DAS HERZ DER FRISCHE

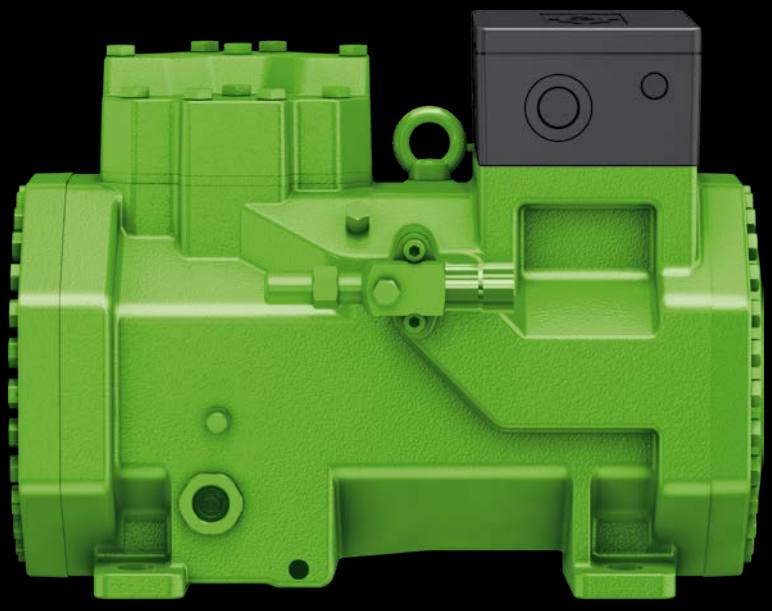
CO_2 // SEMI-HERMETIC

RECIPROCATING COMPRESSORS

50 Hz // KP-120-8 EN

SUBCRITICAL APPLICATIONS

WITH IQ MODULE



ECOLINE

R744 CO_2

IQ INTELLIGENT PRODUCTS

BITZER Innovation Targets

Products for refrigerants with low greenhouse warming potential (GWP)

// for naturally appearing substances

// for new refrigerants like R1234yf, R1234ze(E) and low-GWP-blends

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

Products with high efficiency in 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 optimize operation.

Semi-hermetic reciprocating compressors for CO_2

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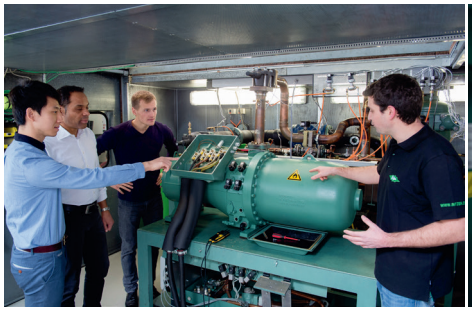
Introduction

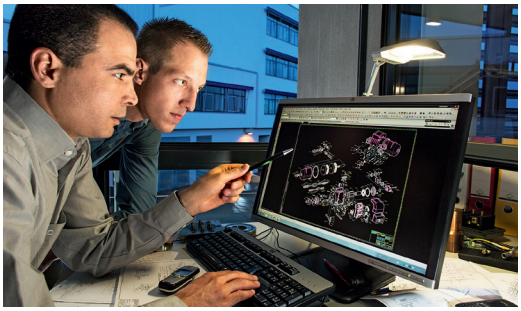
The refrigerant R744/CO_2 is used in many commercial and industrial refrigeration systems, as well as in heat pumps.

The ECOLINE compressors for subcritical applications are developed for low temperature applications in cascade and booster systems. They are also suitable for similar applications with brine or chilled water cooled condensers.

COMMERCIAL REFRIGERATION

INDUSTRIAL REFRIGERATION





BITZER compressors for subcritical CO_2 applications

The BITZER compressors of the SL series certified by ASERCOM are the result of more than 15 years of experience and a continuous further development in the field of subcritical CO_2 applications.

The 18 compressors with a cooling capacity from 1.9 to 82 kW① provide the highest energy efficiency with maximum reliability and are also optimally suited for operation with frequency inverter to control and increase capacity.

① Based on: t_o = -35°C, t_c = -5°C, Δt_{oh} = 20 K, 50 Hz

Highlights and technical features

// 18 compressors with displacements from 1.3 to 46.9 m³/h

// Specially adapted motor version for condensing temperatures up to t_c = 15°C

// Housing with high strength pressure
- High pressure side up to 53 bar
- Low pressure side up to 30 bar

// Particularly well suited to the operation with frequency inverter in order to increase and control capacity

// Wear-resistant drive gear with further developed multilayer bearings

// Highly efficient and robust working valves

// Advanced centrifugal lubrication system by dynamic disc

// Proven long term reliability

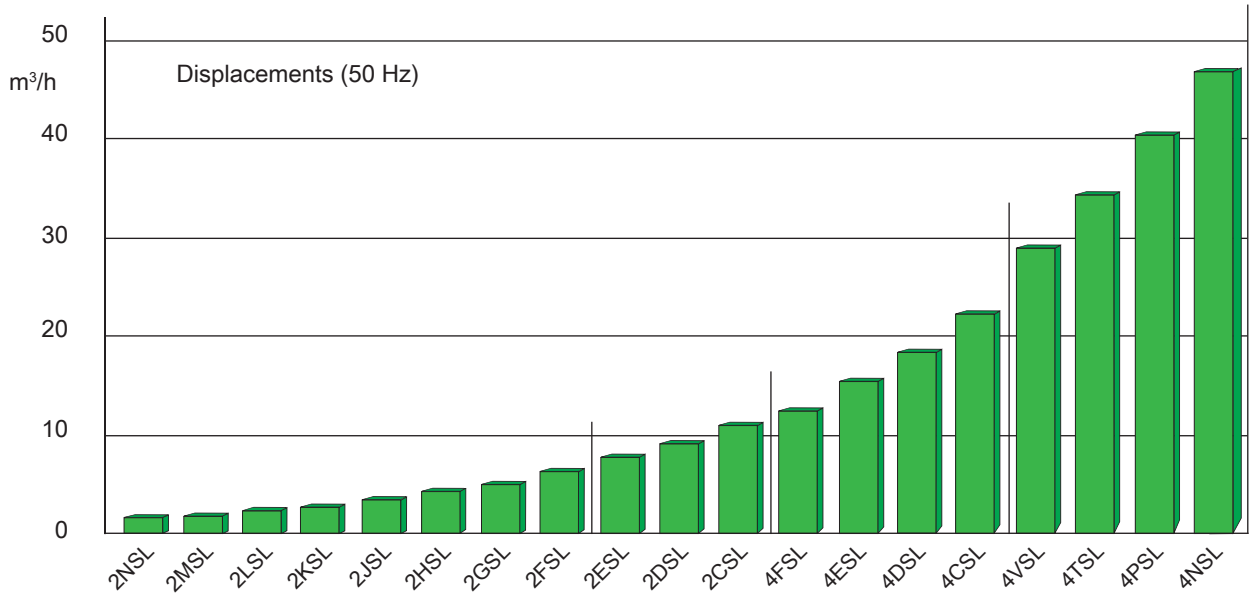
// Quiet and low vibrations

In combination with CO_2 compressor for transcritical operation this series offers the possibility for very efficient medium and low temperature compound systems within a wide capacity range. This particularly applies to holistic system concepts with heat recovery.

