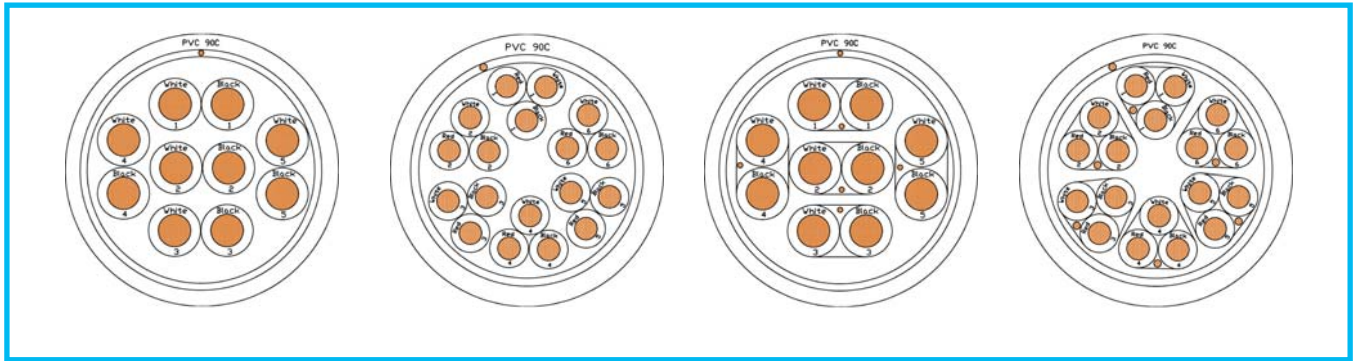


# MACHLINK INSTRUMENTATION CABLE

## MACHLINK

### Instrumentation Cables

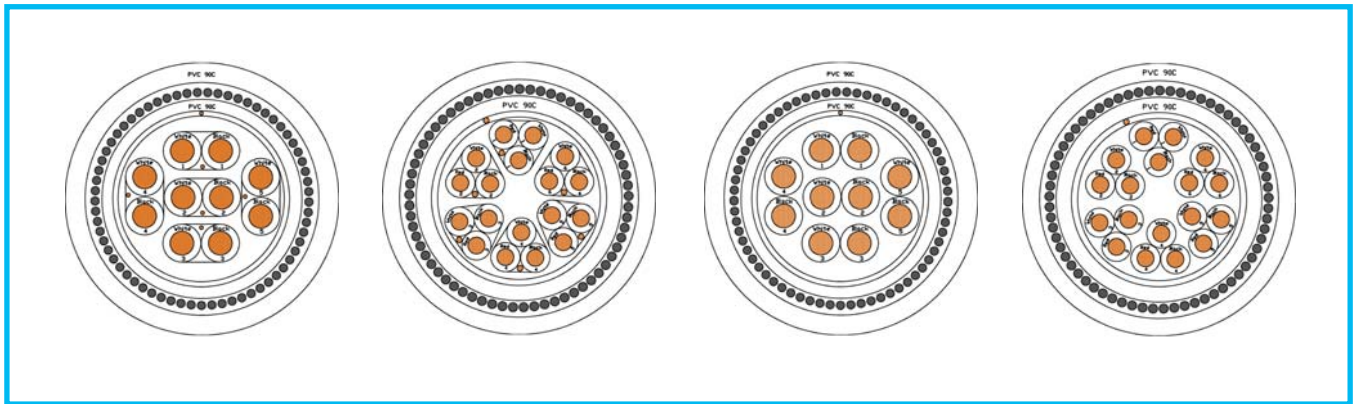


O/A SCR, Pair

O/A SCR, Triad

IND & O/A SCR, Pair

IND & O/A SCR, Triad



O/A SCR, Pair, SWA

O/A SCR, Triad, SWA

IND & O/A SCR, Pair, SWA

IND & O/A SCR, Triad, SWA



# MACHLINK INSTRUMENTATION CABLE

## ● Applications

The WW MACHLINK instrumentation cables described in this catalogue are manufactured strictly based on the requirement of Underwriters Laboratories (UL) as well as relevant Australian Standard. WW MACHLINK Instrumentation cables are mainly used in data processing and process control i.e. electrical measuring device to instrument panel, instrument to instrument connection, and electrical sensing device to control cabinets; it also can be used for general transmission of electrical signals in any systems of remote control, indication, telemetering, monitoring and analysis where it needs to be protected from interference to the transmission signal by other electrical circuits. Instrumentation cable with the identification colour blue is specified for intrinsically safe circuits use.

