

MARINE

**STAY COOL
ON BOARD.
AND STEADY
AT SEA.**



DAS HERZ DER FRISCHE



BITZER. EXPERTISE AND INNOVATION.



AIR CONDITIONING



HEAT PUMPS



REFRIGERATION



PROCESS COOLING



TRANSPORT

As an independent global leader in refrigeration, air conditioning and heat pump technology for comfort air conditioning, process technology and mobile applications, we use our extensive experience to provide innovative products and intelligent solutions which create additional value for our partners and the environment all over the world.

CONTENTS

»TRENDS AND CHALLENGES

Page 4–5

»RECIPROCATING COMPRESSORS

Product series and application limits / Refrigerants, applications and oils / Inclination angles

Page 6–13

»SCREW COMPRESSORS

Product series and application limits / Refrigerants, applications and oils / Inclination angles

Page 14–21

»HEAT EXCHANGERS AND PRESSURE VESSELS

Water cooled shell-and-tube condensers / Shell-and-tube evaporators

Liquid receivers / Oil separators / Oil coolers

Page 22–27

»REFRIGERANTS AND CHARACTERISTICS

Page 28–29

»SOFTWARE, SERVICE AND TRAINING

Page 30–35

TRENDS AND CHALLENGES

ALWAYS AN UNTROUBLED JOURNEY. MASTER ALL COOLING REQUIREMENTS AT SEA.

Refrigeration and air conditioning technologies play a significant role aboard any ship; out at sea, all operations have to be absolutely reliable. High-performance BITZER products provide optimum temperatures at all times and places. Ship your goods, machinery and crew safely across the oceans – with a broad product portfolio from BITZER.

QUALITY STANDARDS

BITZER provides a broad range of international type approval certificates for high quality standards. If required, we will support you in requesting further special certificates.

Examples of some classification societies:

// DNV (Det Norske Veritas)

// LR (Lloyds Register)

// BV (Bureau Veritas)

// RINA (Registro Italiano Navale)

Further marine approvals are in progress.

MARINE COATING

BITZER delivers compressors, heat exchangers and liquid receivers optionally with an optional anticorrosive protective coating. The coating provides a higher level of flexibility with a wider range of market requirements and conforms to standards DIN EN ISO 12944-CX and NORSOK M-501. This leads to the highest resistance in salty and other aggressive ambient atmospheres.

WASTE HEAT FOR POWER

Utilise the waste heat from your engines to run an Organic Rankine Cycle (ORC) and produce power with the BITZER screw expander. You can thereby reduce fuel consumption and take a step towards climate-neutral shipping – a goal which the UN organisation IMO is aiming for. Take BITZER on board as your partner to achieve it.



NATURAL REFRIGERANTS

Prepare now for the future of cooling with natural refrigerants and get a long-term solution with low operating costs. We have a high level of expertise and have been offering solutions for cooling with CO₂ (R744), for example, for more than 20 years as well as for ammonia (R717). With BITZER, you take no risks and make future-proof investments.



EXPLOSION-PROOF

BITZER compressors for explosion-proof (EX) applications provide the necessary safety for operations in critical environments. They are designed according to the EU Protection Directive 2014/34/EU (ATEX114) in Zone 1 and Zone 2 (ATEX) according to the EU Protection Directive 1992/92/EC (ATEX 137). BITZER compressors for explosion-proof applications are ready to use in different applications for high, medium and low temperatures. Typical installation areas include offshore platforms and rigs, offshore accommodation areas and FPSO vessels.

Explosion-proof products are:

// Reciprocating compressors

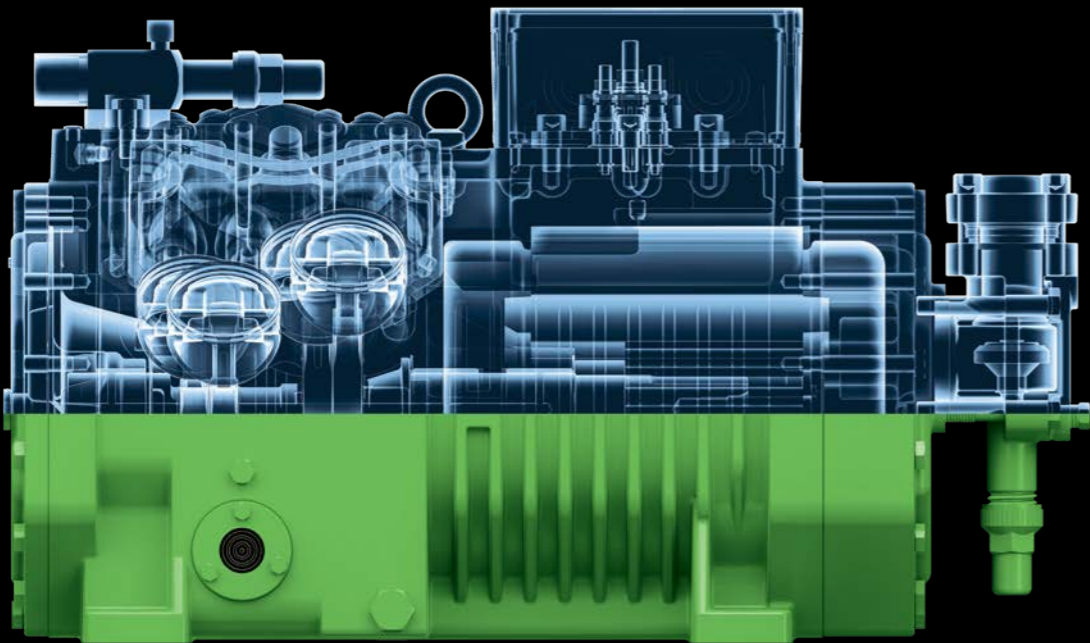
// Compact screw compressors

// Open drive screw compressors
(+ oil separators)

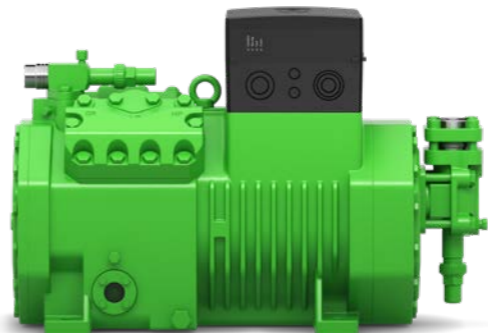


RECIPROCATING COMPRESSORS

FOR ALL TEMPERATURES.
TRUST IN OUR MISSION-
PROVEN TECHNOLOGY.




SEMI-HERMETIC RECIPROCATING COMPRESSORS:
ECOLINE



The exemplary product picture shows full equipment.
Required equipment for marine versions is optionally available.

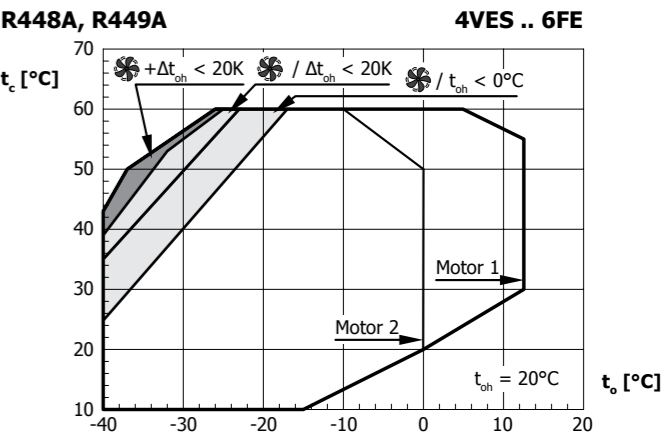
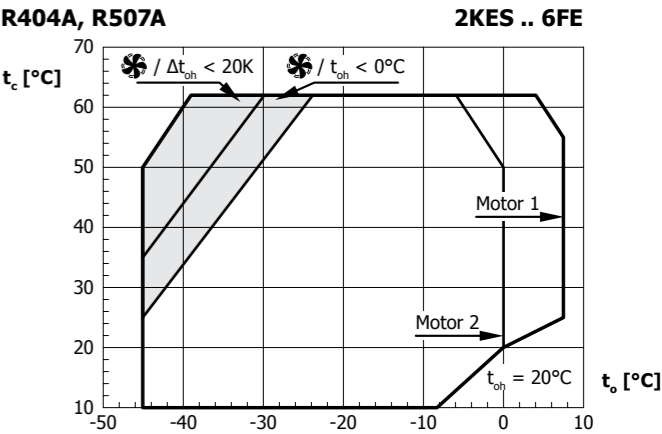
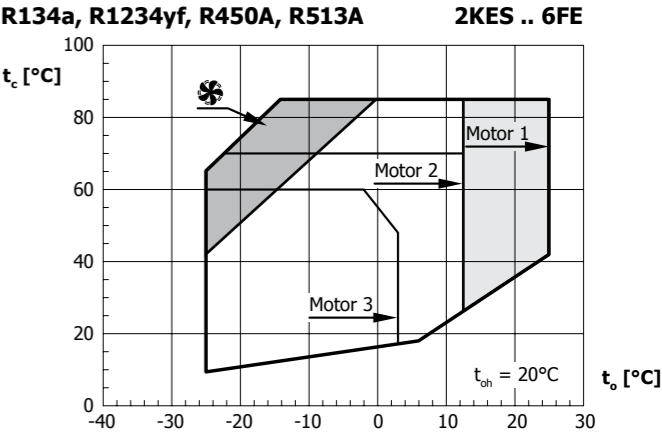
ECOLINE COMPRESSORS	DISPLACEMENT m³/h at 60 Hz
2KES	4.9
2JES	6.3
2HES	7.9
2GES	9.1
2FES	11.5
2EES	13.7
2DES	16.2
2CES	9.6
4FES	21.8
4EES	27.4
4DES	32.4
4CES	39.2
4BES	43.6
4VE	41.9
4TE	49.9
4PE	58.5
4NE	67.9
4JE	76.6
4HE	88.8
4GE	102.0
4FE	121.3
6JE	115.0
6HE	133.4
6GE	153.0
6FE	183.1

