

# NavalLine® Cables for naval technologies



Photo: HDW

**The Quality Connection**

**LEONI**

# Applications as multifaceted as the ocean.

**Cables and cable systems for marine technology applications are exposed to very widely varying and sometimes extreme ambient conditions.**

With our extensive knowledge, we can offer our customers products that will match these extraordinary requirements at any time. From fire protection and high temperature applications to bus cable systems and through to high requirements in terms of resistance to oil or suitability for trailing and submersion, our developments set the highest standards.

Yet in this exceptionally demanding market we have specialised in one thing above all:

**>> The best solution for you.**

Find out more:



**Issue: August 2016** © LEONI elocab GmbH  
The contents of this catalog are protected by copyright.  
All rights are reserved.

**Technical changes, errors and omissions without prior notice.**



	Page
Cable solutions for marine / shipbuilding	4
<b>Special cable</b>	<b>6</b>
<b>Special cable, longitudinally water blocked</b>	
acc. to VG 95218 part 29D	6
acc. to VG 95218 part 29J	7
acc. to VG 95218 part 29M	7
<b>Special cable, partially longitudinally water blocked</b>	
acc. to VG 95218 part 29B and C	8
acc. to VG 95218 part 29E	9
acc. to VG 95218 part 29F	9
acc. to VG 95218 part 29G and H	10
acc. to VG 95218 part 29K	11
acc. to VG 95218 part 29L	11
<b>Special cable, water blocked</b>	
acc. to further requirements	12
Comparison list for LEONI's water blocked cables	13
<b>Data cable</b>	<b>14</b>
<b>Data cable Cat. 7</b> acc. to VG 95218 part 31D	14
<b>Data cable Profibus DP</b> acc. to VG 95218 part 31F	14
<b>Data cable CAN-Bus</b> acc. to VG 95218 part 31H	15
<b>Fiber optic cable</b>	<b>16</b>
<b>FiberConnect® Breakout cable with central strength member</b>	
acc. to VG 95218-30 type B	16
<b>Installation cable</b>	<b>18</b>
<b>Installation wire, hook-up</b> acc. to VG 95218 part 20P	18
<b>Individually designed installation cable</b>	
acc. to VG 95218-8 and VG 95218-9	20
<b>Individually designed installation cable</b>	
without any relation to VG standards	21
The LEONI Group	22
Cables for marine / shipbuilding – Worldwide	23

# Cable solutions

for marine / shipbuilding

The new cable generation can also be installed onboard of submarines as they conform to the inside installation regulations.

The outboard cables are available with the previous and the new design. The minimum order quantity is 100 m.



**The Business Unit Industrial Solutions comprises the comprehensive know how, innovation strength and manufacturing technology of different LEONI plants.**

With our NavalLine® products we have specialised in the demands of naval shipbuilding. For instance, along with inboard cables for all naval vessels, we supply laterally and longitudinally waterproof cables for outboard applications on submarines.

Neutral buoyancy and floating trailing and underwater cables or tensile cables with either steel or aramide strain relief elements for rated loads up to several tons as well as coiled cables round off our range for naval shipbuilding. With our NavalLine® products we have specialised in the demands of naval shipbuilding.

## NavalLine®

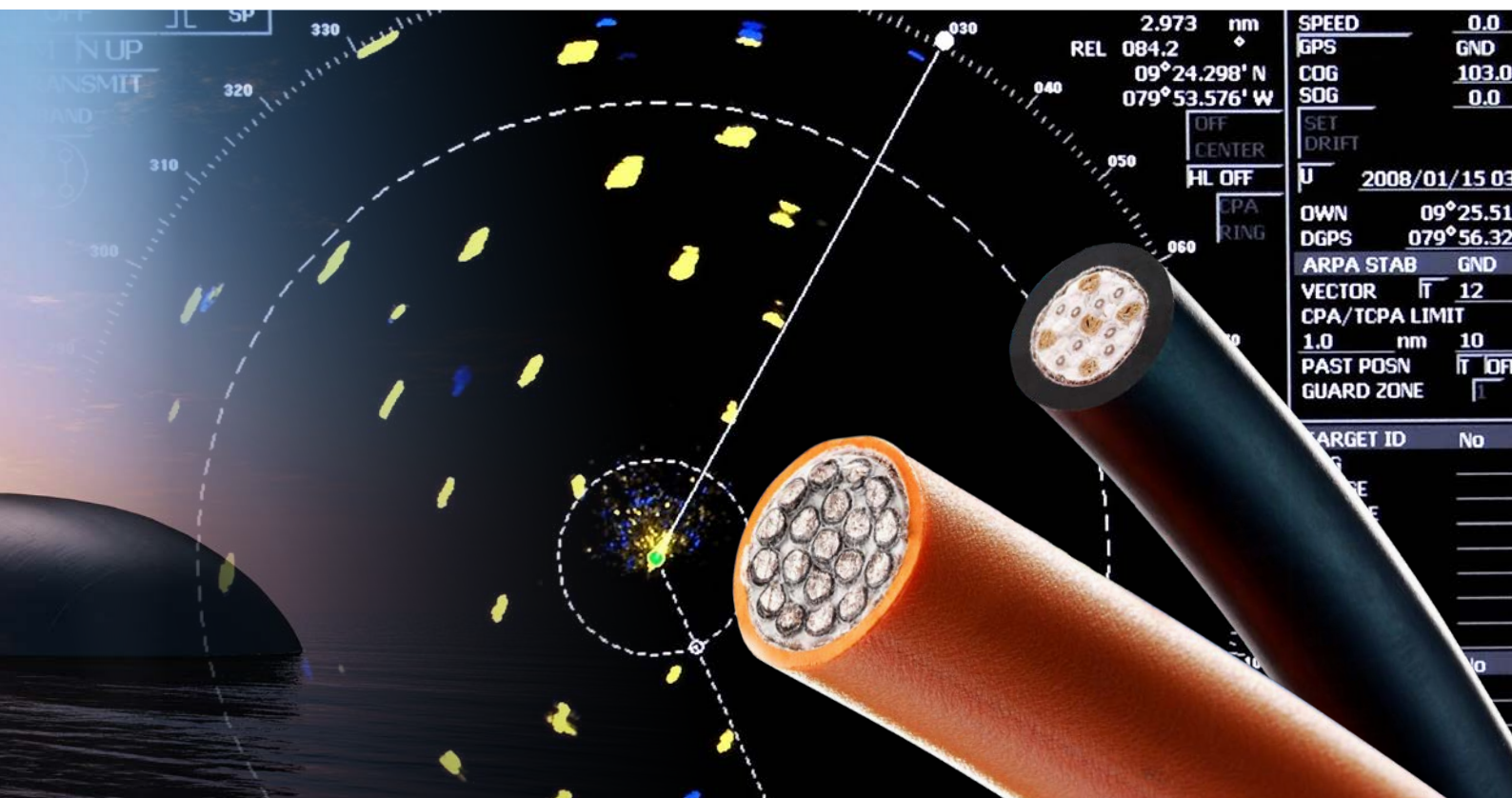
- longitudinally and transversally water blocked cables
- inboard and outboard applicable
- compliant with VG standards everything is done in our own production plants.

As a manufacturer of customised outboard installation cables for naval vessels, LEONI offers, for more than ten years now, a wide range of cables with the following characteristics:

- seawater resistance
- operating lifetime of 20.000 hours
- transversal and/or longitudinal water blocking up to a pressure of 63 bars

The cables are for example installed in submarines operating in

- |                |          |
|----------------|----------|
| ■ Germany      | ■ Israel |
| ■ South Africa | ■ Greece |
| ■ Turkey       | ■ Korea  |



With the edition of the new German military standard VG 95218 part 29 the cables must also >>

- be fire resistant
- have a toxicity index lower than 5
- be non-corrosive in case of fire \*
- have a low smoke density in case of fire \*
- be highly oil-resistant\*

\* not valid for cables VG 95218T029 G-M

VG 95218 part 29 defines two different types of outboard cables

#### ■ LWDC

These cables are transversally water blocked up to a pressure of 100 bars and longitudinally completely water blocked up to a pressure of 63 bars.

#### ■ PLWDC

These cables are transversally water blocked up to a pressure of 100 bars and longitudinally partially water blocked (all wires are not water blocked) up to a pressure of 63 bars.



longitudinally  
water blocked





transversally  
water blocked

In addition to designing cables, which conform to the requirements of the standard VG 95218 part 29 LEONI offers cables which are only transversally water blocked or have to meet other pressure requirements.

As a matter of course we customise cable designs with various types of wires, conductor number and design, colours and strength members to meet your requirements.

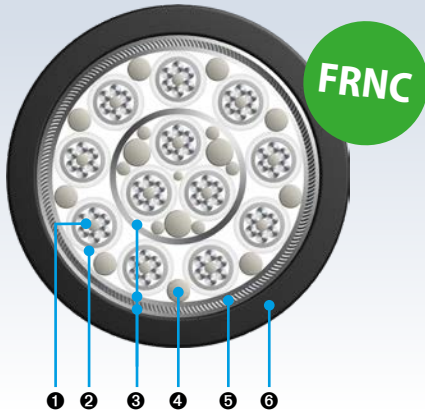
#### Explanation of cable type description for water blocked cables

		
P	Partiell	partial
LWD	LängsWasserDicht	longitudinal water blocked
C	Gesamtschirm	overall screen
CC	Paarschirm und Gesamtschirm, elektrisch nicht getrennt	pairscreen and overall screen, electrically not separated
C-C	Paarschirm und Gesamtschirm, elektrisch getrennt	pairscreen and overall screen, electrically separated



# Special cable, longitudinally water blocked

acc. to VG 95218 part 29D



### Application & characteristics

Suitable for outside and inside installation on submarines.