## ● Cable configuration

Conductor:	Plain annealed copper (class 2 strands) of the type specified in AS/NZS 1125.
Insulation:	Numbered and colour coded high grade polyvinyl chloride (PVC 90°C) compounds insulation to UL Style 1569.
Laying-up core:	Twisted to pair or triple with optimum pitch to minimise the cross talk.
Individually screened:	A stranded tinned annealed copper drain wire (7/0.2mm) is helically applied between the lapping polyester tape and the aluminium foil (100% coverage) for protection against static noise, common mode noise and crosstalk between each pair
Overall screened:	A stranded tinned annealed copper drain wire (7/0.2mm) is helically applied between the lapping polyester tape and the aluminium foil (100% coverage) for extra protection against external noise and interference (i.e. electrostatic from external high voltages, electromagnetic from external high currents)
Armour:	Single layer galvanized (mild) steel wires for corrosion resistance
Bedding and sheath:	High grade (PVC 90°C) Flame retardant to UL Style 2464.

--Flame retardant PVC is tested to standard IEC 332-3A.

--Alternative sheath material e.g. Polyurethane (PUR) compound with excellent hydrolytic stability, Flame resistant polyurethane (FR PUR), and polyolefin based compounds zero halogen low smoke material for application where require minimal smoke, flame spread and acid gas emissions, can also be produced to order.

--Customers should specify if the compound is required on the bedding (where applicable), the sheath, or both (where applicable), where any of these options are ordered.

### Sheath Material characteristics

Material Type	Flame Retardant	Halogen – free	Abrasion resistance	Mechanical resistance	Aliphatic hydrocarbons	Aromatic hydrocarbons	Acids	Alkalies	Oils	Water	Hardness, Shore A
PVC	Yes	No	Good	Good	Fair	Unsatisfactory	Fair	Fair	Good	Good	72
PUR	No	Yes	Excellent	Excellent	Good	Good	Fair	Good	Good	Good	90
FR-PUR	Yes	No	Excellent	Excellent	Good	Good	Fair	Good	Good	Good	75

Sheath identification: Black sheath (Ultraviolet – UV stabilised) – standard type instrumentation cable to UL Style 2464  
Blue sheath – instrumentation cable for intrinsically safe circuit to AS 2381.7

Core identification to UL Style 2464: Pair element: Black, White, and all cores numbered  
Triple element: Black, White, Red, and all cores numbered

## ● Operating temperature

Minimum conductor continuous operating temperature:	-25°C	Permanent continuous conductor operating Temperature:	75°C
Maximum conductor operating temperature:	90°C	Short circuit temperature for 5 sec:	160°C

--The maximum conductor temperature specified is based on the properties of the insulation material but in practice may need to be derated to take account of joints and terminations and environmental conditions.

--The cables should not be flexed when either the ambient or cable temperature is below 0°C

--Thermoplastic PVC 90°C insulation is subject to deformation at temperature above 75°C.



# MACHLINK INSTRUMENTATION CABLE

## Physical & electrical properties

### 1. Type 110 instrumentation cable (black sheath)\*:

Test voltage: In-process spark test - 4500V and A.C withstand voltage test - 1500V  
 Rated voltage: Max. 300V a.c.  
 Nominal voltage:  $\leq 110V$  a.c. / 150V d.c.

