

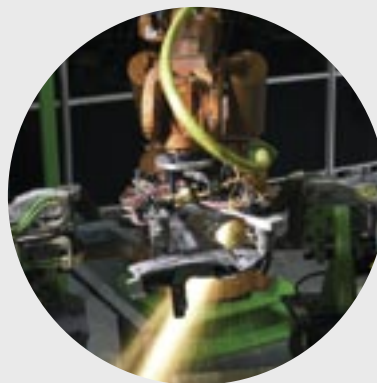
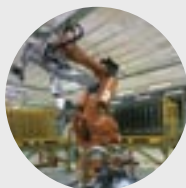
A close-up photograph of a robotic hand, constructed from blue metal frames and silver joints, holding a yellow Ethernet cable connector. The background is a soft, out-of-focus blue gradient.

Wired technology for man-made machines



«LAPP MULLER» - ROBOCABLE F1 GOLD - REF 47855

“A wide range of special and standard cables designed for your robotic and drag chains applications”.



When it comes to special customised cabling, continuous customer oriented service and consistent quality, LAPP MULLER stands ahead in this industry.

Its 25 successful years of experience in designing and manufacturing cables for Robots and flexion torsion help itself to meet customer's growing demand in specific applications. We also work in close association with partner companies around the world who supply original equipments for the robotic industry.

Customer satisfaction and long term relationship supported by advanced technology and know how has lead LAPP MULLER to emerge out as a “QUALITY GURU” in supplying cables for applications such as machine tool, robots, gantries, integrated power lines, power/control, servomotors and safety control systems.

Our strength and Mantra is “Complete Quality cabling solution”, after thorough analysis and a detailed study of our customer's application by our Research and development team, we provide products, assembled and harnessed ready to plug in.



ABB, ARO, CIMLEC, COMAU, ETFA, FANUC, FIAT, HUNDAY, KUKA, MERCEDES, PEUGEOT-CITROËN, RENAULT, SAMES, SAMSUNG, SEPRO ROBOTIQUE, STAUBLI...

• **ROBOCABLES F3**

Miniaturized cable for
drag chain (< 5m)
low bending radius
Life cycle range of 5 Million cycles*

Power cables
screened and unscreened.....p.6

Control / power cables
screened and unscreened.....p.7

Signal cables
screened.....p.8

Servomotor cables
screened.....p.9

• **ROBOCABLES F1X**

Miniaturized cable for long
drag chain
low bending radius
Life cycle range of 8 Million cycles*

Control / power cables
screened.....p.12

Control / power cables
unscreened.....p.13

• **ROBOCABLES F1**

Cables for robots in bending
and torsion combined
up to $\pm 360^\circ/m$
Life cycle range of 10 Million cycles*

Power cables
screened and unscreened.....p.16

Control / power cables
screened and unscreened.....p.17

Signal cables
screened.....p.18

Servomotor cables
screened.....p.19

• **ROBOCABLES F1 GOLD**

Cables for robots in bending
and torsion combined
up to $\pm 720^\circ/m$
Life cycle range of 10 Million cycles*

Power cables
screened and unscreened.....p.22

Control / power cables
screened and unscreened.....p.23

Signal cables
screened.....p.24

Servomotor cables
screened.....p.25

**SPECIAL CABLES
AND SERVICES**

For static or dynamic
Umbilical tailor made
Used in specific environment

Robocables UL.....p.28

Robocables BUS.....p.29-30

Umbilical cables.....p.31

Composite cables.....p.32

Cable harness
assembly.....p.33

robots equipments
& services.....p.34



* According to LAPP Muller
test methods

**”A wide range of miniaturized dynamic cables
designed for short drag chain applications”.**



ROBOCABLES F3, a miniaturized extra flexible cables, meet all conditions for extremely flexible applications in harsh industrial environments. With reduced diameters and tight capability, the F3 is an ideal cable for very small drag chain applications. The outer jacket is a blend of polyurethane, which is ideal for abrasive conditions and a variety of chemicals, oils and solvents.

• **ROBOCABLES F3**

Miniaturized cable for drag chain (< 5m)

Low bending radius

Life cycle range of 5 Million cycles*

- Power cables screened and unscreened.....p.6
- Control/power cables screened and unscreened.....p.7
- Signal cables screened.....p.8
- Servomotor cables screened.....p.9



* According to LAPP Muller test methods

ROBOCABLES F3 POWER

Optimized Diameter/weight
Resistant to abrasion
and oils




ROBOTIC CABLES SCREENED OR UNSCREENED
Extra flexible power cables
for drag chain $\leq 5m$

«LAPP MULLER» - ROBOCABLE F3 - REF 37781- OF...




Cable make up

Conductors	Extra flexible plain copper according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White or black numbering + Y/G
Assembling	Stranding of single cores, wound by anti friction tape
Screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane mat - low friction coefficient
Marking	«LAPP MULLER - composition - ROBOCABLE F3 - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 3 m/s	 Dynamic bending radius : from 5 x outside diameter (Please contact us)
 Gantry cranes : Yes	 Torsion : No	 Acceleration : Up to 10m/s ²	 Performances* : 5 million cycles (10 x diam.ext)

Technical data

 Rated voltage : 0.6/1 kVolt	 Temperature range : - 15°C + 80°C	 Outer sheath resistant to abrasion and oils
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
power screened				power unscreened			
47346	(1X16 ²)C	10.5	251	37008	1G25 ²	11.2	290
40423	(1X50 ²)C	15.9	600	47539	1X50 ²	14.5	543
61402	(1X70 ²)C	18.3	870	31020	1X70 ²	17.1	750
61403	(1X95 ²)C	20.3	1170	42274	1X120 ²	22	1300
40360	(1X120 ²)C	22.7	1390	57743	2X70 ² + 1G35 ²	33	2230
61400	(1X240 ²)C	31.2	2800	31423	3G16 ²	18.2	800
52460	(3X25 ²)C	23.2	1120	37781	3G25 ²	22	1000
46086	(3X35 ²)C	27.9	1570	49479	3X50 ²	29.5	1860
40361	(3X120 ²)C	46.6	4900	50264	3X185 ²	56.4	6700
29284	(4G10 ²)C	18	570	33478	4G16 ²	19.6	760
33492	(4G16 ²)C	21	910	30975	4G25 ²	23,1	1100
33493	(4G25 ²)C	25,8	1360	35754	4G35 ²	28,8	1760
58896	(4G35 ²)C	29,2	1820	47671	4G50 ²	34	2140
43357	(4G50 ²)C	35,4	2700	47672	4G95 ²	46,3	4500

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F3 CONTROL/POWER

Miniaturized,
Resistant to abrasion
and oils

ROBOTIC CABLES SCREENED OR UNSCREENED
Extra flexible control/power cables
for drag chain $\leq 5m$

«LAPP MULLER» - composition - ROBOCABLE F3 - REF 29106 - OF...






Cable make up

Conductors :	$\leq 0.5^2$: Extra flexible tinned copper wires > 0.5^2 : Extra flexible plain copper wires according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White with black numbers + Y/G and DIN 47100 for section $\leq 0.5mm^2$
Assembling	Stranding of single cores, wound by anti friction tape
Screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane mat - low friction coefficient
Marking	«LAPP MULLER - composition - ROBOCABLE F3 - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 3 m/s	 Dynamic bending radius : from 5 x outside diameter (Please contact us)
 Gantry cranes : Yes	 Torsion : No	 Acceleration : Up to $10m/s^2$	 Performances* : 5 million cycles (10 x diam.ext)

Technical data

 Rated voltage : 0.6/1 kVolt for section $\geq 0.5^2$ 0.3/0.5 kVolt for section $< 0.5^2$	 Temperature range : - 15°C + 80°C	 Outer sheath resistant to abrasion and oils
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
screened				unscreened			
29498	(3G0.5²)C	5	40	29437	3G0.5²	4.2	30
29500	(5G0.5²)C	6.3	64	29438	5G0.5²	5	40
29114	(7G0.5²)C	7.4	91	29099	7G0.5²	6.4	70
9503	(9X0.5²)C	8	108	28880	12G0.5²	7.4	91
28274	(12G0.5²)C	8.4	122	29445	18G0.5²	8.8	139
29507	(18G0.5²)C	9.7	174	29456	3G0.75²	4.8	40
29116	(25G0.5²)C	11	230	29458	5G0.75²	6.4	70
30864	(3G0.75²)C	6.5	76	29101	7G0.75²	7.4	91
39931	(5G0.75²)C	7.3	99	25616	12G0.75²	8.8	133
29517	(7G0.75²)C	8.4	124	29464	18G0.75²	10.2	210
25617	(12G0.75²)C	10	190	29103	3G1²	5.3	48
29518	(18G0.75²)C	11.2	250	28965	7G1²	8.1	112
29119	(7G1²)C	9.5	154	29106	12G1²	9.7	165
29129	(12G1²)C	10.7	200	28901	18G1²	11.3	226
29121	(18G1²)C	12.3	285	29235	3G1.5²	6.8	76
29520	(3G1.5²)C	7.9	110	24491	5G1.5²	7.4	120
29123	(4G1.5²)C	9.4	120	26945	7G1.5²	9.6	166
31725	(5G1.5²)C	9.4	150	28822	12G1.5²	11.3	234
29124	(7G1.5²)C	10.8	220	29107	18G1.5²	13.4	344
29125	(12G1.5²)C	12.5	310	28823	12G2.5²	14.7	382
29126	(18G1.5²)C	14.4	460	29111	4G4²	10.6	208
45860	(25G1.5²)C	16.8	530	30943	4G6²	14	335