 **BITZER SOFTWARE**
For further details,
please refer to BITZER Software

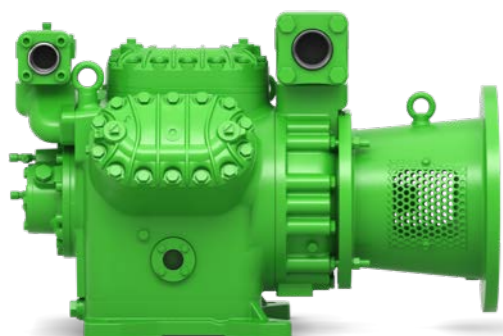


-  **INTELLIGENT PRODUCTS**
-  **ATEX**
-  **NATURAL REFRIGERANTS**

SELECTED APPLICATION LIMITS

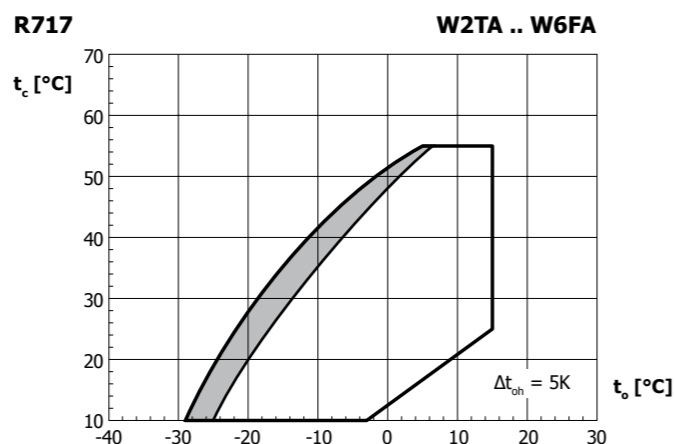
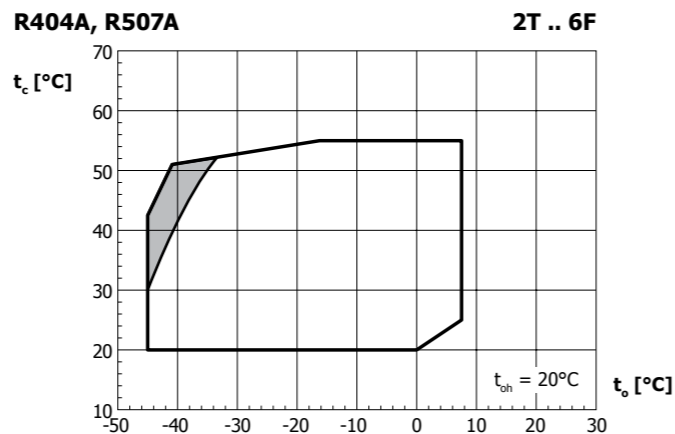
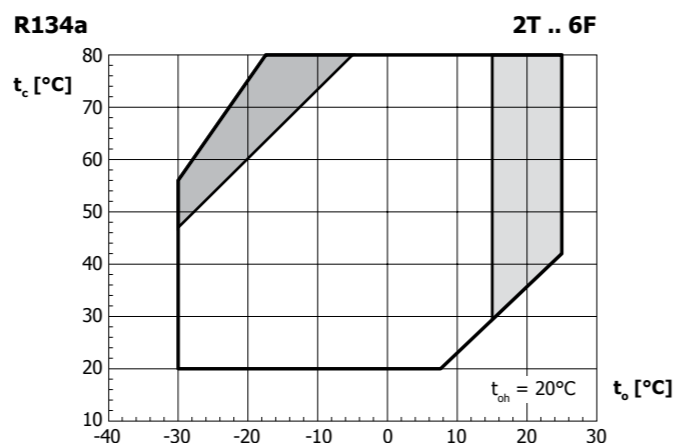


OPEN DRIVE RECIPROCATING COMPRESSORS



OPEN DRIVE COMPRESSORS	MOTOR PULLEY DIAMETER mm	DISPLACEMENT m³/h at 60 Hz
0	130	2.2
I	120	3.5
II	180	5.4
III	180	11.3
IV	200	18.0
V	220	34.5
VIW	180	53.1
VIIW	180	70.0
2T.2	230	23.7
2N.2	230	33.8
4T.2	230	47.5
4P.2	230	56.9
4N.2	230	67.7
4H.2	230	88.8
4G.2	230	102.0
6H.2	230	133.4
6G.2	230	153.0
6F.2	230	183.0
W2TA	230	23.7
W2NA	230	33.8
W4TA	230	47.5
W4PA	230	56.9
W4NA	230	67.7
W4HA	230	88.8
W4GA	230	102.0
W6HA	230	133.4
W6GA	230	153.0
W6FA	230	183.0

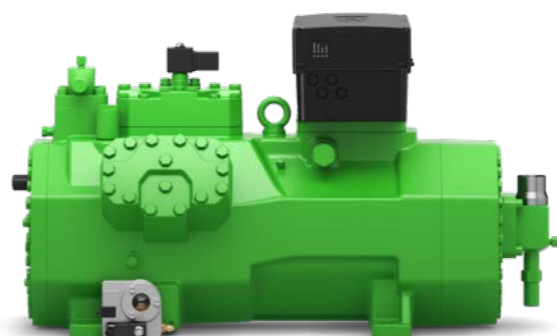
SELECTED APPLICATION LIMITS



BITZER SOFTWARE
For further details,
please refer to BITZER Software



SEMI-HERMETIC RECIPROCATING COMPRESSORS: CO₂

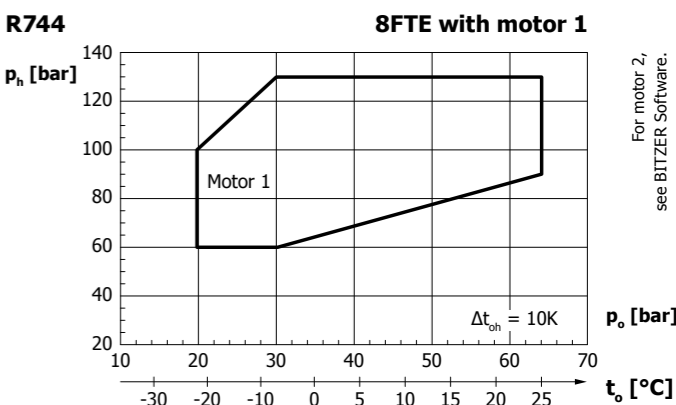
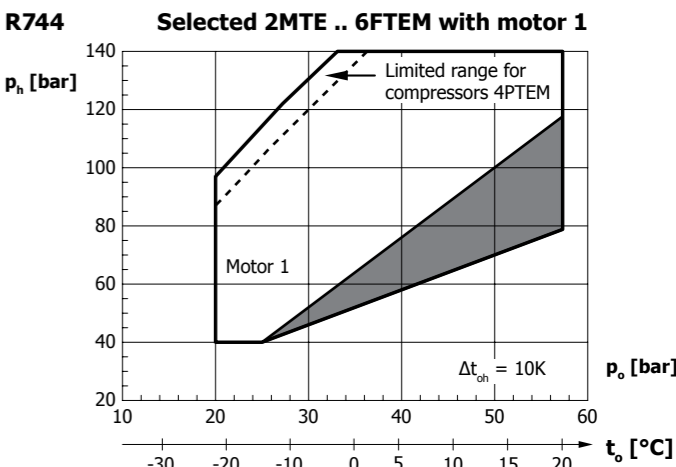
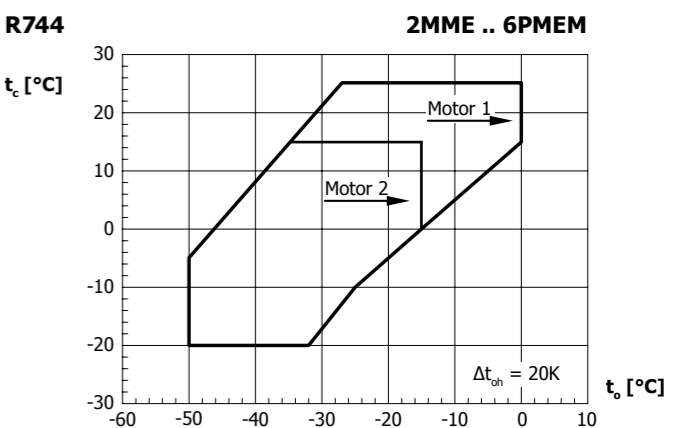


The exemplary product picture shows full equipment.
Required equipment for marine versions is optionally available.