Nominal CSA	Nominal conductor diameter	Maximum conductor Resistance @ 20°C	Approximate current carrying capacity	Fault Current for 1 sec	Insulation Resistance @20°C	Max. capacitance Cond. to Cond. (screened)	Max. capacitance Cond. to Scr. (screened)	Max. capacitance Cond. to Cond. (unscreened)
0.50 mm <sup>2</sup>	0.87 mm	38.4/km	2 ~ 3.5 A	70 A	140M $\Omega$ .km	145pF/m	240pF/m	82pF/m
0.75 mm <sup>2</sup>	1.08 mm	24.5/km	3 ~ 7.5 A	105 A	140M $\Omega$ .km	-	-	89pF/m
1.00 mm <sup>2</sup>	1.14 mm	18.1/km	4 ~ 10 A	140 A	140M $\Omega$ .km	-	-	98pF/m
1.50 mm <sup>2</sup>	1.47 mm	13.6/km	5 ~ 13.1 A	210 A	140M $\Omega$ .km	200pF/m	300pF/m	110pF/m

Nominal CSA	Cross talk attenuation between pairs @ 1kHz (screened)	Cross talk attenuation between pairs @ 1kHz (unscreened)	Attenuation of pairs @1kHz between 600 $\Omega$ terminations (unscreened)	Attenuation of pairs @1kHz between 600 $\Omega$ terminations (screened)	Characteristic impedance @ 1kHz (screened)	Characteristic impedance @ 1kHz (unscreened)	Inductance @ 1kHz	L/R ratio @1kHz
0.50 mm <sup>2</sup>	> 125dB/100m	> 90dB/100m	0.09dB/100m	0.11dB/100m	300 $\Omega$	380 $\Omega$	1.00mH/km	13.7 $\mu$ H/ $\Omega$
0.75 mm <sup>2</sup>	> 125dB/100m	> 90dB/100m	0.09dB/100m	-	-	313 $\Omega$	0.98mH/km	20.0 $\mu$ H/ $\Omega$
1.00 mm <sup>2</sup>	> 125dB/100m	> 90dB/100m	0.08dB/100m	-	-	255 $\Omega$	0.97mH/km	27.7 $\mu$ H/ $\Omega$
1.50 mm <sup>2</sup>	> 125dB/100m	> 90dB/100m	0.08dB/100m	0.09 dB/100m	150 $\Omega$	200 $\Omega$	0.95mH/km	36.5 $\mu$ H/ $\Omega$

\*Type 110 blue sheath instrumentation cable for intrinsically safe circuits operates at EXTRA LOW VOLTAGE (<32V a.c. / 115V d.c) complying with the electrical requirements of AS2380.7 and AS2381.7 can be supplied upon request, subjects to minimum order quantities.

### 2. Type 600 Instrumentation cable for intrinsically safe circuits operates at low voltage (blue sheath):

Test voltage: In-process spark test - 6000V / A.C withstand voltage test - 2000V  
 Rated voltage: Max. 600V a.c.  
 Intrinsically safe circuits operating voltage:  $\leq 250V$  a.c.

Nominal CSA	Max. conductor resistance @ 20°C	Max. current carrying capacity	Insulation resistance @20°C	Max. capacitance Cond to Cond (screened)	Max. capacitance Cond to Scrn. (screened)
0.50 mm <sup>2</sup>	38.4/km	3A	140M $\Omega$ .km	16nF/100m	26nF/100m
1.50 mm <sup>2</sup>	13.6/km	13A	140M $\Omega$ .km	16nF/100m	26nF/100m

--WW MACHLINK instrumentation cables are not to be regarded as power cables or for the direct connection of equipment to main power supplies or low impedance source.

## Mechanical properties

### Cable minimum bending radius (approximate):

The recommended bending radius is as follow:

Minimum Bending Radius: Unarmoured cable: 9 x Cable Outer Diameter (during installation)  
 6 x Cable Outer Diameter (after installation)  
 Armoured cable: 18 x Cable Outer Diameter (during installation)  
 12 x Cable Outer Diameter (after installation)

### Cable maximum pulling tension (approximate):

- The safety pulling tension is limited to 65~70N/mm<sup>2</sup> of the total cross-sectional area of conductor.

