ATLAS COPCO MARINE AIR SOLUTIONS

Setting the standard in marine compressed air

www.atlascopco.com/marine

TABLE OF CONTENTS

GLOBAL SOLUTIONS FOR SUSTAINABLE PRODUCTIVITY

Atlas Copco is a world leader in solutions that generate sustainable productivity in your industrial applications. Built with more than 135 years of experience and know-how, our products and services range from compressed air and gas equipment, generators, construction and mining equipment, industrial tools and assembly systems to all related parts and services, including industrial rental services.

What sets Atlas Copco apart as a company? Above all, it is our conviction that our own success is directly linked to the success of our customers. This is why we always go the extra mile to provide the best possible know-how and technology to help our customers grow, produce and succeed. There is a unique way to achieve this goal – we simply call it The Atlas Copco Way. It is based on our company values: constant innovation and interaction with our customers, plus a commitment to the highest standards in safety, quality and efficiency. These values are the foundation that helps us achieve sustainable productivity for our customers – and for the environment.

> *"Atlas Copco has been a world-leading provider of productivity solutions for more than a century."*

Benefits of working with Atlas Copco:

- World-leading player in air/gas compression and purification
- More than 135 years of experience
- Presence in more than 170 countries
- Extensive global service network with highly trained personnel
- No compromises on component quality
- Complete range of solutions and services
- One designer, one supplier for all products

SETTING THE STANDARD IN MARINE COMPRESSED AIR

With a comprehensive product offering, Atlas Copco is a trusted partner in the marine industry. We provide reliable equipment for many challenging applications along the entire marine value chain. We know our business – and we know yours. When we work with our customers, we have one goal in mind: sustainable productivity.

Based on our company's early roots in compressor techniques, we have built our expertise and expanded our portfolio over decades of research & development and customer interaction. We have grown to become a premier, reliable end-to-end partner in the marine industry.

Close to the customer

Atlas Copco has designed a wide range of standard marine products to create a compressed air system for your specific needs. Our Marine Air System compressors offer our customers industry-leading performance and premium energy savings throughout the compressor's lifetime.

Integration of components such as refrigeration air dryers or filters ensures maximum performance with the smallest possible footprint.

Moreover, our Marine Competence Center can design special products in line with additional customer specifications.

We have experience with all relevant marine standards. Our equipment is type approved, designed and built in accordance with well known classification societies and complies with ISO 1217 standards.

Rounding out this offering are our state-of-the-art control and monitoring systems which ensure optimum performance and low cost of ownership.

LLOYD'S REGISTER · LRQA

ISO 9001 · ISO 14001
OHSAS 18001
ISO 22000

An energy-efficient solution for any marine application

Atlas Copco offers the following equipment for the marine industry:

- Starting air
- Oil-injected and oil-free compressors
  - Working air
  - Control air
  - Instrument air
  - Bulk handling
  - Feed air (N2-generator)
  - Exhaust gas treatment
  - Low pressure air for de-blasting semi sub & sewage treatment and hull air lubricating system
- Seismic survey HP compressors
- Centrifugal air and gas compressors
- Nitrogen for dual fuel systems including booster units up to 350 bar
- Nitrogen as inert gas for blanketing and flushing pipes, tanks and insulation
- Air treatment
  - Starting air receivers
  - Working air receivers
  - Air dryers
  - Air filters
  - Condensate treatment
- Pneumatic tools and pumps
- Atlas Copco Global Parts and Services
- Atlas Copco Global Temporarily Rental Solutions for air, nitrogen and electric power

AIR-COOLED STARTING AIR COMPRESSORS

Lubricated Reciprocating Compressors

Atlas Copco's air-cooled starting air compressors excel in a proven aluminium design, enjoy the approval of all major classification societies and have been installed at a multitude of satisfied customers.

The aluminium design makes sure the compressors are very lightweight, well balanced and provide excellent heat transfer to the ambient. Since the warm-up time is only 6 minutes compared to 20 minutes for steel blocks, the compressors experience no issues with condensation in the oil. In addition, Atlas Copco can also guarantee that the temperature of the compressed air will stay well below the maximum temperature as required by classification societies.

The compressors are delivered standard with re-silent chocks, pressure switches and in case required, oil level and temperature switches. Also the drain valve and built-on stainless steel water separator with non-return valve are included. The compressor has an excellent splash lubricating system that sufficiently lubricates all needle and roller bearings under harsh environment conditions and rolling of the vessel. Due to its special designed oil breather, no dirty oil flumes will be entering the ambient ensuring the lowest lub oil consumption compared with competitors in the market.

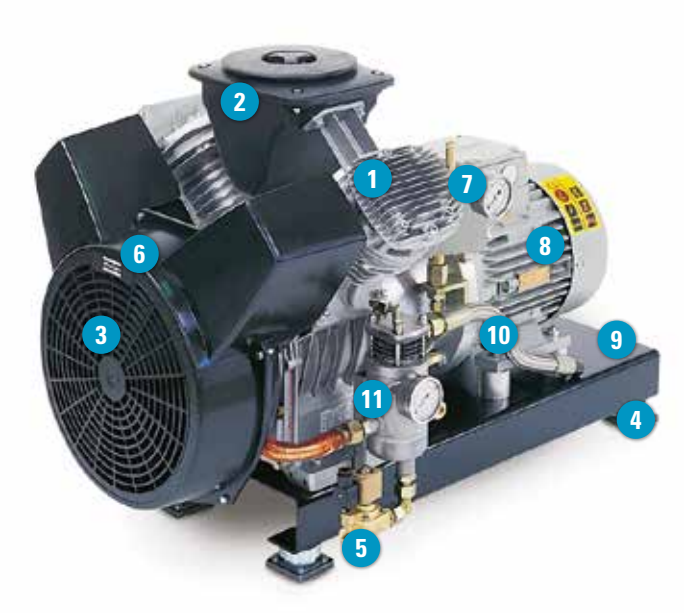
The oversized marine motor is equipped with pre-loaded bearings and coupled directly via a flex coupling to the compressor. It can be delivered with starter boxes including all available options and with DOL or Y-D starting method, as well as in electrically and diesel driven version, with custom made skids, special colors... whatever is required.

These compressors are tested for 22.5 rolling in all directions. As a result they provide proven durability at fishing and platform supply vessels in a very harsh environment.

Your benefits

- **Optimizing efficiency**
  - High quality components ensure trouble-free operation.
- **Flexible installation and operation**
  - The LT is delivered to site fully equipped and ready for efficient operation.
  - Easy installation on re-silent anti-vibration mountings.
  - Oil change and valve condition check is only required once a year or every 3,000 hours.
- **Saving space**
  - Compact (and lightweight) design through the use of aluminium.
  - Direct driven.
- **Ease of operation**
  - Instant availability of pressures ranging from 10 to 30 bar.
- **Enduring performance**
  - IP 55 marine electric motor suitable for high ambient temperatures.
  - Built according to all classified marine notified bodies.
  - Many proven design features are incorporated, including V-design and lightweight materials for low vibration and optimal heat dissipation, to provide a long lifetime of operation.
  - Flexi-disc valve system with non-corroding flexible inlet and outlet valve plates of high quality stainless steel increase performance and valve life.
- **Low cost of ownership**
  - Limited number of parts.
  - Long maintenance intervals.
  - All components and service points are easily accessible: dismantling valves takes only a few minutes.
  - No electronic temperature and pressure sensors: all readable on the compressor.

Air-cooled Piston Compressors LT 3-20 (30 bar)



1. Full aluminium block, excellent heat transfer
2. Air inlet with dry-type replaceable filter element
3. High volume fan for cooling
4. Re-silent chocks with welding or bolted plates
5. Solenoid valve for auto drain and unloaded start/stop
6. Excellently balanced by V-shape design
7. Glycerin filled pressure gauge
8. Direct coupled motor with pre-loaded bearings
9. Pressure switch
10. Flexible hose for compressed air out
11. High pressure stainless steel water separator with integrated check valve

Options

- Master/slave switch
- Electric cubicle
- Anti-condensation heater e-motor
- Oil level switch
- Amp meter
- Remote control

Electrically Driven Compressors

Technical specifications

Nominal working pressure	30 bar
Revolutions	1500 rpm (50 Hz) and 1800 rpm (60 Hz)
Sound level unsilenced	79-88 dB(A)
Sound level silenced version	63-68 dB(A)
Ambient temperature	55°C
Two cylinder-two stage air-cooled version	

Type	FAD*	Charging capacity**	Power	Dimensions			Weight
	m³/h	m³/h	kW	L (mm)	W (mm)	H (mm)	kg
50 Hz							
LT 3-30 KE	9.10	10.5	3	827	553	620	94
LT 5-30 KE	15.80	19.5	4	827	553	620	115
LT 7-30 KE	23.40	26.5	5.5	1016	619	699	152
LT 10-30 KE	30.60	33	7.5	1016	619	699	166
LT 15-30 KE	33.40	43.5	11	1268	682	815	260
LT 20-30 KE	61.20	71	15	1268	682	815	290
60 Hz							
LT 3-30 KE	11.17	13	3.4	827	553	620	94
LT 5-30 KE	19.80	24.5	4.6	827	553	620	115
LT 7-30 KE	28.80	32.5	6.3	1016	619	699	152
LT 15-30 KE	39.90	51.5	12.5	1268	682	815	260
LT 20-30 KE	70.90	82	17.3	1268	682	815	290

** According to ISO 1217, latest edition.*
*** In accordance with shipbuilding regulations. For further information, please refer to page 82.*

Diesel Driven Compressors

Technical specifications

Nominal working pressure	30 bar
Revolutions	1800 rpm
Ambient temperature	55°C
Starting method	Electric, recoil, crank or spring well starting
Two cylinder-two stage air-cooled version	
Diesel engine standard Hatz	

Type	FAD*	Charging capacity**	Shaft power	Installed power	Installed engine	Dimensions			Weight
	m³/h	m³/h	kW	kW	HATZ	L (mm)	W (mm)	H (mm)	kg
Diesel driven									
LT 3-30 Khe or KHh	11.17	13	3.4	3.4	1 B20-6	1000	420	620	150
LT 5-30 Khe or KHh	19.80	24.5	4.6	6.8	1D 81 Z	940	700	620	200
LT 7-30 Khe or KHh	28.80	32.5	6.3	7.6	1D 90 Z	940	778	699	230
LT 15-30 Khe or KHh	39.90	51.5	12.5	18.9	2 M 41	1250	778	1050	460
LT 20-30 Khe or KHh	70.90	82	17.3	18.9	2 M 41	1250	778	1050	490

** According to ISO 1217, latest edition.*
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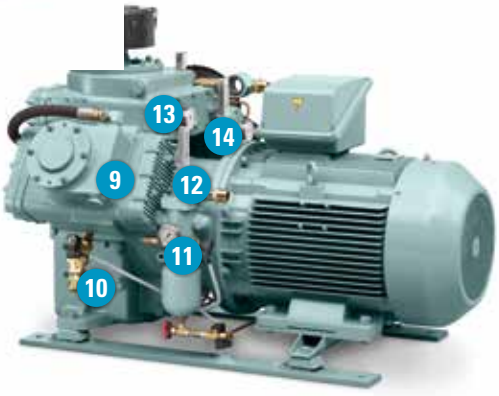
WATER-COOLED PISTON COMPRESSORS LT 25-125 (30 BAR)

Atlas Copco has developed a new range of water-cooled piston compressors for starting air together with Bumhan Korea. With capacities up to 90 kW, Atlas Copco can now offer starting air compressors for any marine application. The new LT KE starting air compressors are made of cast iron and have capacities from 25 to 125 hp. They withstand ambient temperatures up to 60°C, which makes them ideal for the engine room. They also have a small footprint while offering extended maintenance intervals and low running costs.

Your benefits

- **Efficiency and reliability**
  - Forced air flow around crankcase reduces condensate to zero and extends bearing life. The minimum running time is 12 minutes, compared to 20 minutes for other compressors.
  - Suitable for seawater and fresh water at ambient temperatures up to 60°C.
- **Low cost of ownership**
  - Limited number of parts.
  - Long maintenance intervals.
  - All components and service points are easily accessible.
  - Dismantling valves takes only a few minutes.
  - No electronic temperature and pressure sensors – all readable on compressor.
- **Low running costs**
  - Highly durable components extend compressor lifetime.
  - Synthetic oil used as standard.
  - Low oil consumption: less than 0.2 g/kW/hr.
- **Easy installation**
  - Small footprint.
  - Supplied with baseplate and delivered as plug-and-play unit for quick installation.
  - No need for canopy.
- **Quiet operation**
  - Silencing intake guarantees low noise levels: max. 91 dB(A) depending on the type.
  - V-type construction ensures low vibration: less than 14 mm/sec.
  - Sound muffler on condensate drain as standard.

LT KE water-cooled piston compressors for starting air (18.5-90 kW / 25-125 hp)



1. Marine e-motor with flex coupling
2. Sound muffler on drain collector for low noise levels
3. Junction box for easy installation
4. Auto drain valves on first and second stages as well as unloaded start
5. Internal crankcase ventilation chamber avoids oil fumes venting to ambient air
6. Water-cooled air coolers
7. Air inlet with replaceable filter element
8. Cooling water flow indicator
9. Standard cooling water hoses
10. Cooling water inlet solenoid valve to avoid condensation
11. Built-in oil-water separator
12. Air outlet with standard non-return valve
13. Glycerine-filled pressure gauges on every stage
14. Temperature gauges fitted where you need them, to give you full control and overview

Technical specifications

Type	FAD*	Charging capacity**	Frequency	Power	
	m³/h	m³/h	Hz	kW	hp
LT 25-30 KE	55	60	60	15	20
	69	75	50	18.5	25
	83	90	60	22	30
LT 30-30 KE	74	80	60	18.5	25
	92	100	50	22	30
	111	120	60	30	40
LT 35-30 KE	92	100	60	22	30
	115	125	50	30	40
	139	150	60	30	40
LT 40-30 KE	106	115	60	30	40
	134	145	50	37	50
	162	175	60	37	50
LT 50-30 KE	134	145	60	30	40
	166	180	50	37	50
	204	220	60	45	60
LT 60-30 KE	162	175	60	37	50
	204	220	50	45	60
	241	260	60	55	75
LT 100-30 KE	268	290	60	55	75
	333	360	50	75	100
	398	430	60	90	125
LT 125-30 KE	315	340	60	75	90
	398	430	50	90	125

** Measured according to ISO 1217, Annex C, latest edition.*
*** In accordance with shipbuilding regulations. For further information, please refer to page 82.*

Reference conditions:
- Absolute inlet pressure: 1 bar(a), 14.5 psig.
- Intake air and coolant temperature: 20°C.

Scope of supply

- Certification
- Cooling water shut off solenoid valve
- Non-return valve
- Auto drain valves
- Oil-water separator
- e-motor IP55
- Re-silent chocks
- Flanged connections
- Synthetic oil
- Approval drawings
- Spare parts & instruction manual

Type	Motor speed	Cooling water flow	Heat dissapation	Dimensions			Weight	
	rpm	l/min	kcal/h	L (mm)	W (mm)	H (mm)	kg	lbs
LT 25-30 KE	1170	17	8800	1228	794	785	570	1257
	1470	21	11050	1228	794	785	570	1257
	1770	25	13310	1228	794	785	570	1257
LT 30-30 KE	1170	22	11720	1296	794	785	570	1257
	1470	28	14730	1296	794	785	570	1257
	1770	33	17730	1296	794	785	570	1257
LT 35-30 KE	1170	22	11720	1296	794	785	890	1962
	1470	28	14730	1296	794	785	890	1962
	1770	33	17730	1296	794	785	890	1962
LT 40-30 KE	1170	31	16560	1364	1027	892	890	1962
	1470	39	20950	1364	1027	892	890	1962
	1770	47	25410	1364	1027	892	890	1962
LT 50-30 KE	1170	38	20500	1364	1041	899	890	1962
	1470	48	25940	1364	1041	899	890	1962
	1770	58	31460	1364	1041	899	890	1962
LT 60-30 KE	1170	45	24440	1386	1041	899	890	1962
	1470	57	30930	1386	1041	899	940	2072
	1770	69	37510	1386	1041	899	940	2072
LT 100-30 KE	1170	72	38780	1553	1190	1066	1380	3042
	1470	89	48390	1553	1190	1066	1380	3042
	1770	108	58660	1553	1190	1066	1380	3042
LT 125-30 KE	1170	84	45620	1591	1190	1066	1380	3042
	1470	106	57700	1591	1190	1066	1450	3197

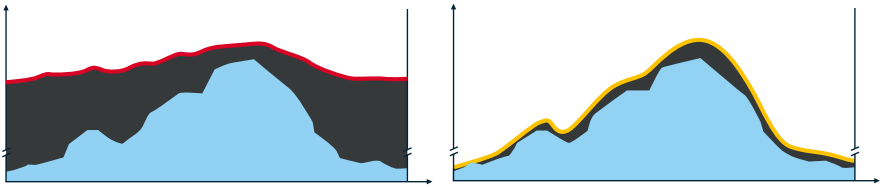
Options

- Starter box IP54, Y/D
- Cooling water pump
- Seawater cooling
- Pressure switches
- Spare parts kit

WORKING, CONTROL & INSTRUMENT AIR COMPRESSORS

Variable Speed Drive Units (VSD)

Energy can represent over 70% of a compressor's lifecycle costs (LCC). Most applications have a fluctuating air demand depending on the time of day, week, or even months per year. Atlas Copco's Variable Speed Drive (VSD) technology mirrors air usage – automatically adjusting the motor speed depending on demand. With VSD technology, Atlas Copco has made major energy cost savings a reality, while helping to protect the environment for future generations.



Atlas Copco pioneered the VSD concept early 90's and has extended the VSD range ever since. The use of VSD driven machines can result in energy savings up to 40% considering the typical air demand on board of ships, in view of the total running hours.