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F3 SIGNAL

ROBOTIC CABLES SCREENED
Extra flexible signal cables
for drag chain $\leq 5\text{m}$

Miniaturized with small
dynamic bending radius
Resistant to abrasion

«LAPP MULLER» - composition - ROBOCABLE F3 - REF 29961 - OF...






Cable make up

Conductors	$\leq 0.5^2$: Extra flexible tinned copper wires > 0.5^2 : Extra flexible plain copper wires according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	Colors -DIN 47100-
Assembling	Stranding of cores in twisted pairs
Individual screen	Spun by tinned copper - Optical coverage > 95%
Cable assembly	Stranding of pairs with anti friction tape
Overall screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane mat - With low friction coefficient
Marking	«LAPP MULLER - composition - ROBOCABLE F3 - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 3 m/s	 Dynamic bending radius : from 5 x outside diameter (Please contact us)
 Gantry cranes : Yes	 Torsion : No	 Acceleration : Up to 10m/s^2	 Performances* : 5 million cycles (10 x diam.ext)

Technical data

 Rated voltage : 0.3/0.5 kVolt	 Temperature range : - 15°C + 80°C	 Outer sheath resistant to abrasion and oils
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
overall screened				individually screened			
45861	1x(2x0.25 ²) C	4.4	18	31337	4x(2x0.25 ²) C	8.1	130
33772	2x(2x0.25 ²) C	6.5	50	33775	7x(2x0.25 ²) C	12.2	220
33773	3x(2x0.25 ²) C	6.5	60	33774	12x(2x0.25 ²) C	14.9	260
29685	4x(2x0.25 ²) C	7.2	74	45948	4x(2x0.34 ²) C	10.1	140
29686	7x(2x0.25 ²) C	8.3	112	45946	7x(2x0.34 ²) C	13.2	230
29687	10x(2x0.25 ²) C	9.6	135	45947	12x(2x0.34 ²) C	15.1	330
29688	12x(2x0.25 ²) C	10.2	155	double screened			
37035	1x(2x0.34 ²) C	4.6	28	30004	(3x(2x0.14 ²) C) + 2x0.5 ²) C	9.8	130
45949	3x(2x0.34 ²) C	6.8	66	30976	(3x(2x0.14 ²) C) + 2x1 ²) C	10.4	140
29961	5x(2x0.34 ²) C	9.2	110	30005	(4x(2x0.14 ²) C) + 2x0.5 ²) C	10.8	160
31789	10x(2x0.34 ²) C	10.2	160	30041	(5x(2x0.14 ²) C) + 4x0.5 ²) C	12.2	205
33794	(4x(2x0.25 ²)+2x0.5 ²) C	8.8	113	30007	(6x(2x0.14 ²) C) + 2x0.5 ²) C	12.4	210
35597	(4x(2x0.25 ²)+1x(2x0.5 ²) C	8.8	120	29690	7x(2x0.25 ²) C	11.8	210
33795	(10x0.25 ² +2x0.5 ²) C	7.8	90	45862	12x(2x0.25 ²) C	14.1	336
33796	(10x0.25 ² +4x0.5 ²) C	8.2	107				

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F3 SERVOMOTOR

ROBOTIC CABLES SCREENED
Extra flexible servomotor cables
for drag chain ≤ 5m

Miniaturized with small
dynamic bending radius
Resistant to abrasion

«LAPP MULLER» - composition - ROBOCABLE F3 - REF 33322 - OF...




Cable make up

Conductors	Extra flexible plain copper wires for power / extra flexible tinned copper wires
Insulation	Miniaturized - Special polymer for robotics
Color code	White with black numbers + Y/G, for power / colors - DIN 47100 for signal
Assembling	Stranding of the data or control cores in twisted pairs wound by anti friction tape
screen twisted pairs	Spun by tinned copper. Optical coverage >95%
Assembling	Stranding of the conductors wound by anti friction tape
Overall screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane mat with low friction coefficient
Marking	«LAPP MULLER - composition - ROBOCABLE F3 - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 3 m/s	 Dynamic bending radius : from 5 x outside diameter (Please contact us)
 Gantry cranes : Yes	 Torsion : No	 Acceleration : Up to 10m/s ²	 Performances* : 5 million cycles (10 x diam.ext)

Technical data

 Rated voltage : 0.3 / 0.5 kVolt for signal 0.6 / 1 kVolt for power	 Temperature range : - 15°C + 80°C	 Outer sheath resistant to abrasion and oils
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
45863	(4X0.75+2X(2X0.34C)C)	11	170	45869	(4G6 +(2X0.75C)+(2X1C)C)	17.8	500
33789	(4G1 + 2X(2X0.75C)C)	12.8	216	45870	(4G6 + 2X(2x1C)C)	18	521
45864	(4G1.5 + 2X(2X0.5C)C)	11.9	250	45871	(4G6 + 2X(2x1.5C)C)	18.2	570
45865	(4G1.5 + 2X(2X0.75C)C)	13.3	280	45872	(4G10 +(2X0.75C+(2X1C)C)	21.2	680
45282	(4G2.5 + 1P0.25)	11.6	230	45873	(4G10 + 2X(2X1C)C)	21.2	760
45867	(4G2.5 + 2X(2X0.75C)C)	13.9	300	37696	(4G10 + 2X(2X1.5C)C)	21.4	808
37694	(4G2.5 + 2X(2X1.5C)C)	16.6	400	45874	(4G16 + 2X(2X1C)C)	24.2	980
45868	(4G4 +(2X0.75C)+(2X1C)C)	15.4	380	45875	(4G16 + 2X(2X1.5C)C)	24.4	1020
37300	(4G4 + 2X(2X1C)C)	14.9	400	45876	(4G25 + 2X(2X1C)C)	30	1460
37695	(4G4 + 2X(2x1.5C)C)	18.1	500	45877	(4G25 + 2X(2X1.5C)C)	30.4	1515

Other constructions and dimensions,
Please contact us.
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e-mail : contact@mullercables.com



* According to LAPP Muller
test methods

**“A complete range of miniaturized cables
designed for long distance and fast drag chains”.**



ROBOCABLES F1X, a miniaturized extra flexible cable, is specifically designed for continuous flexing in demanding industrial environments. The cables reduced outer diameter design allows for a very small bend radius and is designed for very long drag chain applications. The outer jacket is a blend of polyurethane, which is ideal for abrasive conditions and a variety of chemicals, oils and solvents.

• **ROBOCABLES F1X CONTROL**

Miniaturized cable for long drag chain

low bending radius

Life cycle range of 8 Million cycles*

• Control / power cables screened.....p.12

• Control / power cables unscreened.....p.13



* According to LAPP Muller test methods

ROBOCABLES F1X CONTROL/POWER SCREENED

Long drag chain
Resistant to abrasion
and oils

ROBOTIC SCREENED CABLES
Extra flexible control / power cables with high performances
on long drag chain installation.

«LAPP MULLER» - composition - ROBOCABLE F1X - REF 36594 - OF...