Example: 2 pair 0.5mm<sup>2</sup>, total cross-sectional area = 2 x 2 x 0.5 = 2mm<sup>2</sup>

Ts = 2mm<sup>2</sup> x 70N/mm<sup>2</sup> = 140N

- For dragging the cable, the safety pulling tension should be calculated by  $T = L \times W \times f \times 10$ , where T is the pulling tension, L is the length of cable to be pulled (m), W is the weight of the cable (kg/m), f is the friction coefficient (usually take as 0.5).

- For pulling by armour, the pulling tension should be limited to 130N/mm<sup>2</sup> of the total cross-sectional area of steel wires.

Ta = Number of wires x  $\pi$  x (wires diameter <sup>2</sup>) x 0.25 x 130



# MACHLINK INSTRUMENTATION CABLE

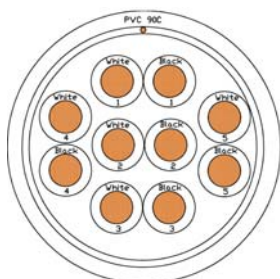
## -- Type 110 Standard Instrumentation Cables (Black Sheath):

Nominal voltage:

≤ 110V a.c. / 150V d.c.

### ● Overall Screened, Pairs

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Pairs	Cable Diameter mm	Approximate Weight kg/100m	Standard Sheath Identification
0.5 (20) (7/0.30mm)	5201	1	5.71	4.1	Black
	5202	2	7.25	6.0	Black
	5203	3	7.67	7.5	Black
	5204	4	8.35	9.1	Black
	5206	6	10.07	12.8	Black
	5208	8	11.45	16.5	Black
	5210	10	13.30	21.1	Black
	5212	12	13.72	23.9	Black
	5216	16	15.93	32.9	Black
	5218	18	16.72	36.1	Black
	5220	20	17.99	41.0	Black
	5224	24	19.74	47.8	Black
	5236	36	22.77	67.7	Black
5251	50	25.79	88.7	Black	
1.5 (16) (7/0.50mm)	5001	1	7.33	7.0	Black
	5002	2	9.57	11.3	Black
	5003	3	10.14	14.9	Black
	5004	4	11.27	19.0	Black
	5006	6	13.55	27.1	Black
	5008	8	15.36	35.1	Black
	5010	10	17.34	42.7	Black
	5012	12	17.91	49.3	Black
	5016	16	20.04	64.1	Black
	5018	18	21.12	71.1	Black
	5020	20	22.70	80.3	Black
	5024	24	25.10	94.7	Black
	5036	36	29.09	137.8	Black
5050	50	33.21	185.2	Black	
0.75 (18) (24/0.2mm)	5601	1	5.36	4.0	Black
	5602	2	8.02	7.5	Black
	5603	3	8.50	10.0	Black
1.00 (18) (7/0.40mm)	5101	1	5.5	4.2	Black
	5102	2	8.2	7.9	Black
	5103	3	8.7	10.4	Black

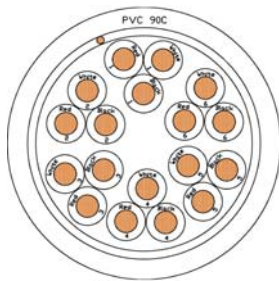
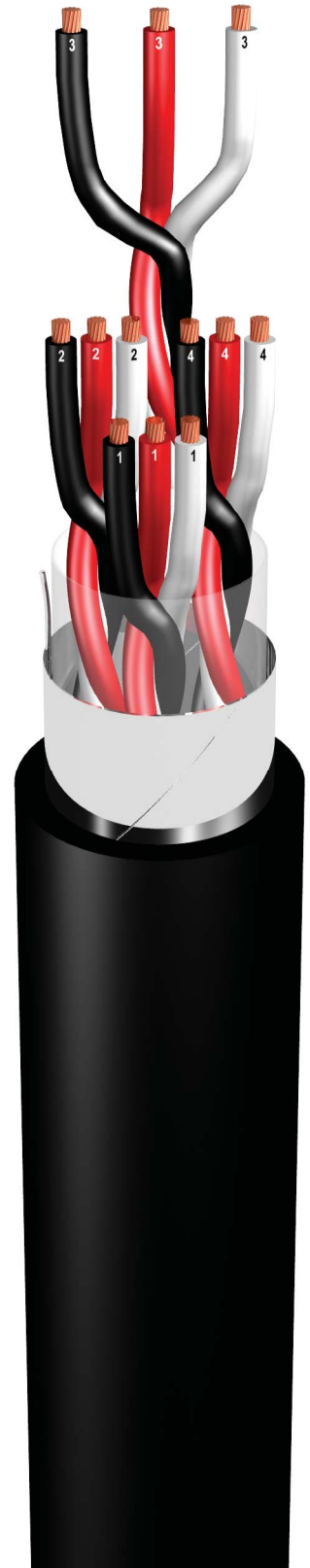


