

# Atlas Copco Marine Air Solutions

Setting the standard in marine compressed air



*Sustainable Productivity*



# Table of Contents

<b>Global Solutions for Sustainable Productivity .....</b>	<b>5</b>
<b>Setting the Standard in Marine Compressed Air .....</b>	<b>6</b>
<b>Starting Air Compressors.....</b>	<b>8</b>
Air-cooled Piston Compressors LT 3-20 (30 bar).....	9
Electrically Driven Compressors .....	10
Diesel Driven Compressors.....	11
Water-cooled Piston Compressors LT 25-125 (30 bar).....	12
<b>Working, Control &amp; Instrument Air Compressors .....</b>	<b>16</b>
Variable Speed Drive Units (VSD) .....	16
Oil-injected Screw Compressors .....	18
Marine Air Systems (MAS) Compressors.....	19
Oil-injected Screw Compressors MAS GA 5-90 (5-90 kW).....	20
Oil-injected Screw Compressors MAS GA 110-160 (110-160 kW).....	22
Oil-injected Screw Compressors MAS G 180-315/MAS GA 315-355* (345-385 kW) ....	24
Oil-injected Screw Compressors MAS* GA 55-90PP (55-90 kW/75-120 hp).....	26
Oil-free Piston Type Compressors LE 2-20 (10 bar) .....	28
Class 0 Oil-free Air Compressors.....	29
Scroll Type Compressors SF 1-15.....	30
Oil-free Tooth Compressors ZT 15-22 / ZR 30-45 .....	31
Screw Blowers ZS 37*-160* VSD / ZS 18-132 .....	32
Oil-free Screw Compressors ZR 55-570/75-900 VSD / ZT 55-75/75-315 VSD .....	33
<b>Air Receivers .....</b>	<b>34</b>
<b>Engineered Solutions for Your Every Need .....</b>	<b>36</b>
<b>Atlas Copco Rental.....</b>	<b>39</b>
<b>Portable Air .....</b>	<b>40</b>
ZoneAir Compressor XATS 1020 .....	40
Hurricane Boosters B13-62 .....	41
High Pressure Compressors for Seismic Surveying.....	42
<b>Flexible Gas and Process Solutions .....</b>	<b>44</b>
<b>Nitrogen for Marine Applications .....</b>	<b>46</b>
<b>Standard Complete Nitrogen Skids for Dual Fuel Systems.....</b>	<b>48</b>
<b>Air Treatment.....</b>	<b>50</b>
Refrigerant Compressed Air Dryers FD 5-4000.....	52
Refrigerant Compressed Air Dryers FX 1-22 .....	54
Heatless Adsorption Air Dryers CD 7-1600 / BD .....	56
Compressed Air Filters.....	58
<b>Compressed Air Tools and Pumps.....</b>	<b>60</b>
<b>Atlas Copco Global Parts and Services .....</b>	<b>66</b>
<b>Calculation &amp; Converting Factors .....</b>	<b>68</b>
<b>Contact .....</b>	<b>78</b>

# 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

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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.



## An energy-efficient solution for any marine application

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Atlas Copco offers the following equipment for the marine industry:

- ▶ Starting air
- ▶ Oil-injected and oil-free compressors for:
  - Working air
  - Control air
  - Instrument air
  - Bulk handling
  - Feed air (N<sub>2</sub>-generator)
  - Exhaust gas treatment
  - Low pressure air for de-blasting semi sub & sewage treatment
- ▶ Oil-free compressors for instrument air
- ▶ Seismic survey HP compressors
- ▶ Oil-free air screw compressors for instrument air and booster air for nitrogen plants
- ▶ Centrifugal air and gas compressors
- ▶ Nitrogen for dual fuel systems
- ▶ Air treatment
  - Starting air receivers
  - Working air receivers
  - Air dryers
  - Air filters
  - Condensate treatment
- ▶ Pneumatic tools and pumps
- ▶ Atlas Copco Global Parts and Services



# Starting Air Compressors

## Lubricated Reciprocating Compressors

Atlas Copco's 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 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 electric and diesel driven version, with custom made skids, special colors... whatever is required.

These compressors are tested for 22.5 rolling direction and 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.
  - Oil change and valve condition check is only required once a year or every 3000 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.

