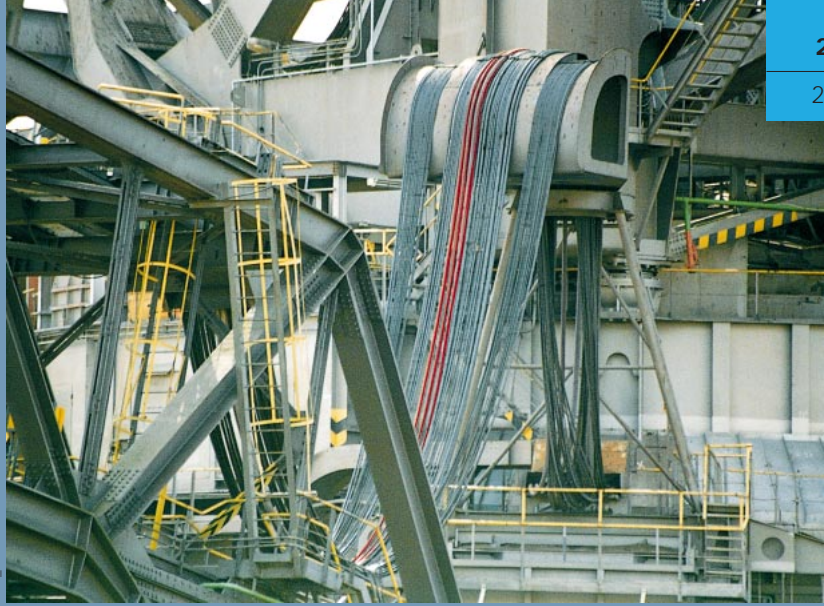


# PROTOLON (M) Medium-Voltage Flexible Cables for Fixed Installation with and without Fibre-Optics



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### Selection and dimensioning criteria

Refer to Section 4 for further details



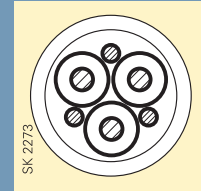
	Type	<b>PROTOLON (M)</b>	<b>PROTOLON (M)-LWL</b>			Page	4/2
	Type designation	F-(N)TSCGEWÖU	F-(N)TSCGEWÖU			Page	4/3
	Approvals/standards	Based on DIN VDE 0250, Part 813 MSHA P-189-4	Based on DIN VDE 0250, Part 813 MSHA P-189-4			Page	4/4
	Application (refer also to DIN VDE 0298, Part 3)	For laying alongside the conveyor belts (also for shiftable units) and on material handling equipment (even with continuous move- ment such as in cable booms or as connection between upper and lower car) and for connection of submersible pump units				Page	4/6
<b>Electrical parameters</b>	Rated voltage	$U_0/U = 3.6/6$ kV to 18/30 kV	$U_0/U = 3.6/6$ kV to 18/30 kV			Pages to	4/14
	Maximum permissible operating voltage in AC systems	$U_0/U = 4.2/7.2$ kV to 20.8/36 kV	$U_0/U = 4.2/7.2$ kV to 20.8/36 kV				4/17
	Maximum permissible operating voltage in DC systems	$U_0/U = 5.4/10.8$ kV to 27/54 kV	$U_0/U = 5.4/10.8$ kV to 27/54 kV				
	AC test voltage	11 kV to 43 kV according to DIN VDE 0250, Part 813	11 kV to 43 kV according to DIN VDE 0250, Part 813				
	Current-carrying capacity	According to DIN VDE 0298, Part 4	According to DIN VDE 0298, Part 4				
<b>Optical parameters</b>	Transmission data of the fibre-optics		G50/125	G62.5/125	E9/125	Page	4/5
	Attenuation at wavelength 850 nm		≤2.8 dB/km	≤3.3 dB/km	–		
	Attenuation at wavelength 1300 nm		≤0.8 dB/km	≤0.9 dB/km	≤0.4 dB/km		
	Attenuation at wavelength 1550 nm		–	–	≤0.3 dB/km		
	Bandwidth at 850 nm and 1300 nm		≥400 MHz	≥400 MHz			
	Numerical aperture		0.20 ± 0.02	0.275 ± 0.02			
<b>Thermal parameters</b>	Ambient temperature					Pages to	4/18
	• Fully flexible operation	-25 °C to + 60 °C	-25 °C to + 60 °C				4/19
	• Fixed installation	-40 °C to + 80 °C	-40 °C to + 80 °C				
	Maximum permissible operating temperature of the conductor	90 °C	90 °C				
	Short-circuit temperature of the conductor	250 °C	250 °C				