MAS+ VSD reduces energy costs by:

- Eliminating the inefficient transition period from full to no load power.
- Avoiding excessive off-load power consumption.
- Maintaining the net pressure band to within 0.10 bar, 1.5 psi.
- Reducing overall average working pressure.
- Minimizing system leakage due to lower system pressure.
- Offering flexible pressure selection from 4 to 13 bar with electronic gearing to ensure lowered fuel costs.
- Increasing flexibility with gradual motor ramp-up to avoid electricity surges (less genset load).

Unique value proposition

Atlas Copco is committed to developing a highly efficient screw element for each MAS generation. Developed from extensive R&D by dedicated Atlas Copco engineers, the latest version of the patented oil-injected rotary screw element provides unrivaled efficiency and reliability.

The MAS+ VSD adapts to the flow and controls your costs:

- The electric motor, which is specifically designed for VSD operation (inverter duty motor), thus enables the compressor to start under full load, thereby overcoming additional required torque.
- The motor bearings are protected against induced bearing current, thus increasing reliability.
- The Elektronikon® Graphic controls the compressor with feedback from the integrated converter, thus ensuring maximum efficiency and complete protection of the compressor.
- High operating speed range allowing further reduced operating costs.
- EMC filter and overvoltage protection included as standard.

Variable Speed Drive+ Units (VSD+)

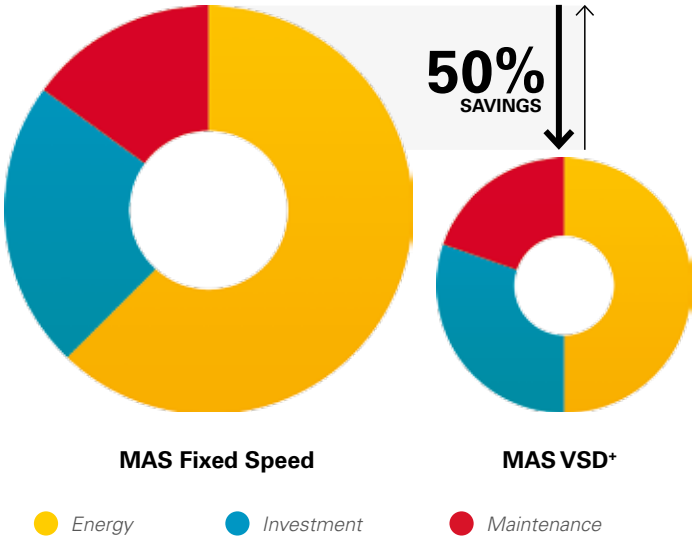
Atlas Copco's Variable Speed Drive+ (VSD+) technology closely matches the air demand by automatically adjusting the motor speed. Combined with the innovative design of the iPM (interior Permanent Magnet) motor, this results in average energy savings of 50% and an average cut of 37% in the lifecycle cost of a compressor. VSD+ works with in-house designed magnet motors.

Why Atlas Copco Variable Speed Drive+ technology?

- On average 20% lower Specific Energy Requirement (SER) than the current MAS VSD models.
- Integrated Elektronikon® Graphic controller controls the motor speed and high efficiency frequency inverter.
- No wasted idling times or blow-off losses during operation.
- Compressor can start/stop under full system pressure without the need to unload with special VSD+ motor.
- Eliminates peak current penalty during start-up.
- Minimizes system leakage due to a lower system pressure.
- EMC Compliance to directives (2004/108/EG).

VSD+ for 50% average energy savings

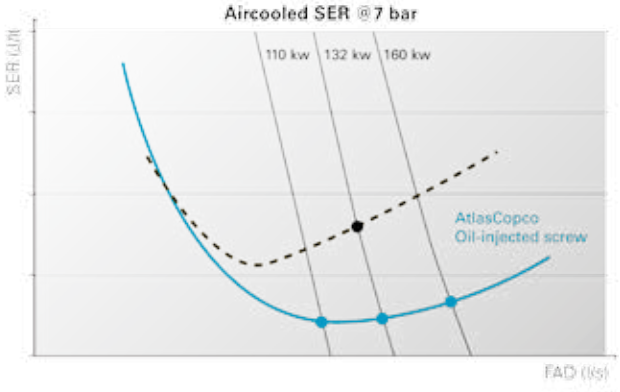
- On average 20% lower Specific Energy Requirement (SER) than the current MAS VSD models. Eco-efficient VSD+ reduces energy consumption by on average 50% compared to the current idling models.
- On top of energy savings, Free Air Delivery (FAD) increase of up to 12% over the range.
- Efficient fan motor (ERP 2015) reduces electricity consumption and noise levels.
- Highest motor efficiency (iPM), outperforming IE3 efficiency levels.



Oil-injected Screw Compressors

Atlas Copco has a complete range of screw compressors at your service. With only 7 sizes we cover a range of approximately 50 to 2800 m³/h. Based on experience in the most severe industrial applications, there's no question that these fully packaged units are up for the job. Knowing that the cost of a ship can be up to some millions USD, would you compromise on quality when there's an Atlas Copco solution available for your needs?

These compressors come with a high performing screw element*. The 4/6 lobe combination reduces axial thrust loads and leakages compared to conventional 5/6 combinations. The IP 55 main drive motor is fitted with a gearbox from 11 kW onwards, enabling the use of smaller bearings. This means less mechanical losses, not to mention optimum energy efficiency compared to belt driven units.



- *Only one working point per element.*
- *Gearbox allows to use the same element on multiple working points in the elements optimal working range.*

Through extensive testing on core components like the oil separator, oil filter, coolers and electric cubicle, our machines are ready to tackle extreme duties as a daily challenge, hereby securing long service internals at minimum cost. All of this is of course fully tested according ISO1217, supplied with class certification upon request.

** Atlas Copco designs and produces these elements 100% in their own high tech production facility, today still the biggest element production site worldwide.*

Marine Air Systems (MAS) Compressors

MAS compressors are specifically designed for the harsh environments on board marine and offshore applications. They can be delivered as **air-cooled, water-cooled or energy recovery version**.
The compressors are standard equipped with a tropical thermostat or in case of air-cooled versions with a fan saver cycle, to keep the oil temperature high in order to avoid condensation. All compressors can be delivered with **Inventory Hazardous Material information (Green passport)**.
Whereas the MAS version does not have approvals, the MAS+ has all available approvals.
The screw elements and oil separator are highly efficient. As a result, the compressed air only has 2-3 ppm oil carry-over at maximum flow and pressure. The compressor is designed for **55°C ambient temperature**, while 45°C can be delivered upon request.
The controller has voltage-free contacts for alarms and read-out and a remote control is standard foreseen. Due to the **state-of-the-art element and sophisticated control and monitoring**, the compressors have the highest efficiency in the market. All compressors can be equipped with a built-in air dryer with or without by-pass fitted.

	MAS	MAS+	VSD+
ISO 8573 Class 1 filter kit*	•	•	•
ISO 8573 Class 2 filter kit*	•	•	•
Dryer by-pass*	•	•	•
Modulating control	•	•	-
Lifting device (sales version only)	•	•	-
Marine motor	-	✓	-
Permanent magnet motor	-	-	✓
Drive motor space heaters and thermistor protection	-	✓	✓
Phase sequence relay	•	•	-
Main power switch	•	✓	✓
Remote control	•	✓	✓
Voltage free contacts	•	✓	✓
Water cooling	✓	✓	-
Seawater cooling	-	•	-
Amp meter	-	✓	-
Approvals of major classification societies	-	•	✓
Flanged in/outlet	•	•	•
Customised cable glands	•	•	•
Controller with DSS function	✓	✓	✓
Ambient 55°C	✓	✓	✓
Tropical thermostat	✓	✓	-
Halogen free cabling	-	✓	✓
Flame retardant cabling	-	✓	✓
Doorstopper	✓	✓	-
Star-delta start	✓	✓	-
VSD (Variable Speed Drive)	•	•	✓
400/440/690 V	✓	✓	✓
Re-silent chocks	✓	✓	✓

** Full feature versions only.* ✓*: Standard* •*: Optional* *- : Not available*

Oil-injected Screw Compressors

MAS 5-90 (5-90 kW)

Derived from the premium GA range these units are not only fully equipped, but feature a patented oil filter, integrated refrigerant dryer (option) and sophisticated controller algorithms to complete these state-of-the-art compressors and ensure **quick and easy installation**.

While minimising operational losses via an optimum oil vessel design, the oil temperature is maintained above condensation level for **ideal lubrication and optimum lifetime**.

From 30 kW onwards, freshwater cooling is available to remove the compressor heat. Smaller units have a brazed plate cooler whereas from 110 kW tube stack coolers are used. By adjusting the cooling flow, the air outlet temperature can remain within requested limits, providing **ideal approach temperature for downstream equipment** like dryers, inert gas generators, etc. Expensive outlet ducting can be avoided.

As the unit is supplied with a 3.5" graphic Elektronikon®, all pressure and temperature measurements can be monitored.

- Premium MAS quality
- Longest service intervals
- Coated coolers
- Quick & easy installation
- Narrow band pressure regulating at the package discharge
- Integrated water separator & electronic drains
- VSD is available as from MAS 22+
- VSD+ is available as from MAS 7 VSD+

Technical specifications

Type	kW	Outlet air temperature				Weight	Dimensions		
		Air-cooled		Water-cooled		Air-cooled/water-cooled			
		Without dryer (P)	With dryer	Without dryer (P)	With dryer	P/ kg	L (mm)	W (mm)	H (mm)
MAS 5	5	a+10°C	a+5°C	N/A	N/A	260/300	1145	710	1240
MAS 7	7	a+10°C	a+5°C	N/A	N/A	270/315	1145	710	1240
MAS 11	11	a+10°C	a+5°C	N/A	N/A	300/345	1145	710	1240
MAS 11+	11	a+5°C	a+1°C	N/A	N/A	410/456	1255	692	1475
MAS 15+	15	a+5°C	a+1°C	N/A	N/A	420/470	1255	692	1475
MAS 18+	18.5	a+5°C	a+1°C	N/A	N/A	440/501	1255	692	1475
MAS 22+	22	a+5°C	a+1°C	N/A	N/A	455/523	1255	692	1475
MAS 30+	30	a+10°C	a+5°C	cwt+5°C	a+5°C	780/855	1395	865	1625
MAS 37	37	a+10°C	a+5°C	cwt+5°C	a+5°C	787/862	1395	865	1625
MAS 45	45	a+10°C	a+5°C	cwt+5°C	a+5°C	821/896	1395	865	1625
MAS 55	55	a+10°C	a+5°C	cwt+5°C	a+5°C	1145/1305	2040	970	1802
MAS 75	75	a+10°C	a+5°C	cwt+5°C	a+5°C	1500/1650	2040	970	1802
MAS 90	90	a+10°C	a+5°C	cwt+5°C	a+5°C	1580/1730	2290	1080	1960

ER (energy recovery) data is identical to air-cooled unless specified.
Water-cooled calculated with inlet cwt of 36°C.

a = ambient temp, cwt = cooling water temperature, P = Pack.
MAS 5-11 also available as tank-mounted version.

MAS 11⁺-22⁺

MAS 5-11

MAS 5-11

MAS 90

MAS 30⁺-45

Technical specifications

FAD* 50 Hz m³/h				FAD* 60 Hz m³/h				Sound level	Heat dissipation	Cooling	
										Water flow ER	Water-cooled
7.5 bar	8.5 bar	10 bar	13 bar	7.4 bar	9.1 bar	10.8 bar	12.5 bar	dB(A)	kW	l/min	
48	43	37	28	49	43	36	30	60	5.5	2.5	N/A
69	63	58	45	70	61	57	44	61	8	3.5	N/A
94	86	79	70	94	86	77	66	62	10.5	5.5	N/A
117	109	94	-	114	105	93	-	63	12	5.5	N/A
150	139	127	106	155	132	123	107	64	15	7.5	N/A
184	174	156	125	190	168	154	129	66	18.5	9.3	N/A
207	206	183	153	224	203	181	165	67	22	11.1	N/A
321	289	269	229	325	288	262	239	65	32	N/A	32
371	342	326	259	385	344	320	284	69	40	N/A	39
443	409	393	335	465	414	379	340	72	49	N/A	47
522	503	477	405	554	494	452	411	69	59	N/A	67
737	657	584	507	705	656	600	542	73	81	N/A	91
-	-	-	-	865	795	717	692	74	97	N/A	100

ER (energy recovery) data is identical to air-cooled unless specified.
Water-cooled calculated with inlet cwt of 36°C.
a = ambient temp, cwt = cooling water temperature,
P = Pack.
MAS 5-11 also available as tank-mounted version.
** According to ISO 1217, latest edition.*
Sound level acc. to ISO 2151.

MAS+ 55-90PP (55-90 kW/75-120 hp)

Your benefits

- **Saving space**
  - Highly compact design (footprint reduced by 37%) allows for greater flexibility and ease of installation.
- **Optimizing efficiency**
  - High-quality components ensure troublefree operation.
  - Elektronikon® Graphic allows energy-saving functions such as dual pressure band.
- **Flexible installation and operation**
  - Delivered to site fully equipped and ready for efficient operation.
- **Ease of operation**
  - Instant availability of pressures ranging from 7.5 to 13 bar.
- **Enduring performance**
  - High ambient version as standard, for temperatures up to 55°C / 131°F.
  - Built according to all classified marine notified bodies.
  - Ampere meter, anti-condensation heaters, thermistors, main switch and marine-approved wiring and motor (installed as standard).
  - Preventive maintenance kits enhance reliable operation, long life and efficient service.

Technical specifications (50 Hz versions)

Type	kW	Outlet air temperature				Weight	Dimensions		
		Air-cooled	Air-cooled	Water-cooled	Water-cooled	Water-cooled			
		Without dryer	With dryer	Without dryer	With dryer	P/ kg	L (mm)	W (mm)	H (mm)
MAS+ 55PP	55	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ 75PP	75	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ 90PP	90	N/A	N/A	cwt+7°C	N/A	980	1540	1000	1540
MAS+ 55PP[1]	55	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ 75PP[1]	75	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ 90PP[1]	90	N/A	N/A	cwt+7°C	N/A	980	1540	1000	1540

Type	kW	Free Air Delivery*				Sound level**	Heat dissipation	Cooling
		7.5 bar	8.5 bar	10 bar	13 bar			Water-cooled
		m³/h				dB(A)	kW	l/min
MAS+ 55PP	55	517	498	472	401	85	48	55
MAS+ 75PP	75	729	651	578	502	85	64	90
MAS+ 90PP	90	857	857	770	646	85	80	90
MAS+ 55PP[1]	55	582	545	509	435	85	48	55
MAS+ 75PP[1]	75	760	720	652	561	85	64	90
MAS+ 90PP[1]	90	967	945	859	755	85	80	90

[1] *Max. ambient temperature 46°C.*

Technical specifications (60 Hz versions)

Type	kW	Outlet air temperature				Weight	Dimensions		
		Air-cooled	Air-cooled	Water-cooled	Water-cooled	Air-cooled/ Water-cooled			
		Without dryer	With dryer	Without dryer	With dryer	P/ kg	L (mm)	W (mm)	H (mm)
MAS+ 55PP	55	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ 75PP	75	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ 90PP	90	N/A	N/A	cwt+7°C	N/A	980	1540	1000	1540
MAS+ 55PP[1]	55	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ 75PP[1]	75	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ 90PP[1]	90	N/A	N/A	cwt+7°C	N/A	980	1540	1000	1540

Type	kW	Free Air Delivery*				Sound level**	Heat dissipation	Cooling
		7.5 bar	8.5 bar	10 bar	13 bar			Water-cooled
		m³/h				dB(A)	kW	l/min
MAS+ 55PP	55	548	489	447	407	85	48	55
MAS+ 75PP	75	698	650	594	536	85	64	90
MAS+ 90PP	90	918	857	788	709	85	80	90
MAS+ 55PP[1]	55	599	531	487	444	85	48	55
MAS+ 75PP[1]	75	771	688	651	584	85	64	90
MAS+ 90PP[1]	90	996	917	860	789	85	80	90

1 Max. ambient temperature 46°C.
** Unit performance measured according to ISO 1217, latest edition.*
*** A-weighted emission sound pressure level at the work station, Lp WSA (re 20 µPa) dB (with uncertainty 3 dB). Values determined according to noise level test code ISO 2151 and noise measurement standard ISO 9614.*
Pressure dew point of integrated refrigerant dryer at reference conditions: 2°C to 3°C, 36°F to 37°F.