Operating temperature >>  $-40\text{ °C}$  up to  $+90\text{ °C}$

### Construction

- ❶ Core >> conductor with fine stranded wires, **water-blocking central element**, fine stranded tin-plated copper, **water blocking tape**
- ❷ Insulation >> special elastomer, white with black printed numbers
- ❸ **Water-blocking tapes**
- ❹ **Water-blocking fillers**
- ❺ Outer shielding >> copper braid with tin-plated wires
- ❻ Sheath >> cross-linked, flame retardant, black

Type description	∅ single core max.	Sheath wall thickness min.	Cable ∅ min.	Cable ∅ max.	Weight max.	Transfer impedance max.	Operating voltage AC/AC	VG part no.	Order no.
	mm	mm	mm	mm	kg/km	mΩ/m	V		
<b>acc. to VG 95218 part 29D</b>									
LWDC 2 x 1.5	3.4	2.0	12.6	13.2	200	30	500	VG95218T029D001	ERK 14036 Rev. 00
LWDC 3 x 1.5	3.4	1.8	13.4	13.8	250	30	500	VG95218T029D002	ERK 12313 Rev. 01
LWDC 3 G 1.5*	3.4	1.8	13.4	13.8	250	30	500	VG95218T029D003	ERK 14042 Rev. 00
LWDC 7 x 1.5	3.4	1.5	15.7	16.2	430	30	500	VG95218T029D004	ERK 14044 Rev. 00
LWDC 4 x 2 x 0.75	2.5	2.0	20.6	21.2	560	30	500	VG95218T029D005	ERK 12907 Rev. 00
LWDC 12 x 0.75	2.5	2.0	18.5	19.1	540	30	500	VG95218T029D006	ERK 14051 Rev. 00
LWDC 12 x 1.5	3.4	2.0	20.9	21.5	700	30	500	VG95218T029D007	ERK 14046 Rev. 00
LWDC 24 x 1.5	3.4	2.0	28.1	28.7	1,230	30	500	VG95218T029D008	ERK 14049 Rev. 00
LWDC 3 x 2 x 0.75	2.5	2.4	17.2	17.8	370	30	500	VG95218T029D009	ERK 023271 REV.01
LWDC 3 x 0.75	2.5	2.1	10.7	11.3	170	30	500	VG95218T029D010	ERK 023270 REV.00
LWDC 7 x 2 x 0.75	2.5	2.5	20.7	21.3	600	30	500	VG95218T029D011	ERK 023272 REV.01
LWDC 9 x 2 x 0.75	2.5	2.8	24.7	25.3	790	30	500	VG95218T029D012	ERK 023273 REV.00
LWDC 19 x 2 x 0.75	2.5	3.1	32.2	32.8	1300	30	500	VG95218T029D013	ERK 023636 REV.00
LWDC 4 x 1.5	3.4	2.2	13.7	14.4	270	30	500	VG95218T029D014	ERK 023275 REV.01
LWDC 4 x 4	4.7	2.2	16.7	17.3	450	30	500	VG95218T029D015	ERK 023276 REV.01
LWDC 4 x 0.5	2.2	1.5	9.7	10.3	150	30	500	VG95218T029D016	ERK 015084 REV.00

\* G: one green/yellow core

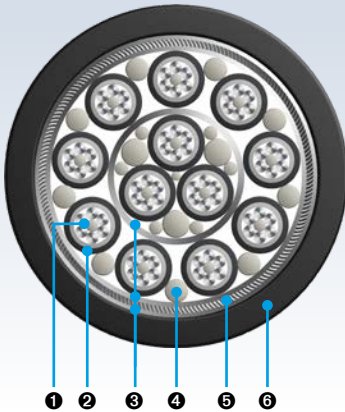




# Special cable, longitudinally water blocked

acc. to VG 95218 part 29J

acc. to VG 95218 part 29M

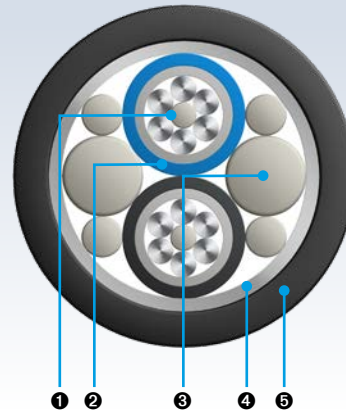


## Application & characteristics

Suitable for outside installation on submarines.  
 Suitable for fixed installation and installation in flexible chains.  
 Operating temperature >>  $-50\text{ °C}$  up to  $+90\text{ °C}$

## Construction

- ① Core >> conductor with fine stranded wires, **water-blocking central element**, fine stranded tin-plated copper, **water blocking tape**
- ② Insulation >> special elastomer, black with white printed numbers
- ③ **Water-blocking tapes**
- ④ **Water-blocking fillers**
- ⑤ Outer shielding >> copper braid with tin-plated wires
- ⑥ Sheath >> cross-linked, flame retardant, black



## Application & characteristics

Suitable for outside installation on submarines.  
 Suitable for fixed installation and installation in flexible chains.  
 Operating temperature >>  $-50\text{ °C}$  up to  $+90\text{ °C}$

## Construction

- ① Core >> conductor with fine stranded wires, **water-blocking central element**, fine stranded tin-plated copper, **water blocking tape**
- ② Insulation >> special elastomer, black/blue
- ③ **Water-blocking fillers**
- ④ **Water-blocking tape**
- ⑤ Sheath >> polyurethane, flame retardant, black

Type description	∅ single core max.	Sheath wall thickness min.	Cable ∅ min.	Cable ∅ max.	Weight max.	Transfer impedance max.	Operating voltage AC/AC	VG part no.	Order no.
	mm	mm	mm	mm	kg/km	mΩ/m	V		
<b>acc. to VG 95218 part 29J</b>									
LWDC 2 x 1.5	3.4	2.0	12.6	13.2	200	30	500	VG95218T029J001	ERK 8136 REV.00
LWDC 3 x 1.5	3.4	1.8	13.4	13.8	250	30	500	VG95218T029J002	ERK 022708 REV.00
LWDC 3 G 1.5*	3.4	1.8	13.4	13.8	250	30	500	VG95218T029J003	ERK 8172 REV.00
LWDC 7 x 1.5	3.4	2.0	17.0	17.6	430	30	500	VG95218T029J004	ERK 021538 REV.00
LWDC 4 x 2 x 0.75	2.5	2.0	18.7	19.3	390	30	500	VG95218T029J005	ERK 8219 REV.00
LWDC 12 x 0.75	2.5	2.0	18.5	19.1	540	30	500	VG95218T029J006	ERK 8256 REV.00
LWDC 12 x 1.5	3.4	2.0	21.2	21.8	700	30	500	VG95218T029J007	ERK 6078 REV.00
LWDC 24 x 1.5	3.4	2.0	28.7	29.3	1,230	30	500	VG95218T029J008	ERK 6339 REV.00

## acc. to VG 95218 part 29M

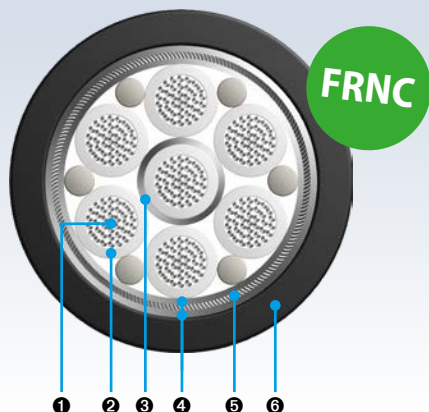
LWD 2 x 1.5	3.4	1.4	9.8	10.2	120	-	500	VG95218T029M001	ERK 023487 REV.00
-------------	-----	-----	-----	------	-----	---	-----	-----------------	-------------------

\* G: one green/yellow core



# Special cable, partially longitudinally water blocked

acc. to VG 95218 part 29B and C



### Application & characteristics

Suitable for outside and inside installation on submarines.  
 Operating temperature >> -40 °C up to +90 °C

### Construction

- ❶ Core >> conductor with fine stranded tin-plated copper
- ❷ Insulation >> special elastomer, white with black printed numbers
- ❸ Water-blocking tapes
- ❹ Water-blocking tapes
- ❺ Outer shielding >> copper braid with tin-plated wires
- ❻ Sheath >> cross-linked, flame retardant, black

