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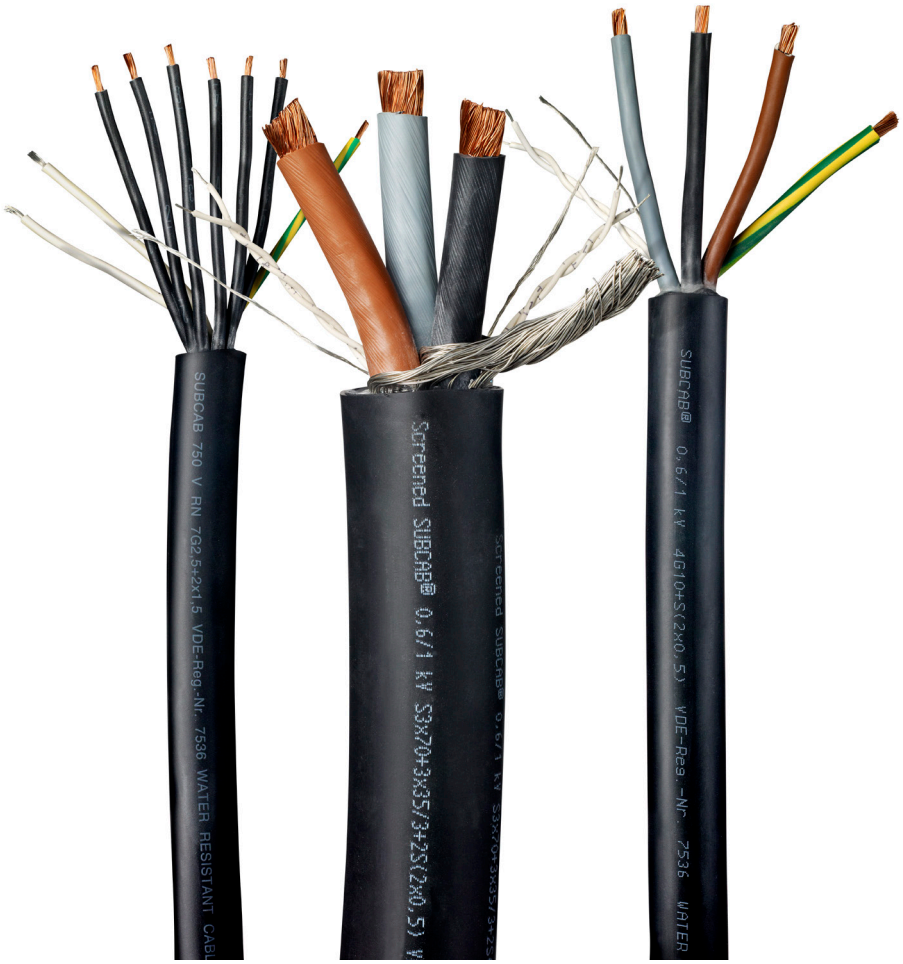
Flygt Submersible Motor Cables

FLYGT
a xylem brand

This brochure contains an overview of the Flygt motor cable assortment. The cables are especially designed for submersible use and made of carefully selected materials. The assortment contains the following cables for varying applications:

Flygt SUBCAB® 3-6
Flygt HCR (Heat and Chemical Resistant) 7-8
Silicone Cable (Heat Resistant)..... 7-8
Medium Voltage Cable..... 7-8
Screened Medium Voltage Cable 7-8



Flygt SUBCAB®

Why choose a Flygt SUBCAB®?

Flygt SUBCAB® is a range of pump motor power cables especially developed by Xylem. They are made for use with Flygt pumps and mixers and make sure that the cable attached to your product will never let you down, whatever your application is. Choose Flygt SUBCAB® for a low life cycle cost, durability and minimum down time.

Long lifetime

» High temperature resistance: up to 70°C water temperature

» Superior mechanical strength and high abrasion and tear resistance

» Extremely low water absorption rate: Withstands water depths up to 50 m

» Chemical resistance within pH 3–10

» Ozone, oil and flame resistant

Ensures a reliable leak-free fit

» Tight outer diameter tolerances ensure a perfect fit with cable entry sleeve

» Retains its mechanical and physical properties and withstands the high pressure of the seal sleeve

Prevents insulation deterioration

» Conductor insulation with a temperature rating of 90°C, which minimizes the risk for insulation cracks

Built-in monitoring cores

» Secure proper monitoring and easy connection of pump sensors

» Eliminate the use of small auxiliary cables that often get damaged and are awkward to handle

» Screened control cores specifically adapted for the use of the Flygt MAS 800 pump supervision system

» All screened cables and all unscreened cables ≥10 mm² have built-in screened control cores

Screened versions for variable frequency drive (VFD) operation

» Reduce electromagnetic emissions to other electronics

» Secure correct communication with supervision units

Complies with international standards

» See table at page 10

General properties for Flygt SUBCAB®

Flygt SUBCAB® is designed for use with standard and explosion proof submersible products in applications where the ambient temperature does not exceed 70°C. The cable is also FM approved according to certificate number J.I. 0R8A0.AE.

