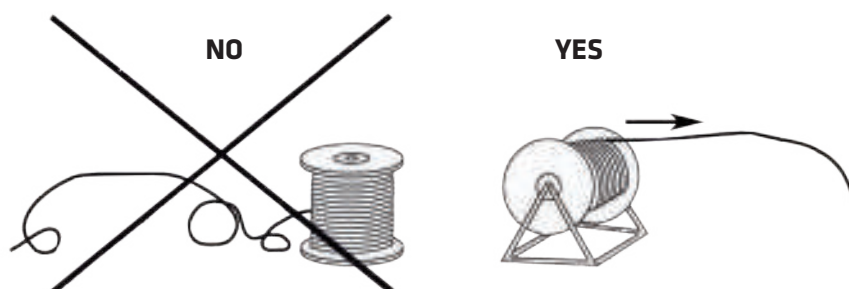


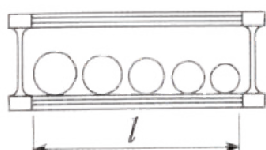
Fig.2

2. Once the cable is cut to length it is recommended to lay the cable straight on the floor for several hours to allow the inner tension to be relieved. It is preferable to lay the cables in the open drag chain instead of pulling it through.
3. If multiple cables are being installed in the drag chain the cables should be separated by vertical and horizontal dividers. The weight should be distributed evenly. (Fig. 3)



Fig.3

4. The installed cables require free movement. Please allow additional height and width in each cavity to ensure free cable movement. The sum of all cable diameters in the drag chain cannot be greater than 90% of the width available in the drag chain. (Fig. 4). The headroom within the cavity height should be at least 15% of the largest cable diameter.



$$l = 90\% \sum \varnothing e$$

Fig.4

5. Do not secure cables against each other with zip ties or any other fastening means within the moving portion of the drag chain. (Fig. 5)

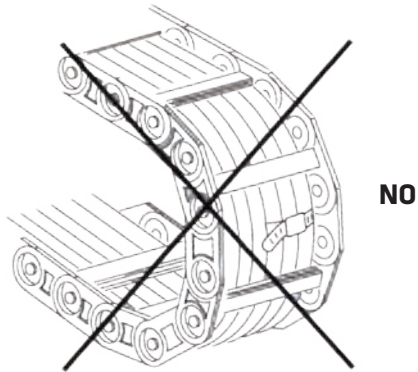


Fig.5

6. Cables should be secured on both ends of the drag chain by using the proper strain relief supplied with the drag chain. The strain relief position should be placed away from the last moving link of the drag chain at a distance equal to 30 times the OD of the biggest cable. (Fig. 6)

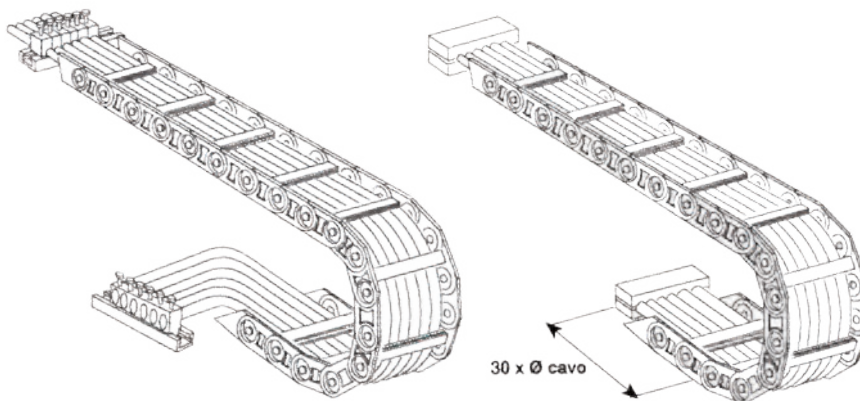


Fig.6

7. The cables shall be length adjusted inside the drag chain by ensuring that the cables are not stretching over the inner bend (too short) or pushing against the outer bend (too long). (Fig. 7)