Reference conditions:
- *Absolute inlet pressure 1 bar (14.5 psi)*
- *Intake air temperature 20°C, 68°F*

FAD is measured at the following working pressures:
- *7.5 bar versions at 7 bar*
- *8.5 bar versions at 8 bar*
- *10 bar versions at 9.5 bar*
- *13 bar versions at 12.5 bar*

Type	kW	Outlet air temperature				FAD* 50/60 Hz m³/h				Weight air-cooled/ water-cooled	Dimensions		
		Air-cooled		Water-cooled									
		Without dryer (P)	With dryer	Without dryer (P)	With dryer	5.5 bar	7.5 bar	10 bar	13 bar	kg	L (mm)	W (mm)	H (mm)
MAS 7 VSD+	7	a+10°C	a+5°C	N/A	N/A	80	78	65	51	188/268	610/985	630	1420
MAS 11 VSD+	11	a+10°C	a+5°C	N/A	N/A	119	117	98	85	191/271	610/985	630	1420
MAS 15 VSD+	15	a+10°C	a+5°C	N/A	N/A	152	150	128	100	194/279	610/985	630	1420
MAS 18 VSD+	18	a+10°C	a+5°C	N/A	N/A	230	225	193	157	367/480	810/1260	780	1590
MAS 22 VSD+	22	a+10°C	a+5°C	N/A	N/A	277	270	235	195	363/485	810/1260	780	1590
MAS 26 VSD+	26	a+10°C	a+5°C	N/A	N/A	311	308	282	232	373/490	810/1261	780	1590
MAS 30 VSD+	30	a+10°C	a+5°C	N/A	N/A	353	351	308	260	376/500	810/1262	780	1590
MAS 37 VSD+	37	a+10°C	a+5°C	N/A	N/A	419	414	368	312	376/500	810/1263	780	1590

a = ambient temp
** According to ISO 1217, latest edition.*

MAS 110-160 (110-160 kW)

SMALLEST FOOTPRINT IN THE MARKET
THE MOST EFFICIENT COMPRESSOR IN THE MARKET

Your benefits

- **Optimized energy**
  - State-of-the-art screw element for highest energy savings.
  - Several starter types: Star/Delta, DOL and Soft Starter. VSD, diesel driven and hydraulically driven on request.
  - Air delivery mentioned is including oil separator, aftercooler and water separator.
- **Flexible installation and operation**
  - Flanged air and water connection, on the same side of the unit for easy installation.
  - Marine motor with reduced starting current, avoiding stress on generator system.
  - Elektronikon® regulation, ensuring reliable and safe operation.
  - Control panel including hour counter, amp read out at Elektronikon®, high-temperature outlet, motor overload, low cooling water, motor heating on (lamp), auto operation sign and general alarm.
  - 50 Hz units available as an option.
- **Economical space usage**
  - Small footprint (L x W x H): 3,000 x 799 x 1,850 mm.
  - All-in-one package: mounted on oil-containing frame, fully interconnected, no extra pipework, no coaming needed around compressor, can be fitted straight on frames or floorplate, bolted or welded.
  - Including oil and aftercooler, water separator, air inlet filter.
  - Without canopy, reducing equipment volume, easy access and only one side access possible.
- **Ease of operation**
  - Voltage free contacts to customer installation (open-closed): automatic operation, general warning, general shut-down, load-unload, motor running and local-remote.
  - Analog signals to customer installation (4-20 mA): all signals can be provided such as outlet pressure and motor current, temperature, etc.

Technical specifications

Drive	Direct driven working air compressor
Outlet air temperature	Cooling water temperature: +5°C
Cooling	Water-cooled (sea and fresh water)
Inlet temperature cw	32°C (seawater) and 36-40°C (fresh water)
Ambient temperature	45-55°C
Max. pressure	13.8 bar
Dimensions (L x W x H)	3000 x 799 x 1850 mm

Type	kW	Free Air Delivery* (m³/h)				Cooling water capacity	Weight
		6 bar	8.6 bar	10 bar	14 bar	l/s	kg
60 Hz version							
MAS 110	125	1260	1152	1036	868	3	1938
MAS 132	150	1465	1354	1242	1051	3	2073
MAS 160	185	1742	1541	1498	1292	4	2103

** According to ISO 1217, latest edition, with reference conditions: 20°C and 1 bar.*
*** The cooling water flow is given for FAD at 8.6 bar and ambient temperature of 45°C.*
The mentioned power is the installed motor power in kW.
50 Hz units are available upon request.

Options

- Modulating control
- Type of starters
- Sea or fresh water-cooled
- Munsell green color
- Material certificate
- Test certificate
- Witness performance test
- Galvanic barrier for motor current read-out
- Closed canopy available to reduce noise with 14 dB(A)

MAS 180-315 (180-315 kW)

SMALLEST FOOTPRINT IN THE MARKET

THE MOST EFFICIENT COMPRESSOR IN THE MARKET

Your benefits

- **Optimized energy**
  - State-of-the-art screw element for highest energy savings.
  - Several starter types: Star/Delta, DOL and Soft Starter. VSD, diesel driven and hydraulically driven on request.
  - Air delivery mentioned is including oil separator, aftercooler and water separator.
- **Flexible installation and operation**
  - Flanged air and water connection, on same side of unit for easy installation.
  - Marine motor with reduced starting current, avoiding stress on generator system.
  - Elektronikon® regulation, ensuring reliable and safe operation and including hour counter, amp read out on controller, high-temperature outlet, motor overload, low cooling water, motor heating on (lamp), auto operation sign and general alarm.
- **Economical space usage**
  - Small footprint.
  - Frame-mounted, fully interconnected, no extra pipework, can be fitted straight on frames or floorplate, bolted or welded.
  - All-in-one package including oil and aftercooler, water separator, heavy duty air inlet filter.
  - Without canopy, reducing equipment volume, easy access and only one side access possible.
- **Ease of operation**
  - Voltage free contacts to customer installation (open-closed): automatic operation, general warning, general shut-down, load-unload, motor running and local-remote.
  - Analog signals to customer installation (4-20 mA): all signals can be provided such as outlet pressure and motor current, temperature, etc.

Technical specifications

Drive	Direct driven working air compressor
Outlet air temperature	Cooling water temperature + 5°C
Cooling	Water-cooled (sea or fresh water)
Inlet temperature cooling water	32°C (seawater) and 36-40°C (fresh water)
Ambient temperature	55°C
Max. pressure	13.8 bar
Dimensions (L x W x H)	2500 x 1250 x 1954 mm

Type	kW	Free Air Delivery (m³/h)					Cooling water flow (m³/h)**	Weight
		6 bar	7.5 bar	8.6 bar	10.4 bar	13.8 bar	8.6 bar	kg
60 Hz*								
MAS 180	185	1999	1898	1753	1526	1336	17.3	2877
MAS 200	227	2350	2231	2126	1882	1663	21.2	3040
MAS 250	285	2473	2470	2466	2341	2075	25.6	3200
MAS 250 X	285	2541	2541	2541	-	-	28.8	3200
MAS 315	345	-	-	-	2422	2401	25.0	3350
MAS 315 X	345				2537	2523	37.2 (10.4 bar)	3350

** 50 Hz machines: on request.*
*** Cooling water capacity given by FAD with 8.6 bar.*

Option

- Closed canopy available to reduce noise with 14 dB(A)

Oil-free Piston Type Compressors

LF 2-20 (10 bar)

ALSO AVAILABLE IN OIL-FREE VERSION

Your benefits

- Because of their basic design, limited number of working parts and straightforward working principle, piston compressors are the best solution when compressed air is needed in harsh conditions.
- Simple maintenance, thanks to easily accessible parts for servicing.
- No need for special treatment (oil separation) nor oil filtering as there is no direct contact with oil.
- High reliability and increased lifetime due to limited risk of condensation formation as a result of the piston compressor's low mass.
- Piston compressors can operate in a very wide range of working pressures. Maximum working pressure for the Atlas Copco L series is 30 bar.
- LE is also available in the oil-free range, called Atlas Copco Oil-free piston LF-range.
- Especially for yachts and other applications a silenced version is available.

Technical specifications

Max. ambient temperature	45°C
Available in 400/3/50 and 460/3/60	
Aluminium housing	
Direct drive	
Standard unloader valve	
Can be used for vessel whistle according to Colreg regulations	
All LE are type approved by major classification societies	

Type	bar(e)	FAD*				Sound level dB(A)		Dimensions		
		50 Hz (1500 rpm)		60 Hz (1800 rpm)		Unsilenced	Silenced			
		m³/h	kW	m³/h	kW	50/60 Hz	50/60 Hz	L (mm)	W (mm)	H (mm)
LF 10 bar										
LF 2-10	10	12	1.5	14.04	1.88	78/80	63/65	640	610	740
LF 3-10	10	15.6	2.2	18.36	2.59	79/81	64/66	640	610	740
LF 5-10	10	30	4	34.92	4.62	79/81	64/66	640	610	740
LF 7-10	10	42	5.5	48.96	6.18	80/82	68/70	780	670	850
LF 10-10	10	56.4	7.5	65.52	8.6	81/81	68/69	780	670	850
LF 15-10	10	85.8	11	103.32	12.84	89/90	78/78	1230	860	1020
LF 20-10	10	114	15	133.92	17.4	88/89	76/78	1230	860	1020

** According to ISO 1217, Annex C latest edition.*

Class 0 Oil-free Air Compressors

The Only Environmentally Friendly and Safe Solution for Oil-free Applications

Oil-free compressed air is essential to smooth onboard operations. Onboard compressed air can be used for **sensitive equipment** or e**ssential instruments** where oil contamination could cause breakdowns. Oil-free compressors are also used on board in situations where the oil presence in sea and/or ballast water needs to be avoided, such as Ballast Water Treatment, emptying ballast tanks or air inside ballast tank for winterization or as air lubricating systems where air is used to lower the ship hull friction. In instrument air applications aboard gas tanker cargo systems and in general instrument air applications such as control panels, oil-free air is used to avoid contamination and create a safer vessel without oil or explosion hazards.

Oil and air filters lose their efficiency exponentially under higher ambient temperatures. Oil carry-over and high pressure drops will affect your downstream equipment and fuel consumption. Over-sizing filters increase investment and lifecycle cost. It is also a compromise – it will only partially overcome these problems since the pre-filtration is based on the speed of the compressed air inside the filter. Moreover, the concentration of oil vapors can be 4 times higher than oil aerosols, vapors which coalescing filtering cannot remove.

An oil-injected compressor simply cannot achieve a purity Class 0 according to ISO8573 ed. 2010, the latest norm which takes oil vapors into account. Therefore technical oil-free simply does not exist (please refer to the ISO classes table on page 83).

As the world's number one compressor manufacturer, **Atlas Copco offers both solutions; oil-free and oil-injected**. We are uniquely positioned to offer clients the compressor solutions best suited for their specific needs and we know that oil-free compressors are the only solution for oil-free applications.

TÜV certified our oil-free products by means of full flow method B1 testing in polluted operating environments, such as engine rooms, under nominal and worst case conditions.

With its range of state-of-the-art oil-free compressor technologies such as screw, tooth, centrifugal, reciprocating and scroll, Atlas Copco has the right solutions for your specific needs.

Read more at www.classzero.com

Scroll Type Compressors

SF 1-15

Your benefits

- Extremely low noise level
- 100% oil-free
- Compact yet service-friendly
- IP55 class F motor(s)

Technical specifications

Type 50/60 Hz	Max. working pressure		Capacity FAD*			Installed motor power		Noise level**	Dimensions (L x W x H)	Weight
	bar(e)	psig	l/s	m³/h	cfm	kW	hp	dB(A)	mm	kg
Skid versions										
SF 1	8	116	2.7	9.6	5.7	1.5	2	65	800 x 600 x 540 (Receiver mounted) 1267 x 600 x 1154	105
	10	145	2.1	7.1	4.4	1.5	2	65		105
SF 2	8	116	4.0	14.4	8.5	2.2	3	67		110
	10	145	3.4	12.0	7.2	2.2	3	67		110
SF 4	8	116	6.6	24.0	14.0	3.7	5	68		120
	10	145	5.6	18.0	11.9	3.7	5	68		120
Skid versions – duplex tank mounted										
SF 6T	8	116	10.6	38.4	22.5	5.9	8	72	2043 x 600 x 1154	365
	10	145	9.0	32.4	19.1	5.9	8	72		365
SF 8T	8	116	13.2	48.0	28.0	7.4	10	73		375
	10	145	11.2	40.2	23.7	7.4	10	73		375
Fully silenced – WorkPlace Air System™										
SF 1	8	116	2.7	9.6	5.7	1.5	2	53	590 x 600 x 850	97
	10	145	2.1	7.8	4.4	1.5	2	53		97
SF 2	8	116	4.0	14.4	8.5	2.2	3	55		97
	10	145	3.4	12.0	7.2	2.2	3	55		97
SF 4	8	116	6.6	24.0	14.0	3.7	5	57		102
	10	145	5.6	20.4	11.9	3.7	5	57		102
SF 6	8	116	10.4	37.2	22.0	5.9	8	63	1450 x 750 x 1040	340
	10	145	8.8	31.8	18.6	5.9	8	63		340
SF 8	8	116	13.4	48.0	28.4	7.4	10	63		345
	10	145	11.3	40.8	23.9	7.4	10	63		345
SF 11	8	116	20.2	72.6	42.8	11	15	63	1450 x 750 x 1844	480
	10	145	17.0	60	36.0	11	15	63		480
SF 15	8	116	26.4	94.8	55.0	15	20	63		560
	10	145	22.8	82.2	48.3	15	20	63		560

** According to ISO 1217, latest edition.*
*** Sound level measured at a distance of 1m according to Pneurop/Cagi PN8NTC2 test code.*

Oil-free Tooth Compressors

ZT 15-22 / ZR/ZT 30-45 / ZR/ZT 22-55 VSD

Your benefits

- **Optimizing efficiency**
- **Total supervision and monitoring**
  - Advanced Elektronikon® control and monitoring system, designed for integration in a (remote) process control system.
- **Energy savings**
  - Lower energy consumption thanks to two-stage compression system.
- **Enduring performance**
  - Stainless steel symmetrical rotors ensure perfect dynamic balancing and minimum bearing load to guarantee a long life span.
- The straight rotor design and the opposing axial in- and outlet port avoid axial load on element components, increasing element lifetime.
- Cast teeth allow for efficient heat dissipation, eliminating the need for a complex cooling water system and ensuring greater reliability.
- Two independent floating oil and air seals, separated by a neutral buffer area, safeguard the compression chamber from oil penetration.
- Also available as Variable Speed Drive units (VSD).

Technical specifications

Type	Max. working pressure	Capacity FAD*	Installed motor power	Weight without dryer
	bar(e)	m³/h	kW	kg
Air-cooled only				
ZT 15	7.5	138	15	900
	8.6	126		
	10	108		
ZT 18	7.5	174	18	920
	8.6	162		
	10	132		
ZT 22	7.5	210	22	925
	8.6	192		
	10	162		
Air- (ZT) and water-cooled (ZR)				
ZR/ZT 30	7.5	282	30	1065/1125
	8.6	264		
ZR/ZT 37	7.5	348	37	1115/1175
	8.6	330		
ZR/ZT 45	7.5	414	45	1140/1200
	8.6	390		
ZT 22 VSD	7.5	78-204	22	1120
	8.6	72-186		
	10	72-168		
ZR/ZT 37 VSD	7.5	150-372	37	1432
	8.6	150-354		
ZR/ZT 55 VSD	7.5	150-522	55	1485
	8.6	150-504		

** According to ISO 1217, latest edition.*

Low Pressure Solutions

Atlas Copco offers the perfect solution for low pressure marine applications. Our solution comprises a complete package including compressors, air treatment and control and monitoring systems. All technologies are developed in-house and our total solution offers you the benefits of increased compressor efficiency, lower energy consumption, reduced maintenance and longer life cycles. Every demand is covered, whether your application is wastewater treatment, pneumatic conveying, deballasting or any other low pressure application requiring low pressure compressed air.

Which technology is best for you?

We can help you find the best solution of your specific application, so it is in your benefit to compare technologies. The analysis of your installation and application is important. In this way we can define either one of more technologies that can serve you better, or a mix of technologies which meet your needs.

	Lobe blower (DT/BAH)	Screw blower (ZS)	Screw compressor (ZE/ZA)	Turbo direct drive (ZB)	Multistage (ZM)
Technology	Roots rotary displacement	Screw rotary displacement	Screw rotary displacement	Centrifugal dynamic	Centrifugal dynamic
Motor (kW)	0.55-315	18-355	22-500	100-160	4-2600
Pressure (bar/g)	0.2-1.0	0.3-1.5	1.0-4	0.3-1.3	0.2-1.3
Flow (m^3/h)	20-9700	271-9300	241-7600	2400-12000	1000-55000

For more information, please go to www.efficiencyblowers.com.







	ZS	ZE/ZA	ZB VSD
	Oil-free screw blower	Oil-free rotary screw compressor	Oil-free VSD centrifugal air compressor
Installed motor power	18-355 kW	22-500 kW	100-250 kW
Inlet pressure	Atmospheric	Atmospheric	Atmospheric
Working pressure	0.3-1.2 bar(e)	1.0-4 bar(e)	0.3-1.4 bar(e)
Capacity FAD	75-2225 l/s	87-2083 l/s	400-1875 l/s
	270-9100 m³/h	311-7500 m³/h	1440-6750 m³/h
Applications	Pneumatic conveying	Pneumatic conveying	Wastewater treatment
	Wastewater treatment	Deballasting	Deballasting
	Air lubrication	Air lubrication	Air lubrication



	ZR/ZT (VSD/FF)	ZH(+)	ZH+ VSD
	Oil-free rotary tooth and screw blower	Oil-free centrifugal compressor	Oil-free VSD centrifugal compressor
Installed motor power	15-900 kW	355-2750 kW	350 kW
Inlet pressure	Atmospheric	Atmospheric	Atmospheric
Working pressure	4-13 bar(e)	2-13 bar(e)	6-7 bar(e)
Capacity FAD	29.9-2456 l/s	970-7200 l/s	700-1070 l/s
	107.64-8842 m³/h	3500-26000 m³/h	2520-3850 m³/h
Applications	Instrument air	Instrument air	Instrument air
	Fermentation	Fermentation	Fermentation
	Cleaning air	Cleaning air	Cleaning air
	Air lubrication	Air lubrication	Air lubrication
	Air bubbling for sound protection at seabed and pollution prevention	De-ballasting	Air bubbling for sound protection at seabed and pollution prevention
		Air bubbling for sound protection at seabed and pollution prevention	

Screw Blowers

ZS 18-355

Your benefits

- Proven technology in a leading design
  The ZS is the latest addition to Atlas Copco's air blowing solutions, manufactured to the highest standards of quality and reliability. Built to ensure complete product safety, ZS blowers guarantee a continuous, highly reliable, energy-efficient and 100% oil-free air supply for years on end.
- Driving down energy costs
  By keeping energy efficiency low and strictly following ISO 14001 standards, Atlas Copco continuously strives to reduce the environmental impact of its compressors and blowers. The integrated Variable Speed Drive (VSD) technology offers extra energy savings by automatically tuning the compressed air flow precisely to the air demand.
- Easy installation
  Delivered ready for use, ZS+ blowers can come as all-in-one packages including a PLC based Elektronikon® controller, integrated converter, forklift slots, check valve, air filter, blow-off valve and silencers.

