

CS Series**Open-Type Marine Screw Compressor unit****SRM · Sweden**

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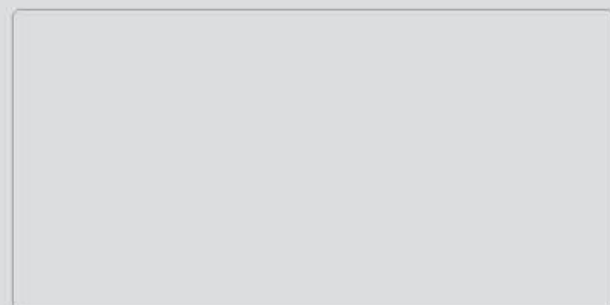
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Distributors

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SRM Sweden

The inventor and leader of screw compressor
100-year legacy of technical quality & energy efficiency



Focus on screw technology
or one hundred years

More than 3 million screw compressors all over the world
are technologically licensed by SRM



CS-1701-02

CONTENTS

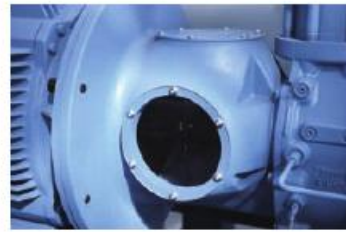
Descriptions	Page
Product Introduction	01-02
Compressor Unit Features	03
Technical Overview of Compressor Unit	04-06
Technical Data Sheet of High-Temperature Open-Type Marine Single-Stage Screw Compressor Unit.....	07
Technical Data Sheet of Medium-Temperature Open-Type Marine Single-Stage Screw Compressor Unit	08
Technical Data Sheet of Low-Temperature Open-Type Marine Single-Stage Screw Compressor Unit	09
Technical Data Sheet of Low-Temperature Open-Type Marine Single Machine Two-Stage Screw Compressor Unit.....	10
System Diagram of Typical Marine Unit	11-12
Applications	13

CS Open-Type Marine Screw Compressor Unit

Fully automatic control, excellent energy efficiency performance, reliable and safe design, wide temperature range and highly integrated design.