Universal application ranges and very favourable eco efficiency are also offered by hybrid systems with CO_2 direct evaporation in the low temperature stage.

R744 CO_2

Capacity range BITZER compressors for subcritical CO_2 applications



ECOLINE series for subcritical CO_2 applications with high standstill pressures

Based on the proven SL-series, a new series has been developed to meet the specific requirements of subcritical CO_2 applications with high demands on standstill pressures and condensing temperatures.

The compressors with motor 1 are particularly suited for use in cold-water networks with condensing temperatures of up to 25°C.

This new series combines the high energy efficiency and proven features of the SL compressors with an increased pressure strength of 100 bar at the high and low pressure sides, and an extended application range.

Thus, in response to regional market developments, BITZER is able to provide energy efficient and operationally safe compressors even for systems with high demands on permitted pressure levels.

Highlights and technical features

// 15 compressors with displacements from 1.7 to 64.9 m³/h

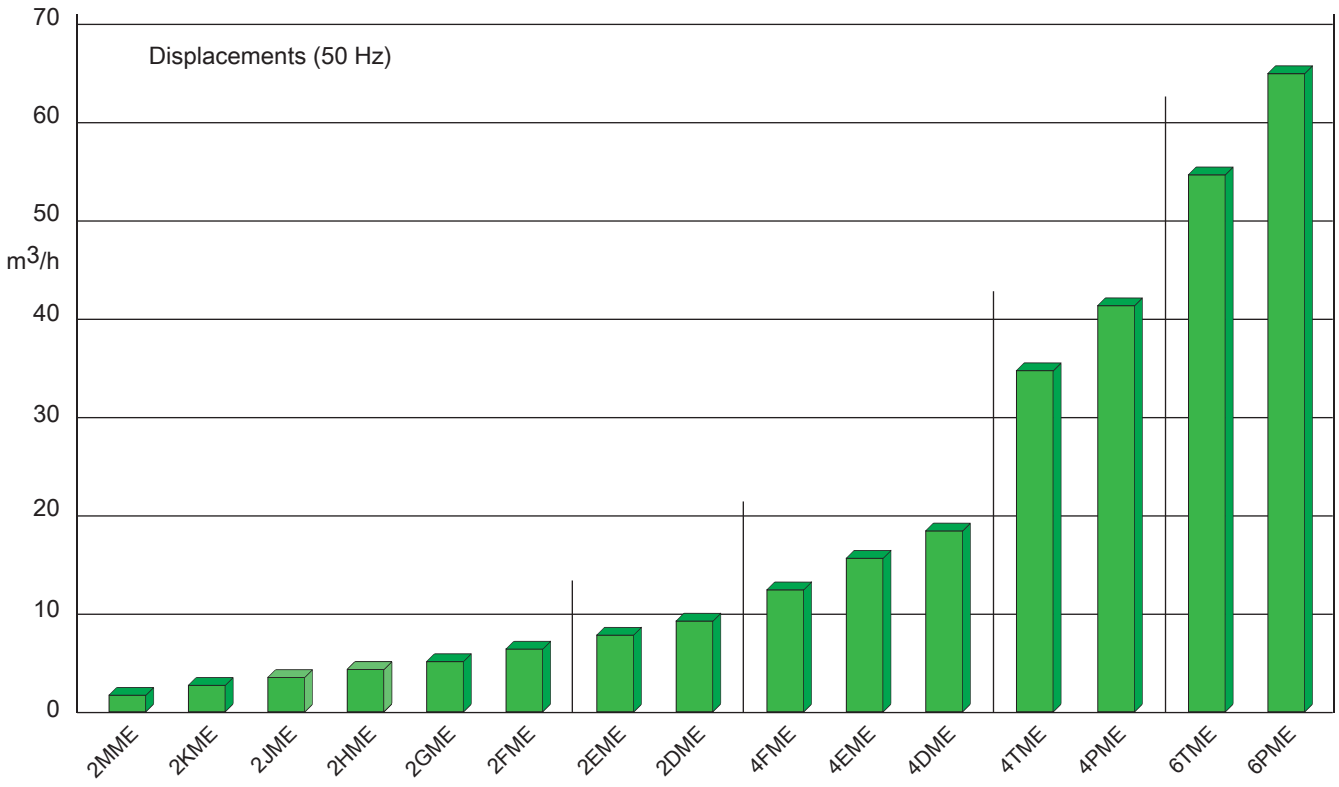
// Pressure-proof housing without bottom plate for maximum pressures of up to 100 bar on the high pressure side and the low pressure side

// Two motor versions (for 2 MME .. 2DME) allowing efficient use in conventional CO_2 low temperature systems or in applications with elevated condensing temperatures

// High energy efficiency with new suction gas flow, highly adapted efficient working valves and optimized cylinder heads

NATURAL REFRIGERANTS

Capacity range ECOLINE series for subcritical CO_2 applications with high standstill pressures



Accessories

IQ MODULE CM-RC-01

The new generation of extended BITZER compressor modules reliably operates, monitors and protects reciprocating compressors and communicates with the superior system controller. Sensors and actuators are prewired and preconfigured in the BITZER factory.
Option: 4FME..6PME

The new, extended protection concept

Intelligent actuation of the oil heater to improve the system efficiency.