COMPRESSORS SUBCRITICAL SL + ME	DISPLACE- MENT m³/h at 60 Hz	COMPRESSORS TRANSCRITICAL TE	DISPLACE- MENT m³/h at 60 Hz
2NSL	1.6	2MTE	3.9
2MSL	2.0	2KTE	5.8
2LSL	2.7	4PTEM	5.2
2KSL	3.3	4MTEM	7.8
2JSL	4.2	4KTEM	11.6
2HSL	5.2	4JTEM	11.2
2GSL	6.1	4HTEM	14.5
2FSL	7.7	4GTEM	18.1
2ESL	9.4	4FTEM	21.1
2DSL	11.1	4DTEM	26.6
2CSL	13.5	6FTEM	31.5
4FSL	15.0	6DTEM	36.6
4ESL	18.8	6CTEM	46.1
4DSL	22.3	8FTE	83.3
4CSL	26.9	8CTE	119.0
2MME	2.0		
2KME	3.3		
2JME	4.2		
2HME	5.2		
2GME	6.1		
2FME	7.7		
2EME	9.4		
2DME	11.1		
4FMEM	15.0		
4EMEM	18.8		
4DMEM	22.3		
4TMEM	41.9		
6TMEM	65.9		
6PMEM	78.3		
8VME	167.2		
8TME	194.0		
8PME	240.8		

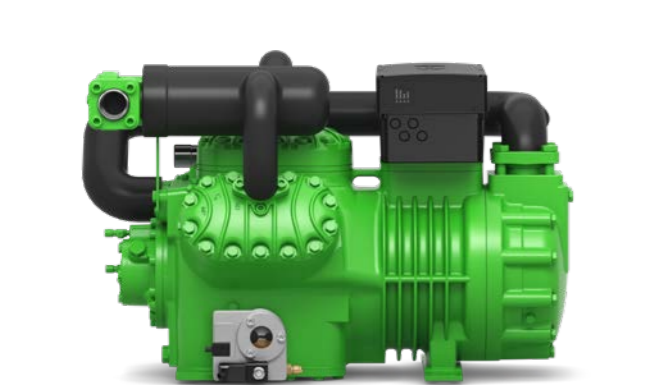
The additional letter 'M' in some type
designations indicates the marine version
of the respective compressor.

SELECTED APPLICATION LIMITS



For motor 2,
see BITZER Software.

SEMI-HERMETIC RECIPROCATING COMPRESSORS: 2-STAGE

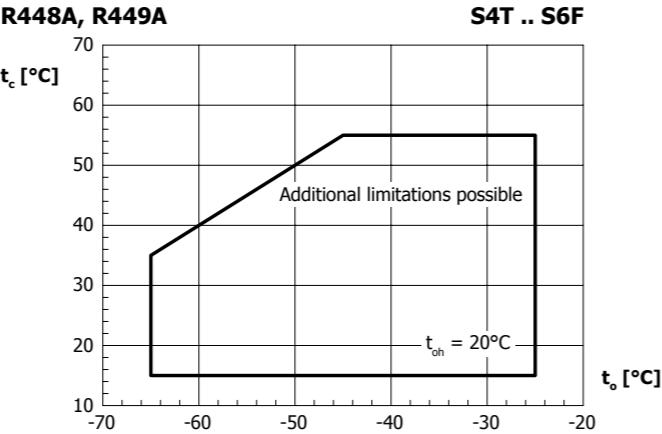
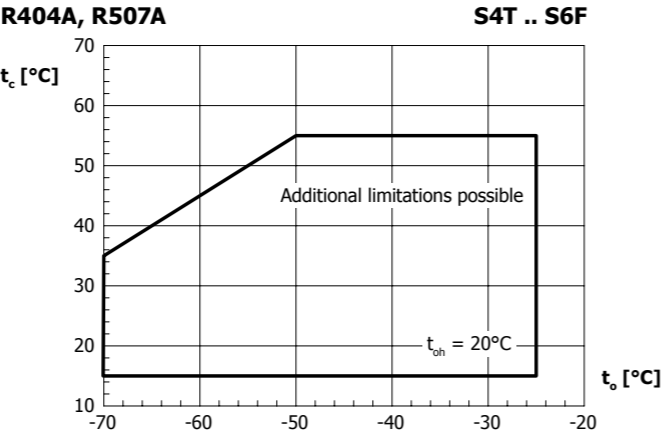


The exemplary product picture shows full equipment.
Required equipment for marine versions is optionally available.

2-STAGE COMPRESSORS	DISPLACEMENT m³/h at 60 Hz low pressure stage	DISPLACEMENT m³/h at 60 Hz high pressure stage
S4T	23.8	15.2
S4N	33.8	21.6
S4G	51.0	32.6
S6J	76.6	38.4
S6H	88.8	44.5
S6G	102.0	51.0
S6F	122.0	60.1

HFO BLEND
READY

SELECTED APPLICATION LIMITS



**BITZER
SOFTWARE**
For further details,
please refer to BITZER Software



REFRIGERANTS, APPLICATIONS AND OILS

COMPRESSOR TECHNOLOGY	TYPE DESIGNATION	REFRIGERANTS	APPLICATIONS			
			AIR CONDITIONING	PROVISION COOLING MT + LT	PROCESS COOLING MT + LT	FOOD PROCESSING MT + LT
Semi-hermetic ECOLINE	2KES .. 6FE	HCFC, HFC, HFO, HFO/HFC blends, HC	X	X	X	X
Open drive	0 .. VIIW, 2T.2 .. 6F.2	HCFC, HFC, HFO/HFC blends	X	X	X	X
Open drive NH ₃	W2TA .. W6FA	R717			MT	MT
Semi-hermetic CO ₂	2NSL .. 4CSL, 2MME .. 6PME, 2MTE .. 8CTE	R744		X	X	X
Semi-hermetic 2-stage	S4T .. S6F	HCFC, HFC, HFO/HFC blends		LT	LT	LT

COMPRESSOR TECHNOLOGY		SEMI- HERMETIC ECOLINE 2KES .. 6FE	OPEN DRIVE 2T.2 .. 6F.2, 0 .. VIIW	OPEN DRIVE NH ₃ W2TA .. W6FA	SEMI-HERMETIC CO ₂			SEMI- HERMETIC 2-STAGE S4T .. S6F
REFRIGERANT					2NSL .. 4CSL	2MME .. 6PME	2MTE .. 8CTE	
R717	NH ₃			Reniso KC86				
R744	CO ₂				BSE60K	BSE85K	BSE85K	
R22	HCFC	B5.2	B5.2					B5.2
R134a	HFC	BSE32	BSE32					
R227ea	HFC	BSE55*	BSE55*					
R236fa	HFC	BSE55*	BSE55*					
R404A	HFC	BSE32	BSE32					BSE32
R507A	HFC	BSE32	BSE32					BSE32
R407A	HFC	BSE32	BSE32					BSE32
R407C	HFC	BSE32	BSE32					BSE32
R407F	HFC	BSE32	BSE32					BSE32
R417A	HFC	BSE32	BSE32					
R417B	HFC	BSE32	BSE32					
R422D	HFC	BSE32	BSE32					
R437A	HFC	BSE32	BSE32					
R438A	HFC	BSE32	BSE32					
R448A	HFO/HFC	BSE32	BSE32					BSE32
R449A	HFO/HFC	BSE32	BSE32					BSE32
R450A	HFO/HFC	BSE32	BSE32					
R452A	HFO/HFC	BSE32	BSE32					BSE32
R454A	HFO/HFC	BSE32	BSE32					
R454C	HFO/HFC	BSE32	BSE32					
R455A	HFO/HFC	BSE32*	BSE32*					
R513A	HFO/HFC	BSE32	BSE32					
R1234yf	HFO	BSE32	BSE32					
R1234ze(E)	HFO	BSE55	BSE55					
R600a	HC	SHC226E*						
R290	HC	SHC226E*						
R1270	HC	SHC226E*						

The overview only mentions standard oils. Alternatives upon request. * Please contact BITZER if you want to use one of these combinations (compressor/refrigerant/oil).

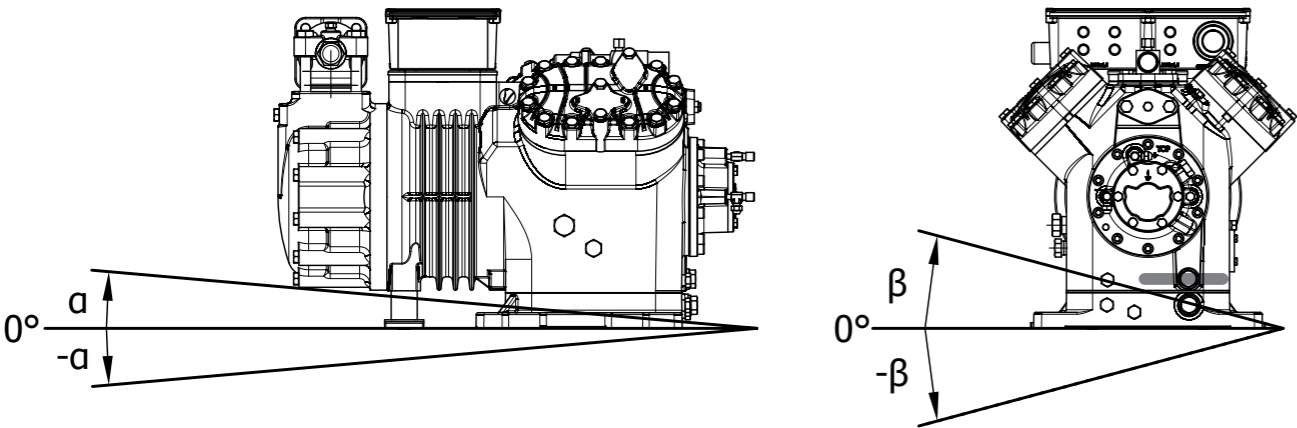
Detailed
information
on oils



Please find all
BITZER Marine Type
approvals here



RECIPROCATING COMPRESSORS: INCLINATION ANGLES



The grey line indicates the oil level.