Type description	∅ single core max.	Sheath wall thickness min.	Cable ∅ min.	Cable ∅ max.	Weight max.	Transfer impedance max.	Operating voltage AC/AC	VG part no.	Order no.
	mm	mm	mm	mm	kg/km	mΩ/m	V		
<b>acc. to VG 95218 part 29B and C</b>									
PLWDC 1 x 35	11.3	2.0	17.0	17.5	680	30	600	VG95218T029B001	ERK 14090 Rev. 00
PLWDC 1 x 120	21.6	2.0	28.7	29.3	2,000	30	600	VG95218T029B002	ERK 14091 Rev. 00
PLWDC 1 x 185	25.3	2.0	31.9	32.5	2,900	30	600	VG95218T029B003	ERK 14093 Rev. 00
PLWDC 1 x 240	29.8	2.0	35.3	35.9	4,050	30	600	VG95218T029B004	ERK 14097 Rev. 00
PLWDC 2 x 1.5	2.4	1.5	9.4	10.0	150	30	500	VG95218T029C001	ERK 14055 Rev. 00
PLWDC 3 x 1.5	2.4	1.5	9.7	10.3	160	30	500	VG95218T029C002	ERK 14056 Rev. 00
PLWDC 3 G 1.5*	2.4	1.5	9.7	10.3	160	30	500	VG95218T029C003	ERK 14057 Rev. 00
PLWDC 4 x 0.5	1.5	1.5	9.5	9.7	140	30	500	VG95218T029C004	ERK 14602 Rev. 00
PLWDC 4 x 1.0	2.2	1.8	10.0	10.6	175	30	500	VG95218T029C005	ERK 12261 Rev. 00
PLWDC 4 x 6 + 2 x 1.0	5.2/2.2	2.0	18.7	19.3	785	30	500	VG95218T029C006	ERK 14071 Rev. 00
PLWDC 7x 1.5	2.4	1.5	11.6	12.2	250	30	500	VG95218T029C007	ERK 14060 Rev. 00
PLWDC 4 x 2 x 0.75	1.9	1.8	14.3	14.9	275	30	500	VG95218T029C008	ERK 12265 Rev. 00
PLWDC 12 x 1.5	2.4	1.8	15.1	15.7	425	30	500	VG95218T029C009	ERK 14061 Rev. 00
PLWDC 8 x 2 x 0.75	1.9	1.8	16.9	17.5	420	30	500	VG95218T029C010	ERK 14069 Rev. 00
PLWDC 24 x 1.5	2.4	2.5	21.5	22.1	835	30	500	VG95218T029C011	ERK 14065 Rev. 00
PLWDC 37 x 0.75	1.9	2.0	18.3	18.9	650	30	500	VG95218T029C012	ERK 14066 Rev. 00
PLWDC 27 x 2 x 0.38	1.35	2.0	22.0	22.6	630	30	500	VG95218T029C013	ERK 14081 Rev. 00
PLWDC 19 x 6	5.2	2.5	32.5	33.0	1,800	30	500	VG95218T029C014	ERK 14324 Rev. 00
PLWDC 4 x 0.5	1.5	0.5	6.0	6.2	65	30	500	VG95218T029C015	ERK 14173 Rev. 00
PLWDC 2 x 0.75	1.9	1.3	7.8	8.2	96	30	500	VG95218T029C016	ERK 014605 Rev.00
PLWDC 2 x 6.0	5.2	2.0	16.8	17.4	410	30	500	VG95218T029C017	ERK 014648 Rev.00
PLWDC 5 x 1.5	2.4	1.5	11.3	11.8	230	30	500	VG95218T029C018	ERK 014949 Rev.00
PLWDC 5G 1.5*	2.4	1.5	11.3	11.8	230	30	500	VG95218T029C019	ERK 015259 Rev.00
PLWDC 10 x 2 x 0.75	1.9	2.0	21.2	21.8	600	30	500	VG95218T029C020	ERK 014741 Rev.00
PLWDC 3 x 0.75	1.9	1.3	8.0	8.4	110	30	500	VG95218T029C021	ERK 014808 Rev.00

\* G: one green/yellow core

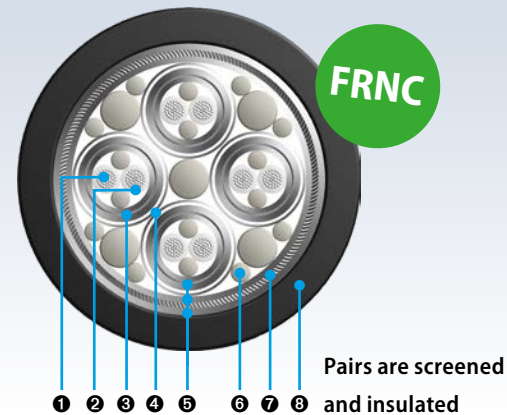
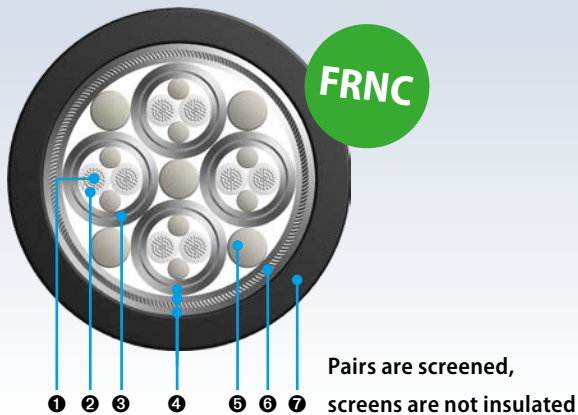




# Special cable, longitudinally water blocked

acc. to VG 95218 part 29E

acc. to VG 95218 part 29F



## Application & characteristics

Suitable for outside and inside installation on submarines.

Operating temperature >>  $-40\text{ }^{\circ}\text{C}$  up to  $+90\text{ }^{\circ}\text{C}$ 

## Construction

- ① Core >> conductor with fine stranded tin-plated copper
- ② Insulation >> special elastomer, white with black printed numbers
- ③ Pair shielding >> copper braid with tin-plated wires
- ④ **Water-blocking tapes**
- ⑤ **Water-blocking fillers**
- ⑥ Outer shielding >> copper braid with tin-plated wires
- ⑦ Sheath >> cross-linked, flame retardant, black

## Application & characteristics

Suitable for outside and inside installation on submarines.

Operating temperature >>  $-40\text{ }^{\circ}\text{C}$  up to  $+90\text{ }^{\circ}\text{C}$ 

## Construction

- ① Core >> conductor with fine stranded tin-plated copper
- ② Insulation >> special elastomer, white with black printed numbers
- ③ Pair shielding >> copper braid with tin-plated wires
- ④ Inner covering >> special elastomer
- ⑤ **Water-blocking tapes**
- ⑥ **Water-blocking fillers**
- ⑦ Outer shielding >> copper braid with tin-plated wires
- ⑧ Sheath >> cross-linked, flame retardant, black

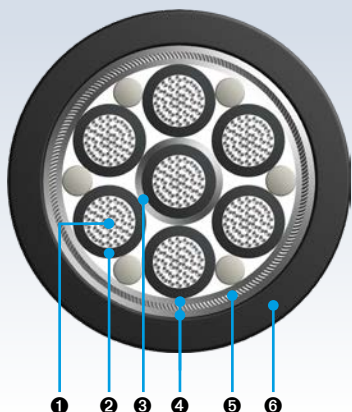
Type description	∅ single core max.	Sheath wall thickness min.	Cable ∅ min.	Cable ∅ max.	Weight max.	Transfer impedance max.	Operating voltage AC/AC	VG part no.	Order no.
	mm	mm	mm	mm	kg/km	mΩ/m	V		
<b>acc. to VG 95218 part 29E</b>									
PLWDCC 4 x 2 x 0.75	1.9	1.7	17.8	18.4	430	15	500	VG95218T029E001	ERK 014647 Rev.00
PLWDCC 8 x 2 x 0.75	1.9	2.0	22.1	22.7	720	15	500	VG95218T029E002	ERK 015249 Rev.00
PLWDCC 10 x 2 x 0.75	1.9	2.0	26.3	26.9	900	15	500	VG95218T029E003	ERK 015252 Rev.00
PLWDCC 27 x 2 x 0.38	1.3	2.5	34.1	34.7	1,500	15	500	VG95218T029E004	ERK 015267 Rev.00
PLWDCC 7 x 2 x 0.75	1.9	2.0	19.8	20.4	650	15	500	VG95218T029E005	ERK 015025 Rev.00

<b>acc. to VG 95218 part 29F</b>									
PLWDC-C 4 x 2 x 0.75	1.9	2.0	20.5	20.9	530	15	500	VG95218T029F001	ERK 015253 Rev.00
PLWDC-C 8 x 2 x 0.75	1.9	2.0	26.1	26.5	880	15	500	VG95218T029F002	ERK 015254 Rev.00
PLWDC-C 10 x 2 x 0.75	1.9	2.0	32.3	32.9	1,350	15	500	VG95218T029F003	ERK 015257 Rev.00
PLWDC-C 27 x 2 x 0.38	1.3	3.0	42.1	42.7	1,800	15	500	VG95218T029F004	ERK 015266 Rev.00
PLWDC-C 12 x 2 x 0.38	1.9	2.0	30.6	31.2	1,190	15	500	VG95218T029F005	ERK 014950 Rev.00
PLWDC-C 2 x 2 x 0.75	1.9	2.0	17.7	18.3	540	15	500	VG95218T029F006	ERK 023637 REV.00



# Special cable, partially longitudinally water blocked

acc. to VG 95218 part 29G and H



### Application & characteristics

Suitable for outside installation on submarines.  
 Suitable for fixed installation and installation in flexible chains.  
 Operating temperature >> **-50 °C** up to **+90 °C**

### Construction

- ❶ Core >> conductor with fine stranded tin-plated copper
- ❷ Insulation >> special elastomer, black with white printed numbers
- ❸ **Water-blocking tapes**
- ❹ **Water-blocking fillers**
- ❺ Outer shielding >> copper braid with tin-plated wires
- ❻ Sheath >> polyurethane, flame retardant, black