## 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 High pressure stainless steel water separator with integrated check valve
- 7 Excellently balanced by V-shape design
- 8 Flexible hose for compressed air out
- 9 Pressure switch
- 10 Direct coupled motor with pre-loaded bearings
- 11 Glycerin filled pressure gauge

## 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	

Compressor type	FAD*	Charging capacity**	Power	Dimensions			Weight
	m <sup>3</sup> /h	m <sup>3</sup> /h	kW	L (mm)	W (mm)	H (mm)	kg
<b>50 Hz</b>							
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
<b>60 Hz</b>							
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 74.

## 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	

Compressor 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
<b>Diesel driven</b>									
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.

\*\* In accordance with shipbuilding regulations. For further information, please refer to page 74.

## 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, noise levels as low as 91 dB(A) and a vibration foundation of less than 14 mm/sec. The LT KE offer 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.
- Suitable for sea water 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).
- 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

Compressor type	FAD*	Charging capacity**	Frequency	Power
	m <sup>3</sup> /h	m <sup>3</sup> /h	Hz	kW
LT 25-30 KE	55	60	60	15
	69	75	50	18.5
	83	90	60	22
LT 30-30 KE	74	80	60	18.5
	92	100	50	22
	111	120	60	30
LT 35-30 KE	92	100	60	22
	115	125	50	30
	139	150	60	30
LT 40-30 KE	106	115	60	30
	134	145	50	37
	162	175	60	37
LT 50-30 KE	134	145	60	30
	166	180	50	37
	204	220	60	45
LT 60-30 KE	162	175	60	37
	204	220	50	45
	241	260	60	55
LT 100-30 KE	268	290	60	55
	333	360	50	75
	398	430	60	90
LT 125-30 KE	315	340	60	75
	398	430	50	90

\* Measured according to ISO 1217, Annex C, latest edition.

\*\* In accordance with shipbuilding regulations. For further information, please refer to page 74.

### 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

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

## 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+ GA 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 GA 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+ GA VSD adapts to the flow and controls your costs:

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- 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.

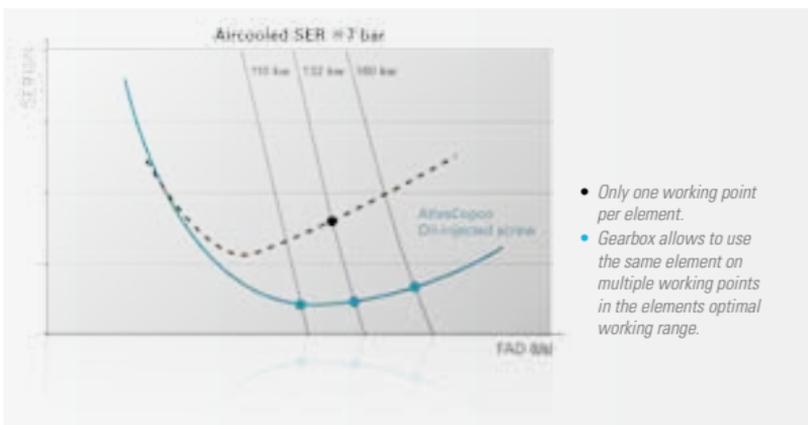


## Oil-injected Screw Compressors



**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 m<sup>3</sup>/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.



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<sup>+</sup> 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.

### Scope of supply

	MAS	MAS <sup>+</sup>
Marine motor	-	✓
Ambient temperature 55°C	✓	✓
Controller with DSS function	✓	✓
Tropical thermostat	✓	✓
AM meter	-	✓
Halogen-free cabling	-	✓
Flame retardant wiring	-	✓
Doorstopper	✓	✓
Remote stop/start	○	✓
Voltage-free contacts	○	✓
Motor heating and thermistor protection	-	✓
Star-delta start	✓	✓
Variable Speed Drive (VSD)	-	○
440/400/690 V 50 & 60 Hz	✓	✓
Main switch	○	✓
Re-silent chocks	✓	✓
Approvals	-	✓
Built-in air dryer	○	○

- : Not available

✓: Standard

○: Optional

## Oil-injected Screw Compressors MAS GA 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 GA 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 GA 22\*