# PROTOLON (M) Medium-Voltage Flexible Cables for Fixed Installation with and without Fibre-Optics

Selection and dimensioning criteria		Refer to Section 4 for further details →			
<b>Mechanical parameters</b>	Tensile load	Up to 15 N/mm <sup>2</sup>	Up to 15 N/mm <sup>2</sup>	Page	4/20
	Torsional stresses	±100 °/m	±100 °/m	Page	4/21
	Minimum bending radii	According to DIN VDE 0298, Part 3	According to DIN VDE 0298, Part 3	Page	4/22
	Speed on rewinding with drum car	Up to 100 m/min	Up to 100 m/min	Page	4/23
	Additional tests	Torsional stress test, reversed bending test, roller bending test (type C), water compatibility according to HD 22.16	Torsional stress test, reversed bending test, roller bending test (type C), water compatibility according to HD 22.16	Pages to	4/24 4/25
<b>Chemical parameters</b>	Resistance to oil and brine	Given to DIN VDE 0473, Part 811-2-1, Para. 10	Given to DIN VDE 0473, Part 811-2-1, Para. 10	Page	4/28
	Behaviour in case of fire	Given to DIN VDE 0482, Part 265-2-1	Given to DIN VDE 0482, Part 265-2-1		
	Weather resistance	Unrestricted use outdoors and indoors, resistant to ozone and moisture	Unrestricted use outdoors and indoors, resistant to ozone and moisture		
<b>Note on installation</b>	Termination with sealing ends	Suitable material sets for self-assembly		Page	3/13
		Termination of fibre-optics requires special skills and use of 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.		Page	3/15

# PROTOLON (M) Medium-Voltage Flexible Cables for Fixed Installation with and without Fibre-Optics

- 1 Conductor
- 2 Insulation
- 3 Outer semiconductive layer
- 4 Protective-earth conductor
- 5 Inner sheath
- 6 Outer sheath



Design features	Refer to Section 4 for further details →		
Type	<b>PROTOLON (M)</b>	<b>PROTOLON (M)-LWL</b>	Page <b>4/2</b>
Conductor (refer also to DIN VDE 0295)	Electrolytic copper, not tinned, finely stranded, Class 5	Electrolytic copper, not tinned, finely stranded, Class 5	Page <b>4/29</b>
Insulation (refer also to DIN VDE 0207, Part 20)	PROTOLON, basic material EPR, compound type: special compound	PROTOLON, basic material EPR, compound type: special compound	Page <b>4/34</b>
Electrical field control	Inner and outer semiconductive layer of semiconductive rubber	Inner and outer semiconductive layer of semiconductive rubber	Page <b>4/36</b>
Core identification	Natural colouring with black semiconductive rubber on which white digits 1 to 3 are printed	Natural colouring with black semiconductive rubber on which white digits 1 to 3 are printed	
Fibre-optics			Page <b>4/5</b>
• Fibre		Inner core diameter of fibre 9 µm, 62.5 µm or 50 µm Diameter across cladding 125 µm Diameter over coating 250 µm	
• Fibre covering		Buffering tube with filling compound, basic material: ETFE compound 7YI 1	
• Identification of the fibres		Colour coding of the fibres and buffering tube for identification of the fibre type	Page <b>4/5</b>
• Core arrangement		Six cores in one layer, especially laid-up around the GFK supporting element	
• Sheath over the laid-up cores		Special material	
Core arrangement	Three main conductors laid-up, with protective-earth conductor split into three in the outer interstices	Three-core design, protective-earth conductor split into two and fibre-optic element in the outer interstices	
Inner sheath (refer also to DIN VDE 0207, Part 21)	Basic material EPR, Compound type: special compound	Basic material EPR, Compound type: special compound	Page <b>4/34</b>
Outer sheath (refer also to DIN VDE 0207, Part 21)	Basic material CM, compound type: special compound, colour red	Basic material CM, compound type: special compound, colour red	Page <b>4/34</b>
Marking	(Year of manufacture) (serial number) PROTOLON (M) F-(N)TSCGEWÖU (number of cores) x (cross-section) (rated voltage)	(Year of manufacture) (serial number) PROTOLON (M) LWL F-(N)TSCGEWÖU (number of cores) x (cross-section) (rated voltage)	Page <b>4/40</b>