Type description	∅ single core max.	Sheath wall thickness min.	Cable ∅ min.	Cable ∅ max.	Weight max.	Transfer impedance max.	Operating voltage AC/AC	VG part no.	Order no.
	mm	mm	mm	mm	kg/km	mΩ/m	V		
<b>acc. to VG 95218 part 29G and H</b>									
PLWDC 1 x 35	11.3	2.0	17.0	17.5	680	30	600/900	VG95218T029G001	ERK 019361 REV.00
PLWDC 1 x 120	21.6	2.0	28.7	29.3	2,000	30	600/900	VG95218T029G002	ERK 019358 REV.00
PLWDC 1 x 185	25.3	2.0	31.9	32.5	2,900	30	600/900	VG95218T029G003	ERK 023045 REV.00
PLWDC 1 x 240	29.8	2.0	35.0	36.5	4,050	30	600/900	VG95218T029G004	ERK 019360 REV.00
PLWDC 2 x 1.5	2.4	2.2	10.4	11.0	150	30	500	VG95218T029H001	ERK 019367 REV.00
PLWDC 3 x 1.5	2.4	2.0	10.8	11.2	170	30	500	VG95218T029H002	ERK 019370 REV.00
PLWDC 3 G 1.5*	2.4	2.0	10.8	11.2	170	30	500	VG95218T029H003	ERK 015666 REV.00
PLWDC 4 x 0.5	1.5	2.0	9.3	9.7	140	30	500	VG95218T029H004	ERK 019388 REV.00
PLWDC 4 x 1.0	2.2	1.8	10.0	10.6	175	30	500	VG95218T029H005	ERK 6422 REV.00
PLWDC 4 x 6 + 2 x 1.0	5.2/2.2	2.0	18.7	19.3	785	30	500	VG95218T029H006	EHRK 6424 REV.00
PLWDC 7x 1.5	2.4	2.0	13.3	13.7	280	30	500	VG95218T029H007	ERK 019387 REV.00
PLWDC 4 x 2 x 0.75	1.9	1.8	14.8	15.2	275	30	500	VG95218T029H008	ERK 019371 REV.00
PLWDC 12 x 1.5	2.4	1.8	16.2	16.6	425	30	500	VG95218T029H009	ERK 019363 REV.00
PLWDC 8 x 2 x 0.75	1.9	1.8	16.9	17.5	415	30	500	VG95218T029H010	ERK 019374 REV.00
PLWDC 24 x 1.5	2.4	2.0	20.8	21.4	835	30	500	VG95218T029H011	ERK 019385 REV.00
PLWDC 37 x 0.75	1.9	1.5	18.3	18.9	650	30	500	VG95218T029H012	ERK 019386 REV.00
PLWDC 27 x 2 x 0.38	1.35	1.5	22.0	22.6	630	30	500	VG95218T029H013	ERK 6499 REV.00
PLWDC 19 x 6	5.2	2.5	33.0	33.5	1,800	30	500	VG95218T029H014	ERK 5870 REV.00
PLWDC 4 x 0.5	1.5	0.5	6.0	6.4	70	30	500	VG95218T029H015	ERK 019372 REV.00
PLWDC 2 x 0.75	1.9	1.3	7.8	8.2	96	30	500	VG 95218T29H016	ERK 020197 REV.00
PLWDC 2 x 6.0	5.2	2.0	16.8	17.4	410	30	500	VG 95218T29H017	ERK 014089 REV.00
PLWDC 5 x 1.5	2.4	1.8	11.6	12.0	230	30	500	VG 95218T29H018	ERK 019373 REV.00
PLWDC 5G 1.5*	2.4	1.8	11.6	12.0	230	30	500	VG 95218T29H019	ERK 022700 REV.00
PLWDC 10 x 2 x 0.75	1.9	2.0	21.9	22.5	600	30	500	VG 95218T29H020	ERK 020607 REV.00
PLWDC 3 x 0.75	1.9	1.3	8.0	8.4	110	30	500	VG 95218T29H021	ERK 022702 REV.00
PLWDC 4 x 6	5.2	2.0	18.7	19.3	785	30	500	VG95218T029H022	ERK 022704 REV.00
PLWDC 14 x 2 x 0.75	1.9	2.0	24.3	24.9	820	30	500	VG95218Z029H023	ERK 22706 REV.00

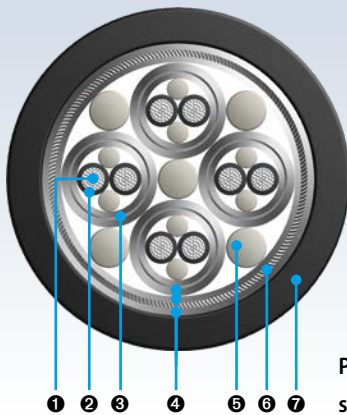
\* G: one green/yellow core



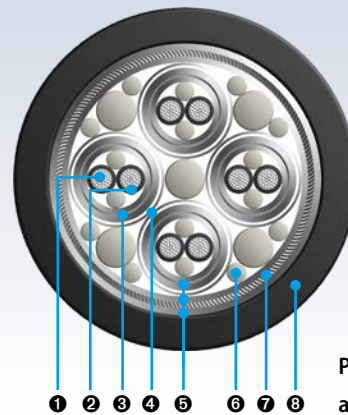
# Special cable, partially longitudinally water blocked

acc. to VG 95218 part 29K

acc. to VG 95218 part 29L



Pairs are screened,  
screens are not insulated



Pairs are screened  
and insulated

## Application & characteristics

Suitable for outside installation on submarines.  
Suitable for fixed installation and installation in flexible chains.  
Operating temperature >>  $-50\text{ °C}$  up to  $+90\text{ °C}$

## Construction

- ① Core >> conductor with fine stranded tin-plated copper
- ② Insulation >> special elastomer, black with white printed numbers
- ③ Pair shielding >> copper braid with tin-plated wires
- ④ **Water-blocking tapes**
- ⑤ **Water-blocking fillers**
- ⑥ Outer shielding >> copper braid with tin-plated wires
- ⑦ Sheath >> polyurethane, flame retardant, black

## Application & characteristics

Suitable for outside installation on submarines.  
Suitable for fixed installation and installation in flexible chains.  
Operating temperature >>  $-50\text{ °C}$  up to  $+90\text{ °C}$

## Construction

- ① Core >> conductor with fine stranded tin-plated copper
- ② Insulation >> special elastomer, black with white printed numbers
- ③ Pair shielding >> copper braid with tin-plated wires
- ④ Inner covering >> special elastomer
- ⑤ **Water-blocking tapes**
- ⑥ **Water-blocking fillers**
- ⑦ Outer shielding >> copper braid with tin-plated wires
- ⑧ Sheath >> polyurethane, flame retardant, black

Type description	∅ single core max. mm	Sheath wall thickness min. mm	Cable ∅ min. mm	Cable ∅ max. mm	Weight max. kg/km	Transfer impedance max. mΩ/m	Operating voltage AC/AC V	VG part no.	Order no.
<b>acc. to VG 95218 part 29K</b>									
PLWDCC 4 x 2 x 0.75	1.9	1.7	17.2	17.8	430	15	500	VG95218T029K001	ERK 7778 REV.00
PLWDCC 8 x 2 x 0.75	1.9	2.0	22.1	22.7	720	15	500	VG95218T029K002	ERK 6607 REV.00
PLWDCC 10 x 2 x 0.75	1.9	2.0	26.3	26.9	900	15	500	VG95218T029K003	ERK 6657 REV.00
PLWDCC 27 x 2 x 0.38	1.3	2.5	34.1	34.7	1,500	15	500	VG95218T029K004	ERK 6770 REV.00
PLWDCC 7 x 2 x 0.75	1.9	2.0	19.8	20.4	650	15	500	VG95218T029K005	ERK 022197 REV.00
PLWDCC 14 x 2 x 0.75	1.9	3.0	30.7	31.3	1,200	15	500	VG95218T029K006	ERK 023573 REV.00

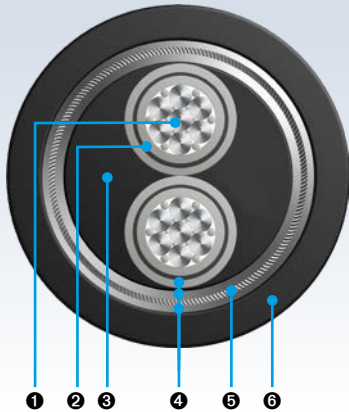
<b>acc. to VG 95218 part 29L</b>									
PLWDC-C 4 x 2 x 0.75	1.9	2.0	20.5	21.1	530	15	500	VG95218T029L001	ERK 019382 REV.01
PLWDC-C 8 x 2 x 0.75	1.9	2.0	22.7	23.3	680	15	500	VG95218T029L002	ERK 021062 REV.00
PLWDC-C 10 x 2 x 0.75	1.9	2.0	32.3	32.9	1,350	15	500	VG95218T029L003	ERK 021299 REV.00
PLWDC-C 27 x 2 x 0.38	1.3	3.0	42.1	42.7	1,800	15	500	VG95218T029L004	ERK 021563 REV.00
PLWDC-C 12 x 2 x 0.38	1.9	2.0	30.6	31.2	1,190	15	500	VG95218T029L005	ERK 11402 REV.00
PLWDC-C 2 x 2 x 0.75	1.9	1.8	17.5	18.1	330	15	500	VG95218T029L006	ERK 021580 REV.01
PLWDC-C 14 x 2 x 0.75	1.9	3.0	36.5	37.5	1,600	15	500	VG95218T029L007	ERK 023533 REV.00





# Special cable, water blocked

acc. to further requirements



### Application & characteristics

Suitable for outside and inside installation on submarines.

