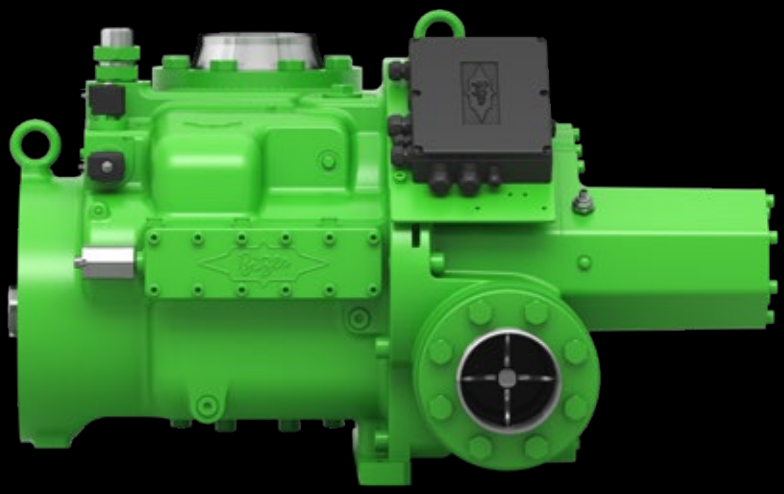
DAS HERZ DER FRISCHE

OPEN
SCREW COMPRESSORS

50 Hz // SP-500-5 EN

OS.53 // OS.74 // OS.85 // OS.95 // OS.105

WITH IQ MODULE



COMMERCIAL REFRIGERATION

INDUSTRIAL REFRIGERATION

MARINE

BITZER Innovation Targets

Products for refrigerants with low greenhouse warming potential (GWP)

// For naturally appearing substances

// For new refrigerants like low-GWP blends

These refrigerants reduce the direct contribution of refrigeration systems to global warming.

Products with high efficiency at full and part load

// Efficiency improvements of motor and mechanics

// High system efficiency in part load operation

- by optimised mechanical capacity regulation
- by specially developed frequency inverters

This reduces the indirect contribution to global warming by saving energy.

Simple handling and serviceability with advanced electronic modules

// Electronic components for

- data logging
- capacity regulation
- actuation of accessories

// Unified user software for simple configuration. Choose compressor or condensing unit and refrigerant. Ready.

This makes it simple to fully utilize the efficiency potential of our products and optimise operation.

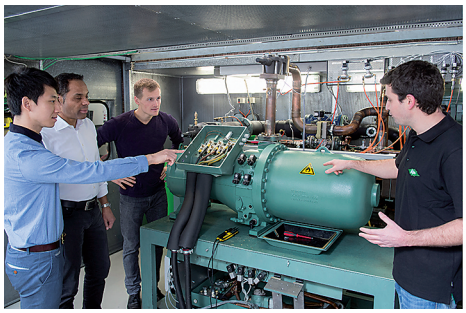
Open drive screw compressors

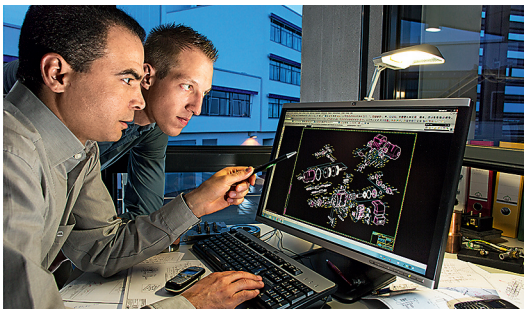
OS. series

Displacements from 84 m^3/h to 2000 m^3/h at 2900 min^{-1}

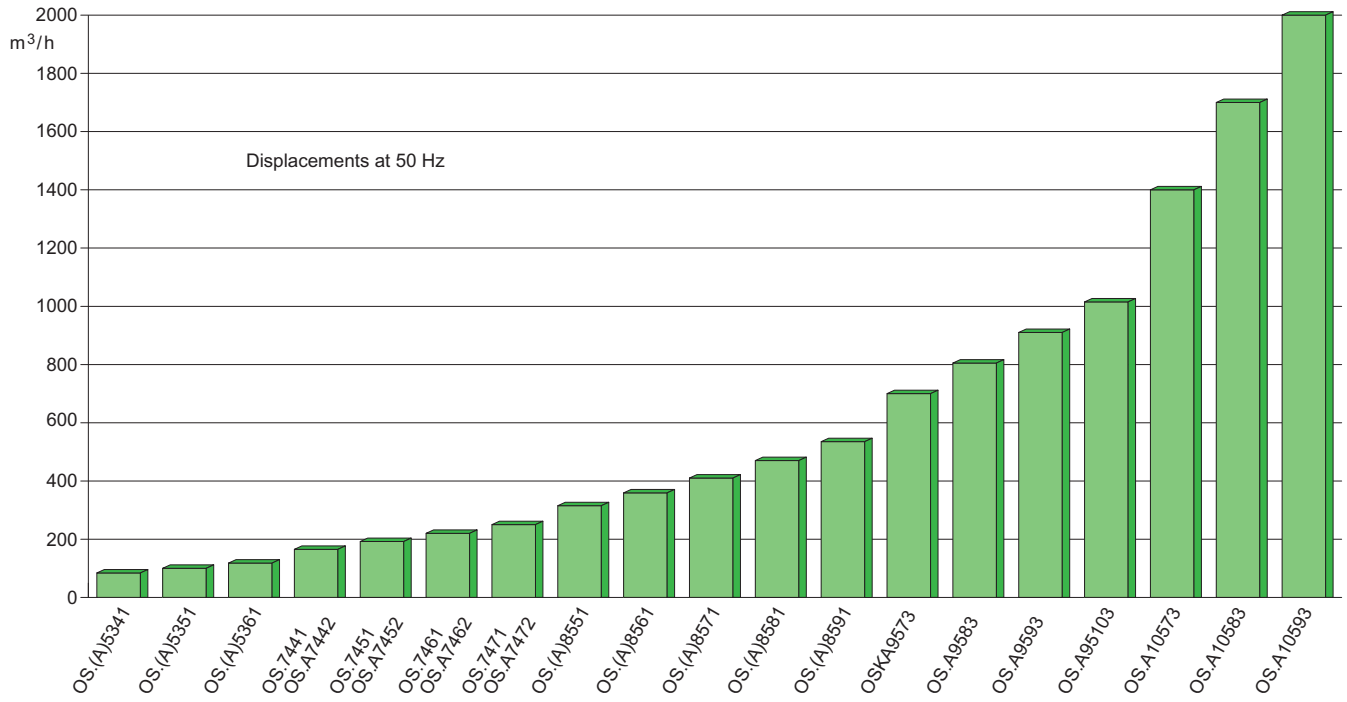
Contents Page

The OS screw compressors set the worldwide standard for technological innovation, versatility and efficiency. They have been developed both for single compressor systems and for use in parallel compounding.





The capacity range



The special highlights

// Energy efficient
- high-efficiency profile
- efficient capacity control
- economiser operation (ECO)

// Universal
- R134a, R404A, R507A, R407A, R407C, R407F, R407H, R448A, R449A, R452A, R450A, R513A, R1234yf, R454A, R454C, R455A
- R717 with own design
- with and without Economiser (ECO)
- other refrigerants upon request

// Robust design
- generously dimensioned bearings
- large volume motor
- automatic start unloading

// Low sound and low vibration
- steady discharge characteristics
- only rotating masses

// Capacity control
- particularly suitable for operation with frequency inverter (FI)
  speed range:1450 .. 4000/4500 min^{-1}
- mechanical capacity control
  stepped for OS.53 to OS.74
  steppless for OS.85 to OS.A105

Versatile due to parallel compounding

// High system performance
- in parallel compounding up to 4060 m^3/h at 50 Hz with four OS.A95103
- only rotating masses

// Optimum capacity adjustment and lowest power consumption at full and part load
- combination of different compressor sizes possible
- part load by simply switching off compressor
- fine gradation by additional compressor capacity control or by operating a compressor with FI

