

# SIMPLEX-COMPACT

## Shaft Components



A company  
of ThyssenKrupp  
Marine Systems

**Blohm + Voss Industries**

Blohm+Voss

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## Note:

The dimensions and weights stated in the tables of this brochures are our standard sizes. On request we would be pleased to advise of further possible sizes and alternatives.

In the interest of further development of our products we retain the right to change dimensions, sizes and design without prior notice.

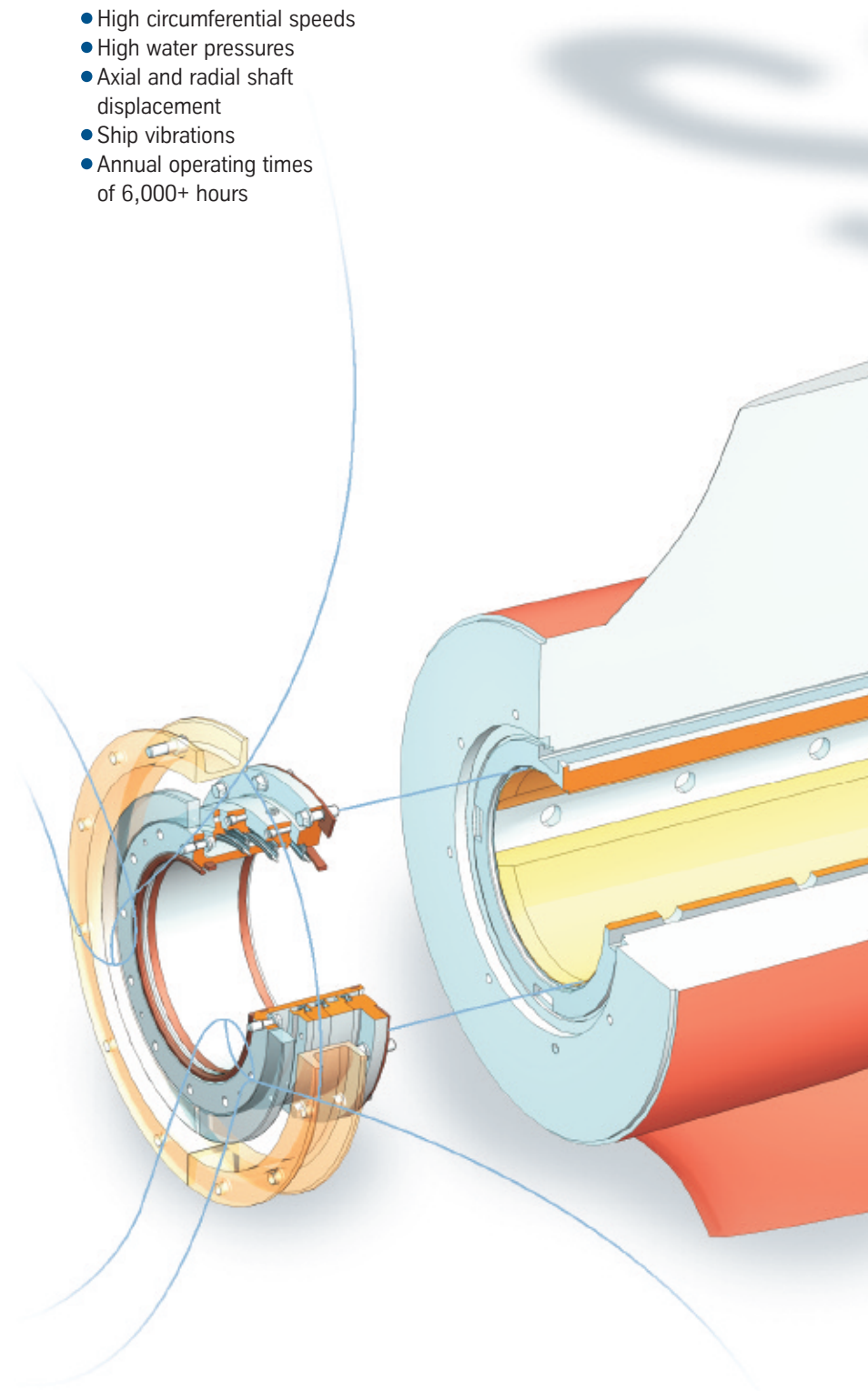
# SIMPLEX-COMPACT 2000

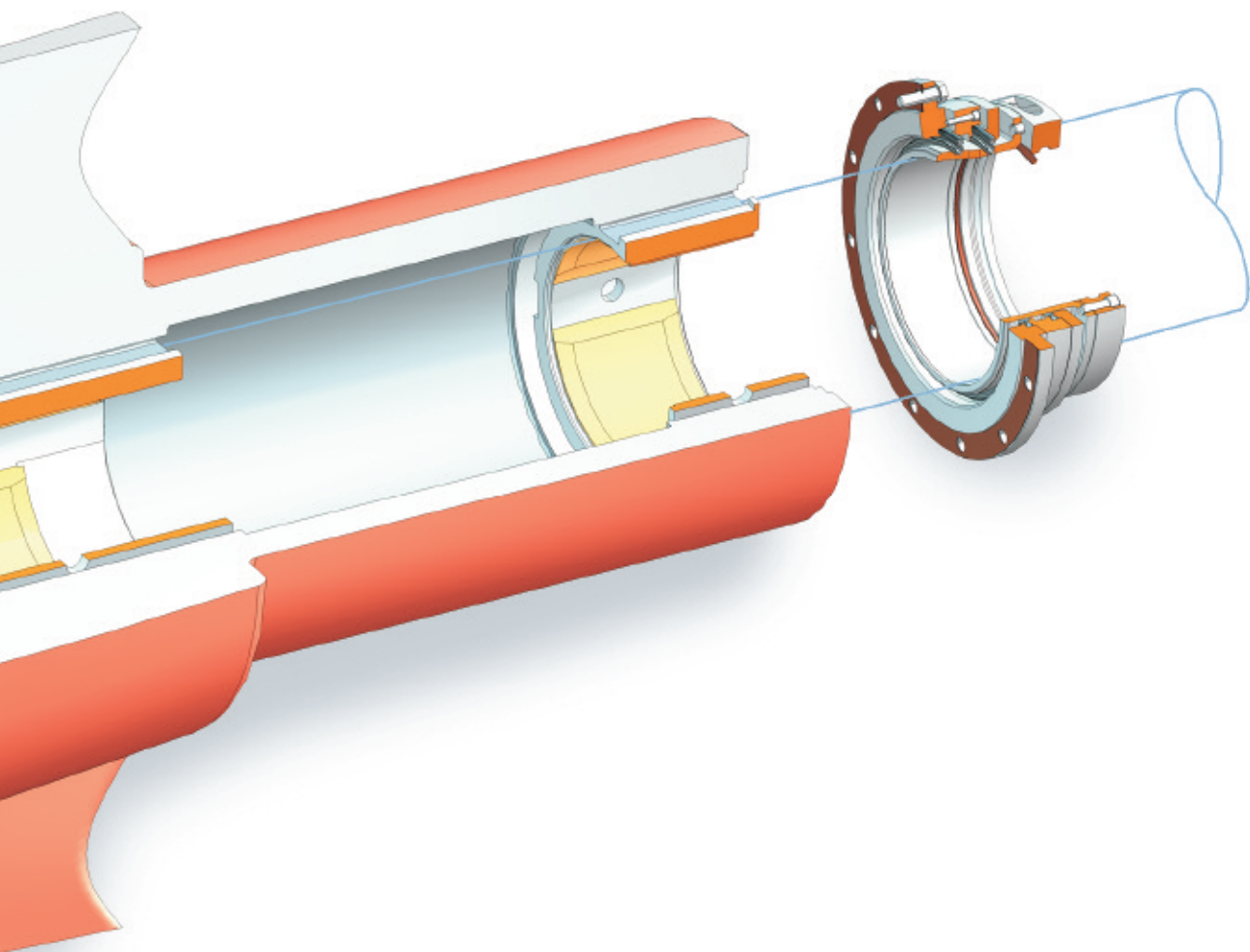
A sealing system for oil-lubricated propeller shaft bearings prevents the ingress of sea-water into the sterntube, while at the same time preventing leakage of sterntube oil into the water or into the engine room.

The sealing systems must withstand extreme conditions:

- High circumferential speeds
- High water pressures
- Axial and radial shaft displacement
- Ship vibrations
- Annual operating times of 6,000+ hours

Compliance with these requirements demonstrates the quality and reliability of the Simplex-Compact range of sealing products. Simplex-Compact sealing systems are certified by all Classification Societies in compliance with the particular Classification regulations.





# SIMPLEX-COMPACT 2000 History

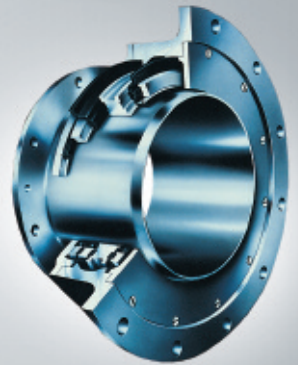
First tests by our company with bearings and lip sealing rings for oil-lubricated propeller shaft bearings.

**1936**



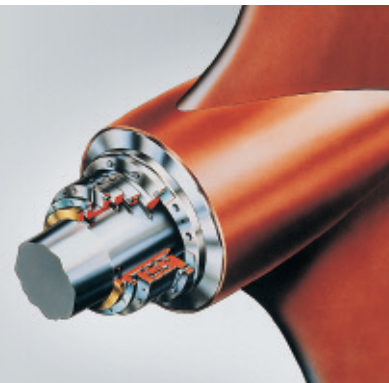
The Simplex Sterntube Seal; a prerequisite for the use of oil-lubricated propeller shaft bearings.

**1948**



The Simplex-Compact Seal continues the extraordinary advance of our seal concept throughout the world.

**1970**



Introduction of the  
3rd Generation  
Simplex-Compact SC 2000  
Sterntube Seal

**1992**



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# SIMPLEX-COMPACT 2000

## The Sealing Ring



The Simplex-Compact SC 2000 seal is the latest design, aimed at

- The improvement of environmental protection
- A further extension of lifetime
- An increase in operating safety.

The work entailed required a re-thinking of the present sealing ring technology and has led to further developments.

### Micro-Lubricating Film

The quality of a stern-tube seal depends ultimately on the technical quality of the contact area between the sealing ring and the liner, the so-called "sealing or lubricating gap".

Only an extremely thin and stable lubricating film ensures optimum seal performance.

### Intelligent Simplex-Compact Knee

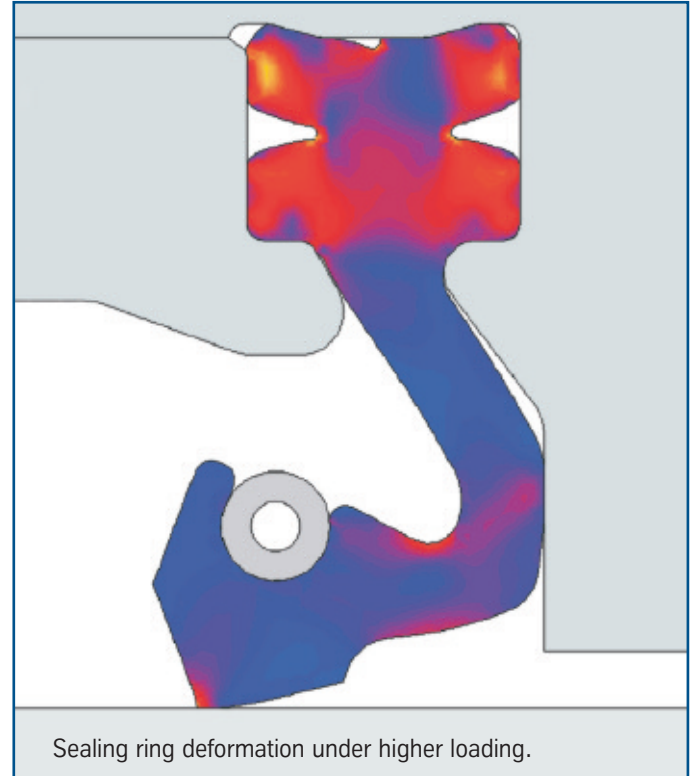
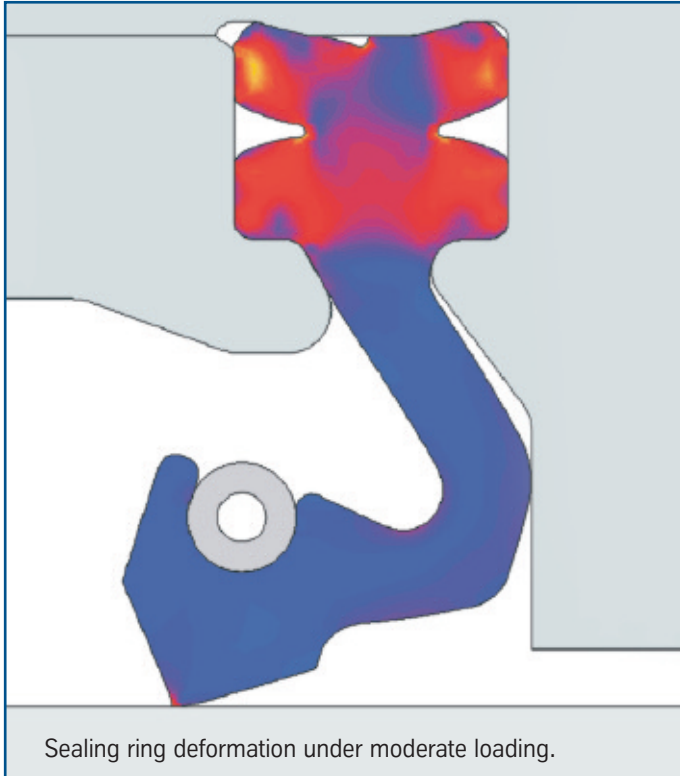
A special feature of the Simplex-Compact sealing rings is the knee shape which is essential for the synchronous following movement of the sealing ring with radial shaft movements.

A further development goal was to dispense with the inflexible lip support. This has resulted in an improvement of the SC 2000 sealing ring with its intelligent complex knee.

With varying vessel draughts the SC 2000 sealing ring is subjected to varying loads; the sealing ring knee absorbs this load by pressing itself against the back wall of the housing accordingly.

The newly developed knee and the modified lip of the SC 2000 sealing ring ensure that the load on the sealing ring does not increase proportionally with the hydrodynamic pressure.

The load on the sealing ring is reduced. Further, the forces are transferred into the sealing ring lip in such a way that the lip retains angular stability under varying pressures.



### The “CLICK” Clamping Concept

The “CLICK” concept is a design feature of the SC 2000 sealing allowing the sealing rings to be held in the respective housing rings during fitting; eliminating the risk of tilting, twisting or even falling out in the case of large-diameter seals.

This defined and dedicated positioning is a prerequisite for the correct behaviour of the “intelligent knee”, and vital for the micro-lubricating film between sealing ring lip edge and liner surface.

Because the “CLICK Clamping” ensures that the sealing ring is in one plane and not twisted, the lip edge contact area on the liner is kept to a minimum, and entry of water or exit of oil is prevented.

### High Operating Reliability

With the SC 2000 seal design we had introduced an entirely new concept and vastly improved performance data compared to previous generations of stern-tube seal. The SC 2000 set new standards in the industry.

Protection of the environment was a very important precondition for the new design and with this came an increase in operational reliability. The changes in design brought about an improved load characteristic on the sealing ring lip, resulting in a much longer operating life of the wear parts, i.e. liner and ring.

The pressure within the seal housing chamber is actively controlled by connecting the respective chamber via a pipe-line to either:

- A 30 l tank mounted at a defined height above the shaft in the engine room, or
- to our “Leakproof” system described in this brochure separately, or
- to the “Airspace” non-pollution sealing system.

# SIMPLEX-COMPACT 2000

## Sealing Ring Material Selection

For the SC 2000 sealing rings three different materials are used:

- The new Perbunan-S
- Viton-Plain
- Viton-Superlip

The choice of material for the sealing rings is based mainly on the ship's operating conditions.

The governing parameters are the shaft revolutions and the distance between the shaft centre (CL) and the load waterline (LWL). The new Perbunan-S is the result of very intensive development over a number of years. The improved performance is shown by the p-v diagram.

Perbunan-S may now be used instead of Viton-Plain for many applications.

For maintenance cases the Perbunan-S replaces the Perbunan of the earlier SC 1 generations.

### Selection of the Sealing Ring Material and Application of the Pressure Control System

The operating parameters of the Simplex-Compact seal are determined according to the following formulae:

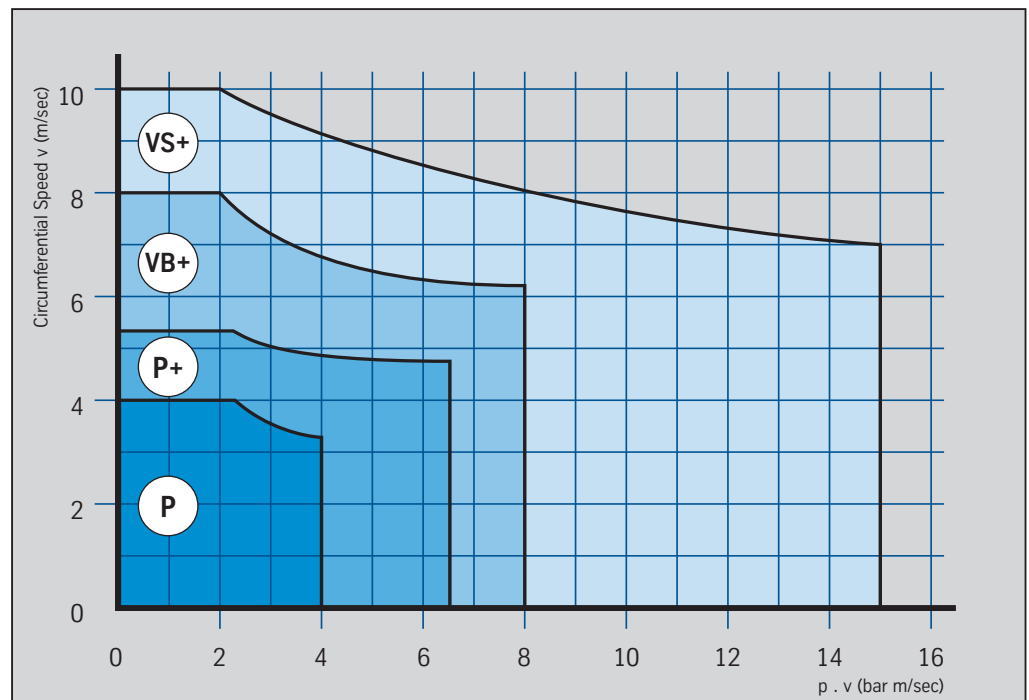
$$v = \frac{A \cdot \pi}{60,000} \cdot n \text{ (m/sec)}$$

$$p = 0.1 \cdot H + 0.25 \text{ (bar)}$$

where

- v** = Circumferential speed of the liner (m/sec)
- p** = Oil pressure in sterntube (bar)
- A** = Size of seal
- H** = Distance from shaft centre to load waterline (m)
- n** = Shaft revolutions (rpm)

In order to determine the correct material and the application of the pressure control system for the respective operating condition the rpm and distance between the shaft centre line (CL) and load water line (LWL) must be stated.



#### Material Description:

**Perbunan-S**  
Oil and seawater resistant nitrile rubber with excellent running properties.

**Viton-Plain**  
Oil and seawater resistant fluorene rubber for more severe operating conditions.

**Viton-Superlip**  
Oil and seawater resistant fluorene rubber with a special fabric in the sealing lip for severest operating conditions.

**P** Perbunan-S range without pressure control  
 $p_{max} = 1,0$  bar

**VB+** Viton-Plain range  
 $p_{max} = 2,4$  bar

**VS+** Viton-Superlip range  
 $p_{max} > 2,4$  bar

**P+** Perbunan-S range  
 $p_{max} = 1,6$  bar

+ = With pressure control in seal chamber by means of separate oil tank.

The result of the above formulae, transferred onto the graph on the right, determines the sealing ring material selection and the need for pressure control.



# SIMPLEX-COMPACT 2000 Type Designations

The various Simplex-Compact 2000 (SC 2) seal versions have the following code designations:

**Basic Types of Aft Seals:**

- A** - Without pressure control
- B** - With pressure control
- Z** - "Leakproof" with pressure control, circulator and reduced sterntube pressure
- M** - "Multisafe" with pressure control and spare ring
- S** - Non-Pollution Seal "Airspace" with air chamber and pressure control

**Basic Types of Forward Seals:**

- Z** - With circulator and oil tank
- ZW** - Water-lubricated with circulator and water tank

**Split Aft and Forward Seals:**

- E** - Fully split
- F** - Split liner only
- G** - Split housing only

**Options:**

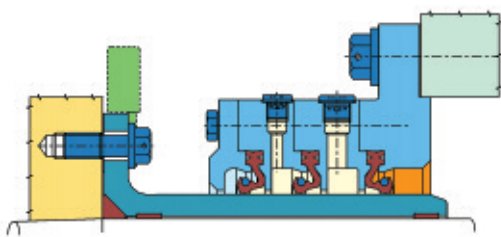
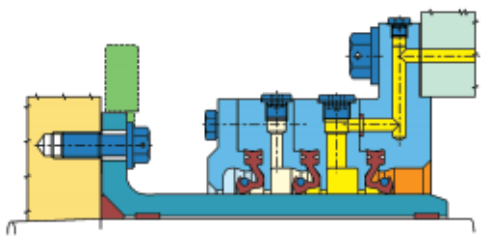
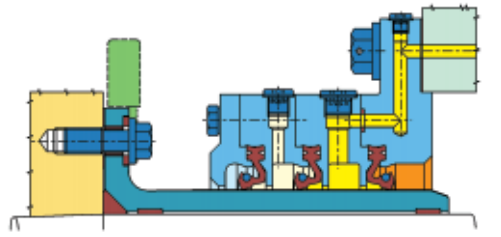
- C** - Ceramic-coated liner
- SI** - "Airspace" without draught sensor control
- SII** - "Airspace" with draught sensor control

**Note:**

- A number of combinations of the above mentioned types and options is possible in respect of the ship-specific application.
- Types SI, SII, E, F and ZW are not possible with option C.

## Aft Seals

Replacement of the sealing rings without drawing the shaft.

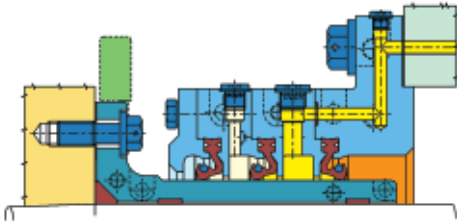
Aft Seal	Technical Specification	Description
<p><b>Aft SC 2 A Seal</b></p> 	<p>Radially Split Housing: Cast Iron Liner: CrNi steel Sealing Rings: Perbunan-S Viton-Plain (p-v diagram) Ring Anode: Zinc</p>	<p>The classic application of the SC 2 seal is shown: as used mainly for smaller shaft diameters.</p>
<p><b>Aft SC 2 B Seal</b></p> 	<p>Radially Split Housing: Cast Iron Liner: CrNi steel Sealing Rings: Perbunan-S Viton-Plain (p-v diagram) Pressure Control: 30 L tank Ring Anode: Zinc</p>	<p>A special feature is the pressure control of the aft seal by means of a 30 L tank located in the engine room. The pressure control was designed for medium and large shaft diameters. It is provided for seals size 400 upwards.</p>
<p><b>Aft SC 2 BC Seal</b></p> 	<p>Radially Split Housing: Cast Iron Liner: Special CrNiMo Steel/Ceramic Sealing Rings: Viton-Superlip Pressure Control: 30 L tank Ring Anode: Zinc</p>	<p>The highlight of this version is the ceramic-coated liner. This SC 2 version is the optimum in sterntube seal technology in respect of liner wear.</p>

# SIMPLEX-COMPACT 2000

## Type Designations

### Aft Seals

#### Aft SC 2 BE Seal



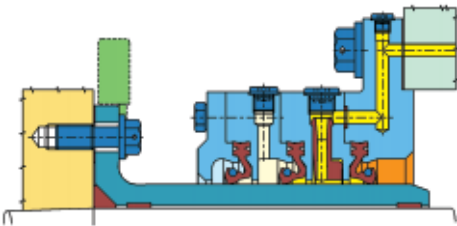
#### Technical Specification

Axially and Radially Split Housing:	Cast Iron
Axially Split Liner:	Special CrNiMo steel
Sealing Rings:	Perbunan-S Viton-Plain (p-v diagram)
Pressure Control:	30 L Tank
Ring Anode:	Zinc

#### Description

This seal is equipped with an axially split liner. Mounting or dismantling of the seal is accomplished without drawing the shaft (the aft housing is also axially split). This SC 2 version is mainly used where frequent service is expected. The axially split components allow easy and quick service.

#### Aft SC 2 Z Seal ("Leakproof")



#### Technical Specification

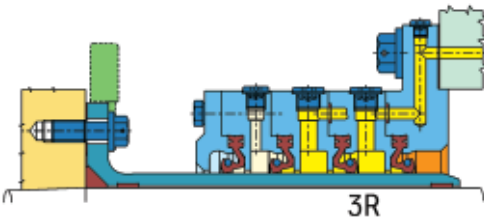
Radially Split Housing:	Cast Iron
Liner:	CrNi steel
Sealing Rings:	Perbunan-S Viton-Plain (p-v diagram)
Pressure Control:	50 L Tank
Ring Anode:	Zinc

#### Description

Special features of this SC 2 version are:

- Gravity tank below the ballast waterline (BWL) with bigger draughts.
- Aft SC 2 seal with circulator and pipe connection to circulation tank in engine room.
- Continuous monitoring.
- The pressure conditions within the seal chambers ensure environmental protection as well as extended lifetime of wear parts.

#### Aft SC 2 M Seal ("Multisafe")



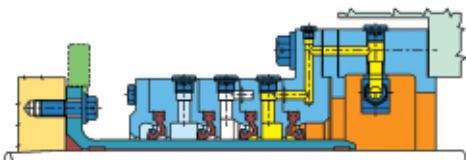
#### Technical Specification

Radially Split Housing:	Cast Iron
Liner:	CrNi steel
Sealing Rings:	Perbunan-S Viton-Plain (p-v diagram)
Pressure Control:	30 L Tank
Ring Anode:	Zinc

#### Description

This seal includes a sealing ring (3R) which faces the sterntube and which serves as a spare ring. Using appropriate bypasses it is possible to either let this spare ring run without load on the liner or to activate the sealing ring if necessary.

#### Aft SC 2 SI/SII Seal ("Airspace")



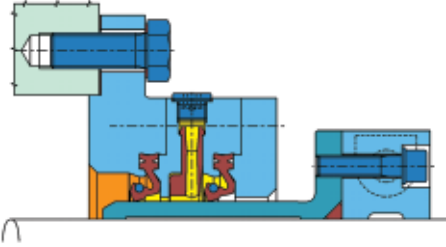
#### Technical Specification

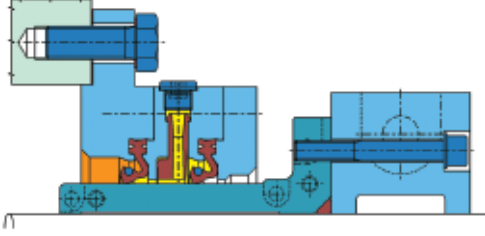
Radially Split Housing:	Bronze
Liner:	Special CrNiMo steel
Sealing Rings:	Viton-Plain
Pressure Control:	Air system and 30/50 L Tank
Ring Anode:	Zinc

#### Description

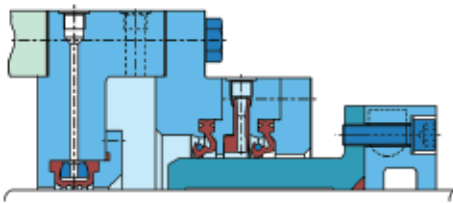
The SC 2 SI/SII "Airspace" seal is the latest in the Simplex-Compact seal range. A 4-ring sealing system, with a dedicated "Airspace" chamber allowing for absolute separation of sterntube oil and water.