Operating temperature >>  $-40\text{ °C}$  up to  $+90\text{ °C}$

### Construction

- ❶ Core >> conductor with fine stranded wires, water-blocking central element, stranded copper
- ❷ Insulation >> **water blocking tape**, special elastomer, black with white print 1–2
- ❸ **Water-blocking filling compound**
- ❹ **Water-blocking tapes**
- ❺ Outer shielding >> copper braid with tin-plated wires
- ❻ Sheath >> cross-linked, flame retardant, black

Type description	∅ single core max.	Sheath wall thickness min.	Cable ∅ min.	Cable ∅ max.	Weight max.	Transfer impedance max.	Operating voltage AC/AC	VG part no.	Order no.
	mm	mm	mm	mm	kg/km	mΩ/m	V		
<b>acc. to further requirements</b>									
LWDC 2 x 10 fix	5.9	2.0	20.3	21.5	650	100	500	–	ERK 013218

# Comparison list

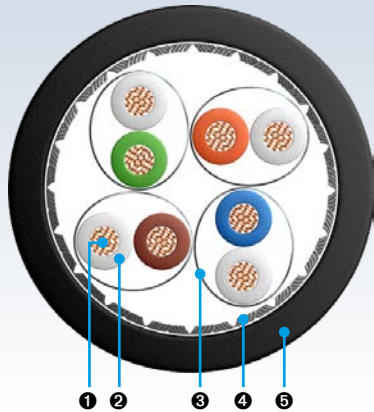
for LEONI's water blocked cables

Type description	Existing LEONI elocab design numbers (not VG approval)	New LEONI elocab design numbers	VG Order no.	New LEONI elocab design numbers	VG Order no.
	Polyurethane sheath ● orange	VG approved polyurethane sheath ● black		VG approved cross-linked sheath halogen free	
PLWDC 1 x 35	ERK 8314 Rev.00	ERK 019361 Rev.00	VG95218T029G001	ERK 14090 Rev. 00	VG95218T029B001
PLWDC 1 x 120	ERK 5129 Rev. 03	ERK 019358 Rev.00	VG95218T029G002	ERK 14091 Rev. 00	VG95218T029B002
PLWDC 1 x 185	ERK 5300 Rev. 03	ERK 023045 REV.00	VG95218T029G003	ERK 14093 Rev. 00	VG95218T029B003
PLWDC 1 x 240	ERK 8315 Rev. 01	ERK 019360 Rev.00	VG95218T029G004	ERK 14097 Rev. 00	VG95218T029B004
PLWDC 2 x 1.5	ERK 5131 Rev. 02	ERK 019367 Rev.00	VG95218T029H001	ERK 14055 Rev. 00	VG95218T029C001
PLWDC 3 x 1.5	ERK 5000 Rev. 02	ERK 019370 Rev.00	VG95218T029H002	ERK 14056 Rev. 00	VG95218T029C002
PLWDC 3 G 1.5	-	ERK 015666 Rev.00	VG95218T029H003	ERK 14057 Rev. 00	VG95218T029C003
PLWDC 4 x 0.5	ERK 5512 Rev. 03	ERK 019388 Rev.00	VG95218T029H004	ERK 14602 Rev.00	VG95218T029C004
PLWDC 4 x 1.0	ERK 6353 Rev. 01	ERK 6422 Rev.00	VG95218T029H005	ERK 12261 Rev. 01	VG95218T029C005
PLWDC 4 x 6 + 2 x 1	ERK 5149 Rev. 02	EHRK 6424 REV.00	VG95218T029H006	ERK 14071 Rev. 00	VG95218T029C006
PLWDC 7 x 1.5	ERK 5044 Rev. 02	ERK 019387 Rev.00	VG95218T029H007	ERK 14060 Rev. 00	VG95218T029C007
PLWDC 4 x 2 x 0.75	ERK 6054 Rev. 01	ERK 019371 Rev.00	VG95218T029H008	ERK 12265 Rev. 00	VG95218T029C008
PLWDC 12 x 1.5	ERK 5045 Rev. 00	ERK 019363 Rev.00	VG95218T029H009	ERK 14061 Rev. 00	VG95218T029C009
PLWDC 8 x 2 x 0.75	ERK 6242 Rev. 00	ERK 019374 Rev.00	VG95218T029H010	ERK 14069 Rev. 00	VG95218T029C010
PLWDC 24 x 1.5	ERK 5046 Rev. 01	ERK 019385 Rev.00	VG95218T029H011	ERK 14065 Rev. 00	VG95218T029C011
PLWDC 37 x 0.75	ERK 5004 Rev. 02	ERK 019386 Rev.00	VG95218T029H012	ERK 14066 Rev. 00	VG95218T029C012
PLWDC 27 x 2 x 0.38	ERK 5299 Rev. 00	ERK 6499 REV.00	VG95218T029H013	ERK 14081 Rev. 00	VG95218T029C013
PLWDC 19 x 6.0	ERK 5882 Rev. 01	ERK 5870 REV.00	VG95218T029H014	ERK 14324 Rev. 00	VG95218T029C014
PLWDC 4 x 0.5	ERK 5163 Rev.02	ERK 019372 Rev.00	VG95218T029H015	ERK 14173 Rev.00	VG95218T029C015
PLWDC 2 x 0.75	ERK 8978 Rev.00	ERK 020197 REV. 00	VG95218T029H016	ERK 014605 Rev.00	VG95218T029C016
PLWDC 2 x 6.0	ERK13778 Rev.00	ERK 014089 REV.00	VG95218T029H017	ERK 014648 Rev.00	VG95218T029C017
PLWDC 5 x 1.5	ERK 8313 Rev.00	ERK 019373 Rev.00	VG95218T029H018	ERK 014949 Rev.00	VG95218T029C018
PLWDC 5 G 1.5	ERK 022701 Rev.00	ERK 022700 REV.00	VG95218T029H019	ERK 015259 Rev.00	VG95218T029C019
PLWDC 10 x 2 x 0.75	ERK 11704 Rev.00	ERK 020607 REV.00	VG95218T029H020	ERK 014741 Rev.00	VG95218T029C020
PLWDC 3 x 0.75	ERK 022703 REV.00	ERK 022702 REV.00	VG95218T029H021	ERK 014808 Rev.00	VG95218T029C021
PLWDC 4 x 6	ERK 022705 REV.00	ERK 022704 REV.00	VG95218T029H022	-	-
PLWDC 14 x 2 x 0.75	ERK 022707 REV.00	ERK 22706 REV.00	VG95218T029H023	-	-
LWDC 2 x 1.5	ERK 8143 REV.00	ERK 8136 REV.00	VG95218T029J001	ERK 14036 Rev. 00	VG95218T029D001
LWDC 3 x 1.5	ERK 6093 Rev. 02	ERK 022708 REV.00	VG95218T029J002	ERK 12313 Rev. 01	VG95218T029D002
LWDC 3 G 1.5	ERK 8175 REV.00	ERK 8172 REV.00	VG95218T029J003	ERK 14042 Rev. 00	VG95218T029D003
LWDC 7 x 1.5	ERK 6048 Rev. 01	ERK 021538 Rev.00	VG95218T029J004	ERK 14044 Rev. 00	VG95218T029D004
LWDC 4 x 2 x 0.75	ERK 8219 Rev.00	ERK 8219 Rev.00	VG95218T029J005	ERK 012907 Rev. 00	VG95218T029D005
LWDC 12 x 0.75	ERK 8297 Rev.00	ERK 8256 REV.00	VG95218T029J006	ERK 014051 Rev. 00	VG95218T029D006
LWDC 12 x 1.5	ERK 6214 Rev. 01	ERK 6078 REV.00	VG95218T029J007	ERK 14046 Rev. 00	VG95218T029D007
LWDC 24 x 1.5	ERK 6298 Rev. 01	ERK 6339 REV.00	VG95218T029J008	ERK 14049 Rev. 00	VG95218T029D008
LWDC 3 x 2 x 0.75	-	-	-	ERK 023271 REV.01	VG95218T029D009
LWDC 3 x 0.75	-	-	-	ERK 023270 REV.00	VG95218T029D010
LWDC 7 x 2 x 0.75	-	-	-	ERK 023272 REV.01	VG95218T029D011
LWDC 9 x 2 x 0.75	-	-	-	ERK 023273 REV.01	VG95218T029D012
LWDC 19 x 2 x 0.75	-	-	-	ERK 023636 REV.00	VG95218T029D013
LWDC 4 x 1.5	-	-	-	ERK 023275 REV.00	VG95218T029D014
LWDC 4 x 4	-	-	-	ERK 023276 REV.00	VG95218T029D015
LWDC 4 x 0.5	-	-	-	ERK 015084 REV.00	VG95218T029D016
PLWDCC 4 x 2 x 0.75	ERK 7800 Rev.00	ERK 7778 REV.00	VG95218T029K001	ERK 014647 Rev.00	VG95218T029E001
PLWDCC 8 x 2 x 0.75	ERK 6610 REV.00	ERK 6607 REV.00	VG95218T029K002	ERK 015249 Rev.00	VG95218T029E002
PLWDCC 10 x 2 x 0.75	ERK 6761 REV.00	ERK 6657 REV.00	VG95218T029K003	ERK 015252 Rev.00	VG95218T029E003
PLWDCC 27 x 2 x 0.38	ERK 6771 REV.00	ERK 6770 REV.00	VG95218T029K004	ERK 015267 Rev.00	VG95218T029E004
PLWDCC 7 x 2 x 0.75	ERK 7799 Rev.00	ERK 022197 REV.00	VG95218T029K005	ERK 015025 Rev.00	VG95218T029E005
PLWDCC 14 x 2 x 0.75	-	ERK 023573 REV.00	VG95218T029K006	-	-
PLWDC-C 8 x 2 x 0.75	ERK 019583 REV.00	ERK 019382 REV.01	VG95218T029L001	ERK 015253 Rev.00	VG95218T029F001
PLWDC-C 8 x 2 x 0.75	ERK 021064 REV.00	ERK 021062 REV.00	VG95218T029L002	ERK 015254 Rev.00	VG95218T029F002
PLWDC-C 10 x 2 x 0.75	ERK 021545 REV.00	ERK 021299 REV.00	VG95218T029L003	ERK 015257 Rev.00	VG95218T029F003
PLWDC-C 27 x 2 x 0.38	ERK 021564 REV.00	ERK 021563 REV.00	VG95218T029L004	ERK 015266 Rev.00	VG95218T029F004
PLWDC-C 12 x 2 x 0.38	ERK 011401 REV.01	ERK 11402 REV.00	VG95218T029L005	ERK 014950 Rev.00	VG95218T029F005
PLWDC-C 2 x 2 x 0.75	ERK 021739 REV.00	ERK 021580 REV.01	VG95218T029L006	ERK 023637 REV.00	VG95218T029F006
PLWDC-C 14 x 2 x 0.75	-	ERK 023533 REV.00	VG95218T029L007	-	-
LWD 2 x 1.5	ERK 023488 REV.00	ERK 023487 REV.00	VG95218T029M001	-	-