Versatile in use

// In commercial refrigeration systems

// In industrial refrigeration systems

// In marine applications

The new screw compressors OS.A105

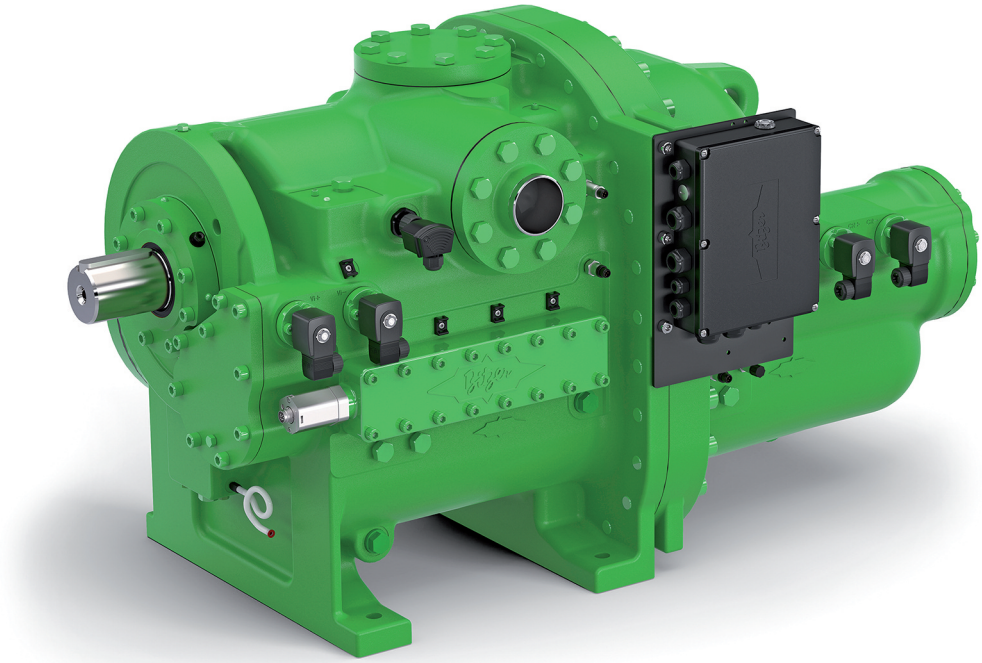
// New series for R717 up to displacement of 2000 m^3/h at 2900 min^{-1}

// Evolved technology of OS.A95

- steppless capacity and V_i control
- highly efficient in the same wide application ranges
- compressor module CM-SW-01 for activation and monitoring of the operating functions

// Mountable to motor with coupling housing. No further alignment necessary

R717 NH_3



Explanation of the type designation

Example

OSKA95103-K

Open screw compressor

OS**K**A95103-K

Identification letter for application range
K = medium temperature
N = low temperature
H = air conditioning and heat pumps①

OSK**A**95103-K

NH_3 design

OSKA**95**103-K

Housing size

OSKA95**10**3-K

Displacement

OSKA95103-**K**

Compressor design

OSKA95103-**K**

Design for direct coupling

① only OS.A74

Capacity control and V_i depending on construction size

Capacity control

// OS.53 to OS.74: Multi-stage capacity control
  – efficient capacity control by shifting of the suction port in two steps (75 and 50%)
  – hydraulically operated control pistons – at full load operation absolutely form-fit
  – both protection against liquid slugging and strong over-compression
  – simple control via flanged solenoid valves
// OS.85: Dual capacity control
  – infinite or 3-stage slider control with V_i-compensation (for lower pressure ratios also 4-stage) Alternative operating mode by varying control sequence only – no need for compressor modification
  – easy control by flanged-on solenoid valves
// OS.A95/OS.A105: Stepless capacity control
  – efficient stepless capacity and V_i control due to an optimised slider concept
  – automatic V_i control
  – high efficiency in wide application limits
  – intelligent compressor monitoring module with extended protection concept and slider control

Automatic start unloading

Adjusted discharge ports

// OSK models for air-conditioning and medium temperature applications
// OSN models for low temperature application
// OS.53 to OS.74: High efficiency over a wide application range due to the Duo-Port system: special port contour with additional radial outlet
// OS.85: V_i adaption by capacity control slider
// OS.A95/OS.A105: Automatic V_i control

Equipment and accessories

Complete equipment

// Capacity control
// Start unloading
// Suction gas connection: flange with brazing and welding bush, for OS.53 to OS.74: suction gas shut-off valve
// Discharge gas connection: flange with brazing and welding bush
// Check valve in the discharge gas chamber
// Integrated pressure relief valve according to EN12693
// Kit for oil injection

Comprehensive range of accessories

// Shut-off valves up to DN125
  – discharge gas shut-off valve
  – suction gas shut-off valve
// ECO shut-off valve, depending on size with pulsation muffler
// Connection adapter for liquid injection (LI), depending on size with integrated injection nozzle
// Oil injection valve for every size
// Oil separators of various capacity sizes with
  – oil heaters in pre-mounted heater sleeves
  – oil thermostat in pre-mounted heating sleeve
  – oil level switch
// Air cooled oil coolers
// Water cooled oil coolers
// Thermosiphon oil cooling depending on system design upon request
// Intelligent compressor module CM-SW-01 as optional accessory for OS.A85

Accessories for operation in parallel compounding

// Selection and technical data see BITZER SOFTWARE

Refrigeration compressor oils

Oil type BITZER	Viscosity cSt/40°C ①	Refrigerant	Condensing temperature °C	Evaporation temperature °C	Discharge gas temperature °C	Oil injection temperature °C
BSE170	170	HFKW HFO			60 .. 100	max. 80
B100	100	R22	.. 45	-5 .. -50		
B150SH	150		.. 60	+12,5 .. -40		
Reniso KM32	32	NH_3	.. 40	-20 .. -40	60 .. 80 (100)②	max. 50
Reniso KS46	46		.. 53	-10 .. -35		max. 60
Reniso KC68	68		.. 53	+10 .. -30		
Reflo 68A	58①		.. 60	+25 .. -40		
SHC226E	68①		.. 60	+25 .. -40		

① Operation with equivalent mineral oils or PAO oils is possible but must be individually agreed on with BITZER

② Discharge gas temperature up to 100°C only after consultation with BITZER

Oil management

// Complete accessories for oil injection

// Simple parallel compounding

// No oil pump required

Accessories for the oil injection line, included in the scope of delivery:

// Oil filter

// Oil flow switch

// Electronic oil monitoring

// Solenoid oil valve

// Oil sight glass

Further information on refrigeration compressor oils and oil management in applications with NH_3 see Technical Information AT-640.

IQ MODULE CM-SW-01

The new generation of extended BITZER compressor modules operates, monitors and protects screw compressors reliably and communicates with the superior system controller. Sensors and actuators are pre-wired and preconfigured ex works by BITZER.

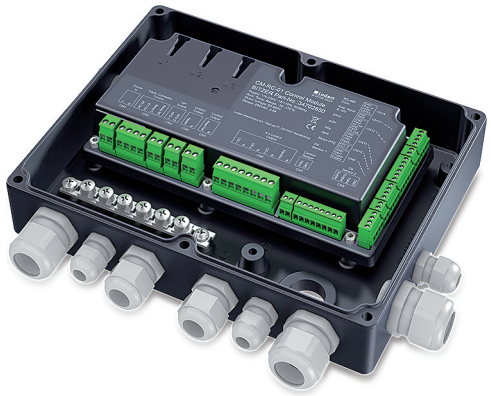
The new, extended protection concept

// Intelligent activation to improve system efficiency
- start unloading
- V_i control
- capacity control

// Monitored compressor parameters
- motor and discharge gas temperature
- oil monitoring with oil pressure transmitter and oil level switch in the compressor
- rotation direction
- high and low pressure
- high pressure switch
- monitoring of application limits

// Diagnosis
- an early warning system reports critical operating conditions
- data log of all digital and analog inputs and outputs
- history of alarm and warning messages
- operating time and load statistics

// Communication
- via Modbus (standardised interface)
- via Bluetooth
- configuration and operational monitoring via BEST SOFTWARE and BEST App
- status LEDs for fast initial diagnosis



BEST SOFTWARE

Via PC, a lot of BITZER IQ products may be configured with the BEST SOFTWARE and the BEST App. With its intuitive user interface displays a complete operating status overview including data log for easy maintenance and service. This is completely in line with our innovation targets.

Easy configuration

// Easy device parameterisation

// Storage and installation of device and compressor setups

// Safe and easy firmware update (not over Bluetooth)

Reliable online diagnosis

// Display of all connected sensors, e. g. pressure transmitters, temperature sensors, oil level switches, digital and analog inputs and outputs

// Current operating point in the application limit

// Current capacity control status

Comfortable analysis

// Data log download and visualisation of all operating parameters

// Alarm list with integrated help function for easy maintenance and service

Communication

// Via BEST interface converter and Bluetooth

WIRELESS LOCAL AREA NETWORK

New refrigerants with low warming potential

The open drive screw compressors can be used with new low global warming potential (GWP) refrigerants. These refrigerants are important tools to reach the emission reductions of the EU Regulation 517/2014 and similar scenarios clearly decided worldwide. This application is part of our innovation targets.