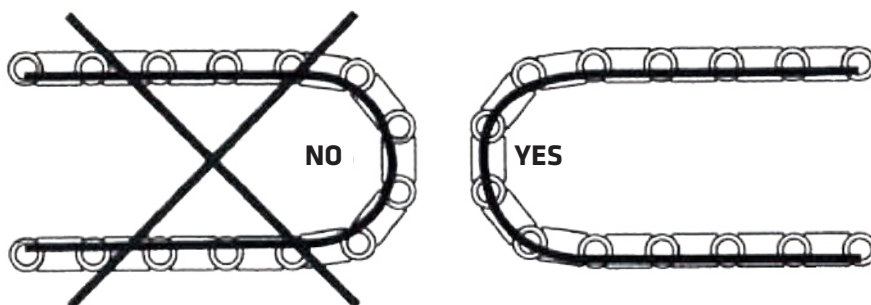


Fig.7

Technical references

Conversions

Metric to AWG	
Metric size mm ²	AWG/kcmil
0.14	26
0.25	24
0.35	22
0.38	22
0.5	21
0.75	19
1.00	18
1.5	16
2.5	14
4	12
6	10
10	8
16	6
25	4
35	2
50	1
70	2/0
95	3/0
120	4/0
150	250 kcmil
185	350 kcmil
240	450 kcmil
300	550 kcmil

Weight conversion	
kg/km	Lbs./Mft
100	≈ 67.197
X kg/km x 67.197 = lbs./Mft	
X kg/km x 0.067197 = lbs./ft	

Temperature	
°C	°F
-40	-40
-30	-22
-25	-13
-20	-4
-15	5
-10	14
-5	23
0	32
30	86
70	158
80	176
85	185
90	194
105	221

Unit conversion	
Metric	US (Imperial)
1 mm	0.03937"
1 cm	0.3937"
1 m	3.28 ft
1 km	3280 ft
1 g	0.0353 ounces
1 kg	2.2 lbs

Cable designations and abbreviations explained

Designation	Meaning
4G2.5	4C 2.5mm ² , one conductor marked as gn/ye ground
4x2.5	4C 2.5mm ² , no ground included
(4G2.5)	4C 2.5 mm ² with ground, overall shield indicated by brackets
(2x2x0.5)	2 twisted pairs 0.5mm ² , overall shield
[2x(2x0.5)]	2 twisted shielded pairs 0.5mm ² , overall shield
H	Tape shield
H1	Spiral shield
H2	Braid shield

Ampacity per NFPA 79 2021 edition Table 12.5.1 (abbreviated)

Conductor size		Ampacity	
AWG / kcmil	60° C (140 °F)	75 °C (167 °F)	90 °C (194 °F)
30	-	0.5	0.5
28	-	0.8	0.8
26	-	1	1
24	2	2	2
22	3	3	3
20	5	5	5
18	7	7	14
16	10	10	18
14	15	20	25
12	20	25	30
10	30	35	40
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	110
2	95	115	130
1	110	130	145
1/0	125	150	170
2/0	145	175	195
3/0	165	200	225
4/0	195	230	260
250	215	255	290
300	240	385	320
350	260	310	350
400	280	335	380
500	320	380	430

Notes:

(1) Conductor types listed in section 12.3.1 NFPA 79 shall be permitted to be used at the ampacities listed in this table

(2) The sources for ampacities in this table is table 310.15(B)(16) / 310.16 of NFPA 70 (NEC)

(3) Teknikabel / TK USA is not responsible for errors or conformity of these values with their references. Please refer to the original NFPA 79 document in its most current edition.