**Forward Seals for Oil Lubricated Sterntubes**

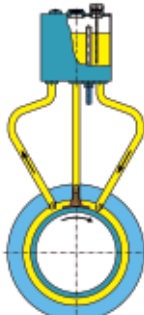
<p><b>Forward SC 2 Z Seal</b></p>	<p><b>Technical Specification</b></p>	<p><b>Description</b></p>
	<p>Radially Split Housing: Cast Iron Liner: Special Cast Iron Sealing Rings: Perbunan-S Viton-Plain (p-v diagram)</p> <p>Axially Split Clamp Ring : Cast Iron</p>	<p>The forward seal is independent of the aft seal, and can be combined with each of the above mentioned aft seals.</p> <p>With Circulator and 15/30 L Tank</p>

<p><b>Forward SC 2 FZ Seal</b></p>	<p><b>Technical Specification</b></p>	<p><b>Description</b></p>
	<p>Radially Split Housing: Cast Iron Axially Split Liner: Special Cast Iron Sealing Rings: Perbunan-S Viton-Plain (p-v diagram)</p> <p>Axially Split Clamp Ring : Cast Iron</p>	<p>For the forward seal the axially split liner is shifted on the shaft and also mounted or dismantled without any shaft work being required (if necessary the forward housing may also be axially split).</p> <p>With Circulator and 15/30 L Tank</p>

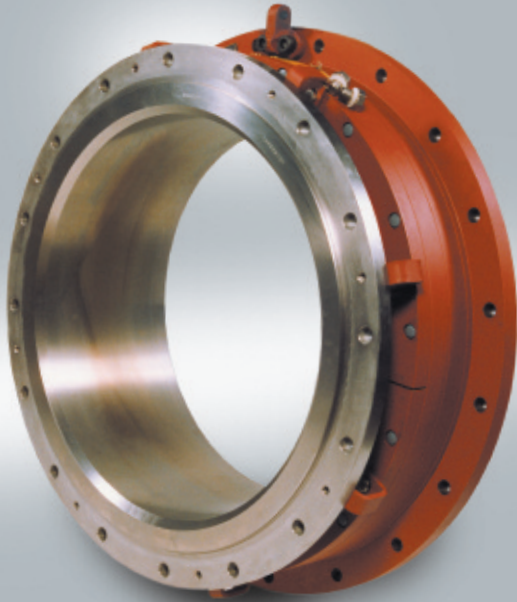
**Forward Seals for Water Lubricated Sterntubes**

<p><b>Forward SC 2 ZW Seal</b></p>	<p><b>Technical Specification</b></p>	<p><b>Description</b></p>
	<p>Radially Split Housing: Bronze Liner: CrNi Steel Sealing Rings: Viton-Plain</p> <p>Axially Split Clamp Ring : Chrome Steel</p>	<p>For open-ended water-lubricated stern-tubes the forward seal type SC 2 ZW was developed.</p> <p>This SC 2 seal is equipped with a "Pneumostop" in a special housing ring, which allows replacement of the sealing rings without drydocking or any shaft work (if necessary the liner and the forward housing may also be axially split).</p> <p>With Circulator and 20/30 L Tank</p>

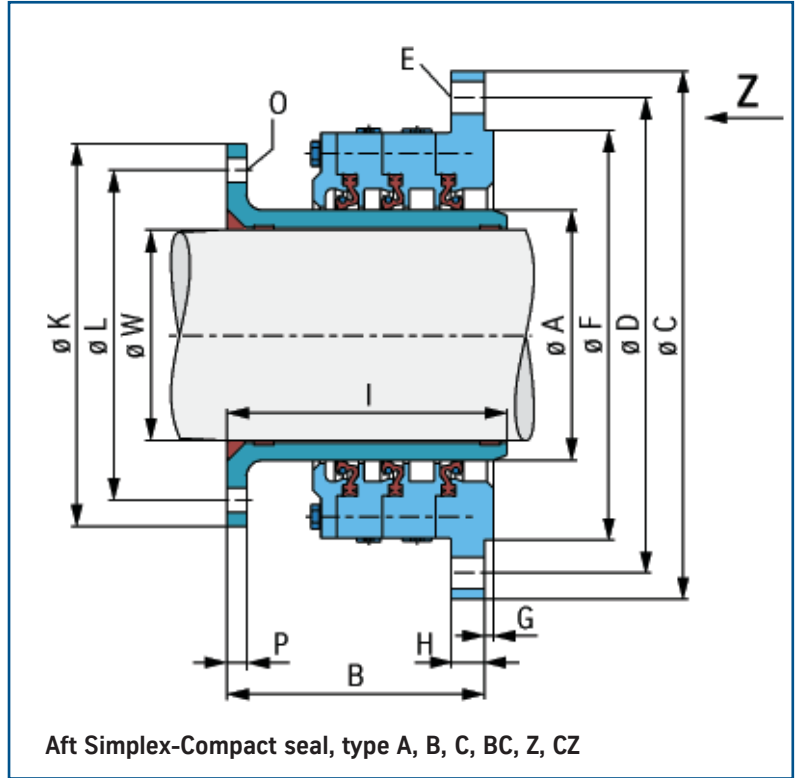
**Circulator with Tank for Forward Seal**

	<p><b>Description</b></p> <p>The circulator was included in the forward seal in 1972 and has been very successful in service. It ensures that, with the addition of a small surface-cooled tank, the volume of oil in the chamber between the sealing rings is permanently circulated during operation without the need for a supplementary lubricating unit. This results in improved cooling as well as constant lubrication of the seal</p>	<p>with perfectly clean oil ensuring that a deposit of oil residues in way of the sealing ring lip is avoided.</p> <p>The advantages naturally lead to an extension of the service life of the sealing rings in particular through the temperature reduction achieved.</p> <p>With water lubricated sterntube seals, the seal chamber and the tank is filled with fresh water.</p>
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# SIMPLEX-COMPACT 2000 Non-Split Version



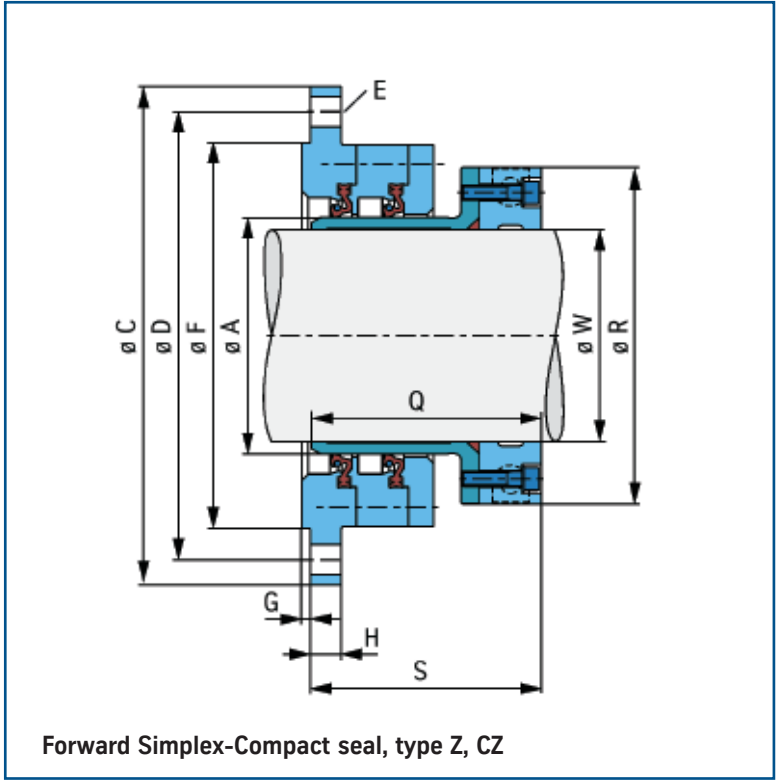
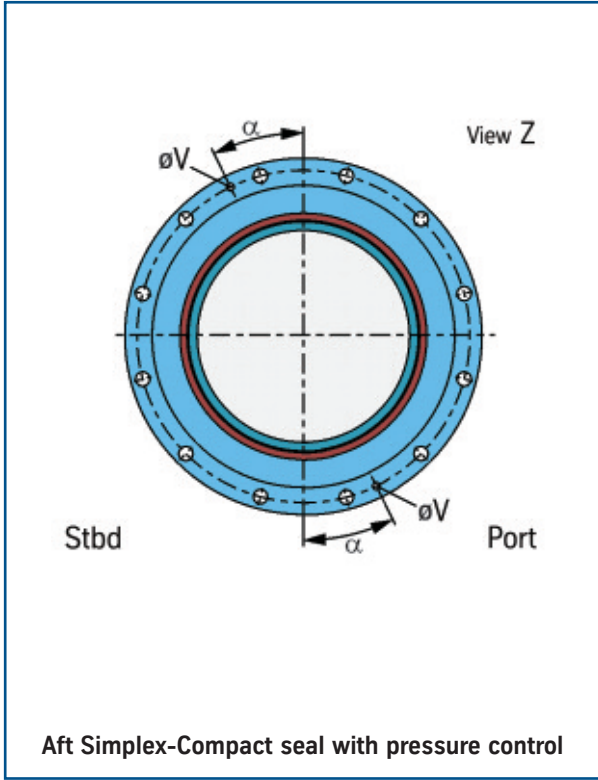
Simplex-Compact



Non-Split Version	A	125	140	160	180	200	220	240	260	280	300	330	355	380	400	420	450	480
W - min		80	111	126	146	166	186	206	226	246	266	286	316	340	363	382	401	429
W - max		110	125	145	165	185	205	225	245	265	285	315	339	362	381	400	428	457
B*		162	162	162	162	162	162	177	177	177	177	177	197	197	202	202	227	227
C		275	290	310	330	350	370	425	445	465	485	515	565	590	610	630	675	705
D		245	260	280	300	320	340	390	410	430	450	480	525	550	570	590	630	660
E		8x M12	8x M12	8x M12	8x M12	8x M12	8x M12	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20
F		210	225	245	265	285	305	345	365	385	405	435	475	500	520	540	575	605
G		6	6	6	6	6	6	6	6	6	6	6	7	7	7	7	8	8
H		15	15	15	15	15	15	20	20	20	20	20	25	25	25	25	30	30
I		180	180	180	180	180	180	191	191	191	191	191	212	212	217	217	241	241
K		186	202	222	260	280	300	320	340	360	375	425	450	480	500	520	550	590
L		164	180	200	230	250	270	290	310	330	346	390	416	440	460	486	510	550
O		8x M8	8x M8	8x M8	8x M12	8x M12	8x M12	8x M12	8x M12	12x M12	12x M12	12x M12	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20
P		12	12	12	12	12	12	15	15	15	15	15	15	15	20	20	20	20
Q		149	149	149	149	149	149	159	159	164	164	164	185	185	185	190	205	205
R		190	210	230	250	260	280	300	320	350	370	400	430	460	480	500	530	560
S**		142	142	142	142	142	142	156	156	161	161	161	187	187	187	192	208	208
α		34	34	34	34	34	34	26	26	26	26	26	26	26	26	26	35	35
V		8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	12	12
(kg) Aft Seal		26	32	32	36	37	42	59	64	69	76	92	122	130	135	144	203	215
(kg) Fwd. Seal		14	29	29	32	33	37	52	55	62	70	84	109	119	120	131	170	180

\*) incl. 2x1mm packing    \*\*) incl. 1mm packing

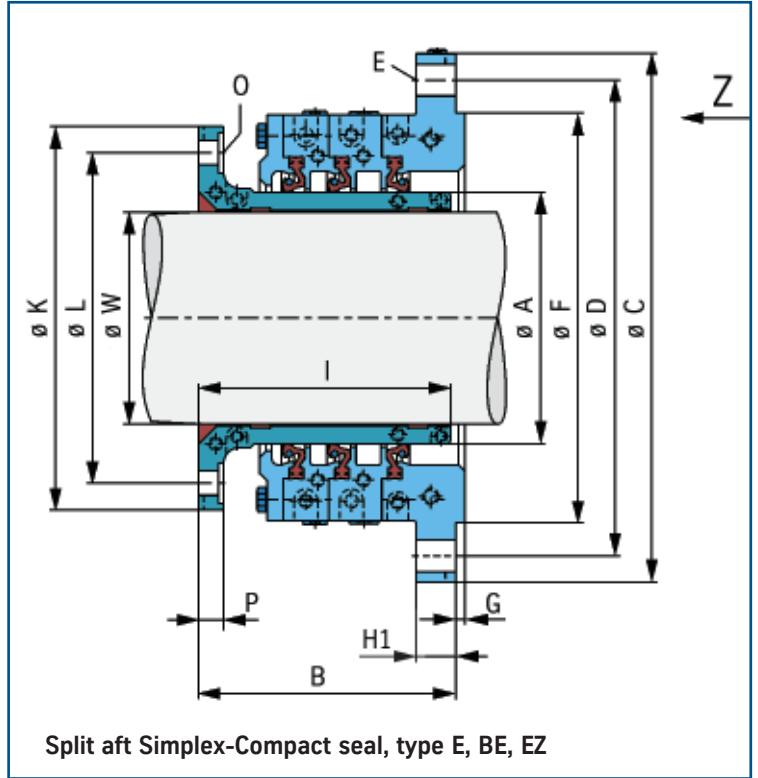
Above weights may vary according to seal execution.



500	530	560	600	630	670	710	750	800	850	900	950	975	1000	1030	1060	1090	1120	1180	1250
458	477	505	533	571	599	636	673	711	757	804	852	897	928	953	983	1008	1033	1057	1117
476	504	532	570	598	635	672	710	756	803	851	896	927	952	982	1007	1032	1056	1116	1176
227	227	242	242	247	247	282	282	312	312	332	332	332	332	356	356	356	356	356	372
725	755	820	860	890	930	990	1030	1090	1140	1200	1250	1300	1300	1400	1400	1460	1460	1520	1595
680	710	765	805	835	875	930	970	1030	1080	1135	1185	1235	1235	1325	1325	1385	1385	1445	1520
12x	12x	12x	12x	12x	12x	16x	16x	20x	20x	20x	20x	20x	20x	24x	24x	24x	24x	24x	24x
M20	M20	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M30	M30	M30	M30	M30	M30
625	655	700	740	770	810	865	905	960	1010	1065	1115	1165	1165	1245	1245	1305	1305	1365	1440
8	8	9	9	9	9	10	10	10	10	11	11	11	11	11	11	11	11	11	12
30	30	35	35	35	35	40	40	40	40	45	45	45	45	50	50	50	50	50	50
241	241	253	253	258	258	301	301	338	338	362	362	362	362	381	381	439	381	381	406
600	630	675	700	760	820	840	885	945	1000	1070	1130	1170	1170	1230	1230	1300	1300	1360	1430
560	590	630	660	710	750	790	836	890	950	1010	1070	1110	1110	1170	1170	1230	1230	1290	1360
12x	12x	12x	12x	12x	12x	12x	16x	16x	16x	16x	16x	20x	20x	20x	20x	20x	20x	24x	24x
M20	M20	M20	M20	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M30	M30	M30	M30
20	20	20	20	25	25	25	25	30	30	35	35	35	35	35	35	40	40	40	40
205	205	221	221	238	238	268	318	337	337	349	349	349	349	389	389	399	399	399	408
580	620	650	690	720	760	830	870	915	974	1027	1076	1130	1130	1200	1200	1260	1260	1340	1410
208	208	226	226	243	243	271	321	338	338	354	354	354	354	395	395	406	406	406	413
35	35	35	35	35	35	18	18	14	14	14	14	18	18	18	18	18	18	15	15
12	12	12	12	12	12	12	12	12	12	12	12	12	12	15	15	15	15	15	15
220	230	294	325	392	417	504	529	655	735	858	933	892	1000	1118	1205	1600	1385	1477	1783
189	212	262	290	331	371	477	580	668	736	825	890	885	998	1136	1222	1595	1360	1495	1803

# SIMPLEX-COMPACT 2000

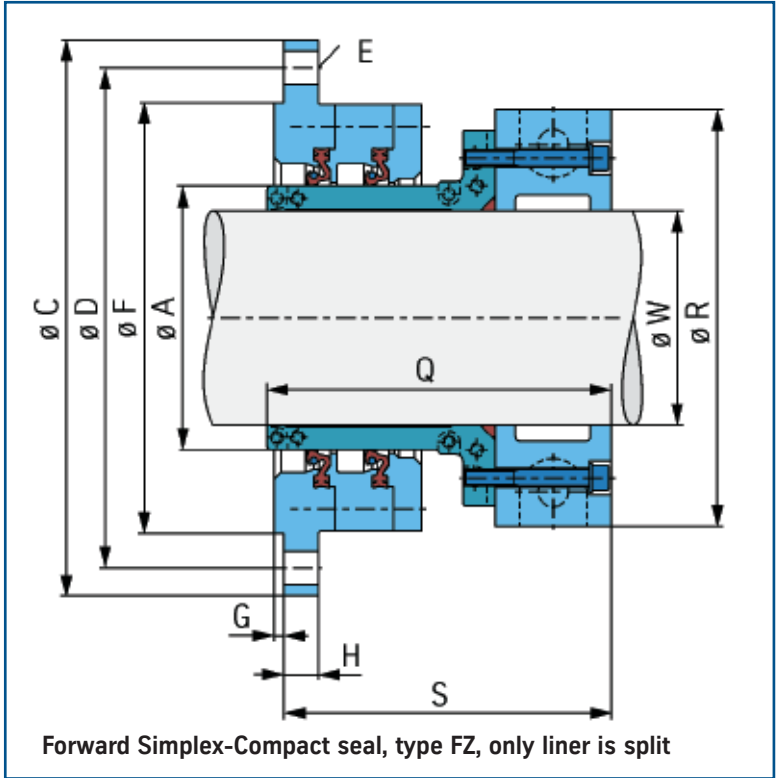
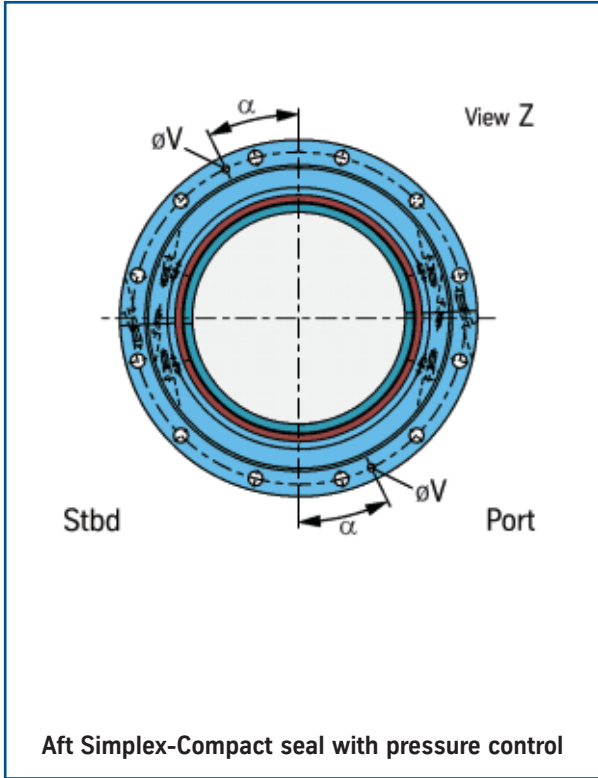
## Split Version



Split Version	A	140	160	180	200	220	240	260	280	300	330	355	380	400	420
	W-min	90	105	125	145	165	185	205	225	245	265	295	320	345	365
W-max	104	124	144	164	184	204	224	244	264	294	319	344	364	384	404
B*	162	162	162	162	162	177	177	177	177	177	197	197	202	202	202
C	290	310	330	350	370	425	445	465	485	515	565	590	610	630	650
D	260	280	300	320	340	390	410	430	450	480	525	550	570	590	610
E	8x M12	8x M12	8x M12	8x M12	8x M12	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	12x M20	12x M20	12x M20
F	225	245	265	285	305	345	365	385	405	435	475	500	520	540	560
G	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7
H1	23	23	23	23	23	24	24	24	24	24	30	30	30	30	30
I	158	158	158	158	158	172	172	172	172	172	191	191	196	196	196
K	202	222	260	280	300	320	340	360	375	425	450	480	500	520	540
L	180	200	230	250	270	290	310	330	346	390	416	440	460	486	512
O	8x M8	8x M8	8x M12	8x M12	8x M12	8x M12	8x M12	12x M12	12x M12	12x M12	12x M16	12x M16	12x M16	12x M16	12x M16
P	14	14	18	18	18	19	19	19	19	19	19	19	19	19	19
Q	177	177	183	183	196	211	211	211	211	230	248	248	248	248	248
R	230	244	270	280	320	340	360	376	392	436	466	490	510	522	534
S**	158	158	164	164	177	195	195	195	195	214	236	236	231	231	231
H	15	15	15	15	15	20	20	20	20	20	25	25	25	25	25
α	34	34	34	34	34	26	26	26	26	26	26	26	26	26	26
V	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
(kg) Aft Seal	48	48	55	55	57	86	92	99	104	123	156	176	180	188	198
(kg) Fwd. Seal	40	40	48	48	63	81	88	93	98	127	160	171	183	192	202

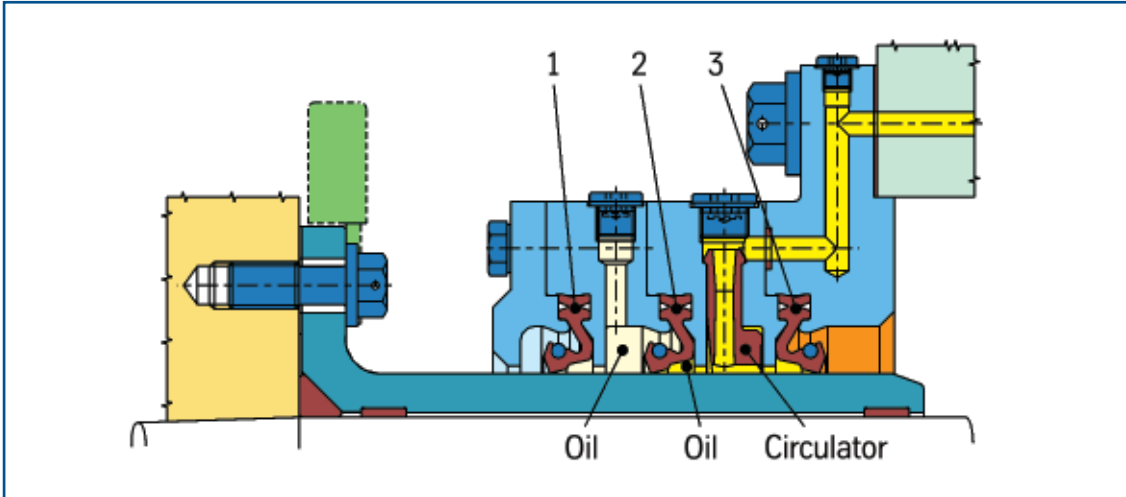
\*) incl. 2x1mm packing    \*\*) incl. 1mm packing

Above weights may vary according to seal execution.



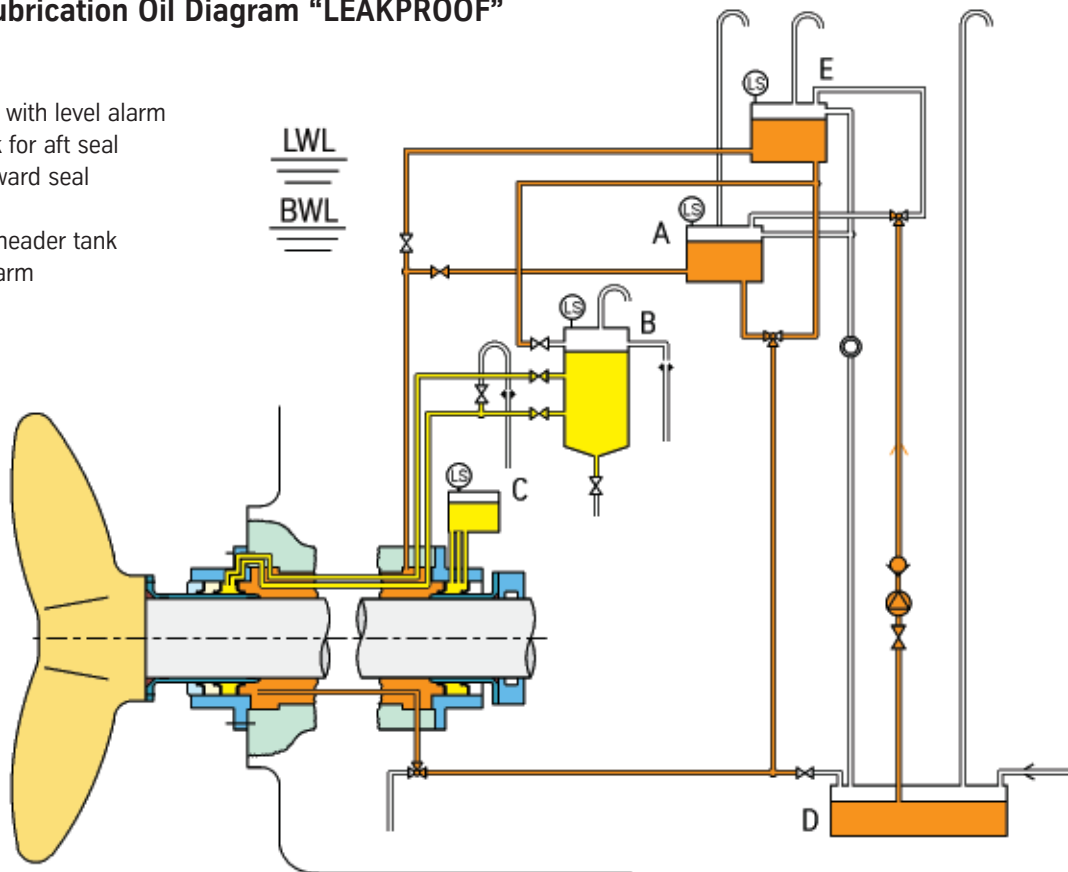
450	480	500	530	560	600	630	670	710	750	800	850	900	950	1000
385	416	446	465	495	524	559	589	629	663	703	753	802	852	902
415	445	464	494	523	558	588	628	662	702	752	801	851	901	950
227	227	227	227	242	242	247	247	282	282	312	312	332	332	332
675	705	725	755	820	860	890	930	990	1030	1090	1140	1200	1250	1300
630	660	680	710	765	805	835	875	930	970	1030	1080	1135	1185	1235
12x	12x	12x	12x	12x	12x	12x	12x	16x	16x	20x	20x	20x	20x	20x
M20	M20	M20	M20	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24
575	605	625	655	700	740	770	810	865	905	960	1010	1065	1115	1165
8	8	8	8	9	9	9	9	10	10	10	10	11	11	11
30	30	30	30	35	35	35	35	40	40	40	40	45	45	45
220	220	220	220	235	235	240	240	275	275	303	303	320	320	320
550	590	600	630	675	700	760	820	840	885	945	1000	1070	1130	1170
510	550	560	590	630	660	710	750	790	836	890	950	1010	1070	1110
12x	12x	12x	12x	12x	12x	12x	12x	12x	16x	16x	16x	16x	16x	20x
M16	M20	M20	M20	M20	M20	M24	M24	M24	M24	M24	M24	M24	M24	M24
22	22	22	22	25	25	25	25	27	27	34	34	36	36	36
279	279	279	279	317	319	319	391	425	425	475	475	489	567	567
530	560	580	620	670	704	736	790	834	868	940	986	1030	1116	1166
263	263	263	263	307	307	307	379	413	413	457	457	472	550	550
30	30	30	30	35	35	35	35	40	40	40	40	45	45	45
35	35	35	35	35	35	35	35	18	18	14	14	14	14	18
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
243	261	256	284	343	399	413	470	583	646	809	860	991	1057	1105
225	236	238	265	357	404	417	569	685	738	961	1030	1138	1536	1616

# SIMPLEX-COMPACT 2000 "LEAKPROOF" Seal and Lubrication Oil Diagram



## Sterntube Lubrication Oil Diagram "LEAKPROOF"

- A = Header tank with level alarm
- B = Settling tank for aft seal
- C = Tank for forward seal
- D = Sump tank
- E = Emergency header tank with level alarm



With the "Leakproof" system the sterntube gravity tank is arranged in such a way that the pressure of lubrication oil in the sterntube is slightly lower than the seawater pressure.

