



PROTOLON(M) R-(N)

Medium Voltage Reeling Cable

ENERGY



Technical Data

	Type	PROTOLON (M)-R
	Type designation	R-(N)
	Approvals/ standards	Based on DIN VDE 0250 Part 813 MSHA P-189-4
	Application (refer also to DIN VDE 0298, Part 3)	For connection of large material handling machines such as excavators, dumpers, mobile crusher in open-cast mines. Flexible MV reeling cable suitable for high mechanical stresses in conjunction with mono spiral reels and cylindrical reels.
Electrical parameters	Rated voltage	$U_0/U = 3.6/6 \text{ kV to } 18/30 \text{ kV}$
	Maximum permissible operating voltage in AC systems	$U_0/U = 4.2/7.2 \text{ kV to } 20.8/36 \text{ kV}$
	Maximum permissible operating voltage in DC systems	$U_0/U = 5.4/10.8 \text{ kV to } 27/54 \text{ kV}$
	AC test voltage	11 kV to 43 kV according to DIN VDE 0250, Part 813
	Current-carrying capacity	According to DIN VDE 0298, Part 4
Thermal parameters	Ambient temperature	
	- Fully flexible operation	-25 °C to +60 °C
	- Fixed installation	-40 °C to +80 °C
	Maximum permissible operating temperature of the conductor	90 °C
	Short-circuit temperature of the conductor	250 °C
Mechanical parameters	Tensile load	Up to 20 N/mm ²
	Torsional stresses	+/- 100°/m
	Minimum bending radii	According to DIN VDE 0298, Part 3
	Minimum distance with S-type directional changes	20 x D
	Travel speed	
	- In operation	Up to 60 m/min
	- On rewinding	Up to 100 m/min
	Additional tests	Reversed bending test, torsional stress test, roller bending test (type C)
Chemical parameters	Resistance to oil and brine	Given to DIN VDE 0473, Part 811-2-1, Para. 10 EN 60811-2-1, IEC 60811-2-1
	Behaviour in case of fire	VDE 0482, Part 332-1-2, EN 60332-1-2, IEC 60332-1-2
	Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone, UV and moisture

Technical Data

Note on installation

Termination with sealing ends

Suitable material sets for self-assembly

Termination of fibre-optics requires special skills and use elaborate tools. It is therefore recommended that performance of this work be entrusted to our customer service. (Assembly at works)
Please give the connection dimensions.



Version Illustrated

Design features

Type	PROTOLON (M)-R
Conductor (refer also to DIN VDE 0295)	Electrolytic copper, not tinned, very finely stranded, class FS
Insulation (refer also to DIN VDE 0207, Part 20)	PROTOLON, basic material EPR, compound type: special compound
Electrical field control	Inner and outer semiconductive layer of semiconductive rubber
Core identification	Natural colouring with black semiconductive rubber on which white digits 1 to 3 are printed
Core Arrangement	Three main conductors laid-up, with protective-earth conductor split into 3 in the outer interstices
Inner sheath (refer also to DIN VDE 0207, Part 21)	Basic material: EPR, compound type: special compound
Anti-torsion braid	Braid of polyester threads in a vulcanized bond between inner and outer sheath
Outer sheath (refer also to DIN VDE 0207, Part 21)	Basic material: PCP, compound type: special compound, colour: red
Marking	(Year of manufacture) (serial number) PROTOLON (M) R-(N)xxxxxxx (number of cores) x (cross-section) (rated voltage)

Selection and ordering data

Number of cores and nominal cross-section	Conductor diameter (guidance value) Max. value	Overall diameter of cable (guidance value) Min. value	Overall diameter of cable (guidance value) Max. value	Conductor resistance at 20 °C	Inductance per unit length	Operating capacitance per unit length	Current carrying capacity at 30 °C	Permissible short-circuit current (1s)	Approx. net weight for 1000 m	Maximum permissible tensile force
[mm ²]	[mm]	[mm]	[mm]	[Ohm/km]	[mH/km]	[μF/km]	[A]	[kA]	[kg]	[N]