The unsaturated fluorinated hydrocarbon (HFO) R1234yf, a variant of tetrafluoropropene, plays a central role in this. It can be used as pure substance or as a component of blends – see also the application limits.

The pure substance R1234yf is classified as flammable in A2L according to ISO817. For flammable refrigerants, a risk assessment for the system has to be made reflecting the flammability and it must be constructed in accordance with national or local regulations. If the risk assessment classifies the installation area as an explosion protection zone, these OS. compressors are not applicable. Consultation with BITZER is absolutely necessary.

Further information on refrigerants can be found in the Refrigerant Report A-500.

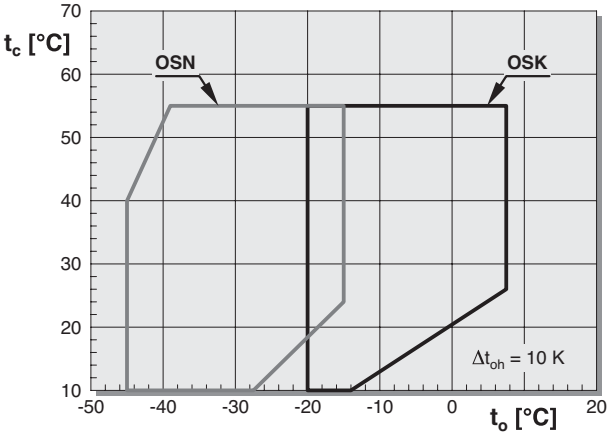
Performance data for the entire application range are available in the BITZER SOFTWARE.

HFO READY

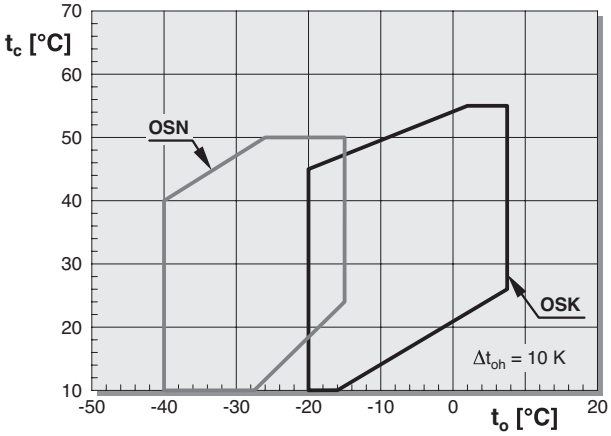
Application limits

OS.53 .. OS.85

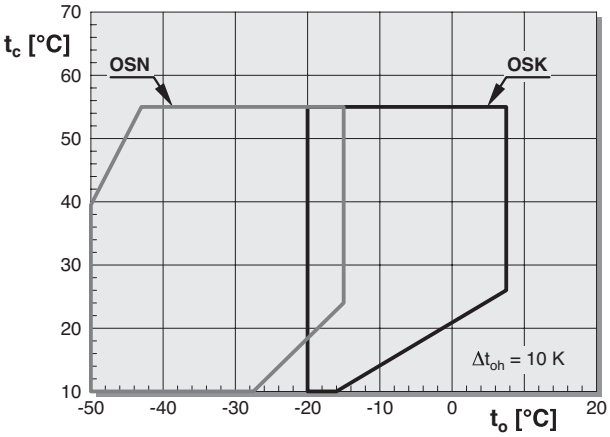
R448A ▮ R449A ▮ R407A ▮ R407F CR100%



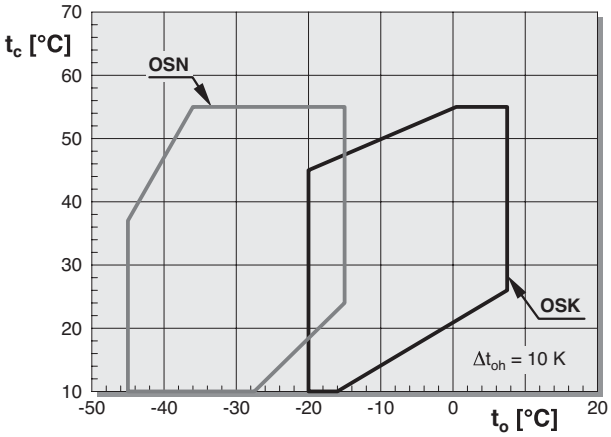
R448A ▮ R449A ▮ R407A ▮ R407F CR75% ▮ CR50%



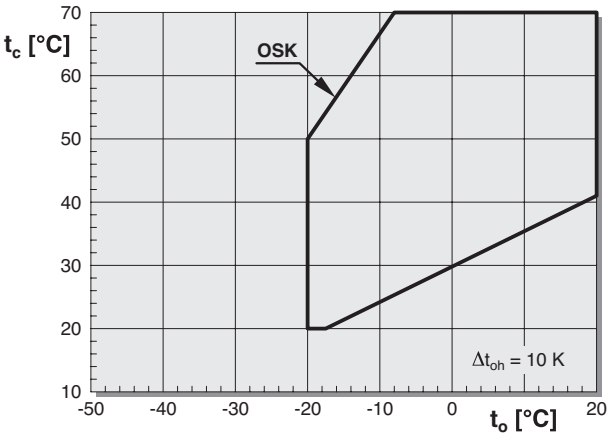
R404A ▮ R507A CR100%



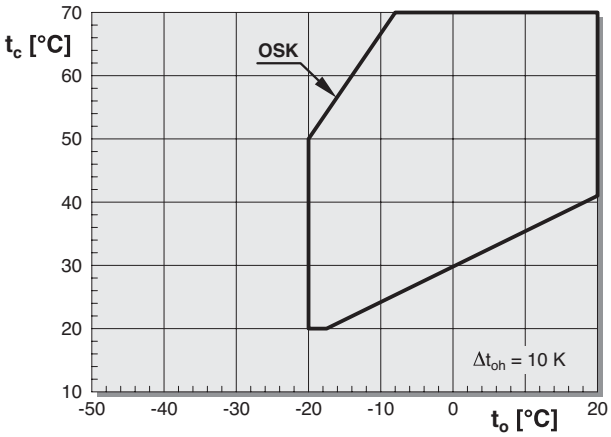
R404A ▮ R507A CR75% ▮ CR50%



R134a ▮ R513A ▮ R450A ▮ R1234yf CR100%



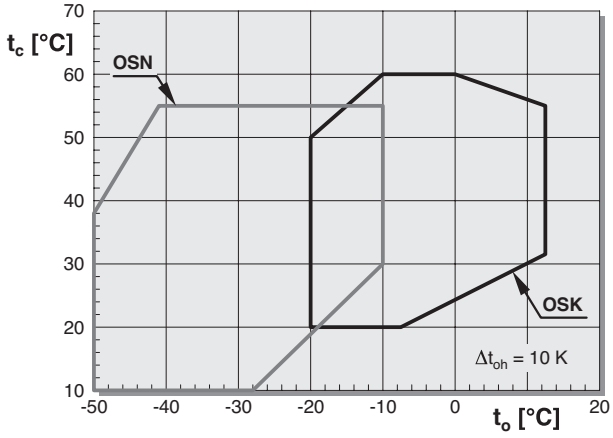
R134a ▮ R513A ▮ R450A ▮ R1234yf CR75% ▮ CR50%