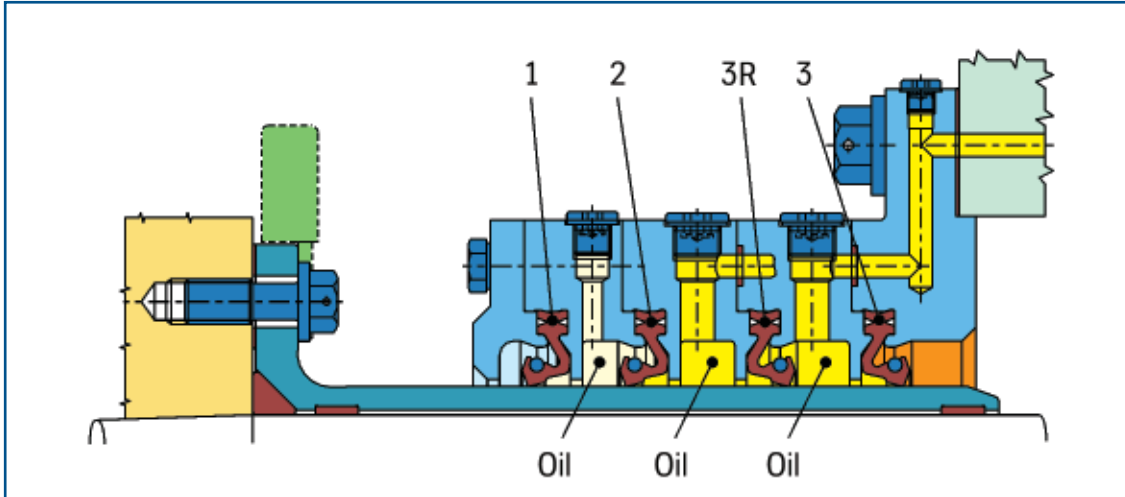
The oil chamber of the seal is connected to a 50 l settling tank by means of two pipes leading through the sterntube.

With the shaft rotating, oil is circulated by the circulator and any

water entering the oil chamber as a result of extreme operating conditions of the vessel will be diverted through the pipeline to the settling tank and can be drained into the bilge.

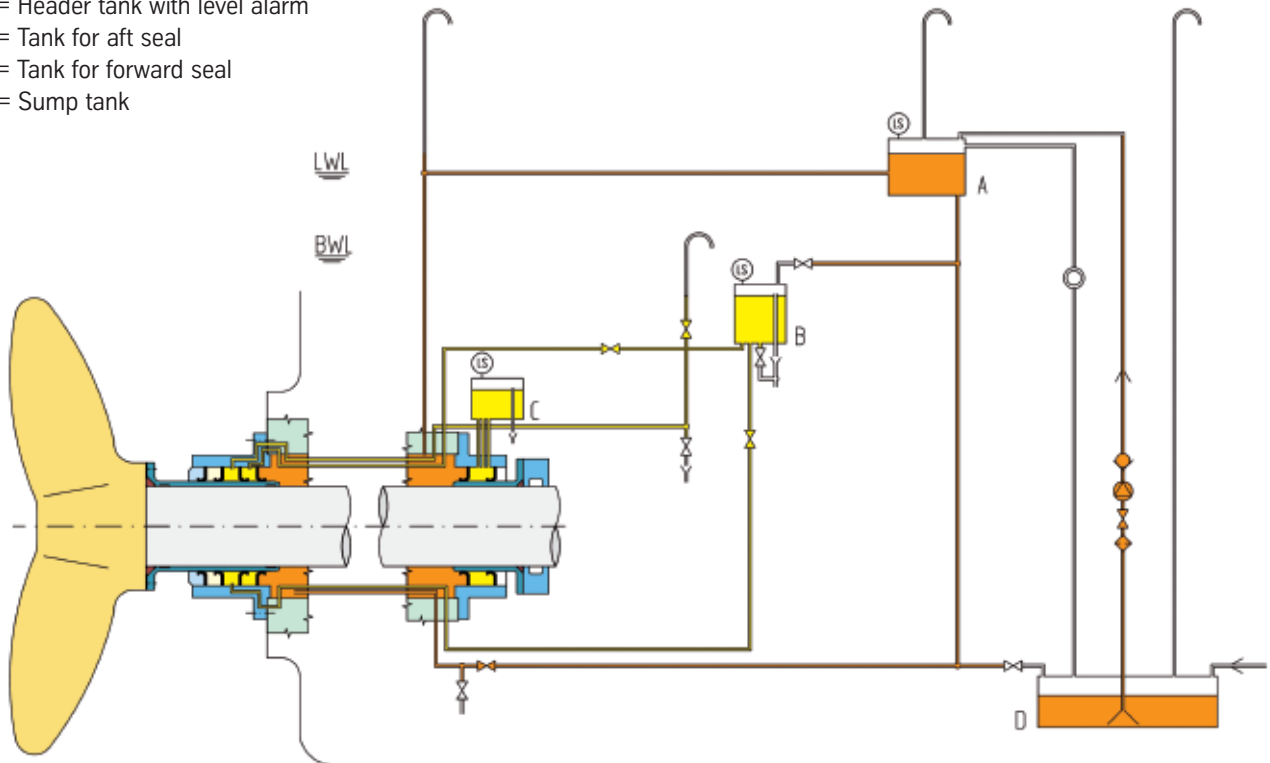


# “MULTISAFE” Seal and Lubrication Oil Diagram



## Stern tube Lubrication Oil Diagram “MULTISAFE”

- A = Header tank with level alarm
- B = Tank for aft seal
- C = Tank for forward seal
- D = Sump tank

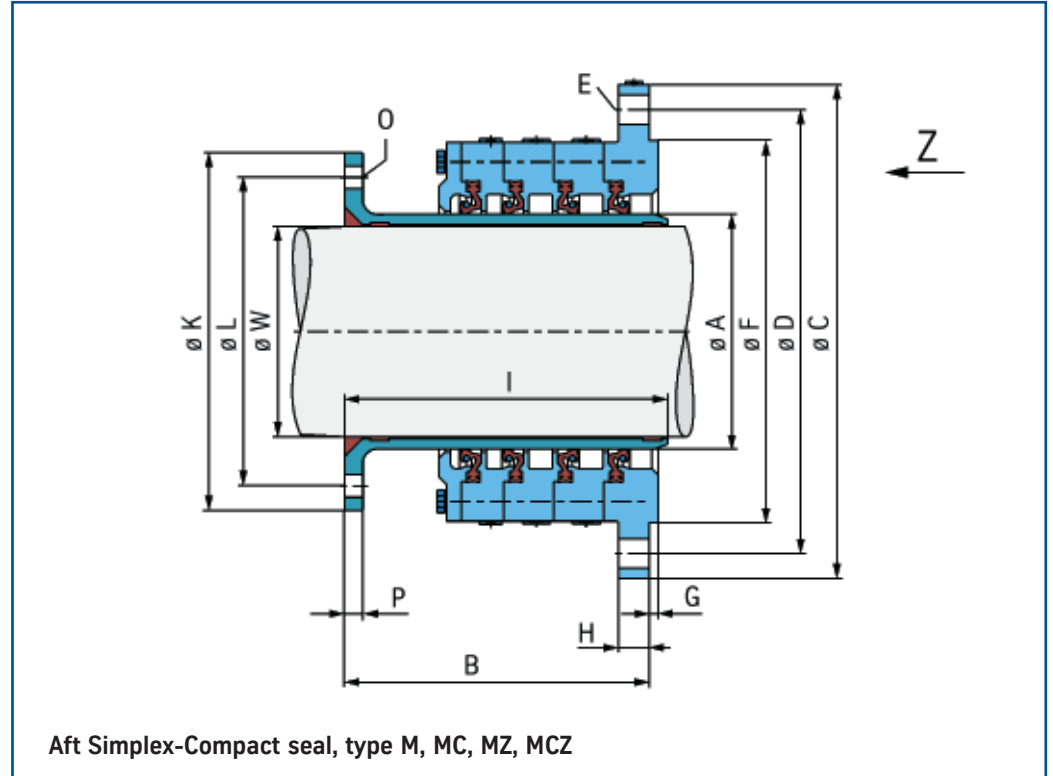


The design of the aft “Multisafe” Simplex-Compact seal with the four SC 2 sealing rings is the result of specific market demands.

This seal includes a sealing ring (3R) which faces the stern tube and which serves as a spare ring. Using appropriate bypasses

it is possible to either let this spare ring run without load on the liner or to activate the ring if necessary.

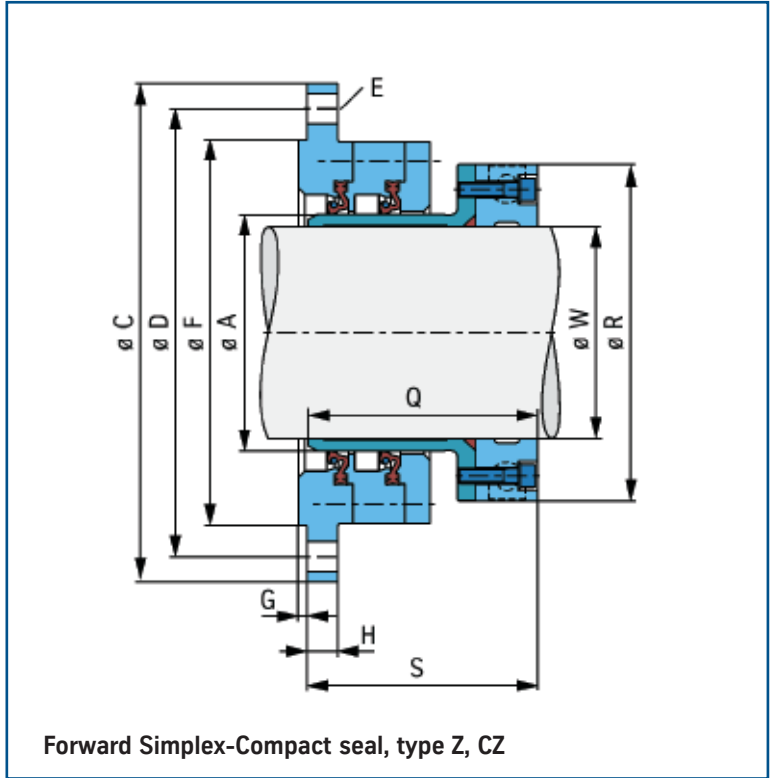
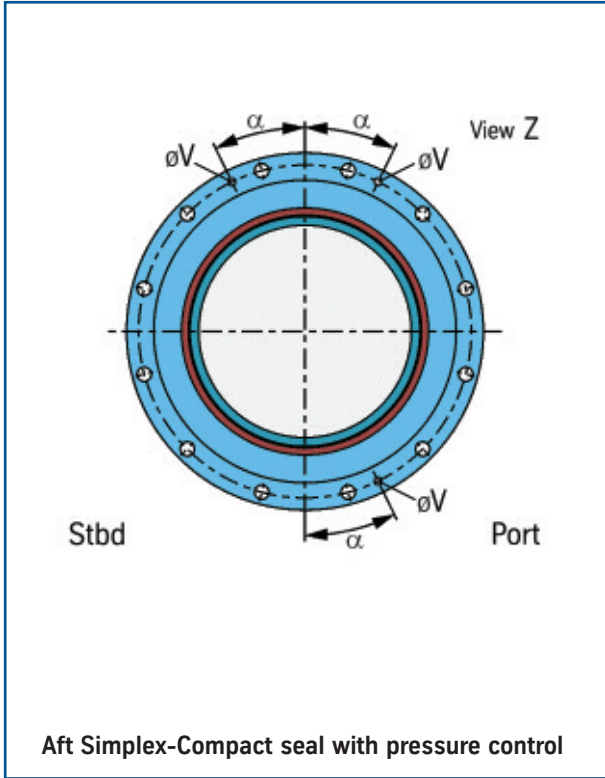
# SIMPLEX-COMPACT 2000 "MULTISAFE" Non-Split Version



Non-Split Version	A	125	140	160	180	200	220	240	260	280	300	330	355	380	400	420	450	480	500
	W-min	80	111	126	146	166	186	206	226	246	266	286	316	340	363	382	401	429	458
W-max	110	125	145	165	185	205	225	245	265	285	315	339	362	381	400	428	457	476	
B*	202	202	202	205	205	205	228	228	228	228	228	247	247	252	252	277	277	277	
C	275	290	310	330	350	370	425	445	465	485	515	565	590	610	630	675	705	725	
D	245	260	280	300	320	340	390	410	430	450	480	525	550	570	590	630	660	680	
E	8x M12	8x M12	8x M12	8x M12	8x M12	8x M12	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	
F	210	225	245	265	285	305	345	365	385	405	435	475	500	520	540	575	605	625	
G	6	6	6	6	6	6	6	6	6	6	6	7	7	7	7	8	8	8	
H	15	15	15	15	15	15	20	20	20	20	20	25	25	25	25	30	30	30	
I	220	220	220	223	223	223	242	242	242	242	242	262	262	267	267	291	291	291	
K	184	200	220	260	280	300	320	340	360	375	425	450	480	500	520	550	590	600	
L	164	180	200	230	250	270	290	310	330	346	390	416	440	460	486	510	550	560	
O	8x M8	8x M8	8x M8	8x M12	8x M12	8x M12	8x M12	8x M12	12x M12	12x M12	12x M12	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	
P	12	12	12	12	12	12	15	15	15	15	15	15	15	20	20	20	20	20	
Q	149	149	149	149	149	149	159	159	164	164	164	185	185	185	190	205	205	205	
R	190	210	230	250	260	280	300	320	350	370	400	430	460	480	500	530	560	580	
S**	142	142	142	142	142	142	156	156	161	161	161	187	187	187	192	208	208	208	
α	34	34	34	34	34	34	26	26	26	26	26	26	26	26	26	35	35	35	
V	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	12	12	12	
(kg) Aft Seal	33	36	40	44	45	51	72	77	83	92	110	146	157	162	173	240	255	259	
(kg) Fwd. Seal	14	23	29	32	33	37	52	55	62	70	84	109	119	120	131	170	180	189	

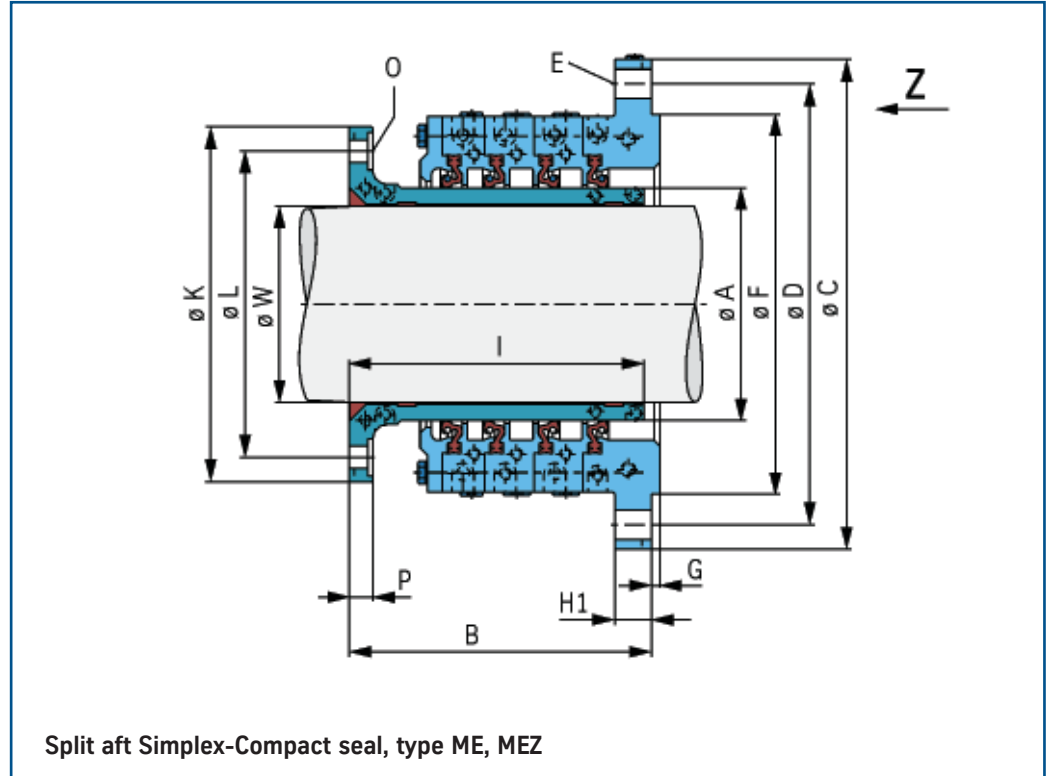
\*) incl. 2x1mm packing    \*\*) incl. 1mm packing

Above weights may vary according to seal execution.



530	560	600	630	670	710	750	800	850	900	950	975	1000	1030	1060	1090	1120	1180	1250
477	505	533	571	599	636	673	711	757	804	852	897	928	953	983	1008	1033	1057	1117
504	532	570	598	635	672	710	756	803	851	896	927	952	982	1007	1032	1056	1116	1176
277	293	293	298	298	332	332	367	367	389	389	389	389	414	414	414	414	414	434
755	820	860	890	930	990	1030	1090	1140	1200	1250	1300	1300	1400	1400	1460	1460	1520	1595
710	765	805	835	875	930	970	1030	1080	1135	1185	1235	1235	1325	1325	1385	1385	1445	1520
12x	12x	12x	12x	12x	16x	16x	20x	20x	20x	20x	20x	20x	24x	24x	24x	24x	24x	24x
M20	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M30	M30	M30	M30	M30	M30
655	700	740	770	810	865	905	960	1010	1065	1115	1165	1165	1245	1245	1305	1305	1365	1440
8	9	9	9	9	10	10	10	10	11	11	11	11	11	11	11	11	11	12
30	35	35	35	35	40	40	40	40	45	45	45	45	50	50	50	50	50	50
291	304	304	309	309	351	351	393	393	419	419	419	419	439	439	381	439	439	468
630	675	700	760	820	840	885	945	1000	1070	1130	1170	1170	1230	1230	1300	1300	1360	1430
590	630	660	710	750	790	836	890	950	1010	1070	1110	1110	1170	1170	1230	1230	1290	1360
12x	12x	12x	12x	12x	12x	16x	16x	16x	16x	16x	20x	20x	20x	20x	20x	20x	24x	24x
M20	M20	M20	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M30	M30	M30	M30
20	20	20	25	25	25	25	30	30	35	35	35	35	35	35	40	40	40	40
205	221	221	238	238	268	318	337	337	349	349	349	349	389	389	399	399	399	408
620	650	690	720	760	830	870	915	974	1027	1076	1130	1130	1200	1200	1260	1260	1340	1410
208	226	226	243	243	271	321	338	338	354	354	354	354	395	395	406	406	406	413
35	35	35	35	35	18	18	14	14	14	14	18	18	18	18	18	18	15	15
12	12	12	12	12	12	12	12	12	12	12	12	12	15	15	15	15	15	15
330	351	390	456	489	591	621	769	861	994	1077	1023	1140	1292	1362	2010	1521	1640	1961
212	262	290	331	371	477	580	668	736	825	890	885	998	1136	1222	1595	1360	1495	1803

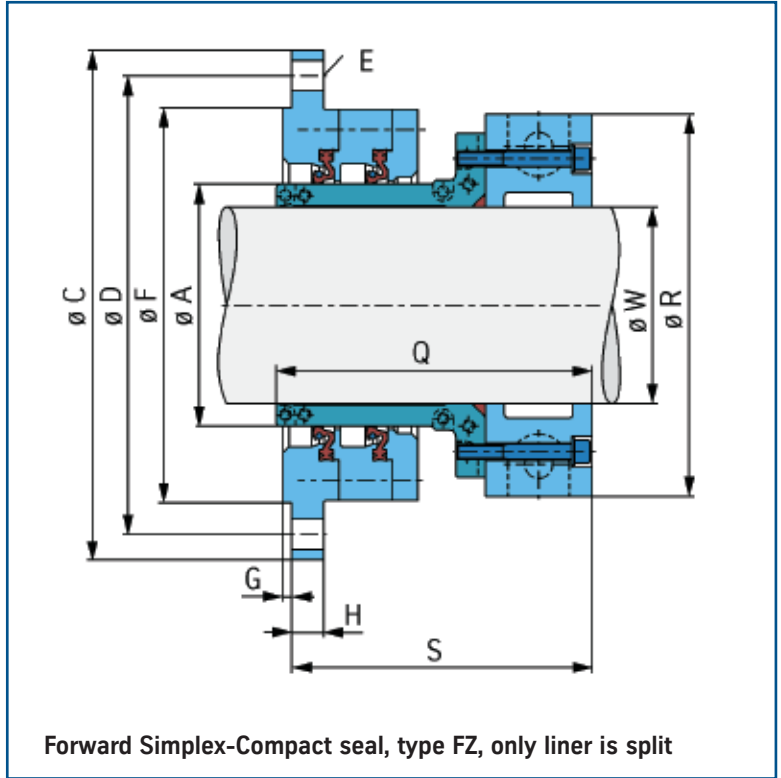
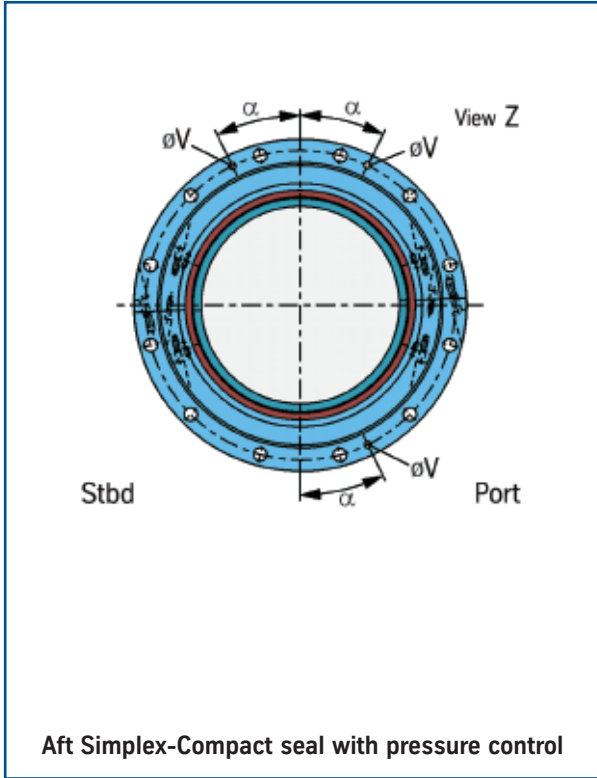
# SIMPLEX-COMPACT 2000 "MULTISAFE" Split Version



Split Version	A	140	160	180	200	220	240	260	280	300	330	355	380	400	
	W-min	90	105	125	145	165	185	205	225	245	265	295	320	345	
	W-max	104	124	144	164	184	204	224	244	264	294	319	344	364	
	B*	202	202	205	205	205	228	228	228	228	228	247	247	252	
	C	290	310	330	350	370	425	445	465	485	515	565	590	610	
	D	260	280	300	320	340	390	410	430	450	480	525	550	570	
	E	8x M12	8x M12	8x M12	8x M12	8x M12	12x M16	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	12x M20
	F	225	245	265	285	305	345	365	385	405	435	475	500	520	
	G	6	6	6	6	6	6	6	6	6	6	7	7	7	
	H1	23	23	23	23	23	24	24	24	24	24	30	30	30	
	I	198	198	201	201	201	223	223	223	223	223	241	241	246	
	K	202	222	260	280	300	320	340	360	375	425	450	480	500	
	L	180	200	230	250	270	290	310	330	346	390	416	440	460	
	O	8x M8	8x M8	8x M12	8x M12	8x M12	8x M12	8x M12	12x M12	12x M12	12x M12	12x M16	12x M16	12x M16	
P	14	14	18	18	18	19	19	19	19	19	19	19	19		
Q	177	177	183	183	196	211	211	211	211	230	248	248	248		
R	230	244	270	280	320	340	360	376	392	436	466	490	510		
S**	158	158	164	164	177	195	195	195	195	214	236	236	231		
H	15	15	15	15	15	20	20	20	20	20	25	25	25		
α	34	34	34	34	34	26	26	26	26	26	26	26	26		
V	8	8	8	8	8	8	8	8	8	8	8	8	8		
(kg) Aft Seal	50	57	65	72	76	104	112	119	126	144	188	199	213		
(kg) Fwd. Seal	40	40	48	48	63	81	88	93	98	127	160	171	183		

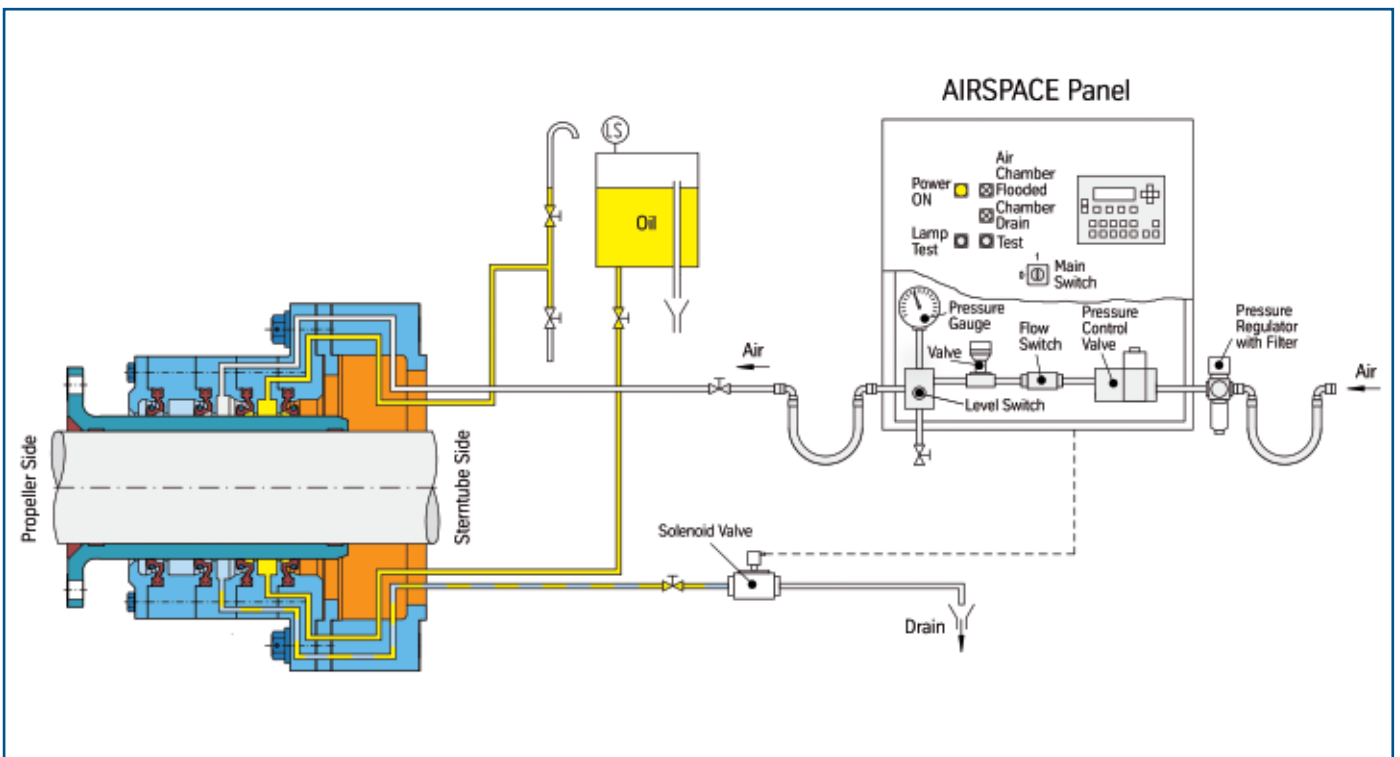
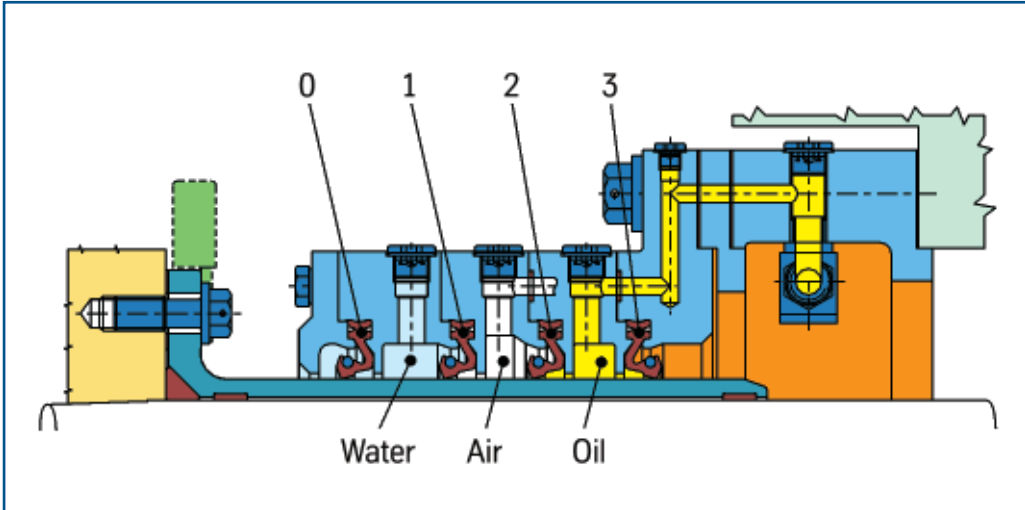
\*) incl. 2x1mm packing    \*\*) incl. 1mm packing

Above weights may vary according to seal execution.