Monitored compressor parameters:
// Motor and discharge gas temperature
// High-pressure switch
// Oil pressure (with the new oil pressure switch) or oil level

Diagnosis:
// An early warning system signals critical operating conditions
// Data log of all digital and analog inputs and outputs
// Alarm and warning history
// Runtime and load statistics

Communication:
// via Modbus (standardized interface)
// via Bluetooth
// Configuration and operation monitoring via the BEST SOFTWARE
// Status LED for quick diagnosis
// Prepared for data analysis via the BITZER DIGITAL NETWORK

IQ INTELLIGENT PRODUCTS

See price list for scope of delivery

VARIPACK – External BITZER frequency inverters

For easy and safe capacity control, BITZER VARIPACK series offers a new generation of intelligent frequency inverters that can be used with all BITZER reciprocating compressors.
The new VARIPACK frequency inverter series was specially developed for refrigeration and operation of BITZER refrigeration compressors. The focus of the development was the easy use, the reliability and the high performance of the frequency inverters.

Selection and assignment

The VARIPACK frequency inverters are completely integrated in the BITZER SOFTWARE and can be found under the button “Accessories”.

The visualization of the resulting application limit allows you to create an economic but yet operationally safe selection for every application, even without any extensive special knowledge of frequency inverters and manual calculation steps.

Operation

Communication with the VARIPACK frequency inverters for configuring, monitoring and reading out fault messages can be done with
// The BEST SOFTWARE,
// The control panel.

FREQUENCY INVERTER

BEST SOFTWARE

Via PC, a lot of BITZER IQ products may be configured with the BEST SOFTWARE. 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 parameterization
// Storage and installation of device and compressor setups
// Safe and easy firmware update

Reliable online diagnosis

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

Comfortable analysis

// Data log download and visualization of all operating parameters
// Alarm list with integrated help function for easy maintenance and service
// Prepared for data analysis via the BITZER DIGITAL NETWORK

Communication

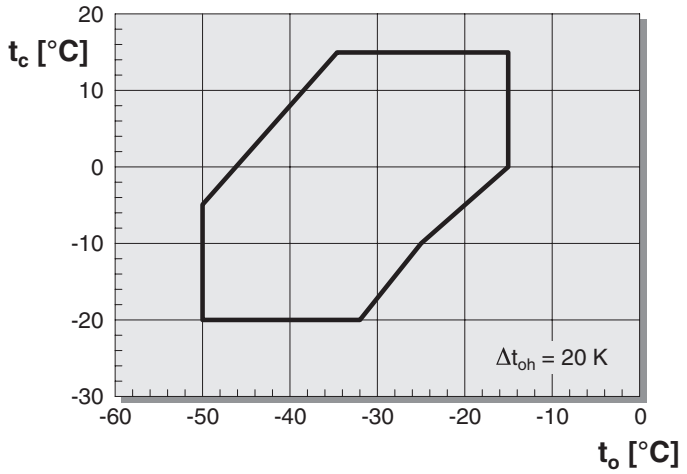
// Via BEST interface converter and Bluetooth