Cable make up

Conductors	≤ 0.5² : Extra flexible tinned copper wires > 0.5² : Extra flexible plain copper wires according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White with black n° + Y/G or color code
Assembling	Stranded in several layers wound by anti friction tape
Overall screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane mat with low friction coefficient
Marking	«LAPP MULLER - composition - ROBOCABLE F1X - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 10 m/s	 Dynamic bending radius : from 5 x outside diameter (Please contact us)
 Gantry cranes : Yes	 Torsion : No	 Acceleration : Up to 15m/s²	 Performances* : 8 million cycles (10 x diam.ext)

Technical data

 Rated voltage : 0.6/1 kVolt for section≥0.5² 0.3/0.5 kVolt for section<0.5²	 Temperature range : - 30°C + 80°C	 Outer sheath resistant to abrasion, oils and welding sparks.
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
46404	(18x0.25²)C	8.8	118	46430	(36G1²)C	15.1	471
46419	(18x0.34²)C	9.8	145	32472	(12G1.5²)C	12.5	310
36594	(16x0.5²)C	9.6	170	46431	(18G1.5²)C	14.7	433
53548	(18x0.5²)C	11.7	220	46432	(27G1.5²)C	16.2	517
46425	(18x0.75²)C	11.5	253	46433	(36x1.5²)C	19.2	81

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F1X CONTROL/POWER UNSCREENED

Long drag chain
Resistant to abrasion
and oils

ROBOTIC UNSCREENED CABLES

Extra flexible control / power cables with high performances on long drag chain.

«LAPP MULLER» - composition - ROBOCABLE F1X - REF 46401 - OF...






Cable make up

Conductors	≤ 0.5 ² : Extra flexible tinned copper wires > 0.5 ² : Extra flexible plain copper wires according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White with black n° + Y/G or color code DIN 47100
Assembling	Stranded in several layers wound by anti friction tape
Outer sheath	Polyurethane - mat - with low friction coefficient
Marking	«LAPP MULLER - composition - ROBOCABLE F1X - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 10 m/s	 Dynamic bending radius : from 5 x outside diameter (Please contact us)
 Gantry cranes : Yes	 Torsion : No	 Acceleration : Up to 15m/s ²	 Performances* : 8 million cycles (10 x diam.ext)

Technical data

 Rated voltage : 0.6/1 kVolt for section≥0.5 ² 0.3/0.5 kVolt for section<0.5 ²	 Temperature range : - 30°C + 80°C	 Outer sheath resistant to abrasion, oils and welding sparks.
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
46374	18x0.25 ²	7.8	86	44906	15G0.75 ²	9.9	170
46375	27x0.25 ²	9.2	121	46587	12G1 ²	11.4	212
36777	18X0.5 ²	8.8	130	46391	18G1 ²	11.6	204
46385	18G0.5 ²	8.6	139	48783	25G1 ²	13.5	350
44584	25G0.5 ²	10.1	190	46399	27G1 ²	13.5	351
29652	42X0.5 ²	12.7	280	46401	18G1.5 ²	13.6	359
				44363	12G2.5 ²	14	280

Other constructions and dimensions,
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* According to LAPP Muller
test methods

“A broad range of dynamic cables for continuous bending and torsional applications with high speed and acceleration”



ROBOCABLES F1 are an extra flexible and highly mechanically resistant cables, LAPPMULLER are designed for robotic applications where high speed and acceleration are required. A few examples of applications are umbilical robots for welding and drag chain applications.

• ROBOCABLES F1

Cables for robots in bending and torsion combined up to $\pm 360^\circ$ /m

Life cycle range of 10 Million cycles*

• Power cables screened and unscreened.....	p.16
• Control / power cables screened and unscreened.....	p.17
• Signal cables screened.....	p.18
• Servomotor cables screened.....	p.19



* According to LAPP Muller test methods

ROBOCABLES F1 POWER

ROBOTIC BENDING/TORSION CABLES SCREENED OR UNSCREENED
Extra flexible cables with high performances for robots

Bending / torsion
Optimized Diameter/weight
Resistant to abrasion
and oils

«LAPP MULLER» - composition - ROBOCABLE F1 - REF 38592 - OF...



Cable make up

Conductors	Extra flexible plain copper wires according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White or black n° + Y/G
Assembling	Stranded conductors wound by tape
Overall screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane elastomer - Matt - With very good mechanical properties
Marking	«LAPP MULLER - composition - ROBOCABLE F1X - REF... - OF...»

Mechanical data

Drag chain : Yes	Bending : Yes	Speed : Up to 10 m/s	Dynamic bending radius : from 5 x outside diameter (Please contact us)
Gantry cranes : Yes	Bending and torsion : Yes	Acceleration : Up to 15m/s ²	Torsion : up to ±360°/m (Please contact us)
Robots : Yes	Torsion : Yes		Bending and torsion * : 10 million cycles under 10 x diam.ext ±180°/m

Technical data

Rated voltage : 0.6/1 kVolt	Temperature range : - 30°C +80°C	Outer sheath resistant to abrasion, oils and welding sparks.
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
screened				unscreened			
45564	(1X10 ²)C	9.3	170	37650	1X25 ²	9.75	280
26779	(1X16 ²)C	11.2	240	39415	1X35 ²	11.4	390
32033	(1X25 ²)C	12.5	370	29181	1X50 ²	13.6	525
59554	(1X35 ²)C	14.1	490	26673	1X95 ²	18.6	1030
38979	(1X50 ²)C	16.3	640	27522	1X120 ²	20.3	1030
47120	(1X70 ²)C	22	1000	39753	2X25 ² + 1G16 ²	20.9	900
40712	(3G10 ²)C	16.6	500	30186	2X35 ² + 1G25 ²	25.5	1180
23443	(3G16 ²)C	21	750	28900	3G16 ²	18.8	670
33430	(3G25 ²)C	23	1140	25046	3G25 ²	22.3	910
30822	(3G35 ²)C	26.6	1350	30822	3G35 ²	26.6	1350
49327	(4G10 ²)C	18.2	640	34515	3G16 ² + 1X(2X1 ²)	19	700
37830	(4G16 ²)C	23	990	38592	3G25 ² + 1X(2X1 ²)	22.4	1100
46450	(4G25 ²)C	26.4	1250	43565	4G10 ²	17.1	650
46452	(4G35 ²)C	31.4	1911	41084	4G16 ²	19.9	800

Other constructions and dimensions,
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Fax +33(0) 4 94 43 38 16
e-mail : contact@mullercables.com



* According to LAPP Muller
test methods

ROBOCABLES F1 CONTROL/POWER

Bending / torsion
Optimized Diameter/weight
Resistant to abrasion
and oils

ROBOTIC BENDING/TORSION CABLES SCREENED
OR UNSCREENED
Extra flexible control/power cables with high performances
for robots

«LAPP MULLER» - composition - ROBOCABLE F1 - REF 50106 - OF...



Cable make up

Conductors	≤ 0.5 ² : Extra flexible tinned copper wires > 0.5 ² : Extra flexible plain copper wires according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White with black n° + Y/G or color code according to DIN 47100
Assembling	Stranded conductors wound by anti friction tape
Overall screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane - Matt - With very good mechanical properties
Marking	«LAPP MULLER - composition - ROBOCABLE F1X - REF... - OF...»

Mechanical data

	Drag chain : Yes		Bending : Yes		Speed : Up to 10 m/s		Dynamic bending radius : from 5 x outside diameter (Please contact us)
	Gantry cranes : Yes		Bending and Torsion : Yes		Acceleration : Up to 15m/s ²		Torsion : up to ±360°/m (Please contact us)
	Robots : Yes		Torsion : Yes				Bending and torsion * : 10 million cycles under 10 x diam.ext ±180°/m

Technical data

	Rated voltage : 0.6/1 kVolt for section≥0.5 ² 0.3/0.5 kVolt for section<0.5 ²		Temperature range : - 30°C + 80°C		Outer sheath resistant to abrasion, oils and welding sparks.
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
screened							
26923	(7G0,5 ²)C	7,9	100	29738	(4G2,5 ²)C	10,9	210
29577	(9G0,5 ²)C	8,6	120	16256	(4G6 ²)C	17,3	460
26924	(12G0,5 ²)C	9,8	160	unscreened			
29580	(18G0,5 ²)C	11,8	200	37292	4X1 ²	6,4	70
45828	(37G0,5 ²)C	16,2	315	29521	5G0,5 ²	5,3	40
32548	(4X0,75 ²)C	7,1	83	26914	7G0,5 ²	6,8	74
29904	(3G1 ²)C	7,1	80	26915	12G0,5 ²	8,7	120
36449	(4G1 ²)C	6,6	80	45818	37G0,5 ²	14,9	235
29609	(5G1 ²)C	8,1	110	24996	25G0,6 ²	12,8	260
29611	(7G1 ²)C	9,7	158	30331	3G1 ²	5,9	52
38673	(12G1 ²)C	12,5	230	36597	4G1 ²	6,4	74
29616	(18G1 ²)C	14,1	300	29542	5G1 ²	7,3	80
29618	(25G1 ²)C	16,9	465	29154	7G1 ²	8,4	106
45829	(37G1 ²)C	20,7	710	26920	12G1 ²	11,3	215
46278	(2X1,5 ²)C	7,6	90	33639	3G1,5 ²	6,7	86
29905	(3G1,5 ²)C	7,9	110	33184	4G1,5 ²	7,6	89
29906	(4G1,5 ²)C	8,7	100	29558	7G1,5 ²	9,9	160
36478	(4G1,5 ²)C	8,5	120	29562	12G1,5 ²	13,5	297
29626	(7G1,5 ²)C	11	216	29564	18G1,5 ²	15,9	411
45836	(9G1,5 ²)C	12,6	290	29566	25G1,5 ²	19,9	553
45837	(18G1,5 ²)C	16,7	480	45819	37G1,5 ²	23,6	700
54219	(25G1,5 ²)C	20,9	700	46199	16G2,5 ²	18,6	570
45838	(37G1,5 ²)C	24,3	1000				

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F1 SIGNAL

Bending / torsion
Optimized Diameter/weight
Resistant to abrasion
and oils



ROBOTIC BENDING/TORSION CABLES SCREENED
Extra flexible link with high performances for robots

«LAPP MULLER» - composition - ROBOCABLE F1 - REF 31397 - OF...