420	450	480	500	530	560	600	630	670	710	750	800	850	900	950	1000
365	385	416	446	465	495	524	559	589	629	663	703	753	802	852	902
384	415	445	464	494	523	558	588	628	662	702	752	801	851	901	950
252	277	277	277	277	293	293	298	298	332	332	367	367	389	389	389
630	675	705	725	755	820	860	890	930	990	1030	1090	1140	1200	1250	1300
590	630	660	680	710	765	805	835	875	930	970	1030	1080	1135	1185	1235
12x	12x	12x	12x	12x	12x	12x	12x	12x	16x	16x	20x	20x	20x	20x	20x
M20	M20	M20	M20	M20	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M24
540	575	605	625	655	700	740	770	810	865	905	960	1010	1065	1115	1165
7	8	8	8	8	9	9	9	9	10	10	10	10	11	11	11
30	30	30	30	30	35	35	35	35	40	40	40	40	45	45	45
246	270	270	270	270	286	286	291	291	325	325	358	358	377	377	377
520	550	590	600	630	675	700	760	820	840	885	945	1000	1070	1130	1170
486	510	550	560	590	630	660	710	750	790	836	890	950	1010	1070	1110
12x	12x	12x	12x	12x	12x	12x	12x	12x	12x	16x	16x	16x	16x	16x	20x
M16	M16	M20	M20	M20	M20	M20	M24	M24	M24	M24	M24	M24	M24	M24	M24
19	22	22	22	22	25	25	25	25	27	27	34	34	36	36	36
248	279	279	279	279	317	319	319	391	425	425	475	475	489	567	567
522	530	560	580	620	670	704	736	790	834	868	940	986	1030	1116	1166
231	263	263	263	263	307	307	307	379	413	413	457	457	472	550	550
25	30	30	30	30	35	35	35	35	40	40	40	40	45	45	45
26	35	35	35	35	35	35	35	35	18	18	14	14	14	14	18
8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
217	266	284	290	309	387	426	450	497	620	668	813	819	990	1007	1094
192	225	236	238	265	357	404	417	569	685	738	961	1030	1138	1536	1616

## SIMPLEX-COMPACT 2000 “AIRSPACE” Non-Pollution Seal



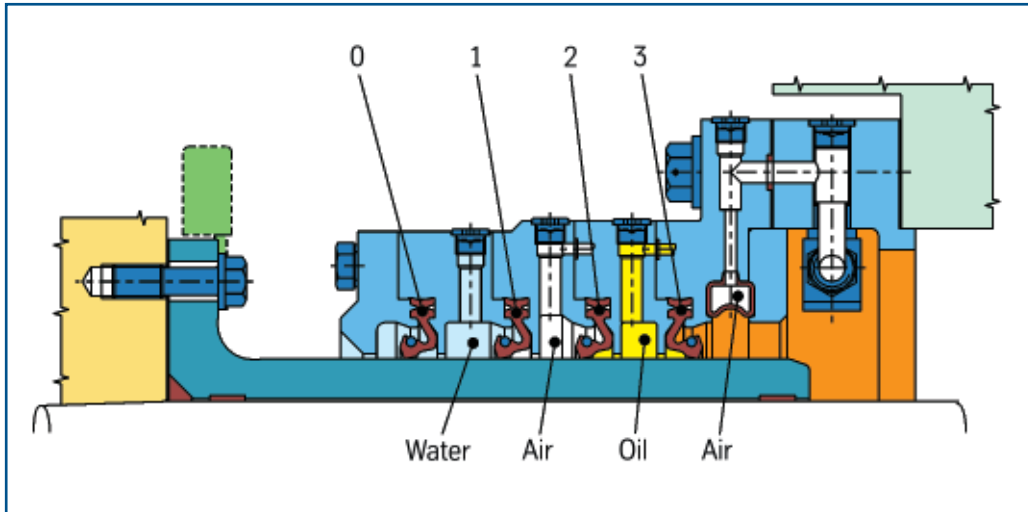
The “Airspace” seal is the latest in the Simplex-Compact sealing range: a 4-ring sealing system, with a dedicated air chamber, allowing for a perfect separation of sterntube oil and sea water. The life of the sterntube bearing is increased by eliminating water ingress into the sterntube system. On the other hand, no oil can escape to the sea.

Simplex-Compact 2000 “Air-space” is certified and approved as a “Non-Pollution Seal” by the leading Classification Societies.

Decisive Advantages:

- “Airspace” guarantees a separation of sea water and sterntube oil
- “Airspace” ensures non-pollution of the seawater

- “Airspace” ensures no water ingress into the sterntube
- No air escapes to the seawater
- No oil pulled into the seawater by escaping air
- Low air consumption
- Test button for seal status indication
- Failsafe switch-over from “Airspace”-to SC 2 B operation



The SC 2 “Airspace” seal with PPA is a suitable option to limit the negative effects of abnormal axial and radial shaft vibrations to the sealing system.

The special feature of this seal is the “Peak Pressure Absorber” (PPA). This is a prerequisite for reliable functioning with special applications where there are strong axial and radial vibrations of the shaft during operation.

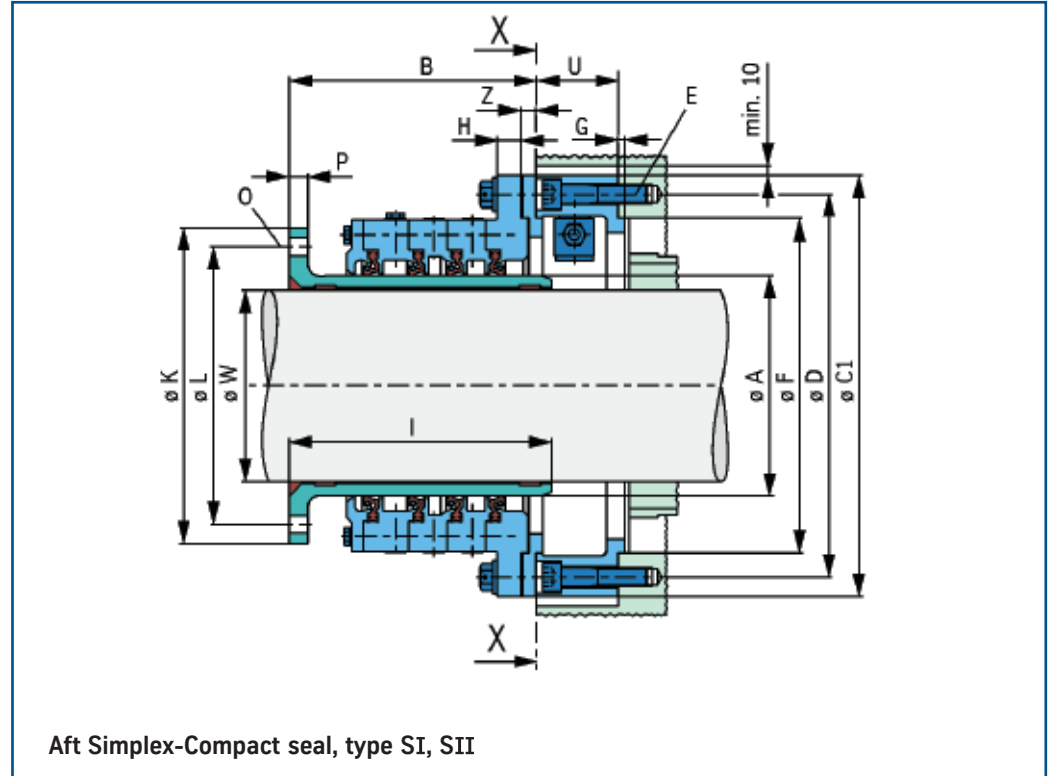


### **The “Arctic” Seal for Operation in Ice**

The “Arctic” seal is a SC 2 “Airspace” seal for icebreakers and ships operating in ice as well as for ships with abnormal shaft vibrations.

The functional reliability of this seal type was proven during field trials and it has been in use successfully since 1996.

# SIMPLEX-COMPACT 2000 "AIRSPACE" Non-Split Version



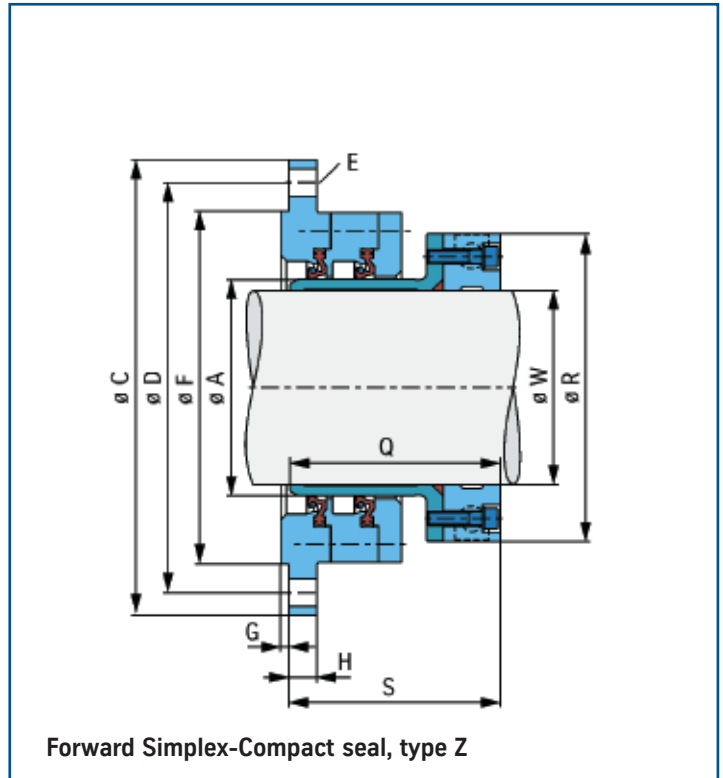
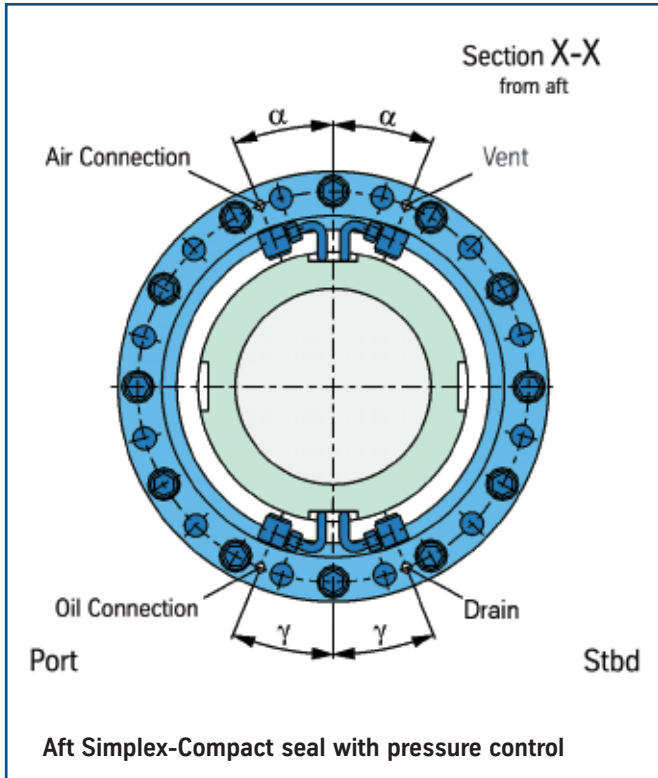
**Non-Split Version**

	<b>A</b>	<b>355</b>	<b>380</b>	<b>400</b>	<b>420</b>	<b>450</b>	<b>480</b>	<b>500</b>	<b>530</b>	<b>560</b>	<b>600</b>	<b>630</b>	<b>670</b>
<b>W-min</b>		316	340	363	382	401	429	458	477	505	533	571	599
<b>W-max</b>		339	362	381	400	428	457	476	504	532	570	598	635
<b>B*</b>		260	260	260	260	290	290	290	290	305	305	310	310
<b>C1</b>		575	600	620	640	675	705	725	755	820	860	890	930
<b>D</b>		525	550	570	590	630	660	680	710	765	805	835	875
<b>E</b>		12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	12x M24	12x M24	12x M24	12x M24
<b>F</b>		475	500	520	540	575	605	625	655	700	740	770	810
<b>G</b>		7	7	7	7	8	8	8	8	9	9	9	9
<b>H</b>		25	25	25	25	30	30	30	30	35	35	35	35
<b>I</b>		275	275	275	275	304	304	304	304	316	316	321	321
<b>K</b>		450	480	500	520	550	590	600	630	675	700	760	820
<b>L</b>		416	440	460	486	510	550	560	590	630	660	710	750
<b>O</b>		12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	12x M20	12x M20	12x M20	12x M24	12x M24
<b>P</b>		15	15	20	20	20	20	20	20	20	20	25	25
<b>C</b>		565	590	610	630	675	705	725	755	820	860	890	930
<b>Q</b>		185	185	185	190	205	205	205	205	221	221	238	238
<b>R</b>		430	460	480	500	530	560	580	620	650	690	720	760
<b>S**</b>		187	187	187	192	208	208	208	208	226	226	243	243
<b>U**</b>		86	86	86	86	86	86	86	86	86	86	86	86
<b>Z**</b>		15	15	15	15	15	15	15	15	15	15	15	15
<b>α</b>		22	22	22	22	36	36	36	36	36	36	36	36
<b>γ</b>		22	22	22	22	21	21	21	21	21	21	21	21
<b>(kg) Aft Seal</b>		178	191	200	210	272	294	288	324	402	450	473	540
<b>(kg) Fwd Seal</b>		109	119	120	131	170	180	189	212	262	290	331	371

\*) incl. 2x1mm packing    \*\*) incl. 1mm packing

Above weights may vary according to seal execution.

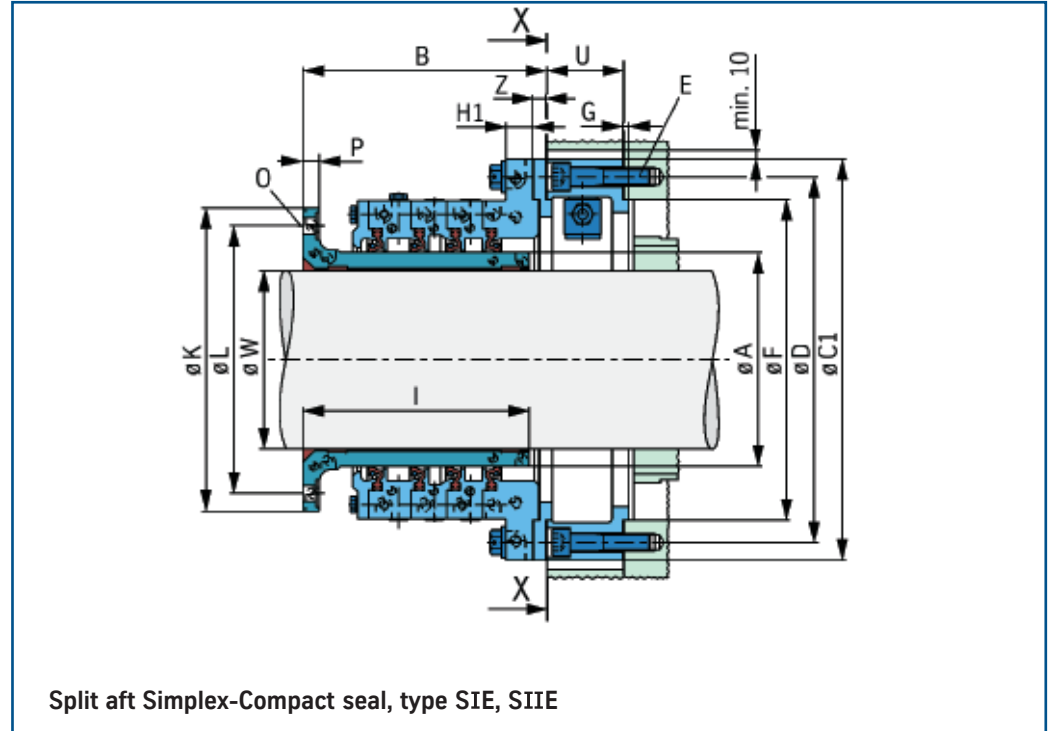




710	750	800	850	900	950	975	1000	1030	1060	1090	1120	1180	1250
636	673	711	757	804	852	897	928	953	983	1008	1033	1057	1117
672	710	756	803	851	896	927	952	982	1007	1032	1056	1116	1176
345	345	383	383	404	404	404	404	430	430	430	430	430	450
990	1030	1090	1140	1200	1250	1300	1300	1400	1400	1460	1460	1520	1595
930	970	1030	1080	1135	1185	1235	1235	1325	1325	1385	1385	1445	1520
16x	16x	20x	20x	20x	20x	20x	20x	24x	24x	24x	24x	24x	24x
M24	M24	M24	M24	M24	M24	M24	M24	M30	M30	M30	M30	M30	M30
865	905	960	1010	1065	1115	1165	1165	1245	1245	1305	1305	1365	1440
10	10	10	10	11	11	11	11	11	11	11	11	11	12
40	40	40	40	45	45	45	45	50	50	50	50	50	50
364	364	409	409	434	434	434	434	455	455	455	455	455	484
840	885	945	1000	1070	1130	1170	1170	1230	1230	1300	1300	1360	1430
790	836	890	950	1010	1070	1110	1110	1170	1170	1230	1230	1290	1360
12x	16x	16x	16x	16x	16x	20x	20x	20x	20x	20x	20x	24x	24x
M24	M24	M24	M24	M24	M24	M24	M24	M24	M24	M30	M30	M30	M30
25	25	30	30	35	35	35	35	35	35	40	40	40	40
990	1030	1090	1140	1200	1250	1300	1300	1400	1400	1460	1460	1520	1595
268	318	337	337	349	349	349	349	389	389	399	399	399	408
830	870	915	974	1027	1076	1130	1130	1200	1200	1260	1260	1340	1410
271	321	338	338	354	354	354	354	395	395	406	406	406	413
91	91	91	91	91	91	91	91	91	91	91	91	91	91
19	19	19	19	19	19	19	19	19	19	19	19	19	19
17	17	13,5	13,5	14	14	24	24	26	26	26	26	19	19
17	17	13,5	13,5	14	14	12	12	11	11	11	11	19	19
670	717	897	967	1123	1210	1412	1228	1492	1601	2400	1736	1856	2168
477	580	668	736	825	890	885	998	1136	1222	1595	1360	1495	1803

# SIMPLEX-COMPACT 2000

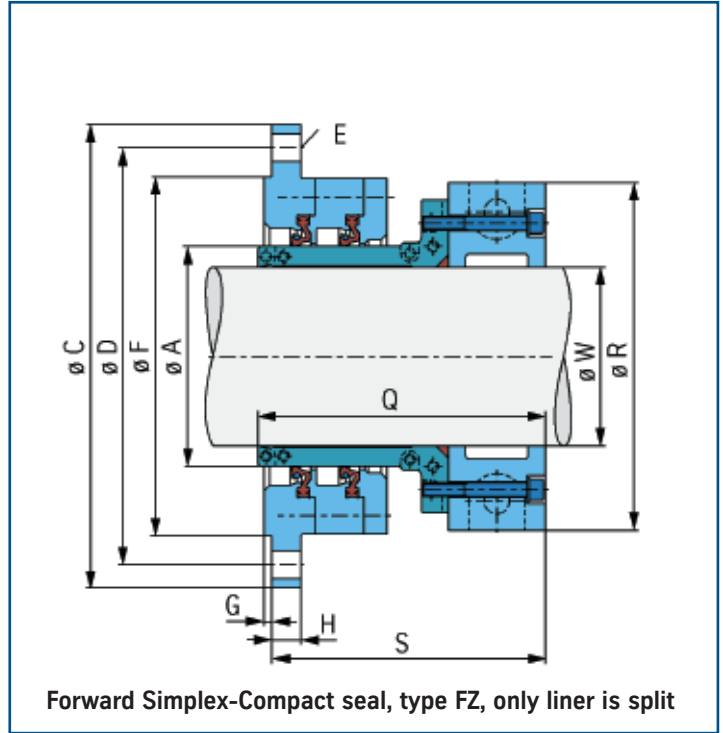
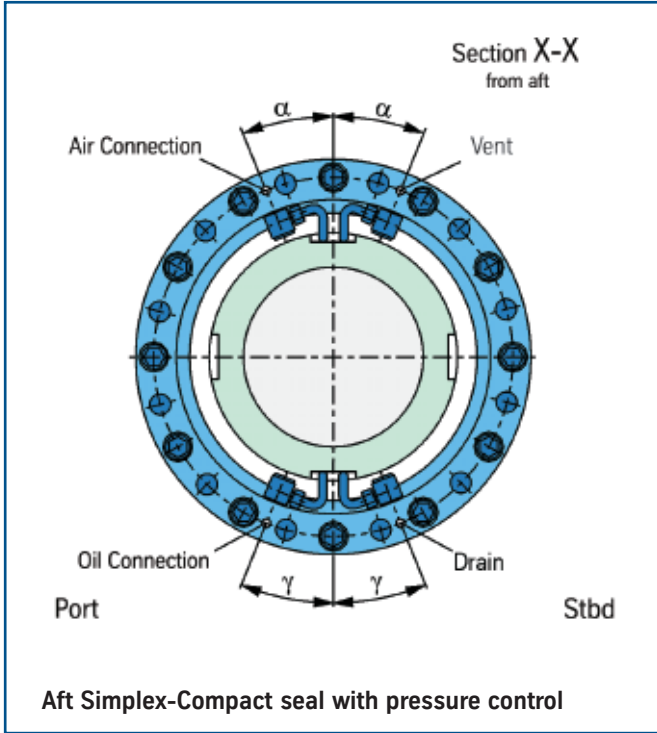
## “AIRSPACE” Split Version



Split Version	A	355	380	400	420	450	480	500	530	560
	W-min	295	320	345	365	385	416	446	466	494
W-max	319	344	364	384	415	445	464	494	523	552
B*	275	275	275	275	305	305	305	305	305	320
C1	575	600	620	640	675	705	725	755	785	820
D	525	550	570	590	630	660	680	710	740	765
E	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20	12x M24
F	475	500	520	540	575	605	625	655	685	700
G	7	7	7	7	8	8	8	8	8	9
H1	30	30	30	30	30	30	30	30	30	35
I	269	269	269	269	298	298	298	298	298	313
K	450	480	500	520	550	590	600	630	660	675
L	416	440	460	486	510	550	560	590	620	630
O	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	12x M20	12x M20	12x M20
P	19	19	19	19	22	22	22	22	22	25
C	565	590	610	630	675	705	725	755	785	820
Q	248	248	248	248	279	279	279	279	279	317
R	466	490	510	522	530	560	580	620	670	670
S**	236	236	231	231	263	263	263	263	263	307
H	25	25	25	25	30	30	30	30	30	35
U**	86	86	86	86	86	86	86	86	86	86
Z**	15	15	15	15	15	15	15	15	15	15
α	22	22	22	22	36	36	36	36	36	36
γ	22	22	22	22	21	21	21	21	21	21
(kg) Aft Seal	205	219	226	237	297	316	311	346	428	428
(kg) Fwd Seal	160	171	183	192	225	236	238	265	357	357

\*) incl. 2x1mm packing    \*\*) incl. 1mm packing

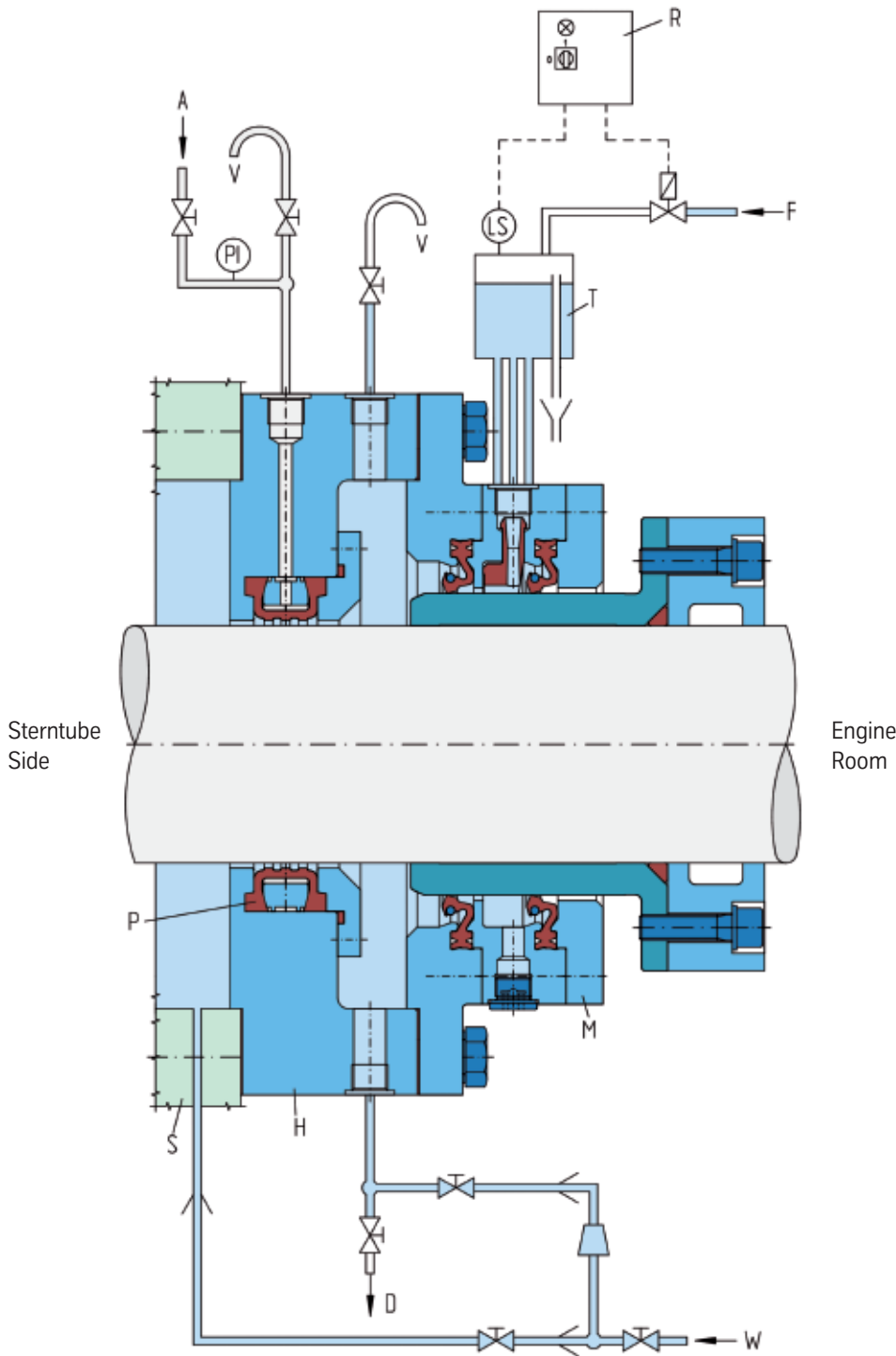
Above weights may vary according to seal execution.