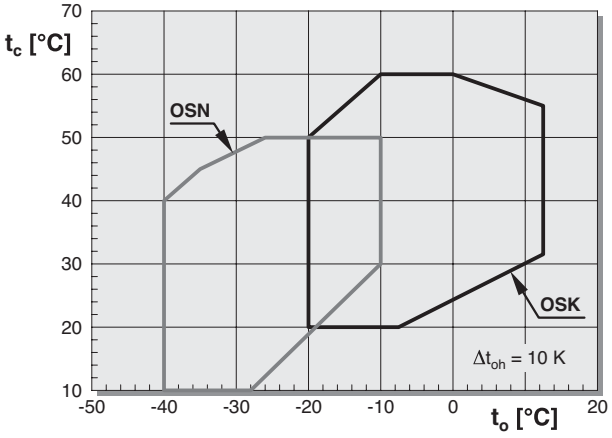
Application limits

OS.53 .. OS.85

R22 CR100%

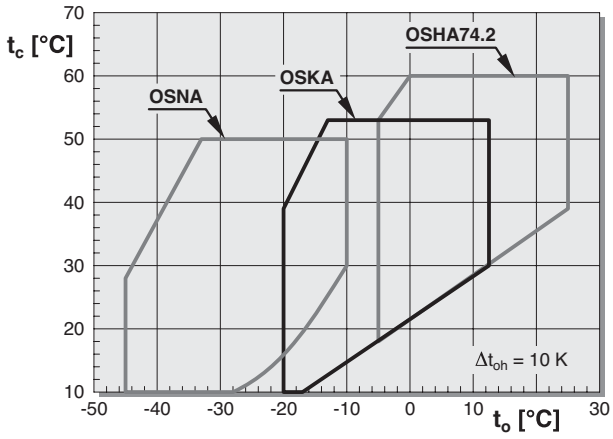


R22 CR75% ∎ CR50%

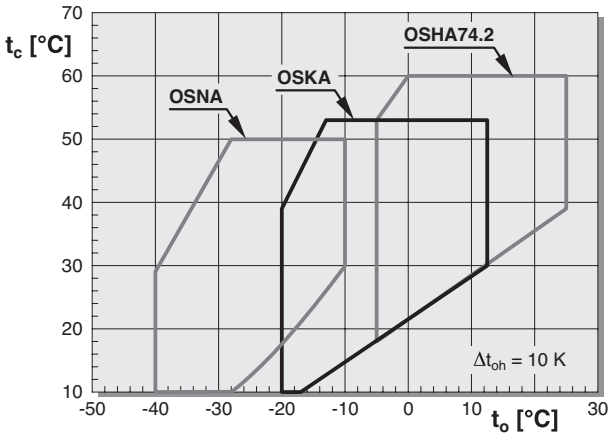


OS.A53 .. OS.A85

R717 CR100%



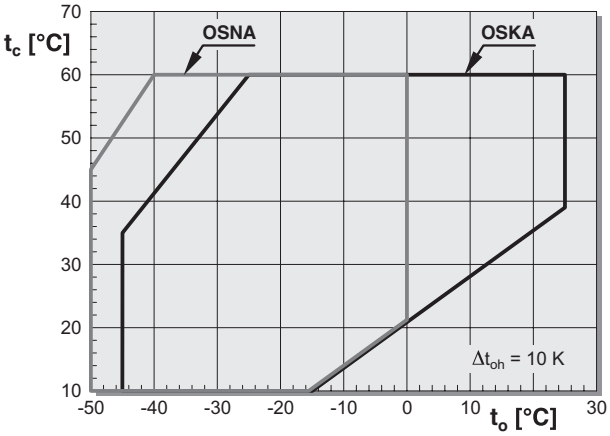
R717 CR75% ∎ CR50%



Application limits

OS.A95 .. OS.A105

R717 CR100%



Legend

t_o Evaporation temperature (°C)
t_c Condensing temperature (°C)
Δt_{oh} Suction gas superheat (K)

Oil cooling

For ranges in which oil cooling becomes necessary see BITZER SOFTWARE. Here, the required oil cooler capacity can be determined.

ECO operation

Maximum condensing temperature may be limited. For ECO application limits, see BITZER SOFTWARE.
With OS.53 to OS.74 in ECO operation, the capacity control is limited to one regulation step (CR 75%). Exceptions are possible depending on the operating conditions. This requires individual coordination with BITZER. Use both regulation steps for start unloading only.

Performance data

BITZER SOFTWARE

The BITZER SOFTWARE is available in many languages as a download for Windows as well as a web-based version. It is compatible with any browser and always up to date. The program is also suitable for tablets and smartphones.

The BITZER SOFTWARE covers:

// Performance data for all common refrigerants under freely selectable operating conditions

// All relevant technical data

// Calculation results and individually defined performance tables for compressors

// Seasonal calculation

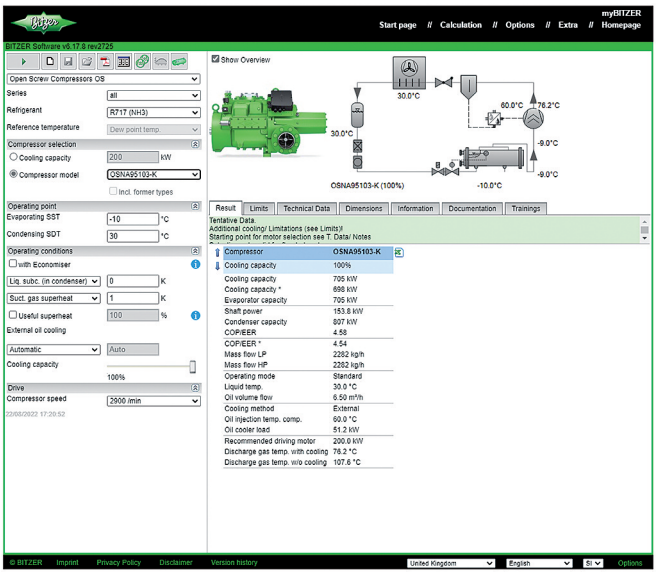
// Compound connection

// Available accessories and their selection

// All relevant technical documents

// Further BITZER products

bitzer-software.com



Performance data

Performance data based on European standard EN12900 and 50 Hz operation. Evaporation and condensing temperatures correspond to "dew point" conditions (saturated vapor).

Standard conditions

With standard conditions, no liquid subcooling is considered according to EN12900. Therefore the rated cooling capacity and efficiency (COP) show lower values in comparison to data based on 5 or 8.3 K of subcooling.

Economiser operation (ECO)

Data for economiser operation inherently include liquid subcooling. The liquid temperature is defined as 5 K above saturated temperature according to EN12900 at economiser inlet ($t_{cu} = t_{ms} + 5$ K).

Technical data

Type	Displacement at 2900 min^{-1} m³/h	Displacement at 3500 min^{-1} m³/h	Cooling capacity Q_o R1234yf t_o / t_c 5°C/50°C kW	Cooling capacity Q_o R448A R449A t_o / t_c -10°C/45°C kW	Cooling capacity Q_o R448A R449A t_o / t_c -35°C/40°C kW	Weight kg	Coupling Type	Capacity control %①	Speed min^{-1}
OSK5341-K	84	101	44.5	42.9	–	65	KS 620	100/75 ②	1450 up to 4500
OSK5351-K	100	121	53.2	51.7	–	65			
OSN5351-K			–	–	16.3				
OSK5361-K	118	142	61.7	60.1	–	65			
OSN5361-K			–	–	19.3				
OSK7441-K	165	199	94.9	90.1	–	176	up to 45 kW: KS 720 up to 75 kW: KS 730	100/75	1450 up to 4000
OSN7441-K			–	–	31.4				
OSK7451-K	192	232	111.7	107.4	–	176		100/ 75/ 50	
OSN7451-K			–	–	34.0				
OSK7461-K	220	266	126.0	123.3	–	176			
OSN7461-K			–	–	39.6				
OSK7471-K	250	302	138.3	135.4	–	188			
OSN7471-K			–	–	43.6				
OSK8551-K	315	380	173.2	166.1	–	330	KS 800	100/ 50 or 100/ 75/ 50	1450 up to 4000
OSK8561-K	359	433	198.7	190.9	–	340			
OSK8571-K	410	495	230.0	221.0	–	350			
OSN8571-K			–	–	73.5				
OSK8581-K	470	567	253.0	255.0	–	360			
OSK8591-K	535	646	291.0	288.0	–	360			
OSN8591-K			–	–	93.4				