## Data cable Cat. 7

acc. to VG 95218 part 31D



### Application & characteristics

Suitable for fixed installation inside military vessels.  
 Suitable for fixed installation in harsh environment areas.  
 Operating temperature >>  $-33\text{ }^{\circ}\text{C}$  up to  $+85\text{ }^{\circ}\text{C}$

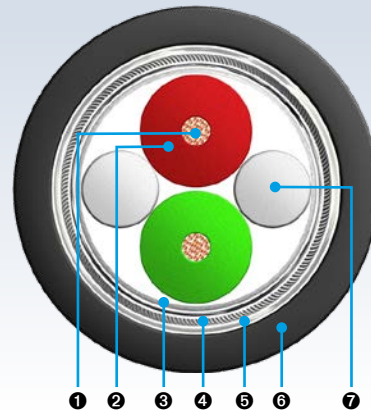
### Construction

- ❶ Core >> conductor with fine stranded wires,
- ❷ Insulation >> special elastomer, WH/BU, WH/BN, WH/GN, WH/OR
- ❸ Pair shielding >> aluminated foil
- ❹ Outer shielding >> copper braid with tin-plated wires
- ❺ Sheath >> flame retardant, black



## Data cable Profibus DP

acc. to VG 95218 part 31F



### Application & characteristics

Suitable for fixed installation inside military vessels.  
 Suitable for fixed installation in harsh environment areas.  
 Operating temperature >>  $-33\text{ }^{\circ}\text{C}$  up to  $+85\text{ }^{\circ}\text{C}$

### Construction

- ❶ Core >> conductor with fine stranded wires
- ❷ Insulation >> special elastomer, RD, GN
- ❸ Tape >> plastic foil
- ❹ Outer shielding >> copper braid with tin-plated wires
- ❺ Tape >> plastic foil
- ❻ Sheath >> flame retardant, black
- ❼ Filler

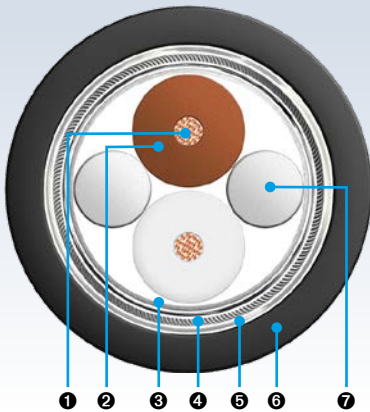
Type description	∅ single core max.	Sheath wall thickness min.	Cable ∅ min.	Cable ∅ max.	Weight max.	Transfer impedance max.	Operating voltage AC/AC	VG part no.	Order no.
	mm	mm	mm	mm	kg/km	mΩ/m	V		
<b>acc. to VG 95218 part 31D</b>									
Cat 7 4 x 2 x 0.27	0.7	0.8	8.3	8.8	120	15	125	VG 95218 T031D001	ERK 020654
Cat 7 4 x 2 x 0.355	0.8	1.3	10.6	11.0	150	30	125	VG 95218 T031D002	ERK 017466
<b>acc. to VG 95218 part 31F</b>									
Profibus 2x0.35	3.1	1.3	9.6	10.0	110	15	125	VG 95218 T031F001	ERK 017460
Profibus 2x0.35	2.8	1.3	9.0	9.4	110	20	125	VG 95218 T031F002	ERK 20657





# Data cable CAN-Bus

acc. to VG 95218 part 31H



## Application & characteristics

Suitable for fixed installation inside military vessels.

Suitable for fixed installation in harsh environment areas.

Operating temperature >>  $-33\text{ °C}$  up to  $+85\text{ °C}$

## Construction

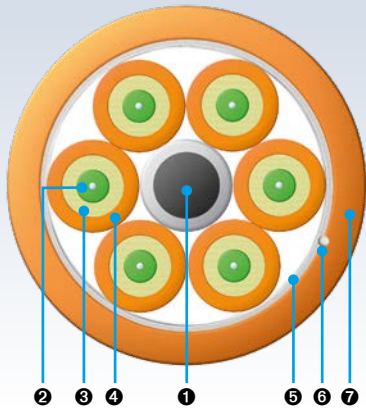
- ❶ Core >> conductor with fine stranded wires
- ❷ Insulation >> special elastomer, WH, BN
- ❸ Tape >> plastic foil
- ❹ Outer shielding >> copper braid with tin-plated wires
- ❺ Tape >> plastic foil
- ❻ Sheath >> flame retardant, black
- ❼ Filler

Type description	∅ single core max. mm	Sheath wall thickness min. mm	Cable ∅ min. mm	Cable ∅ max. mm	Weight max. kg/km	Transfer impedance max. mΩ/m	Operating voltage AC/AC V	VG part no.	Order no.
<b>acc. to VG 95218 part 31H</b>									
CAN-Bus 2 x 0.34	2.18	1.3	7.6	8.0	90	15	125	VG 95218 T031H001	ERK 017461
CAN-Bus 2 x 0.34	2.15	1.3	7.6	8.0	90	15	125	VG 95218 T031H002	ERK 020658
CAN-Bus 2 x 0.5	2.35	1.08	7.6	8.2	83	25	125	VG 95218 T031H003	ERK 020659



# FiberConnect® Breakout cable with central strength member

acc. to VG 95218-30 type B



### Application & characteristics

Suitable for fixed installation inside military vessels.  
 Suitable for fixed installation in harsh environment areas.

### Construction

- ❶ FRP central strength member in the core
- ❷ Over that stranding of certain number of single cable elements each consisting of a tight buffered fiber (TB900L)
- ❸ Non-metallic strain relief elements (Aramid)
- ❹ Halogen free, flame retardant subcable sheath (Ø 2.2 mm), stranded in layers (2–16)
- ❺ Nonwoven aramid
- ❻ Rip cord
- ❼ Sheath, flame-retardant material

### Thermal properties

Transport/storage	– 33 °C to + 85 °C
Installation	– 15 °C to + 50 °C
Operating temperature	– 33 °C to + 85 °C

### Mechanical properties

Min. bending radius	static	15 × outer diameter
	dynamic	20 × outer diameter
Max. crush resistance	2000 N/dm	

### Fire performance

Flame retardancy	IEC 60332-1-2 and IEC 60332-3-22 Cat. C
Smoke density	IEC 61034
Absence of halogen	IEC 60754-1
Acidity of combustion gases	IEC 60754-2

No. of fibers max.	Outer Ø mm	Wall thickness mm	Pull force N	Order no.
<b>acc. to VG 95218-30 type B</b>				
2	7.7	1.1	1200	8406601L#
4	7.7	1.1	1200	8406602L#
6	9.1	1.1	1800	8406603L#
8	10.4	1.1	2400	8406604L#
10	11.9	1.2	2400	8406605L#
12	13.3	1.2	2400	8406606L#
16	12.9	1.2	2400	8406608L#

Example of VG dash no. VG 95218 T030 B01A:  
 Standard 95218, part 30 / cable type B / 2 fibers / fiber type A

Fiber specifications				
VG fiber type (Dash no.)	A	B	C	D
IEC	G62.5/125 OM1	G50/125 OM2	G50/125 OM3	E9/125 OS1
IEC 60793-10 or -50 type	A1b	A1a.1	A1a.2	B6a
Order no.	84#####L	84#####X	84#####V	84#####A