Correction factors

Based on table 12.5.5(a) Ambient Temperature Correction Factors. For ambient temperatures other than 30 °C (86 °F), multiply the allowable ampacity by the appropriate factor shown in the table:

Ambient Temperature	Correction Factor 60 °C	Correction Factor 75 °C	Correction Factor 90 °C
21-25	1.08	1.05	1.04
26-30	1.00	1.00	1
31-35	0.91	0.94	0.96
36-40	0.82	0.88	0.91
41-45	0.71	0.82	0.87
46-50	0.58	0.75	0.82
51-55	0.41	0.67	0.76
56-60	-	0.58	0.71
61-70	-	0.33	0.58
71-80	-	-	0.41

Based on table 12.5.5(b) Adjustment Factors for More Than Three Current Carrying Conductors in Raceway or Cable:

Number of Current-Carrying Conductors	Percent of Values in Table 12.5.1 and 12.5.5(a), as Adjusted for Ambient Temperature as necessary
4-6	80
7-9	70
10-20	50
21-30	45
31-40	40
≥40	35

Notes:

(1) TecniKabel / TK USA is not responsible for errors or conformity of these values with their references. Please refer to the original NFPA 79 document in its most current edition.

Ampacity per NEC Table 310.16 (abbreviated, copper conductors only)

Conductor size		Ampacity	
AWG / kcmil	60° C (140 °F)	75 °C (167 °F)	90 °C (194 °F)
	Types TW, UF	Types RHW, THHW, THW, THWN, XHHW, XHWN, USE, ZW	Types TBS, SA, SIS, FEP, FEPB MI, PFA, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, XHWN, XHWN-2, XHHN, Z, ZW-2
18	-	-	14
16	-	-	18
14	15	20	25
12	20	25	30
10	30	35	40
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	115
2	95	115	130
1	110	130	145
1/0	125	150	170
2/0	145	175	195
3/0	165	200	225
4/0	195	230	260
250	215	255	290
300	240	285	320
350	260	310	350
400	280	335	380
500	320	380	430

Notes:

(1) NEC Section 310.15(B) shall be used for ambient temperature correction other than 30 °C.

(2) NEC Section 310.15(C) shall be referenced for more than three current carrying conductors

(3) NEC Section 310.16 shall be referenced for conditions of use

(4) TecniKabel / TK USA is not responsible for errors or conformity of these values with their references. Please refer to the original NFPA 79 document in its most current edition.

Simplified 75 °C Cable Sizing Guide for AC Induction Motors per NEC 430.250

Table for 75 °C cables with four conductors (3 phases plus ground):

AWG size	Metric size mm ²	Amp rating 75 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	7 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
16	1.5	10 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
14	2.5	20	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
12	4	25	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 15 HP (11.2 KW)
10	6	35	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 25 HP (18.6 KW)
8	10	50	≤ 10 HP (7.5 KW)	≤ 30 HP (22.4 KW)	≤ 30 HP (22.4 KW)
6	16	65	≤ 15 HP (11.2 KW)	≤ 40 HP (30 KW)	≤ 50 HP (37 KW)
4	25	85	≤ 25 HP (18.6 KW)	≤ 50 HP (37 KW)	≤ 60 HP (45 KW)
2	35	115	≤ 25 HP (18.6 KW)	≤ 60 HP (45 KW)	≤ 75 HP (56 KW)
1	50	130	≤ 40 HP (30 KW)	≤ 75 HP (56 KW)	≤ 100 HP (75 KW)
1/0	-	150	≤ 40 HP (30 KW)	≤ 75 HP (56 KW)	≤ 100 HP (75 KW)
2/0	70	175	≤ 50 HP (37 KW)	≤ 100 HP (75 KW)	≤ 100 HP (75 KW)
3/0	95	200	≤ 60 HP (45 KW)	≤ 125 HP (93 KW)	≤ 150 HP (112 KW)
4/0	120	230	≤ 60 HP (45 KW)	≤ 150 HP (112 KW)	≤ 150 HP (112 KW)

Table for 75 °C cables with four conductors (3 phases plus ground) and one control pair (80% derated):