# MACHLINK INSTRUMENTATION CABLE

## -- Type 110 Standard Instrumentation Cables (Black Sheath)

### ● Overall Screened, Triads

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Triads	Cable Diameter mm	Approximate Weight kg/100m	Standard Sheath Identification
0.5 (20) (7/0.30mm)	5303	1	5.3	4.3	Black
	5304	2	7.9	7.8	Black
	5305	3	8.3	10.0	Black
	5306	4	9.3	12.8	Black
	5307	6	11.0	17.6	Black
	5308	8	12.9	24.0	Black
	5309	10	14.5	29.1	Black
	5310	12	15.0	33.4	Black
	5311	16	16.6	42.4	Black
	5312	18	18.2	50.2	Black
	5314	20	19.2	55.0	Black
	5316	24	22.0	68.6	Black
	5317	36	24.9	95.5	Black
1.5 (16) (7/0.50mm)	5403	1	7.0	8.2	Black
	5404	2	10.3	15.2	Black
	5406	3	11.0	20.3	Black
	5407	4	12.2	26.2	Black
	5408	6	14.7	37.8	Black
	5409	8	16.5	48.5	Black
	5410	10	19.5	63.0	Black
	5411	12	20.1	73.0	Black
	5412	16	23.0	98.0	Black
	5414	18	24.2	108.8	Black
	5416	20	25.5	119.6	Black
	5417	24	28.2	141.4	Black
	5418	36	32.1	202.7	Black

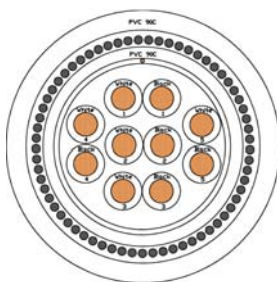


# MACHLINK INSTRUMENTATION CABLE

## -- Type 110 Standard Instrumentation Cables (Black Sheath)

### ● Overall Screened, Armoured, Pairs

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Pairs	Over bedding diameter mm	Cable Diameter mm	Approximate Weight kg/100m	Standard Sheath Identification
0.5 (20) (7/0.30mm)	5531	1	5.78	10.98	19.77	Black
	5532	2	7.85	12.85	24.63	Black
	5533	4	8.95	14.15	30.40	Black
	5534	6	10.47	15.67	36.07	Black
	5535	8	11.65	17.05	43.04	Black
	5530	10	13.10	18.90	53.47	Black
	5536	12	13.72	19.92	57.07	Black
	5537	16	15.13	22.33	76.63	Black
	5540	20	17.19	23.99	89.93	Black
	5538	24	18.94	25.74	101.89	Black
	5539	36	21.97	29.57	136.59	Black
	5541	50	24.99	32.59	165.83	Black
	1.5 (16) (7/0.50mm)	5501	1	6.88	12.08	23.88
5502		2	9.77	14.97	33.30	Black
5504		4	11.47	16.87	45.53	Black
5506		6	13.55	19.45	62.35	Black
5508		8	15.16	21.06	73.00	Black
5510		10	17.14	24.34	94.06	Black
5512		12	17.71	25.31	107.54	Black
5516		16	19.64	27.64	128.26	Black
5520		20	21.90	29.90	149.18	Black
5524		24	24.30	32.30	170.20	Black
5556		36	28.29	36.29	249.74	Black
5550		50	32.41	40.41	312.46	Black