TYPE	OIL LEVEL	α max. (β = 0°)	β max. (α = 0°)	α, β max. (α = β)	α max. (α = 2/3 β)	β max.
Semi-hermetic reciprocating compressors						
2KES .. 4NE	Middle of sight glass	5°	15°			
4JE .. 6FE	Middle of sight glass	12°	22°	8°	6.7°	10°
	Bottom of sight glass	5°	9°	3°		
S4T .. S6F	Middle of sight glass	12°	22°	8°	6.7°	10°
	Bottom of sight glass	5°	9°	3°		
4JE .. 6FE*	Middle of sight glass	27°	45°	19°	16°	24°
	Bottom of sight glass	21°	37°	14°	12°	18°
S4T .. S6F*	Middle of sight glass	27°	45°	19°	16°	24°
	Bottom of sight glass	21°	37°	14°	12°	18°
Open drive compressors						
0, I	Middle of dipstick	35°	60°	35°	35°	45°
II .. VII	Middle of sight glass	35°	60°	35°	35°	45°
	Bottom of sight glass	35°	50°	35°	35°	40°
2T.2, 2N.2	Middle of sight glass	30°	50°			
4T.2 .. 4N.2	Middle of sight glass	24°	40°			
2T.2 .. 4N.2*	Middle of sight glass	35°	50°			
4H.2 .. 6F.2*	Middle of sight glass	26°	43°	18°	15°	22.5°
	Bottom of sight glass	20°	35°	15°	13°	17°

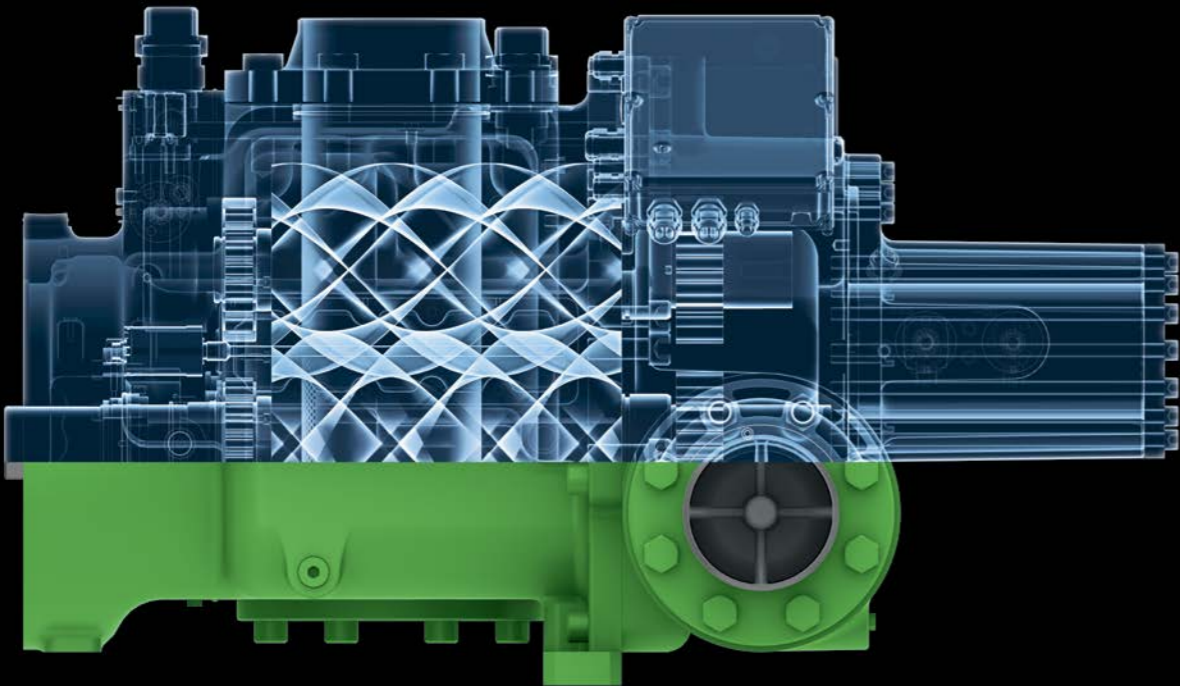
* With optionally available conversion kit for marine application.

TYPE	OIL LEVEL	INCLINATION IN THE LONGITUDINAL DIRECTION α		INCLINATION IN THE TRANSVERSAL DIRECTION β	
		STATIC	DYNAMIC	STATIC	DYNAMIC
Semi-hermetic reciprocating compressors for subcritical CO ₂ applications					
2NSL .. 4CSL	Middle of sight glass	±5°	±7.5°	±15°	±22.5°
2MME .. 2DME	Middle of sight glass	±5°	±7.5°	±15°	±22.5°
4TMEM .. 4DMEM	Middle of sight glass	±15°	±15°	±22.5°	±22.5°
6TMEM .. 6PME*	Middle of sight glass	±15°	±15°	±22.5°	±22.5°
8VME .. 8PME	Middle of sight glass	±5°	±7.5°	±15°	±22.5°
Semi-hermetic reciprocating compressors for transcritical CO ₂ applications					
2MTE .. 2KTE	Middle of sight glass	±5°	±7.5°	±15°	±22.5°
4PTM .. 4CTM	Middle of sight glass	±15°	±15°	±22.5°	±22.5°
6FTM .. 6CTM*	Middle of sight glass	±15°	±15°	±22.5°	±22.5°
8FTE .. 8CTE	Middle of sight glass	±5°	±7.5°	±15°	±22.5°

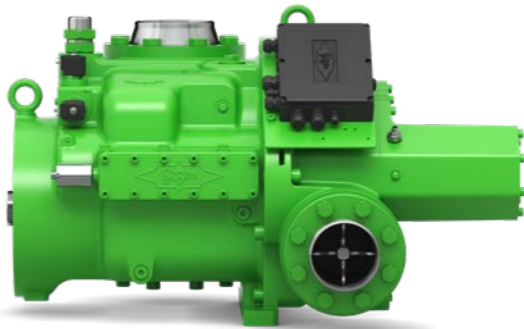
* 6TME-35 and 6FTE-35 are not available as a marine version, which means there are no 6TME-35 and 6FTE-35 types.

SCREW COMPRESSORS

HIGH COOLING CAPACITY.
ON ANY PERFORMANCE LEVEL.

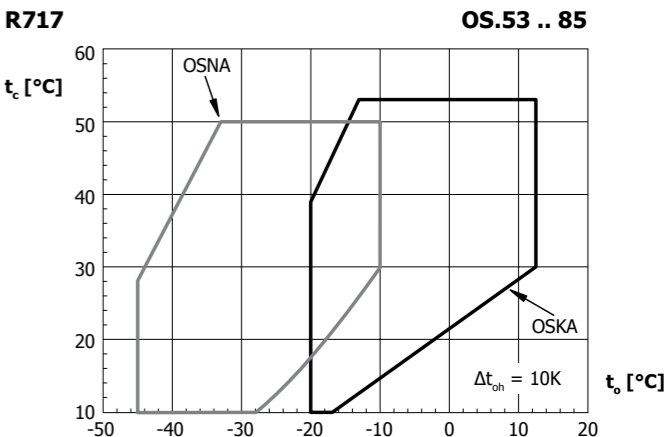
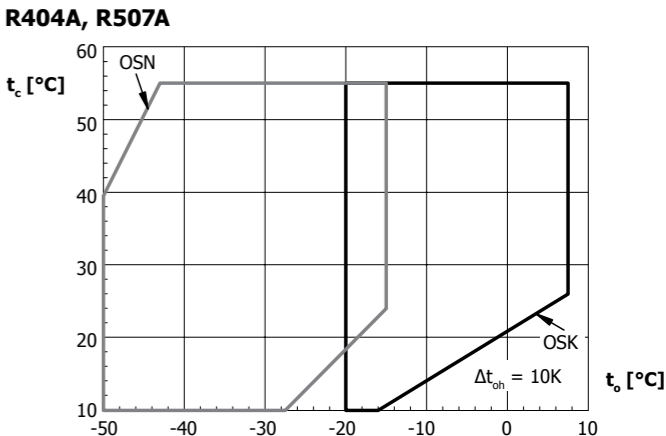
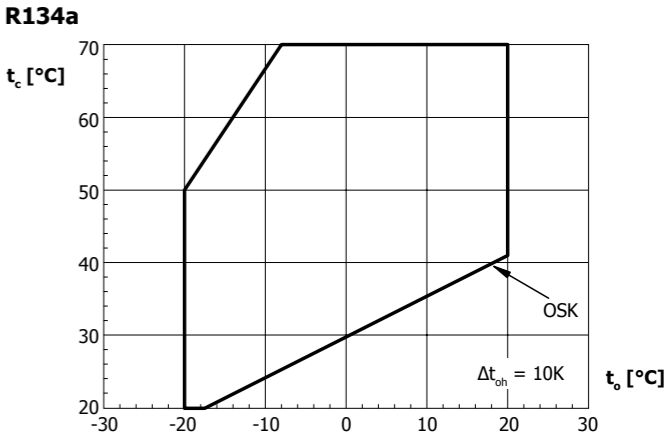


OPEN DRIVE SCREW COMPRESSORS:
OS




- IQ INTELLIGENT PRODUCTS
- Ex ATEX
- R717 NH₃
- HFO HFO READY


SELECTED APPLICATION LIMITS



OS COM-PRESSORS	DISPLACEMENT m³/h at 60 Hz	OS.A COM-PRESSORS	DISPLACEMENT m³/h at 60 Hz
OSK5341	101	OSKA5341	101
OSK5351	121	OSKA5351	121
OSN5351	121	OSNA5351	121
OSK5361	142	OSKA5361	142
OSN5361	142	OSNA5361	142
OSK7441	199	OSHA7452	232
OSN7441	199	OSKA7452	232
OSK7451	232	OSNA7452	232
OSN7451	232	OSHA7462	266
OSK7461	266	OSKA7462	266
OSN7461	266	OSNA7462	266
OSK7471	302	OSHA7472	302
OSN7471	302	OSKA7472	302
OSK8551	380	OSNA7472	302
OSK8561	433	OSKA8551	380
OSK8571	495	OSKA8561	433
OSN8571	495	OSKA8571	495
OSK8581	567	OSNA8571	495
OSK8591	646	OSKA8581	567
OSN8591	646	OSKA8591	646
		OSNA8591	646
		OSKA9573	845
		OSKA9583	972
		OSNA9583	972
		OSKA9593	1098
		OSKA95103	1225
		OSNA95103	1225