3,6/6 kV R-(N)

3x 25+2x25/2+1x10	7,10	36,3	39,3	0,780	0,31	0,37	131	3,58	2215	1500
3x 25+2x25+1x10	7,10	40,2	43,2	0,780	0,35	0,37	131	3,58	2763	1500
3x 35+2x25/2+1x10	8,35	40,1	43,1	0,554	0,30	0,43	162	5,01	2767	2100
3x 35+2x25/2+1x10	8,35	42,4	45,4	0,554	0,32	0,43	162	5,01	3169	2100
3x 50+2x25/2+1x10	10,05	43,8	46,8	0,386	0,28	0,49	202	7,15	3439	3000
3x 50+2x25+1x10	10,05	45,5	48,5	0,386	0,30	0,49	202	7,15	3630	3000
3x 70+2x35/2+1x10	11,80	47,5	50,5	0,272	0,27	0,55	250	10,01	4382	4200
3x 70+2x25+1x10	11,80	47,5	50,5	0,272	0,27	0,55	250	10,01	4495	4200
3x 95+2x25+1x10	13,80	52,7	56,7	0,206	0,26	0,63	301	13,60	5635	5700
3x120+2x35+1x16	15,50	56,8	60,8	0,161	0,25	0,70	352	17,16	6782	7200
3x150+2x95/2+1x16	17,40	61,9	65,9	0,129	0,25	0,76	404	21,45	8180	9000
3x185+2x60+1x16	19,20	65,8	69,8	0,106	0,24	0,82	462	26,46	9620	11100
3x240+2x60+1x16	22,10	73,2	77,2	0,080	0,24	0,93	540	34,32	12374	14400
3x300+2x70+1x16	24,70	78,9	82,9	0,064	0,23	1,03	620	42,90	14901	18000

6/10 kV R-(N)

3x 25+2x25/2+1x10	7,10	38,6	41,6	0,780	0,32	0,33	131	3,58	2416	1500
3x 25+2x25/2+1x10	7,10	41,5	44,5	0,780	0,32	0,33	131	3,58	2854	1500
3x 35+2x25/2+1x10	8,35	41,4	44,4	0,554	0,31	0,38	162	5,01	2881	2100
3x 35+2x25/2+1x10	8,35	43,1	46,1	0,554	0,31	0,38	162	5,01	3234	2100
3x 50+2x25/2+1x10	10,05	45,1	48,1	0,386	0,29	0,43	202	7,15	3560	3000
3x 50+2x25+1x10	10,05	45,1	48,1	0,386	0,29	0,43	202	7,15	3745	3000
3x 70+2x35/2+1x10	11,80	49,7	53,7	0,272	0,28	0,49	250	10,01	4667	4200
3x 70+2x25+1x10	11,80	51,4	55,4	0,272	0,28	0,49	250	10,01	4780	4200
3x 95+2x25+1x10	13,80	54,0	58,0	0,206	0,27	0,56	301	13,60	5810	5700
3x 120+2x35+1x16	15,50	58,1	62,1	0,161	0,26	0,62	352	17,16	7037	7200
3x 150+2x35+1x16	17,40	63,2	67,2	0,129	0,25	0,67	404	21,45	8350	9000
3x185+2x95/2+1x16	19,20	67,1	71,1	0,106	0,25	0,73	462	26,46	9864	11100
3x240+2x60+1x16	22,10	74,6	78,6	0,080	0,24	0,82	540	34,32	12570	14400
3x300+2x70+1x16	24,70	80,2	84,2	0,064	0,24	0,91	620	42,90	15114	18000

Selection and ordering data

Number of cores and nominal cross-section	Conductor diameter	Overall diameter of cable	Overall diameter of cable	Conductor resistance at 20 °C	Inductance per unit length	Operating capacitance per unit length	Current carrying capacity at 30 °C	Permissible short-circuit current (1s)	Approx. net weight for 1000 m	Maximum permissible tensile force
	(guidance value)	(guidance value)	(guidance value)							
	Max. value	Min. value	Max. value							
[mm ²]	[mm]	[mm]	[mm]	[Ohm/km]	[mH/km]	[μF/km]	[A]	[kA]	[kg]	[N]