See price list for scope of delivery

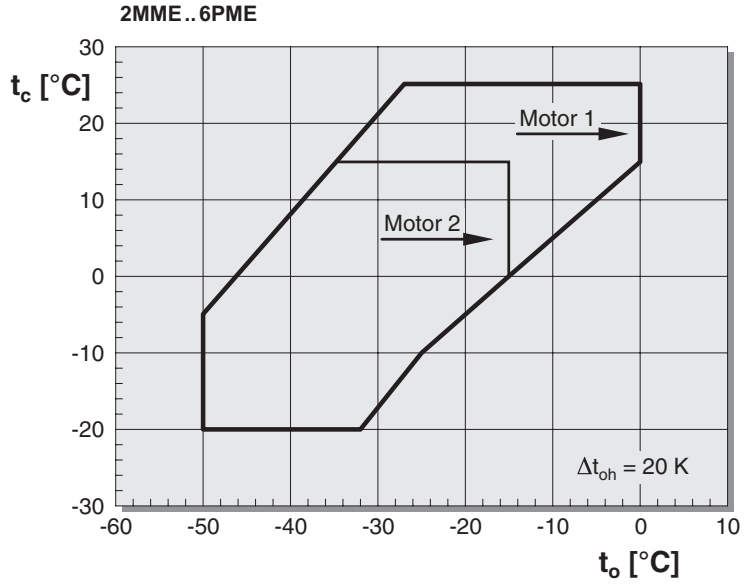
Application limits

based on 20 K suction gas superheat

2NSL..4NSL



2MME..6PME



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

Performance data

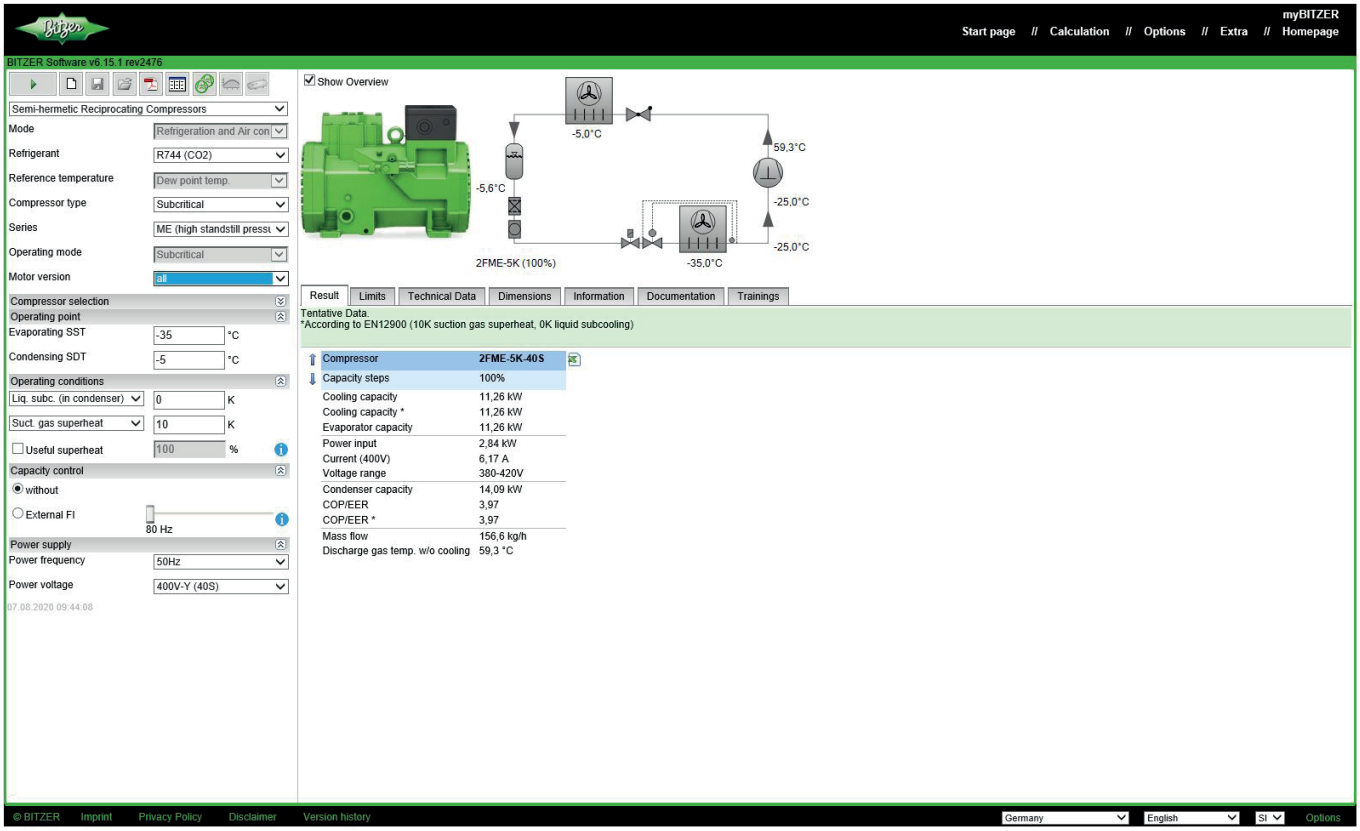
BITZER SOFTWARE

The BITZER SOFTWARE is available in many languages as download for Windows or online version. It is compatible with all browsers and always up to date. The program is ideal for tablets and smartphones.

The BITZER SOFTWARE covers:

// Performance data for all common refrigerants at freely selectable operating conditions
// All relevant technical data
// Application limits
// Calculation results and individually designed performance tables for compressors
// Seasonal calculation
// Dimensional drawings
// Parallel compounds
// Available accessories and their selection
// All relevant technical documents
// More BITZER products

www.bitzer-software.com



ASERCOM certified performance data for 2NSL..4NSL

The Association of European Refrigeration Component Manufacturers (ASERCOM) has implemented a procedure of certifying compressor performance data.

The high standard of this certification is assured by

// plausibility checks of the data performed by experts

// regular random tests at independent institutes

These high efforts result in the fact that only a limited number of compressors can be submitted. Due to this not all BITZER compressors are certified yet.

Performance data of compressors which meet the strict requirements may carry the label “ASERCOM certified product”. All certified compressors and further information are listed on the ASERCOM website (www.ASERCOM.org).

In the BITZER SOFTWARE the certified compressors for subcritical CO_2 applications are marked with this label.

Explanation of model designation

Example

2 D M E – 5 K – 40S

Index for number of cylinders

2 **D** M E – 5 K – 40S

Identification letter for bore x stroke

2 D **M** **E** – 5 K – 40S

Identification letter for subcritical CO_2 applications
SL = Standard standstill pressures
ME = High standstill pressures

2 D M E – **5** K – 40S

Code for motor size

2 D M E – 5 **K** – 40S

Identification letter for oil charge
K = BSE85K, Z = BSG68K

2 D M E – 5 K – **40S**

Motor code

Technical data and performance data

Performance data 50 Hz

based on 20 K suction superheat and compressors with suction and discharge shut-off valve without subcooling acc. to EN12900.

BITZER compressors for subcritical CO_2 applications

Compressor type	Displacement at 50 Hz	Number of cylinders	Refrigeration capacity **Q_o (kW)** t_o/t_c = -35°C/-5°C	Power consumption **P_e (kW)** t_o/t_c = -35°C/-5°C	Oil charge ⑤	Weight	Pipe connections ④ DL	Pipe connections ④ SL	Motor	Electrical data: Max. operating current	Electrical data: Starting current (locked rotor)
	m^3/h		kW	kW	dm^3	kg	mm	mm	V ①	A ②	A ③
2NSL-05K	1.33	2	1.92	0.66	1.0	47	12	16	**Δ / Y** 220..240V Δ-3-50Hz. 380..420V Y-3-50Hz 265..290V Δ-3-60Hz. 440..480V Y-3-60Hz	3.7/2.1	20.9/12.0
2MSL-07K	1.73	2	2.54	0.71	1.0	47	12	16		4.5/2.5	25.6/14.8
2LSL-1K	2.27	2	3.55	0.98	1.0	47	12	16		5.4/3.1	28.9/16.7
2KSL-1K	2.71	2	4.24	1.17	1.0	47	12	16		6.5/3.7	39.0/22.5
2JSL-2K	3.48	2	5.57	1.52	1.0	48	12	16		8.1/4.6	44.2/25.5
2HSL-3K	4.34	2	7.08	1.91	1.0	50	12	16		9.5/5.5	44.2/25.5
2GSL-3K	5.05	2	8.46	2.23	1.0	52	12	16		12.1/6.8	68.1/39.3
2FSL-4K	6.36	2	10.89	2.85	1.0	53	12	16		15.4/8.6	68.1/39.3
2ESL-4K	7.81	2	13.54	3.41	1.5	77.5	16	22		17.5/9.7	92.7/53.5
2DSL-5K	9.22	2	16.01	4.01	1.5	77.5	16	22		20.1/11.3	107.7/62.2
2CSL-6K	11.16	2	19.45	4.85	1.5	77.5	16	22		24.8/13.9	107.7/62.2
4FSL-7K	12.41	4	20.95	5.21	2.0	94	16	28		28.2/15.7	142.8/82.4
4ESL-9K	15.62	4	26.55	6.59	2.0	94.5	16	28		33.7/18.9	168/97
4DSL-10K	18.45	4	31.50	7.81	2.0	94.5	22	28		39.3/22.0	168/97
4CSL-12K	22.32	4	38.45	9.51	2.0	100	22	28		47.6/26.7	182/105
4VSL-15K	28.94	4	49.45	12.14	2.6	153.5	22	28	**PW** 380..420V Y/YY-3-50Hz 440..480V Y/YY-3-60Hz	33.5	97/158
4TSL-20K	34.44	4	59.20	14.53	2.6	153.5	28	35		40.0	97/158
4PSL-25K	40.42	4	70.00	17.14	2.6	171	28	35		48.3	135/220
4NSL-30K	46.87	4	81.80	19.99	2.6	171	28	35		55.5	135/220

Oil heater

// 230V
- 2NSL-05K..2FSL-4K: 0..60 W
- 2ESL-4K.. 4NSL-30K: 0..120/140 W
  self-regulating PTC heater

Oil heater is generally required due to high solubility of CO_2 in the oil.