Cable make up

Conductors	≤ 0.5² : Extra flexible tinned copper > 0.5² : Extra flexible plain copper according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	Colors - DIN 47100
Assembling	Stranding of cores in twisted pairs, wound by anti friction tape
Individual screen	Spun by tinned copper - Optical coverage > 95%
Final assembling	Stranding of pairs, wound by anti friction tape
Overall screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane - Mat - With very good mechanical properties
Marking	«LAPP MULLER - composition - ROBOCABLE F1 - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 10 m/s	 Dynamic bending radius : from 5 x diam.Ext (Please contact us)
 Gantry cranes : Yes	 Bending and torsion : Yes	 Acceleration : Up to 15m/s²	 Torsion : up to ±360°/m (Please contact us)
 Robots : Yes	 Torsion : Yes		 Bending and torsion * : 10 Million cycles. 10 x diam.ext ±180°/m

Technical data

 Rated voltage : 0.3/0.5 kVolt	 Temperature range : - 30°C + 80°C	 Outer sheath resistant to abrasion, oils and welding sparks.
--	--	--

Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
overall screened				individually screened			
46213	(1X2X0.25²)C	4.6	26	25408	3x(2x0.14²)C	7.4	65
46214	(2X2X0.25²)C	6.6	53	6514	3x(2x0.25²)C + 4x0.5	9.4	107
46215	(3X2X0.25²)C	6.9	62	46230	4X(2X0.25²)C	8.5	100
46219	(12X2X0.25²)C	11.5	190	46231	7X(2X0.25²)C	10.8	173
46220	(1X2X0.34²)C	4.8	60	46232	12X(2X0.25²)C	14.8	323
46221	(3X2X0.34²)C	6.9	68	46233	4X(2X0.34²)C	8.9	120
5255	(5X2X0.34²)C	8.8	115	46234	7X(2X0.34²)C	11.4	198
42592	(8X2X0.34²)C	10.3	160	46235	12X(2X0.34²)C	15.9	341
46223	(10X2X0.34²)C	11.6	210	double screened			
18961	(4x2x0.14²+2x0.5²)C	8	90	16317	(5x(2x0.14²)C)C	9.7	160
44827	(3x2x0.25²+6x0.5²)C	9.1	140	34293	(4x(2x0.25²)C)C	9.4	150
27288	(4x2x0.25²+1x0.5²)C	8.8	120	46464	(7x(2x0.25²)C)C	11.8	199
46225	(4X2X0.25²+2X0.5²)C	9.4	103	46465	(12x(2x0.25²)C)C	14.1	319
46227	(4X2X0.25²+1X2X0.5²)C	8.8	100	18963	(3x(2x0.34²)C)C	9.4	130
46228	(10X0.25²+2X0.5²)C	9.9	136	29760	(4x(2x0.34²)C)C	10.2	163
46229	(10X0.25²+4X0.5²)C	10.7	163				

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F1 SERVOMOTOR

Bending / torsion
Optimized Diameter/weight
Resistant to abrasion
and oils

ROBOTIC BENDING/TORSION CABLES SCREENED
Extra flexible servomotor cables design for robot












«LAPP MULLER» - composition - ROBOCABLE F1 - REF 25411 - OF...






Cable make up

Conductors	≤ 0.5 ² : Extra flexible tinned copper > 0.5 ² : Extra flexible plain copper according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White with black n° + Y/G for power / color code according to DIN 47100 for signal
Paired	Stranding of single conductors in twisted pairs and tape wound for signal
Screen	Spun with tinned copper, optical coverage > 95%
Assembling	Stranding of cores with a short pitch tape wound
Overall screen	Tinned copper braid - Optical coverage > 85%
Outer sheath	Polyurethane - Mat - With high mechanical resistance
Marking	«LAPP MULLER - composition - ROBOCABLE F1 - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 10 m/s	 Dynamic bending radius : from 5x diam.Ext (Please contact us)
 Gantry cranes : Yes	 Bending and torsion : Yes	 Acceleration : Up to 15m/s ²	 Torsion : Up to ±360° /m (Please contact us)
 Robots : Yes	 Torsion : Yes		 Bending and torsion * : 10 million cycles under 10 x diam.ext ± 180° /m

Technical data

 Rated voltage : 0.3 / 0.5 kVolt for signal 0.6 / 1 kVolt for power	 Temperature range : - 30°C + 80°C	 Outer sheath resistant to abrasion, oils and welding sparks.
--	--	--

Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
53499	(5G1.5 ² +1X(2X0.5 ²)C)C	10.1	180	58797	(4G2.5 ² +1X(3X0.5 ²)C+1X(2X0.34 ²)C)C	12.3	250
46523	(4X1.5 ² +1X(2X1 ²)C)C	11.1	211	46525	(4G4 ² +1X(2X1 ²)C)C	13.9	352
35539	(4X2.5 ² +1X(2X0.5 ²)C)C	12.2	230	55423	(4G6 ² +1X2X0.25 ²)C	15.3	470
52468	4G2.5 ² +2X(2X0.5 ²)C	13	280	46526	(4X6 ² +1X(2X1 ²)C)C	16.5	500
46524	(4X2.5 ² +1X(2X1 ²)C)C	13.6	273	46527	(4X10 ² +1X(2X1 ²)C)C	22.4	753

Other constructions and dimensions,
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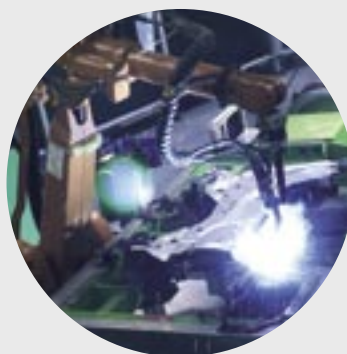
* According to LAPP Muller
test methods

“A wide range of cables with very high mechanical properties in extreme conditions”



As a result of close partner relationship with selected robotic manufacturers, the ROBOCABLE F1 GOLD excels in reliability for extreme applications and conditions. Tested for combinations of continuous flexing and torsion, the F1 Gold is the most perfect design for robots.

The entire design of this cable is optimized for 10 million continuous cycles while maintaining constant electrical reliability.



• ROBOCABLES F1 GOLD

Cables for robots in bending and torsion combined up to $\pm 720^\circ/m$
Life cycle range of 10 Million cycles*

• Power cables screened and unscreened.....	p.22
• Control / power cables screened and unscreened.....	p.23
• Signal cables screened.....	p.24
• Servomotor cables screened.....	p.25



* According to LAPP Muller test methods

ROBOCABLES F1 GOLD POWER

Bending / torsion
low dynamic bending radius
Torsion $\pm 720^\circ/m$

ROBOTIC BENDING/TORSION CABLES SCREENED
OR UNSCREENED
Extra flexible power cables with high performances for robots












«LAPP MULLER» - composition - ROBOCABLE F1 GOLD - REF 47871 - OF...