Geometry/mechanical properties				
Transmission properties	LEONI fiber type L (OM1)	LEONI fiber type G (OM2)	LEONI fiber type L (OM1)	LEONI fiber type B (OS1)
Core diameter (µm)	62.5 ± 3	50 ± 2.5	50 ± 2.5	–
Mode field diameter (at 1310 nm) (µm)	–	–	–	9.2 ± 0.4
Cladding diameter (µm)	125 ± 2	125 ± 1	125 ± 1	125 ± 0.7
Coating diameter (µm)	245 ± 10	245 ± 10	245 ± 10	245 ± 10
Core non-circularity (%)	< 5	< 5	< 5	–
Cladding non-circularity (%)	< 1	< 1	< 1	< 0.7
Core/Clad concentricity error (µm)	< 1.5	< 1.5	< 1.5	< 0.5
Eccentricity of coating (µm)	< 10	< 10	< 10	< 10
Screen test	≥ 100 kpsi	≥ 100 kpsi	≥ 100 kpsi	≥ 100 kpsi

Transmission properties																
Wavelength (nm)	850		1300		850		1300		850		1300		1310		1550	
Attenuation max. (dB/km)	3.2		0.9		3.0		1.0		3.0		1.0		0.38		0.28	
Bandwidth min. (MHz · km)	200		500		500		500		1500		500		–		–	
Effective group of refraction	1.497		1.493		1.483		1.478		1.483		1.478		1.4695		1.4701	
Numerical aperture	0.275 ± 0.015		–		0.200 ± 0.015		–		0.200 ± 0.015		–		–		–	
Dispersion coefficient max. (ps/nm · km)	–		–		–		–		–		–		3.5		18	
Zero dispersion wavelength (nm)	–		–		–		–		–		–		1304 – 1324		–	
Dispersion slope (ps/nm <sup>2</sup> · km)	–		–		–		–		–		–		≤ 0.092		–	
Cutoff wavelength (cabled) (nm)	–		–		–		–		–		–		≤ 1260		–	
Polarization mode dispersion (ps/√km)	–		–		–		–		–		–		≤ 0.1		–	

Further fiber qualities are available on request

Dash no.	No. of optical fibers	∅ tight buffered core $d_1$	∅ single fiber element $d_2$	Outer sheath wall thickness min.	Cable ∅ $d_3$ min.	Cable ∅ $d_3$ max.	Mass max.
		mm	mm	mm	mm	mm	kg/km
01*	2	0.90 ± 0.05	2.2 ± 0.4	0.8	6.5	6.5	65
02*	4	0.90 ± 0.05	2.2 ± 0.4	0.8	6.5	6.5	65
03*	6	0.90 ± 0.05	2.2 ± 0.4	0.8	8.0	10.0	90
04*	8	0.90 ± 0.05	2.2 ± 0.4	0.8	8.5	11.0	110
05*	10	0.90 ± 0.05	2.2 ± 0.4	1.0	10.5	12.5	140
06*	12	0.90 ± 0.05	2.2 ± 0.4	1.0	11.5	13.5	165
07*	16	0.90 ± 0.05	2.2 ± 0.4	1.0	11.0	13.0	155

\* The dash no. is to be completed with the fiber type acc. to the table above

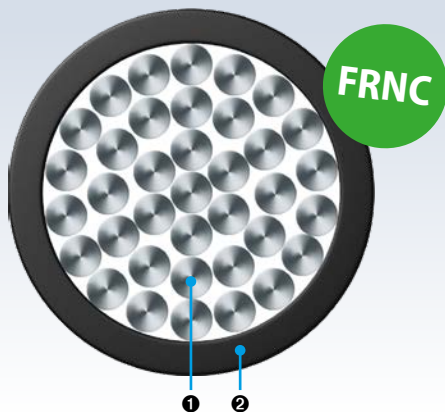






# Installation wire, hook-up

acc. to VG 95218 part 20P



### Application & characteristics

The wiring lines distinguish by their halogen free features and an improved behavior in case of fire. In this case the generating of corrosive and toxic fission products is down to a minimum and the light transparency is at least 75 %.

Operating temperature >> -55 °C up to +105 °C

Max. voltage >> 600 V

### Construction

- ❶ Core >> conductor with fine stranded wires
- ❷ Insulation >> the insulation material has a high resistance against many types of oil, grease, lubricants and other chemical materials.

Cross section nom.	Cross section AWG	No. of single wires	Conductor Ø max.	Insulated wire Ø min.	Insulated wire Ø max.	Weight max.	VG part no.
mm²			mm	mm	mm	kg/km	
<b>acc. to VG 95218 part 20E – halogen free</b>							
0.15	26	19	0.55	0.83	1.13	2.7	VG95218T020P12 *
0.25	24	19	0.66	0.97	1.29	3.8	VG95218T020P01 *
0.4	22	19	0.84	1.14	1.46	5.5	VG95218T020P02 *
0.5	21	19	0.94	1.22	1.54	7.1	VG95218T020P03 *
0.6	20	19	1.04	1.35	1.67	8.0	VG95218T020P04 *
0.75	19	19	1.20	1.45	1.77	9.6	VG95218T020P05 *
1.0	18	19	1.32	1.60	1.92	11.6	VG95218T020P06 *
1.2	16	19	1.47	1.75	2.07	14.3	VG95218T020P07 *
1.5	15	37	1.68	1.90	2.34	17.0	VG95218T020P08 *
2.0	14	37	1.87	2.16	2.60	21.6	VG95218T020P09 *
2.5	13	37	2.14	2.35	2.79	27.5	VG95218T020P10 *
3.0	12	37	2.29	2.64	3.08	33.3	VG95218T020P11 *
4	–	56**	2.56	3.01	3.17	46.7	VG95218T020P13 *
6	–	84**	3.05	3.78	4.15	62.4	VG95218T020P14 *
10	–	80**	4.00	4.78	5.20	107	VG95218T020P15 *

\* last figure will be added by the color of the insulation

\*\* standard value



Type description		Colors and LEONI part no.										
nom. mm <sup>2</sup>	AWG	black 0	brown 1	red 2	orange 3	yellow 4	green 5	blue 6	violet 7	grey 8	white 9	yellow/green G
0.15	26	ESL 016090	ESL 016091	ESL 016092	ESL 016093	ESL 016094	ESL 016095	ESL 016096	ESL 016097	ESL 016098	ESL 016089	ESL 016099
0.25	24	ESL 016126	ESL 016127	ESL 016128	ESL 016129	ESL 016130	ESL 016131	ESL 016132	ESL 016133	ESL 016134	ESL 016025	ESL 016135
0.4	22	ESL 016138	ESL 016139	ESL 016140	ESL 016141	ESL 016142	ESL 106143	ESL 016144	ESL 016145	ESL 016146	ESL 016137	ESL 016147
0.5	21	ESL 016198	ESL 016199	ESL 016200	ESL 016201	ESL 016202	ESL 016203	ESL 016204	ESL 016205	ESL 016206	ESL 016197	ESL 016207
0.6	20	ESL 016114	ESL 106115	ESL 016116	ESL 016117	ESL 016118	ESL 016119	ESL 016120	ESL 016121	ESL 016122	ESL 016113	ESL 016123
0.75	19	ESL 016102	ESL 016103	ESL 016104	ESL 016105	ESL 016106	ESL 016107	ESL 016108	ESL 016109	ESL 016110	ESL 016101	ESL 016111
1.0	18	ESL 016209	ESL 016210	ESL 016211	ESL 016212	ESL 016213	ESL 016214	ESL 016215	ESL 016216	ESL 016217	ESL 016208	ESL 016218
1.2	16	ESL 016150	ESL 016151	ESL 016152	ESL 016153	ESL 016154	ESL 016155	ESL 016156	ESL 016157	ESL 016158	ESL 016149	ESL 016159
1.5	15	ESL 016220	ESL 016221	ESL 016222	ESL 016223	ESL 016224	ESL 016225	ESL 016226	ESL 016227	ESL 016228	ESL 016219	ESL 016229
2.0	14	ESL 016162	ESL 016163	ESL 016164	ESL 016165	ESL 016166	ESL 016167	ESL 016168	ESL 016169	ESL 016170	ESL 016161	ESL 016171
2.5	13	ESL 016174	ESL 016175	ESL 016176	ESL 016177	ESL 016178	ESL 016179	ESL 016180	ESL 016181	ESL 016182	ESL 016173	ESL 016183
3.0	12	ESL 016186	ESL 016187	ESL 016188	ESL 016189	ESL 016190	ESL 016191	ESL 016192	ESL 016193	ESL 016194	ESL 016185	ESL 016195

# Individually designed installation cable

acc. to VG 95218-8 and VG 95218-9

The standard VG 95218-8 describes different types of sheathing material which can be used for individually designed VG cables >>

Place of cable installation	Material type	Acc. to standard	Main characteristics	Type of sheath acc. to VG 95218-8
Inboard	Cross-linked	VG 95218-29	Halogen-free Non-toxic Non corrosive Flame retardant	<b>E</b>
	Non cross-linked	VG 95219-30 and VG 95218-31	Halogen-free Non-toxic Non corrosive Flame retardant	<b>D</b>
Outboard	Cross-linked	VG 95218-29	Halogen-free Non-toxic Non corrosive Flame retardant	<b>E</b>
	Polyurethane	VG 95218-29	Halogen-free Flame retardant	<b>F</b>

For the design of the individually designed cables are allowed to use the following elements to cover the cable by the standard VG 95218-9 (all elements available from LEONI) >>