Technical specifications

Drive	Direct driven working air compressor
Cooling	Air-cooled
Ambient temperature	40°C
Max. pressure	1.2 bar

Options

- Winterization
- Freeze protection
- High ambient temperature

Type	Pressure	Motor power	Shaft power	FAD* m³/h		Sound level	Dimensions
	mbar(e)	kW	kW	min.	max.	dB(A)	L x W x H (mm)
ZS 37+ VSD	800	37	-	284	947	71	2040x970 x1804
ZS 45+ VSD	1200	45	-	259	1145	71	2040x970 x1804
ZS 55+ VSD	800	55	-	731	2310	70	2288x1080x1940
ZS 55+ VSD	1200	55	-	949	1688	70	2288x1080x1940
ZS 75+ VSD	1200	75	-	776	2289	70	2288x1080x1940
ZS 110+ VSD	800	110	-	1500	4300	72	3200x1630x2000
ZS 160+ VSD	1200	160	-	1600	4578	72	3200x1630x2000
ZS 18- 30 60 Hz	300-1000	18-30	3.6-31.7	271	1244	77	1610 x 1060 x 1228
ZS 37-75 - 60 Hz	300-1000	37-75	14.2-85.8	882	2237	72	1910x1240x1558
ZS 90-132 - 60 Hz	300-1000	90-132	61-171	3170	4345	72	2385x1650x1853

** According to ISO 1217, latest edition.*

Oil-free Screw Compressors

ZR 55-750/75-900 VSD
ZT 55-75/75-315 VSD

Your benefits

- **A complete and flexible solution**
  - For over 60 years, Z compressors stand for efficiency and reliability under the harshest conditions. They incorporate Atlas Copco's proven screw technology, are built using long-standing internal engineering practices and manufactured and tested according ISO 9001.
  - The first air compressors in the world to be certified CLASS 0 according to ISO 8573-1, 2010, they ensure completely oil-free air to protect your process and end products.
  - Maximize your savings through the state-of-the art air compressor element, which is powered by a high-efficiency electric motor contributing to maximum compressor package efficiency.
- **Flexible installation and operation**
  - Flanged air and water connection, on same side of unit for easy installation.
  - Marine motor with reduced starting current, avoiding stress on generator system.
  - Elektronikon® (MKV) regulation, ensuring reliable and safe operation.
  - Control panel (MKV) including hour counter, amp meter, high-temperature outlet, motor overload, low cooling water, motor heating on (lamp), auto operation sign and general alarm.
  - 50Hz units available.
- **Saving space**
  - Thanks to the integrated design, these ready-to-use packages have a small footprint and are easy to use.
- **Ease of operation**
  - Voltage free contacts to customer installation (open-closed): automatic operation, general warning, general shut-down, load-unload, motor running and local-remote.
  - Analog signals to customer installation (4-20mA): all signals can be provided such as outlet pressure and motor current, temperature, etc.

Technical specifications

Type	Principle	Max. working pressure	Capacity FAD*		Motor power	Cooling
		bar(e)	l/s	m³/h	kW	
60 Hz						
ZT 55-90	Screw compressor	7.25-10.4	124-260	446-936	55-90	Air-cooled
ZT 110-275	Screw compressor	8.6-10.4	261-729	940-2624	110-275	Air-cooled
ZR 90 VSD	Screw compressor	9-10.4	79-260	284-936	90	Water-cooled
ZR 132-315 VSD	Screw compressor	8.6-10.4	max.:836	max.:3009	132-315	Water-cooled
ZR 400-900 VSD	Screw compressor	8.6-10.4	360-2456	1296-8842	400-900	Water-cooled

** According to ISO 1217, latest edition.*

ES - THE LATEST IN CONTROL TECHNOLOGY

A properly managed compressed air network will save energy, reduce maintenance, decrease downtime, increase production and improve product quality. Atlas Copco's ES central controllers are the most efficient way to monitor and control multiple compressors simultaneously as well as dryers and filters.

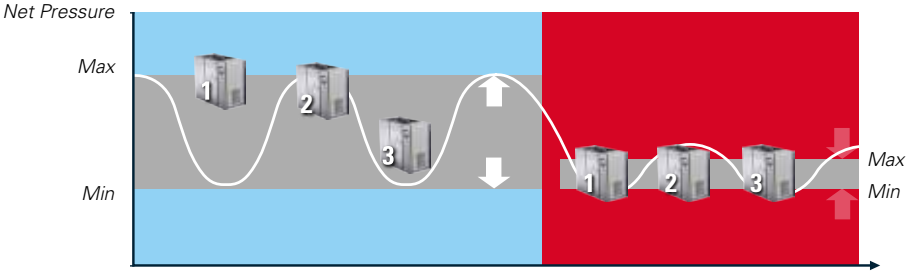
An ES controller offers one central point of control for your whole compressed air network, ensuring all compressors provide optimum performance for your process. The result is a completely dependable and energy efficient network, giving you peace of mind and keeping your costs to a minimum.

See how ES can benefit your network

With four customized solutions to choose from – from the integrated ES for up to four compressors to the ultimate ES for all sizes and types of machines – Atlas Copco's range of ES central controllers allows you to get the most out of your complete compressed air installation.

Stable process, lower energy consumption

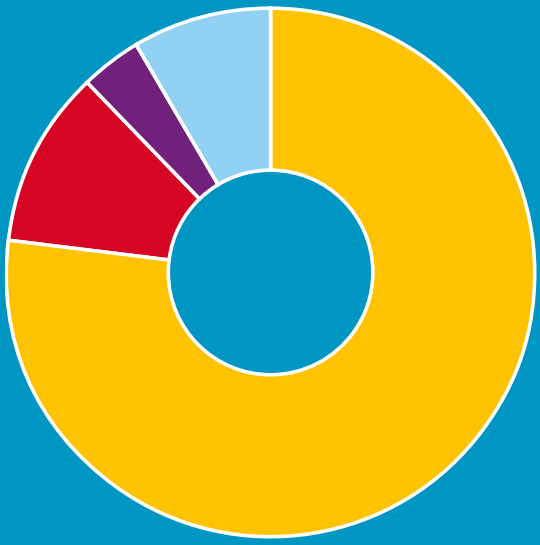
Without a central controller, a complete compressed air installation has to work in a pressure cascade with a large pressure band. ES central controllers keep your network running within a narrow, predefined pressure band. This increases the stability of the process and optimizes overall energy consumption.



Without ES ES

Max: *Maximum system pressure*

Min: *Minimum system pressure*



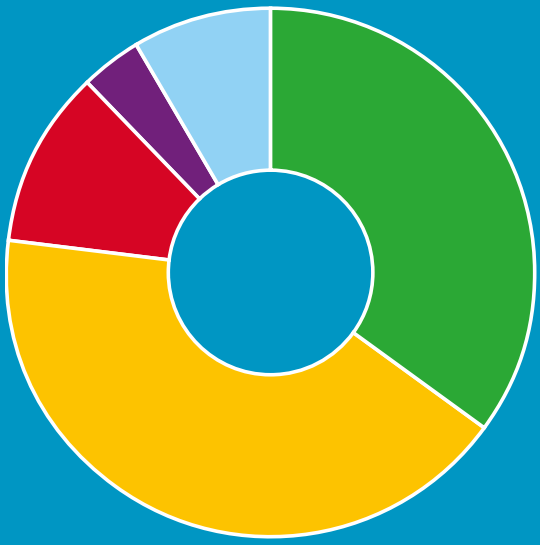
Standard compressors without ES control

Maximize your savings

Energy can represent over 70% of a compressor's lifecycle cost, and energy consumption can account for more than 40% of a plant's total electricity bill.
For these reasons, optimizing energy consumption is essential. ES central controllers ensure your compressed air network matches your precise needs, optimizing your energy usage and minimizing your energy costs.

Total compressor lifecycle cost

- *Energy*
- *Energy savings*
- *Investment*
- *Installation*
- *Maintenance*



ES controlled compressors

AIR RECEIVERS

Atlas Copco supplies premium working and starting air receivers for marine use. Their design is versatile enough for a wide range of on-board applications. As well as being equipped to the highest standards, they are treated to withstand corrosion even in the toughest conditions. With approval and certification by all major classification societies, you can be sure of the highest performance.

Working Air Receivers

Your benefits

- **High design pressure, therefore suitable for various applications on board.**
- **Versatile connections for easy installation.**
- **Hot dip galvanised corrosion protection according to ISO 1461*.**
- **Approved by all major classification societies: LLR, BV, DNV, ABS, RINA, GL*.**
- **Including all necessary ancillaries for instance:**
  - 100 mm dial Glycerine filled pressure gauge c/w test flange.
  - Drain valve.
  - Safety valve.
- **Horizontal versions on request.**

Technical specifications

Volume*	Length (mm)	Diameter (mm)	Weight (kg)	Design pressure (bar)	Supporting legs	Inlet (quantity - size)	Outlet (quantity - size)	Drain	Manhole (quantity - size (mm))
250 liter	1530	500	150	16	included	2 - BSP 1"	2 - BSP 1"	2 - BSP 1/2"	2 - 100 x 150
500 liter	1930	600	300	16	included	2 - BSP 1"	2 - BSP 1"	2 - BSP 1/2"	2 - 100 x 150
1000 liter	2370	800	400	16	included	2 - BSP 1 1/2"	2 - BSP 1 1/2"	2 - BSP 1"	2 - 100 x 150
2000 liter	2420	1100	600	16	included	2 - BSP 1 1/2"	2 - BSP 1 1/2"	2 - BSP 1"	1 - 320 x 420

* Other dimensions and capacities are available on request.

Starting Air Receivers

Your benefits

- **Corrosion protected*.**
  - Inside: sandblasted SA 2 ½ + Brantho Nitrofest coating.
  - Outside: sandblasted SA 2 ½ + Zinc primer & Enamel topcoat.
- **Approved by all major classification societies: LLR, BV, DNV, ABS, RINA, GL*.**
- **Valve heads included.**
- **Including all necessary ancillaries for instance:**
  - 63 mm dial Glycerine filled pressure gauge c/w test flange.
  - Safety valve.
- **Vertical & horizontal mounting.**
- **Feet on request.**

Technical specifications

Volume	Length (mm)	Diameter (mm)	Weight (kg)	Pressure (bar)	Valve head	Drain
125 liter	1700	323.9	130	33	VK38	2 - BSP 1/2"
250 liter	1580	480	200	33	VK38	2 - BSP 1/2"
500 liter	3050	480	360	33	VK50	2 - BSP 1/2"
750 liter	2550	650	500	33	VK50	2 - BSP 1/2"
1000 liter	3360	650	650	33	VK50	2 - BSP 1/2"
1500 liter	3350	800	970	33	VK50	2 - BSP 1/2"

* Other dimensions and capacities are available on request.

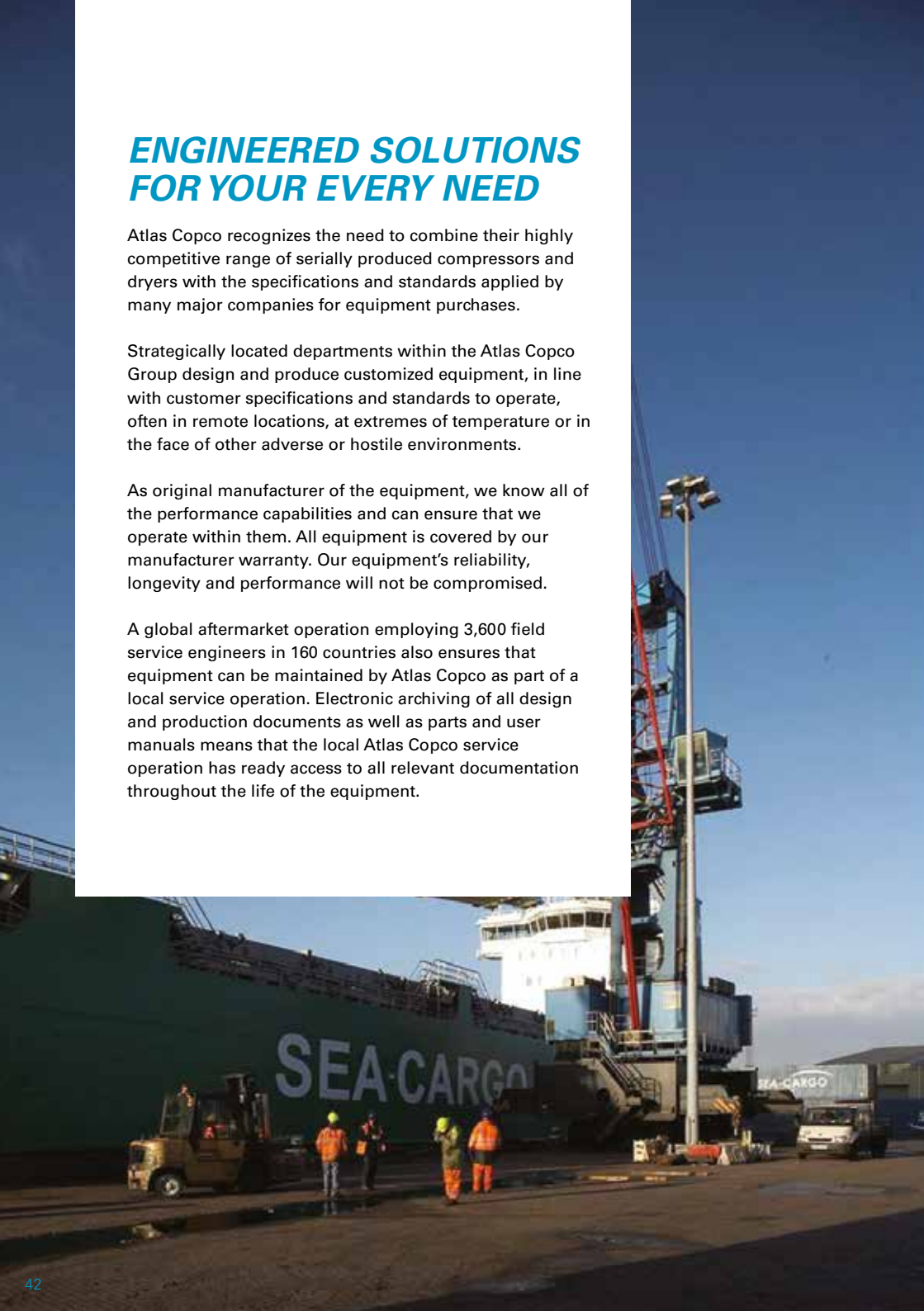
ENGINEERED SOLUTIONS FOR YOUR EVERY NEED

Atlas Copco recognizes the need to combine their highly competitive range of serially produced compressors and dryers with the specifications and standards applied by many major companies for equipment purchases.

Strategically located departments within the Atlas Copco Group design and produce customized equipment, in line with customer specifications and standards to operate, often in remote locations, at extremes of temperature or in the face of other adverse or hostile environments.

As original manufacturer of the equipment, we know all of the performance capabilities and can ensure that we operate within them. All equipment is covered by our manufacturer warranty. Our equipment's reliability, longevity and performance will not be compromised.

A global aftermarket operation employing 3,600 field service engineers in 160 countries also ensures that equipment can be maintained by Atlas Copco as part of a local service operation. Electronic archiving of all design and production documents as well as parts and user manuals means that the local Atlas Copco service operation has ready access to all relevant documentation throughout the life of the equipment.



Innovative Technology

Atlas Copco has a strong commitment to deliver high quality products to create efficient and reliable engineered solutions which meet customer specifications. By working with a wide network of leading industry suppliers, we provide customers with leading edge technology.

Innovative Systems

We are fully aware that Project Management can be complex, with final equipment destination often not situated in the same country as the owner. We have developed an internet based application called IC³, which is shared by all Atlas Copco sites, to give it a transparent view of data and drawings. The transparency of the system helps with on-site commissioning and aftersales back up, with machine details always available locally on demand. Atlas Copco sites needing access are involved from the start and can also monitor, observe and contribute to the project if required.

Innovative Engineering

Each project is unique and by entering into partnership with our customers, we can appreciate the challenge at hand, ask the relevant questions and design the best solution. Atlas Copco is a strong mix of people working with industry leading systems ensuring that we take care of every process in a project; from initial quote to installation and aftersales service.

Typical conditions or applications requiring customization or packaging include:

- Special electrical requirements such as Class 1, Group C&D, Division 1 & 2 NEC, IEC, ATEX, PLC control systems
- Extreme hot and cold environments
- Offshore applications
- Dust laden or corrosive environments
- Instrument air applications
- Starting air packages
- Air separation nitrogen compressors
- Refinery service
- Process air
- Emergency back up air applications
- API applications
- Nitrogen generation
- Gas purification
- Plant air applications

ATLAS COPCO RENTAL FOR NITROGEN, COMPRESSED AIR AND POWER GENERATION

Worldwide 24/7 available

The Atlas Copco Rental division offers worldwide specialty marine related temporary rental solutions and services with a focus on oil-free, high pressure and other compressed air applications, steam power units and portable nitrogen through our own rental companies and rental business lines in our customer centers.

With a marine focus, a global network of rental branches and service centers, the Atlas Copco Rental organisation can meet any immediate or urgent need for compressed air or power. We are able to provide multi-unit solutions around the clock, 24/7. Our rental equipment guarantees quality equipment for harsh environments and efficiency for maximum cost savings and safety. That is what sets us apart from the competition.

Visit our microsite at www.atlascopcorental.com for more details.

Your benefits

- Most reliable diesel engine: Tier 3 certified.
- Integrated aftercooler (+10°C).
- Spillage free frame.
- Spark arrestor + overspeed shutdown valve.
- Class 0 certified, acc. to ISO 8573-1.
- Tier 3 certified diesel engine.
- Weatherproof canopy.
- No oil contamination for air bubbling systems in dredging and drilling applications on seabed.
- Complete portable nitrogen supply, turnkey delivery and maintenance all from one company.
- Portable air on deck for temporary maintenance by riding crew and service in every port available.