# PROTOLON (M)

## Medium-Voltage Flexible Cables for Fixed Installation without Fibre-Optics

### Selection data

Number of cores and nominal cross-section  mm <sup>2</sup>	Conductor diameter (guidance value)  Max. value  mm	Overall diameter of cable (guidance value)  Min. value Max. value  mm		Conductor resistance at 20 °C  Ω/km	Inductance per unit length  mH/km	Operating capacitance per unit length  μF/km	Current-carrying capacity at 30 °C  A	Permissible short-circuit current (1s)  kA	Approx. net weight for 1000 m  kg	Maximum permissible tensile force  N
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### 3.6/6 kV F-(N)TSCGEWÖU

3 x 25 + 3 x 25/3	6.75	36.7	39.7	0.780	0.33	0.45	131	3.58	2320	1125
3 x 25 + 3 x 50/3	6.75	40.6	43.6	0.780	0.36	0.45	131	3.58	2860	1125
3 x 35 + 3 x 25/3	8.05	40.5	43.5	0.554	0.31	0.50	162	5.01	2860	1575
3 x 35 + 3 x 50/3	8.05	42.3	45.3	0.554	0.33	0.50	162	5.01	3220	1575
3 x 50 + 3 x 25/3	9.55	43.8	46.8	0.386	0.30	0.58	202	7.15	3500	2250
3 x 50 + 3 x 50/3	9.55	43.8	46.8	0.386	0.30	0.58	202	7.15	3650	2250
3 x 70 + 3 x 35/3	11.05	47.0	50.0	0.272	0.29	0.64	250	10.01	4360	3150
3 x 70 + 3 x 50/3	11.05	49.7	53.7	0.272	0.29	0.64	250	10.01	5010	3150
3 x 95 + 3 x 50/3	13.10	52.2	56.2	0.206	0.27	0.73	301	13.60	5550	4275
3 x 120 + 3 x 70/3	14.80	55.9	59.9	0.161	0.26	0.80	352	17.16	6690	5400
3 x 150 + 3 x 70/3	16.50	61.0	65.0	0.129	0.26	0.88	404	21.45	8030	6750
3 x 185 + 3 x 95/3	17.90	64.0	68.0	0.106	0.25	0.94	462	26.46	9320	8325
3 x 240 + 3 x 120/3	21.00	72.1	76.1	0.080	0.24	1.07	540	34.32	11960	10800
3 x 300 + 3 x 150/3	23.40	77.3	81.3	0.004	0.24	1.18	620	42.90	14260	13500

### 6/10 kV F-(N)TSCGEWÖU

3 x 25 + 3 x 25/3	6.75	39.0	42.0	0.780	0.34	0.40	131	3.58	2520	1125
3 x 25 + 3 x 50/3	6.75	41.4	44.4	0.780	0.36	0.40	131	3.58	2930	1125
3 x 35 + 3 x 25/3	8.05	41.8	44.8	0.554	0.32	0.45	162	5.01	2980	1575
3 x 35 + 3 x 50/3	8.05	43.6	46.6	0.554	0.34	0.45	162	5.01	3350	1575
3 x 50 + 3 x 25/3	9.55	45.1	48.1	0.386	0.30	0.51	202	7.15	3640	2250
3 x 50 + 3 x 50/3	9.55	45.1	48.1	0.386	0.30	0.51	202	7.15	3780	2250
3 x 70 + 3 x 35/3	11.05	48.3	51.3	0.272	0.29	0.57	250	10.01	4500	3150
3 x 70 + 3 x 50/3	11.05	48.3	51.3	0.272	0.29	0.57	250	10.01	4730	3150
3 x 95 + 3 x 50/3	13.10	53.5	57.5	0.206	0.28	0.65	301	13.60	5710	4275
3 x 120 + 3 x 70/3	14.80	57.2	61.2	0.161	0.27	0.71	352	17.16	6860	5400
3 x 150 + 3 x 70/3	16.50	62.3	66.3	0.129	0.26	0.78	404	21.45	8210	6750
3 x 185 + 3 x 95/3	17.90	65.3	69.3	0.106	0.26	0.83	462	26.46	9510	8325
3 x 240 + 3 x 120/3	21.00	73.4	77.4	0.080	0.25	0.95	540	34.32	12170	10800
3 x 300 + 3 x 150/3	23.40	78.6	82.6	0.004	0.24	1.04	620	42.90	14500	13500