Safe and reliable adapter



Original oil injection system



Intelligent control center
Portable control panel



Reliable precise control elements



Best forged steel rotor
"I" profile with optimal
5+7 tooth mesh



High strength ductile iron machine body



10%~100% step-less capacity control



Variable VI control



Super wear-resistant shaft seal



High precision, high wear
resistance roller bearing

Efficient refrigeration compressor



Efficient heat exchanger



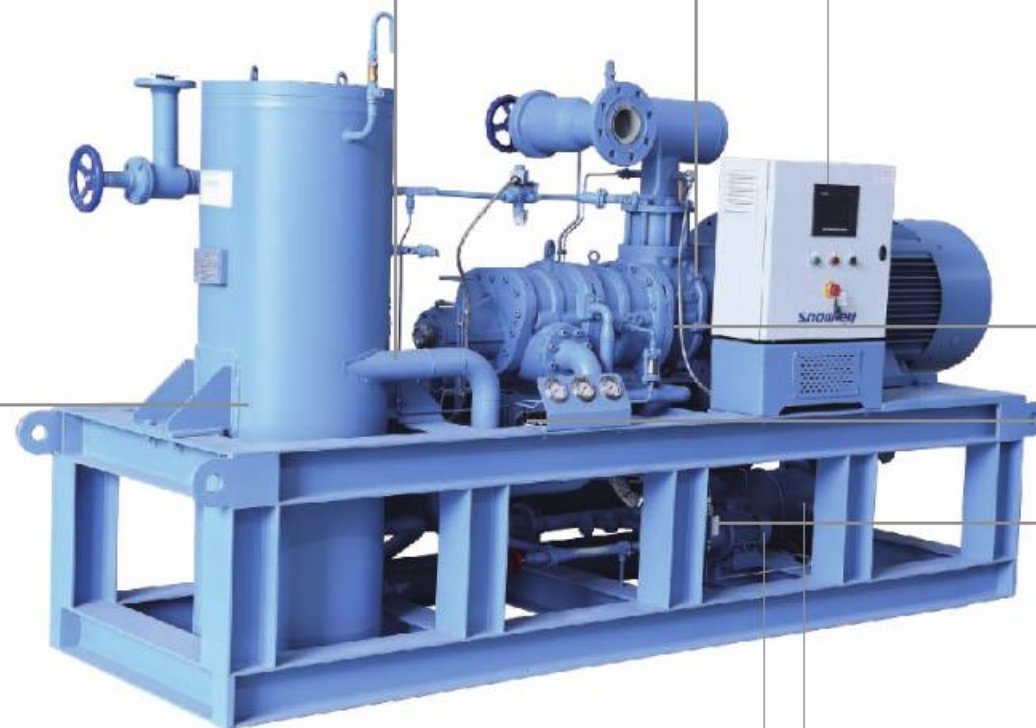
Large capacity oil filter



Pre-lubrication oil pump



Efficient oil separator



Features

Advanced intelligent control center

- User-friendly interface, startup with the press of a button, easy operation and intelligent control;
- Real-time unit monitoring, touch panel capable of displaying system pressure, power capacity, control position, running time, operational mode, operating condition, etc. In real time and capable of storing historical information;
- The common centre is equipped with a preventive safety device system which allows unattended operation to be safe and reliable;
- Automatic power control allows the unit to operate effectively under different conditions;
- Automatic management of oil temperature limits the oil temperature in a certain range, ensuring the efficient and stable operation of the unit;
- Automatic control of the pressure ensuring the exhaust pressure, intake pressure, etc. are within preset range;
- With vector frequency conversion control, the unit is capable of adjusting the rotational speed according to the conditions and reasonably distribute motor rotational torque accordingly, allowing energy-efficient operation and low cost;
- Remote control, local control and other control modes are available for the system to turn on and turn off equipment, it can also be linked to the monitoring center in real time by reserved bus protocol.

Excellent energy efficiency performance

- The package is equipped with international leading SRMTEC open screw compressor. Use "1" patent screw rotor profile, efficient and energy-saving;
- Highly sensitive capacity control unit for 10%~100% step-less capacity control and a VI control allows package to run efficiently in different working conditions.
- Adopt a small oil pump for pre-lubrication first, and then use pressure differential to supply oil, which saves energy;
- High pressure liquid from condenser gains extra cooling power by being injected into compressor after absorbing the sensible heat of the high pressure liquid in the economizer. COP can be improved greatly in this way;
- Advanced energy-saving technology allows package to have quite high running efficiency and excellent part load performance.

Safe and reliable design

High standard safety design, such as high pressure resistance compressor design, high standard pressure vessel design, safety valve design and preventive safety protection design. SRMTEC compressors fully conform to European industrial product standard and GB/T19410 design standard, ensuring stable and reliable running all day with design space pressure up to 2.8 MPa.

Wide applicable temperature range

CS open-type marine screw compressor unit has a wide range of applicable temperature:
 $-65^{\circ}\text{C} < \text{Evaporating temperature} \leq 10^{\circ}\text{C}$;
 $25^{\circ}\text{C} < \text{Condensing temperature} \leq 60^{\circ}\text{C}$;
 Temperature is subject to special design required by customers.

Highly integrated design

The optimal structural design, highly integrated unit, small occupying shell space, convenient transportation and short engineering and installation time.

Efficient oil separator

Efficient oil separator is adopted, with a special internal tilt prevention design to prevent refrigerant oil from flowing back to the compressor because of the motion of the ship.

Efficient heat exchanger

Optimized heat exchange design, which ensures efficient heat exchange and improves the efficiency of the unit.

Fine and removable filter

To ensure the cleanliness of cleanliness the system, the unit is equipped with a large capacity precise oil filter, a suction filter to stop foreign matters which might occur in refrigeration during installation and keep unit running efficiently and stably. Filters are easy to use and can be removed for cleaning.

Anti reverse flow design

In order to prevent the reverse flow during a machine shut down, the package is equipped with check valves on the discharge and suction side. The check valve on the discharge side is located on the discharge port of oil the separator, which can also prevent the liquid refrigerant in evaporating condenser from flowing back to oil separator during shut down.

Stable product quality

- Swedish hundred years' technology of SRM has been proved by global applications;
- Full performance test before delivery ensures product stability.

Unit technical overview

Control center

The system adopts the internationally famous PLC brand in the core of control, equipped with a 64k true color touch screen, the whole operation process can be controlled, historical data can be saved.