NGM

Membrane nitrogen generators – up to 99.5% purity

Your benefits

- Delivered ready for use.
- Engineered with membrane technology.
- High purity.
- Optimal flexibility.
- Efficient control and monitoring.
- Integrated feed air filtration system.
- Option DNV 2.7-1 container installation for offshore applications.

Maximum inlet pressure	Up to 25 bar
N_2 outlet pressure	Up to 23 bar
N_2 purity range	Up to 99.5%
N_2 flow range	Up to 4850 Nm^3/h

NGP

Pressure swing adsorption nitrogen generator – up to 99.999% purity

Your benefits

- Delivered ready for use.
- Engineered with PSA technology.
- Highest purity.
- Optimal flexibility.
- Efficient control and monitoring.

Air inlet pressure	6.5-13 bar
N_2 outlet pressure	Up to 9 bar
N_2 purity range	97.0-99.999%
N_2 flow range	Up to 200 m^3/h

STEAM GENERATORS

On-site steam boiler

Your benefits

- Advanced control and monitoring.
- Internal water and fuel stainless steel tanks.
- Safe for your operators.

Working pressure	10.3 bar
Capacity steam	2000 kg/h
Maximum steam temperature	186°C/367°F

ON-SITE RIG SAFE GENERATOR

On-site steam boiler

Your benefits

- Rig safe.
- Reliable, robust and versatile.
- Quickly ready to run once on-site.
- Designed for fast and safe transport.

Prime power	12-1250 kVA
Frequency	50/60 Hz

PORTABLE AIR

ZoneAir Compressor XATS 1020

As a world leader in innovation and compression technology, Atlas Copco sets a new standard in diesel driven Zone 2 compressors for the oil and gas industry.

This portable compressor is built into a specially adapted DNV offshore container and includes the latest ATEX technologies for safe operation in hazardous areas (Zone 2 / Class 1, Div. 2). As a long-term investment, the ZoneAir XATS 1020 combines low cost of ownership with simplified maintenance.

Designed with maximum safety in mind, this unique package provides energy efficient performance for well tests, gas flaring or maintenance jobs in offshore environments.

Technical data on request.


LPG
AtlasCopco
Rental

HIGH PRESSURE SOLUTIONS

High Pressure Compressors for Seismic Surveying

Seismic applications

- Deep water exploration
- Shallow waters exploration
- Transition Zone (TZ)
- Vertical Seismic Profile (VSP)

Your benefits

- **The seismic compressor system consists of a single piston type compressor or of a screw/piston type compressor combination.**
- **Water-cooled with closed loop fresh/sea water-cooling or air-cooled.**
- **Electrical motor direct driven screw type and V-belt driven reciprocating type.**
- **Equipped with PLC controlled MCS (master controlled cabinet).**
- **Optional features:**
  - Containers or canopies for on deck installation.
  - Frequency converter control system.
  - Transportable units.

Technical specifications

Type	FAD	FAD	Speed	Drive	Dimensions	Weight
	scfm	m³/h	rpm	kW	L x W x H (mm)	tons
Maximum pressure 2200 psig / 150 bar(a)						
C5U217	102	174	900	55	2600 x 1230 x 1430	2.1
C4T320	200	340	660	90	4075 x 2500 x 2300	5
C4T320	309	525	1030	160	4075 x 2500 x 2300	5.4
C3T211 MAS 90-7	410	697	1030	132 90	4075 x 2500 x 2300 2950 x 925 x 1650	5.3 2.15
C3T212 MAS 90-7	508	863	920	160 90	4075 x 2500 x 2300 2950 x 925 x 1650	5.4 2.15
C3T210 MAS 160-13	603	1025	970	160 160	4075 x 2500 x 2300 2950 x 925 x 1650	5.4 2.57
C3T212 MAS 160-13	709	1205	680	160 200	4075 x 2500 x 2300 3300 x 1310 x 1976	5.4 4.4
C3T212 MAS 200-13	880	1496	850	200 200	4075 x 2500 x 2300 3300 x 1310 x 1976	5.6 4.4
Maximum pressure 3000 psig / 207 bar(a)						
C5U217	103	176	915	55	2600 x 1230 x 1430	2.1
C5T223	204	347	770	110	4075 x 2500 x 2300	5.1
C4T116 MAS 90-7	308	524	680	110 90	4075 x 2500 x 2300 2950 x 925 x 1650	5.1 2.15
C4T116 MAS 90-7	406	690	900	132 90	4075 x 2500 x 2300 2950 x 925 x 1650	5.3 2.15
C3T212 MAS 90-7	500	850	940	200 90	4075 x 2500 x 2300 2950 x 925 x 1650	5.6 2.15
C3T210 MAS 160-13	607	1032	880	160 160	4075 x 2500 x 2300 3300 x 1310 x 1976	5.4 4.4
C3T210 MAS 200-13	716	1217	1045	200 200	4075 x 2500 x 2300 3300 x 1310 x 1976	5.6 4.4

For enquiries, please see: www.greenfield-comp.com.

NITROGEN FOR MARINE APPLICATIONS

Atlas Copco can deliver nitrogen based on Pressure Swing Adsorption (PSA) or membrane technology for the following applications:

- As inert gas for fruit carriers, the so-called Controlled Atmosphere unit (CA).
- As inert Gas for blanketing of cargo tanks and stripping of cargo pumps on tankers and PSV.
- As inert gas for dual fuel piping on board of ships using dual fuel.
- As inert gas for venting cargo tanks insulation and piping systems on LNG/LPG tankers.
- For several applications on offshore tankers.

The inert gas units will be delivered as a turnkey package including nitrogen PSA or membrane N2 generators, compressors, dryers, filters, heaters, etc. – all engineered and produced by Atlas Copco. As customer this offers you a major benefit as all the equipment and interfaces are fully aligned for and designed for the required capacities. Units will also be completed with pressure vessels, an electric sub control panel, block and bleed valves and a PV-breaker, etc. The inert gas units can be provided with certificates of all major classification societies and according to Solas requirements. Typical pressure will be 7.5 up to 12.5 bar for marine while we also can deliver up to 22 bar for offshore applications.

Your benefits

- Optimized installation and therefore optimized energy efficiency.
- The most efficient way to produce nitrogen due to balanced CMS on PSA or membranes and compressed air pressure.
- One manufacture means one contact and one service engineer.
- Several standard units available.
- The most up to date products are installed at all times.
- All certifications are available.
- No problems with interfaces.
- Plug and play installations and smaller footprint due to modular skids.
- Service available in all ports.
- 95% up to 99.9 % purity.
- Less energy required due to lower pressure.
- Lower cost of ownership because of fewer moving parts and less maintenance.
- CMS inside on PSA for a lifetime of at least 40,000 running hours.
- No risk for oil contamination due to absorbed material.

Why Pressure Swing Absorption (PSA)?

- Very high reliability
- Higher purity
- Higher capacity
- Less energy consumption
- Lower maintenance costs

PSA vs Membrane

PSA	Membrane	Remarks
Low inlet pressure, typically from 7.5 bar	High inlet pressure, typically from 8.5 up to 12 bar	Saving 7% energy per bar in pressure reduction for each compressor
Air to nitrogen factor at 5% Oxygen: 1.8-2	Air to nitrogen factor at 5% Oxygen: 2.3 – 2.7 depending of maker	Saving energy due to smaller compressor requirement
Air to nitrogen factor at 0.1% Oxygen: 4.6	Air to nitrogen factor at 0.1% Oxygen: 14 – 20 depending of maker	At 2,100 m³/h compressed air PSA produce 450 Nm³/h Nitrogen at 99.9% purity
CMS lifetime: 40-45,000 running hours	Membrane lifetime: maximum 7 years, typically 3-5 years	A substantial reduction in the total cost of ownership
Built-in availability for dry air (dew point -20°C) for venting and drying cargo tanks and void spaces	Built-in availability for dry air (dew point -20°C) for venting and drying cargo tanks and void spaces	Dry air capacity at 2 x Nitrogen capacity at 95%
Moving parts: Yes, 6 valves per generator module	No moving parts	All valves mounted on PSA with flanges for easy maintenance (once a year or after 3,000 running hours). Pilot air with oil for greasing the valves during operation
Built-in availability for ship work air	N/A	Pressure sensor will start up the compressor automatically when pressure goes below pre-set value
No risk for oil contamination due to absorbed material	Possible risk for oil contamination	N/A
Lower maintenance cost	N/A	Due to longer lifetime of the CMS and less compressed air

NITROGEN UNIT INCLUDING BOOSTER 300 BAR

Atlas Copco proudly introduces a new all-in-one concept in nitrogen generation. The Atlas Copco Nitrogen Skid comes with a MAS VSD+ compressor, an NGP+ nitrogen generator, air and nitrogen receivers, a booster, dryers and filters, all integrated into one compact and pre-commissioned skid. It is a true plug-and-play solution that delivers cost savings and nitrogen supply independence for complete peace of mind. All components are built to Atlas Copco quality and energy efficiency standards. They are tested to work together for optimal performance and reliability. Two models are available: a 40-bar version for direct use and a 350-bar one that also allows for bottling.

Your benefits

- **Small footprint**
  - All components are fitted onto one compact skid.
  - Compact NGP+ and VSD+ design.
- **Supreme efficiency**
  - Includes the most energy efficient components as standard. VSD+ and NGP+ technologies can offer more than 50% cost savings compared to conventional on-site nitrogen generation.
  - High-pressure version allows for storage and thus a smaller plant in case of fluctuating nitrogen consumption.
- **Easy purchase, installation and operation**
  - 8 models available to meet your needs.
  - No compressor and booster sizing or complicated calculations needed.
  - Plug-and-play solution.
- **Increased reliability**
  - 100% designed and manufactured by Atlas Copco.
  - All components are pre-commissioned and tested to work as one system.
  - Your entire nitrogen generation system is covered by one service agreement.

1. NGP⁺ nitrogen generator
2. Nitrogen storage (40 bar receiver or 350 bar cylinders)
3. MAS VSD⁺ compressor
4. Nitrogen booster (40 or 350 bar)

Technical specifications

40-bar N_2 skid	N_2 capacity @ 99.9%	Compressor	Air/ N_2 receiver	N_2 generator	N_2 buffer	N_2 booster	HP storage	Total installed motor power	Average power input @ 99.99%
	Nm^3/h						L / bar	kW	kW
1	6/4	MAS 7 VSD⁺ FF	LV516	NGP10⁺	LV516	15 hp 40 b	500/45	18	6
2	15/9	MAS 7 VSD⁺ FF	LV516	NGP25⁺	LV516	15 hp 40 b	500/45	18	9
3	30/19	MAS 11 VSD⁺ FF	LV1016	NGP50⁺	LV516	15 hp 40 b	1000/45	22	15
4	60/38	MAS 22 VSD⁺ FF	LV1516	NGP100⁺	LV516	15 hp 40 b	1000/45	33	26

350-bar N_2 skid	N_2 capacity @ 99.9%	Compressor	Air/ N_2 receiver	N_2 generator	N_2 buffer	N_2 booster	HP storage	Total installed motor power	Average power input @ 99.99%
	Nm^3/h						L / bar	kW	kW
5	6/4	MAS 7 VSD⁺ FF	LV516	NGP10⁺	LV516	10 hp 350 b	2 hp cylinder rack	15	7
6	15/9	MAS 7 VSD⁺ FF	LV516	NGP25⁺	LV516	10 hp 350 b	12 hp cylinder rack	15	11
7	30/19	MAS 11 VSD⁺ FF	LV1016	NGP50⁺	LV516	15 hp 350 b	12 hp cylinder rack	22	18
8	60/38	MAS 22 VSD⁺ FF	LV1516	NGP100⁺	LV516	2x 15 hp 350 b	16 hp cylinder rack	44	36

FLEXIBLE GAS AND PROCESS SOLUTIONS

Customized solutions for the growing LNG market

In more than five decades, Atlas Copco has built a wealth of experience in the LNG market. The company is a true LNG pioneer and remains as one of the strongest innovators in the market.

When Atlas Copco develops its LNG solutions, it draws from broad and thorough knowledge and experience in engineering customized machines. In 1973 the tanker "Venator" carried an LNG compressor built by Atlas Copco. In 2000 Atlas Copco compressors and expanders were once again the "heart of the plant" when the world's first on-board reliquefaction system was introduced on the "Jamal" vessel. Atlas Copco realized a pilot project for marine specialist Hamworthy KSE off the coast of Norway, installing a machine that merges compressor and expander functionalities – the Compander – in 2003.

Atlas Copco Gas and Process is currently the only manufacturer to offer the inherent mechanical simplicity of integral-gear technology in a complete range of multi-stage compressor / expander packages.

Cargo Handling / Propulsion Systems

Type		Steam Turbine	Duel Fuel Diesel Electric	Slow Speed Diesel with reliquefaction	X-DF	Gas Turbine
Compressors	L/D Single-stage	✓	-	-	-	-
	L/D Two-stage	-	✓	-	-	-
	L/D Three-stage	-	•	-	-	-
	L/D Four-stage	-	-	-	✓	-
	L/D Five-stage	-	-	-	•	✓
	H/D Single-stage	✓	✓	✓	✓	✓
Reliquefaction plant	Nitrogen Compander	-	-	•	•	•
Heaters & vaporizers	L/D Gas Heaters	✓	✓	-	✓	✓
	L/D Forcing Vaporizer	✓	✓	-	✓	✓
	Mist Separator	✓	✓	-	✓	✓
	H/D Gas Heaters	✓	✓	✓	✓	✓
	LNG Vaporizer	✓	✓	✓	✓	✓

✓: *Standard* •: *Optional* - : *Not available*

L/D Compressors

All L/D compressors are designed to maintaining constant absolute cargo tank pressure with respect to the compressor output pressure.

- Single-stage: used to transfer Boil-Off Gas (BOG) to the main boiler.
- Two-Three-stage: used to supply BOG from cargo tanks to Duel-Fuel engines at 6.5 barA.
- Four-stage: used to supply cryogenic BOG from cargo tanks to X-DF engines at 17 barA.
- Used to supply warm or cryogenic BOG from cargo tanks to X-DF engines at 17 barA.
- Five-stage: used to supply cryogenic BOG from cargo tanks to Gas Turbines at 29 barA.

H/D Compressor, Single-stage

- Used to re-circulate hot LNG vapor to warm-up cargo tanks, to return generated LNG vapor back to shore during loading, and for initial cool down.

L/D and HD Gas Heater

- A direct steam-heated horizontal shell and tube gas heater that is employed for heating up Boil-Off Gas delivered by Low-Duty or High-Duty Compressors during warm-up.

LNG Vaporizer

- Used to supply vapor to the cargo tank during discharging and purging of inert gas.
- Can ensure the nitrogen supply to tanks when receiving liquid nitrogen from ashore and as an emergency spare for the Forcing Vaporizer.

Forcing Vaporizer

- Employed to supply vapor to the main boiler plant in case of a low boil-off rate.

Mist Separator

- Installed after the Forcing Vaporizer.

For further information, please visit www.atlascopco-gap.com.

AIR TREATMENT

Clean and dry compressed air: it is crucial for your onboard process. While superb quality air is an essential ingredient for the success of your ship, untreated air may cause extensive damage and lead to serious performance degradation. To protect investments, equipment, processes and end products, all ships need basic air treatment solutions. More critical applications need enhanced solutions to meet air quality requirements. Atlas Copco presents a full range of innovative air treatment equipment to meet and exceed the quality requirements of your specific application.

Dryers

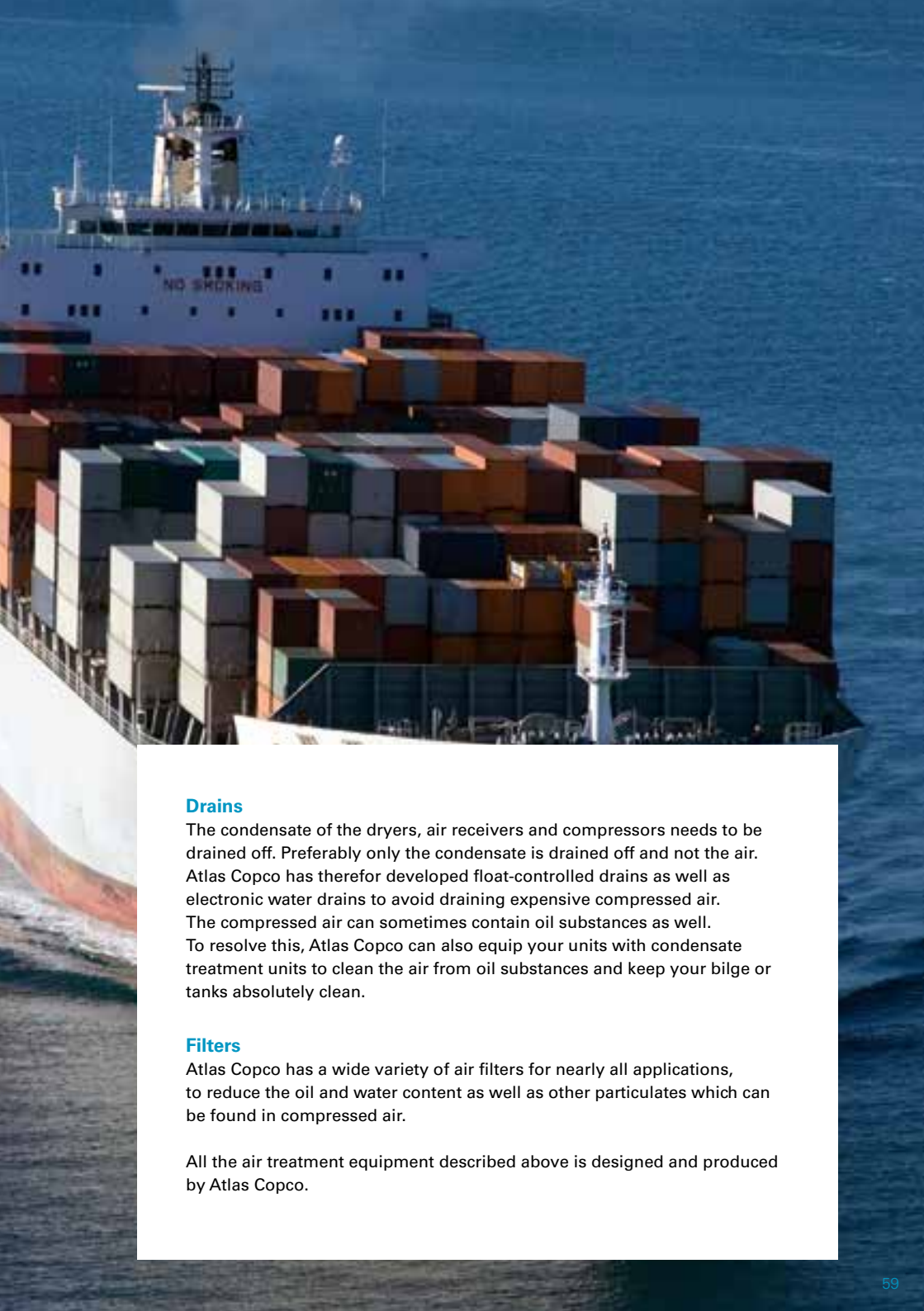
"10.1.4. User equipment requirements for the quality of compressed air in terms of dew point (dryness), oil content and solid particle count are to be recognized in the selection and configuration of compressors, equipment, filters and dryers which are included in the system." (LRS rules)

The sentence above is an extract from the rules and requirements. It tells us that there is equipment on board that needs clean, dry air.