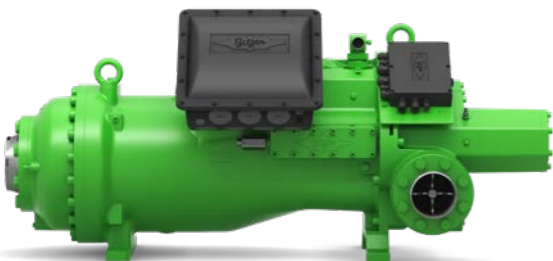


BITZER
SOFTWARE



For further details,
please refer to BITZER Software

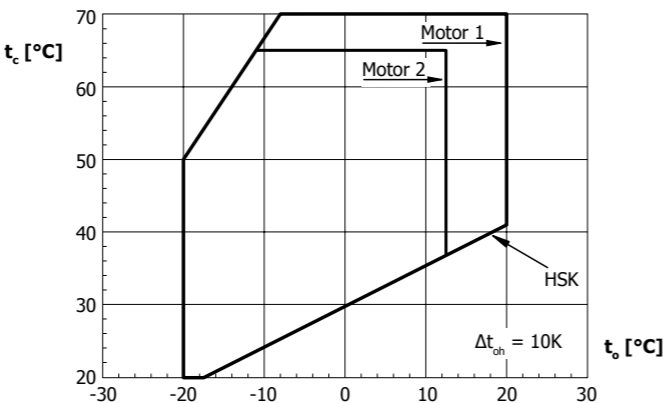
SEMI-HERMETIC SCREW COMPRESSORS: HS



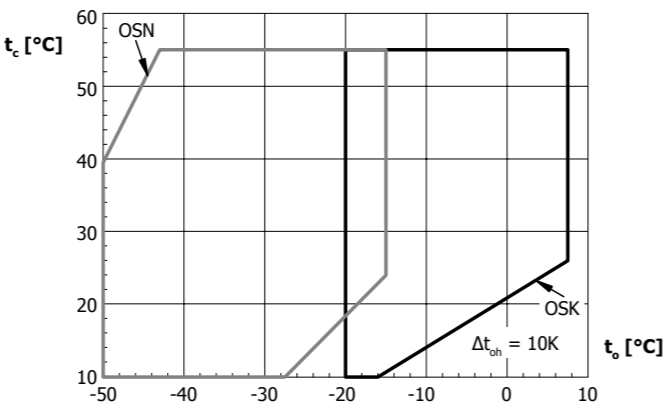
- IQ** INTELLIGENT PRODUCTS
- HFO** HFO READY
- HFO BLEND** HFO BLEND READY

SELECTED APPLICATION LIMITS

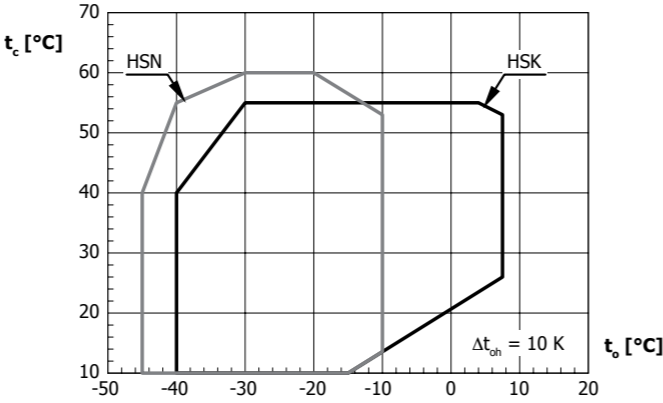
R134a, R450A, R513A, R1234yf HS.53 .. 95



R404A, R507A HS.53 .. 85

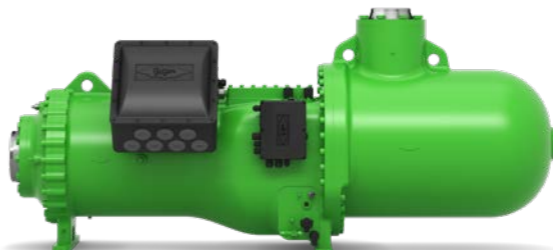


R448A, R449A, R407A, R407F HS.95



HS COMPRESSORS	DISPLACEMENT m³/h at 60 Hz
HSK5343	101
HSN5343	101
HSK5353	121
HSN5353	121
HSK5363	142
HSN5363	142
HSK6451	168
HSN6451	168
HSK6461	198
HSN6461	198
HSK7451	232
HSN7451	232
HSK7461	266
HSN7461	266
HSK7471	302
HSN7471	302
HSK8551	380
HSK8561	433
HSN8561	433
HSK8571	495
HSN8571	495
HSK8581	567
HSK8591	646
HSN8591	646
HSK9573	845
HSK9583	972
HSN9583	972
HSK9593	1098
HSK95103	1225
HSN95103	1225

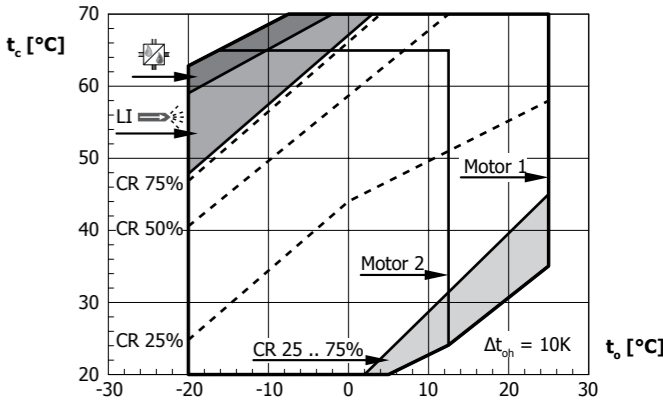
SEMI-HERMETIC COMPACT SCREW COMPRESSORS: CSH // CSW



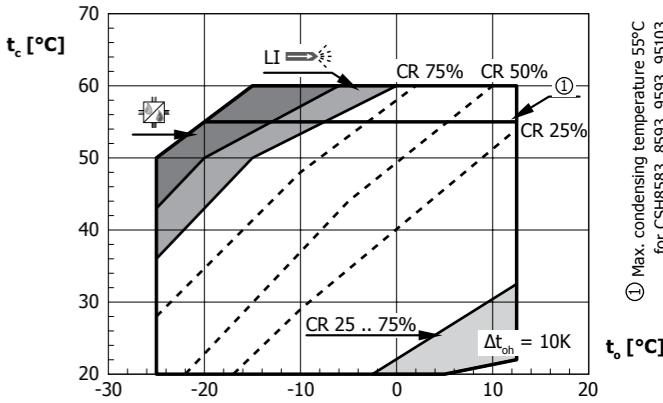
- IQ** INTELLIGENT PRODUCTS
- ATEX** ATEX
- HFO** HFO READY
- R290** PROPANE

SELECTED APPLICATION LIMITS

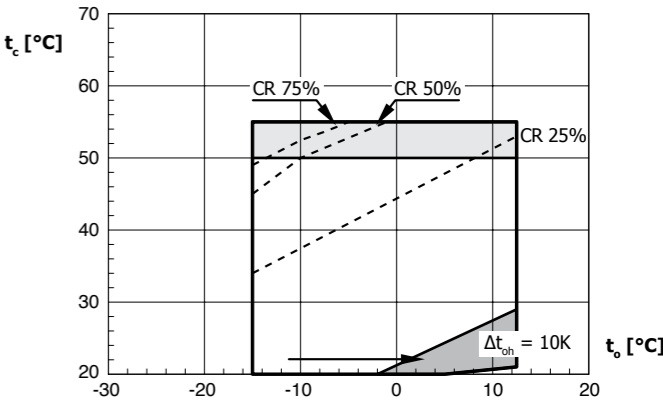
R134a, R450A, R513A, R1234yf CSH



R407C CSH



R134a, R450A, R513A, R1234yf CSW



CSH COM-PRESSORS	DISPLACEMENT m³/h at 60 Hz	CSW COM-PRESSORS	DISPLACEMENT m³/h at 60 Hz
CSH6553	165	CSW6583	235
CSH6563	205	CSW6593	264
CSH6583	235	CSW7573	311
CSH6593	264	CSW7583	356
CSH7553	238	CSW7593	406
CSH7563	274	CSW8573	495
CSH7573	311	CSW8583	567
CSH7583	356	CSW8593	870
CSH7593	406	CSW9563	742
CSH8553	380	CSW9573	845
CSH8563	433	CSW9583	972
CSH8573	495	CSW9593	1098
CSH8583	567	CSW95103	1225
CSH8593	646	CSW95113	1351
CSH9553	646	CSW10563	1404
CSH9563	742	CSW10573	1680
CSH9573	845	CSW10583	2052
CSH9583	972	CSW10593	2414
CSH9593	1098		
CSH95103	1225		
CSH95113	1351		