600	630	670	710	750	800	850	900	950	1000
524	559	589	629	663	703	753	802	852	902
558	588	628	662	702	752	801	851	901	950
320	325	325	345	345	383	383	404	404	404
860	890	930	990	1030	1090	1140	1200	1250	1300
805	835	875	930	970	1030	1080	1135	1185	1235
12x M24	12x M24	12x M24	16x M24	16x M24	20x M24	20x M24	20x M24	20x M24	20x M24
740	770	810	865	905	960	1010	1065	1115	1165
9	9	9	10	10	10	10	11	11	11
35	35	35	40	40	40	40	45	45	45
313	318	318	338	338	374	374	392	392	392
700	760	820	840	885	945	1000	1070	1130	1170
660	710	750	790	836	890	950	1010	1070	1110
12x M20	12x M24	12x M24	12x M24	16x M24	16x M24	16x M24	16x M24	16x M24	20x M24
25	25	25	27	27	34	34	36	36	36
860	890	930	990	1030	1090	1140	1200	1250	1300
319	319	391	425	425	475	475	489	567	567
704	736	790	834	868	940	986	1030	1116	1166
307	307	379	413	413	457	457	472	550	550
35	35	35	40	40	40	40	45	45	45
86	86	86	91	91	91	91	91	91	91
15	15	15	19	19	19	19	19	19	19
36	36	36	17	17	13,5	13,5	14	14	24
21	21	21	17	17	13,5	13,5	14	14	12
473	500	559	686	741	918	975	1115	1185	1237
404	417	569	685	738	961	1030	1138	1536	1616

# SIMPLEX-COMPACT 2000 Seals for Water-Lubricated Sterntubes

- |                                  |                     |
|----------------------------------|---------------------|
| A = Air Supply                   | R = Refilling Panel |
| D = Drain                        | S = Sterntube       |
| F = Freshwater                   | T = Tank            |
| H = Pneumostop Housing           | V = Vent            |
| M = Main Seal                    | W = Water Supply    |
| P = Standstill Seal (Pneumostop) |                     |



Modern Naval Warfare places highly specific demands on surface vessels with regard to operational readiness and functional security. These demands cannot be compromised by components within the system which do not meet the standards of absolute reliability encountered under extreme shock and vibration conditions.

The development of Simplex-Compact seals for open-ended, water-lubricated stern tubes is a direct result of these specifications and our cooperation with Naval Authorities worldwide.

For more than 20 years, we have been supplying this robust and functional product to more than a dozen national naval fleets in accordance with stringent NATO requirements.

We have reached a technically highly advanced stage of development with the Simplex-Compact lip seal for water-lubricated stern tubes. In this way, we have achieved a superior solution in comparison with mechanical type seals for these applications.



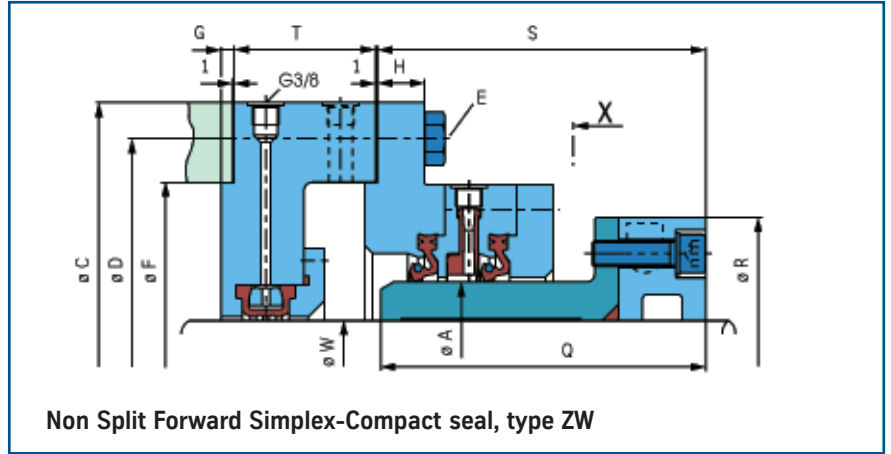
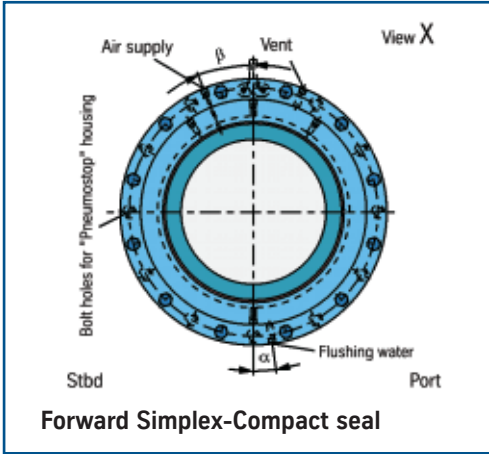
This is demonstrated by a number of advantages highly relevant in this regard:

- Under shock and vibration stresses this seal guarantees a maximum in operational safety, since the rotating components of the seal are connected to the shaft by friction contact.
- In addition, the flexible Elastomer sealing rings also guarantee a higher level of security; the weight and mass acceleration of the flexible sealing ring parts is very low.
- The arrangement of two Elastomer sealing rings gives our Simplex-Compact system the advantage of a double-security character, even with the shaft running at full RPM. This redundancy in the system ensures higher levels of operational readiness in critical situations.
- The modular design of the Simplex-Compact water-lubricated sealing system allows service work to be carried out very quickly and safely. Moreover, by using the built-in Pneumostop (inflatable emergency seal), the service work can be carried out immediately, in any location, without docking the vessel.
- Specific shock calculations can be supplied for each Simplex-Compact seal, based on the shock data for the particular vessel, and in accordance with national naval and/or international standard procedures.

(The Simplex-Compact seal is dynamically shock-tested and approved in accordance with the General Specification Fed. German Navy, Outer Hull Structures.)

# SIMPLEX-COMPACT 2000

## Seals for Water-Lubricated Sterntubes



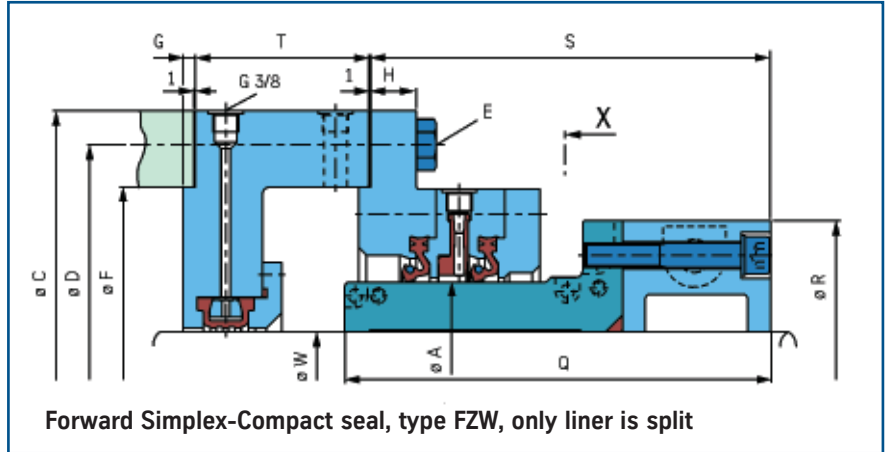
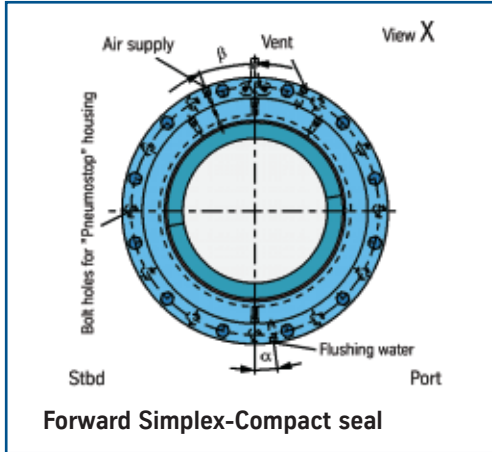
Type SC2 ZW	A	125	140	160	180	200	220	240	260	280	300	330	355	380	400	420
	W-min.	80	111	126	146	166	186	206	226	246	266	286	316	340	363	382
	W-max.	110	125	145	165	185	205	225	245	265	285	315	339	362	381	400
	C	275	290	310	330	350	370	425	445	465	485	515	565	590	610	630
	D	245	260	280	300	320	340	390	410	430	450	480	525	550	570	590
	E	8x M12	8x M12	8x M12	8x M12	8x M12	8x M12	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	12x M20	12x M20
	F	210	225	245	265	285	305	345	365	385	405	435	475	500	520	540
	G	6	6	6	6	6	6	6	6	6	6	6	7	7	7	7
	H	15	15	15	15	15	15	20	20	20	20	20	25	25	25	25
	Q	149	149	149	149	149	149	159	159	164	164	164	185	185	185	190
	R	190	210	230	250	260	280	300	320	350	370	400	430	460	480	500
	S	141	141	141	141	141	141	155	155	160	160	160	186	186	186	191
	T	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
	α	12	12	12	12	12	12	8	8	8	8	8	8	8	8	8
	β	33	33	33	33	33	33	22	22	22	22	22	22	22	22	22
	kg	47	67	68	75	78	87	121	129	141	155	179	229	246	250	264

	A	450	480	500	530	560	600	630	670	710	750	800	850	900	950	1000
W-min	401	429	458	477	505	533	571	599	636	673	711	757	804	852	902	
W-max	428	457	476	504	532	570	598	635	672	710	756	803	851	901	950	
C	675	705	725	755	820	860	890	930	990	1030	1090	1140	1200	1250	1300	
D	630	660	680	710	765	805	835	875	930	970	1030	1080	1135	1185	1235	
E	12x M20	12x M20	12x M20	12x M20	12x M24	12x M24	12x M24	12x M24	16x M24	16x M24	20x M24	20x M24	20x M24	20x M24	20x M24	
F	575	605	625	655	700	740	770	810	865	905	960	1010	1065	1115	1165	
G	8	8	8	8	9	9	9	9	10	10	10	10	11	11	11	
H	30	30	30	30	35	35	35	35	40	40	40	40	45	45	45	
Q	205	205	205	205	221	221	238	238	268	318	337	337	349	349	349	
R	530	560	580	620	650	690	720	760	830	870	915	974	1027	1076	1130	
S	207	207	207	207	225	225	242	242	270	320	337	337	353	353	353	
T	90	90	90	90	94	94	94	94	112	112	120	120	120	120	120	
α	8	8	8	8	8	8	8	8	6	6	13	13	13	13	13	
β	22	22	22	22	22	22	22	22	16,5	16,5	23	23	23	23	23	
kg	340	360	373	411	524	573	631	696	879	1016	1075	1282	1430	1532	1682	

Above weights may vary according to seal execution.

# SIMPLEX-COMPACT 2000

## Split Seals for Water-Lubricated Sterntubes



<b>Type SC2 FZW</b>	<b>A</b>	<b>140</b>	<b>160</b>	<b>180</b>	<b>200</b>	<b>220</b>	<b>240</b>	<b>260</b>	<b>280</b>	<b>300</b>	<b>330</b>	<b>355</b>	<b>380</b>	<b>400</b>	<b>420</b>	<b>450</b>	
	<b>W-min.</b>	90	105	125	145	165	185	205	225	245	265	295	320	345	365	385	
	<b>W-max.</b>	104	124	144	164	184	204	224	244	264	294	319	344	364	384	415	
	<b>C</b>	290	310	330	350	370	425	445	465	485	515	565	590	610	630	675	
	<b>D</b>	260	280	300	320	340	390	410	430	450	480	525	550	570	590	630	
	<b>E</b>	8x M12	8x M12	8x M12	8x M12	8x M12	12x M16	12x M16	12x M16	12x M16	12x M16	12x M20	12x M20	12x M20	12x M20	12x M20	12x M20
	<b>F</b>	225	245	265	285	305	345	365	385	405	435	475	500	520	540	575	
	<b>G</b>	6	6	6	6	6	6	6	6	6	6	7	7	7	7	8	
	<b>H</b>	15	15	15	15	15	20	20	20	20	20	25	25	25	25	30	
	<b>Q</b>	177	177	183	183	196	211	211	211	211	230	248	248	248	248	279	
	<b>R</b>	230	244	270	280	320	340	360	376	392	436	466	490	510	522	530	
	<b>S</b>	157	157	163	163	176	194	194	194	194	213	235	235	230	230	262	
	<b>T</b>	100	100	100	100	100	104	104	104	104	104	106	106	106	106	111	
	<b><math>\alpha</math></b>	12	12	12	12	12	8	8	8	8	8	8	8	8	8	8	
	<b><math>\beta</math></b>	33	33	33	33	33	22	22	22	22	22	22	22	22	22	22	
	<b>kg</b>	87	88	102	103	125	166	179	189	199	242	300	320	342	358	425	

<b>A</b>	<b>480</b>	<b>500</b>	<b>530</b>	<b>560</b>	<b>600</b>	<b>630</b>	<b>670</b>	<b>710</b>	<b>750</b>	<b>800</b>	<b>850</b>	<b>900</b>	<b>950</b>	<b>1000</b>	
<b>W-min</b>	416	446	465	495	524	559	589	629	663	703	753	802	852	902	
<b>W-max</b>	445	464	494	523	558	588	628	662	702	752	801	851	901	950	
<b>C</b>	705	725	755	820	860	890	930	990	1030	1090	1140	1200	1250	1300	
<b>D</b>	660	680	710	765	805	835	875	930	970	1030	1080	1135	1185	1235	
<b>E</b>	12x M20	12x M20	12x M20	12x M24	12x M24	12x M24	12x M24	12x M24	16x M24	20x M24	20x M24	20x M24	20x M24	20x M24	
<b>F</b>	605	625	655	700	740	770	810	865	905	960	1010	1065	1115	1165	
<b>G</b>	8	8	8	9	9	9	9	10	10	10	10	11	11	11	
<b>H</b>	30	30	30	35	35	35	35	40	40	40	40	45	45	45	
<b>Q</b>	279	279	279	311	319	319	391	425	425	475	475	489	567	567	
<b>R</b>	560	580	620	670	704	736	790	834	868	940	986	1030	1116	1166	
<b>S</b>	262	262	262	306	306	306	378	412	412	456	456	471	549	549	
<b>T</b>	111	111	111	121	121	121	121	141	141	150	150	145	145	145	
<b><math>\alpha</math></b>	8	8	8	8	8	8	8	6	6	13	13	13	13	13	
<b><math>\beta</math></b>	22	22	22	22	22	22	22	16,5	16,5	23	23	23	23	23	
<b>kg</b>	447	452	495	654	728	752	949	1162	1250	1546	1657	1830	2327	2444	

Above weights may vary according to seal execution.

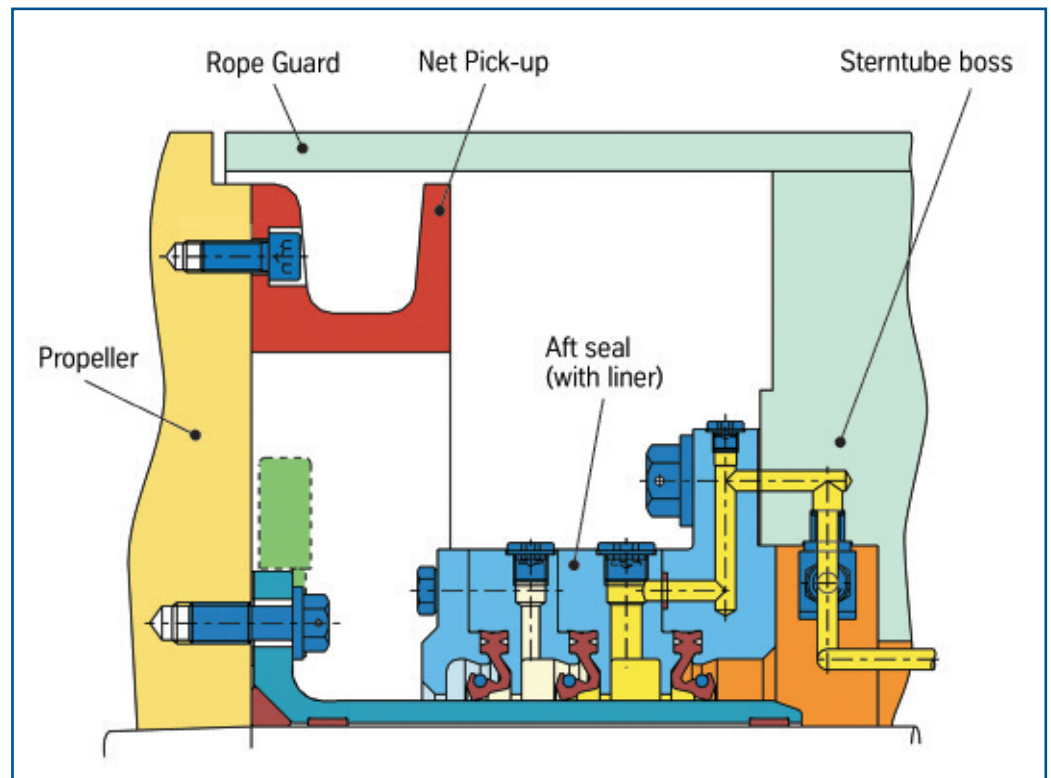
## SIMPLEX-COMPACT 2000 Net Pick-Up



The net pick-up is a complementary component to the aft seal: its purpose being to prevent netting and fishing lines from entering the seal.

Netting and fishing lines not kept off by the rope guard are taken up by the net protection ring with its U-shaped cross-section. With increasing amounts of netting or lines filling up the ring the entry gap decreases and finally closes completely, so preventing access to the SC 2 seal.

The flow of water into the propeller is not changed by this proven and functionally reliable component.







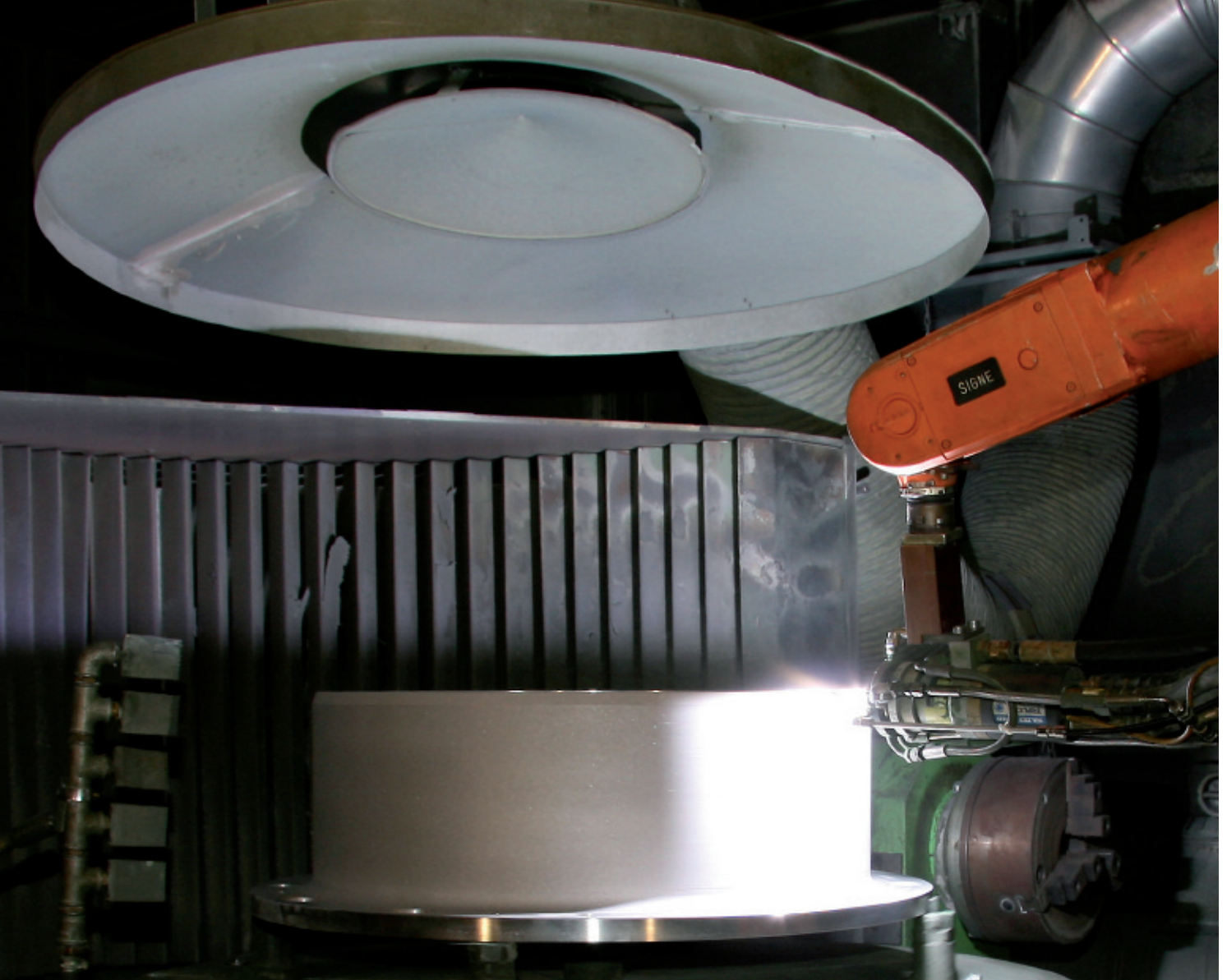
AZIPOD by ABB

The Pod Seal is an SC 2 seal for ships with a podded electric propulsion.

In respect of the application and Pod-size, specially-developed seals with special materials have been installed since 1990, in addition to the standard seals.

For large Pod designs special "Airspace" seals with 6 rings have been designed.

## SIMPLEX-COMPACT 2000 Ceramic Coating



The ceramic coating of liners has already been mentioned under SC 2 BC (SC 2 C) in the section dealing with the available seal versions and their application.

By using a specially-developed process, a chromic oxide is sprayed onto the special chrome steel material under stringent physical and chemical conditions.

This high quality coating process ensures

- A perfectly smooth surface with an extremely low roughness
- A maximum bond between the chrome steel base and the ceramic coating.

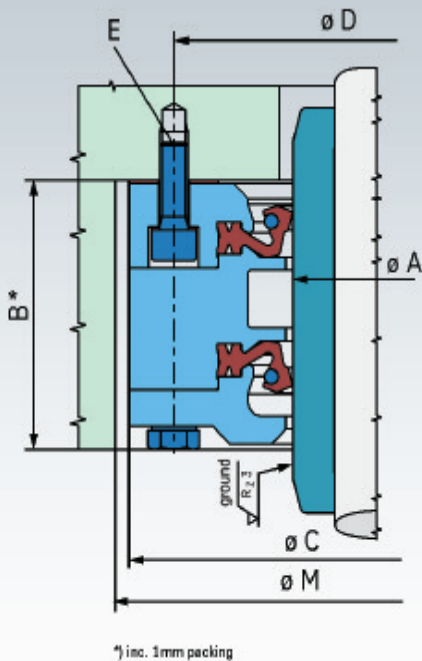
To date, we have delivered more than 5,000 Simplex-Compact seals with ceramic-coated liners.

# SIMPLEX-COMPACT 2000

## Rudder Stock Seals

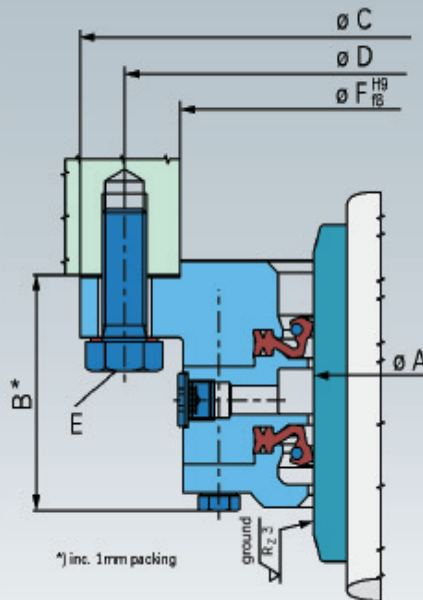
### Lower Sealing fitted into the Trunk

Arrangement of the seal in the rudder trunk, when the space between rudder trunk and rudder is too small.