There are several dryer types and systems. For a normal operating ship an FD or FX refrigerant dryer giving a dew point of 3°C/4°C will be sufficient. However, offshore, dredging and working vessels may require a dew point of up to -70°C. This can be achieved with a CD dryer, also called an adsorption dryer.

For applications remotely fitted from the compressed air outlet of the compressor on board, we can fit a membrane dryer, the so-called SD dryer. Examples of this usage are: pneumatic level and sounding systems, dry air for purifier systems and compressed air application on wheelhouse or control rooms. A dew point of either 3°C or 20°C can be selected for the SD dryer.

For good dryer operation, various limitations need to be taken into account when designing the compressed air system on board the ship. The inlet temperature of the dryer is often limited, as is the working pressure. Atlas Copco offers dryers that can still guarantee a given dew point with an inlet compressed air temperature of 50°C.
Atlas Copco also offers heat reactivated dessicant dryers and refrigerant dryers with advanced energy saving control algorithms as well as dryers for high pressure (30 bar).



Drains

The condensate of the dryers, air receivers and compressors needs to be drained off. Preferably only the condensate is drained off and not the air. Atlas Copco has therefor developed float-controlled drains as well as electronic water drains to avoid draining expensive compressed air. The compressed air can sometimes contain oil substances as well. To resolve this, Atlas Copco can also equip your units with condensate treatment units to clean the air from oil substances and keep your bilge or tanks absolutely clean.

Filters

Atlas Copco has a wide variety of air filters for nearly all applications, to reduce the oil and water content as well as other particulates which can be found in compressed air.

All the air treatment equipment described above is designed and produced by Atlas Copco.

Refrigerant Compressed Air Dryers

FD 5-4000

Incorporating unique, patented technological innovations and extra energy-saving options, Atlas Copco's FD refrigerant dryers provide you with the clean, dry air to expand the lifetime of your equipment and ensure the quality of your end product.

Your benefits

- **Supreme energy & cost savings**
  - Low pressure drop.
  - Energy-efficient refrigerant.
  - Flow Switch.
  - Heat exchanger technology.
  - Unique Saver Cycle Control.
  - VSD option.
  - Atlas Copco dryers comply with major environmental classification notations such as EP, Clean Design, Clean Ship and ENVIRO (depending on the size of the dryer).
- **Space-saving, easy installation**
  - In-& outlet on top of the unit.
  - Forklift slots.
  - Integrated spin-on DD/PD filters.
- **Advanced control & monitoring**
  - State-of-the-art packages to increase efficiency.
  - Guaranteed maximum uptime and reliability.

Technical specifications

Type	Maximum inlet conditions (ambient/inlet)	Air flow at outlet with a PDP of 3°C/4°C (50/60 Hz)	Power consumption air-cooled, 50 Hz	Power consumption, 60 Hz	Maximum working pressure	Dimensions		
	°C	l/s	kW	kW	bar(g)	L (mm)	W (mm)	H (mm)
Water-cooled versions								
FD 310 [1]	50°C/60°C	310	2.0	2.5	14	986	850	1190
FD 410 [1]	50°C/60°C	410	2.4	3.2	14	1250	850	1375
FD 510 [1]	50°C/60°C	510	4.1	5.0	14	1250	850	1375
FD 610	40°C/50°C	610	3.1	3.9	14	1245	1059	1430
FD 760	40°C/50°C	760	3.6	4.5	14	1245	1059	1430
FD 760 VSD	40°C/50°C	760	3.3	4.3	14	1580	1059	1430
FD 870	40°C/50°C	870	4.5	5.8	14	1245	1059	1430
FD 870 VSD	40°C/50°C	870	4.2	5.6	14	1580	1059	1430
FD 1010	40°C/50°C	1010	5.1	6.2	14	1245	1059	1430
FD 1010 VSD	40°C/50°C	1010	5.6	6.1	14	1580	1059	1430
FD 1250	40°C/50°C	1250	8.1	9.8	13	1300	1348	1880
FD 1250 VSD	40°C/50°C	1250	9.7	5.0	13	1300	1348	1880
FD 1400	40°C/50°C	1400	7.3	9.5	13	1300	1348	1880
FD 1400 VSD	40°C/50°C	1400	8.5	5.1	13	1300	1348	1880
FD 1600	40°C/50°C	1600	11.8	12.0	13	2120	1348	1880
FD 1600 VSD	40°C/50°C	1600	9.3	8.1	13	2120	1348	1880
FD 2000	40°C/50°C	2000	17.0	19.0	13	2120	1348	1880
FD 2000 VSD	40°C/50°C	2000	13.5	12.9	13	2120	1348	1880
FD 2400 VSD	40°C/50°C	2400	18.3	9.8	13	2000	1348	1880
FD 4000 VSD	40°C/50°C	4000	27.9	13.2	13	2200	2301	1910

Technical specifications

Type		Air flow at outlet with a PDP of 3°C 50 Hz/ 60 Hz	Power consumption air-cooled, 50 Hz	Power consumption, 60 Hz	Maximum working pressure	Dimensions		
	°C	l/s	kW	kW	bar(g)	L (mm)	W (mm)	H (mm)
Air-cooled versions								
FD 5 (1)	50°C/60°C	6	0.20	0.2	16 (2)	558	515	582
FD 10 (1)	50°C/60°C	10	0.20	0.2	16 (2)	558	515	582
FD 15 (1)	50°C/60°C	15	0.33	0.3	16 (2)	558	515	582
FD 20 (1)	50°C/60°C	20	0.41	0.5	16 (2)	558	515	582
FD 25 (1)	50°C/60°C	25	0.41	0.5	16 (2)	558	515	582
FD 30 (1)	50°C/60°C	30	0.41	0.5	16 (2)	558	515	582
FD 40 (1)	50°C/60°C	40	0.57	0.7	16 (2)	716	389	679
FD 50 (1)	50°C/60°C	50	0.54	0.8	16 (2)	716	389	679
FD 60 (1)	50°C/60°C	60	0.63	1.0	13	795	482	804
FD 70 (1)	50°C/60°C	70	0.87	1.0	13	795	482	804
FD 95 (1)	50°C/60°C	95	1.18	1.5	13	795	482	804
FD 120 (1)	50°C/60°C	120	1.10	1.2	13	1170	855	1540
FD 150 (1)	50°C/60°C	150	1.30	1.6	13	1170	855	1540
FD 185 (1)	50°C/60°C	185	1.60	2.0	13	1170	855	1540
FD 220 (1)	50°C/60°C	220	1.80	2.2	13	1170	855	1540
FD 245 (1)	50°C/60°C	245	2.1	2.3	13	1170	855	1540
FD 285 (1)	50°C/60°C	285	2.4	2.4	13	1170	855	1540
FD 310 (1)	40°C-60°C (ambient)	310	2.8-2.9	4.3-4.6	14	986	850	1190
FD 410 (1)	40°C-60°C (ambient)	410	3.0-4.8	4.5-7.3	14	986-1525	850	1375
FD 510 (1)	40°C-60°C (ambient)	510	4.5-6.9	7.3-10.4	14	1250-1525	850	1375
FD 610	40°C/50°C	610	4.8	7.6	14	1040	1059	1430
FD 760	40°C/50°C	760	5.3	8.1	14	1245	1059	1430
FD 760 VSD	40°C/50°C	760	5.3	9.1	14	1245	1059	1430
FD 870	40°C/50°C	870	6.6	10.2	14	1245	1059	1430
FD 870 VSD	40°C/50°C	870	5.8	11.1	14	1245	1059	1430
FD 1010	40°C/50°C	1010	7.4	11.9	14	1580	1059	1430
FD 1010 VSD	40°C/50°C	1010	6.6	11.4	14	1580	1059	1430
FD 1250	40°C/50°C	1250	8.3	13.6	13	1640	1348	1880
FD 1250 VSD	40°C/50°C	1250	10.0	8.5	13	1640	1348	1880
FD 1400	40°C/50°C	1400	8.5	14.1	13	1640	1348	1880
FD 1400 VSD	40°C/50°C	1400	9.3	8.6	13	1640	1348	1880
FD 1600	40°C/50°C	1600	13.6	18.4	13	2660	1348	1880
FD 1600 VSD	40°C/50°C	1600	13.3	16.1	13	2660	1348	1880
FD 2000	40°C/50°C	2000	20.0	26.0	13	2660	1348	1880
FD 2000 VSD	40°C/50°C	2000	19.5	24.9	13	2660	1348	1880

(1) Saver Cycle.

Reference conditions 50 Hz:
Ambient temperature: 25°C.
Inlet compressed air temperature: 35°C.
Inlet pressure: 102 psig/7 bar(e).

Reference conditions 60 Hz:
Ambient temperature: 38°C.
Inlet compressed air temperature: 38°C.
Inlet pressure: 102 psig/7 bar(e).

Maximum conditions:
Ambient temperature: 46°C.
Inlet compressed air temperature: 56°C.
Inlet compressed air temperature: 50°C/60°C (FD 310-510).
For conditions other than reference conditions, please consult Atlas Copco.
For additional information regarding Saver Cycle FD refrigerant dryers, please consult the specific FD 120-285 leaflet.

Refrigerant Compressed Air dryers

FX 1-22/FXM 17-21

The FX range of refrigerant dryers offer a reliable, cost effective and simple solution. To avoid condensation and thus all chance of corrosion and damage, the compressed air needs to be dried, which is exactly what the FX units are designed for. These simple reliable units remove water from the air and the risk from your system, ensuring that your money doesn't just disappear into the air.

Your benefits

- **Solid performance**
  - Steady pressure dew point.
  - No freezing of condensed moisture.
  - No chance of moisture entering the compressed air system.
- **Simple reliability**
  - Quality components, generously sized.
  - Simple and proven design.
  - Effective control system (hot gas bypass).
- **Easy installation**
  - Plug and play concept.
  - Single electrical connection.
  - All units pre-commissioned.
  - Self regulating.
- **Minimal maintenance**
  - Long service intervals.
  - Few component replacements.
  - Ergonomic design for fast access to key components.

Technical specifications

Type	Maximum inlet conditions (ambient/inlet)	Air flow at outlet with a PDP of 5°C (50/60 Hz)	Power consumption air-cooled (50 Hz)	Power consumption (60 Hz)	Maximum working pressure	Dimensions		
	°C	l/s	kW	kW	bar(g)	L (mm)	W (mm)	H (mm)
Air-cooled versions								
FX 1	45-55	7	0.17	0.21	16 (1)	500	350	484
FX 2	45-55	12	0.24	0.24	16 (1)	500	350	484
FX 3	45-55	16	0.26	0.32	16 (1)	500	350	484
FX 4	45-55	23	0.48	0.47	16 (1)	500	350	484
FX 5	45-55	35	0.4	0.58	16 (1)	500	350	484
FX 6	45-55	45	0.84	0.84	13	500	370	804
FX 7	45-55	58	0.95	0.95	13	500	370	804
FX 8	45-55	69	1.08	1.08	13	500	460	829
FX 9	45-55	79	1.26	1.26	13	560	460	829
FX 10	45-55	100	1.58	1.58	13	560	460	829
FX 11	45-55	125	1.64	1.64	13	560	580	939
FX 12	45-55	148	2	2.03	13	560	580	939
FX 13	45-55	192	2.3	3.4	13	898	735	1002
FX 14	45-55	230	2.9	4.15	13	898	735	1002
FX 15	45-55	288	3.8	5.1	13	898	735	1002
FX 16	45-55	345	4.1	6.1	13	898	735	1002
FX 17	45-55	424	6.3	8.1	13	1082	1020	1560
FX 18	45-55	530	7	8.7	13	1082	1020	1560
FX 19	45-55	618	8.5	10.5	13	1082	1020	1560
FX 19.5	45-55	795	10	12.1	10	1123	1020	1560
FX 20	45-55	883	11.3	13.9	13	2099	1020	1560
FX 21	45-55	1236	15.9	17	13	2099	1020	1560
FX 22	45-55	1400	19.3	22	13	2099	1020	1560

(1) 20 bar(g) / 290 psi(g) variant available.

Reference conditions:
Ambient temperature: 25°C.
Inlet air temperature: 35°C.
Working pressure: 7 bar.

Maximum conditions:
Ambient temperature: 46°C.
Inlet air temperature: 60°C.
Working pressure: 13 bar.

FX 1 - FX 10 available in 230 V 50 Hz and 115 V-230 60 Hz.
FX 11 and FX 12 available in 230 V/ 50 and 60 Hz.
FX 13 - FX 22 available in 400/50 Hz and 460/60 Hz.

Type	Maximum inlet conditions (ambient/inlet)	Air flow at outlet (PDP: 4°C, ambient: 46°C, air inlet: 43°C, pressure: 6 bar)(60 Hz)	Power consumption (60 Hz)	Maximum working pressure	Dimensions		
	°C	l/s	kW	bar(g)	L (mm)	W (mm)	H (mm)
Water-cooled versions							
FXM 17	46-60	990	8.1	13	1082	1020	1560
FXM 18	46-60	1116	8.7	13	1082	1020	1560
FXM 19	46-60	1476	10.5	13	1082	1020	1560
FXM 19.5	46-60	1836	12.1	13	1123	1020	1560
FXM 20	46-60	2196	13.9	13	2099	1020	1560
FXM 21	46-60	2916	17	13	2099	1020	1560
Air-cooled versions							
FXM 17	46-60	756	8.1	13	1082	1020	1560
FXM 18	46-60	900	8.7	13	1082	1020	1560
FXM 19	46-60	1080	10.5	13	1082	1020	1560
FXM 19.5	46-60	1296	12.1	13	1123	1020	1560
FXM 20	46-60	1476	13.9	13	2099	1020	1560
FXM 21	46-60	2196	17	13	2099	1020	1560

Maximum cooling water inlet temperature: 36°C (fresh water), 32°C (seawater).
Options: sea cooling water, 400 V 50 Hz, counter flanges.

Heatless Adsorption Air Dryers

CD⁺ 7-1600

Atlas Copco CD adsorption dryers eliminate the moisture before it can cause any damage. Even the possibility of freezing is non-existent. The CD⁺ dryers ensure a reliable process and impeccable end products by offering absolutely dry air to your compressed air system.

Your benefits

- **Reliable, high-quality air**
  - Unique, worldwide experience in supplying for the most demanding applications.
  - Nothing but top end components.
  - Robust design (large desiccant overfill, optimum aspect ratio, low air speed).
  - Built to perform across a wide range of conditions.
  - Tight control and monitoring.
  - Based on years of extensive research and continuous development.
  - Designed using state-of-the-art tools and facilities.
- Easy installation
  - All-in-one design.
  - Small footprint & minimal floor space required.
  - No need for extras.