### Technical specifications

Compressor 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 GA 5	5	a+10°C	a+5°C	N/A	N/A	260/300		1145	710	1240
MAS GA 7	7	a+10°C	a+5°C	N/A	N/A	270/315		1145	710	1240
MAS GA 11	11	a+10°C	a+5°C	N/A	N/A	300/345		1145	710	1240
MAS GA 11*	11	a+5°C	a+1°C	N/A	N/A	410/456		1255	692	1475
MAS GA 15*	15	a+5°C	a+1°C	N/A	N/A	420/470		1255	692	1475
MAS GA 18*	18.5	a+5°C	a+1°C	N/A	N/A	440/501		1255	692	1475
MAS GA 22*	22	a+5°C	a+1°C	N/A	N/A	455/523		1255	692	1475
MAS GA 30*	30	a+10°C	a+5°C	cwt+5°C	a+5°C	780/855		1395	865	1625
MAS GA 37	37	a+10°C	a+5°C	cwt+5°C	a+5°C	787/862		1395	865	1625
MAS GA 45	45	a+10°C	a+5°C	cwt+5°C	a+5°C	821/896		1395	865	1625
MAS GA 55	55	a+10°C	a+5°C	cwt+5°C	a+5°C	1145/1305		2040	970	1802
MAS GA 75	75	a+10°C	a+5°C	cwt+5°C	a+5°C	1500/1650		2040	970	1802
MAS GA 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 GA 5-11 also available as tank-mounted version.

\* According to ISO 1217, latest edition.

**55°C RESISTANT  
THROUGH  
INNOVATION**



MAS GA 11\*22'

MAS GA 5-11

MAS GA 5-11



MAS GA 90



MAS GA 30\*45

## Technical specifications

FAD* 50 Hz m <sup>3</sup> /h				FAD* 60 Hz m <sup>3</sup> /h				Sound level	Heat dissipation	Cooling		
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	Water flow ER
												I/min
48	43	37	28	49	43	36	30	60	6	2.5	N/A	
69	63	58	45	70	61	57	44	62	8	3.5	N/A	
94	86	79	70	94	86	77	66	62	13	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	17	7.5	N/A	
184	174	156	125	190	168	154	129	66	21	9.3	N/A	
196	195	174	145	224	203	181	165	67	25	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 GA 5-11 also available as tank-mounted version. Sound level acc. to ISO 2151.

\* According to ISO 1217, latest edition.

# Oil-injected Screw Compressors

## MAS+ GA 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**
  - Large 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 MAS+ GA 55-90PP (50 Hz versions)

Compressor type	kW	Outlet air temperature				Weight	Dimensions		
		Air-cooled	Air-cooled	Water-cooled	Water-cooled				
		Without dryer	With dryer	Without dryer	With dryer	Air-cooled/ water-cooled	P/ kg	L (mm)	W (mm)
MAS+ GA 55PP	55	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ GA 75PP	75	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ GA 90PP	90	N/A	N/A	cwt+7°C	N/A	980	1540	1000	1540
MAS+ GA 55PP <sup>1</sup>	55	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ GA 75PP <sup>1</sup>	75	N/A	N/A	cwt+7°C	N/A	930	1540	1000	1540
MAS+ GA 90PP <sup>1</sup>	90	N/A	N/A	cwt+7°C	N/A	980	1540	1000	1540

Compressor type	kW	Free Air Delivery*				Sound level**	Heat dissipation	Cooling
		7.5 bar	8.5 bar	10 bar	13 bar			Water-cooled
		m <sup>3</sup> /h				dB(A)	kW	l/min
MAS+ GA 55PP	55	517	498	472	401	85	48	55
MAS+ GA 75PP	75	729	651	578	502	85	64	90
MAS+ GA 90PP	90	857	857	770	646	85	80	90
MAS+ GA 55PP <sup>1</sup>	55	582	545	509	435	85	48	55
MAS+ GA 75PP <sup>1</sup>	75	760	720	652	561	85	64	90
MAS+ GA 90PP <sup>1</sup>	90	967	945	859	755	85	80	90

<sup>1</sup> Max. ambient temperature 46°C

## Technical specifications MAS<sup>+</sup> GA 55-90PP (60 Hz versions)

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

Compressor type	kW	Free Air Delivery*				Sound level**	Heat dissipation	Cooling
		7.5 bar	8.5 bar	10 bar	13 bar			Water-cooled
		m <sup>3</sup> /h				dB(A)	kW	l/min
MAS <sup>+</sup> GA 55PP	55	548	489	447	407	85	48	55
MAS <sup>+</sup> GA 75PP	75	698	650	594	536	85	64	90
MAS <sup>+</sup> GA 90PP	90	918	857	788	709	85	80	90
MAS <sup>+</sup> GA 55PP <sup>1</sup>	55	599	531	487	444	85	48	55
MAS <sup>+</sup> GA 75PP <sup>1</sup>	75	771	688	651	584	85	64	90
MAS <sup>+</sup> GA 90PP <sup>1</sup>	90	996	917	860	789	85	80	90

<sup>1</sup> Max. ambient temperature 46°C

\* Unit performance measured according to ISO 1217, Annex E, Edition 4

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

\*\* A-weighted emission sound pressure level at the work station, L<sub>p</sub> 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: 20°C to 30°C, 36°F to 37°F.