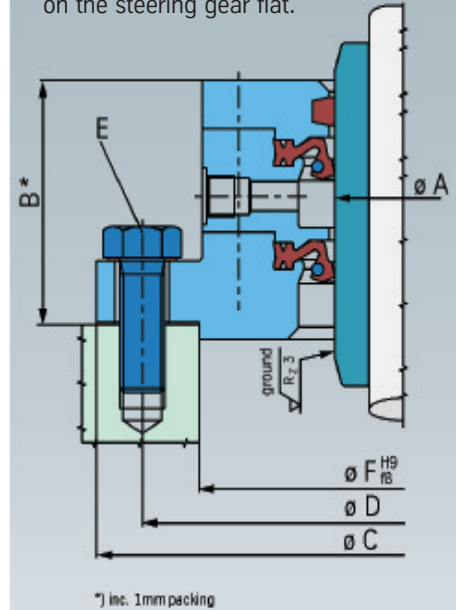
### Lower Sealing

Arrangement of the rudder stock seal under the rudder trunk.



### Upper Sealing

Arrangement of the rudder stock seal on the steering gear flat.



For uncomplicated locations we manufacture easy-fitting packing glands consisting of split-ring elements. For more difficult locations, for example in the region of the waterline, we offer our Simplex-Compact rudder stock seal, which in its design and in the sizes available, corresponds to the Simplex-Compact

stern tube seal. The above diagrams show the standard types of our rudder stock seals.

Of course all seals can also be manufactured with split-ring elements. In this case the sealing rings on the rudder stock are bonded by means of a special bonding tool.

If a seal to suit your requirements is not shown, please contact us and we would be pleased to advise you on a custom design.

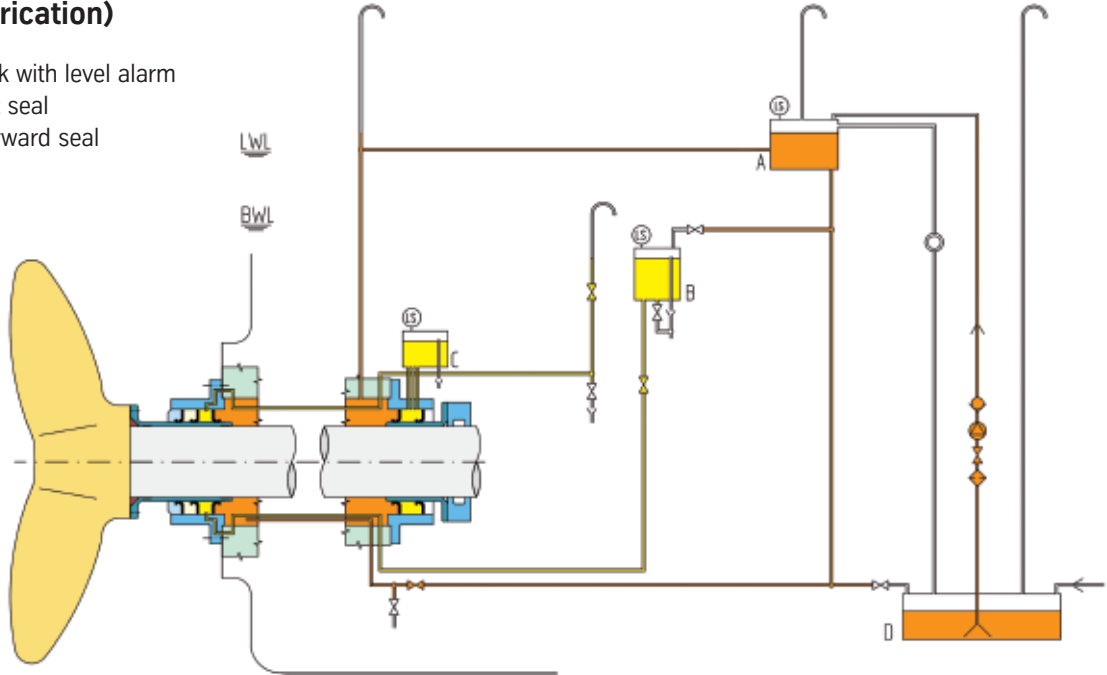
Dimensions and other types shown in a separate brochure.

# SIMPLEX-COMPACT 2000

## Sterntube Lubrication

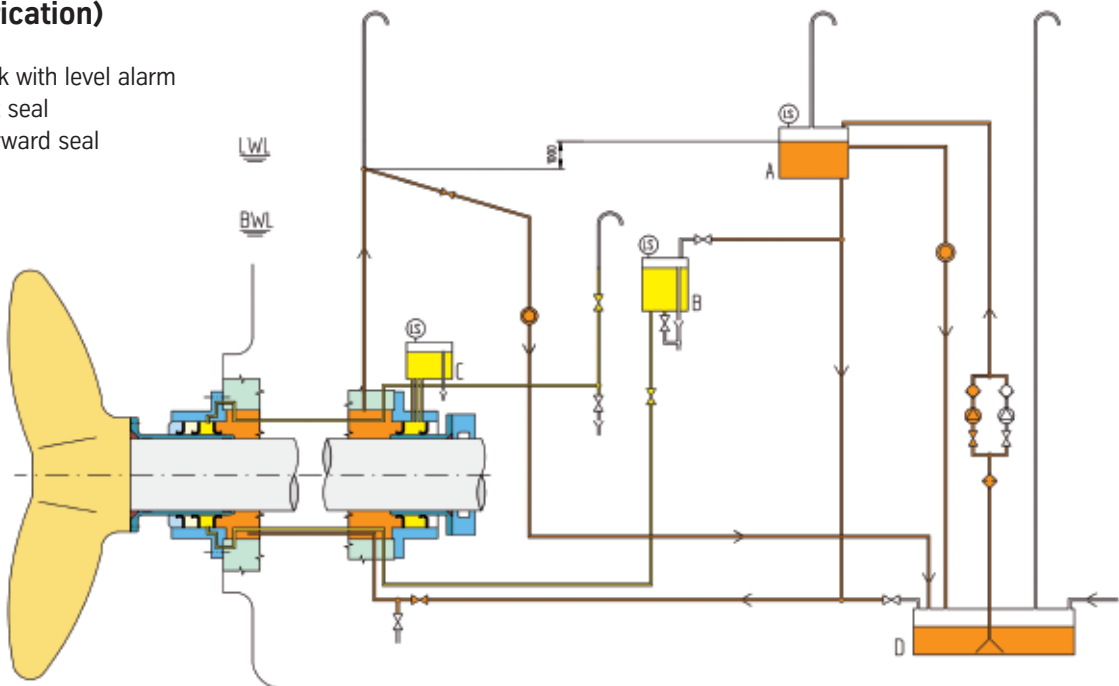
### Sterntube Lubrication Oil Diagram (natural lubrication)

- A = Header tank with level alarm
- B = Tank for aft seal
- C = Tank for forward seal
- D = Sump tank



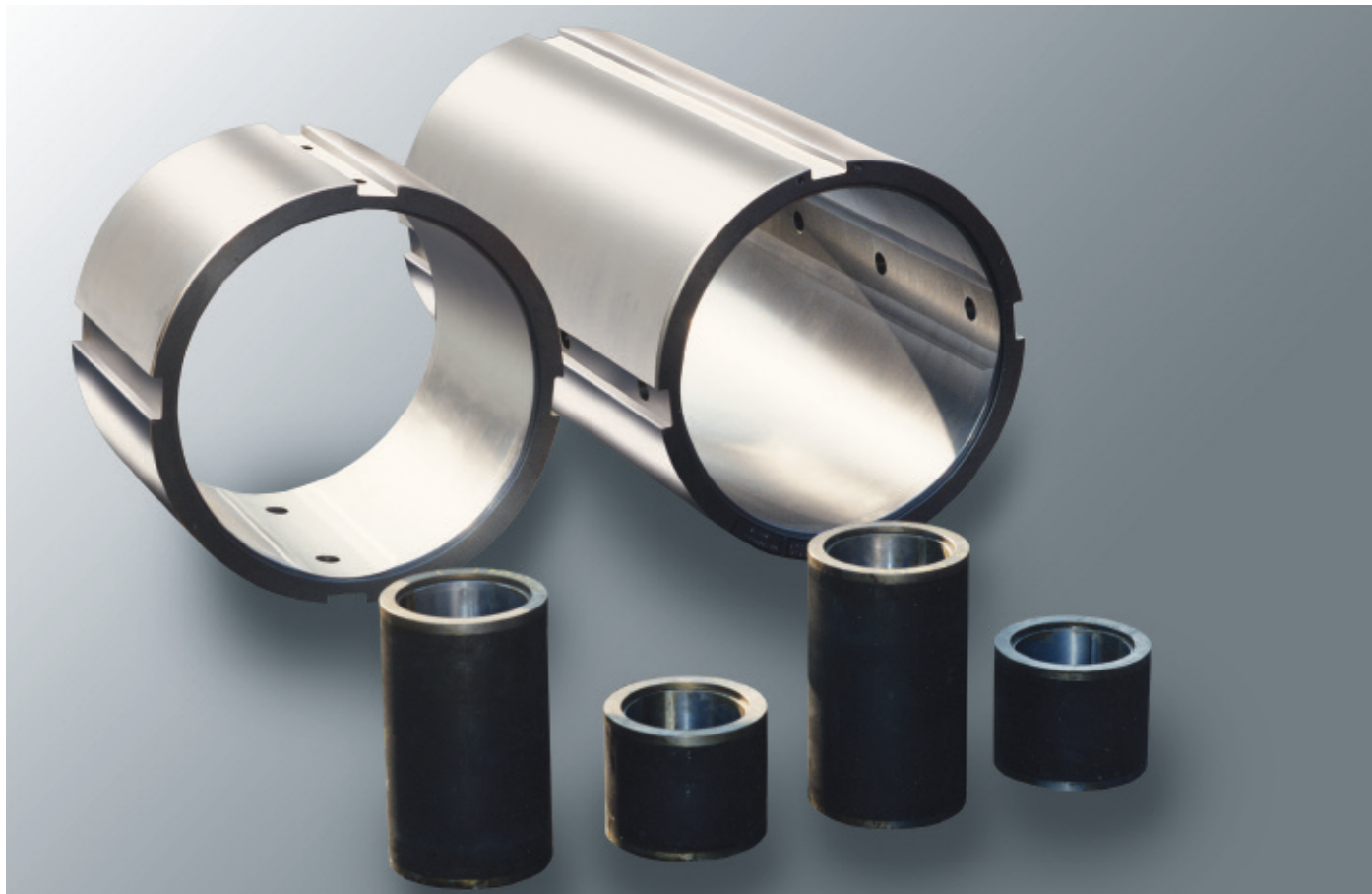
### Sterntube Lubrication Oil Diagram (forced lubrication)

- A = Header tank with level alarm
- B = Tank for aft seal
- C = Tank for forward seal
- D = Sump tank



# SIMPLEX

## Sterntube Bushes



Simplex sterntube bushes in combination with Simplex-Compact seals have proven themselves as the ideal combination for oil-lubricated stern-tubes over many years. More than 22,000 of these bushes have been delivered: a testament to their high quality and functional reliability.

### White Metal

The standard bushes are made of treated cast iron and a white metal with a high lead/tin content.

Special treatment of the inside surface of the cast iron bush forms the basis for a high quality bonding of the white metal. Using a centrifugal process for lining the bush, a pore-free structure and more forceful entry of the white metal into the open graphite veins are obtained.

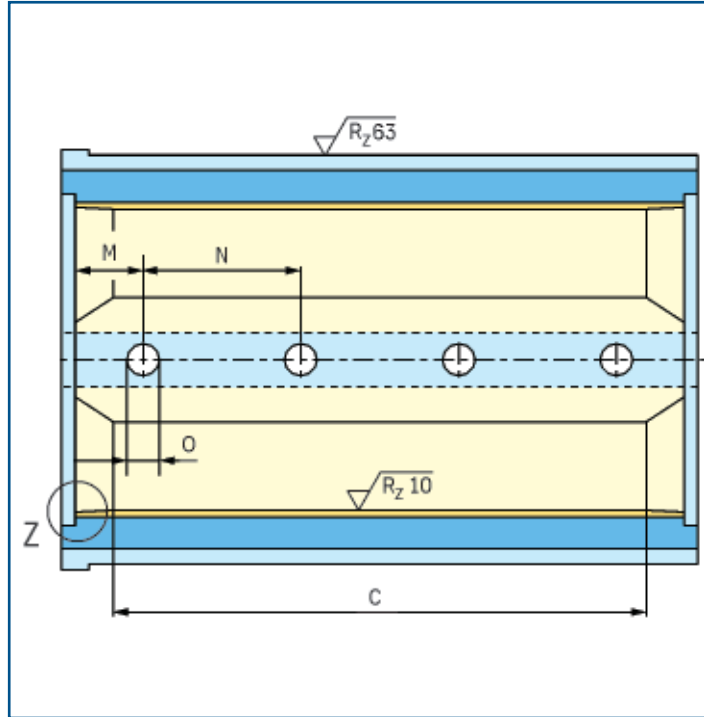
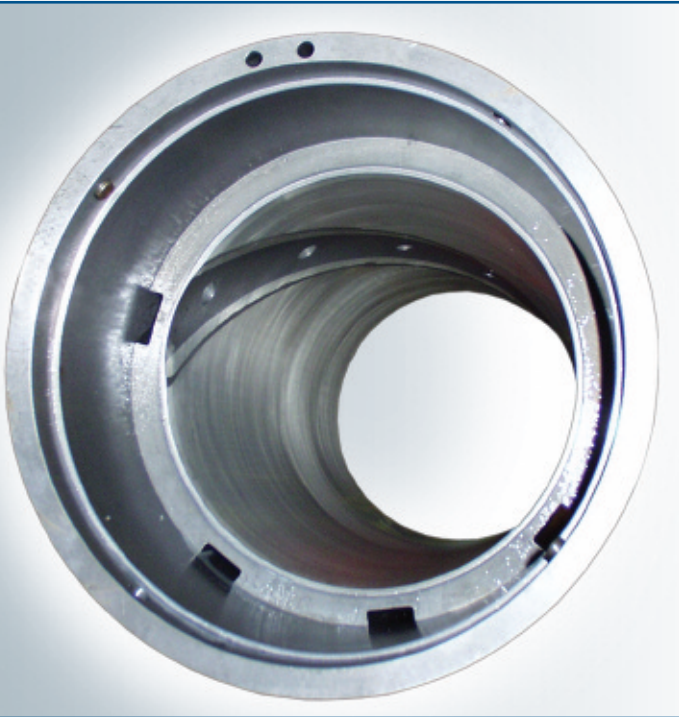
### Materials

The standard design of our Simplex sterntube bushes - EN-GJL-200 (GG-20) cast iron/lead-based white metal - is used mainly for merchant shipping. The bushes intended for vessels subjected to higher stresses, e.g. naval ships or icebreakers, are made of EN-GJS-400-15 (GGG-40) nodular cast iron/tin based white metal.

### Production

High quality and fast production are ensured by our modern facilities. The standard version is finish-machined inside and rough-machined outside. The length of a bush is determined by the rules of the respective Classification Society. Bushes up to a length of 2,800 mm and an outside diameter of 1,200 mm are available.

# SIMPLEX Sterntube Bushes



### Quality Assurance

Simplex sterntube bushes are produced in accordance with the rules of the respective Classification Societies and, if required, may be supplied together with the appropriate Certificate.

Every bush is ultrasonically tested before shipment. A test certificate will be supplied upon request.

### Delivery and Service

The scope of delivery of the Simplex sterntube bushes can be extended by the following equipment and service:

- Pt-100 temperature sensors for remote monitoring, measuring the temperature at the white metal.
- Hydrostatic lubrication systems.

- Bushes with specific oil groove geometry (e.g. helical grooves) for twin screw vessels.
- The hydrodynamic operational reliability of the bushes is calculated by computer to determine various technical parameters, e.g. lower rpm limit at liquid friction, transition rpm, etc..

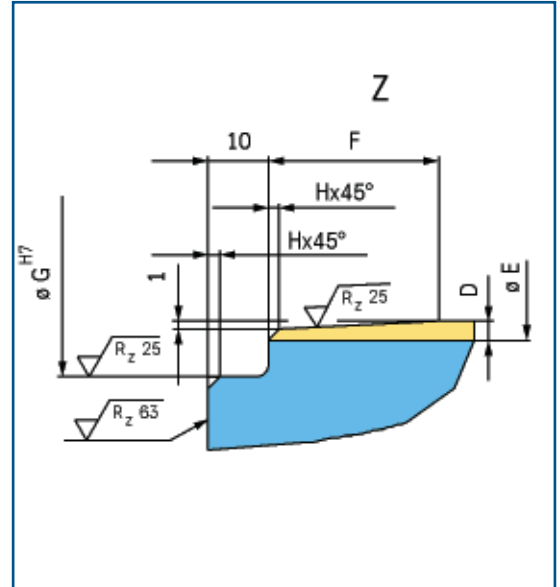
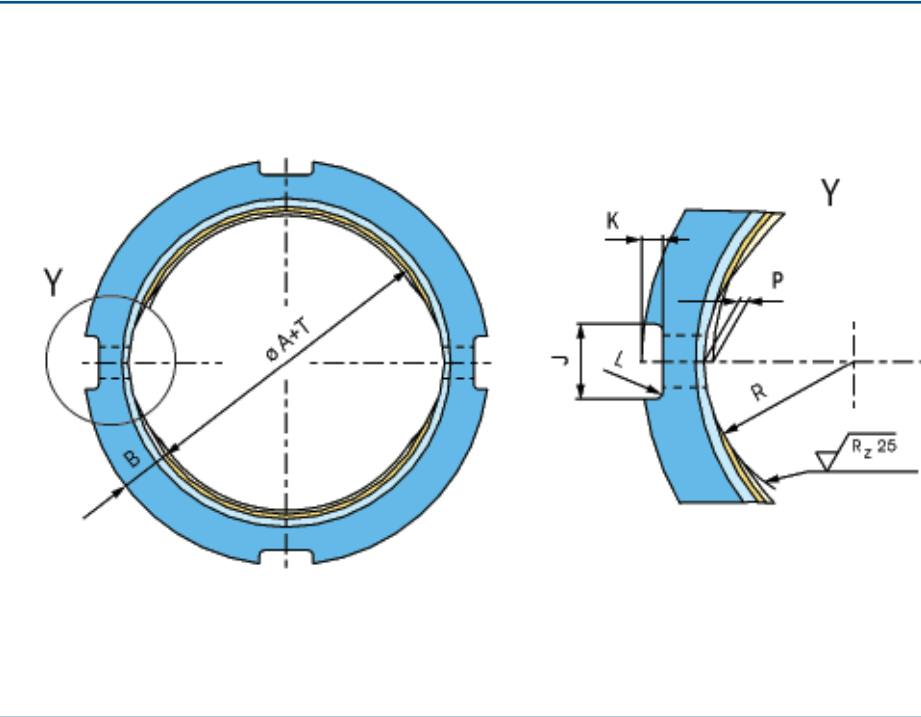
For this, the following technical data are needed :

- Shaft diameter, maximum and minimum rpm.
- Radial load in t or kN.
- Maximum ambient and sea water temperatures.
- Oil viscosity, if the type of oil is known.

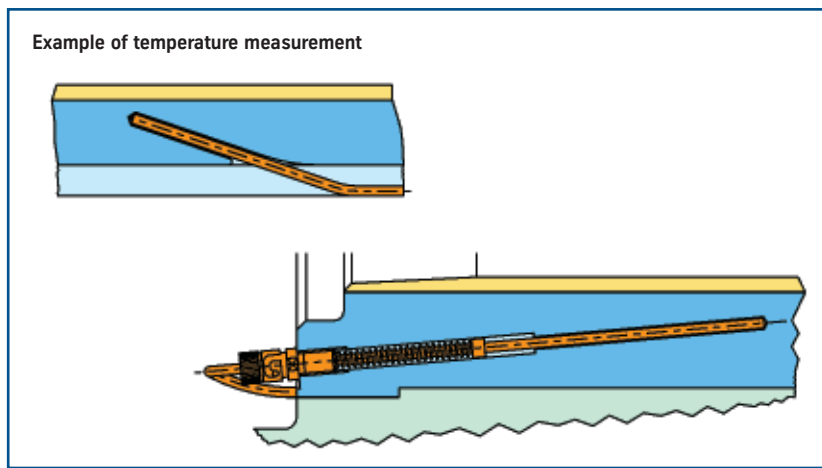
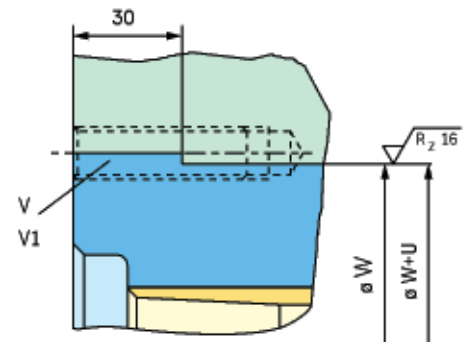
In emergency cases we can supply or repair a complete set of bushes within a few working days.

Explanation	
<b>A</b>	= Shaft diameter
<b>B</b>	= Including 3 mm machining allowance
<b>S</b>	= Clearance with propeller shaft installed
<b>T</b>	= Shaft clearance without bush being installed
<b>U</b>	= Oversize
<b>W</b>	= Inside diameter of sterntube
<b>W+U</b>	= Outside diameter of bush
* Bush length "C", taking into consideration the special rules of some classification societies.	
** Only for the aft sterntube bush according to L.R.	
Shaft tolerance required: ISO h6	
Shaft surface Rz 6,3 or better	

A	B	C*	D	E	F	G	H	J	K
101-200	28	Aft. Bush 1,5 x A Fwd. Bush 0,5 x A	2	A + T + 2D	10	E + 10	1	40	8
201-300	33		2		15		1	40	8
301-400	38		3		20		1,5	50	13
401-500	43		3		25		1,5	50	13
501-600	48		4		30		2	63	18
601-700	53		4		35		2	63	18
701-800	58		4		40		2	63	18
801-900	63		4		45		2	63	18
901-1000	68		4		50		2	63	18
1001-1100	73		4		55		2	63	18



Example of an anti-rotation protection



Example of temperature measurement

Taking into account the tolerance quoted in the table, the pressing-in force can be determined according to the following formula:

$$F = \frac{\pi \cdot E_1 \cdot \mu}{2} \cdot L_1 \cdot \left[ 1 - \left( \frac{d}{D_1} \right)^2 \right] \cdot U$$

$E_1$  = EN-GJL-200 (GG-20) = 100.000 - 120.000 N/mm<sup>2</sup>  
 EN-GJS-400-15 (GGG-40) = 170.000 N/mm<sup>2</sup>

$\mu$  = (GS/GG) = 0,16 - 0,20  
 (GG/GG) = 0,22 - 0,26

$d$  = Inside diameter of the sterntube bush  
 $D_1$  = Outside diameter of the sterntube bush

$L_1$  = Total length of the carrying outside diameter of the sterntube bush

Dimensions in mm

L	M	N	O	P	R	S	T	U	V	V1**	
3	50	120-210	20	3	0,35 x A	0,4-0,5	0,5	+0,05	+0,02/+0,03	2xM16x50	4xM16x50
3	50	120-210	20	3		0,5-0,6	0,6	+0,05	+0,02/+0,03	2xM16x50	6xM16x50
4	80	190-280	30	4,5		0,6-0,7	0,7	+0,05	+0,03/+0,05	2xM20x60	6xM20x60
4	80	190-280	30	4,5		0,7-0,9	0,8	+0,15	+0,03/+0,05	2xM20x60	8xM20x60
4	110	260-350	40	6		0,8-1,0	0,9	+0,15	+0,03/+0,05	2xM20x60	8xM20x60
4	110	260-350	40	6		0,9-1,1	1,0	+0,15	+0,03/+0,05	2xM20x60	6xM24x70
4	140	330-420	40	6		1,0-1,3	1,2	+0,2	+0,04/+0,06	2xM20x60	6xM24x70
4	140	330-420	40	6		1,1-1,4	1,3	+0,2	+0,04/+0,06	2xM20x60	6xM24x70
4	170	400-490	40	6		1,2-1,5	1,4	+0,2	+0,04/+0,06	2xM20x60	6xM24x70
4	170	400-490	40	6		1,3-1,6	1,5	+0,2	+0,04/+0,06	2xM20x60	7xM24x70

## SIMPLEX FlexiTube Complete Sterntube



Our Simplex product range of ship components ensures safe ship operations, environmental protection and optimum economy for the fleets worldwide.

Simplex-Compact seals and Simplex bearings stand for maximum reliability and durability through innovative technology. With our new product, the Simplex FlexiTube, we demonstrate our proficiency in marine engineering.

Traditionally, all ships' stern tubes have been designed and constructed in a similar way. Now we present a new technological breakthrough – the patented Simplex FlexiTube. The FlexiTube is a turnkey solution involving less preparation for the designer, the shipyard and the shipbuilder. It facilitates rapid and exact installation under the supervision

of our skilled personnel as well as easier maintenance and lower maintenance costs when the ship is in operation. The Simplex FlexiTube is suitable for all types and sizes of vessels. Please contact us for further information about this innovative design.

### **Precision Technology in a complete package solution**

- A true turnkey solution; the Simplex FlexiTube is a complete stern tube including bearings, a patented sealing package and installation supervision.
- Integrally cast in epoxy resin, using a specially patented sealing package and filling system, the Simplex FlexiTube is perfectly aligned, avoiding vibrations and bearing wear caused by misalignment.
- The Simplex FlexiTube provides for stress-free installation. The forward part has a patented axial flexibility to permit thermal expansion.
- The Simplex FlexiTube is suitable for all types of vessels. Through an intelligent module design we are able to deliver customized FlexiTubes for vessels of all sizes.
- As a part of the turnkey concept, the Simplex FlexiTube is type-approved by classification societies.





**With the Simplex FlexiTube, most of the job has already been done**

For designing a customised Simplex FlexiTube, we only need to know the type of hull, the sterntube length and the diameter of the propeller shaft. According to the requirements, the design drawing can be effected separately or be integrated into the ship drawings. In addition, we take care of all the classification work.

Fast delivery of our drawings gives the shipyard ample time to manufacture and install the aft and forward bosses. The built-in properties of the Simplex FlexiTube ease the requirements for precision and welding work which gives the shipyard freedom of choice for the manufacture and

installation method of the bosses. By using the Simplex FlexiTube, a great deal of the work is already done, both on the drawing board and at the shipyard.

**A complete sterntube installation in less than 8 hours**

Whereas the installation of a conventional sterntube requires at least one week, the Simplex FlexiTube installation can be carried out within eight hours under the guidance of our experienced installation supervisors. Our personnel is on the spot at the shipyard to check that everything is arranged for a smooth and easy installation.

Possible mechanical deviations are compensated by the Simplex FlexiTube, achieving perfect alignment with the

propeller shaft. The result is checked by laser; the best control method available. The FlexiTube is then integrally casted with epoxy resin, using our patented sealing package, and our filling method which results in complete filling without any air pockets.