Technical specifications

Dryer type	Inlet flow FAD 7bar(e)/100 psig(1)	Pressure drop (excl. filters)	Connections	Recommended filter sizes			Dimensions (mm)			Weight
	m³/h	bar	50 Hz: G/PN 16 60 Hz: NPT/DN	0.1 ppm prefilter		0.01 ppm after filter	L	W	H	kg
CD1+	4	0.2	1/4"	n/a	PD3	Integrated	106	172	540	7
CD 1.5+	5	0.2	1/4"	n/a	PD3	Integrated	106	172	590	8
CD 2+	8	0.2	1/4"	n/a	PD3	Integrated	106	172	720	9
CD 2.5+	9	0.2	1/4"	n/a	PD3	Integrated	106	172	830	10
CD 3+	11	0.2	1/4"	n/a	PD3	Integrated	106	172	855	11
CD 5+	18	0.2	1/2"	n/a	PD9	Integrated	149	295	640	19
CD 7+	25	0.2	1/2"	n/a	PD9	Integrated	149	295	730	22
CD 10+	36	0.2	1/2"	n/a	PD9	Integrated	149	295	875	25
CD 12+	43	0.2	1/2"	n/a	PD17	Integrated	149	295	1015	29
CD 17+	61	0.2	1/2"	n/a	PD17	Integrated	149	295	1270	35
CD 22+	79	3.5	1/2"	n/a	PD17	Integrated	149	295	1505	44
CD 25+	90	0.1	1/2"	DD32	PD32	DDp32	550	201	1233	50
CD 30+	108	0.1	1/2"	DD32	PD32	DDp32	550	201	1233	50
CD 35+	126	0.1	1/2"	DD32	PD32	DDp32	550	201	1478	60
CD 50+	180	3.5	1"	DD60	PD60	DDp60	550	201	1846	80
CD 60+	216	1.2	1"	DD60	PD60	DDp60	550	364	1233	100
CD 70+	252	1.6	1"	DD60	PD60	DDp60	550	364	1479	120
CD 80+	288	1.2	1½"	DD120	PD120	DDp120	550	364	1846	160
CD 100+	360	3.5	1½"	DD120	PD120	DDp120	550	364	1846	160
CD 145+	522	3.5	1½"	DD150	PD150	DDp150	550	526	1846	240
CD 110+	396	1.2	1½"	DD120	PD120	DDp120	950	728	1695	340
CD 150+	540	1.6	1½"	DD150	PD150	DDp150	1089	848	1731	415
CD 185+	666	0.2	1½"	DD175	PD175	DDp175	1089	848	1731	445
CD 250+	900	1.4	2"	DD280	PD280	DDp280	1106	960	1816	600
CD 300+	1080	1.9	2"	DD280	PD280	DDp280	1173	1116	1854	650
CD 330+	1188	0.1	DN80	DD425+	PD425+	DDp425+	1088	1776	2537	950
CD 400+	1440	0.1	DN80	DD425+	PD425+	DDp425+	1088	1776	2537	1030
CD 550+	1980	0.1	DN80	DD550+	PD550+	DDp550+	1091	1884	2592	1310
CD 850+	3060	0.1	DN100	DD850+	PD850+	DDp850+	1259	2359	2655	2120
CD 1100+	3960	0.1	DN100	DD1100+	PD1100+	DDp1100+	1259	2472	2637	2600
CD 1400+	5040	0.11	DN125	DD1400+	PD1400+	DDp1400+	1428	2693	2576	3700

(1) FAD given by the following reference conditions:
Ambient temperature 35°C, relative humidity: 60%, effective air pressure of 7 bar compressed air.
Compressed air inlet temperature: 20°C. Relative humidity of compressed air: 100% by cooling water temperature of 26.7°C.
The above mentioned dimenstional sizes are just an indication. Please consult the original drawings.
Dryers will run on higher temperatures, RH and higher cooling water temperatures. Please consult Atlas Copco for the correct sizing.

Bigger capacity CD+ dryers standard available until 1,400 l/s or bigger upon request.

Compressed Air Filters

In-house development & testing

Since 1998, our dedicated Filtration team is responsible for in-house development of cutting-edge filtration solutions. This results in expert know-how of filtration mechanisms, state-of-the-art test facilities and breakthrough innovations. For many years, our filter team has cooperated closely with the University of Karlsruhe, a leading institute in research and development of filtration mechanisms.

Rigorous quality control

It's well-known that Atlas Copco puts all its products through a series of rigorous quality control tests. The entire filter range is produced in-house, on the most advanced production lines, and tested using the most stringent methods in the industry. You can rest assured at all times that strict certification and testing procedures are conducted to ensure air is supplied to the highest standards of quality control.

Compressed air can be contaminated by dirt, water and oil, which can be further divided as follows:

- **Dirt**: micro-organisms, dust, solid particles, rust particles.
- **Water**: water vapor, condensed liquid water, water aerosols, acidic condensates.
- **Oil**: liquid oil, oil aerosol, hydrocarbon vapor.

Atlas Copco offers the widest selection of filtration solutions and application knowledge.

Flanged design
6 grades
12 sizes
550 → 8,000 l/s
1,200 → 17,000 cfm

Threaded design
6 grades
11 sizes
9 → 550 l/s
19 → 1,200 cfm

Tower design
1 grade
9 sizes
20 → 310 l/s
42 → 657 cfm

20 bar / 290 psi
50 bar / 725 psi
100 bar / 1,450 psi
350 bar / 5,075 psi

Threaded design
5 grades
9 sizes
15 → 944 l/s
32 → 2,000 cfm

Threaded design
5 grades
11 sizes
9 → 520 l/s
19 → 1,102 cfm

Threaded design
1grade
10 sizes
400 → 6,700 l/min
14 → 237 cfm

Name	DDp+ / DDp	PDp+ / PDp	DD+ / DD	PD+ / PD	UD+	QD+ / QD	QDT	H High pressure			SFA Silicone-free			MV Medical vacuum
Grade	Rough	Fine	Rough	Fine	Ultimate	Basic	Optimal	Rough & Fine	Rough & Fine	Basic	Rough & Fine	Rough & Fine	Basic	Fine
Contaminant	Dry dust		Oil aerosol / wet dust			Oil vapor								Dry dust
	General applications							Special applications						

COMPRESSED AIR TOOLS AND PUMPS

Atlas Copco air hoists

Atlas Copco air hoists will stand up to the roughest treatment. Overheating is never a problem, even during intensive operation at maximum load. Outstanding inching characteristics give precise load control. Compact, lightweight designs make installation easy. All hoists are Ex certified and are also available in lubrication-free versions for cleaner working environments. Designed to complement the hoists, Atlas Copco trolleys are supplied as manual or motor-driven units.

Choose Atlas Copco material removal tools and boost your productivity!

Offering high power-to-weight ratios, Atlas Copco tools give you maximum material removal with minimum effort, thus boosting your productivity. Available in a wide range of versions covering virtually every application, these robust tools are extremely reliable and simple to maintain, with long service lives. Their ergonomic design, including efficient noise and vibration damping, makes them easy on the operator in demanding applications.

Get it together fast and accurately with Atlas Copco assembly tools

Ergonomically designed screwdrivers, pulse tools, nut runners and impact wrenches from Atlas Copco are light and comfortable to hold. Correct grip diameters reduce reaction forces. Noise and vibration levels are low, and power-to-weight ratios are high. Optional built-in monitoring and control of torque and angle in the nut runner range allows a wide variety of tightening strategies.

Atlas Copco Air Line accessories

Atlas Copco Air Line accessories ensure correct air pressure. Our quick couplings provide low pressure drop, plus one-handed operation for fast, easy tool changing. Atlas Copco balancers take the strain off the operator by making the tool virtually weightless. Our highly flexible, high-performance hose for all applications is up to 50% lighter than conventional hoses. You can't fail to notice the difference!

Your benefits

- Correct air pressure
- Low pressure drop
- Fast tool cleaning

Pneumatic Tools Overview

Atlas Copco air hoist and trolleys

All hoists are certified to: Ex II 2G T5 IIB D100C	
Hoist	Lifting capacity
LLA 200 EX	200 kg
LLA 250 EX	250 kg
LLA 500 EX	500 kg
LLA 1000 EX	1000 kg
LLA 2500 EX	2500 kg
LLA 5000 EX	5000 kg

Trolleys - Manual	Lifting capacity
TLT 1000	max 1000 kg
TLT 2500	max 1000 kg
Trolleys - Motor driven	Lifting capacity
TLT 1000 M	max 1000 kg
LLT 2500 M	max 2500 kg
LLT 5000 M	max 5000 kg

Atlas Copco industrial power tools

Turbine grinders					
Type		ø in mm	Power	RPM	Ref n°
GTG 40 angle grinder	F 085-18	180	4.5 kW	8500	8423-2900-10
GTG 40 angle grinder	S 060	230	4.5 kW	6000	8423-2930-00
GTG 21 angle grinder	F 120-13	125	2.1 kW	12000	8423-2962-00

Vane motor grinders					
Type		ø in mm	Power	RPM	Ref n°
LSV 38 angle grinder	ST12-125	125	1.0 kW	12000	8423-0130-87
LSV 28 angle grinder	ST12-12	115	0.62 kW	12000	8423-0125-24
LSS 53 vertical sander	S 085-18	180	1.4 kW	8500	8423-2530-72
LSS 64 vertical grinder	S 085-18	180	2.6 kW	8500	8423-2641-38
LSS 53 vertical sander	S 060	180	1.2 kW	6000	8423-2530-23

Drills					
Type		ø in mm	Power	RPM	Ref n°
LBB 34 pistol	H 026	6	0.4 kW	2600	8421-0308-21
LBB 34 pistol	H 007	13	0.4 kW	700	8421-0308-05
LBB 36 pistol	H 005	19	0.7 kW	500	8421-0408-03
RAB 9 screw-feed	VR006	23	0.85 kW	600	8421-5109-45
RAB 12 screw-feed	L250	51	1.5 kW	240	8421-5112-16

Die grinders					
Type		ø in mm	Power	RPM	Ref n°
LSF28 long	S180 E	16	0.65 kW	18000	8423-1235-03
LSF28 short	S180	16	0.65 kW	18000	8423-1235-02

Chippers & needle scalers			
Type	Freq. (Hz)	Energy/blow	Ref n°
RRC 13 scaler	73	1.4 J	8425-0101-30
RRC 13N needle scaler	73	1.4 J	8425-0101-36

Atlas Copco industrial power tools

Impact wrenches				
Square drive	Torque	Name		Ref n°
3/8"	Max 70	LMS 17	HR 10	8434-1170-60
1/2"	Max 340	LMS 37	HR 13	8434-1360-41
3/4"	Max 500	LMS 57	HR 20	8434-1570-09
1"	Max 1300	LMS 61	HR 25	8434-1055-01
1"	Max 2300	LMS 67	HR 25	8434-1640-03
1"	Max 2300	LMS 67	GR 25	8434-1641-02
1 1/2"	5000-10000	LMS 86	GOR 38	8434-1860-14
1 1/2"	5000-10000	LMS 86	GIR 38	8434-1860-22

PRO material removal tools

Vertical grinders				
Type	Ø in mm	Power	RPM	Ref n°
G 2415 grinder	180	1.0 kW	8500	8423-2522-49
G 2416 sander	180	1.0 kW	6000	8423-2522-56

Angle grinders				
Type	Ø in mm	Power	RPM	Ref n°
G 2510-125	125	0.8 kW	12000	8423-0316-00
G 2510-115	115	0.8 kW	12000	8423-0316-01

Die grinders				
Type	Ø in mm	Power	RPM	Ref n°
G 2414	16	0.75 kW	20000	8423-0312-30
G 2424E	16	0.85 kW	20000	8423-0312-56

Pistolgrip & belt sander				
Type	Ø in mm	Power	RPM	Ref n°
G 2402 sander	125	0.3 kW	12000	8423-0312-02
G 2403 belt sander	10 x 330	0.25 kW	18000	8423-0304-33
G 2404 belt sander	20 x 520	0.4 kW	16500	8423-0304-44

Chippers & needle scalers			
Type	Freq. (Hz)	Chissel Shank	Ref n°
P 2520 straight scaler	90	12.7 mm	8425-0103-15
P 2516A straight needle scaler	76	19 needles	8425-0103-67
P 2525 pistol scaler	55	10.2 mm O	8425-0206-02
P 2526 pistol scaler		12.7 mm	8425-0206-10
P 2505 engraving pen	183		8425-0102-72

Drills				
Type	Ø in mm	Power	RPM	Ref n°
D 2112 pistol drill	6,5	0.4 kW	5400	8421-0405-05
D 2116 pistol drill	10	0.4 kW	2400	8421-0405-13
D 2121 pistol drill	13	0.4 kW	750	8421-0405-21
D 2163 angle drill	10	0.3 kW	200	8421-0410-08

PRO assembly and accessories

Impact wrenches			
Square drive	Torque	Name	Ref n°
1/2"	350-650 Nm	W 2215XTC	8434-1244-80
3/4"	650-1300 Nm	W 2220	8434-1244-39
1"	1600 Nm	W 2225B	8434-1244-54

Ratchet wrenches			
Square drive	Torque	Name	Ref n°
3/8"	5 - 68 Nm	W 2300	8431-0350-00
1/2"	5 - 68 Nm	W 2301	8431-0350-01

Airline accessories	
Couplings	
qic 10	nip 10
qic 15	nip 15
ergo qic 08	ergo nip 08
ergo qic 10	ergo nip 10
claw	

Air prep. units	
Midi F/R D	ball / ergoqic
Midi F/R	ball / claw
Maxi F/R D	ball / claw

Hoses 20 m		Ref n°
10 mm	Rubbair 10 mm	8202-0402-10
13 mm	Rubbair 13 mm	8202-0402-13
16 mm	Rubbair 16 mm	8202-0402-16
20 mm	Rubbair 20 mm	8202-0402-20
25 mm	Rubbair 25 mm	8202-0402-25

WEDA pumps

WEDA					
	Max flow	Length	Power	Weight	Outlet
	l/m	m	kW	kg	
WEDA 10	600	15	1	12.5	2"
WEDA 30	800/1500	24	2	20	3"
WEDA 40	1500	21	3	25	3"
WEDA 50	1000/3000	18/53	4.7/5.4	55/63	3"/4"
WEDA 60	1200/2900	24	7.5	55/63	3"/4"
WEDA 70	1350/4700	34/80	11.8	95	4"/6"
WEDA 90	1700/6200	45/84	26.5	180	4"/6"
WEDA 100	20200	38	54	510	10"

Pneumatic pumps

DIP applications:

Centrifugal pumps designed for clean, low-viscosity liquids such as water, cooling fluids, solvents, light oil or petrol

DOP applications:

Diaphragm pump designed for construction, mining and industrial applications or process industry

- Polluted media
- Viscous media
- Highly abrasive or inflammable fluids

Your benefits

- Robust
- Cannot be damaged by overloading
- Suitable for all kinds of environments

Technical specifications

Type	Max. head	Max. flow	Max. air requirement	Weight	Fluid outlet	Air inlet	Air outlet	Ref n°
	m	l/s	l/s	kg	in	in	in	
DIP 25	25	28	70	23	G 2 1/2	G 3/4	G 1 1/2	8492-0103-20
DIP 35	35	22	70	23	G 2 1/2	G 3/4	G 1 1/2	8492-0103-38
DIP 65	59	11	70	23	G 2 1/2	G 3/4	G 1 1/2	8492-0106-19
DOP 15N	59	7	34	31	G 2 1/2	G 3/4	-	8492-0101-48
DOP 15F	59	7	34	31	G 2 1/2	G 3/4	-	8492-0101-63

Data at 6 bar (90 psi) air pressure.
US versions and pumping kits also available.
15N: for construction industry.
15F: for process industry.

ATLAS COPCO GLOBAL PARTS AND SERVICE

Keeping Your Equipment Fit at All Times

We know how important it is to keep your equipment running. Our equipment has the longest maintenance intervals in the business and very limited breakdowns because we believe in keeping the Total Low Cost of Ownership low. However, if your compressor should need attention, it is always good to know that we are close by and ready to assist.

As our compressors are fitted with especially made Atlas Copco heavy duty oil, your crew can continue maintaining, painting and chipping. You have good quality air and your cargo operations continue smoothly with perfectly working compressed air equipment.

For service we can offer you:

- Oil sampling services
- Inspection service once a year in major hubs around the world on board of your ship
- Service contracts
- Training for your crew
- Special developed lubricants for top performance

Atlas Copco Global Parts and Service

Tel.:
+32 3 8702111
+31 117493412
+31627658850

Your benefits

You order the original parts from the sales contact in your country and we will take care of prompt delivery. With our own Atlas Copco offices in more than 180 countries, we can act fast for service and parts and meet your needs all over the world, avoiding extra transport costs and travelling time. Even in case the specific part you are in need of is not available at your local Atlas Copco Center, we will be able to find it for you. Regardless of where the part is located, you can order it at your local Atlas Copco Center and we will make sure it is delivered to the address of your choice. This service is unique in the industry. By using Atlas Copco genuine parts, you can be assured that the compressor, starting or working air, dryers and filters will keep performing with the highest efficiency.

All our office have 24/7 call numbers and an additional number especially for Marine services. Atlas Copco is the only company in the sector with highly trained service engineers available around the clock.

Any urgent inquiries for quotes, parts and services can also be addressed via the website www.atlascopco.com/marine, via mail to atlascopco.marine@atlascopco.com or via our international telephone number +31 627658850.

To deliver parts, we have a World Class Distribution Center

- Fully automated order handling
- Shipping: 80 trucks – 500 tons per day
- 75,000 parts references
- 1,300,000 orders line per year
- 4,000 parcels packed & shipped per day
- Parcels from 100 g to 16 tons
- 200 people
- Open Year Round
- DDD delivery in 24 hours in Europe
- DTC to the states in 48 hours
- Delivery in 72-96 hours to the rest of the world
- Service centers in North America – China
- Service centers in development in India and Brasil

CALCULATION & CONVERTING FACTORS

1. Calculation Tools

1. Example of dimensioning compressed air installations

The following paragraphs contain calculations for dimensioning a typical compressed air installation. Their purpose is to show how some of the formulas and reference data from previous chapters are used. The example is based on a given compressed air requirement and the resulting dimensioned data are based on components that have been selected for this particular compressed air installation. Following the paragraph dealing with a typical case are a few additional paragraphs that illustrate how special cases can be handled: high altitude, intermittent output, energy recovery and calculating pressure drop in the piping.

2. Input data

The quantitative compressed air requirements and the local ambient conditions must be established before starting any dimensioning. In addition to this quantitative requirement, a qualitative selection must be made, depending on whether the compressor should be oil-lubricated or oil-free, and whether the equipment should be water-cooled or air-cooled.

2.1 Compressed Air Requirement

Assume that the installation contains three compressed air consumers with the following data:
Consumer Air Flow Pressure Dew Point
1. 12 Nm3/min, 6 bar(e), $^{+}$6°C
2. 67 l/s (FAD), 7 bar(a), $^{+}$6°C
3. 95 l/s (FAD), 4 bar(e), $^{+}$6°C

2.2 Ambient conditions for dimensioning

Normal ambient temperature: 20°C
Maximum ambient temperature: 30°C
Ambient pressure: 1 bar(a)
Humidity: 60%

2.3 Additional specifications

Air-cooled equipment only.
Compressed air quality from oil-lubricated compressors.

3. Component selection

Recalculate all input data from the requirement in 2.1, to ensure that it is normalized with regard to measurement units before dimensioning the different components.
Flow conversion:
In general, the unit l/s is used to define compressor capacity, which is why consumer 1, given in Nm^3/min, must be recalculated in l/s:
12 Nm3/min = 12 x 1000/60 = 200 Nl/s.