AWG size (power)	Metric size mm ²	Amp rating 75 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	7 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
16	1.5	10 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
14	2.5	16	≤ 3HP (2.24 KW)	≤ 7.5 HP (5.6 KW)	≤ 10 HP (7.5 KW)
12	4	20	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
10	6	28	≤ 7.5 HP (5.6 KW)	≤ 15 HP (11.2 KW)	≤ 20 HP (14.9 KW)
8	10	40	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 30 HP (22.4 KW)
6	16	48	≤ 10 HP (7.5 KW)	≤ 30 HP (22.4 KW)	≤ 40 HP (30 KW)
4	25	68	≤ 20 HP (14.9 KW)	≤ 40 HP (30 KW)	≤ 50 HP (37 KW)
2	35	92	≤ 25 HP (18.6 KW)	≤ 50 HP (37 KW)	≤ 60 HP (45 KW)
1	50	104	≤ 25 HP (18.6 KW)	≤ 60 HP (45 KW)	≤ 75 HP (56 KW)

Table for 75 °C cables with four conductors (3 phases plus ground) and two control pairs (70% derated):

AWG size (power)	Metric size mm ²	Amp rating 75 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	7 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
16	1.5	10 (NFPA 79 12.5.1)	See drive manual or NEC 430.22(G)		
14	2.5	14	≤ 3HP (2.24 KW)	≤ 7.5 HP (5.6 KW)	≤ 10 HP (7.5 KW)
12	4	17.5	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
10	6	24.5	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 15 HP (11.2 KW)
8	10	35	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 25 HP (18.6 KW)
6	16	45.5	≤ 10 HP (7.5 KW)	≤ 25 HP (18.6 KW)	≤ 30 HP (22.4 KW)

Notes:

Type of motor design is B.

Class of Service and Duty-Cycle Service is continuous

Copper conductors rated 75 °C, at ambient temperature between 26 and 30 °C

Values are based on NEC 2020 430.250, power factor 1.25, ampacities are based on NEC 310.16, 75 °C

Derating for control pairs based on NEC 310.15C

Disclaimer: This is a simplified sizing guide, the final selection and sizing is the responsibility of the Authority Having Jurisdiction (AHJ) for the application. Please also refer to the drive manuals.

Simplified 90 °C Cable Sizing Guide for AC Induction Motors per NEC 430.250

Table for 90 °C cables with four conductors (3 phases plus ground):

AWG size	Metric size mm ²	Amp rating 90 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	14	See drive manual or NEC 430.22(G)		
16	1.5	18	See drive manual or NEC 430.22(G)		
14	2.5	25	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 15 HP (11.2 KW)
12	4	30	≤ 7.5 HP (5.6 KW)	≤ 15 HP (11.2 KW)	≤ 20 HP (14.9 KW)
10	6	40	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 30 HP (22.4 KW)
8	10	55	≤ 15 HP (11.2 KW)	≤ 30 HP (22.4 KW)	≤ 40 HP (30 KW)
6	16	75	≤ 20 HP (14.9 KW)	≤ 40 HP (30 KW)	≤ 50 HP (37 KW)
4	25	95	≤ 25 HP (18.6 KW)	≤ 50 HP (37 KW)	≤ 60 HP (45 KW)
2	35	130	≤ 40 HP (30 KW)	≤ 75 HP (56 KW)	≤ 100 HP (75 KW)
1	50	145	≤ 40 HP (30 KW)	≤ 75 HP (56 KW)	≤ 100 HP (75 KW)
1/0	-	170	≤ 50 HP (37 KW)	≤ 100 HP (75 KW)	≤ 125 HP (93 KW)
2/0	70	195	≤ 60 HP (45 KW)	≤ 125 HP (93 KW)	≤ 150 HP (112 KW)
3/0	95	225	≤ 60 HP (45 KW)	≤ 150 HP (112 KW)	≤ 150 HP (112 KW)
4/0	120	260	≤ 75 HP (56 KW)	≤ 150 HP (112 KW)	≤ 200 HP (149 KW)

Table for 90 °C cables with four conductors (3 phases plus ground) and one control pair (80% derated):