Cable make up

Conductors	Extra flexible plain copper wires, taped
Insulation	Miniaturized - special polymer for robotics
Color code	Black n° + Y/G
Assembling	Stranding of cores, wound by anti friction tape
Screen	Spun by tinned copper, optical coverage > 95%
Outer sheath	Polyurethane - mat - with very good mechanical properties
Marking	«LAPP MULLER - composition - ROBOCABLE F1 GOLD - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 10 m/s	 Dynamic bending radius : from 5 x diam .Ext (Please contact us)
 Gantry cranes : Yes	 Torsion : Yes	 Acceleration : Up to 15m/s ²	 Torsion : Up to $\pm 720^\circ/m$ (Please contact us)
 Robots : Yes	 Bending and torsion : Yes		 Bending and torsion * : 10 Million cycles under 8 x diam.ext at $\pm 360^\circ/m$

Technical data

 Rated voltage : 0.6 / 1 kVolt	 Temperature range : - 30°C + 80°C	 Outer sheath resistant to abrasion, oils and welding sparks. VDE 472-803 B	 Fire resistance : IEC 60332-1
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
61585	(1x25 ²)C	14.6	450	47872	1X50 ²	16.5	610
56372	1X25 ²	13.6	390	61943	1x95 ²	23	1210
47871	1X35 ²	15	430	59589	2X25 ² +1X16 ²	27.6	1120
				60742	3G16 ²	27.3	890
				57122	3X35 ²	31	1440

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F1 GOLD CONTROL/POWER

Bending / torsion
low dynamic bending radius
Torsion $\pm 720^\circ/m$












ROBOTIC BENDING/TORSION CABLES SCREENED
OR UNSCREENED
Extra flexible control/power cables with high performances
for robots

«LAPP MULLER» - composition - ROBOCABLE F1 GOLD - REF 57497 - OF...


Cable make up

Conductors	$\leq 0.5^2$: Extra flexible tinned copper wires $> 0.5^2$: Extra flexible plain copper wires according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White with black n° + Y/G or color code DIN 47100
Individual screen	Spun by tinned copper - Optical coverage : 95%
Assembling	Stranded conductors wound tape
Overall screen	Spun by tinned copper - Optical coverage : 95%
Outer sheath	Polyurethane - mat - with high mechanical properties
Marking	«LAPP MULLER - composition - ROBOCABLE F1 GOLD - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 10 m/s	 Dynamic bending radius : from 5 x diam .Ext (Please contact us)
 Gantry cranes : Yes	 Torsion : Yes	 Acceleration : Up to 15m/s ²	 Torsion : Up to $\pm 720^\circ/m$ (Please contact us)
 Robots : Yes	 Bending and torsion : Yes		 Bending and torsion* : 10 Million cycles under 8 x diam.ext at $\pm 360^\circ/m$

Technical data

 Rated voltage : 0.6 / 1 kVolt for section $\geq 0.5^2$ 0.3/0.5 kVolt for section $< 0.5^2$	 Temperature range : - 30°C + 80°C	 Outer sheath resistant to abrasion, oils and welding sparks. VDE 472-803 B	 Fire resistance : IEC 60332-1
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
screened				unscreened			
47748	(16G0.34 ²)C	10.5	140	58767	3G1 ² +16X0.5 ²	12.3	180
61372	(19G0.5 ²)C	11.2	210	60645	3G1 ²	5.6	50
56373	16X1 ² +(1X2X1 ²)C	14	340	57497	12G1 ²	11.5	200
58900	(4G2.5 ²)C	10.4	180	61397	25G0.5 ²	12	230
59523	(4G4 ²)C	11.5	270				
59640	4G(4 ²)C	12.4	330				

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F1 GOLD SIGNAL

ROBOTIC BENDING/TORSION CABLES SCREENED
Extra flexible link with high performances for robots.

Bending / torsion
low dynamic bending radius
Torsion $\pm 720^\circ/m$












«LAPP MULLER» - composition - ROBOCABLE F1 GOLD - REF 47747 - OF...



Cable make up

Conductors	$\leq 0.5^2$: Extra flexible tinned copper wires $> 0.5^2$: Extra flexible plain copper wires according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	Colors according to DIN 47100
Assembling	Stranding of conductors in twisted pairs, tape wound
Individual screen	Spun by tinned copper, optical coverage $> 95\%$
Final assembling	Stranding of cores in twisted pairs, tape wound
Overall screen	Spun by tinned copper, optical coverage $> 95\%$
Outer sheath	Polyurethane - mat - with high mechanical resistance
Marking	«LAPP MULLER - composition - ROBOCABLE F1 GOLD - REF... - OF...»

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Up to 10 m/s	 Dynamic bending radius : from 5 x diam. Ext (Please contact us)
 Gantry cranes : Yes	 Torsion : Yes	 Acceleration : Up to 15m/s ²	 Torsion : Up to $\pm 720^\circ/m$ (Please contact us)
 Robots : Yes	 Bending and torsion : Yes		 Bending and torsion * : 10 Million cycles under 8 x diam.ext at $\pm 360^\circ/m$

Technical data

 Rated voltage : 0.6 / 1 kVolt for section $\geq 0.5^2$ 0.3 / 0.5 kVolt for section $< 0.5^2$	 Temperature range : $- 30^\circ\text{C} + 80^\circ\text{C}$	 Outer sheath resistant to abrasion, oils and welding sparks. VDE 472-803 B	 Fire resistance : IEC 60332-1
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
52150	(3X2X0.14 ²)C	5.4	38	61691	((5X2X0.34 ²)C+1T0.34 ² +2T0.5 ²)C	13.5	230
47747	(5X2X0.25 ²)C	8.7	95	56200	1X(2X0.34 ²)C+3X4X0.34 ² +5G0.5 ²	10.8	170
52690	(4X2X0.25 ²)C	7.3	80	49297	((2X2X0.5 ²)C+6X4X0.5 ²)C	16	351
61048	(3X(2X0.34 ²)C	9.3	140	45006	4X3X0.5 ² +4X(2X0.25 ²)C	12.8	230
61049	(4X(2X0.34 ²)C	10.1	170	59639	4X(2X0.34 ²)C+3G1 ²	10.2	180
60820	(3X2X0.25 ² +3X2X0.5 ²)C	9.4	130	60657	2X3X0.5 ² +1X(2X0.34 ²)C	8.8	110
58344	(7X2X0.34 ² +2X1 ²)C	10.8	180	59104	3G0.5 ² +1X(2X0.5 ²)C	8.1	70
60512	(4X2X0.25 ² + 2X1.5 ²)C	10.3	160	59105	10G0.5 ² +1X(2X0.5 ²)C	10	110
61227	(5X2X0.34 ²)C+1T0.34 ² +2T0.5 ²	13	210				

Other constructions and dimensions,
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* According to LAPP Muller
test methods

ROBOCABLES F1 GOLD SERVOMOTOR

Bending / torsion
low dynamic bending radius
Torsion $\pm 720^\circ/m$

ROBOTIC BENDING/TORSION CABLES SCREENED
Extra flexible servomotor cables with high performances
for robots.

«LAPP MULLER» - composition - ROBOCABLE F1 GOLD - REF 47855 - OF...



Cable make up

Conductors	$\leq 0.5^2$: Extra flexible tinned copper $> 0.5^2$:Extra flexible plain copper according to NFC 32013 and IEC 228 Class 6
Insulation	Miniaturized - Special polymer for robotics
Color code	White with black n° + Y/G for power / color code for signal
Assembling	Stranding of cores in twisted pairs, tape wound for signal
Individual screen	Spun by tinned copper, optical coverage $> 95\%$ for signal
Assembling	Stranding of cores in twisted pairs, tape wound
Overall screen	Spun by tinned copper
Outer sheath	Polyurethane - mat - with high mechanical resistance
Marking	«LAPP MULLER - composition - ROBOCABLE F1 GOLD - REF... - OF...»

Mechanical data

Drag chain : Yes	Bending : Yes	Speed : Up to 10 m/s	Dynamic bending radius : from 5 x diam .Ext (Please contact us)
Gantry cranes : Yes	Torsion : Yes	Acceleration : Up to 15m/s ²	Torsion : up to $\pm 720^\circ/m$ (Please contact us)
Robots : Yes	Bending and torsion : Yes		Bending and torsion * : 10 Million cycles under 8 x diam.ext at $\pm 360^\circ/m$

Technical data

Rated voltage : 0.3 / 0.5 kVolt for signal 0.6 / 1 kVolt for power	Temperature range : $-30^\circ\text{C} + 80^\circ\text{C}$	Outer sheath resistant to abrasion, oils and welding sparks. VDE 472-803 B	Fire resistance : IEC 60332-1
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Article n°	construction	diameter	weight kg/km	Article n°	construction	diameter	weight kg/km
52689	(4X0.34+2X0.25)C	6.3	60	47746	(4G1.5+1X(2X0.5)C)C	11.5	210
60927	4G0.5+2X2X0.14	7.3	90	58768	(4G1.5+2X(2X0.75))C	11.2	190
51796	(4G0.5+1X(2X0.34)C)C	7.9	100	60660	(4G2.5+4X(2X0.25)C)C	13.8	320
60858	(4X0.5+3X(2X0.14)C+3X2X0.14)C	11.5	180	59689	(4X2.5+1X(2X0.5)C)C	12	250
60928	4G1.5+3X2X0.14	9.7	130	60987	(4G2.5+3X(4X0.34)C)C	14.3	390
47855	(4G1.5+5X(2X0.25)C+1X2X0.5)C	16	320	47744	(4G6+1X(2X1.5)C)C	17	490

Other constructions and dimensions,
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* According to LAPP Muller
test methods

“Special cable designs manufactured and tested according to your requirements”

The foresight of LAPP MULLER made it possible to anticipate the evolution of today's robotic technologies and the demanding requirements and reliability of our customer demand in cables. A complete team of R&D engineers and state of the art manufacturing equipment are keys to success for high quality and reliable cable products in a wide array of designs.