For further details,
please refer to BITZER Software



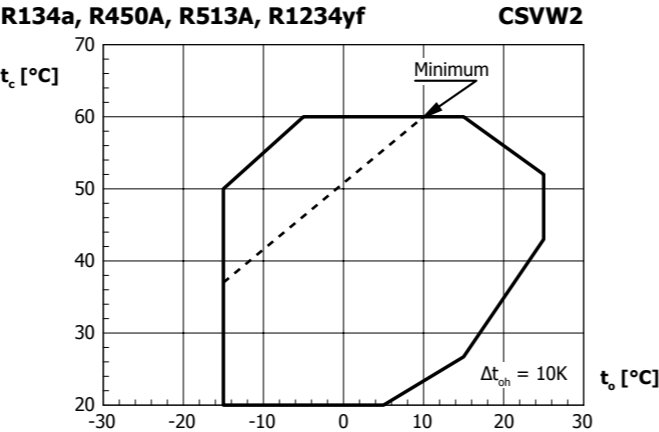
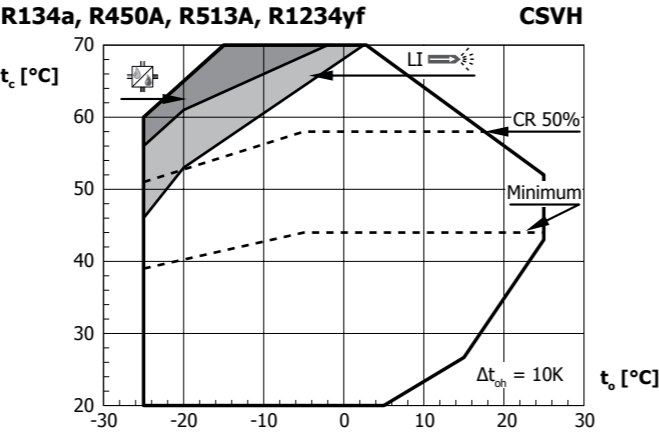
SEMI-HERMETIC COMPACT SCREW COMPRESSORS: CSVH // CSVW



- INTELLIGENT PRODUCTS
- ADVANCED MOTOR TECHNOLOGY
- FREQUENCY INVERTER
- HFO READY

CSVH COMPRESSORS	DISPLACEMENT	DISPLACEMENT
	max. compressor speed	min. compressor speed
CSVH24	464	110
CSVH25	580	110
CSVH26	725	110
CSVH37	1000	226
CSVH38	1206	226
CSVW COMPRESSORS	DISPLACEMENT	DISPLACEMENT
	max. compressor speed	min. compressor speed
CSVW24	464	110
CSVW25	580	110
CSVW26	725	110
CSVW37	1000	226
CSVW38	1206	226

SELECTED APPLICATION LIMITS



REFRIGERANTS, APPLICATIONS AND OILS

COMPRESSOR TECHNOLOGY	TYPE DESIGNATION	REFRIGERANTS	APPLICATIONS			
			AIR CONDITIONING	PROVISION COOLING MT + LT	PROCESS COOLING MT + LT	FOOD PROCESSING MT + LT
Open drive	OS.53 .. OS.85	HCFC, HFC, HFO/HFC-blends	X	X	X	X
Open drive NH ₃	OS.A53 .. OS.A95	R717			X	X
Semi-hermetic	HS.53 .. HS.95	HCFC, HFC, HFO, HFO/HFC-blends	X	X	X	X
Semi-hermetic compact	CS.65 .. CS.105	HCFC, HFC, HFO, HFO/HFC-blends, HC	X		MT	
Variable speed compact	CSV.2 / CSV.3	HFC, HFO, HFO/HFC-blends	X		MT	

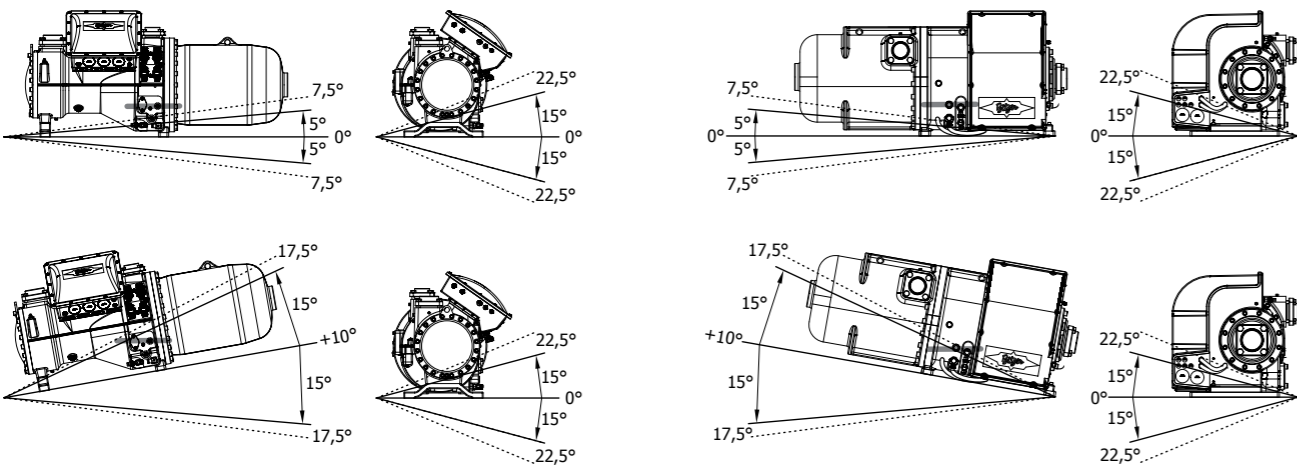
COMPRESSOR TECHNOLOGY	REFRIGERANT	OPEN DRIVE	OPEN DRIVE NH ₃	SEMI-HERMETIC	SEMI-HERMETIC COMPACT		VARIABLE SPEED COMPACT	
		OS.53 .. OS.85	OS.A53 .. OS.A95	HS.53 .. HS.95	CSH65 .. CSH95	CSW65 .. CSW105	CSVH2 .. CSVH3	CSVW2 .. CSVW3
R717	NH ₃		Reniso KC68, SHC226E					
R22	HCFC	B150SH		B150SH	B320SH			
R134a	HFC	BSE170		BSE170	BSE170	BSE170L	BSE170	BSE170L
R227ea	HFC	BSE170*		BSE170*	BSE170*			
R236fa	HFC	BSE170*		BSE170*	BSE170*			
R404A	HFC	BSE170		BSE170				
R507A	HFC	BSE170		BSE170				
R407A	HFC	BSE170		BSE170	BSE170			
R407C	HFC	BSE170		BSE170	BSE170	BSE170L		
R407F	HFC	BSE170		BSE170	BSE170			
R417A	HFC	BSE170		BSE170	BSE170			
R417B	HFC	BSE170		BSE170	BSE170			
R422D	HFC	BSE170		BSE170	BSE170			
R437A	HFC	BSE170		BSE170	BSE170			
R438A	HFC	BSE170		BSE170	BSE170			
R448A	HFO/HFC	BSE170		BSE170	BSE170			
R449A	HFO/HFC	BSE170		BSE170	BSE170			
R450A	HFO/HFC	BSE170		BSE170	BSE170	BSE170L	BSE170	BSE170L
R452A	HFO/HFC	BSE170		BSE170				
R454A	HFO/HFC	BSE170		BSE170				
R454C	HFO/HFC	BSE170		BSE170				
R455A	HFO/HFC	BSE170*		BSE170*				
R513A	HFO/HFC	BSE170		BSE170	BSE170	BSE170L	BSE170	BSE170L
R513B	HFO/HFC	BSE170		BSE170	BSE170	BSE170		
R515B	HFO/HFC	BSE170		BSE170	BSE170	BSE170L	BSE170	BSE170L
R1234yf	HFO	BSE170		BSE170	BSE170	BSE170L	BSE170	BSE170L
R1234ze(E)	HFO	BSE170		BSE170	BSE170	BSE170L	BSE170	BSE170L
R600a	HC				SHC230*			
R290	HC				SHC230*			
R1270	HC				SHC230*			

The overview only mentions standard oils. Alternatives upon request.

* Please contact BITZER if you want to use one of these combinations (compressor/refrigerant/oil).



SEMI-HERMETIC COMPACT SCREW COMPRESSORS:
INCLINATION ANGLES



CSH // CSW

The grey line indicates the oil level.

CSVH // CSVW

The grey line indicates the oil level.

MAXIMUM INCLINATION ANGLES OF THE SHIP

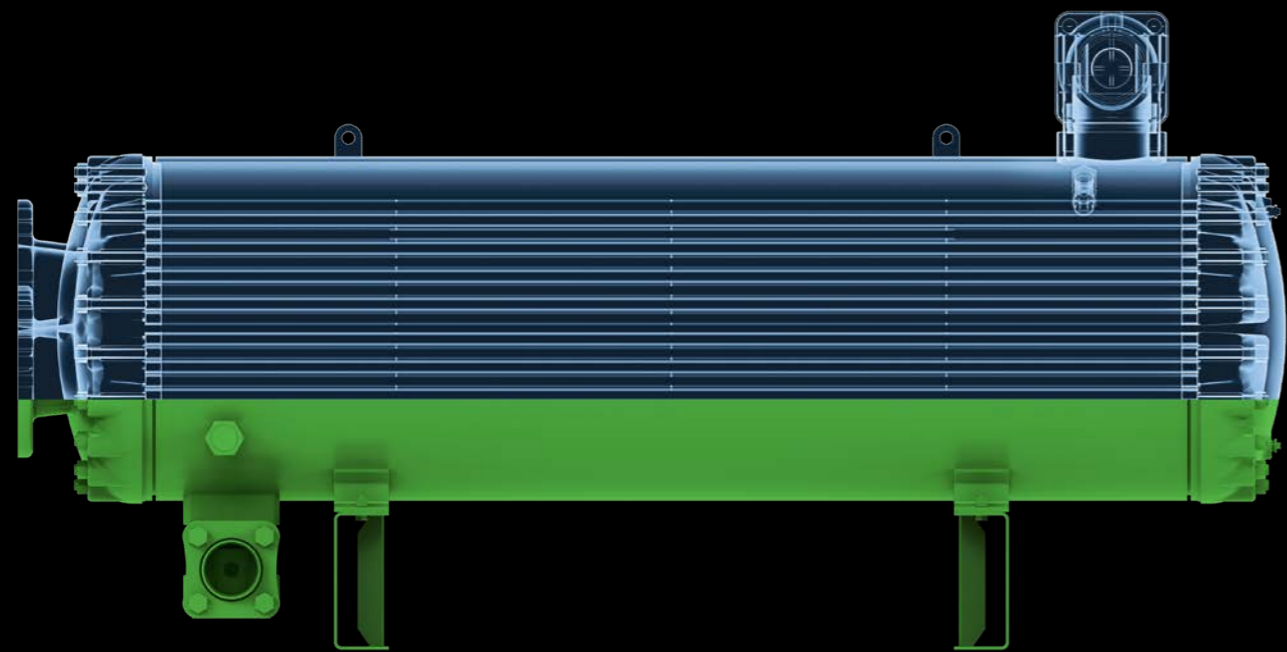
INSTALLATION	INCLINATION IN THE LONGITUDINAL DIRECTION CSH, CSW, CSVH, CSVW		INCLINATION IN THE TRANSVERSAL DIRECTION CSH, CSW, CSVH, CSVW	
	STATIC	DYNAMIC (DASHED LINE)	STATIC	DYNAMIC (DASHED LINE)
Horizontal	±5°	±7.5°	±15°	±22.5°
Inclined by +10°	±15°	±17.5°	±15°	±22.5°