Easy Operation

Friendly interactive interface, multiple languages to choose from. One-button operation mode simplifies the boot process

Dynamic tracking

Real-time monitoring of the unit, touch panel capable of displaying system pressure, power capacity, control position, running time, operation mode, and operation condition in real time. Unit automatically records all fault messages, the fault messages includes detailed description of the abnormal situation and the corresponding solution, making it convenient for maintenance staff to do rapid diagnosis and troubleshooting.

Safety protection

Equipped with preventive safety protection system, unattended operation is also safe..

Hierarchical password access

Provide the operator with a hierarchical security access password; in case non-professionals input incorrect parameters. There are 3 levels of access, and each level has its own password.

Inverter control

Frequency conversion control can be used, it can rationally distribute motor rotational torque, and enhance the unit efficiency.

Various communication modes

The system adopts remote/local control modes to start or stop; it can also be linked to the monitoring center by a reserved bus protocol in real time.



Compressor

Rotor

- SRM patented 7 screw rotor profile line, optimal 5+7 tooth mesh combination Provides, high efficiency, low vibration, and stable running;
- Use high quality forged steel material, high wear resistance, high strength, strong liquid impact resistance, applicable to a wide range of refrigerants;
- Big shaft dimension, large torque.

Housing

- Adopt ductile cast iron for a high strength housing design, working pressure can be up to 2.8Mpa;
- Can change the economizer port according to real conditions.

Bearing

Precision high wear resistant high precision wear resistant composition rolling bearings can apply to high density refrigerant load; the design lifetime is 100,000 hours.

Shaft seal

- Innovative shaft seal structure, even stress distribution, stable running, low wear, high sealing, prevents leakage effectively.
- SiC wear-resistant sealing surface, applicable to the rotation speed of 10,000 rpm.

VI control

VI control can achieve the optimal pressure ratio, high efficiency and energy-saving. The Compressor is equipped with a manual VI control function, which is independent from capacity control to ensure efficient running under different working conditions. The automatic VI control also can be selected to enable the switch between different working conditions.

Capacity control

- 10%-100% step-less capacity control and intelligent controller with accurate positioning;
- Capacity control structure is highly sensitive, the load changes can be achieved within in 30 s;
- Without electricity, unloading control can be realized by the slide valve design;
- World unique explosion-proof device for energy regulation cylinder.

Multi-points oil injection cooling

Multi-points oil injection cooling can ensure efficient and stable running of compressor.

Sealing for whole package

- Adopt a high quality O-ring, super sealing, safe with no leakage;
- Highly precise alignment, the compressor can run smoothly.

Motor

- Marine asynchronous motor is adopted for the unit. The motor design is safe and reliable, with high efficiency, low vibration and low noise;
- The unit is equipped with a 380V motor;
- For start-up methods, it can select star-delta start-up, soft start-up or variable frequency start-up;
- Motor installation type can be B35 or B3.

Adapter

Adaptors may be provided to integrate the compressor and motor, achieving good center alignment and more stable operation of compressor and motor.

Oil separator

Subject to the actual operating requirements on ship, a efficient vertical oil separator is adopted, with special internal tilt prevention design to prevent refrigerant oil from flowing back to compressor because of the motion of ships to ensure efficient, stable and reliable operation of the unit.

Heat Exchanger

- Optimized heat exchange design, which greatly improves the efficiency of heat exchange and ensures efficient running of unit;
- Oil cooler -exclusive anti corrosion measures are taken to ensure the usage of seawater heat exchanger reliable;
- Economizer -the unit is equipped with an economizer under low-temperature working condition, which increases the liquid subcooling before it flows into the expansion valve, thus greatly increasing the refrigeration capacity and refrigeration-factor of the unit.

Others

Refrigerant

Various refrigerants such as R22 and R404A can be used.

Accessories

All the elements in the system are produced by well-known manufacturers and of high reliability and quality assurance.

Preventive protection

- An exhaust non-return valve is configured to prevent the backflow during shut-down to protect the compressor;
- Function of high and low pressure protection can protect the compressor and system so it can operate in severe working conditions safely;
- With the oil level protection function, compressors can be prevented from being damaged by lack of oil;
- Safety valves are configured to prevent the system from high pressure.
- High and low voltage sides can be automatically isolated during sudden power failure.