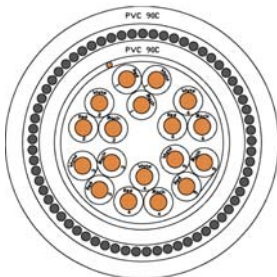


# MACHLINK INSTRUMENTATION CABLE

## -- Type 110 Standard Instrumentation Cables (Black Sheath)

### ● Overall Screened, Armoured, Triads

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Triads	Over bedding diameter mm	Cable Diameter mm	Approximate Weight kg/100m	Standard Sheath Identification
0.5 (20) (7/0.30mm)	5420	1	5.83	9.63	17.34	Black
	5423	2	8.05	12.65	24.21	Black
	5433	3	8.70	13.90	27.73	Black
	5443	4	9.44	15.04	34.76	Black
	5463	6	11.08	17.58	44.94	Black
	5448	8	12.35	18.85	53.09	Black
	5413	10	13.70	20.20	59.91	Black
	5449	12	14.56	22.16	75.67	Black
	5450	16	16.08	23.68	88.78	Black
	5451	20	18.66	26.26	108.30	Black
	5452	24	20.56	28.16	123.41	Black
	5453	36	23.78	32.18	176.75	Black
	1.5 (16) (7/0.50mm)	5405	1	7.02	10.82	22.46
5425		2	10.12	14.72	34.11	Black
5435		3	11.14	16.34	41.60	Black
5445		4	12.14	18.64	55.90	Black
5465		6	14.38	21.68	74.31	Black
5485		8	16.12	23.42	88.60	Black
5415		10	18.24	26.64	115.22	Black
5486		12	18.86	27.26	126.64	Black
5487		16	20.94	29.34	152.94	Black
5488		20	23.77	32.17	216.84	Black
5489		24	27.16	35.96	260.45	Black
5490		36	31.02	40.62	360.03	Black

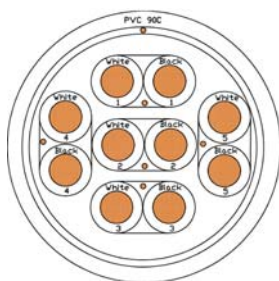


# MACHLINK INSTRUMENTATION CABLE

## -- Type 110 Standard Instrumentation Cables (Black Sheath)

### ● Individually Screened & Overall Screened, Pairs

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Pairs	Cable Diameter mm	Approximate Weight kg/100m	Standard Sheath Identification
0.5 (20) (7/0.30mm)	5702	2	8.3	7.9	Black
	5703	3	8.8	9.8	Black
	5704	4	9.5	11.9	Black
	5706	6	11.2	16.1	Black
	5708	8	12.5	20.0	Black
	5710	10	14.5	25.5	Black
	5712	12	15.3	30.4	Black
	5716	16	17.1	38.1	Black
	5718	18	17.9	42.8	Black
	5720	20	18.9	46.8	Black
	5724	24	21.2	56.7	Black
	5737	36	24.4	80.9	Black
	5750	50	27.7	106.8	Black
1.5 (16) (7/0.50mm)	5732	2	10.2	12.7	Black
	5733	3	10.9	16.5	Black
	5734	4	12.1	21.1	Black
	5736	6	14.3	29.4	Black
	5738	8	16.2	38.2	Black
	5730	10	18.7	48.2	Black
	5740	12	19.3	55.6	Black
	5742	16	21.6	71.9	Black
	5748	18	22.7	79.8	Black
	5743	20	24.4	89.9	Black
	5744	24	26.9	106.0	Black
	5746	36	31.2	153.7	Black
	5749	50	36.0	209.6	Black