### 8.7/15 kV F-(N)TSCGEWÖU

3 x 25 + 3 x 25/3	6.75	42.5	45.5	0.780	0.36	0.32	139	3.58	2850	1125
3 x 25 + 3 x 50/3	6.75	44.2	47.2	0.780	0.38	0.32	139	3.58	3210	1125
3 x 35 + 3 x 25/3	8.05	45.3	48.3	0.554	0.34	0.36	172	5.01	3340	1575
3 x 35 + 3 x 50/3	8.05	45.3	48.3	0.554	0.34	0.36	172	5.01	3480	1575
3 x 50 + 3 x 25/3	9.55	49.4	53.4	0.386	0.32	0.41	215	7.15	4180	2250
3 x 50 + 3 x 50/3	9.55	49.4	53.4	0.386	0.32	0.41	215	7.15	4320	2250
3 x 70 + 3 x 35/3	11.05	52.7	56.7	0.272	0.31	0.45	265	10.01	5090	3150
3 x 70 + 3 x 50/3	11.05	52.7	56.7	0.272	0.31	0.45	265	10.01	5310	3150
3 x 95 + 3 x 50/3	13.10	57.0	61.0	0.206	0.29	0.51	319	13.60	6160	4275
3 x 120 + 3 x 70/3	14.80	62.1	66.1	0.161	0.28	0.56	371	17.16	7550	5400
3 x 150 + 3 x 70/3	16.50	65.7	69.7	0.129	0.28	0.60	428	21.45	8710	6750
3 x 185 + 3 x 95/3	17.90	68.7	72.7	0.106	0.27	0.65	488	26.46	10020	8325
3 x 240 + 3 x 120/3	21.00	76.8	80.8	0.080	0.26	0.73	574	34.32	12750	10800
3 x 300 + 3 x 150/3	23.40	82.0	86.0	0.004	0.25	0.80	665	42.90	15110	13500