Specifications and standards

- CB*3248-85 Technical Specifications for Marine Refrigeration Pressure Vessels;
- GB/T 18816-2014 General Specification for Marine Heat Exchanger;
- Rules for the Construction of Sea-going Steel Fishing Vessels (1998);
- Rules for Classification of Sea-going Steel Ships (2012);
- Regulations for Fishing Vessel and Marine Products Inspection (2003);
- GB/T 19410-2008 Screw Refrigeration Compressor;
- GB 5226.1-2008 Safety of Machinery-Electrical Equipment of Machines-Part 1: General Requirements;
- JB/T 4330-1999 Measurement of Noise Emitted by Refrigerating and Air Conditioning Equipments.

Service condition

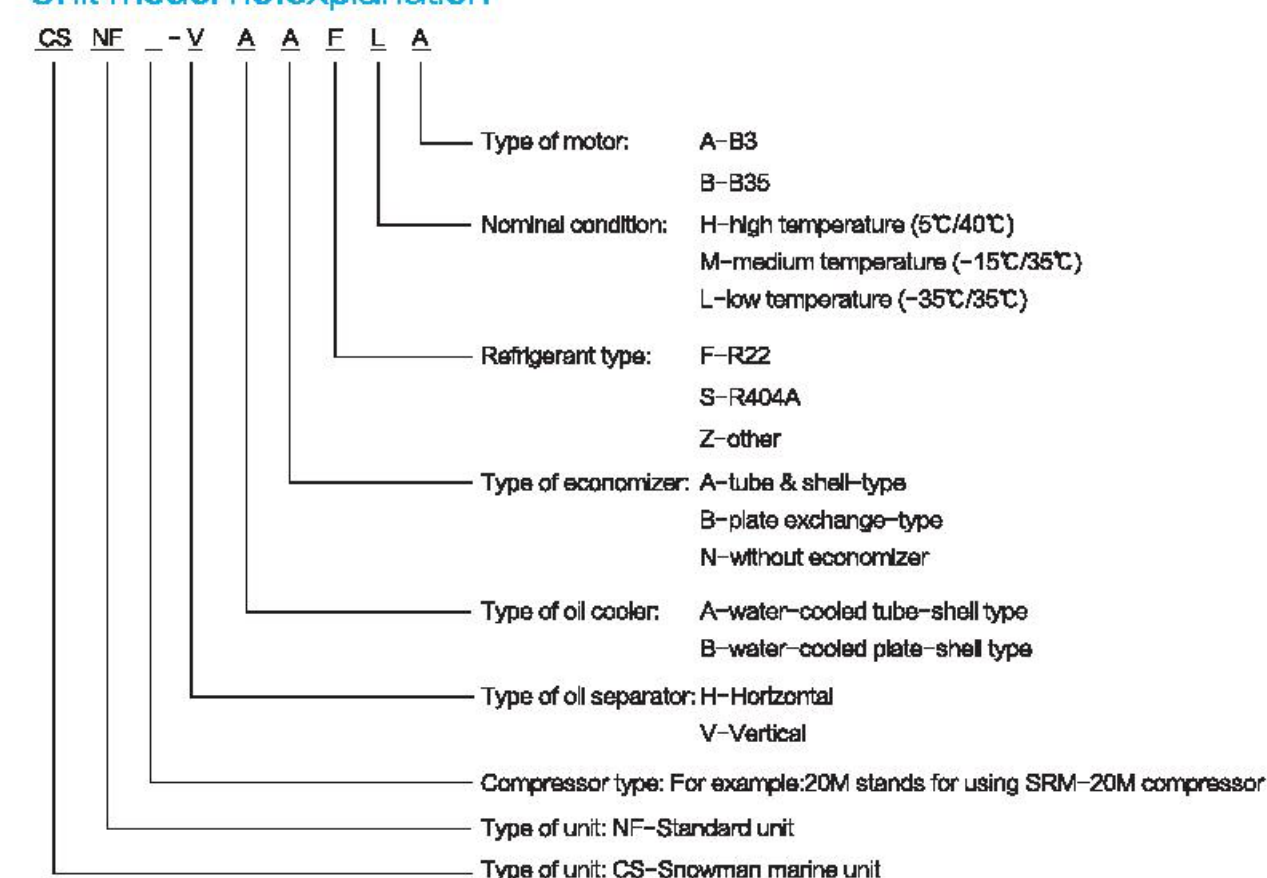
Ambient temperature: +5℃--+40℃

Refrigerant oil: only provided or authorized by snowkey

Cooling water condition: Cooling water quality should meet the requirement of Code For Design Of Industrial Redistributing Cooling Water Treatment