For remote pump control, Flygt provides a simple and reliable solution through its cables with control cores. You only need one cable instead of using the conventional pump control solution of a motor cable plus a separate control cable. The range includes cables with twisted pair of screened control cores specifically adapted for the use of Flygt MAS 800 pump supervision system.

The screened Flygt SUBCAB® is used with Variable Frequency Drives (VFD) to limit unwanted electromagnetic radiation. Typical applications for this cable include mines, quarries, and industrial areas.

Feature	Flygt SUBCAB®	Screened Flygt SUBCAB®
Max. sheath and insulation temperature	70 °C and 90 °C (AWG 60 °C and 90 °C)	70 °C and 90 °C (AWG 60 °C and 90 °C)
Min. operating temperature	-40°C for fixed installations -25°C for flexible installations (bending radius ≥10 x outer cable diameter)	-40°C for fixed installations -25°C for flexible installations (bending radius ≥10 x outer cable diameter)
Outer sheathing material	Chlorinated polyethylene rubber (CPE type: 5GM5)	Chlorinated polyethylene rubber (CPE type: 5GM5)
Conductor insulation material	High density ethylene-propylene rubber (HEPR/3GI3) or Ethylene-propylene rubber (EPR/3GI3). Part numbers marked * in the assortment table below have EPR, the rest HEPR.	High density ethylene-propylene rubber (HEPR/3GI3)
Conductors material	Copper strands	Copper strands including screened tinned copper wires
Rated Voltage (phase to earth, phase to phase)	Europe: ≥ 10 mm² and 7G6+s(2x0,5): 600/1000 V. Remaining models: 450/750 V North America and Canada: 600 V	Europe: 600/1000 V North America and Canada: 600 V
More information	Flygt standard documents M1997.47.0004, M1997.47.0009, M1997.47.0024	Flygt standard document M1997.47 0023



Fig. 1
SUBCAB® - 10-35 mm²

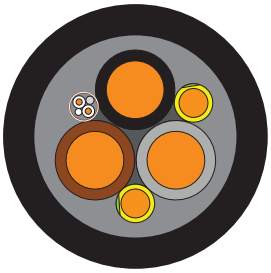


Fig. 2
SUBCAB® - 50-120 mm²



Fig. 3
Screened SUBCAB® - 1,5 mm²

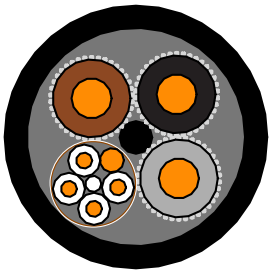


Fig. 4
Screened SUBCAB® - 2,5-50 mm²



Fig. 5
Screened SUBCAB® - 70-120 mm²

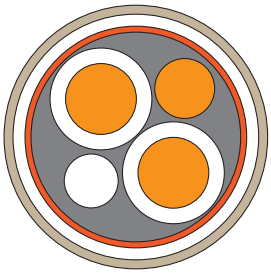


Fig. 6
SUBCAB® - control element design in fig. 1,2,3 and 5

Flygt SUBCAB® assortment

For instructions about how to read the SUBCAB® denominations, see page 11.

Type	Denomination (mm²)	Part no.	Nominal current capacity at 30°C (Amp)**	Outer diameter (mm)	Weight (kg/m)	Bending radius (cm)	Fig. no.
Flygt SUBCAB® without control cores							
3 core	3G1.5	94 20 40*	23	10 - 11	0.16	10	
	3G2.5	94 19 31*	32	11 - 12	0.24	11	
4 core	4G1.5	94 20 41*	23	10.5 - 11.5	0.20	10	
	4G2.5	94 20 42*	32	12.5 - 13.5	0.28	12	
	4G4	94 20 43*	42	16 - 17	0.44	16	
	4G6	94 20 44*	54	18 - 19	0.57	18	
Flygt SUBCAB® with control cores							
4 core	4G1.5 + 2x1.5	94 20 61*	23	15 - 16	0.32	15	
	4G2.5 + 2x1.5	94 20 59*	32	17 - 18	0.43	17	
	4G4 + 2x1.5	94 20 60*	42	20 - 22	0.63	20	
	4G6 + 2x1.5	94 20 56*	54	24 - 26	0.83	24	
	4G10 + S(2x0.5)	94 19 81	75	24 - 26	0.85	24	1
	4G16 + S(2x0.5)	94 19 82	100	26 - 28	1.30	26	1
	4G25 + S(2x0.5)	94 19 83	127	32 - 34	1.70	32	1
	4G35 + S(2x0.5)	94 19 84	157	35 - 37	2.24	35	1
	3x50 + 2G35/2 + S(2x0.5)	94 19 85	192	35 - 37	2.60	35	2
	3x70 + 2G35/2 + S(2x0.5)	94 19 86	246	38 - 41	3.30	38	2