Explanations

① Tolerance (±10%) based on mean value of voltage range.
Other voltages upon request.

② For the selection of contacts, cables and fuses the max. working current/max. power consumption must be considered.
A fast overcurrent protection device is required.
Contactors: operational category AC3

③ Data for compressors with voltage 380..420 V (220..240 V) are based on an average voltage of 400 V (230 V).
Conversion factors:
380 V (220 V) 0.95
420 V (240 V) 1.05

④ Pipe connections may vary depending on the selected shut-off valve. See operating instructions KB-120.

⑤ Oil charge:
BSE60K – e. g. for cascade applications
BSE85K – e. g. for booster applications
BSG68K – Option

Tentative data.

Technical data and performance data

Performance data 50 Hz

based on 20 K suction superheat and compressors with suction and discharge shut-off valve without subcooling acc. to EN12900.

ECOLINE series for subcritical CO_2 applications with high standstill pressures

Compressor type	Motor version	Displacement at 50 Hz	Number of cylinders	Refrigeration capacity Q_o (kW) t_o/t_c = -35°C/-5°C	t_o/t_c = -10°C/20°C	Power consumption P_e (kW) t_o/t_c = -35°C/-5°C	t_o/t_c = -10°C/20°C	Oil charge ⑤	Weight	Pipe connections ④ DL	SL	Motor	Electrical data Max. operating current	Starting current (locked rotor)
		m³/h		kW	kW	kW	kW	dm³	kg	inch	inch	V ①	A ②	A ③
2MME-07K	2	1.73	2	2.61		0.71		1.2	79	1/2	5/8	Δ / Y 220..240V Δ-3-50Hz. 380..420V Y-3-50Hz 265..290V Δ-3-60Hz. 440..480V Y-3-60Hz	5.1/2.9	45/26
2MME-1K	1	1.73	2		4.59		1.23	1.2	81	1/2	5/8		5.6/3.2	45/26
2KME-1K	2	2.71	2	4.36		1.17		1.2	81	1/2	5/8		6.5/3.7	45/26
2KME-2K	1	2.71	2		7.52		2.00	1.2	83	1/2	5/8		8.6/5.0	61/37
2JME-2K	2	3.48	2	5.61		1.52		1.2	83	1/2	5/8		9.1/5.3	61/37
2JME-3K	1	3.48	2		9.76		2.56	1.2	85	1/2	5/8		10.1/5.8	61/37
2HME-3K	2	4.34	2	7.27		1.91		1.2	85	1/2	5/8		10.7/6.2	77/44
2HME-4K	1	4.34	2		12.04		3.33	1.2	87	1/2	5/8		12.7/7.3	77/44
2GME-3K	2	5.05	2	8.67		2.23		1.2	87	1/2	5/8		11.9/6.9	77/44
2GME-4K	1	5.05	2		14.19		3.93	1.2	89	1/2	5/8		14.6/8.5	77/44
2FME-4K	2	6.36	2	11.16		2.85		1.2	89	1/2	5/8		14.6/8.4	77/44
2FME-5K	1	6.36	2		17.78		4.79	1.2	91	1/2	5/8		17.3/10.0	108/62
2EME-4K	2	7.81	2	13.86		3.41		1.2	91	5/8	7/8		17.3/10.0	108/62
2EME-5K	1	7.81	2		23.00		5.62	1.2	93	5/8	7/8		20.7/12.0	143/82
2DME-5K	2	9.22	2	16.40		4.01		1.2	93	5/8	7/8		20.0/11.6	108/62
2DME-7K	1	9.22	2		27.30		6.90	1.2	96	5/8	7/8		24.7/14.3	143/82
4FME-7K	2	12.41	4	21.70		5.27		2.0	117	5/8	1 1/8		25.6/14.8	143/82
4EME-9K	2	15.62	4	27.45		6.63		2.0	119	5/8	1 1/8		32.6/18.8	188/97
4DME-10K	2	18.45	4	32.60		7.80		2.0	119	7/8	1 1/8		37.8/21.8	168/97
4TME-20K	2	34.73	4	63.10		15.30		2.6	186	1 1/8	1 3/8	PW 380..420V Y/YY-3-50Hz 440..480V Y/YY-3-60Hz	42.4	97/158
4PME-25K	2	41.33	4	76.80		18.60		2.6	210	1 1/8	1 3/8		52.9	135/220
6TME-35K	2	54.57	6	100.40		24.00		2.8	232	1 3/8	1 5/8		67.9	165/275
6PME-40K	2	64.94	6	122.00		29.20		2.8	237	1 3/8	1 5/8		82.8	219/362

Oil heater

// 230V
- 2MME-07K..4DME-10K: 0..120 W
- 4TME-20K..6PME-40K: 0..140 W
  self-regulating PTC heater

Oil heater is generally required due to high solubility of CO_2 in the oil.

Tentative data.

Explanations

① Tolerance (±10%) based on mean value of voltage range.
Other voltages upon request.

② For the selection of contacts, cables and fuses the max. working current/max. power consumption must be considered.
A fast overcurrent protection device is required.
Contactors: operational category AC3

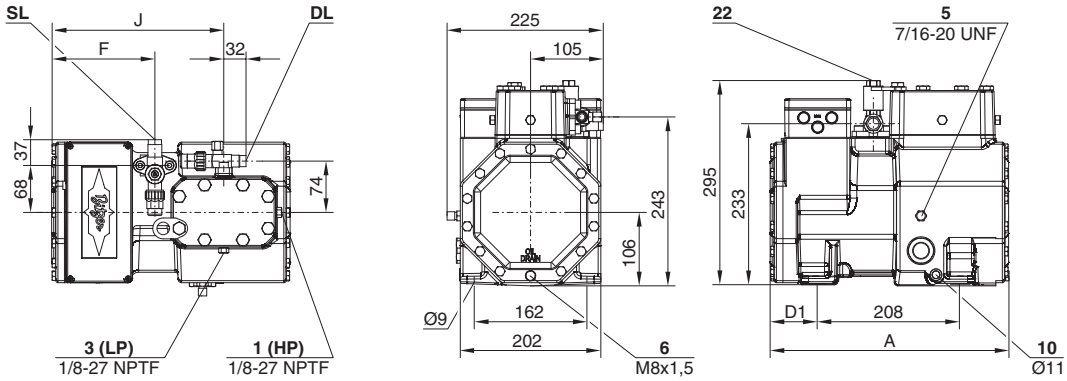
③ Data for compressors with voltage 380..420 V (220..240 V) are based on an average voltage of 400 V (230 V).
Conversion factors:
380 V (220 V) 0.95
420 V (240 V) 1.05

④ Pipe connections may vary depending on the selected shut-off valve. See operating instructions KB-120.