Entering temperature of cooling water: +15℃--+32℃

Unit model no.explanation



High-temperature open-type marine single-stage screw compressor unit (R22)

Models	CSNF12S-VANFHA	CSNF12M-VANFHA	CSNF12L-VANFHA	CSNF16S-VANFHA	CSNF16M-VANFHA	CSNF16L-VANFHA	CSNF20S-VANFHA	CSNF20M-VANFHA	CSNF20L-VANFHA
	203.6	245.5	292.1	427.8	518.3	622.4	868.4	1108.2	1271.1
Refrigeration power in nominal working conditions	175096	211130	251206	367908	445738	535284	736504	935052	1083146
Compressor	Model	SRM-12S	SRM-12M	SRM-16S	SRM-16M	SRM-16L	SRM-20S	SRM-20M	SRM-20L
	Theoretical displacement, m³/h	216	262	310	435	544	862	1100	1270
Capacity control									
Start method									
Main motor	Power, kW	55	75	75	110	132	160	200	280
	Power supply	380V/50Hz/3P							
Oil pump motor	Power, kW	0.75							
	Power supply	380V/50Hz/3P							
Outline dimension	L, mm	3300	3300	3300	3850	3850	4650	4650	4650
	W, mm	1200	1200	1200	1300	1300	1600	1600	1600
	H, mm	1800	1800	1800	1860	1860	2570	2570	2570
	A, mm	900	900	900	1000	1000	1400	1400	1400
	AO, mm	850	850	850	1250	1250	1350	1350	1350
	A1, mm	2800	2800	2800	3400	3400	4300	4300	4300
	B, mm	1120	1120	1120	1220	1220	1340	1340	1340
	B1, mm	1200	1200	1200	1300	1300	1400	1400	1400
Unit weight	do, mm	22	22	22	24	24	24	24	24
	Net weight, kg	2940	2940	2940	3900	3900	6640	6640	6640
Unit weight	Operational weight, kg	3160	3160	3160	4150	4150	6840	6840	6840

Notes:1. Fluctuation range of voltage: ± 10%;
2. The inlet and out of oil cooling are connected by flange. Details should be given in the order if other connections are required;
3. Due to technology improvement, the parameters, overall dimension and weight of the units may differ, and the actual design shall prevail;
4. If technical parameters of other refrigerant units are required, please contact with our company;
5. The units mentioned above are the standard ones which can be specially designed based on user's requirements.

Medium-temperature open-type marine single-stage screw compressor unit (R22)

Models	CSNF12S-VABFMA	CSNF12M-VABFMA	CSNF12L-VABFMA	CSNF16S-VABFMA	CSNF16M-VABFMA	CSNF16L-VABFMA	CSNF20S-VABFMA	CSNF20M-VABFMA	CSNF20L-VABFMA
	100.8	121.5	144.3	212.1	257.2	309.4	428.7	553.2	637.3
Refrigeration power in nominal working conditions	86688	104490	124498	182408	221192	268084	368682	475752	548078
Compressor	Model	SRM-12S	SRM-12M	SRM-16S	SRM-16M	SRM-16L	SRM-20S	SRM-20M	SRM-20L
	Theoretical displacement, m³/h	216	262	310	435	544	862	1100	1270
Capacity control									
Start method									
Main motor	Power, kW	55	75	75	90	110	132	160	220
	Power supply	380V/50Hz/3P							
Oil pump motor	Power, kW	0.75							
	Power supply	380V/50Hz/3P							
Economic device	Form	Tube-shell type or plate type							
	Import and export, mm	32	32	38	38	45	46	57	76
Outline dimension	L, mm	3300	3300	3300	3760	3760	3760	4560	4660
	W, mm	1200	1200	1200	1300	1300	1300	1600	1600
	H, mm	1800	1800	1800	1860	1860	1860	2570	2570
	A, mm	900	900	900	1000	1000	1000	1400	1400
Installation dimensions	AO, mm	850	850	850	1250	1250	1250	1350	1350
	A1, mm	2800	2800	2800	3400	3400	3400	4300	4300
	B, mm	1120	1120	1120	1220	1220	1220	1340	1340
	B1, mm	1200	1200	1200	1300	1300	1300	1400	1400
	do, mm	22	22	22	24	24	24	24	24
	Net weight, kg	2940	2940	2940	3800	3800	3800	6500	6500
Unit weight	Operational weight, kg	3160	3160	3160	4060	4060	4060	6800	6800

Notes:1. Fluctuation range of voltage: ± 10%;
2. The inlet and out of oil cooling are connected by flange. Details should be given in the order if other connections are required;
3. Due to technology improvement, the parameters, overall dimension and weight of the units may differ, and the actual design shall prevail;
4. If technical parameters of other refrigerant units are required, please contact with our company;
5. The units mentioned above are the standard ones which can be specially designed based on user's requirements.