① Effective capacity stages are dependent upon operating conditions

② Capacity regulator: special accessory

Technical data

Type	Displacement at 2900 min^{-1}	Displacement at 3500 min^{-1}	Cooling capacity Q_o			Weight	Coupling	Capacity control	Speed
			R717 t_o / t_c 5°C/50°C	R717 t_o / t_c -10°C/45°C	R717 t_o / t_c -35°C/40°C				
	m³/h	m³/h	kW	kW	kW	kg	Type	%①	min^{-1}
OSKA5341-K	84	101	84.6	38.1	–	65	KS 620	100/75 ②	1450 up to 4500
OSKA5351-K	100	121	100.7	45.3	–	65			
OSNA5351-K			–	47.9	17.9				
OSKA5361-K	118	142	118.9	53.5	–	65			
OSNA5361-K			–	56.6	21.1				
OSHA7452-K	192	232	220.0	–	–	176	up to 45 kW KS 720 up to 75 kW KS 630 ③	100/ 75/ 50	1450 up to 4000
OSKA7452-K			207.0	92.6	–				
OSNA7452-K			–	95.9	33.4				
OSHA7462-K	220	266	243.0	–	–	176			
OSKA7462-K			240.0	112.0	–				
OSNA7462-K			–	112.4	39.8				
OSHA7472-K	250	302	256.0	–	–	188			
OSKA7472-K			260.0	124.1	–				
OSNA7472-K			–	122.6	43.8				
OSKA8551-K	315	380	304.0	131.1	–	330	KS 800	100/ 50 or 100/ 75/ 50	1450 up to 4000
OSKA8561-K	359	433	358.0	154.5	–	340			
OSKA8571-K	410	495	433.0	189.7	–	350			
OSNA8571-K			–	203.0	75.4				
OSKA8581-K	470	567	498.0	227.0	–	360			
OSKA8591-K	535	646	554.0	248.0	–	360			
OSNA8591-K			–	261.0	98.4				
OSKA9573-K	700	845	734.0	335.0	124.5	590	KS 900	100 ⇔ 10	1500 up to 4000
OSKA9583-K	805	972	855.0	392.0	147.8	590			
OSNA9583-K			–	400.0	149.1				
OSKA9593-K	910	1098	975.0	445.0	168.3	660			
OSKA95103-K	1015	1225	1091.0	501.0	191.6	660			
OSNA95103-K			–	510.0	193.1				
OSKA10573-K	1400	1700	–	–	–	1025	KS 1000	100 ⇔ 10	1500 bis 4000
OSNA10573-K									
OSKA10583-K	1700	2000	–	–	–	1025			
OSKA10593-K	2000	2200	–	–	–	1050			
OSNA10593-K									

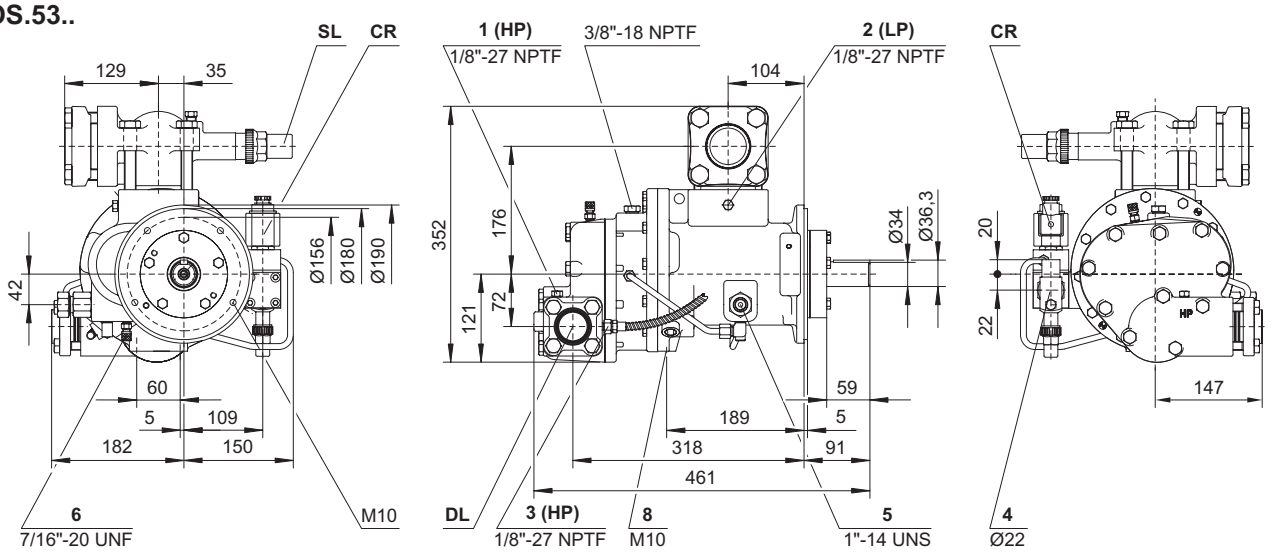
① Effective capacity stages are dependent upon operating conditions

② Capacity regulator: special accessory

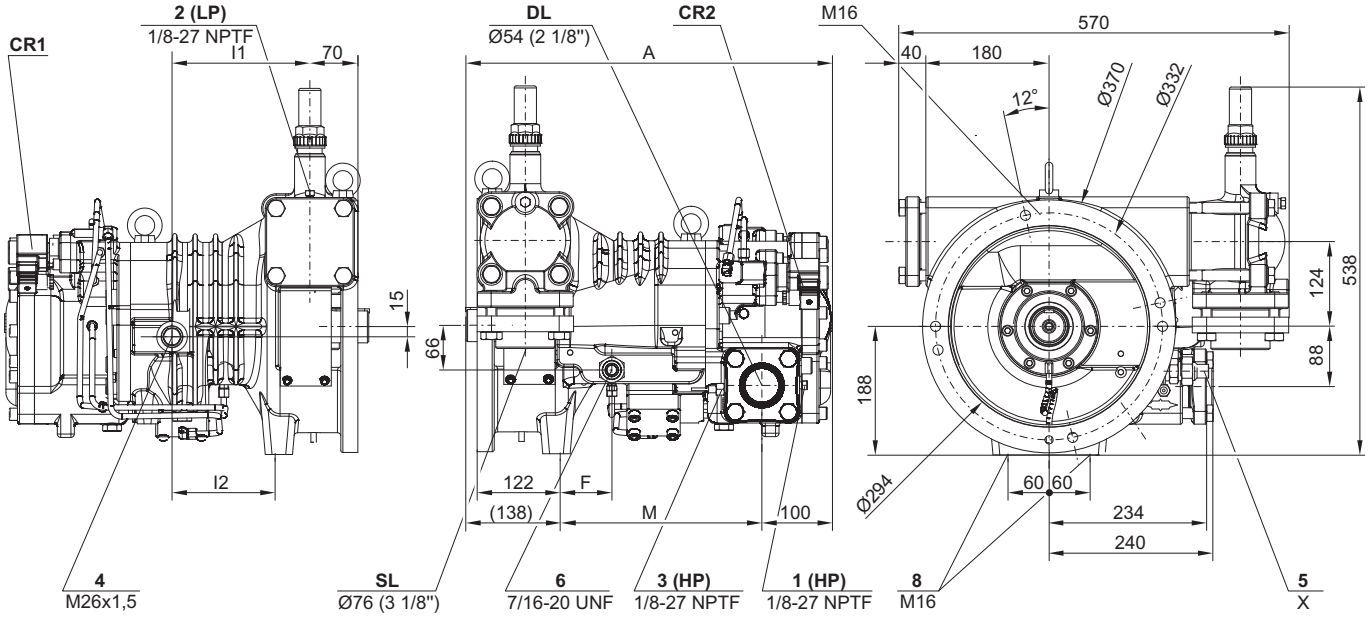
③ OSHA74 up to 105 kW: KS 730

Dimensional drawings

OS.53..



OS.74..