8,7/15 kV R-(N)

3x 25+2x25/2+1x10	7,10	42,1	45,1	0,780	0,34	0,26	139	3,58	2707	1500
3x 25+2x25+1x10	7,10	43,8	46,8	0,780	0,34	0,26	139	3,58	3062	1500
3x 35+2x25/2+1x10	8,35	44,9	47,9	0,554	0,33	0,31	172	5,01	3198	2100
3x 35+2x25+1x10	8,35	44,9	47,9	0,554	0,33	0,31	172	5,01	3382	2100
3x 50+2x25/2+1x10	10,05	49,5	53,5	0,386	0,31	0,35	215	7,15	4083	3000
3x 50+2x25+1x10	10,05	49,5	53,5	0,386	0,31	0,35	215	7,15	4267	3000
3x 70+2x35/2+1x10	11,80	53,1	57,1	0,272	0,30	0,38	265	10,01	5028	4200
3x 70+2x25+1x10	11,80	53,1	57,1	0,272	0,30	0,38	265	10,01	5303	4200
3x 95+2x25+1x10	13,80	57,3	61,3	0,206	0,28	0,43	319	13,60	6216	5700
3x 120+2x35+1x16	15,50	63,0	67,0	0,161	0,27	0,48	371	17,16	7673	7200
3x 150+2x35+1x16	17,40	66,6	70,6	0,129	0,27	0,53	428	21,45	8852	9000
3x185+2x95/2+1x16	19,20	70,5	74,5	0,106	0,26	0,57	488	26,46	10351	11100
3x240+2x60+1x16	22,10	78,0	82,0	0,080	0,25	0,64	574	34,32	13125	14400
3x300+2x70+1x16	24,70	84,9	89,9	0,064	0,25	0,70	665	42,90	16020	18000

12/20 kV R-(N)

3x 25+2x25/2+1x10	7,10	45,1	48,1	0,780	0,36	0,23	139	3,58	2982	1500
3x 25+2x25/3+1x10	7,10	45,1	48,1	0,780	0,36	0,23	139	3,58	3167	1500
3x 35+2x25/2+1x10	8,35	47,9	50,9	0,554	0,34	0,26	172	5,01	3511	2100
3x 35+2x25/2+1x10	8,35	47,9	50,9	0,554	0,34	0,26	172	5,01	3694	2100
3x 50+2x25/2+1x10	10,05	52,5	56,5	0,386	0,32	0,30	215	7,15	4399	3000
3x 50+2x25+1x10	10,05	52,5	56,5	0,386	0,32	0,30	215	7,15	4583	3000
3x 70+2x35/2+1x10	11,80	56,2	60,2	0,272	0,31	0,33	265	10,01	5411	4200
3x 70+2x25+1x10	11,80	56,2	60,2	0,272	0,31	0,33	265	10,01	5684	4200
3x 95+2x25+1x10	13,80	61,9	65,9	0,206	0,30	0,37	319	13,60	6783	5700
3x 120+2x35+1x16	15,50	66,0	70,0	0,161	0,29	0,41	371	17,16	8068	7200
3x 150+2x35+1x16	17,40	69,7	73,7	0,129	0,28	0,44	428	21,45	9323	9000
3x185+2x95/2+1x16	19,20	75,0	79,0	0,106	0,27	0,48	488	26,46	11025	11100
3x240+2x60+1x16	22,10	81,0	85,0	0,080	0,26	0,54	574	34,32	13657	14400
3x300+2x70+1x16	24,70	87,9	92,9	0,064	0,26	0,59	665	42,90	16571	18000