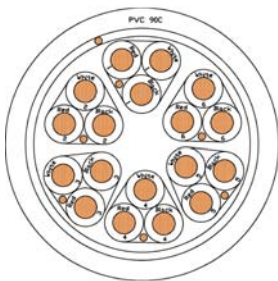
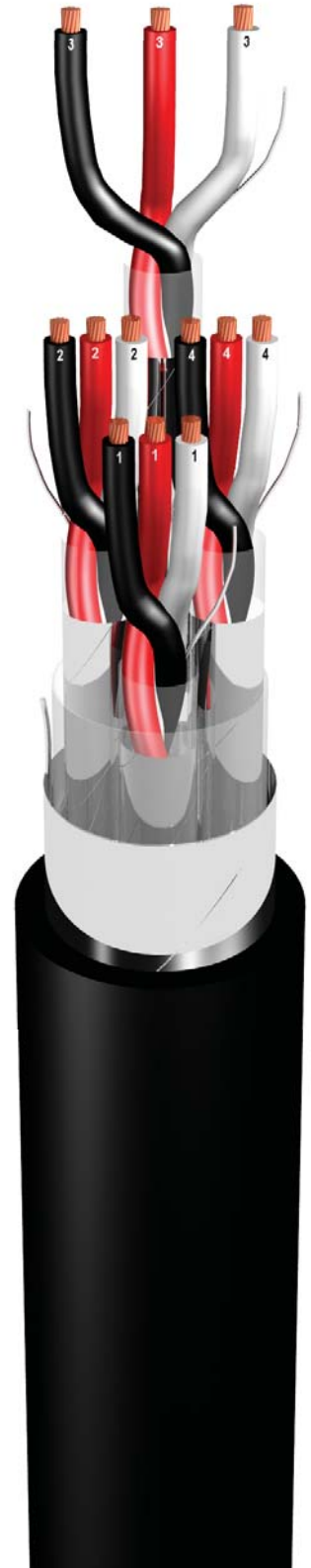


# MACHLINK INSTRUMENTATION CABLE

## -- Type 110 Standard Instrumentation Cables (Black Sheath)

### ● Individually Screened & Overall Screened, Triads

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Triads	Cable Diameter mm	Approximate Weight kg/100m	Standard Sheath Identification
0.5 (20) (7/0.30mm)	5110	2	10.0	11.7	Black
	5111	4	11.4	17.7	Black
	5112	6	13.5	24.3	Black
	5113	8	15.0	30.6	Black
	5114	10	16.9	37.2	Black
	5115	12	17.5	42.5	Black
	5116	16	19.4	53.9	Black
	5117	18	20.4	59.8	Black
	5118	20	21.6	65.8	Black
	5119	24	23.9	78.1	Black
5120	36	27.4	110.6	Black	
1.5 (16) (7/0.50mm)	5121	2	12.2	19.3	Black
	5122	4	14.1	31.4	Black
	5123	6	16.8	44.4	Black
	5124	8	18.8	56.9	Black
	5125	10	21.4	70.1	Black
	5126	12	22.1	81.2	Black
	5127	16	24.6	104.8	Black
	5128	18	25.9	116.8	Black
	5129	20	27.5	129.1	Black
	5130	24	30.5	153.9	Black
	5131	36	35.1	222.2	Black