Type of sheath acc. to VG 95218-8	Approved constructions elements	Type of element
<b>D</b>	VG95218T20P... VG95218T21F... VG95218T22G... VG95218T23C... VG95218T23G... VG95218T30B... <sup>a</sup> VG95218T31A... <sup>a</sup> VG95218T31D... <sup>a</sup> VG95218T31E... <sup>a</sup> VG95218T31F... <sup>a</sup> VG95218T31H... <sup>a</sup>	Single core Twisted pair Single core with screen and protective cover Cables with screen and protective cover Cables with screen and protective cover Fiber optic cables, bundle design Ethernet Cat 6 Ethernet Cat 7 Ethernet Cat 5e Profibus DP CAN-Bus
<b>E</b>	VG95218T20L... VG95218T20M... VG95218T20P... VG95218T21F... VG95218T22G... VG95218T23C... VG95218T23G... VG95218T30B... <sup>a</sup> VG95218T31A... <sup>a</sup> VG95218T31D... <sup>a</sup> VG95218T31E... <sup>a</sup> VG95218T31F... <sup>a</sup> VG95218T31H... <sup>a</sup>	Single core Single core water-blocked Single core Twisted pair Single core with screen and protective cover Cables with screen and protective cover Cables with screen and protective cover Fiber optic cables, bundle design Ethernet Cat 6 Ethernet Cat 7 Ethernet Cat 5e Profibus DP CAN-Bus
<b>F</b>	VG95218T20L... VG95218T20M...	Single core Single core water-blocked

<sup>a</sup> with or without outer sheath

The electrical screens are defined with a maximum transfer impedance of

- 30 mΩ/m for one overall screen
- 15 mΩ/m for a double screen.



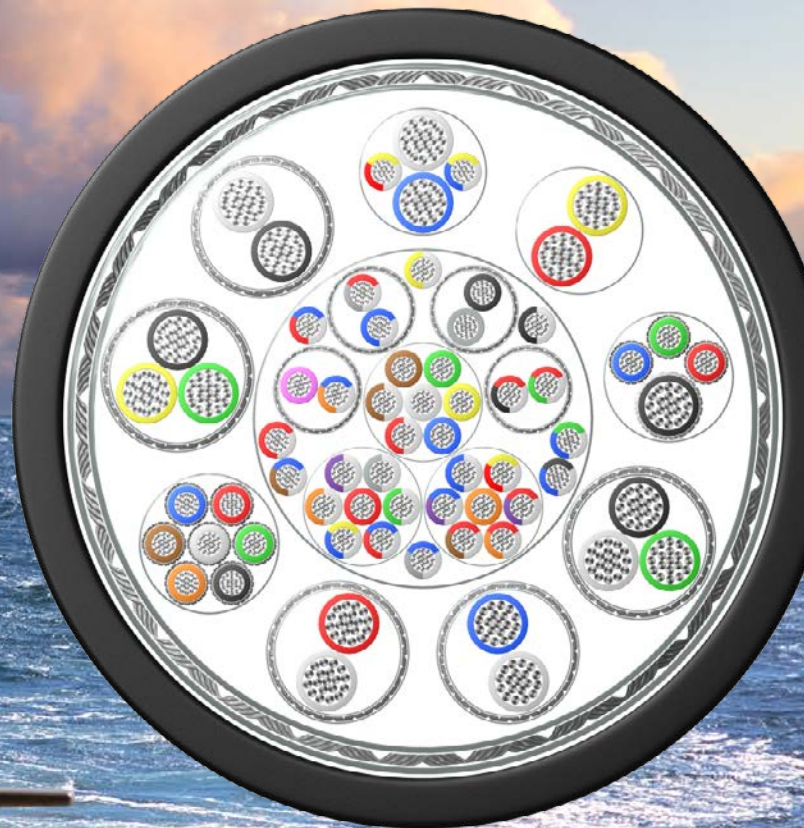
# Individually designed installation cable

without any relation to VG standards

LEONI is able to design and produce outboard and inboard cables with following elements:

- Single wires up to a voltage of 1.5 kV AC
- Twisted pairs up to a voltage of 1.0 kV AC
- Ethernet data (LAN) elements up to Cat 7
- Bus elements
- Fiber optic elements
- Hoses for fluids and gases
- Coaxial elements
- Electrical screens
- Magnetic screens
- Strengths members
- Armor
- Sheath with different characteristics in single or double-layer design
- Water-blocking tapes and fillers (up to a pressure of 100 bars for the complete cable)

Photo: HDW





# The LEONI Group

Concentrated competence in cables



**LEONI is a leading supplier of cable systems and related services for the automotive industry and many other industrial sectors.**

Our group of companies employs over 76,000 people in 32 countries. Entrepreneurial insight, first-class quality and the power to innovate have secured us our position as one of Europe's leading cable manufacturers. LEONI not only develops and manufactures a portfolio of technically sophisticated products that extends from wire and optical fiber to cables, cable systems and services, but also offers its customers a range of bespoke services.

Our full range of products and services also includes strands, standardised cables, hybrid/optical fiber and special cables, cable harnesses and wiring system components, as well as turnkey, assembled systems for applications in various industrial markets.

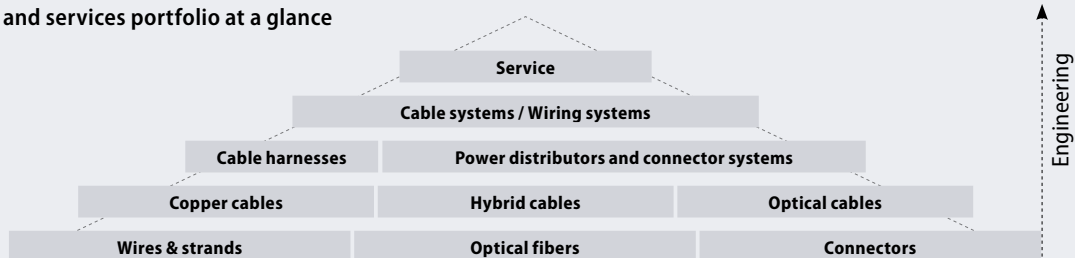
**Your markets – our strength.**

The breadth of LEONI's spectrum of products and services is matched by the markets and segments we supply. We focus our activities on customers in the sectors Automotive & Commercial Vehicles, Industrial Solutions, Electrical Appliances and Conductors & Copper Solutions.

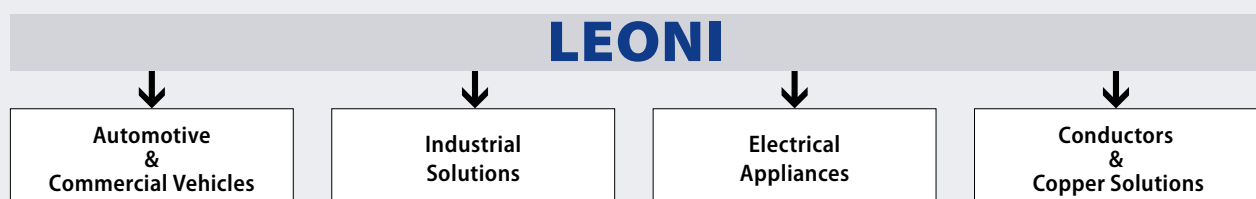
In the Industrial Solutions market, we are one of Europe's leading providers. Acting as both a cable manufacturer and a dedicated solution provider, we work in fields as diverse as telecommunications systems, fiber optic cable, data communications, manufacturing projects, solar and wind power, energy and infrastructure, building services, bespoke product and robotics solutions, healthcare, traffic systems and automation technologies. Customers worldwide benefit from our innovative, high-quality products that are both reliable and long-lasting. LEONI – we create the best connection for your future.

*For further information, please visit [www.leoni.com](http://www.leoni.com)*

## Products and services portfolio at a glance



## LEONI's core markets





# Cables for marine / shipbuilding – Worldwide

Proximity to the customer is a key element of our corporate philosophy.

This is the reason why you will find LEONI close to you wherever you are. Please don't hesitate to make use of our strong distribution network.

For more information of our sales network please visit  
[www.leoni-industrial-solutions.com](http://www.leoni-industrial-solutions.com)



## LEONI Industrial Solutions – centres of competence

### Germany

LEONI elocab GmbH  
 LEONI HighTemp Solutions GmbH  
 LEONI Kabel GmbH  
 LEONI Protec Cable Systems GmbH  
 LEONI Special Cables GmbH

### France

LEONI CIA Cable Systems S.A.S.

### Great Britain

LEONI Tailor-Made Cable UK Ltd.

### Spain

LEONI Special Cables Ibérica S.A.

### Slovakia

LEONI Cable Slovakia spol. s.r.o.

### Canada

LEONI Elocab Ltd.

### USA

LEONI Engineering Products & Services Inc.

### India

LEONI Cable Solutions (India) Private Limited

### China

LEONI Special Cables (Changzhou) Co. Ltd.

### Japan

LEONI Wire & Cable Solutions Japan K.K.

### Singapore

LEONI Special Cables GmbH

Find out more:

**Business Unit Industrial Solutions**

[industrial-solutions@leoni.com](mailto:industrial-solutions@leoni.com)

[www.leoni-industrial-solutions.com](http://www.leoni-industrial-solutions.com)

**LEONI elocab GmbH**

Obere Lerch 34

91166 Georgensgmünd

Germany

Phone +49 9172 6980-0

Fax +49 9172 2029