Selection and ordering data

Number of cores and nominal cross-section	Conductor diameter (guidance value) Max. value	Overall diameter of cable (guidance value) Min. value	Overall diameter of cable (guidance value) Max. value	Conductor resistance at 20 °C	Inductance per unit length	Operating capacitance per unit length	Current carrying capacity at 30 °C	Permissible short-circuit current (1s)	Approx. net weight for 1000 m	Maximum permissible tensile force
[mm ²]	[mm]	[mm]	[mm]	[Ohm/km]	[mH/km]	[μF/km]	[A]	[kA]	[kg]	[N]

14/25 kV R-(N)

3x 25+2x25/2+1x10	7,10	49,9	53,9	0,780	0,38	0,20	139	3,58	3542	1500
3x 25+2x25/2+1x10	7,10	49,9	53,9	0,780	0,38	0,20	139	3,58	3726	1500
3x 35+2x25/2+1x10	8,35	52,7	56,7	0,554	0,36	0,22	172	5,01	4075	2100
3x 35+2x25+1x10	8,35	52,7	56,7	0,554	0,36	0,22	172	5,01	4258	2100
3x 50+2x25/2+1x10	10,05	56,4	60,4	0,386	0,34	0,26	215	7,15	4872	3000
3x 50+2x50/2+1x10	10,05	56,4	60,4	0,386	0,34	0,26	215	7,15	5054	3000
3x 70+2x35/2+1x10	11,80	61,5	65,5	0,272	0,32	0,28	265	10,01	6083	4200
3x 70+2x25+1x10	11,80	61,5	65,5	0,272	0,32	0,28	265	10,01	6356	4200
3x 95+2x25+1x10	13,80	65,8	69,8	0,206	0,31	0,31	319	13,60	7303	5700
3x 120+2x35+1x16	15,80	69,9	73,9	0,161	0,30	0,35	371	17,16	8652	7200
3x 150+2x35+1x16	17,40	75,0	79,0	0,129	0,29	0,37	428	21,45	10139	9000
3x185+2x95/2+1x16	19,20	78,9	82,9	0,106	0,28	0,40	488	26,46	11705	11100
3x 240+2x60+1x16	22,10	86,2	91,2	0,080	0,27	0,45	574	34,32	14670	14400
3x 300+2x70+1x16	24,70	91,8	96,8	0,064	0,27	0,49	665	42,90	17332	18000

18/30 kV R-(N)

3x 25+2x25/2+1x10	7,10	53,4	57,4	0,780	0,40	0,18	139	3,58	3919	1500
3x 25+2x25+1x10	7,10	53,4	57,4	0,780	0,40	0,18	139	3,58	4101	1500
3x 35+2x25/2+1x10	8,35	56,2	60,2	0,554	0,38	0,20	172	5,01	4503	2100
3x 35+2x25+1x10	8,35	56,2	60,2	0,554	0,38	0,20	172	5,01	4684	2100
3x 50+2x25/2+1x10	10,05	61,2	65,2	0,386	0,35	0,22	215	7,15	5482	3000
3x 50+2x25+1x10	10,05	61,2	65,2	0,386	0,35	0,22	215	7,15	5662	3000
3x 70+2x35/2+1x10	11,80	64,9	68,9	0,272	0,34	0,25	265	10,01	6531	4200
3x 70+2x25+1x10	11,80	64,9	68,9	0,272	0,34	0,25	265	10,01	6660	4200
3x 95+2x25+1x10	13,80	69,2	73,2	0,206	0,32	0,28	319	13,60	7807	5700
3x 120+2x35+1x16	15,50	74,7	78,7	0,161	0,31	0,31	371	17,16	9364	7200
3x 150+2x35+1x16	17,40	78,4	82,4	0,129	0,30	0,33	428	21,45	10710	9000
3x185+2x95/2+1x16	19,20	83,6	88,6	0,106	0,29	0,36	488	26,46	12609	11100
3x240+2x60+1x16	22,10	89,7	94,7	0,080	0,28	0,39	574	34,32	15344	14400
3x 300+2x70+1x10	24,70	96,3	101,3	0,064	0,27	0,43	665	42,90	18241	18000