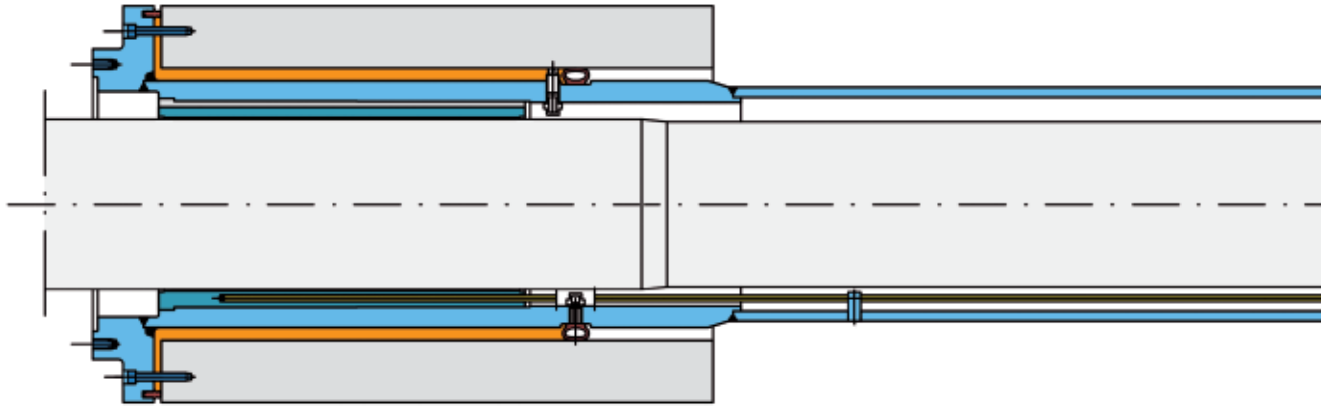
**Less maintenance in the years ahead**

The innovative inherent properties of the Simplex FlexiTube, together with a smooth and exact installation, involve lower maintenance, less wear on bearings, sterntube and hull as well as longer docking intervals without shaft withdrawals. In addition, it perfectly fulfills the classification societies' requirements regarding monitoring systems: The stipulated oil sampling pipe and interchangeable temperature sensors are standard features in the

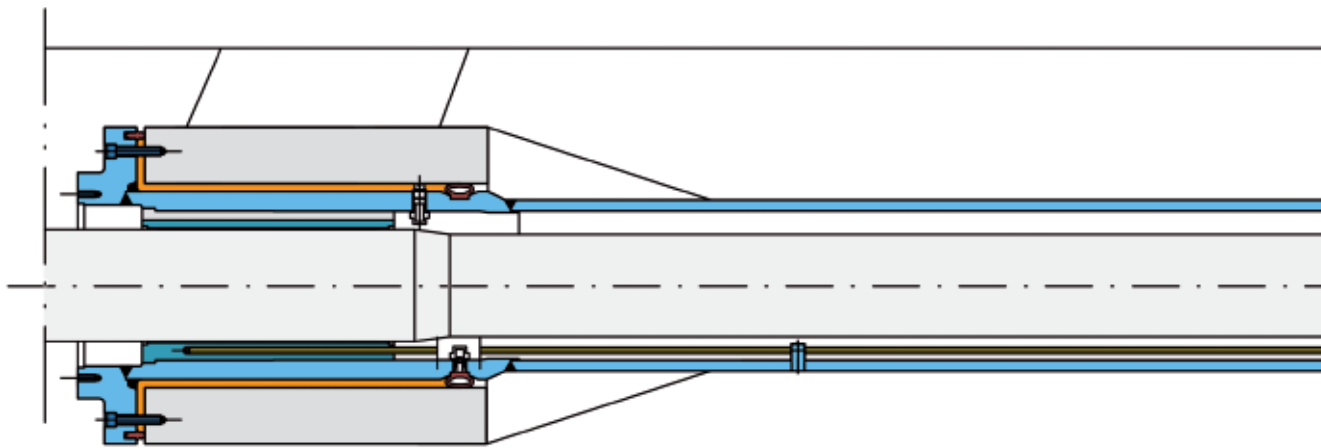
Simplex FlexiTube. Thanks to the FlexiTube's design maintenance work can be carried out easily from within the ship.

The stress-free installation also means that transmission of resonance and vibration is reduced. This decreases wear and increases the life of bearings, hull and shaft seals. In addition, it provides a more comfortable operating environment on board.

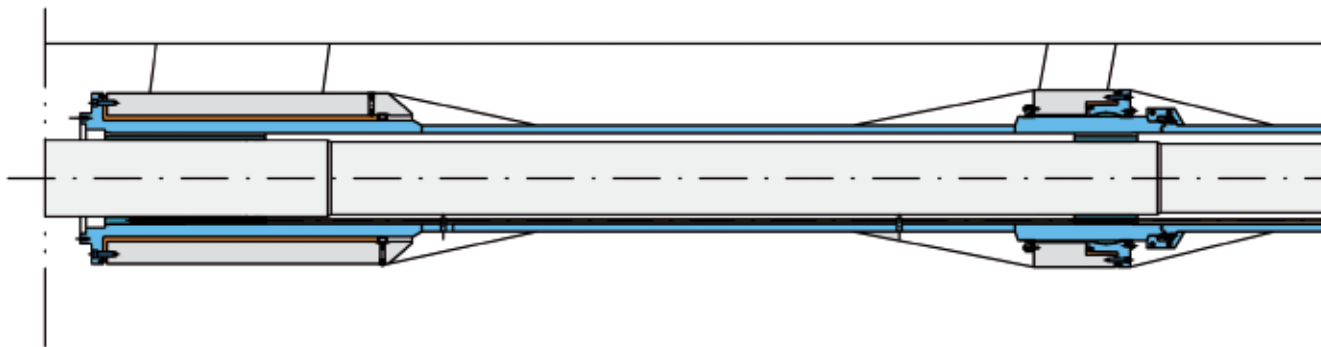
# SIMPLEX FlexiTube Complete Sterntube



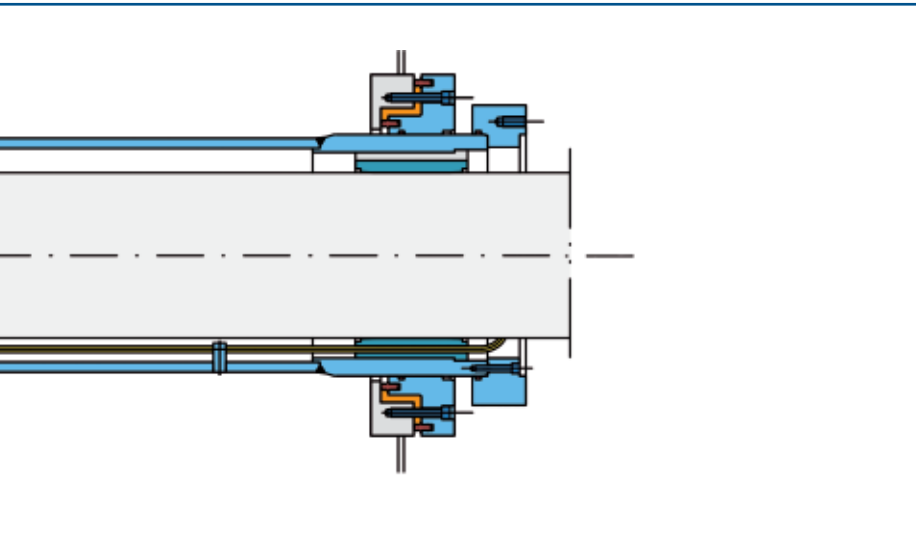
The Simplex FlexiTube – Standard type designed for vessels without shaft strut



The Simplex FlexiTube – R-type designed for vessels with one shaft strut

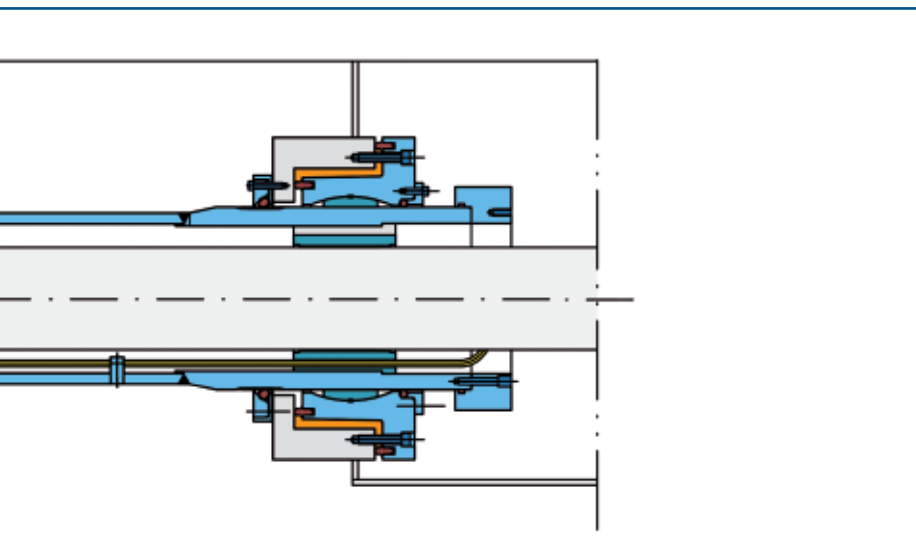


The Simplex FlexiTube – SR-type designed for vessels with two shaft struts



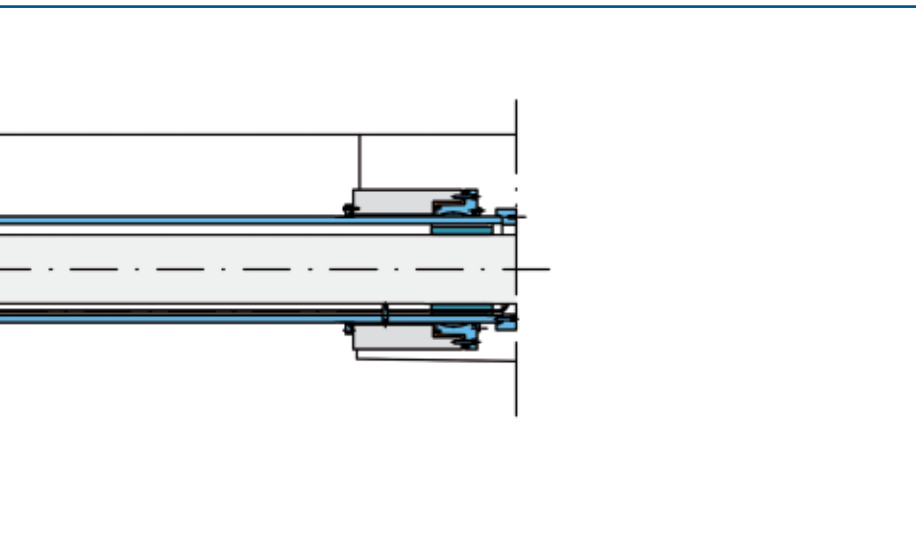
**The Standard Simplex FlexiTube is delivered with the following:**

- Interfaces adapted to the shaft seal
- Connection box for monitoring system
- One interchangeable temperature sensor
- Two bearings (three for SR-Type) fitted in our workshop
- Integrated pipes for shaft seals (if required)
- One integrated oil sampling pipe
- Connections for filling of sterntube oil and air outlet
- Connections for filling of epoxy resin and air outlet
- Package for securing the epoxy resin filling horizontally and vertically as well as for alignment
- Patented sealing package to secure the epoxy resin filling
- Complete o-ring and bolt kit

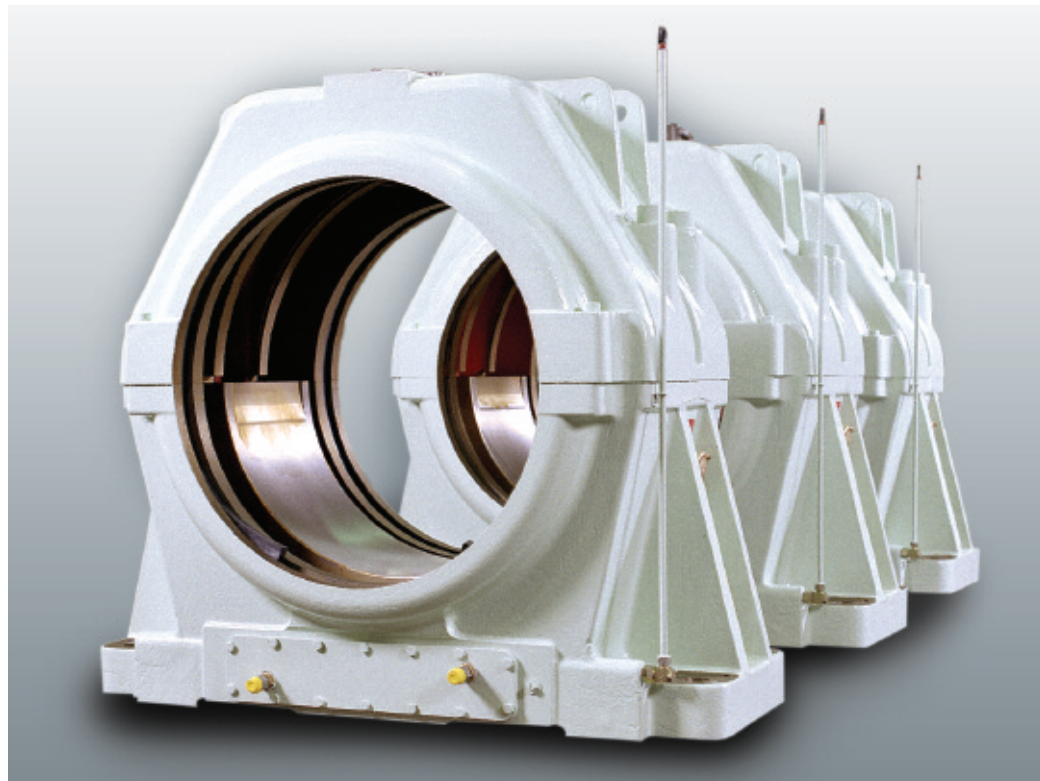
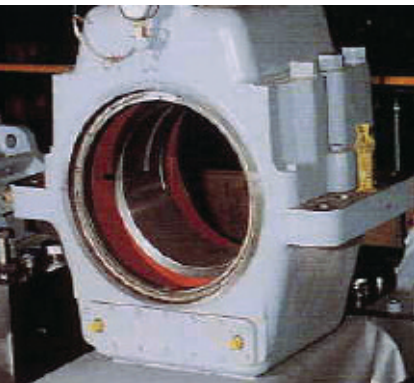


**Benefits:**

- Stress-free installation due to the flexible forward end
- Less preparation work for the design office and the shipyard
- Customised design
- Turnkey solution ready for installation
- Simple and precise installation
- Simple and efficient cooling
- Low wear on bearings, hull and shaft seals
- Low and easy maintenance from within the engine room
- Easily replaceable bearings
- Low consumption of sterntube oil due to the optimised design
- Compensation of Mechanical deviations
- Type approved by classification societies
- Compliance with the requirements of the classification societies' monitoring system



## SIMPLEX Tunnel Bearings and Plummer Blocks



The functional efficiency of a machine or plant is determined by, above all, the bearing quality on all rotating components. This applies in particular to the ship propulsion line-shafting. For this reason the Simplex bearings were developed especially for this application as short, plain bearings. More than 21,000 of these bearings have left our works to date under the "Simplex" mark of quality.

Following consequent further development a range of modern radial plain bearings is available today for a variety of applications.

The Simplex bearings have been designed to offer a maximum in functional reliability. This has been achieved by means of a number of design measures; in particular by a short shell length

combined with a set screw located at the bearing centre. This set screw allows exact alignment during the installation. By this method it is possible to reduce the danger of edge loading, normally occurring in plain bearings. A spherical centering of the shells with all the known disadvantages is therefore not necessary.

As the quality of bearings depends to a large extent on the bearing metal, a material with optimum running properties under emergency conditions has been chosen for metalling the removable shells. Of particular importance hereby is the perfect bonding of the bearing metal with the shell base. This bond is achieved by means of a special metalling process which also makes a technically advantageous thin-walled lining possible.

In addition the running surface of the bearing must be adequately supplied with lubricating oil to ensure that the bearing functions reliably. The oil is supplied, therefore, via a lubricating ring clamped tight on the shaft and a scraping device fixed loosely in the upper half of the bearing. This device, together with the oil pockets in the bearings shells, ensures that the oil supply is maintained at all times in the Simplex bearings, even at low shaft rpm.

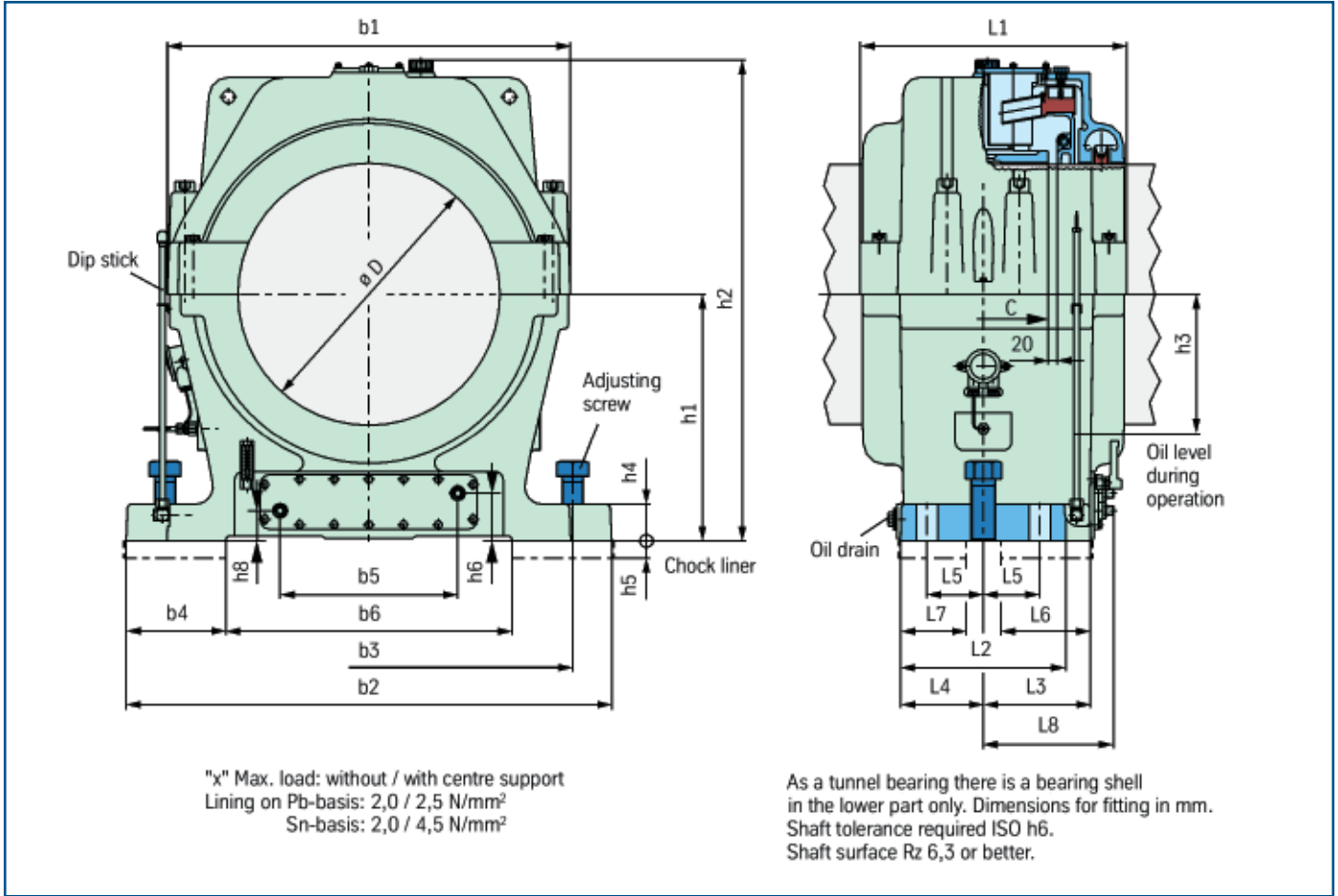
An effective sealing system at the bearing ends prevents the oil from flowing out and increases the reliability.

In special cases we provide our bearings with external lubricating systems which are also suitable for forming hydrostatic lubricating films. If required, we also supply the bearings with additional cooling by means of a water connection.

Simplex bearings are supplied as standard with a Pt-100 temperature sensor for remote monitoring as well as a local thermometer.

The hydrodynamic operation reliability of the bearing is calculated by computer to determine various technical parameters, e.g. lower rpm limit at liquid friction, transition rpm, etc.. For this, the following technical data are needed:

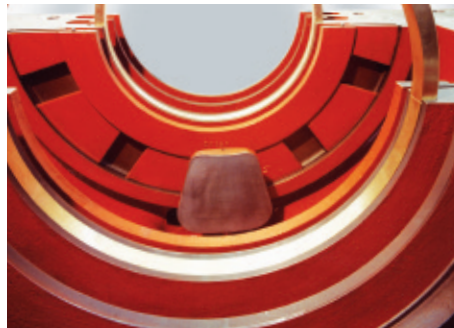
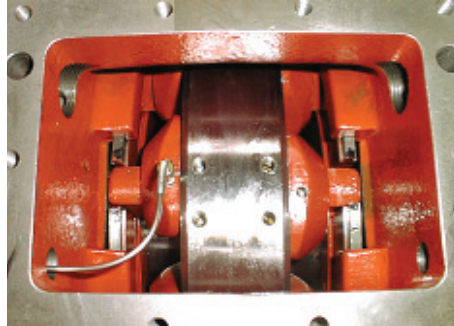
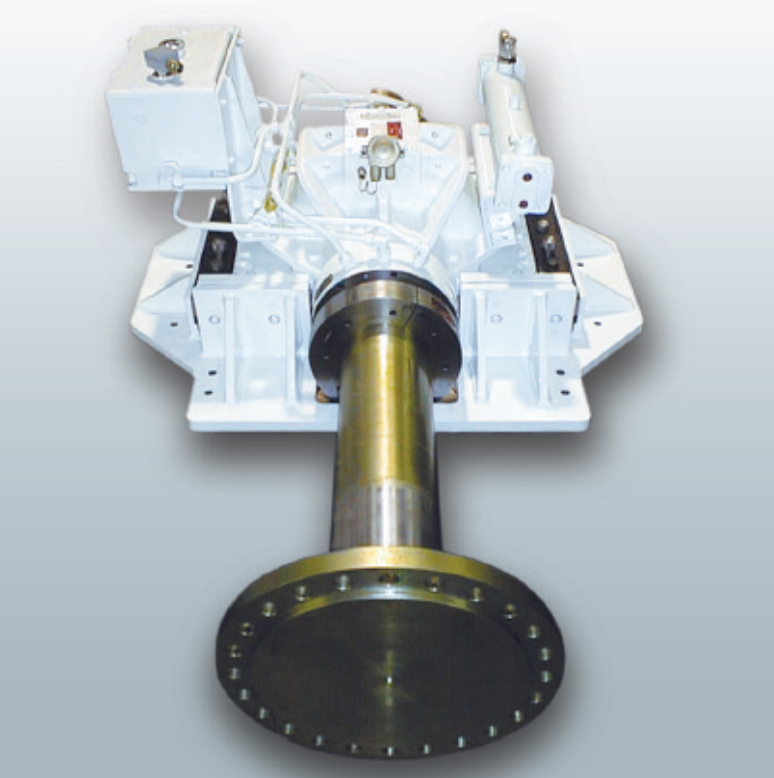
- Shaft diameter, maximum and minimum rpm
- Maximum and minimum radial load in t or kN
- Maximum ambient temperature
- Cooling water temperature
- Oil viscosity, if the type of oil is known



Size	D Shaft ø from to	Foundation bolts	Dimensions in mm																		Weight in kg			
			b1	b2	b3	b4	b5	b6	c	h1	h2	h3	h4	h5	L1	L2	L3	L4	L5	L6	L7	L8	Plummer Block	Tunnel Bearing
160	120-160	4 x M20	Dimensions and weights on request																					
200	161-200	4 x M20	Dimensions and weights on request																					
240	201-240	4 x M24	488	600	540	175	100	250	130	280	583	169	35	20	310	220	140	110	80	121	93	200	260	235
280	241-280	4 x M24	528	650	580	180	100	290	150	330	677	190	40	30	343	278	158	120	85	138	100	204	280	250
330	281-330	4 x M30	610	750	670	205	120	340	170	365	747	215	50	30	370	270	170	135	95	145	110	215	295	260
390	331-390	4 x M30	630	770	695	185	140	400	190	395	760	253	50	30	452	266	175	133	95	155	113	240	310	280
450	391-450	4 x M36	710	870	780	205	160	460	210	450	843	280	60	30	490	310	203	155	110	163	115	250	430	380
510	451-510	4 x M36	810	980	880	230	180	520	240	480	915	310	70	30	514	310	217	155	105	177	115	285	560	510
570	511-570	4 x M42	850	1030	920	225	200	580	270	500	960	340	70	40	580	360	240	180	130	200	140	285	760	700
650	571-650	4 x M42	930	1120	1000	230	200	660	300	570	1090	395	85	40	615	382	247	191	130	207	151	301	930	860
740	651-740	4 x M42	1080	1300	1170	275	300	750	350	620	1190	430	100	40	690	490	290	245	180	250	205	341	1200	1100
840	741-840	4 x M48	1260	1480	1350	315	300	850	460	700	1352	505	120	40	803	560	280	280	215	300	240	395	2340	2035
940	841-940	4 x M56	1380	1660	1500	350	300	960	510	785	1515	580	120	40	871	620	310	310	230	310	260	415	2640	2340
1040	941-1040	4 x M56	Dimensions and weights on request																					
Special sizes and designs on request																								

# SIMPLEX

## High Load Thrust Bearings



Simplex HL thrust bearings are single-collar thrust bearings for taking up the thrust loads produced by the ship's propeller. Other applications, such as with turbines, air blowers, cutter suction dredgers and centrifugal pumps are also possible. For special designs the bearing's internal parts are also fitted into or, by using flange type casings, onto gears or engines and motors. The bearings are manufactured in accordance with the rules of all international Classification Societies.

The thrust shaft with the solid forged collar transmits the thrust to the bearing casing.

In an axial direction the thrust collar is guided on both sides by the tilting pads. These pads rest on a spherical-shaped base and are directly supported on the casing. They can be inserted and removed through an

assembly opening without taking off the bearing's upper casing half.

The shape of the HL tilting pads results in improved oil flow, more effective cooling, lower friction and hence a smaller loss of efficiency and an increased service life. A Pt- 100 temperature sensor is fitted at the upper thrust pad in the main thrust direction.