Low-temperature open-type marine single-stage screw compressor unit (R22)

Models		CSNF12S-VABFLA	CSNF12M-VABFLA	CSNF12L-VABFLA	CSNF16S-VABFLA	CSNF16M-VABFLA	CSNF16L-VABFLA	CSNF20S-VABFLA	CSNF20M-VABFLA	CSNF20L-VABFLA
Refrigeration power in nominal working conditions	kW	58.0	69.7	82.7	123.2	149.8	181.5	260.2	322.0	375.7
	kCal/h	49880	59942	71122	105952	128828	156090	215172	276920	323102
Compressor	Model	SRM-12S	SRM-12M	SRM-12L	SRM-16S	SRM-16M	SRM-16L	SRM-20S	SRM-20M	SRM-20L
	Theoretical displacement m³/h	215	262	310	435	544	652	850	1100	1270
Capacity control	Capacity control	Stepless adjustment: 10 ~100%								
	Start method	Y/Δ								
Main motor	Power kW	55	75	75	90	110	132	160	200	220
	Power supply	380V/50Hz/3P								
Oil pump motor	Power kW	0.75								
	Power supply	380V/50Hz/3P								
Economic device	Form	Tube-shall type or plate type								
	Import and export	25	25	25	32	38	38	45	57	57
Outline dimension	L mm	3300	3300	3300	3760	3760	3760	4580	4580	4580
	W mm	1200	1200	1200	1300	1300	1300	1600	1600	1600
	H mm	1800	1800	1800	1860	1860	1860	2570	2570	2570
	A mm	900	900	900	1000	1000	1000	1400	1400	1400
	A0 mm	850	850	850	1250	1250	1250	1350	1350	1350
	A1 mm	2800	2800	2800	3400	3400	3400	4300	4300	4300
	B mm	1120	1120	1120	1220	1220	1220	1340	1340	1340
Installation dimensions	B1 mm	1200	1200	1200	1300	1300	1300	1400	1400	1400
	do mm	22	22	22	24	24	24	24	24	24
Unit weight	Net weight kg	2940	2940	2940	3800	3800	3800	6500	6500	6500
	Operational weight kg	3160	3160	3160	4050	4050	4050	6800	6800	6800