Lapp Muller is able to create a cable to meet your requirements taking into account all the parameters of electrical, mechanical, chemical and environmental constraints of your application.

This chapter contains a sampling of over 60000 special cable designs studied by Lapp Muller over the last 10 years. We can offer turn-key solutions to you, integrating complete cable assemblies and harnesses with connectors of your choice.

• **SPECIAL CABLES AND SERVICES**

For static or dynamic, umbilical tailor made, used in specific environment

- Robocables UL.....p.28
- Robocables BUS.....p.29
- Robocables MULTIBUS.....p.30
- Umbilical cables.....p.31
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- Cable harness assembly.....p.33
- Robots equipments & services.....p.34

UL ROBOCABLES

Homologation UL / CSA
Bending / torsion
Resistant to abrasion
and oils

ROBOTIC BENDING/TORSION CABLES SCREENED
OR UNSCREENED
Extra flexible cables for power and control for robots
and drag chain










LAPP MULLER - «  » - AWM - style 20940 - 80°C - 600 V - ART 51455 - N° OF

Cable make up on request

UL approval can be obtained for all our family of cables F3, F1X, F1 and F1 GOLD



Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : Depending on selection of cable
 Gantry cranes : Yes	 Torsion : Yes	 Acceleration : Depending on selection of cable
 Robots : Yes	 Bending and torsion : Yes	 Dynamic bending radius : Depending on selection of cable

Technical data

 Rated voltage : 0.3, 0.6, 1 kVolt	 Temperature range : - 30 °C +80°C	 Outer sheath resistant to oils	 Fire resistance : VW1, FT1
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Article n°	construction	diameter	Article n°	construction	diameter
Robocables F3			Robocables F1		
49084	4P0.25 ²	11.1	58430	12X0.25 ²	9
49083	12G0.5 ²	9.25	58653	(16G1 ²)+(1P1 ²)	15.4
49068	3G1 ²	5.9	58450	18G1.5 ²	17.5
49078	7G1 ²	8.2	59729	3G25 ²	23.7
49086	2P0.75 ² +4G1.5 ²	14.3	60835	(4P0.14 ²)+(1P0.5 ²)+BLG	12.3
49089	2P1.5 ² +4G6 ²	17.2	60998	3P0.34 ² BLI+BLG	10.4
Robocables F1X			Robocables F1 GOLD		
53544	12X0.5 ²	10	57294	5P0.25 ²	8.7
53548	18X0.5 ²	11.7	56619	25X1 ²	17.8
53555	12X1 ²	11.6	56624	12X1 ²	13.5
53557	25X1 ²	15.6	57289	(2X0.5 ²)+(4G1.5 ²)	10.3
53560	34X1.5 ²	19.8	57292	(4G1.5 ²)+(4P0.25 ²)	14.3
53562	18X2.5 ²	18.5	57302	3X35 ²	

Other constructions and dimensions,
Please contact us.
Tel +33(0) 4 94 56 65 00
Fax +33(0) 4 94 43 38 16
e-mail : contact@mullercables.com

BUS ROBOCABLES

All protocol compatible
All dynamic applications










ROBOCABLES BUS FOR DRAG CHAIN
AND ROBOT APPLICATION

«LAPP MULLER» - composition - BUS ROBOCABLE - REF 48003 - OF...




Cable make up on request

Our experience with numerous dielectric materials enables us to offer all our Robocables family (F3, F1X, F1 and F1 GOLD) in compatibility with all existing protocols.

Mechanical data

 Drag chain : Yes	 Bending : Yes	 Speed : according to demand
 Gantry cranes : Yes	 Torsion : Yes	 Acceleration : according to demand
 Robots : Yes	 Bending and torsion : Yes	 Dynamic bending radius : according to demand

Technical data

 Rated voltage : 0.3 / 0.5 kVolt for signal 0.5 / 1 kVolt for power	 Temperature range : - 30 °C + 80 °C	 Transmission parameters : according to demand
--	--	--

Article n°	construction	diameter	Article n°	construction	diameter
Compatible interbus			Compatible Profibus/FIP		
42944	$(3 \times (2 \times 0.25^2) \llbracket 100\Omega \rrbracket + 3G1^2)C$	10.3	39036	$(2 \times 0.25^2 \llbracket 150\Omega \rrbracket)C$	9.7
53378	$(2 \times (2 \times 0.25^2) \llbracket 100\Omega \rrbracket + 5 \times 1^2)C$	8.5	48003	$(2 \times 0.34^2)C \llbracket 150\Omega \rrbracket + 3G1^2$	10.8
58978	$6 \times (2 \times 0.25^2)C \llbracket 100\Omega \rrbracket + (5G1^2)C$	14.6	54148	$(2 \times 0.34^2)C \llbracket 150\Omega \rrbracket + 3G1.5^2$	11.2
53069	$3 \times (2 \times 0.25^2)C \llbracket 100\Omega \rrbracket + (2 \times 1^2)C$	12.2	54171	$(2 \times 0.34^2)C \llbracket 150\Omega \rrbracket + 2 \times 0.5^2 + 2 \times 1.5^2 + 2G0.5^2$	13
			43618	$(2 \times 0.34^2)C \llbracket 150\Omega \rrbracket + 15G0.5$	13.4
			48565	$(2 \times 0.34^2)C \llbracket 150\Omega \rrbracket + 5 \times 0.75^2$	13.7
			45936	$3 \times (2 \times 0.34^2)C \llbracket 150\Omega \rrbracket + 5 \times 0.75^2$	13
Compatible CAN/DeviceNet			Compatible CC-link		
58458	$(2 \times (2 \times 0.34^2) \llbracket 120\Omega \rrbracket)C$	7.2	57379	$(3 \times 0.5^2) \llbracket 110\Omega \rrbracket + (3 \times 1^2)C$	12.9
60014	$2 \times (2 \times 0.25^2)C \llbracket 120\Omega \rrbracket + (2 \times 0.34^2)C$	11.5	58287	$(3 \times 0.5^2) \llbracket 110\Omega \rrbracket + (5 \times 1^2)C$	13.9
42287	$(2 \times (2 \times 0.25^2) \llbracket 120\Omega \rrbracket + 18G0.5^2)C$	14	Compatible multiples protocoles		
56196	$((2 \times 0.25^2)C \llbracket 120\Omega \rrbracket + (2 \times 0.75^2)C)$	10	48946	$4 \times (2 \times 0.25^2)C \llbracket 100\Omega \rrbracket + (2 \times 0.25^2)C \llbracket 120\Omega \rrbracket + (5G1^2)C$	16
47825	$((2 \times 0.25^2)C \llbracket 120\Omega \rrbracket + 3 \times 0.5^2 + 2 \times 0.34^2)C$	10	53466	$(2 \times 0.34^2)C \llbracket 150\Omega \rrbracket + 2 \times (2 \times 0.25^2)C \llbracket 120\Omega \rrbracket + 2 \times (2 \times 0.25^2)C \llbracket 100\Omega \rrbracket + (5G1)C$	16.3
60955	$((2 \times 0.34^2)C \llbracket 120\Omega \rrbracket + 3 \times 0.75^2 + 2 \times 0.5^2)C$	11.4	61429	$(2 \times 0.34^2)C \llbracket 150\Omega \rrbracket + 2 \times (2 \times 0.25^2)C \llbracket 100\Omega \rrbracket + 13G1^2$	17.7
51127	$(2 \times 0.34^2)C \llbracket 120\Omega \rrbracket + 3G1^2 + 2 \times 0.5^2$	12.8			

Other constructions and dimensions,
Please contact us.
Tel +33(0) 4 94 56 65 00
Fax +33(0) 4 94 43 38 16
e-mail : contact@mullercables.com

MULTIBUS

Multibus robotic cable from technology F1 GOLD for bending/torsion

Bus 100. 120. et 150 Ohms
Resistant to abrasion
and oils

ART 53466 COMPOSITE ROBOTIC CABLE FOR BENDING AND TORSION

Application : Equipment of multi axis robots

«LAPP MULLER» - composition - ROBOCABLE MULTIBUS - REF 53466 - OF...