* EPR
** See page 9

Type	Denomination (mm²)	Part no.	Nominal current capacity at 30°C (Amp)**	Outer diameter (mm)	Weight (kg/m)	Bending radius (cm)	Fig. no.
	3x95 + 2G50/2 + S(2x0.5)	94 19 87	298	47 - 50	4.50	47	2
	3x120 + 2G70/2 + S(2x0.5)	94 19 88	346	54 - 56	5.70	54	2
7 core	7G2.5 + 2x1.5	94 20 82*	32	20 - 22	0.60	20	
	7G4 + 2x1.5	94 20 80*	42	22 – 24	0.84	22	
	7G6 + S(2x0.5)	94 19 80	54	24 - 26	0,85	24	
Flygt SUBCAB® screened with control cores							
4 core	S3x1,5 + 3x1,5/3 + S(2x0.5)	94 19 89	23	16 - 17	0,5	16	3
	S3x2,5 + 3x2,5/3 + S(4x0.5)	94 19 90	32	18 - 20	0,45	18	4
	S3x6 + 3x6/3 + S(4x0.5)	94 19 91	54	20 - 22	0,55	20	4
	S3x10 + 3x10/3 + S(4x0.5)	94 19 92	75	24 - 26	0.95	24	4
	S3x16 + 3x16/3 + S(4x0.5)	94 19 93	100	24 - 26	1.10	24	4
	S3x25 + 3x16/3 + S(4x0.5)	94 19 94	127	29 - 31	1.40	29	4
	S3x35 + 3x16/3 + S(4x0.5)	94 19 95	157	32 - 34	2.00	32	4
	S3x50 + 3x25/3 + S(4x0.5)	94 19 96	192	38 - 40	3.00	38	4
	S3x70 + 3x35/3 + 2S(2x0.5)	94 19 97	246	42 - 44	3.50	42	5
	S3x95 + 3x50/3 + 2S(2x0.5)	94 19 98	298	44 - 47	4.60	44	5
	S3x120 + 3x70/3 + 2S(2x0.5)	94 19 99	346	50 - 52	5.50	50	5
	S6x95 + 95 + S(4x0.5)	94 20 00	475	57 - 60	7.60	57	
Flygt SUBCAB® control cables							
Control	2x1.5	94 20 76*	-	10 - 11	0.14	10	
	7x1.5	94 19 22*	-	15 - 17	0.38	15	
	12x1.5	94 19 20*	-	18 - 21	0.53	18	
	24x1.5	94 19 21*	-	24 - 29	0.90	24	
Flygt SUBCAB® screened control cables							
Control	S 12x1.5	94 08 94*	-	29 - 31	0.78	29	
	S 24x1.5	94 08 95*	-	33 - 37	1.59	33	

* EPR
** See page 9

General properties for Flygt supplementing cables

Flygt HCR cable

The HCR (Heat and Chemical Resistant) cable is designed for use in severe conditions. It is made of very high quality materials (FEP and ETFE) and is resistant to chemicals and solvents, high temperature and mechanical stress, that often cause rapid deterioration of other cables. A HCR cable should be used in hot liquid applications where temperatures exceed 90°C and high chemical resistance is required.

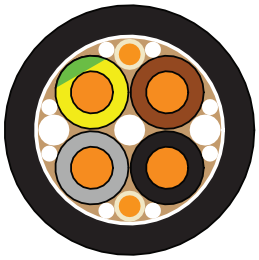


Fig. 7
Flygt HCR cable

Silicone cable

The silicone cable can be used instead of a HCR cable in hot liquid applications where the ambient temperature exceeds 90°C and where the demands for mechanical wear resistance is limited. This is a flexible cable with a wide temperature range. The water absorption rate is very low and the material is halogen free. An application where a silicone cable can be used is hot water without special requirements for chemical resistance. Compared to HCR and SUBCAB® the silicone cable has limited mechanical properties such as resistance to abrasion and lower tensile strength, therefore it is recommendable to use some protection around the cable if it is exposed to mechanical wear.