AWG size (power)	Metric size mm ²	Amp rating 75 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	11	See drive manual or NEC 430.22(G)		
16	1.5	14	See drive manual or NEC 430.22(G)		
14	2.5	20	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
12	4	24	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 15 HP (11.2 KW)
10	6	32	≤ 7.5 HP (5.6 KW)	≤ 15 HP (11.2 KW)	≤ 20 HP (14.9 KW)
8	10	44	≤ 10 HP (7.5 KW)	≤ 25 HP (18.6 KW)	≤ 30 HP (22.4 KW)
6	16	60	≤ 15 HP (11.2 KW)	≤ 30 HP (22.4 KW)	≤ 40 HP (30 KW)
4	25	76	≤ 20 HP (14.9 KW)	≤ 40 HP (30 KW)	≤ 50 HP (37 KW)
2	35	104	≤ 30 HP (22.4 KW)	≤ 60 HP (45 KW)	≤ 75 HP (56 KW)
1	50	116	≤ 30 HP (22.4 KW)	≤ 60 HP (45 KW)	≤ 75 HP (56 KW)

Table for 90 °C cables with four conductors (3 phases plus ground) and two control pairs (70% derated):

AWG size (power)	Metric size mm ²	Amp rating 75 °C	Operating voltage 3Ø		
			230V	460V	575V
18	1.0	9.8	See drive manual or NEC 430.22(G)		
16	1.5	12.6	See drive manual or NEC 430.22(G)		
14	2.5	17.5	≤ 3HP (2.24 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
12	4	21	≤ 5HP (3.73 KW)	≤ 10 HP (7.5 KW)	≤ 10 HP (7.5 KW)
10	6	28	≤ 7.5 HP (5.6 KW)	≤ 15 HP (11.2 KW)	≤ 20 HP (14.9 KW)
8	10	38.5	≤ 10 HP (7.5 KW)	≤ 20 HP (14.9 KW)	≤ 25 HP (18.6 KW)
6	16	52.5	≤ 15 HP (11.2 KW)	≤ 30 HP (22.4 KW)	≤ 40 HP (30 KW)

Notes:

Type of motor design is B.

Class of Service and Duty-Cycle Service is continuous

Copper conductors rated 75 °C, at ambient temperature between 26 and 30 °C

Values are based on NEC 2020 430.250, power factor 1.25, ampacities are based on NEC 310.16, 75 °C

Derating for control pairs based on NEC 310.15C

Disclaimer: This is a simplified sizing guide, the final selection and sizing is the responsibility of the Authority Having Jurisdiction (AHJ) for the application. Please also refer to the drive manuals.

Cable jacket colors per DESINA

Cable jacket materials are available in many colors. The machine tool industry has adopted a standard referred to as DESINA, that aims to standardize cable colors and their interconnection into one common platform for machine tools and manufacturing systems. DESINA is short for (DEcentralized and Standardized INstallation Technology). The purpose of this standard is, that maintenance personnel can easily identify cable runs and their purpose, even across different machine suppliers. This standard was initially developed for the automotive manufacturing industry and is widely used in motion control applications and machine tools.




As per this standard the following jacket colors are used for the respective applications.

- Orange, RAL 2003: servo power, frequency-controlled devices, shielded
- Green, RAL 6018: measurement cable such as measuring systems, feedback systems, analog sensors, shielded
- Purple, RAL 4001: fieldbus and hybrid field bus, shielded
- Yellow, RAL 1021: actuator/sensor cable, not shielded (ASi)
- Black, RAL 9005: power output, not shielded
- Gray, RAL 7040: multiwire control cable for control voltages and 24 V technology, not shielded

The RAL color code uses a number coded system to define the shade. There can sometimes be a slight shade difference between manufacturers and even between production lots from the same manufacturer.

Sometimes slight deviations from the standard can be found. For example, control cables for voltages greater than 24V are often gray or black, servo feedback cables may be orange, many shielded motor-supply cables as well as power tray cables are commonly made with black jackets.



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