Inserting the current input data in the formula gives:

$$Q_{FAD} = \frac{Q_N x(273=T_i)x1.013}{273xP_i} \quad \frac{200x(273^{+}35)x1.013}{273x0.74} \quad 309\ l/s(FAD)$$

qFAD = Free Air Delivery (l/s)
qN = Normal volume rate of flow (Nl/s)
TFAD = Maximum inlet temperature (30°C)
TN = Normal reference temperature (0°C)
PFAD = Standard inlet pressure (1.00 bar(a))
PN = Normal reference pressure (1.013 bar(a))
Pressure conversion:
The unit generally used to define pressure for compressed air components is effective pressure (also called gauge pressure), stated in bar(e).
Consumer 2 is stated in absolute pressure, 7 bar(a). The ambient pressure is subtracted from 7 bar to yield the effective pressure. As the ambient pressure in this case is 1 bar(a), the pressure for consumer 2 can be written as (7-1) bar(e) = 6 bar(e).
With the above recalculations, the table with uniform requirement data becomes:
Consumer Air Flow Pressure Dew Point
1. 225 l/s (FAD), 6 bar(e), +5°C
2. 67 l/s (FAD), 6 bar(e), +5°C
3. 95 l/s (FAD), 4 bar(e), +5°C

3.1 Dimensioning the compressor

The total air consumption is the sum of the three consumers 225 + 67 + 95 = 387 l/s. Taking into account possible changes in the planned air consumption data, and later incremental expansion of compressed air needs, a safety margin of approx. 10-20% should be added. This gives a dimensioned flow rate of
387 x 1.15 ≈ 450 l/s (including the 15% safety margin).

The maximum required pressure for all consumers is 6 bar(e). A reducing valve should be fitted to the consumer number 3 with the requirement of 4 bar(e).

Assuming that the combined pressure drop in the dryer, filter and piping does not exceed 1.5 bar, a compressor with a maximum working pressure capability of no less than 6 + 1.5 = 7.5 bar(e) is suitable in this case.

3.2 Final compressor selection

A compressor with the following specifications is selected:
Oil-injected screw compressor type
Maximum compressor outlet pressure = 7.5 bar(e)
FAD at 7 bar(e) = 450 l/s

This requirement is met by a compressor with installed motor shaft power = 162 kW.
The compressed air temperature out of the compressor aftercooler
= ambient temperature +10°C. Furthermore, the selected compressor has loading/unloading regulation with a maximum cycle frequency of 30 seconds. Using loading/unloading regulation, the selected compressor has a pressure fluctuation between 7.0 and 7.5 bar(e).

3.3 Dimensioning the working air receiver

QC = Compressor capacity = 450 l/s
P1 = Compressor inlet pressure = 1 bar(a)
T1 = Maximum inlet temperature = 30°C = 273 + 30 = 303 K
Fmax = Maximum cycle frequency = 1 cycle/30 seconds
(PU - PL)= Pressure difference between Loaded and Unloaded compressor = 0.5 bar
T0 = Compressed air temperature out of the selected compressor is 10°C higher than the ambient temperature; therefore the maximum temperature in the air receiver will be = 273 + 40 = 313 K
Compressor with loading/unloading regulation gives the following formula for the air receiver volume:
This is the minimum recommended air receiver volume.
The next larger standard size is usually selected.

$$V = \frac{0.25 \times Q_c \times T_o}{F_{max}(P_u - P_L) \times T_1} \quad \frac{0.25 \times 450 \times 313}{1/30 \times 0.5 \times 303} \quad 6972\ l$$

3.4 Dimensioning the dryer

The required dew point in this example is +5°C. Therefore a refrigerant dryer is the most suitable choice of dryer. When selecting the dryer size a number of factors must be taken into consideration and the refrigerant dryer capacity should be corrected using appropriate correction factors. These correction factors are unique to each refrigerant dryer model.
In the case below, the correction factors applicable for Atlas Copco refrigerant dryers are used, and they are stated on the Atlas Copco product data sheet. The correction factors are:

1. Refrigerant dryer inlet temperature and pressure dew point

Because the compressed air temperature out of the compressor is 10°C higher than the ambient temperature, the refrigerant dryer inlet temperature will be maximum 30 + 10 = 40°C. In addition, the desired pressure dew point is +5°C.
The appropriate correction factor 0.95 is obtained from the Atlas Copco data sheet.
The actual working pressure is approx. 7 bar, which represents a correction factor of 1.0.

2. Ambient temperature

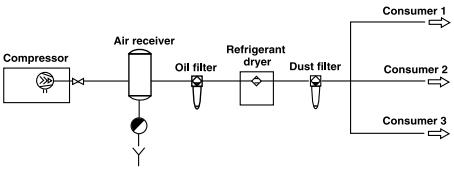
For a maximum ambient temperature of 30°C a correction value of 0.95 is obtained.
Consequently, the refrigerant dryer should be able to handle the compressor's full capacity multiplied by the correction factors above.
450 x 0.95 x 1.0 x 0.95 = 406 l/s.

3.5 Summary for continued calculation

An air-cooled refrigerant dryer with the followed data is selected:
Capacity at 7 bar(e) = 450 l/s
Total power consumption = 5.1 kW
Emitted heat flow to surroundings = 14.1 kW
Pressure drop across the dryer = 0.09 bar

3.6 Checking calculations

When all components for the compressor installation have been selected, it must be ensured that the total pressure drop is not too great. This is done by adding up all of the pressure drops for the components and pipes. It may be appropriate to draw a schematic diagram of the compressed air installation as shown here:



The pressure drop for the components is obtained from the component suppliers, while the pressure drop in the pipe system should not exceed 0.1 bar. The total pressure drop can now be calculated: Component pressure drop (bar) Oil filter (pressure drop when filter is new): 0.08

Refrigerant dryer: 0.09
Dust filter (pressure drop when filter is new): 0.08
Pipe system in compressor central plant: 0.05
Pipes from compressor central plant to consumption points: 0.1
Total pressure drop: 0.4

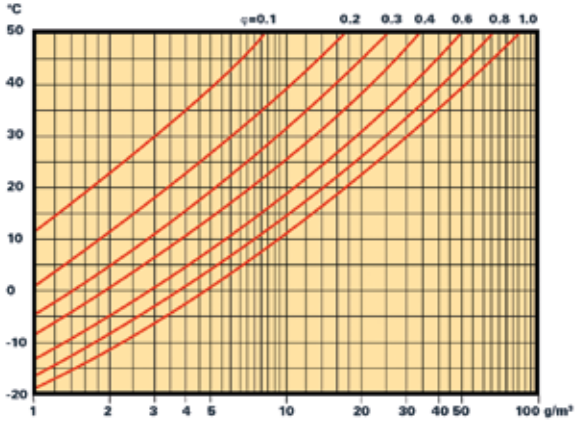
The maximum unloaded pressure of 7.5 bar(e) and load pressure of 7.0 bar(e) for the selected compressor gives a lowest pressure at the consumers of 7.0 - 0.4 = 6.6 bar(e). Add to this the additional pressure drop increase across the filter that occurs over time. This pressure drop increase is unique for each filter type and can be obtained from the Atlas Copco product data sheet.

Table 1: Some physical properties of dry air at 15°C and 1.013 bar.

Boiling point	78.8	K
Critical pressure (a)	97.66	bar
Critical temperature	132.52	K
Specific weight	1.225	kg/m^3
Dynamic viscosity	17.89×10^{-6}	Pa x s
Freezing point	57-61	K
Gas constant	287.1	J (kg x K)
Kinematic viscosity	14.61×10^{-5}	m/s^2
Molar mass	28.964	Dimensionless
Constant pressure	1.004	kJ / (kg x K)
Specific heat capacity ratio	1.40	Dimensionless
Speed of sound	340.29	m/s
Thermal conductivity	0.025	W / (m x k)

2. Water content in air

Water content in air at different relative vapor pressures (ø)



3. SI units

The 16 most important derived units below have been given generic names:

Quantity	Unit	Symbol	Expressed in other SI units
Frequency	Hertz	Hz	s^{-1}
Force	Newton	N	kg x m x s^{-2}
Pressure/mechanical stress	Pascal	Pa	N/m^2
Energy/work	Joule	J	N x m
Electric quantity/charge	Coulomb	C	A x s
Electric voltage	Volt	V	W/A
Capacitance	Farad	F	C/V
Resistance	Ohm	Ω	V/A
Conductivity	Siemens	S	A/V
Magnetic flux	Weber	Wb	V x s
Magnetic flux density	Tesla	T	Wb/m^2
Inductance	Henry	H	Wb/A
Luminous flux	Lumen	lm	Cd x sr
Light	Lux	lx	Lm/m^2
Angle	Radian	rad	m/m
Solid angle	Steradian	sr	m^2/m^2

The following are common additional units for technical use:

Quantity	Unit	Symbol	Remark
Volume	Liter	l	1 l = 1 dm^3
Time	Minute	min	1 min = 60 s
Time	Hour	h	1 h = 60 min
Mass	Metric ton	t	1 t = 1000 kg
Pressure	Bar	bar	1 bar = 10^5 Pa
Plane angle	Degree	.°	1° = n/180 rad
Plane angle	Minute	.′	1′ = 1°/60
Plane angle	Second	.″	1″ = 1′/60

4. Converting factors

Standard prefixes for the SI units of measure												
Multiples	Name		deca-	hecto-	kilo-	mega-	giga-	tera-	peta-	exa-	zetta-	yotta-
	Symbol		da	h	k	M	G	T	P	E	Z	Y
	Factor	10^0	10^1	10^2	10^3	10^6	10^9	10^{12}	10^{15}	10^{18}	10^{21}	10^{24}
Sub-divisions	Name		deci-	centi-	milli-	micro-	nano-	pico-	femto-	atto-	zepto-	yocto-
	Symbol		d	c	m	µ	n	p	f	a	z	y
	Factor	10^0	10^{-1}	10^{-2}	10^{-3}	10^{-6}	10^{-9}	10^{-12}	10^{-15}	10^{-18}	10^{-2}	10^{-24}

Conversions required for:

Length: 1 meter = 39.37 inches
Volume: 1 m³ = 219 (UK) / 264 (US) gallon
Mass: 1 kg = 2.2 lbs (UK)
Power: 1 kW = 1.34 hp

Flow (derived): 1 m³/h = 0.588 cfm
Pressure: 1 bar = 14.5 psi
1 bar = 1000 mbar
10 bar = 1 MPa

Prefixes may be added to a unit to produce a multiple of the original unit.
All of these multiples are integer powers of ten, for example:
- kilo- denotes a multiple of thousand (10^3)
- milli- denotes a multiple of one thousandth (10-3)

5. Air required capacities

Machine type and size	Max. air requirement (l/s)
Drilling machines, ø = bit diameter (mm)	
Small: ø < 6.5	6.0
Medium: 6.5 < ø ≤10	7.5
Large: 10 < ø < 16	16.5
Thread cutters	**6**
Screwdriver, d = screw size	
Small: d < M6	5.5
Medium: M6 < d < M8	7.5
Impact wrench, d = bolt size	
Small: d < M10	5.0
Medium: M10 < d < M20	7.5
Large: d ≥ M20	22.0
Filing machine	**7.5**
Polishers/Die grinders, e = power (kW)	
Small: e < 0.5	8.0
Large: e > 0.5	16.5
Grinders, e = power (kW)	
Small: 0.4 < e < 1.0	20.0
Medium: 1.0 < e < 2.0	40.0
Large: e > 2.0	60.0
Chipping hammers	
Light	6.0
Heavy	13.5
Air hoists, t = lifting tonnage	
t < 1 ton	35
t > 1 ton	45
Scaler	**5.0**
Cleaning nozzle	**6.0**
Nut runner, d = bolt size	
d ≤ M8	9
d ≥ M10	19

Typical air consumption data of some common power tools and machines, based on experience. These values form the basis for calculating the requisite compressor capacity.

6. Explanation of Free Air Delivery

* Free Air Delivery measured according to ISO 1217 with reference conditions:

Absolute inlet pressure	1 bar
Intake air and coolant temperature	20°C

** Air Bottle Charging measured at Atlas Copco works at:

Absolute inlet pressure	1 bar
Intake air and coolant temperature	35°C
Pressure range	0-30 bar
Air bottle volume	1250 liter

For compressor capacities two values are used:

1. Free Air Delivery (FAD)

This is a compressor capacity, measured according ISO 1217 annex C, latest edition, by which measured capacity values are corrected towards reference conditions being:

Absolute inlet pressure	1 bar
Intake air and coolant temperature	20°C
Relative humidity	0%

The standardised FAD capacity value makes it possible to compare capacity values of suppliers of compressors using the same standard (when the FAD is referenced to the ISO standard).

2. Air Bottle Charging

To determine the "Air Bottle Charging" capacity of the compressor, the time is measured to reach the required pressure increase over a specific pressure stage while pumping on a specific air bottle volume, at a specific intake air and coolant temperature. With this "Air Bottle Charging" method, the pressure rise due to the temperature rise of the compressed air is "added" to the compressor capacity.

This means that the capacity value according to method 2 is higher than the value according to method 1, with this remark: that a fall in temperature of the compressed air resulting from heat loss to ambient will more or less undo the "capacity advantage". The speed of the temperature drop (already begun during the pumping of the compressor) shall depend on factors like size and shape of the compressed air storage vessel, ambient temperature and ambient air velocity.

Important note:
Method 2 corresponds with the practical method of determining the compressor capacity which is used among others during capacity approval tests at Atlas Copco by Classification Societies.

ISO quality air standard (ISO 8573-1:2010)

The quality of compressed air used in industrial processes is specified in the international standard ISO 8573-1. Untreated compressed air typically contains 3 types of contaminants: dirt, water and oil. The Quality Classes specify the maximum allowed limits.

ISO 8573-1:2010	Dirt				Water		Oil
	Maximum number of particles per m³			Mass concentration mg/m³	Vapor pressure dewpoint	Liquid g/m³	Total oil (aerosol liquid and vapor) mg/m³
	0.1 - 0.5 micron	0.5 - 1 micron	1 - 5 micron				
0	As specified by the equipment user or supplier and more stringent than Class 1						
1	≤ 20000	≤ 400	≤ 10	-	≤ -70°C/-94°F	-	0.01
2	≤ 400000	≤ 6000	≤ 100	-	≤ -40°C/-40°F	-	0.1
3	-	≤ 90000	≤ 1000	-	≤ -20°C/-4°F	-	1
4	-	-	≤ 10000	-	≤ +3°C/+37.4°F	-	5
5	-	-	≤ 100000	-	≤ +7°C/+44.6°F	-	-
6	-	-	-	≤ 5	≤ +10°C/+50°F	-	-
7	-	-	-	5 - 10	-	≤ 0.5	-
8	-	-	-	-	-	0.5 - 5	-
9	-	-	-	-	-	5 - 10	-
X	-	-	-	> 10	-	> 10	> 10

Installation advice for marine units being placed on board inside engine rooms

1. Ventilation

Air changes can be according to Atlas Copco advice or according to the ISO international standard for engine rooms on ships.
According to Atlas Copco:

Qv = 284.5 N / Δ T

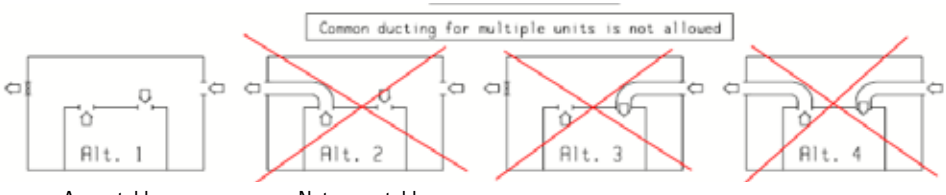
Qv is the required ventilation capacity (cfm)

N is the installed motor power (hp)

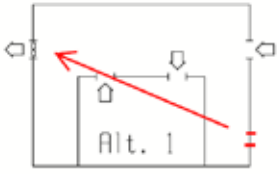
Δ T is the compressor room temperature over the outdoor temperature (°F)

According to ISO 8816 international standard for engine room ventilation calculation:
Air flow should be air flow required for the compressor inlet +50%.
Maximum pressure in compressor room 50 mm Aq colom or 6 air changes of the total room/hr for ventilation purposes.

2. Ventilation ducts



Acceptable Not acceptable



Preferable

Reason: to avoid water direct water ingress by crew deck washing or heavy seas.

3. Space

According to all classifications there must be a minimum space available around the unit in the engine room of 600 mm. However there are MAS compressors which are accessible from one side only and therefore need space only on that specific size. For maintenance spacing please check the dimensional drawings.

4. Connecting compressors to the compressed air piping:

5. Cooling water

Sea cw system

- On sea cw systems the pipe material will be : Galvanized, Aluminized, Polyetyleen coated, CuNiFe or GRP (glass reinforced polyester).
- We advize the customer to have a spool piece fitted of mild steel between the compressor and the ship's system. This piece can then be corroded away, so cold sacrificial spoolpiece.
- It is very important to limit the speed of the cooling water flow.

This speed is maximum according to class rules:

Galvanized steel	3.0 m/s	90/10 copper-nickel-iron	3.5 m/s
Aluminium brass	3.0 m/s	70/30 copper-nickel	5.0 m/s

The outlet speed should not have a free fall to the outside of the vessel to avoid erosion in the cooler waterboxes. Piping diameter should be according to the compressor pecification

Central fresh cooling water system

Normally steel piping; in case more machinery is installed on the same cw pipeline it is advized to fit a non return valve in the system to avoid cooling water flow when the compressor is in standstill. On starting air we have an inlet solenoid valve fitted. Due to corrosion inhibitors added to the cw system no zinc originated material is allowed to be in contact with the cooling water. Connecting pipelines should be according to the specification of the compressor and cannot be smaller from compressor to cw pump.

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