⑤ Oil charge:
BSE60K – e. g. for cascade applications
BSE85K – e. g. for booster applications
BSG68K – Option

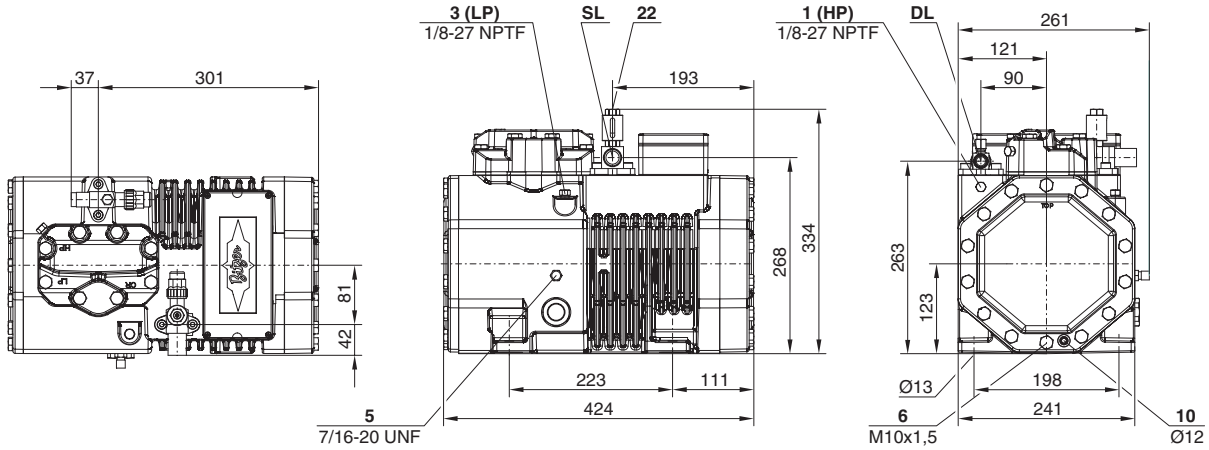
Dimensional drawings

2NSL-05K .. 2FSL-4K

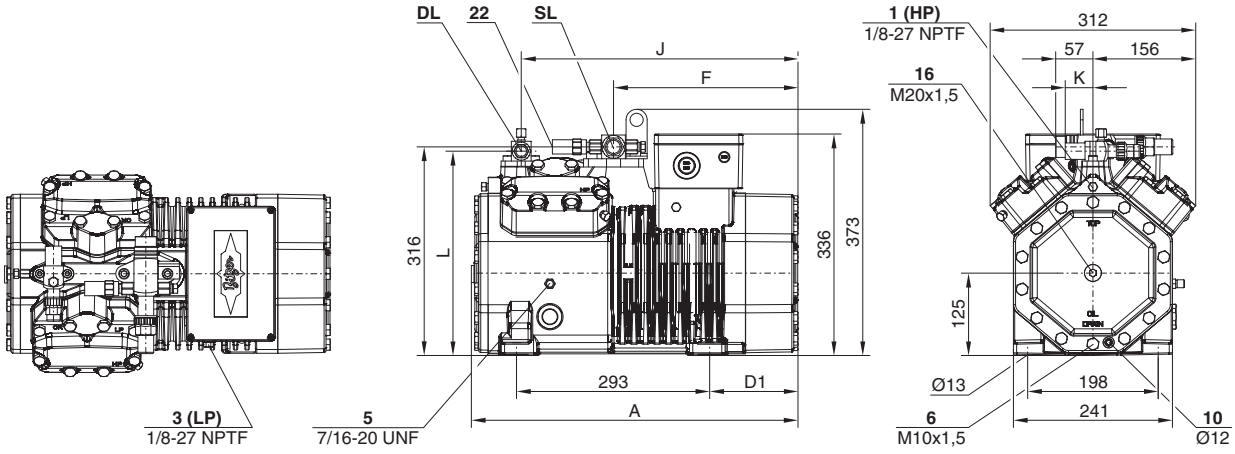


Compressor type	A	D1	F	J
	mm	mm	mm	mm
2NSL-05K .. 2HSL-3K	343	65	148	247
2GSL-3K & 2FSL-4K	373	95	178	277

2ESL-4K .. 2CSL-6K



4FSL-7K .. 4CSL-12K

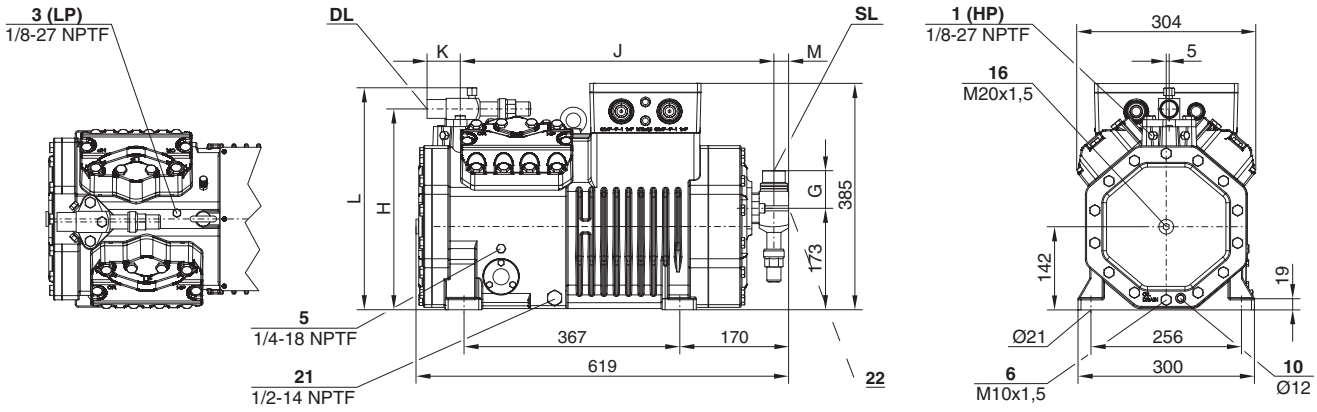


Compressor type	A	D1	F	J	K	L
	mm	mm	mm	mm	mm	mm
4FSL-7K, 4ESL-9K	464	101	247	387	37	306
4DSL-10K	464	101	247	387	42	310
4CSL-12K	497	134	280	420	42	310