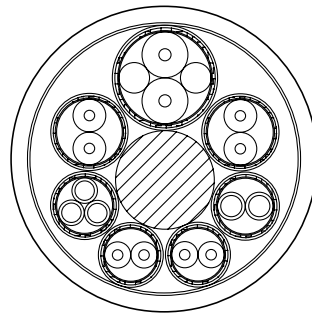
Cable make up

-1 Pair for profibus
2 Conductors 0.34 mm²
insulated by foam polyolefine
Screened by spinned copper and tape

-2 Pairs for Devicenet
2 Conductors 0.25 mm²
insulated by fouroco polymer
Screened by spinned copper

-2 Pairs for Interbus
2 Conductors 0.25 mm²
insulated by fouroco polymer
Screened by spinned copper

-Power :
5 Conductors 1 mm²
Screened by spinned copper
Outer sheath in polyurethane



Outer diameter : 16.3 ± 0.3 mm

General characteristics

Pairs for Interbus :
Impedance characteristic of pairs : 100 ± 15 Ω
Capacitance between 2 conductors : ≤ 60 pF/m
0.25 mm² conductors linear resistance ≤ 93 Ω/km

Pair for Devicenet :
Impedance characteristic of pairs : 120 ± 12 Ω
Capacitance between 2 conductors : ≤ 40 pF/m
0.25 mm² conductors linear resistance ≤ 93 Ω/km

Pair for Profibus :
Impedance characteristic of pairs : 150 ± 15 Ω
Capacitance between 2 conductors ≤ 30 pF/m
Attenuation at 4 Mhz ≤ 25 dB/km
Attenuation at 16 Mhz ≤ 50 dB/km
0.34 mm² conductors linear resistance ≤ 61 Ω/km

ART 48946 MULTIPLE BUS COMPOSITE ROBOTIC CABLE FOR BENDING AND TORSION

Application : Equipment of multi axis robots

«LAPP MULLER» - composition - ROBOCABLE MULTIBUS - REF 48946 - OF...

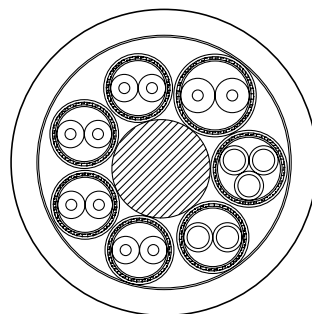


Cable make up

-1 Pair for Devicenet
2 conductors 0.25 mm²
insulated by fouroco polymer
Screened by spinned copper

-4 Pairs for Interbus
2 Conductors 0.25 mm²
insulated by fouroco polymer
Screened by spinned copper

-Power :
5 Conductors 1 mm²
Screened by spinned copper
Outer sheath in polyurethane



Outer diameter : 16 ± 0.3 mm

General characteristics

Pairs for Interbus :
Impedance characteristic of pairs : 100 ± 15 Ω
Capacitance between 2 conductors : ≤ 60 pF/m
0.25 mm² conductors linear resistance ≤ 93 Ω/km

Pair for Devicenet :
Impedance characteristic of pairs : 120 ± 12 Ω
Capacitance between 2 conductors : ≤ 40 pF/m
0.25 mm² conductors linear resistance ≤ 93 Ω/km

Other constructions and dimensions,
Please contact us.
Tel +33(0) 4 94 56 65 00
Fax +33(0) 4 94 43 38 16
e-mail : contact@mullercables.com

UMBILICALS

Composite robotics cables interface with electric hydraulic and pneumatic

Resistant to abrasion, oils and welding sparks.

ART 47478 UMBILICAL POWER, SIGNAL, CONTROL, PNEUMATIC AND COLDING CIRCUIT

Application : Welding robot



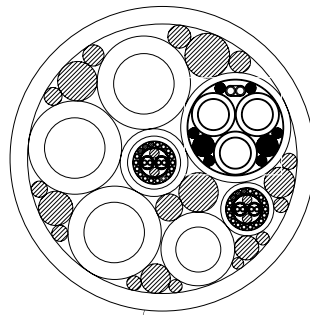
Cable make up

-1 cable of 2 conductors 1 mm², in extra flexible plain copper, insulated in polyester assembled in short pitch under anti friction tape + 3 conductors of 25 mm², taped, insulated by a polyester anti friction tape on each conductor anti friction tape, Sheathing by polyurethane

-2 cables of 15 conductors 0.5 mm², insulated in polyester, 2 layers of 2 conductors of 0.5 mm², tinned, insulated in polyester, teflon taped, teflon, spun by tinned copper, taped and sheathed in polyester

-3 Hoses PU DN 12
-1 Hose PU DN 9

Outer diameter : 62mm ± 5 mm



Outer sheath in polyurethane

General characteristics

Operating voltage :
 0.25 mm² conductors : 0.3/0.6 kVolts
 0.5 mm² conductors : 0.6/1 kVolts
 1 mm² conductors : 0.6/1 kVolts
 Linear resistance :
 0.25 mm² conductors ≤ 81.9 Ω/km
 0.5 mm² conductors ≤ 44.1 Ω/km
 1 mm² conductors ≤ 21.5 Ω/km
 Operating temperature : - 30 à + 80 °C

ART 19146 UMBILICAL POWER, SIGNAL, CONTROL AND PNEUMATIC

Application : High pressure water cut



Cable make up

-3 screened cables of 10 conductors 0.25 mm², sheathing polyurethane by anti friction tape

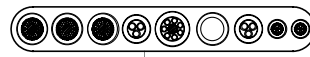
-2 cables of 3 conductors 1.5 mm² sheathing polyurethane by anti friction tape

-1 cable of 7 conductors 1 mm², sheathing polyurethane by anti friction tape

-2 screened cables of 3 conductors 0.25 mm², polyurethane sheath and anti friction tape

-1 polyamide Hose + anti friction tape

Outer sheath in polyurethane



Dimensions : 76 ± 2 mm X 11 ± 1 mm

General characteristics

Conductors operating voltage : 250 Volts
 Operating temperature : -30 to +90 °C
 Static bending radius : 45 mm
 Dynamic bending radius : 110 mm
 Hose operating pressure : 10 Bars

Other constructions and dimensions, Please contact us.
 Tel +33(0) 4 94 56 65 00
 Fax +33(0) 4 94 43 38 16
 e-mail : contact@mullercables.com

COMPOSITES

Robotics cable used for the robot hand tools

High mechanic resistance
Resistant to abrasion
and oils

ART 53623 DIAGNOSTIC CABLE

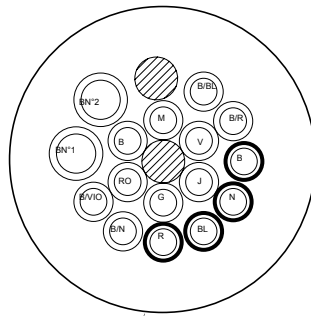
Application : Diagnostic testing

«LAPP MULLER» - composition - ROBOCABLE COMPOSITE - REF 53623 - OF...



Cable make up

- 2 Conductors 0.75 mm², in plain copper, extra flexible, polyester insulation
- 10 Conductors 0.34 mm², in tinned copper, extra flexible, polyester insulation
- 4 Conductors 0.34 mm², in tinned copper, extra flexible, PVDF insulation
- Stranding in layers
- Outer sheath in polyurethane



Outer diameter : 8.6 ± 0.4 mm

General characteristics

Operating voltage
 Conductors 0.75 mm² : 600Volts
 Conductors 0.34 mm² : 300Volts
 Linear resistance :
 Conductors 0.34 mm² ≤ 60 Ω/km
 Conductors 0.75 mm² ≤ 27.3 Ω/km

Electric values between
 2 BUS Conductors of 0.34 mm² :
 Characteristic impedance : 70 Ω
 Capacitance : 70 pF/m
 VP : 69 %
 Attenuation at 1 MHz : ≤ 20 dB/km

Operating temperature : - 30 à + 80 °C
 Dynamic bending radius ≥ 86 mm
 Weight : 0.106 kg/m

ART 45590 MULTIFONCTIONS CABLE

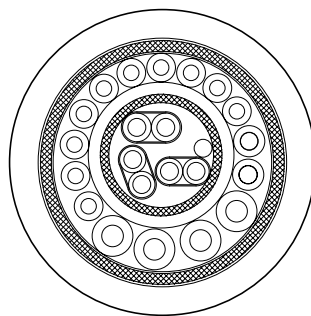
Application : Link between control cabinet and robot

«LAPP MULLER» - composition - ROBOCABLE COMPOSITE - REF 45590 - OF...