# PROTOLON (M) Medium-Voltage Flexible Cables for Fixed Installation without Fibre-Optics

## Selection data

Number of cores and nominal cross-section mm <sup>2</sup>	Conductor diameter (guidance value) Max. value mm	Overall diameter of cable (guidance value)		Conductor resistance at 20 °C Ω/km	Inductance per unit length mH/km	Operating capacitance per unit length μF/km	Current-carrying capacity at 30 °C A	Permissible short-circuit current (1s) kA	Approx. net weight for 1000 m kg	Maximum permissible tensile force N
		Min. value mm	Max. value mm							
<b>12/20 kV F-(N)TSCGEWÖU</b>										
3 x 25 + 3 x 25/3	6.75	45.5	48.5	0.780	0.38	0.28	139	3.58	3150	1125
3 x 25 + 3 x 50/3	6.75	45.5	48.5	0.780	0.38	0.28	139	3.58	3300	1125
3 x 35 + 3 x 25/3	8.05	48.3	51.3	0.554	0.36	0.31	172	5.01	3660	1575
3 x 35 + 3 x 50/3	8.05	48.3	51.3	0.554	0.36	0.31	172	5.01	3800	1575
3 x 50 + 3 x 25/3	9.55	52.5	56.5	0.386	0.34	0.35	215	7.15	4540	2250
3 x 50 + 3 x 50/3	9.55	52.5	56.5	0.386	0.34	0.35	215	7.15	4680	2250
3 x 70 + 3 x 35/3	11.05	55.7	59.7	0.272	0.32	0.38	265	10.01	5460	3150
3 x 70 + 3 x 50/3	11.05	55.7	59.7	0.272	0.32	0.38	265	10.01	5690	3150
3 x 95 + 3 x 50/3	13.10	61.4	65.4	0.206	0.31	0.43	319	13.60	6770	4275
3 x 120 + 3 x 70/3	14.80	65.1	69.1	0.161	0.30	0.47	371	17.16	7980	5400
3 x 150 + 3 x 70/3	16.50	68.7	72.7	0.129	0.29	0.51	428	21.45	9170	6750
3 x 185 + 3 x 95/3	17.90	73.2	77.2	0.106	0.28	0.54	488	26.46	10780	8325
3 x 240 + 3 x 120/3	21.00	79.8	83.8	0.080	0.27	0.62	574	34.32	13280	10800
3 x 300 + 3 x 150/3	23.40	86.3	91.3	0.004	0.26	0.67	665	42.90	16070	13500
<b>14/25 kV F-(N)TSCGEWÖU</b>										
3 x 25 + 3 x 25/3	6.75	50.3	54.3	0.780	0.40	0.24	139	3.58	3750	1125
3 x 25 + 3 x 50/3	6.75	50.3	54.3	0.780	0.40	0.24	139	3.58	3900	1125
3 x 35 + 3 x 25/3	8.05	53.1	57.1	0.554	0.37	0.26	172	5.01	4290	1575
3 x 35 + 3 x 50/3	8.05	53.1	57.1	0.554	0.37	0.26	172	5.01	4430	1575
3 x 50 + 3 x 25/3	9.55	56.3	60.3	0.386	0.35	0.30	215	7.15	5020	2250
3 x 50 + 3 x 50/3	9.55	56.3	60.3	0.386	0.35	0.30	215	7.15	5160	2250
3 x 70 + 3 x 35/3	11.05	61.0	65.0	0.272	0.34	0.33	265	10.01	6190	3150
3 x 70 + 3 x 50/3	11.05	61.0	65.0	0.272	0.34	0.33	265	10.01	6410	3150
3 x 95 + 3 x 50/3	13.10	65.3	69.3	0.206	0.32	0.36	319	13.60	7340	4275
3 x 120 + 3 x 70/3	14.80	69.0	73.0	0.161	0.31	0.40	371	17.16	8580	5400
3 x 150 + 3 x 70/3	16.50	74.0	78.0	0.129	0.30	0.43	428	21.45	10050	6750
3 x 185 + 3 x 95/3	17.90	77.0	81.0	0.106	0.29	0.46	488	26.46	11430	8325
3 x 240 + 3 x 120/3	21.00	85.0	90.0	0.080	0.28	0.52	574	34.32	14400	10800
3 x 300 + 3 x 150/3	23.40	90.2	95.2	0.004	0.27	0.56	665	42.90	16860	13500
<b>18/30 kV F-(N)TSCGEWÖU</b>										
3 x 25 + 3 x 25/3	6.75	53.7	57.7	0.780	0.41	0.21	139	3.58	4160	1125
3 x 25 + 3 x 50/3	6.75	53.7	57.7	0.780	0.41	0.21	139	3.58	4300	1125
3 x 35 + 3 x 25/3	8.05	56.6	60.6	0.554	0.39	0.24	172	5.01	4730	1575
3 x 35 + 3 x 50/3	8.05	56.6	60.6	0.554	0.39	0.24	172	5.01	4870	1575
3 x 50 + 3 x 25/3	9.55	61.2	65.2	0.386	0.37	0.26	215	7.15	5700	2250
3 x 50 + 3 x 50/3	9.55	61.2	65.2	0.386	0.37	0.26	215	7.15	5840	2250
3 x 70 + 3 x 35/3	11.05	64.4	68.4	0.272	0.35	0.29	265	10.01	6680	3150
3 x 70 + 3 x 50/3	11.05	64.4	68.4	0.272	0.35	0.29	265	10.01	6900	3150
3 x 95 + 3 x 50/3	13.10	68.7	72.7	0.206	0.33	0.32	319	13.60	7860	4275
3 x 120 + 3 x 70/3	14.80	73.8	77.8	0.161	0.32	0.35	371	17.16	9390	5400
3 x 150 + 3 x 70/3	16.50	77.5	81.5	0.129	0.31	0.38	428	21.45	10660	6750
3 x 185 + 3 x 95/3	17.90	80.5	84.5	0.106	0.30	0.40	488	26.46	12060	8325
3 x 240 + 3 x 120/3	21.00	88.5	93.5	0.080	0.29	0.46	574	34.32	15090	10800
3 x 300 + 3 x 150/3	23.40	94.7	99.7	0.004	0.28	0.49	665	42.90	17820	13500

# PROTOLON (M)

## Medium-Voltage Flexible Cables for Fixed Installation with Fibre-Optics

### Selection data

Number of cores and nominal cross-section	Conductor diameter (guidance value)	Overall diameter of cable (guidance 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
		Max. value	Min. value							
mm <sup>2</sup>	mm	mm	mm	Ω/km	mH/km	μF/km	A	kA	kg	N