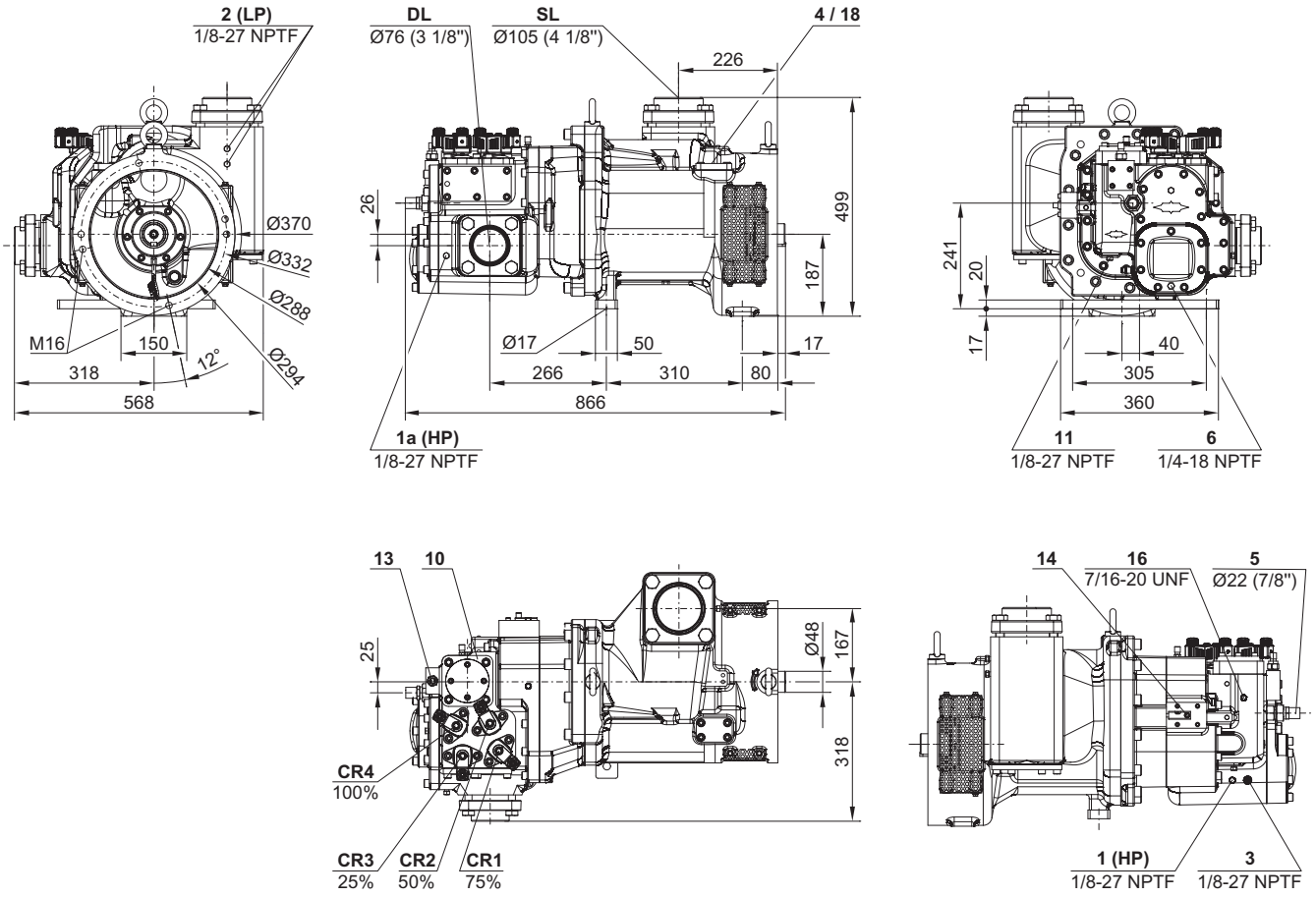


Type	A	F	I1	I2	M	X
	mm	mm	mm	mm	mm	
OS.7441, OS.7451, OS.7461	533	76	202	152	295	⌀16
OS.7471	555	98	224	174	317	⌀16
OS.A7452, OS.A7462	533	76	202	152	295	DN15
OS.A7472	555	98	224	174	317	DN15

Connection positions see page 22.

Dimensional drawings

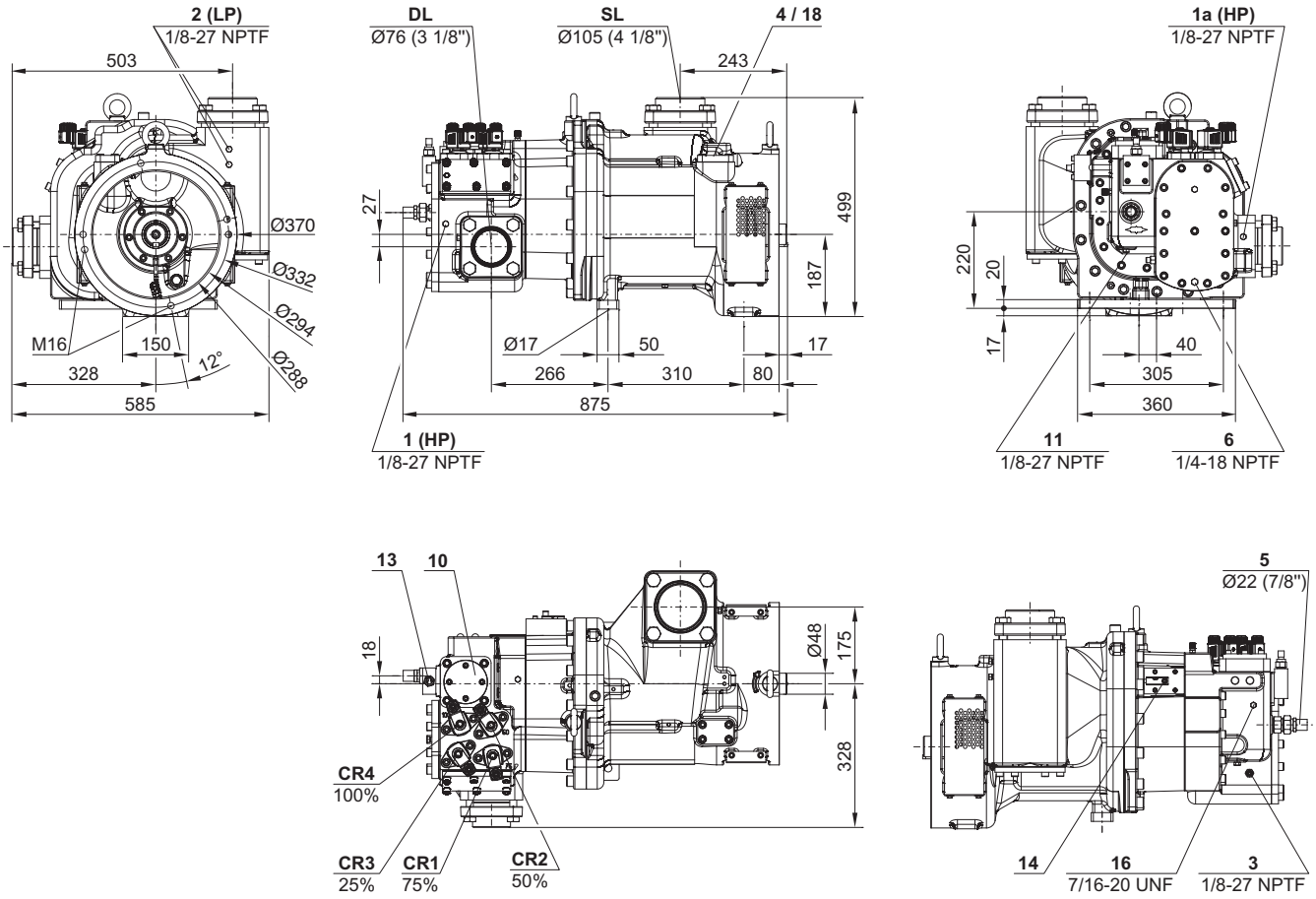
OS.8551 .. OS.8571



Connection positions see page 22.