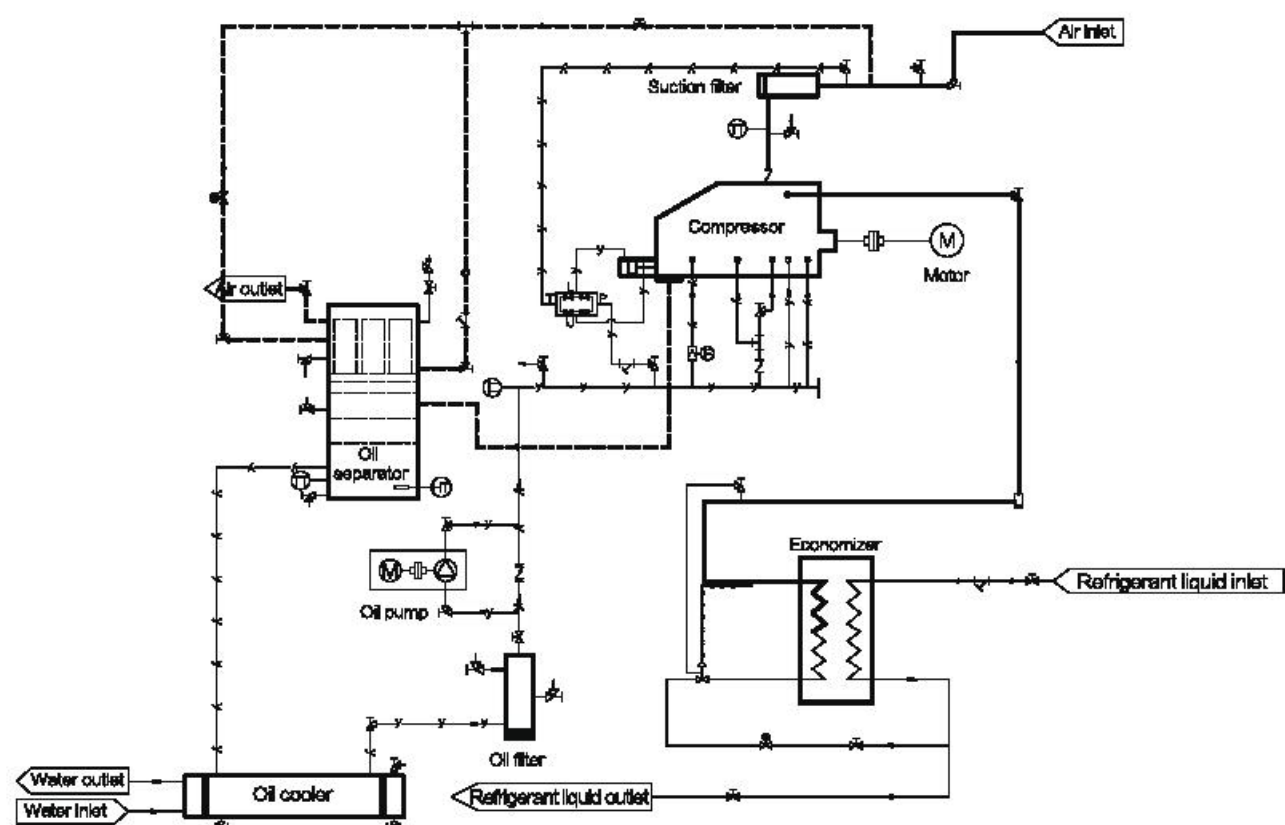
Notes:1. Fluctuation range of voltage: ±10%;
2. The inlet and out of oil cooling are connected by flanges. Details should be given in the order if other connections are required;
3. Due to technology improvement, the parameters, overall dimension and weight of the units may differs, and the actual design shall prevail;
4. If technical parameters of other refrigerant units are required, please contact with our company;
5. The units mentioned above are the standard ones which can be specially designed based on user' s requirements.

Low-temperature open-type marine single machine two-stage screw compressor unit (R22)

Models		CSNF1612MS-VABFLA	CSNF1612LS-VABFLA	CSNF1612LL-VABFLA	CSNF2016MS-VABFLA	CSNF2016L-SVABFLA
Refrigeration power in nominal working conditions	kW	152.6	182.5	185.2	321.9	370.9
	kCal/h	131236	156950	159272	278834	318974
Compressor	Model	SRM-1612MS	SRM-1612LS	SRM-1612LL	SRM-2016MS	SRM-2016LS
	Theoretical displacement m³/h	544	652	652	1100	1270
Capacity control	Capacity control	Stepless adjustment: 10 ~100%				
	Start method	Y/Δ				
Main motor	Power kW	110	110	110	200	200
	Power supply	380V/50Hz/3P				
Oil pump motor	Power kW	0.75				
	Power supply	380V/50Hz/3P				
Economic device	Form	Tube-shall type or plate type				
	Import and export	38	38	38	57	57
Outline dimension	L mm	4250	4250	4250	4930	4930
	W mm	1900	1900	1900	1600	1600
	H mm	1860	1860	1860	2570	2570
	A mm	1200	1200	1200	1600	1600
	A0 mm	1250	1250	1250	1450	1450
	A1 mm	3800	3800	3800	4800	4800
	B mm	1220	1220	1220	1340	1340
Installation dimensions	B1 mm	1300	1300	1300	1400	1400
	do mm	24	24	24	24	24
Unit weight	Net weight kg	4200	4200	4200	6720	6720
	Operational weight kg	4450	4450	4450	7100	7100

Notes:1. Fluctuation range of voltage: ±10%;
2. The inlet and out of oil cooling are connected by flanges. Details should be given in the order if other connections are required;
3. Due to technology improvement, the parameters, overall dimension and weight of the units may differs, and the actual design shall prevail;
4. If technical parameters of other refrigerant units are required, please contact with our company;
5. The units mentioned above are the standard ones which can be specially designed based on user' s requirements.