### 3.6/6 kV F-(N)TSCGEWÖU

3 x 25 + 2 x 25/2 + 1 x (6LWL)	6.75	40.1	43.1	0.780	0.36	0.45	131	3.58	2650	1125
3 x 25 + 2 x 50/2 + 1 x (6LWL)	6.75	42.4	45.4	0.780	0.38	0.45	131	3.58	3060	1125
3 x 35 + 2 x 25/2 + 1 x (6LWL)	8.05	42.3	45.3	0.554	0.31	0.50	162	5.01	3060	1575
3 x 35 + 2 x 50/2 + 1 x (6LWL)	8.05	44.0	47.0	0.554	0.35	0.50	162	5.01	3410	1575
3 x 50 + 2 x 25/2 + 1 x (6LWL)	9.55	43.8	46.8	0.386	0.30	0.58	202	7.15	3490	2250
3 x 50 + 2 x 50/2 + 1 x (6LWL)	9.55	46.1	49.1	0.386	0.32	0.58	202	7.15	3640	2250
3 x 70 + 2 x 35/2 + 1 x (6LWL)	11.05	47.0	50.0	0.272	0.29	0.64	250	10.01	4350	3150
3 x 70 + 2 x 50/2 + 1 x (6LWL)	11.05	52.0	56.0	0.272	0.30	0.64	250	10.01	5280	3150
3 x 95 + 2 x 50/2 + 1 x (6LWL)	13.10	52.2	56.2	0.206	0.27	0.73	301	13.60	5550	4275
3 x 120 + 2 x 70/2 + 1 x (6LWL)	14.80	49.6	50.9	0.161	0.28	0.80	352	17.16	7040	5400
3 x 150 + 2 x 70/2 + 1 x (6LWL)	16.50	48.4	52.3	0.129	0.26	0.88	404	21.45	8000	6750
3 x 185 + 2 x 95/2 + 1 x (6LWL)	17.90	51.3	55.3	0.106	0.25	0.94	462	26.46	9310	8325
3 x 240 + 2 x 120/2 + 1 x (6LWL)	21.00	58.0	62.0	0.080	0.24	1.07	540	34.32	11940	10800
3 x 300 + 2 x 150/2 + 1 x (6LWL)	23.40	63.2	67.2	0.004	0.24	1.18	620	42.90	14230	13500

### 6/10 kV F-(N)TSCGEWÖU

3 x 25 + 2 x 25/2 + 1 x (6LWL)	6.75	41.4	44.4	0.780	0.36	0.40	131	3.58	2770	1125
3 x 25 + 2 x 50/2 + 1 x (6LWL)	6.75	43.1	46.1	0.780	0.38	0.40	131	3.58	3120	1125
3 x 35 + 2 x 25/2 + 1 x (6LWL)	8.05	43.6	46.6	0.554	0.32	0.45	162	5.01	3190	1575
3 x 35 + 2 x 50/2 + 1 x (6LWL)	8.05	44.7	47.7	0.554	0.35	0.45	162	5.01	3470	1575
3 x 50 + 2 x 25/2 + 1 x (6LWL)	9.55	45.1	48.1	0.386	0.30	0.51	202	7.15	3620	2250
3 x 50 + 2 x 50/2 + 1 x (6LWL)	9.55	46.8	49.8	0.386	0.32	0.51	202	7.15	4010	2250
3 x 70 + 2 x 35/2 + 1 x (6LWL)	11.05	48.3	51.3	0.272	0.29	0.57	250	10.01	4500	3150
3 x 70 + 2 x 50/2 + 1 x (6LWL)	11.05	52.7	56.7	0.272	0.31	0.57	250	10.01	5360	3150
3 x 95 + 2 x 50/2 + 1 x (6LWL)	13.10	53.5	57.5	0.206	0.28	0.65	301	13.60	5710	4275
3 x 120 + 2 x 70/2 + 1 x (6LWL)	14.80	57.2	61.2	0.161	0.27	0.71	352	17.16	6830	5400
3 x 150 + 2 x 70/2 + 1 x (6LWL)	16.50	62.3	66.3	0.129	0.26	0.78	404	21.45	8180	6750
3 x 185 + 2 x 95/2 + 1 x (6LWL)	17.90	65.3	69.3	0.106	0.26	0.83	462	26.46	9500	8325
3 x 240 + 2 x 120/2 + 1 x (6LWL)	21.00	73.4	77.4	0.080	0.25	0.95	540	34.32	12160	10800
3 x 300 + 2 x 150/2 + 1 x (6LWL)	23.40	78.6	82.6	0.004	0.24	1.04	620	42.90	14460	13500