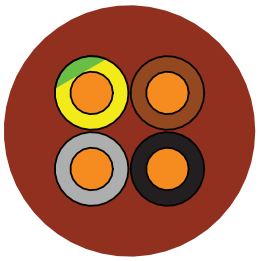


Fig. 8
Silicone cable

Medium voltage pump cable ≤15 kV

The medium voltage cable, (N)TSCGEWOEUS, is a heavy duty cable suitable for use with Flygt medium voltage products. Especially for high and extreme mechanical stress, e.g. torsional stress and high reeling speed. Only authorized Xylem personnel may connect these cables to products because of the semi-conductive layers over the insulation. The ground core must be marked with a green/yellow shrink tube when assembling the cable to the product.



Fig. 9
Screened medium voltage cable

Screened control cable

The screened control signal cable, including two twisted pairs of screened wires, can be used in tough electrical (EMC) and mechanical environments. It has good mechanical properties and excellent attenuation against electrical interference, thanks to its double screening. The cable is halogen free and it is used primarily for EMF 801, RS485, Can-buss, 4-20 mA and other control signal applications.

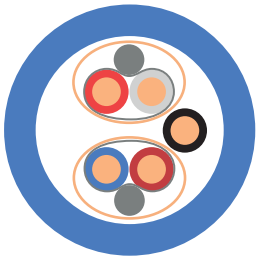


Fig. 10
Screened control cable

General properties for Flygt supplementing cables

Feature	Flygt HCR cable	Silicone cable	Medium voltage cable	Screened control cable
Max. sheath and insulation temperature	90 °C and 155 °C	145 °C and 180 °C	70 °C and 90 °C	+80°C
Min. operating temperature	-40°C for fixed installations -25°C for flexible installations (bending radius ≥10 x outer cable diameter)	-40°C for fixed installations -25°C for flexible installations (bending radius ≥10 x outer cable diameter)	-40°C for fixed installations -25°C for flexible installations (bending radius ≥10 x outer cable diameter)	-20°C
Outer sheathing material	black fluorethylene propylene FEP	red-brown silicone rubber sheath SI	red PCP compound	Polyurethane (PUR)
Conductor insulation material	black fluorethylene propylene FEP	red-brown silicone rubber SI	Ethylene-propylene rubber (EPDM)	Polyethylene (PE)
Control wires insulation material	ethylenetetrafluorethylene ETFE			Polyethylene (PE)
Conductor material	copper strands	copper strands	copper strands	Tinned copper strands
Rated voltage	450/750 V	300/500 V	8700/15 000 V	300 V
More information	Flygt standard document M1997.47.0015	Flygt standard document M1997.47.0014	Flygt standard documents M1947.0005 and A3440.00	Flygt standard documents M1996.47.0002 and M1997.47.0025

Flygt supplementing cable assortment

Type	Denomination (mm²)	Part no.	Nominal current capacity at 30°C (Amp)**	Outer diameter (mm)	Weight (kg/m)	Bending radius (cm)	Fig. no.
HCR Heat & chemical resistant cable - SO7E6E5-F							
4 core	4G16 + 2x1.5	94 20 96	125	19.5-21.5	1.03	19	7
	4G25 + 2x1.5	94 20 97	170	26.5-27.5	1.58	26	7
7 core	7x2.5	94 20 91	28	11.0-11.8	0.33	11	
	7x6	94 20 94	50	16.2-17.2	0.80	16	
Silicone cable - SI-SL-BIHFSIH-J							
4 core	4G2.5	94 19 75	26	10.5-11.5	0.19	10	8
	4G10	94 19 78	61	17.9-19.7	0.71	17	8
7 core	7G2.5	94 19 79	26	11.2-12.4	0.27	11	
Flygt Medium voltage cable ≤15kV							
4 core	3X25 + 3X25/3	94 19 67	127	41-44	2.51	41	9
	3x50 + 3x25/3	94 19 65	192	46-49	3.47	46	9
Flygt Screened Medium Voltage Cable							
4 core	S(4x0,5) + 3x50 + 2 x 25/2	95 00 23	202	50-54	4.4	54	10
Flygt Screened control cable							
Double screened (Al/Cu) four quad cable	S(4xAWG20) +drain wire	941742	5	7.4 +\-0.3	0.90	15	
Five core screened control cable	S(2x2xAWG18)PIMF +1xAWG18	941743	10	8.6 +\-0.5	1.03	15	11

** See page 9

Temperature correction

Temperature correction factors for Flygt cables

The current capacities for Flygt cables are designed for duty at 30°C ambient temperature. If the ambient temperature exceeds 30°C, the maximum current rating the conductors can handle has to be taken into consideration. The current rating must be adjusted (lowered) according to the table.