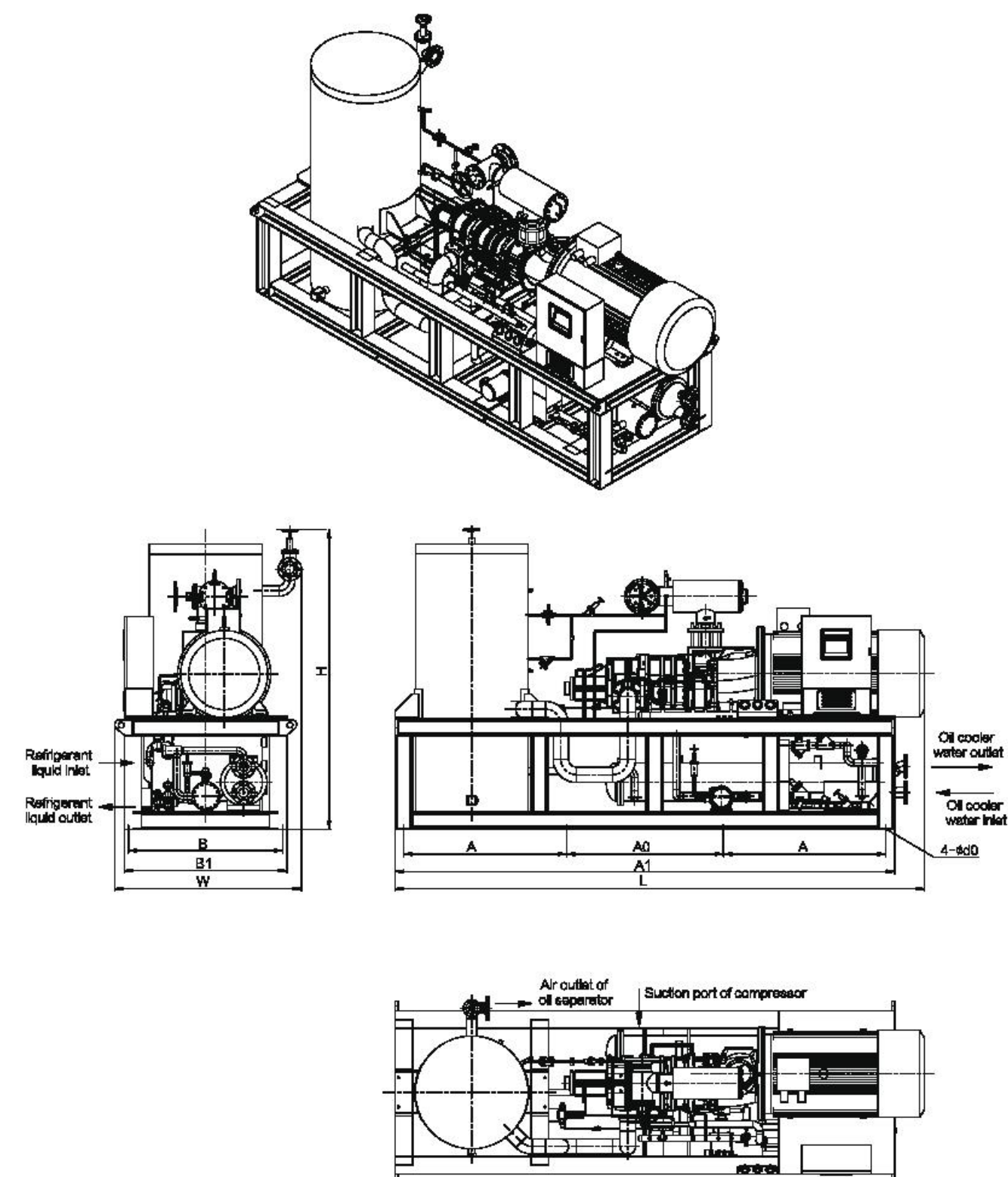
System diagram of typical marine unit



Symbol

Return pipe	Angle valve	Pressure transmitter	Throughway Valve
Liquid supply pipe	Direct check valve	Direct stop check valve	Filter
Discharge pipe	Heater	Sight glass	T-type filter
Refrigeration oil system pipeline	Angled stop check valve	Solenoid valve	Temperature sensor
	Y-type filter	Safety valve	Flow switch

Outline drawing of typical marine unit





Offshore fishing vessel



Deep-sea fishing vessel



Fish preservation



Quick freezing for tuna



Storage and transportation of
liquefied natural gas



Shipboard food cold storage



Refrigerated transportation of goods



Military naval vessel