Cable make up

- 10 Conductors 0.25 mm², in tinned copper, extra flexible, PVC insulation
- 1 Pair of 0.34 mm² BUS, in extra flexible tinned copper, insulated in polyolefine
Screened by aluminium tape
- 2 Pairs of 0.34 mm² ALIM, in extra flexible tinned copper, insulated in polyester
Screened by aluminium tape + braid
- Inner sheath in PVC
- 4 Conductors 0.5 mm², in extra flexible tinned copper, insulated in PVC
- 2 Conductors 0.34 mm², in extra flexible tinned copper, insulated in PVC, anti friction tape
- Overall shield by tinned copper braid
- Protection tape
- Outer sheath in flexible PVC



Outer diameter : 12.7 ± 0.6mm

General characteristics

Conductors operating voltage : 250 Volts
 Linear resistance :
 Conductors 0.25 mm² : ≤ 81.4 Ω/km
 Conductors 0.34mm² : ≤ 62.8 Ω/km
 Conductors 0.5mm² : ≤ 42.1 Ω/km

Linear capacitance of the BUS pair : ≤ 115 pf/m
 Theoretical impedance on the BUS pair : 50 ± 5 Ω

Fire retardant according to IEC 60332-3
 Operating temperature : -15 to + 70 °C

Weight : 0.25 kg/m

Other constructions and dimensions,
 Please contact us.
 Tel +33(0) 4 94 56 65 00
 Fax +33(0) 4 94 43 38 16
 e-mail : contact@mullercables.com

HARNESS CABLES

Connectorized
Resistant to abrasion
and oils

ROBOTIC DRESS KIT

ART 41970 ASSEMBLED SPIRAL CABLE

Application : Interface cable between a diagnostic controller and test system use at the end of production line



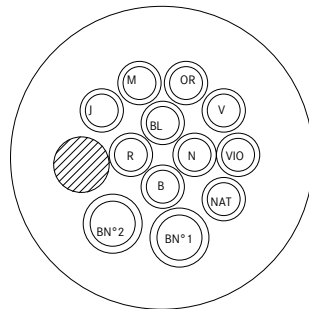
Cable make up

-10 Conductors 0.5 mm²
in extra flexible plain copper,
insulated in polyester

-Filler

-2 Conductors 1 mm²
in extra flexible plain copper,
insulated in polyester

Outer sheath in polyurethane



Outer diameter : 8.7 ± 0.4 mm

General characteristics

Conductors operating voltage : 0.6/1kVolts
Linear resistance :
Conductors 0.5 mm² ≤ 43 Ω/km
Conductors 1 mm² ≤ 21 Ω/km

Operating temperature : -30 to +80 °C
Weight : 0.12 kg/m

ART 39205 HARNESS CABLE

Application : High performances drag chain



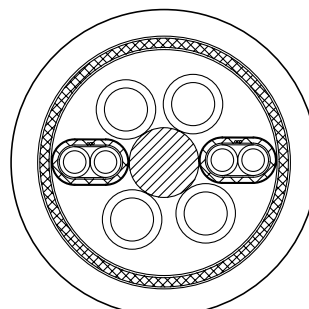
Cable make up

-Filler

-2 pairs of 0.75 mm²
in extra flexible plain copper,
insulated in polyester,
screen by polyester/aluminium tape ,
Tinned copper drain wire
and tinned copper braid

-4 Conductors 2.5 mm²,
in extra flexible plain copper,
insulated in polyester
Overall screened by tinned copper braid

Outer sheath in polyurethane



Outer diameter : 13.3 ± 0.7 mm

General characteristics

Operating voltage :
Conductors 0.75 mm² : 250 Volts
Conductors 2.5 mm² : 1000 Volts
Linear resistance :
Conductors 0.75 mm² ≤ 28.6 Ω/km
Conductors 2.5 mm² ≤ 8.4 Ω/km

Operating temperature :-20 to +70 °C
Static bending radius ≥ 55 mm
Dynamic bending radius ≥ 140 mm
Weight : 0.3 kg/m

Other constructions and dimensions,
Please contact us.
Tel +33(0) 4 94 56 65 00
Fax +33(0) 4 94 43 38 16
e-mail : contact@mullercables.com

Our Strength and Mantra is “Complete Quality Cabling Solution”

As service also being a major perspective of complete solution, we lay maximum emphasise on providing reliable and productive result.



Our Research and development team works round the clock to diagnose and analyse the challenge laid forward and provide a complete documented result as the following:

- Study of trajectories and the definition of points of the optimal anchoring.
- Study and definition of Upper works necessary for the integration of the beam.
- Innovating Prototypes and produce the same in series.
- Documentation of the study and analysis done with the details of production for the ready reference of the customers.



Do not hesitate to contact us for your all specific requests.

“ LAPP MULLER, your partner for total cabling solutions, customized cables and short lengths ”.



Marine and underwater

LAPP MULLER has successfully worked with many Coastal and Deep-sea engineering companies as well as Oceanographical Research Institutes and O.E.M. providers of equipment to the offshore gas and oil industry. Providing both composite electrical and optical cables for many applications such as ROVs (Remote Operated Vehicles), seabed vehicle umbilicals to ship and submarine borne types for the French Navy, with their relevant specifications. These cables can be supplied as complete systems terminated with any preferred style of connector from galvanised, stainless steel to titanium types as either rigid or flexible assemblies dependent on customer specifications.

Nuclear

Present for more than 30 years in the nuclear field, LAPP MULLER SAS has equipped since 1985 the first fuel assembly handling bridges of the waste processing plant of LA HAGUE in France. LAPP MULLER SAS has built its reputation by designing and manufacturing high performance cables using constructions and materials to meet the requirement of nuclear engineering cables.

Oil & gas

LAPP MULLER cables have been used in many applications for both exploration as well as production on oil and gas platforms around the world. Found in day to day maintenance equipment to the actual positioning systems used for the location of platforms and pipelines to all important safety equipment. Additionally LAPP MULLER cables can also be seen in valve control and monitoring equipment used for gas transportation.

Harbour

LAPP MULLER technology can be found in many containerised ports , where the need for mixed umbilical links within the winding cables is required.

Airport

LAPP MULLER ultra flexible cables are to be found in many airside applications such as rollers on aerobridges and taxiway power-stations used to energize the aircraft's electrical systems when on the ground. Both the construction and materials used in these cables make them ideal to withstand both the harsh mechanical and chemical conditions that these applications demand.

Miscellaneous

LAPP MULLER cables can also be found in many other industrial sectors such as medical, petrochemical, telecommunications, leisure and defence. Cables for applications such as silo control in agriculture, ski and chair lifts control in the leisure industry, safety systems used in large buildings from railway stations to municipal complexes. Due to their lightness and high mechanical specification, technologically advanced products such as Araline cables make them ultra competitive and ideal for these applications. In fact anywhere the need for integrity of the cables is paramount particularly because of safety demands or where severe environmental conditions are to be experienced LAPP MULLER cables are to be found



ISO 9001 V2000 Certification

«An important milestone of our quality commitment»



LAPP MULLER

Through thousands of kilometres of cable
LAPP MULLER links man and machine in every field of activity

Head Office and Manufacturing Plant

(and for estimates)

ZA du Grand Pont

Chemin du Peyrat

F-83310 GRIMAUD

Tel. : +33 (0) 4 94 56 65 00

Fax : +33 (0) 4 94 43 38 16

contact@mullercables.com



Founded in 1939 by M. Jean Muller, the Muller et Landais company used to make electric cables for the construction industry. Then the company quickly turned to the manufacture of specially designed electrical cables and more specifically to moving and composite cables.

In 1980, the firm became MULLER SA. Muller met a growing demand for special cables and was then expanding its skills to high tech applications and complete cable systems with fitted connectors.

In 2003, Muller became LAPP MULLER integrating into LAPP group, with its 2500 employees, its 15 production sites, and its 35 sales companies.

Reference of the LAPP group for cables with technology, LAPP MULLER covers a number of specialisms including design studies, tests and "turnkey" systems.



www.mullercables.com

A Lapp Group Company