Compressor types not listed in the table like OSK or OSN (open drive screw compressors) and HSK or HSN (semi-hermetic screw compressors) do not have limitations regarding inclination at the installation in usual commercial ships.

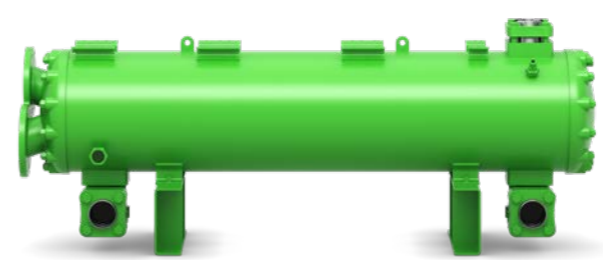


HEAT EXCHANGERS AND PRESSURE VESSELS

EFFICIENT HEAT TRANSFER.
PROFIT FROM COMPACT AND
LIGHT COMPONENTS.



WATER COOLED SHELL-AND-TUBE CONDENSERS:
K AND K .. B



- HEAT EXCHANGERS
- HFO READY
- HFO BLEND READY

		K	K .. B
		NORMAL WATER* CONDENSER	SEAWATER CONDENSER
Capacity range	from	5 kW	5 kW
	to	1000 kW	800 kW
Design pressure – shell side (STD)		33 bar	
Material	tubes	Copper	Copper-nickel 90-10
	tube sheet	Coating	Coating
	end covers	Cast iron	Coating
Features		Tubes brazed to tube sheets Low-fouling water-side tube design	

Five series of water cooled condensers with a standard capacity of up to 2500 kW satisfy all condensation needs with versions for normal water* and for seawater. HFC, HFO, HFC/HFO blends, propane and ammonia (NH₃) can be used as refrigerants. A complete selection of pressure vessel approvals and certifications for stationary and marine applications is available.

K (normal water*) and K..B (seawater) condensers are models focused on heavy-duty applications, including exclusive design and construction features such as tubes brazed to tube sheets, low-fouling tubes and standard plastic coating.

* Normal water means water that is compatible with copper tubes.

BITZER SOFTWARE

For further details,
please refer to BITZER Software

WATER COOLED SHELL-AND-TUBE CONDENSERS: CXP-CXPM AND CRF-CRM



- HEAT EXCHANGERS
- HFO READY
- HFO BLEND READY

		CXP NORMAL WATER* CONDENSER	CXPM SEAWATER CONDENSER	CRF NORMAL WATER* CONDENSER	CRM SEAWATER CONDENSER
Capacity range	from	5 kW	15 kW	57 kW	57 kW
	to	150 kW	150 kW	2500 kW	2000 kW
Design pressure tube side	STD	10 bar		10 bar	
	HP	16 bar		16 bar	
Design pressure shell side	STD	30 bar		30 bar	
	HP	45 bar		45 bar	
Material	tubes	Copper	Copper-nickel 90-10	Copper	Copper-nickel 90-10
	tube sheet	Carbon steel	Stainless steel AISI316L	Carbon steel	Stainless steel AISI316L
	end covers	Carbon steel	Stainless steel ISI316L	Carbon steel	Stainless steel AISI316L
Features		Low-fouling water-side tube design (CRM) Tubes expanded on tube sheets Component customisation available Different tube lengths and water-pass configuration available			

CXP, CRF (normal water*), CXPM and CRM (seawater) condensers use their high-performance design as well as their flexibility in terms of number of models and tube lengths and of customisation possibilities, the global solution for low, medium and very high capacity applications.

For further details,
please refer to BITZER Software

For further details,
please refer to
SMARTUBE Software

SHELL-AND-TUBE EVAPORATORS: DH, PURE COOLER AND DM



- HEAT EXCHANGERS
- HFO READY
- HFO BLEND READY



- HEAT EXCHANGERS
- HFO READY
- HFO BLEND READY

		DH	PURE COOLER	DM
Configuration		Two-pass direct expansion normal water* evaporators		Single-pass direct expansion normal water* evaporators
Capacity range	from	18 kW	100 kW	100 kW
	to	1500 kW	1750 kW	800 kW
Design temperature	max	90°C	50°C	50°C
	min	−10°C	−10°C	−40°C
Design pressure tube side	STD	30 bar	16.5 bar	21.5 bar
	HP	45 bar	24.5 bar	–
Design pressure shell side	STD	10 bar	10 bar	10 bar
Standard tubes material		Copper	Copper	Copper
Special version		Special tube materials: stainless steel, copper-nickel 90/10, carbon steel Low temperature version T _{min} = −40°C		
Features	Extractable tube bundle		Non-extractable tube bundle	
	Advanced baffle design and different baffle spacing versions			
	Patented refrigerant distribution system Component customisation available			

Direct expansion evaporators designed with a ‘U-tube’ or with a single-pass design, combined with patented refrigerant distribution systems, offer the best performance and the lowest approach between refrigerant and water/brine for positive, medium and low temperature (down to −40°C) applications. A selection of materials and a wide approval choice is available.

* Normal water means water that is compatible with copper tubes.

LIQUID RECEIVERS



- PRESSURE VESSELS
- HFO READY
- CO₂
- NH₃

The horizontal and vertical liquid receivers are available for HFC and HFO refrigerants, ammonia (NH₃), hydrocarbons and carbon dioxide and fulfil the various requirements of refrigeration and air conditioning technology. Operating temperatures of -10°C to 120°C are possible with a maximum allowable pressure of 45 bar.

OIL SEPARATORS



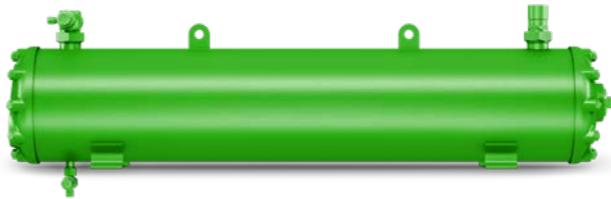
- PRESSURE VESSELS
- HFO READY
- HFO BLEND READY
- NH₃

We offer a complete range of vertical and horizontal solutions that ensure perfect oil separation during full- and part-load operation for single compressors and compound systems. Versions are available for HFC, HFO, HFC/HFO blends, ammonia (NH₃) and hydrocarbons, with one, two or three steps, or for operation with flooded systems.

BITZER SOFTWARE

For further details,
please refer to BITZER Software

OIL COOLERS



- PRESSURE VESSELS
- HFO READY
- HFO BLEND READY

A complete series of shell and tube oil coolers ensure optimal additional cooling by means of normal water* or seawater. Suitable for refrigeration systems using HFC refrigerants and non-flammable HFC/HFO blends.

OVERVIEW OF MARINE CERTIFICATES

CLASSIFICATION SOCIETIES	CONDENSERS: CRF, CRM up to D = 457 mm	CONDENSERS: CXP, CXPM	EVAPORATORS: DH, PC, DM	K-CONDENSER, LIQUID RECEIVER, OIL SEPARATOR, OIL COOLER
DNV-GL type approval	available	-	-	available
DNV-GL case by case	-	on request	on request	-
RINA type approval	available	available	-	-
RINA case by case	-	-	on request	-
ABS type approval	available	-	-	-
ABS case by case	-	on request	on request	-
BV type approval	-	-	-	available
BV case by case	on request	on request	on request	-
LR type approval	-	-	-	-
LR case by case	on request	on request	on request	-
LR third-party inspection	-	-	-	available

Please find all
BITZER Marine Type
approvals here

REFRIGERANTS AND CHARACTERISTICS

ANY REFRIGERANT IT TAKES.
COMBINED WITH PROVEN
TECHNOLOGIES.