Dimensional drawings

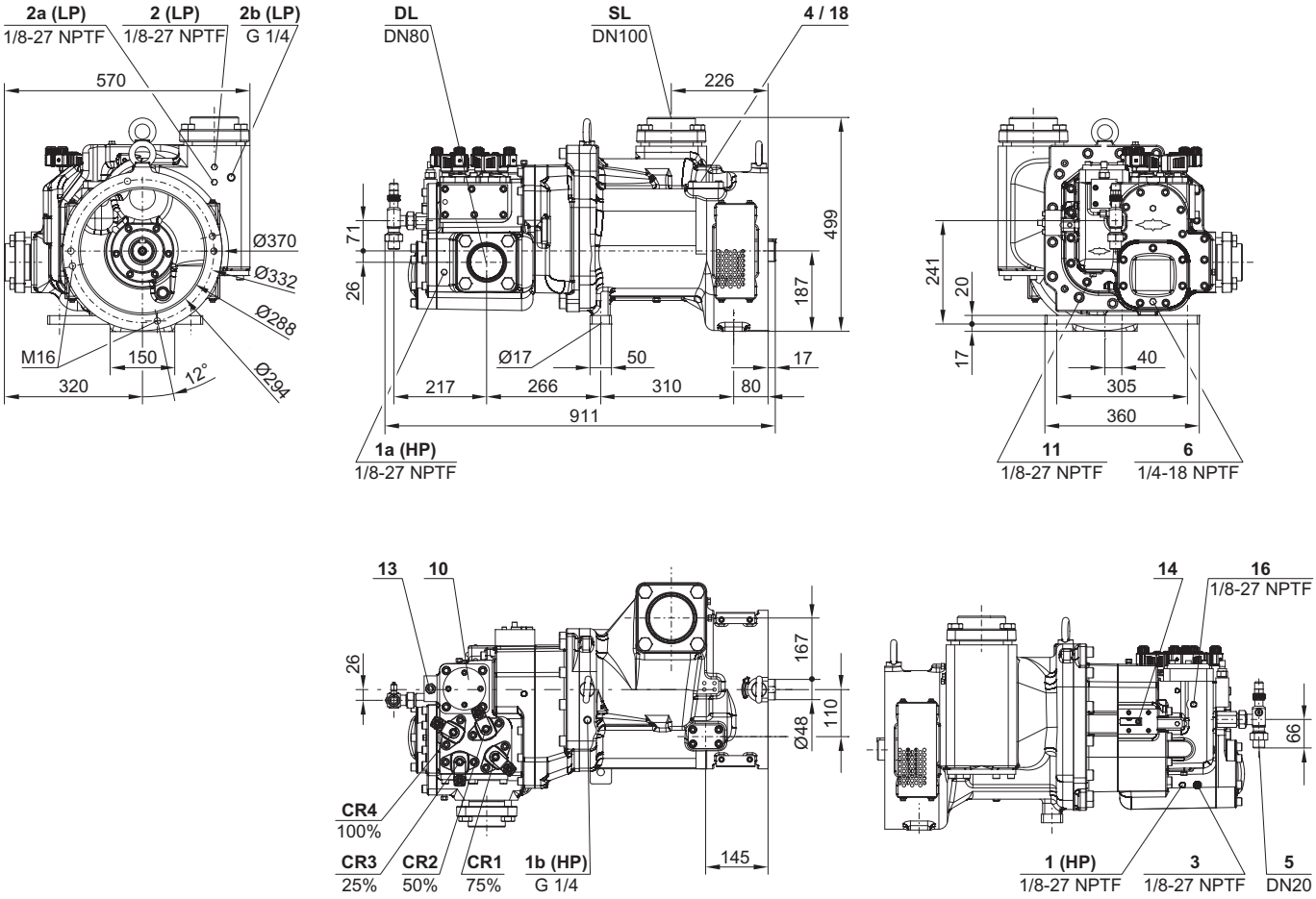
OS.8581 .. OS.8591



Connection positions see page 22.

Dimensional drawings

OS.A8551 .. OS.A8571

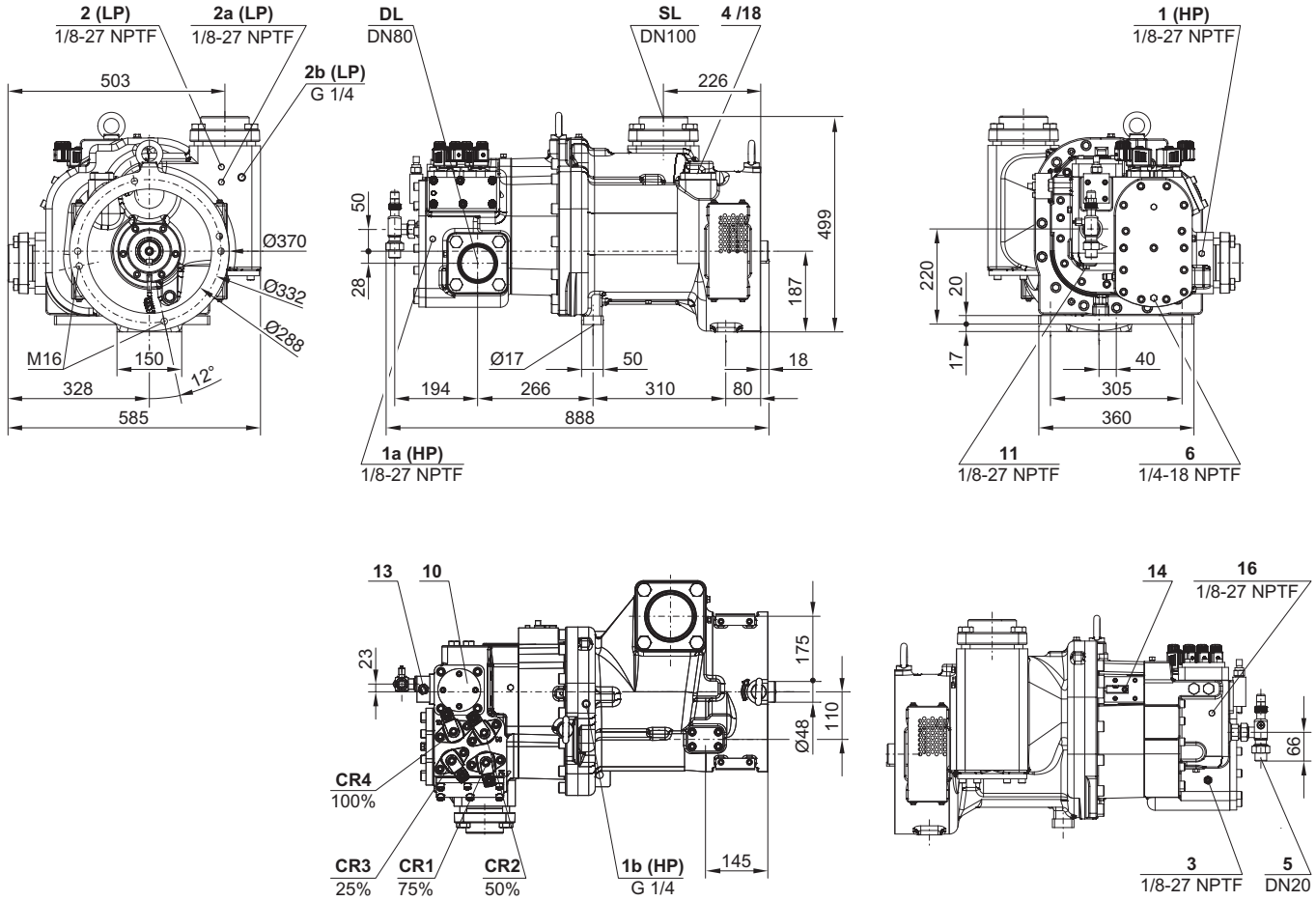


4 OSKA85 and OSNA85:
Optional ECO shut-off valve: DN32

Connection positions see page 22.