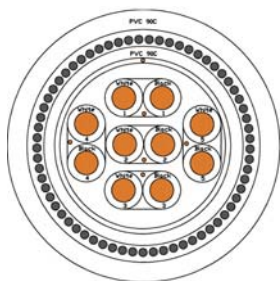


# MACHLINK INSTRUMENTATION CABLE

## -- Type 110 Standard Instrumentation Cables (Black Sheath)

### ● Individually Screened & Overall Screened, Armoured, Pairs

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Pairs	Over bedding diameter mm	Cable Diameter mm	Approximate Weight kg/100m	Standard Sheath Identification
0.5 (20) (7/0.30mm)	5960	2	8.49	13.49	27.7	Black
	5961	4	9.72	14.72	33.4	Black
	5962	6	11.43	17.33	48.1	Black
	5963	8	12.76	18.66	55.5	Black
	5964	10	14.38	20.28	63.0	Black
	5965	12	15.05	21.55	68.1	Black
	5966	16	16.64	23.84	88.5	Black
	5967	20	18.69	25.89	102.6	Black
	5968	24	20.66	28.66	129.7	Black
	5969	36	23.61	31.61	161.9	Black
5970	50	26.99	35.19	202.1	Black	
1.5 (16) (7/0.50mm)	5902	2	10.61	16.51	43.51	Black
	5904	4	12.25	18.75	54.82	Black
	5906	6	14.51	21.01	68.23	Black
	5909	8	16.27	23.47	88.72	Black
	5910	10	18.42	25.62	103.90	Black
	5912	12	19.04	26.64	112.57	Black
	5916	16	21.15	29.15	139.53	Black
	5920	20	23.81	32.21	164.72	Black
	5924	24	26.42	35.22	197.12	Black
	5936	36	30.33	39.13	254.07	Black
5950	50	34.82	44.02	331.90	Black	

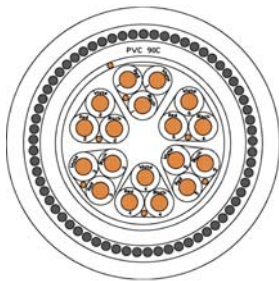


# MACHLINK INSTRUMENTATION CABLE

## -- Type 110 Standard Instrumentation Cables (Black Sheath)

### ● Individually Screened & Overall Screened, Armoured, Triads

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Triads	Over bedding diameter mm	Cable Diameter mm	Approximate Weight kg/100m	Standard Sheath Identification
0.5 (20) (7/0.30mm)	5332	2	9.10	14.30	32.18	Black
	5333	3	9.82	15.02	36.57	Black
	5343	4	11.06	16.46	40.75	Black
	5363	6	12.95	18.95	55.30	Black
	5383	8	14.41	21.21	66.08	Black
	5313	10	16.60	23.40	78.21	Black
	5384	12	17.12	25.12	95.46	Black
	5385	16	18.87	26.87	111.72	Black
	5386	20	20.92	28.92	128.23	Black
	5387	24	23.10	32.50	160.40	Black
1.5 (16) (7/0.50mm)	5334	2	10.97	16.17	41.52	Black
	5335	3	12.05	18.55	56.77	Black
	5345	4	13.57	19.67	65.11	Black
	5346	6	16.05	23.65	93.37	Black
	5348	8	17.98	25.18	104.46	Black
	5315	10	20.33	27.53	121.67	Black
	5349	12	21.42	29.42	144.75	Black
	5351	16	23.73	32.33	172.57	Black
	5352	20	26.43	35.03	202.09	Black
	5353	24	29.30	39.10	261.50	Black
5354	36	33.98	43.78	386.19	Black	



# MACHLINK INSTRUMENTATION CABLE

## --Type 600 Intrinsically Safe Instrumentation Cables (Blue Sheath):

Test voltage:

In-process spark test - 6000V and A.C withstand voltage test - 2000V

Insulation rated level:

Max. 600V a.c

Intrinsically safe circuits operating voltage:

≤250V a.c.

### ● Overall Screened, Pairs

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Pairs	Cable Diameter mm	Approximate Weight kg/100m
0.5 (20) (7/0.30mm)	5801	1	6.4	4.8
	5802	2	9.2	8.2
	5803	3	9.7	10.7
	5804	4	10.7	13.1
	5806	6	13.0	18.7
	5812	12	17.7	35.2
	5816	16	19.6	44.4
	5824	24	25.1	67.8
1.5 (16) (7/0.50mm)	5901	1	7.7	7.7
	5990	2	11.5	14.6
	5991	3	12.6	20.5
	5992	4	13.8	25.4
	5993	6	16.8	37.0
	5908	8	18.9	46.8
	5994	12	22.1	65.7
	5995	16	25.0	86.3
	5996	24	30.9	124.2

### ● Overall Screened, Armoured, Pairs

Nominal Area mm <sup>2</sup> (AWG)	Product Code	No. of Pairs	Over bedding diameter mm	Cable Diameter mm	Approximate Weight kg/100m
1.5 (16) (7/0.50mm)	5611	1	8.48	13.68	30.38
	5612	2	12.53	18.93	56.10
	5613	4	14.57	21.37	74.25