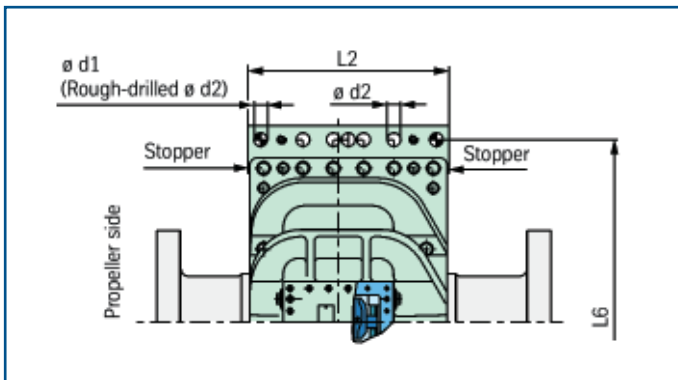
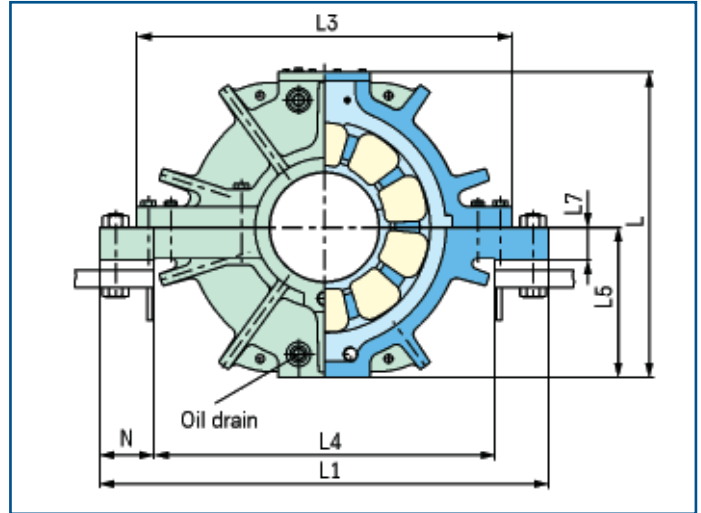
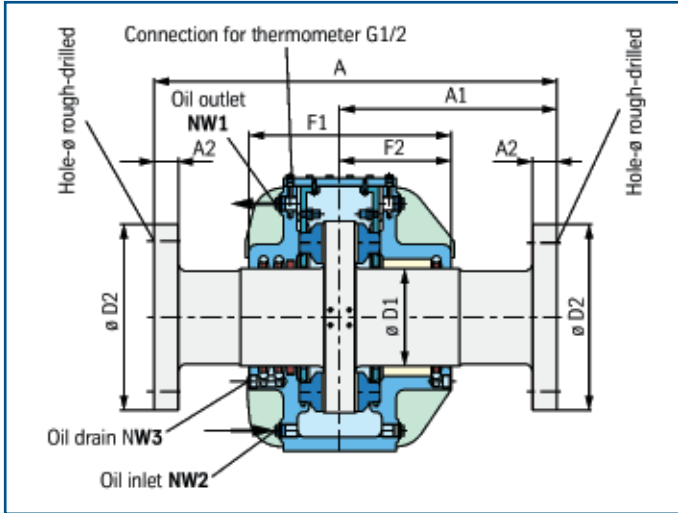
The robust, ribbed design of the casing with the stiffened supports of the tilting pads as well as its centreline mounting on the foundation gives the Simplex HL thrust bearing maximum strength and stability. In addition, the tilting moment is reduced.

Simplex HL thrust bearings are usually connected to a common lubricating oil system. If necessary, suitable separate lubrication units can be provided.

A sealing system at the bearing ends prevents the oil from flowing out. Simplex HL thrust bearings are designed either in combination with a radial bearing or, above size 500, as pure thrust bearings.

In order to accurately specify Simplex HL thrust bearings for a particular application, the following data are required:

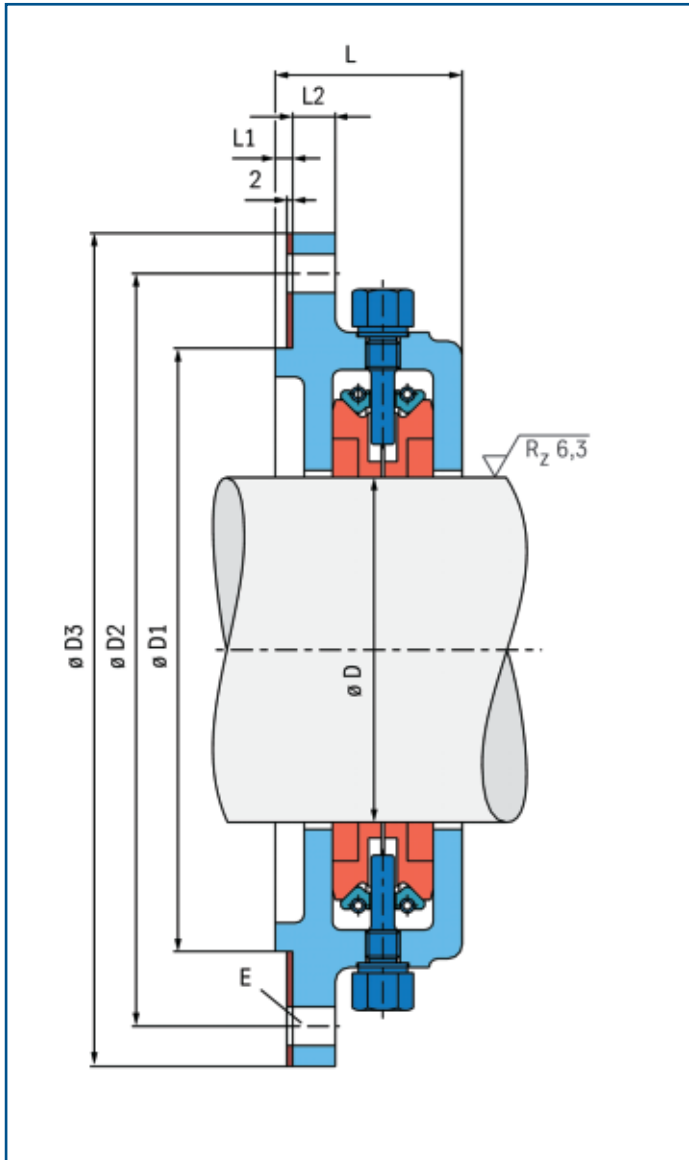
- Type of propulsion plant with output, propeller shaft revolutions and propeller thrust in t or kN.
- Type of propeller and reversing method.
- Direction of rotation of propeller seen from aft when running ahead.
- Possible radial load in t or kN.
- Ambient, oil supply and cooling water temperatures.
- Oil viscosity, if the type of oil is known.
- Classification Society for inspection and approval.



Size	Dimensions in mm														Load**		Weight without shaft in kg	Thrust shaft Dimensions in mm				Weight Thrust Shaft in kg		
	D1	d1	d2	F1	F2	L	L1	L2	L3	L4	L5	L6	L7	N	NW1	NW2		NW3	axial in kN	radial in kN	A		A1	A2 max.
180	25	23	395	210	545	730	405	615	556	265	680	55	87	G1	G3/4	G3/4	200	30	265	1000	550	55	362	300
200	25	23	440	233	595	790	450	675	616	290	744	60	87	G1	G3/4	G3/4	260	40	370	1100	600	60	402	410
225	34	32	475	260	651	940	485	780	704	318	870	65	118	G1	G3/4	G3/4	330	50	540	1200	650	65	450	565
250	34	32	525	85	724	1030	535	870	784	352	964	75	123	G11/4	G1	G1	420	60	745	1300	700	70	497	755
280	40	38	570	311	806	1160	580	975	890	393	1080	85	135	G11/4	G1	G1	530	80	1035	1450	800	80	556	1060
315	46	44	652	359	874	1290	662	1080	980	427	1200	95	155	G11/2	G11/4	G11/4	680	100	1490	1600	900	90	617	1475
355	52	50	712	399	956	1430	722	1195	1080	468	1330	110	175	G11/2	G11/4	G11/4	870	130	2020	1800	1000	105	690	2120
400	56	54	790	442	1050	1610	800	1365	1220	515	1510	120	195	G11/2	G11/4	G11/4	1110	160	2765	1950	1100	115	774	2935
450	62	60	880	493	1165	1790	890	1520	1356	570	1672	135	217	G11/2	G11/4	G11/4	1420	200	3790	2100	1200	120	870	3950
500	62	60	1005	552	1260	1840	1030	1550	1360	620	1710	95	240	50	32	G11/4	1820	250	3250	2400	1350	130	900	5450
560	78	74	1020		1440	2000	1040	1660	1520	710	1850	95	240	50	32	G11/4	2330		4100	2700	1350	140	1000	7550
630	82	80	1100		1650	2260	1155	1910	1700	810	2106	110	280	65	40	G11/2	2970		6500	3000	1500	160	1150	10950
710	95	93	1270		1870	2660	1310	2250	1960	920	2480	120	350	100	40	G11/2	3800		10000	3400	1700	180	1300	16420
800	105	103	1384		2060	2890	1430	2430	2180	1010	2690	150	355	100	40	40	4850		14400	3800	1900	200	1450	22520
900	100	98	1750		2365	3210	1770	2755	2440	1165	3000	165	385	100	50	50	6200		23300	4600	2100	225	1600	32540
1000	115	113	2010		2675	3550	2030	3030	2720	1315	3300	200	415	125	65	50	7930		33000	2010	2300	250	1800	44500

\*\* These loads are permissible only with a certain speed, oil viscosity, bearing and ambient temperature and with asymmetrical tilting pads.

# CENTRAX Seal for Bulkhead Openings



Where bulkhead openings for shafts have to be sealed to protect adjoining spaces against flooding, the Centrax bulkhead seal offers the optimum solution. An axially split housing made of aluminium is mounted on the bulkhead opening.

Two garter springs and a segmented thrust ring ensure proper contact of the sealing faces on the shaft and on the housing sides.

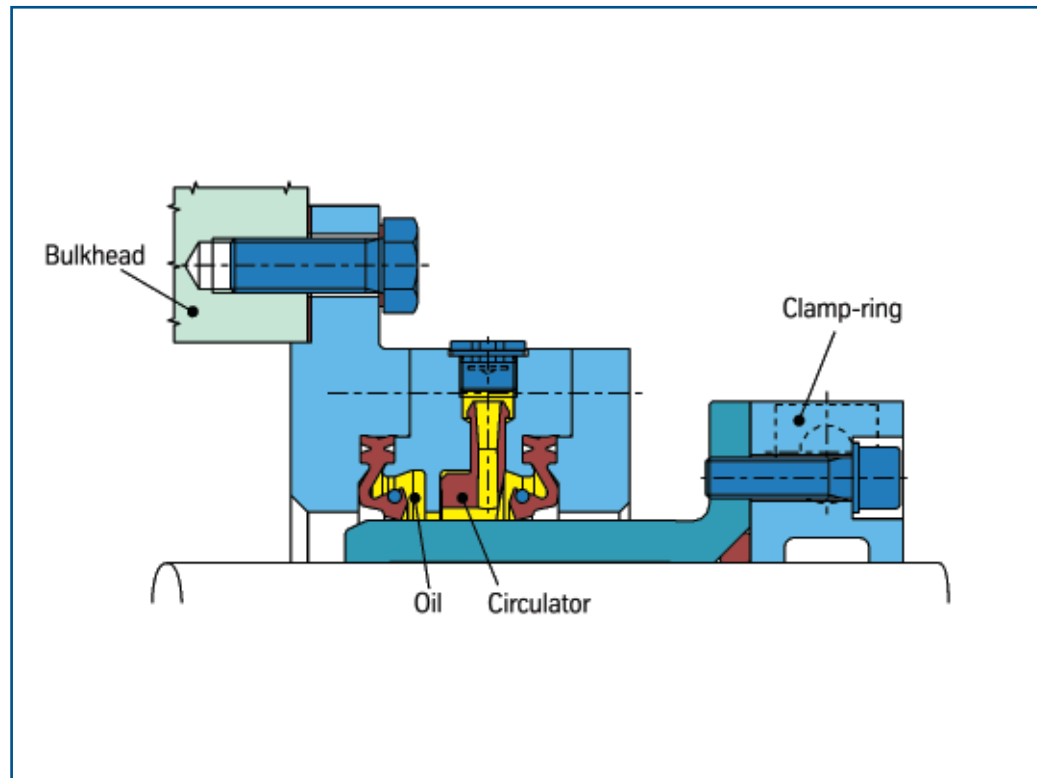
Radial and axial shaft movements are taken up by the Centrax bulkhead seal without any problem. There is practically no wear owing to the very good self-lubricating property of the carbon rings. Aside from the standard design shown, special designs with greater radial and/or angular movement are available.

The Centrax bulkhead seal is a well proven product, in service with merchant and naval shipping.

Size	Shaft- $\phi$ D	D1	D2	D3	E	L	L1	L2
60	50-60	130	175	200	8 x M8	62		13
70	61-70	140	185	210				
80	71-80	150	195	220				
90	81-90	160	205	230				
100	91-100	170	215	240				
120	101-120	210	262	290	8 x M12	65	6	15
140	121-140	230	282	310				
160	141-160	250	302	330				
180	161-180	270	322	350				
200	181-200	290	342	370				
220	201-220	325	390	430	12 x M16	79		20
240	221-240	345	410	450				
260	241-260	365	430	470				
280	261-280	385	450	490				
300	281-300	405	470	510				
320	301-320	425	490	530				
340	321-340	445	510	550				
360	341-360	480	560	610	12 x M20	86		23
380	361-380	500	580	630				
400	381-400	520	600	650				
420	401-420	540	620	670				
440	421-440	560	640	690				
460	441-460	580	660	710				
480	461-480	600	680	730				
500	481-500	620	700	750	16 x M20	93	8	27
520	501-520	640	725	775				
540	521-540	660	745	795				
560	541-560	680	765	815				
580	561-580	700	785	835				
600	581-600	720	805	855				
620	601-620	740	825	875				
640	621-640	760	845	895	16 x M24	103		33
660	641-660	790	885	945				
680	661-680	810	905	965				
700	681-700	830	925	985				
720	701-720	850	945	1005				
740	721-740	870	965	1025				
760	741-760	890	985	1045				
780	761-780	910	1005	1065	16 x M24	103		33
800	781-800	930	1025	1085				



# SIMPLEX-COMPACT 2000 Seal for Bulkhead Openings (Gas-Tight)



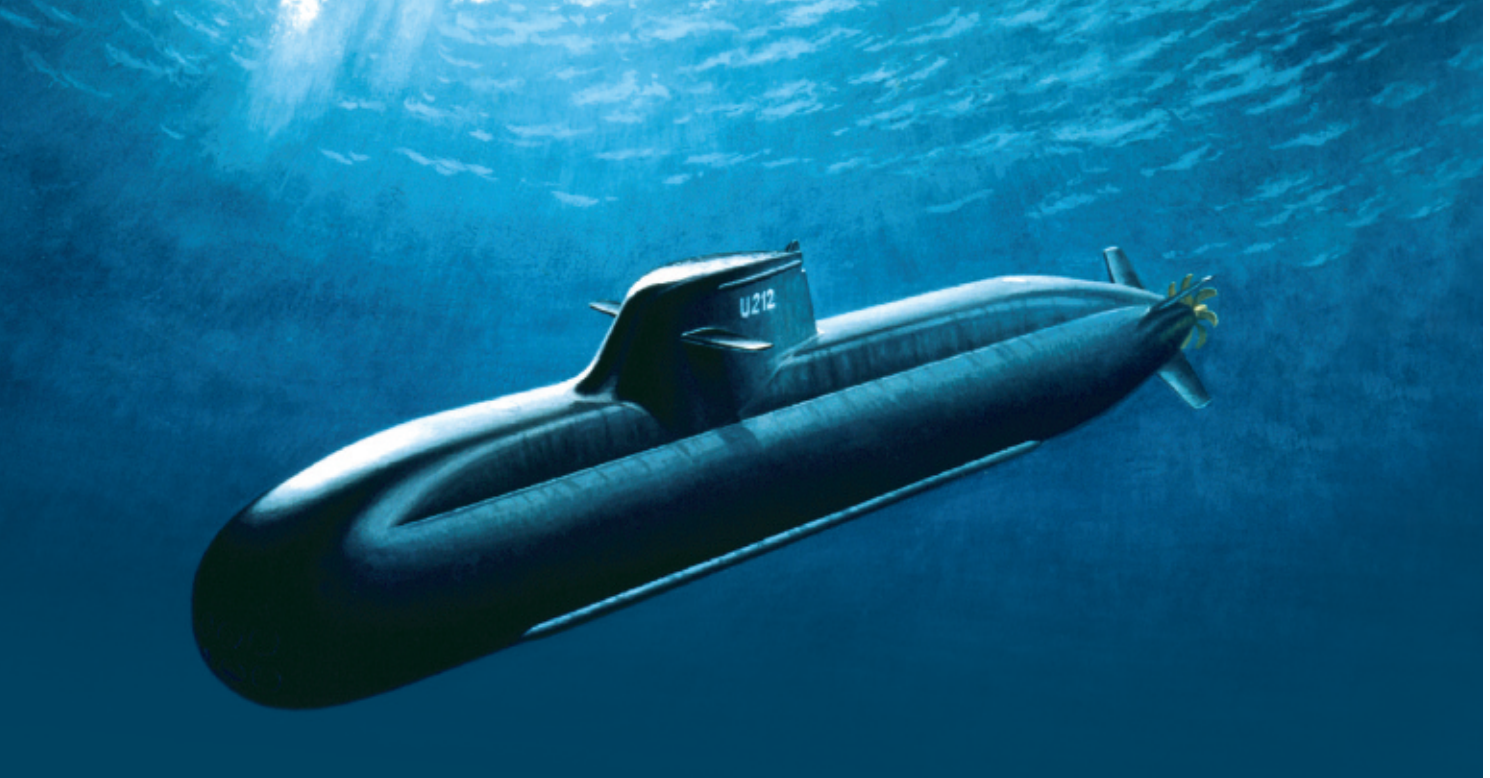
If a gas-tight and water-tight seal is required we can offer our Simplex-Compact bulkhead seal.

The design is based on the forward Simplex-Compact seal. However, the two sealing rings face each other, thus acting as a barrier chamber which is filled with oil.

This chamber is connected to a 4 l oil tank and by means of the circulator a permanent lubrication and cooling is provided. This seal can also be supplied completely radially and axially split.

For this seal the recess, pitch circle and outer diameters can be adapted to the dimensions required to pass shaft flanges, couplings, bearings etc. through the bulkhead.

## CARBOPLAN-PLUS An Optimum Mechanical Seal

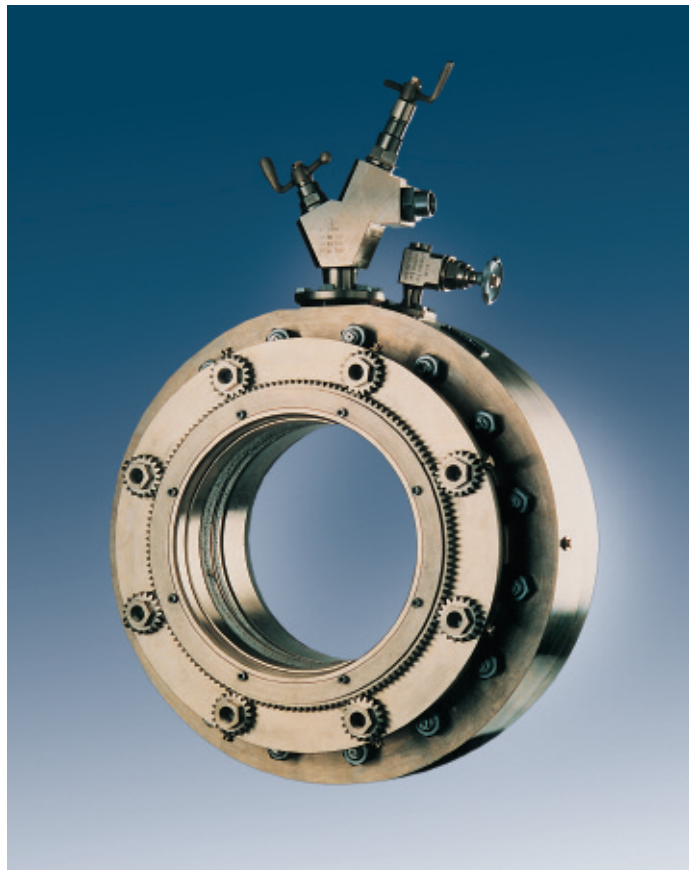


In 1980, we extended our activities in the field of mechanical seals to, among others, naval applications.

For example, the Carboplan mechanical seal, a stern-tube seal used over many decades in international submarine design, was investigated for possibilities of improvement.

This research resulted in a completely new mechanical seal, the Carboplan-Plus.

This new seal has been used internationally in the submarines of several navies since 1984. Every demand made on this type of product, such as resistance to shock, vibration, pressure and corrosion, as well as ease of maintenance and repair, is fully met by the Carboplan-Plus.



# Ship Components Product Range and Services



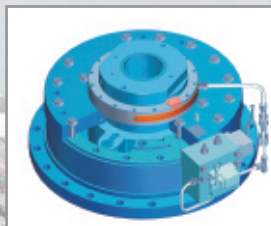
Engineering



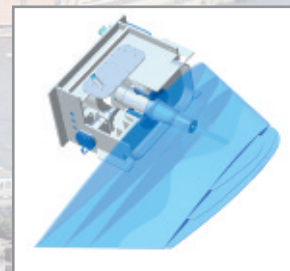
Underwater stern-tube seal repair



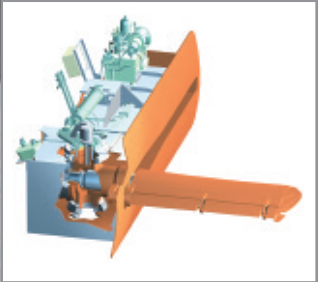
Turbuloseparators



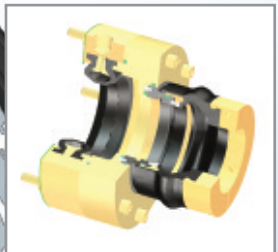
Steering Gear



Fin Stabilizers Type FK



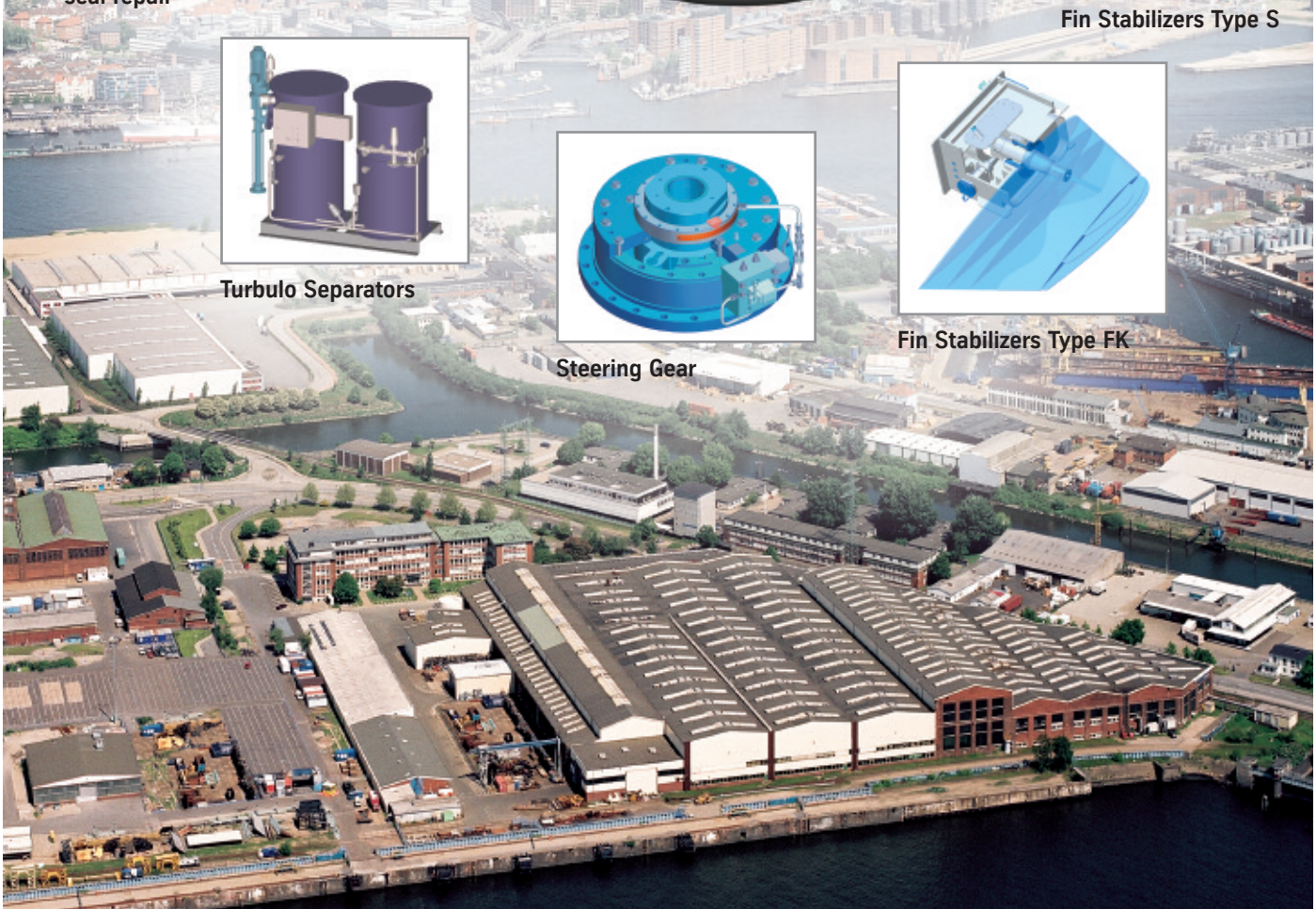
Fin Stabilizers Type S



Simplan Stern-tube Seals



Worldwide Service



# SIMPLEX and TURBULO Products

## Sales Agents and Service Stations



### Headquarters: Manufacture, Sales and Service Hamburg/ Germany

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Internet: [www.bv-industries.com](http://www.bv-industries.com)

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Mobile: +49 -172 -437 47 78  
E-Mail: [service.bvi@thyssenkrupp.com](mailto:service.bvi@thyssenkrupp.com)

We maintain a 24 hr after sales service including:

- Comprehensive spare parts stock.
- Extra production capacity available for urgent service cases.
- Underwater repair service.
- Engineering consultants and software service available.
- Service staff on call 24 hrs.
- Trained service specialists throughout the world.

The conversion of seals to Simplex-Compact on ships in service is a standard procedure. Provided the necessary technical data can be made available a conversion can be carried out within a few days.

# SIMPLEX and TURBULO Products

## Sales Agents – Worldwide

51

### Africa (excl. Egypt)

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Tel.: +44-1606-85 32 28  
Mobile: +44-7879-84 38 98  
technical@maritimepro.com  
www.maritimepro.com  
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nauta@uniontecnica.com.ar  
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Ulf Lienhard  
Hans Dyrzka

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david@duttonservices.com  
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### Bahama Islands

see USA

### Bahrain

see Middle East

### Bangladesh

see Singapore

### Belgium

see Netherlands

### Bermuda Islands

see USA

### Brazil

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Contact: Capt. Fabio Ruiz

### Brunei

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Contact: Emil Petrov

### Canada

see USA

### Caribbean Countries

see USA

### Central America

#### Chile

#### Colombia

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www.miegroupp.com.cy  
Contact: Michael Ajini

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Mobile: +45-21 26 15 52  
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### Ecuador

see USA

### Egypt

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Contact: Nicholas Kolliarakis

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#### Indonesia

see Singapore

#### Iran

#### Iraq

see Middle East

#### Israel

see Cyprus

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#### Jordan

see Middle East

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#### Lebanon

#### Libya

see Middle East

#### Malaysia (excl. Navy)

see Singapore

#### Malaysia Navy

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### Pakistan

see Singapore

### Peru

see USA

### Philippines

see Singapore

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### Qatar

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www.owms.ru

### Saudi Arabia

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### Singapore

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### Sri Lanka

see Singapore

### Sweden

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see Middle East

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### Thailand

see Singapore

### Turkey

Izer Denizcilik Ve Gemi San. Dis.  
Tic. Ltd.  
Evliyacelebi Mahallesi,  
Istasyon Caddesi  
Giptas Sanayi Sitesi D blok No: 24  
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24/7/365 Mobile: +1-908-581 09 00  
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### Venezuela

see USA

### Vietnam

see Singapore

### Yemen

see Middle East

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The information contained in this brochure is of a general nature. Technical details may differ from those described here due to the requirements of specific applications, and may change without notice due to further technical developments of the products. Descriptions of the performance of the products are only then binding when contractually agreed.

5. Issue 9.2008