### 8.7/15 kV F-(N)TSCGEWÖU

3 x 25 + 2 x 25/2 + 1 x (6LWL)	6.75	44.2	47.2	0.780	0.38	0.32	139	3.58	3050	1125
3 x 25 + 2 x 50/2 + 1 x (6LWL)	6.75	45.4	48.4	0.780	0.39	0.32	139	3.58	3350	1125
3 x 35 + 2 x 25/2 + 1 x (6LWL)	8.05	45.3	48.3	0.554	0.34	0.36	172	5.01	3320	1575
3 x 35 + 2 x 50/2 + 1 x (6LWL)	8.05	47.0	50.0	0.554	0.36	0.36	172	5.01	3710	1575
3 x 50 + 2 x 25/2 + 1 x (6LWL)	9.55	49.4	53.4	0.386	0.32	0.41	215	7.15	4160	2250
3 x 50 + 2 x 50/2 + 1 x (6LWL)	9.55	51.2	55.2	0.386	0.34	0.41	215	7.15	4590	2250
3 x 70 + 2 x 35/2 + 1 x (6LWL)	11.05	52.7	56.7	0.272	0.31	0.45	265	10.01	5080	3150
3 x 70 + 2 x 50/2 + 1 x (6LWL)	11.05	55.0	59.0	0.272	0.31	0.45	265	10.01	5640	3150
3 x 95 + 2 x 50/2 + 1 x (6LWL)	13.10	57.0	61.0	0.206	0.29	0.51	319	13.60	6160	4275
3 x 120 + 2 x 70/2 + 1 x (6LWL)	14.80	62.1	66.1	0.161	0.28	0.47	371	17.16	7520	5400
3 x 150 + 2 x 70/2 + 1 x (6LWL)	16.50	65.7	69.7	0.129	0.28	0.51	428	21.45	8670	6750
3 x 185 + 2 x 95/2 + 1 x (6LWL)	17.90	68.7	72.7	0.106	0.27	0.55	488	26.46	10010	8325
3 x 240 + 2 x 120/2 + 1 x (6LWL)	21.00	76.8	80.8	0.080	0.26	0.62	574	34.32	12730	10800
3 x 300 + 2 x 150/2 + 1 x (6LWL)	23.40	82.0	86.0	0.004	0.25	0.68	665	42.90	15080	13500