Dimensional drawings

OS.A8581 .. OS.A8591

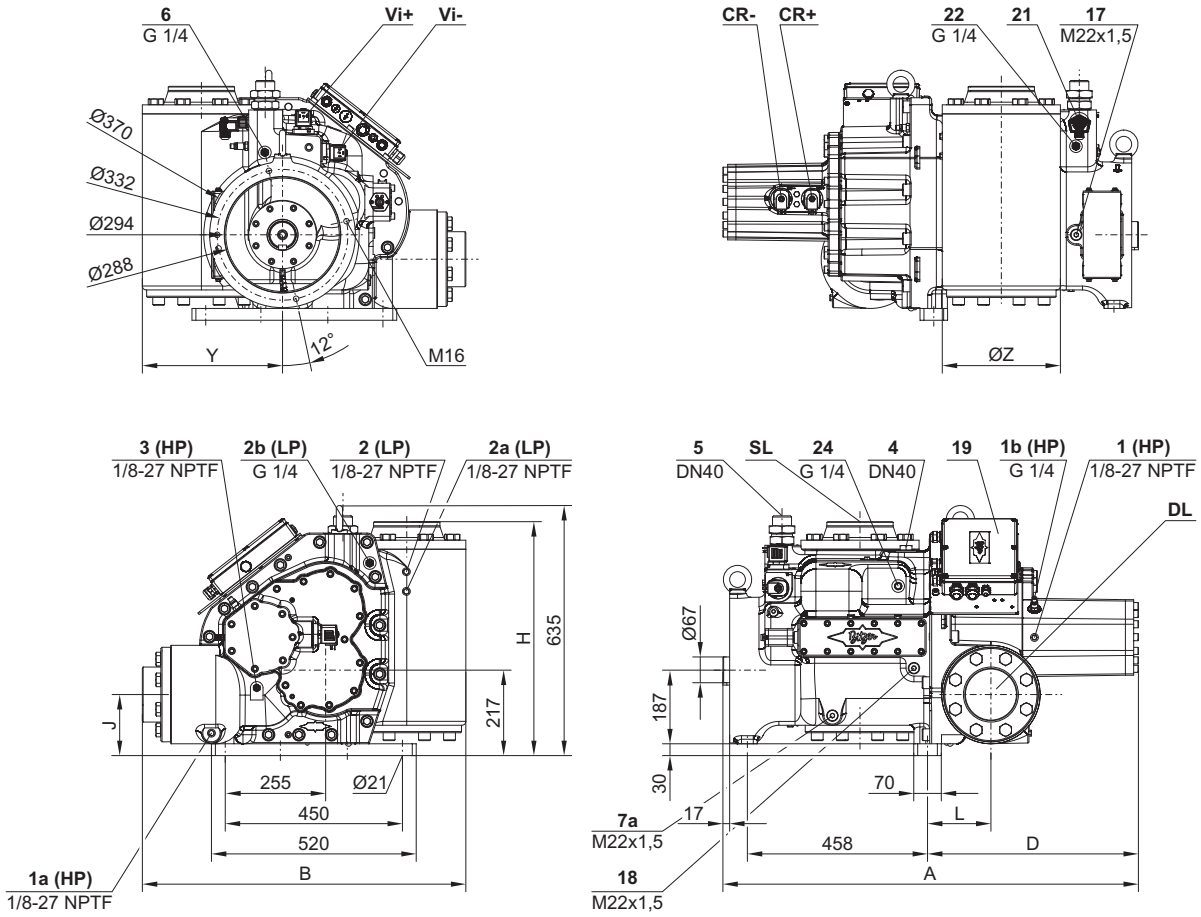


4 OSKA85 and OSNA85:
Optional ECO shut-off valve: DN32

Connection positions see page 22.

Dimensional drawings

OS.A9573 .. OS.A95103

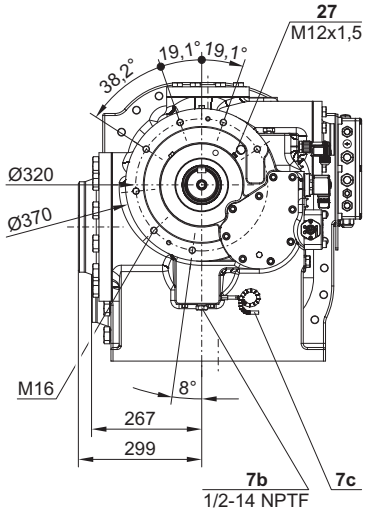


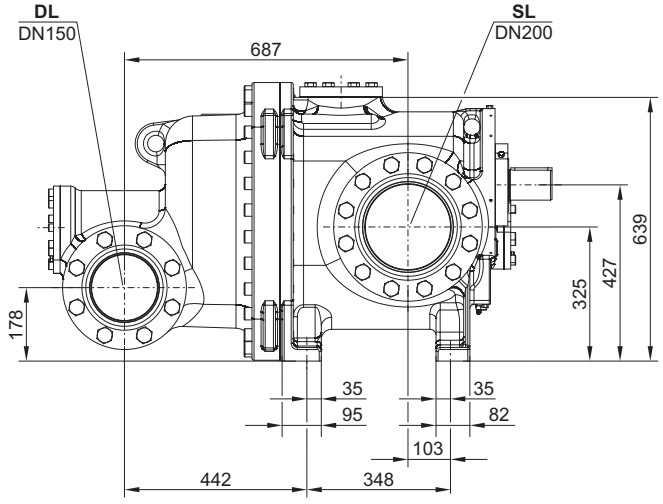
Type	A	B	D	F	G	H	I	J	K	L	R	Y	ØZ	SL	DL
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
OSKA9573, OSKA9583, OSNA9583	1050	730	531	360	176	585	142	144	434	164	154	296	240	DN125	DN100
OSKA9593, OSKA95103, OSNA95103	1055	821	536	332	206	594	117	155	465	161	198	356	300	DN150	DN125

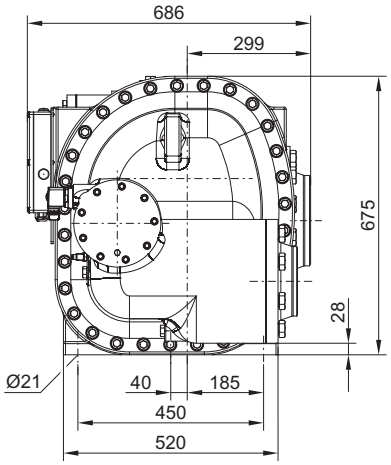
Connection positions see page 22.

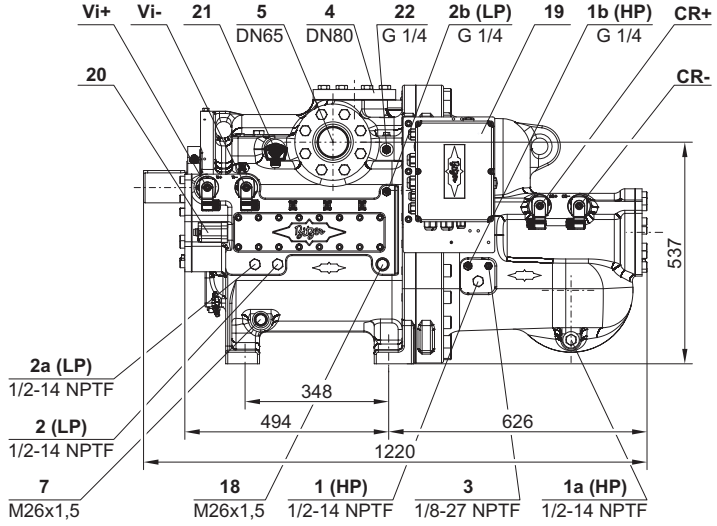
Dimensional drawings

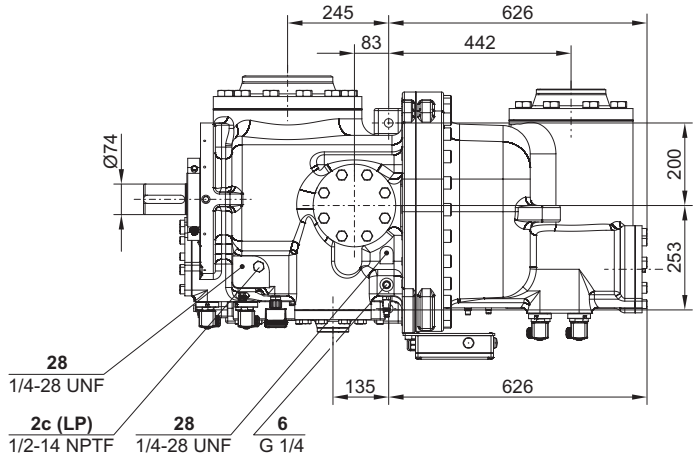
OS.A105











Tentative data

Connection positions see page 22.

Connection positions

1 High pressure connection (HP)
Connection for high pressure switch (HP)
1a Additional high pressure connection (HP)
Not suitable for pressure switch or pressure transmitter!
1b Connection for high pressure transmitter (HP)
2 Low pressure connection (LP)
Connection for low pressure switch
2a Additional low pressure connection (LP)
2b Connection for low pressure transmitter (LP)
2c Low pressure connection for the minimum pressure differential control valve
3 Connection for discharge gas temperature sensor (HP)
4 Connection for economiser (ECO)
OS.85, OS.A95, OS.A105: ECO valve (option)
5 Connection/valve for oil injection
6 Oil pressure connection
7 Oil drain (compressor or motor housing)
7a Oil drain (suction gas filter)
7b Oil drain from shaft seal (maintenance connection)
7c Oil drain hose (shaft seal)
8 Threaded bore for foot fastening
10 Maintenance connection for oil filter
11 Oil drain (oil filter)
13 Oil filter monitoring
14 Oil flow switch
16 Pressure blow-off (oil filter chamber)
17 Maintenance connection for shaft seal
18 Liquid injection (LI)
19 Compressor module
20 Slider position indicator
21 Oil level switch
22 Oil pressure transmitter
24 Access to oil circulation restrictor
27 Temperature sensor in the shaft seal
28 Vibration sensor connection

SL Suction gas line
DL Discharge gas line

Notes

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

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