Connection positions see page 15

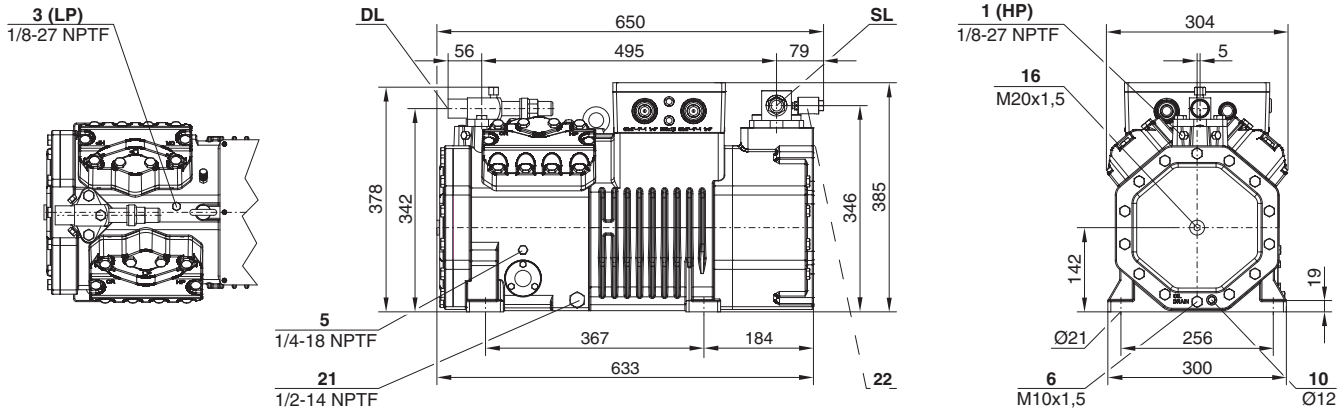
Dimensional drawings

4VSL-15K..4TSL-20K



Compressor type	G	H	J	K	L	M
	mm	mm	mm	mm	mm	mm
4VSL-15K	56	339	526	42	373	18
4TSL-20K	64	342	533	56	378	25

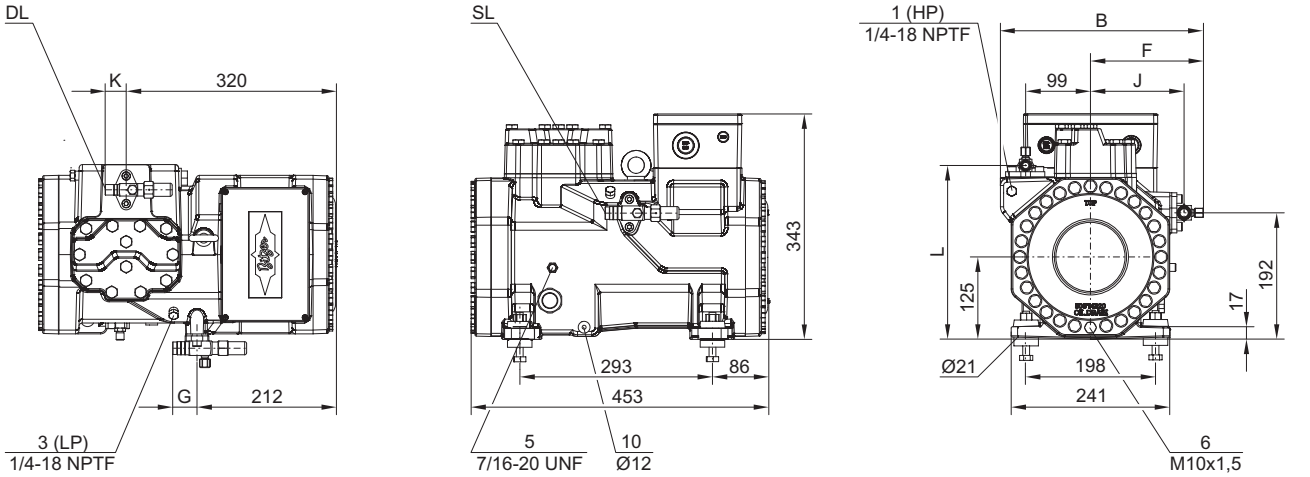
4PSL-25K..4NSL-30K



Connection positions see page 15

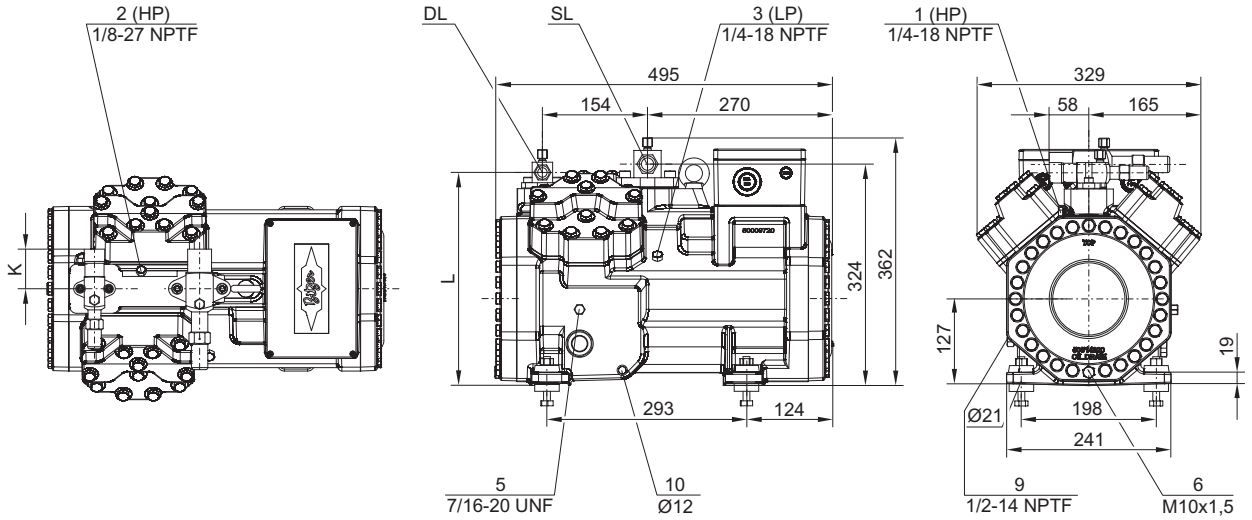
Dimensional drawings

2MME-07K..2DME-7K



Compressor type	B	F	G	J	K	L	DL	SL
	mm	mm	mm	mm	mm	mm	inch	inch
2MME-07K..2FME-5K	311	174	37	145	32	264	1/2	5/8
2EME-4K..2DME-7K	319	182	58	149	37	268	5/8	7/8