Note that there are no reduction factors for the Flygt HCR cables and the Silicone cables up to 90°C, due to their insulation materials' resistance to high temperatures.

Example

Select cable for a pump with a pump current of 33 A and an ambient temperature of 52°C:

- Select correction factor for 52°C in the table (0,76).
- Calculate "virtual" current 33 / 0,76 = 44A
- Choose 4 G 6 mm² at 52°Ctvvt rated 54A

Ambient temp. (°C)	Correction factor	Ambient temp (F)
21-25	1,04	70-77
26-30	1,00	79-86
31-35	0,96	88-95
36-40	0,91	97-104
41-45	0,87	106-113
46-50	0,82	115-122
51-55	0,76	124-131
56-60	0,71	133-140
61-70	0,58	142-158

According to IEC 60364-5-523 table 52-D1 and NEC table 310-16 (USA/Canada) in air.

Maximum mechanical load

The maximum mechanical load on Flygt cables is 1.5 kg/mm² conductor area.

Example

Flygt SUBCAB® 4 G 50 p/No. 94 19 85 can take a max. load of 1.5 x 4 x 50 =300 kg. It weighs 2.6 kg/m, so the max. length that can hang vertically is 300 / 2.6 = 115m cable.

Bending radius

The minimum bending radius of Flygt cables is 10 x outer diameter

Flygt SUBCAB® standards and approvals

Flygt SUBCAB® cables comply with the following general standards:

Standard	Type
IEC 60245	Flexible cable in general
IEC 60228 class 5	Conductor
IEC 60811-1-1 CLAUSE 9	Oil resistant
IEC 60811-2-1 CLAUSE 10	Oil resistant
IEC 60332-1	Flame retardant
IEC 60332-2	Flame retardant
IEC 60364-5-523	Current
CSA C22.2 No.49-1992	Flexible cable in general
UL 1581	Flexible cable in general
CCC.GB5013/IEC60245	Flexible cable in general
EN 50525-2-21	Flexible cable in general
VDE 0207 part 20	Material
VDE 0250	Material
VDE 0282 part 810	Material
VDE 0472 part 803-A	Oil resistant
VDE 0472 part 804-B	Flame retardant
VDE 0295	Conductor
VDE 0298	Current
VDE 0472	Testing
HD 22.4	Flexible cable in general
EN 50525-2-21	Cables for submersible use
EN 50363-1:2005	Material

Other cables standards and approvals

Cable type	Standard/Approval	Type
Flygt HCR	IEC 60287	Current rating
Flygt HCR	IEC 60332-3 Cat A	Flame retardant
Flygt HCR	SS 424 02 46	Conductor insulation material
Flygt HCR	NEMA WC 27500	Material
Silicone cable	VDE 0207	Current rating
Silicone cable	IEC 60332-1	Flame retardant
Medium voltage cable	DIN VDE 250	Material
Medium voltage cable	DIN VDE 298 part 4	Current rating
Medium voltage cable	DIN VDE 207	Insulation material

Conversion table for mm² and AWG sizes

mm²	AWG	Actual mm² size for AWG
1,5	16	1,31
2,5	14	2,08
4	12	3,31
6	10	5,26
10	8	8,39
16	6	13,29
25	4	21,15
35	2	33,62
50	1	42,41

For more detailed calculations regarding transformation of SUBCAB mm² ampacity into AWG ampacity, please refer to NEC Article 310.15C for accurate formula.

How to read the SUBCAB® denominations

Examples:

3x50 + 2G35/2 + S(2x0.5) means

3x50	3 power cores, 50 mm² area each
2G35/2	2 earth cores, 35/2 mm² = 17.5 mm² area each, i.e. total earth area = 35 mm²
S(2x0.5)	1 screened (S) control element, 2 monitoring cores of 0.5 mm² area each

S3x16 + 3x16/3 + S(4x0.5) means

S3x16	Screened. 3 power cores, 16 mm² area each
3x16/3	3 earth cores, 16/3 mm² = 5.3 mm² area each, i.e. total earth area = 16 mm²
S(4x0.5)	1 screened (S) control element, 4 monitoring cores of 0.5 mm² area each

Xylem [ˈzīləm]

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xylem.com

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Let's Solve Water

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