OVERVIEW

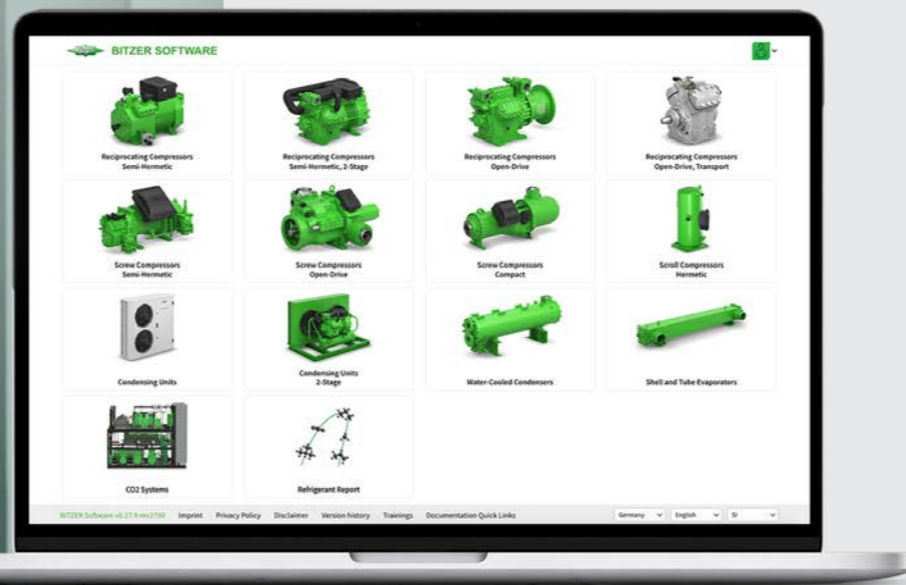
REFRIGERANT	GROUP	COMPONENTS	SAFETY CLASS ISO817	FLUID GROUP PED ¹	GWP AR4 ²	NORMAL BOILING POINT °C	NORMAL DEW POINT °C
R22	HCFC	Chlorodifluoromethane	A1	2	1810	−41	−41
R134a	HFC	1,1,1,2-Tetrafluoroethane	A1	2	1430	−26	−26
R227ea	HFC	1,1,1,2,3,3,3-Heptafluoropropane	A1	2	3220	−16	−16
R236fa	HFC	1,1,1,3,3,3-Hexafluoropropane	A1	2	9810	−1	−1
R404A	HFC	R143a/125/134a	A1	2	3922	−47	−46
R507A	HFC	R143a/125	A1	2	3985	−47	−47
R407A	HFC	R32/125/134a	A1	2	2107	−46	−39
R407C	HFC	R32/125/134a	A1	2	1774	−44	−37
R407F	HFC	R32/125/134a	A1	2	1825	−46	−40
R417A	HFC	R125/134a/600	A1	2	2346	−39	−33
R417B	HFC	R125/134a/600	A1	2	2920	−45	−42
R422D	HFC	R125/134a/600a	A1	2	2729	−45	−40
R437A	HFC	R125/134a/600/601	A1	2	1805	−33	−29
R438A	HFC	R32/125/134a/600/601a	A1	2	2264	−42	−35
R448A	HFO/HFC	R32/125/1234yf/1234ze(E)/134a	A1	2	1387	−46	−40
R449A	HFO/HFC	R32/125/1234yf/134a	A1	2	1397	−46	−41
R450A	HFO/HFC	R1234ze(E)/134a	A1	2	605	−24	−24
R452A	HFO/HFC	R32/125/1234yf	A1	2	2140	−47	−43
R454A	HFO/HFC	R32/1234yf	A2L	1	239	−48	−41
R454C	HFO/HFC	R32/1234yf	A2L	1	148	−46	−38
R455A	HFO/HFC	R32/1234yf/744	A2L	1	148	−52	−40
R513A	HFO/HFC	R1234yf/134a	A1	2	631	−29	−29
R515B	HFO/HFC	R1234ze(E)/227ea	A1	2	293	−19	−19
R1234yf	HFO	2,3,3,3-Tetrafluoropropene	A2L	1	4	−30	−30
R1234ze(E)	HFO	Trans-1,3,3,3-Tetrafluoropropene	A2L	2	7	−19	−19
R717		Ammonia	B2L	1	0	−33	−33
R600a	HC	Isobutane	A3	1	3	−12	−12
R290	HC	Propane	A3	1	3	−42	−42
R1270	HC	Propylene	A3	1	2	−48	−48
R744		Carbon dioxide	A1	2	1		

¹ PED: Pressure Equipment Directive

² AR4: According to IPCC IV

SOFTWARE, SERVICE AND TRAINING

DIGITAL SUPPORT FOR MARINE APPLICATIONS. A PLUS FOR YOU.



BITZER SOFTWARE

CHOOSE THE RIGHT PRODUCTS AND FIND MORE DETAILED TECHNICAL DATA

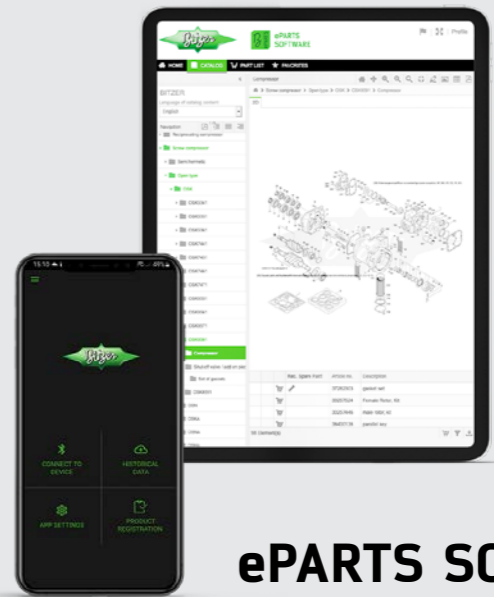
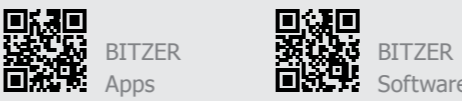
Wherever you are and no matter what device you are using, BITZER SOFTWARE will help you select the appropriate product from the extensive and flexible range of products and accessories. Here you can find technical data and have the possibility to quickly calculate the performance data of compressors and components.

BEST APP AND BEST SOFTWARE

OPERATE YOUR BITZER IQ PRODUCTS WITH ONLY ONE SOFTWARE TOOL

BEST provides comprehensive access to all operating data and parameters. The intuitive user interface provides a complete overview of the operating status including a data log for easy maintenance and service.

- BEST APP
- BITZER SPOT APP
- REFRIGERANT RULER APP
- BEST SOFTWARE
- BITZER SOFTWARE
- ePARTS SOFTWARE



ePARTS SOFTWARE

FIND SUITABLE SPARE PARTS EASILY

Our free-of-charge tool makes finding the appropriate spare parts for our products fast and easy. The parts are listed according to the type range and appear as a simple zoom-able exploded-view drawing.

BITZER DIGITAL NETWORK

USE REAL-TIME DATA TO INCREASE EFFICIENCY

Our cloud-based online platform for IQ products offers digital services including online monitoring, a compressor operation report, access to technical documentation and much more. Troubleshooting is supported through data analysis.

MARINE SERVICE NETWORK.

FULL SYSTEM SERVICES FROM A SINGLE SOURCE.

Ships require dependable service activities to ensure all systems and components are functioning reliably. The Marine Service Network from BITZER carries out all work related to the maintenance and repair of marine refrigeration and air conditioning systems. All BITZER Marine Service Network partners and their service technicians are highly experienced at servicing refrigeration and air conditioning systems and meet the strict quality standards of BITZER.

BENEFITS FOR YOU

- // **Prompt service:** all service network partners are located close to the ports.
- // **Guaranteed qualified service:** exclusive use of service engineers with many years of expertise and BITZER training. Repairs and maintenance only in accordance with defined BITZER quality standards.
- // **Fast spare parts delivery:** directly via the service partners in the nearest ports. Only original spare parts are used at all times.
- // **Service data at hand:** the central database enables service partners and you to access all service activities done easily at any time.

THE SERVICES

- // Fault analysis
- // Replacement of defective parts
- // Functional tests of the entire system
- // Report preparation
- // Checked system

FURTHER SERVICES FOR BITZER PRODUCTS

REPLACEMENT SERVICES

Replacing the equipment may be required for different reasons, during or at the end of its life cycle, if economical evaluations are relevant or when new and more efficient technologies become available.



SPARE PARTS AND OIL

Our marine spare parts specialists ensure prompt availability of BITZER ORIGINAL SPARE PARTS and compressors. Selected service partners are available worldwide to help you choose compressors and suitable spare parts.



PREVENTIVE SERVICING

Preventive maintenance guarantees extended service life and efficient operation for your compressor.



OIL ANALYSIS

To increase availability, a detailed oil analysis is available, including the definition of a suitable replacement schedule in order to avoid unnecessary contaminations.



OUR SERVICE PARTNERS: QUICKLY CONTACTED

- // One central point of contact
- // Time-saving
- // Fast order processing
- // Immediate assistance in urgent cases



Tel. +49 7031 932-0
marineservice@bitzer.de



SPECIAL TRAINING FOR SHIP CREWS.

LEARN INDIVIDUALLY WITH
THE SCHAUFLEER ACADEMY.



The SCHAUFLEER Academy is the international seminar and training centre of BITZER which provides courses on several topics such as heat pumps, refrigeration, air conditioning and alternative refrigerants. It combines theoretical contents and practical exercises on real training systems.

Ship crews must be able to operate, maintain and repair various systems while at sea. This is a great responsibility. To support you to master these challenges, we offer special training sessions for your ship crews. The training sessions are based on the systems that you have installed on your vessels. Theoretical contents will be tailored precisely to these systems.



TRAINING CONTENTS

- // Basics of thermodynamics
- // Functional explanation of each individual component in the system
- // Maintenance work
- // Troubleshooting
- // Practical tasks like changing a shaft seal, leak detection, checking the superheating, etc.



Visit us online and
book your training:
trainings-events.bitzer.de



**WHEN YOU DROP ANCHOR, WE ARE ALREADY THERE.
BITZER WORLDWIDE SALES AND SERVICE EXCELLENCE.**



BITZER Kühlmaschinenbau GmbH
Peter-Schaufler-Platz 1 // 71065 Sindelfingen // Germany
Tel +49 7031 932-0 // Fax +49 7031 932-147
bitzer@bitzer.de // www.bitzer.de

Subject to change // 80005003 // 11.2023