4FME-7K..4DME-10K

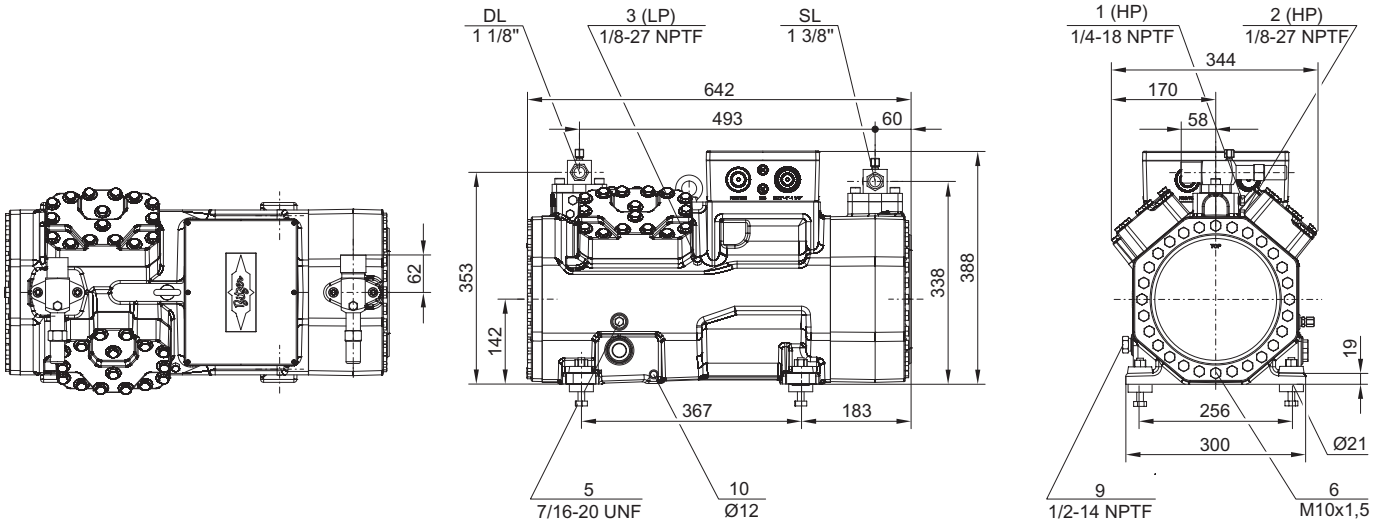


Compressor type	K	L	DL	SL
	mm	mm	inch	inch
4FME-7K, 4EME-9K	49	308	5/8	1 1/8
4DME-10K	58	312	7/8	1 1/8

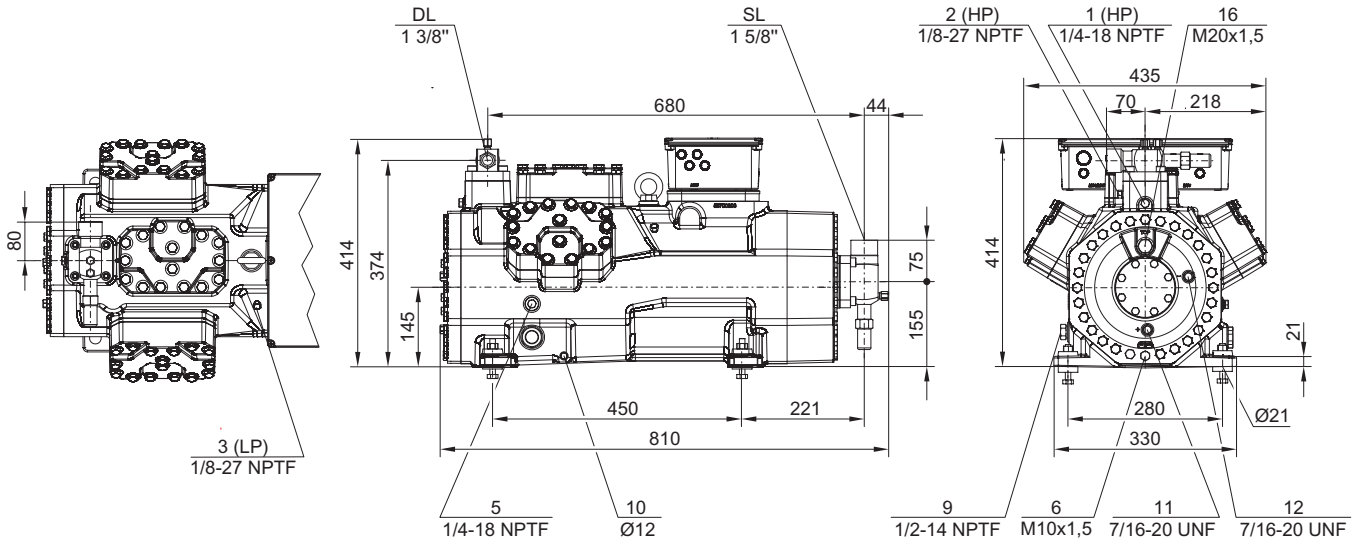
Connection positions see page 15

Dimensional drawings

4TME-20K..4PME-25K



6TME-35K..6PME-40K



Connection positions

1 High pressure connection (HP)
Connection for high pressure switch (HP)
2 Additional high pressure connection (HP)
(e. g. high pressure transmitter)
3 Low pressure connection (LP)
Connection for low pressure switch (LP)
5 Oil fill plug
6 Oil drain
9 Connection for oil and gas equalisation (parallel operation)
10 Connection for oil heating
11 Oil pressure connection +
12 Oil pressure connection –
16 Connection for oil monitoring
(opto-electronic oil monitoring “OLC-K1”
or differential oil pressure switch “Delta-PII”)

SL Suction shut-off valve
DL Discharge shut-off valve

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