# PROTOLON (M) Medium-Voltage Flexible Cables for Fixed Installation with Fibre-Optics

## Selection data

Number of cores and nominal cross-section mm <sup>2</sup>	Conductor diameter (guidance value)	Overall diameter of cable (guidance value)		Conductor resistance at 20 °C Ω/km	Inductance per unit length mH/km	Operating capacitance per unit length μF/km	Current-carrying capacity at 30 °C A	Permissible short-circuit current (1s) kA	Approx. net weight for 1000 m kg	Maximum permissible tensile force N	
	Max. value mm	Min. value mm	Max. value mm								
<b>12/20 kV F-(N)TSCGEWÖU</b>											
3 x 25 + 2 x 25/2 + 1 x (6LWL)	6.75	45.5	48.5	0.780	0.38	0.28	139	3.58	3140	1125	
3 x 25 + 2 x 50/2 + 1 x (6LWL)	6.75	47.2	50.2	0.780	0.39	0.28	139	3.58	3530	1125	
3 x 35 + 2 x 25/2 + 1 x (6LWL)	8.05	48.3	51.3	0.554	0.36	0.31	172	5.01	3640	1575	
3 x 35 + 2 x 50/2 + 1 x (6LWL)	8.05	51.0	55.0	0.554	0.37	0.31	172	5.01	4240	1575	
3 x 50 + 2 x 25/2 + 1 x (6LWL)	9.55	52.5	56.5	0.386	0.34	0.35	215	7.15	4530	2250	
3 x 50 + 2 x 50/2 + 1 x (6LWL)	9.55	52.5	56.5	0.386	0.34	0.35	215	7.15	4690	2250	
3 x 70 + 2 x 35/2 + 1 x (6LWL)	11.05	55.7	59.7	0.272	0.32	0.38	265	10.01	5460	3150	
3 x 70 + 2 x 50/2 + 1 x (6LWL)	11.05	58.0	62.0	0.272	0.32	0.38	265	10.01	6040	3150	
3 x 95 + 2 x 50/2 + 1 x (6LWL)	13.10	61.4	65.4	0.206	0.31	0.43	319	13.60	6770	4275	
3 x 120 + 2 x 70/2 + 1 x (6LWL)	14.80	65.1	69.1	0.161	0.30	0.47	371	17.16	7950	5400	
3 x 150 + 2 x 70/2 + 1 x (6LWL)	16.50	68.7	72.7	0.129	0.29	0.51	428	21.45	9130	6750	
3 x 185 + 2 x 95/2 + 1 x (6LWL)	17.90	73.2	77.2	0.106	0.28	0.54	488	26.46	10770	8325	
3 x 240 + 2 x 120/2 + 1 x (6LWL)	21.00	79.8	83.8	0.080	0.27	0.62	574	34.32	13260	10800	
3 x 300 + 2 x 150/2 + 1 x (6LWL)	23.40	86.3	91.3	0.004	0.26	0.67	665	42.90	16040	13500	
<b>14/25 kV F-(N)TSCGEWÖU</b>											
3 x 25 + 2 x 25/2 + 1 x (6LWL)	6.75	50.3	54.3	0.780	0.40	0.24	139	3.58	3740	1125	
3 x 25 + 2 x 50/2 + 1 x (6LWL)	6.75	50.3	54.3	0.780	0.40	0.24	139	3.58	3900	1125	
3 x 35 + 2 x 25/2 + 1 x (6LWL)	8.05	53.1	57.1	0.554	0.37	0.26	172	5.01	4270	1575	
3 x 35 + 2 x 50/2 + 1 x (6LWL)	8.05	53.1	57.1	0.554	0.37	0.26	172	5.01	4440	1575	
3 x 50 + 2 x 25/2 + 1 x (6LWL)	9.55	56.3	60.3	0.386	0.35	0.30	215	7.15	5000	2250	
3 x 50 + 2 x 50/2 + 1 x (6LWL)	9.55	56.3	60.3	0.386	0.35	0.30	215	7.15	5160	2250	
3 x 70 + 2 x 35/2 + 1 x (6LWL)	11.05	61.0	65.0	0.272	0.34	0.33	265	10.01	6190	3150	
3 x 70 + 2 x 50/2 + 1 x (6LWL)	11.05	61.0	65.0	0.272	0.34	0.33	265	10.01	6390	3150	
3 x 95 + 2 x 50/2 + 1 x (6LWL)	13.10	65.3	69.3	0.206	0.32	0.36	319	13.60	7340	4275	
3 x 120 + 2 x 70/2 + 1 x (6LWL)	14.80	69.0	73.0	0.161	0.31	0.40	371	17.16	8550	5400	
3 x 150 + 2 x 70/2 + 1 x (6LWL)	16.50	74.0	78.0	0.129	0.30	0.43	428	21.45	10020	6750	
3 x 185 + 2 x 95/2 + 1 x (6LWL)	17.90	77.0	81.0	0.106	0.29	0.46	488	26.46	11410	8325	
3 x 240 + 2 x 120/2 + 1 x (6LWL)	21.00	85.0	90.0	0.080	0.28	0.52	574	34.32	14380	10800	
3 x 300 + 2 x 150/2 + 1 x (6LWL)	23.40	90.2	95.2	0.004	0.27	0.56	665	42.90	16820	13500	
<b>18/30 kV F-(N)TSCGEWÖU</b>											
3 x 25 + 2 x 25/2 + 1 x (6LWL)	6.75	53.7	57.7	0.780	0.41	0.21	139	3.58	4140	1125	
3 x 25 + 2 x 50/2 + 1 x (6LWL)	6.75	53.7	57.7	0.780	0.41	0.21	139	3.58	4310	1125	
3 x 35 + 2 x 25/2 + 1 x (6LWL)	8.05	56.6	60.6	0.554	0.39	0.24	172	5.01	4720	1575	
3 x 35 + 2 x 50/2 + 1 x (6LWL)	8.05	56.6	60.6	0.554	0.39	0.24	172	5.01	4880	1575	
3 x 50 + 2 x 25/2 + 1 x (6LWL)	9.55	61.2	65.2	0.386	0.37	0.26	215	7.15	5680	2250	
3 x 50 + 2 x 50/2 + 1 x (6LWL)	9.55	61.2	65.2	0.386	0.37	0.26	215	7.15	5840	2250	
3 x 70 + 2 x 35/2 + 1 x (6LWL)	11.05	64.4	68.4	0.272	0.35	0.29	265	10.01	6670	3150	
3 x 70 + 2 x 50/2 + 1 x (6LWL)	11.05	64.4	68.4	0.272	0.35	0.29	265	10.01	6870	3150	
3 x 95 + 2 x 50/2 + 1 x (6LWL)	13.10	68.7	72.7	0.206	0.33	0.32	319	13.60	7860	4275	
3 x 120 + 2 x 70/2 + 1 x (6LWL)	14.80	73.8	77.8	0.161	0.32	0.35	371	17.16	9350	5400	
3 x 150 + 2 x 70/2 + 1 x (6LWL)	16.50	77.5	81.5	0.129	0.31	0.38	428	21.45	10630	6750	
3 x 185 + 2 x 95/2 + 1 x (6LWL)	17.90	80.5	84.5	0.106	0.30	0.40	488	26.46	12040	8325	
3 x 240 + 2 x 120/2 + 1 x (6LWL)	21.00	88.5	93.5	0.080	0.29	0.46	574	34.32	15070	10800	
3 x 300 + 2 x 150/2 + 1 x (6LWL)	23.40	94.7	99.7	0.004	0.28	0.49	665	42.90	17780	13500	