# Oil-injected Screw Compressors

## MAS GA 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® (MKIV) regulation, ensuring reliable and safe operation.
  - Control panel (MKIV) including hour counter, amp meter, 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): 3000 x 799 x 1850 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	cwt + 5°C
Cooling	Water-cooled (sea and fresh water)
Inlet temperature cw	36°C
Ambient temperature	45°C
Max. pressure	14 bar
Size (L x W x H)	3000 x 799 x 1850 mm

Compressor type	kW	60 Hz FAD* m <sup>3</sup> /h				Cooling water capacity l/s	Weight kg
		6 bar	8.6 bar	10 bar	14 bar		
MAS GA 110	125	1260	1152	1036	868	3	1938
MAS GA 132	150	1465	1354	1242	1051	3	2073
MAS GA 160	185	1742	1541	1498	1292	4	2103

\* According to ISO 1217, latest edition.

## Available options

- ▶ Modulating control
- ▶ Type of starters
- ▶ Sea or fresh water-cooled
- ▶ Ampere meter
- ▶ Material certificate
- ▶ Test certificate
- ▶ Witness performance test

# Oil-injected Screw Compressors

## MAS G 180-315 / MAS GA 315-355+ (345-385 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® (MkIV/Mark 5) regulation, ensuring reliable and safe operation and including hour counter, amp meter, 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	36°C
Ambient temperature	45°C
Max. pressure	13.8 bar
Dimensions G units (L x W x H)	2500 x 1250 x 1954 mm
Dimensions GA units (L x W x H)	3300 x 1310 x 1976 mm

Compressor type	kW	60 Hz - Free Air Delivery (m³/h)*					Cooling water flow (m³/h)****	Weight L x W x H (mm)	Weight kg
		6 bar	7.5 bar	8.6 bar	10.4 bar	13.8 bar			
<b>60 Hz**</b>									
MAS G 180***	176	1999	1904	1753	1526	1336	173	2500 x 1250 x 1954	2876
MAS G 200***	217	-	2239	2126	1882	1609	21.2	2500 x 1250 x 1954	3040
MAS G 250***	256	-	2430	2426	2341	1987	25.6	2500 x 1250 x 1954	4200
MAS G 315***	294	-	-	-	2422	2401	25.0	2500 x 1250 x 1954	4800
MAS GA 315***	269	-	2790	2545	-	-	25.0	3300 x 1310 x 1976	5000
MAS GA 355*	385	-	-	-	-	2552	40.0	3300 x 1310 x 1976	5200

\* According to ISO 1217, latest edition.

\*\* 50 Hz machines: on request.

\*\*\* Value for kW is shaft power and measured for FAD with 8.6 bar.

\*\*\*\* Cooling water capacity given by FAD with 8.6 bar.

## Oil-free Piston Type Compressors LE 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

Compressor type	bar(e)	FAD*				Sound level dB(A)		Size		
		50 Hz (1500 rpm)		60 Hz (1800 rpm)		Unsilenced	Silenced			
		m <sup>3</sup> /h	kW	m <sup>3</sup> /h	kW	50/60 Hz	50/60 Hz	L (mm)	W (mm)	H (mm)
<b>LE 10 bar</b>										
LE 2-10	10	12	1.5	14.04	1.88	78/80	63/65	640	610	740
LE 3-10	10	15.6	2.2	18.36	2.59	79/81	64/66	640	610	740
LE 5-10	10	30	4	34.92	4.62	79/81	64/66	640	610	740
LE 7-10	10	42	5.5	48.96	6.18	80/82	68/70	780	670	850
LE 10-10	10	56.4	7.5	65.52	8.6	81/81	68/69	780	670	850
LE 15-10	10	85.8	11	103.32	12.84	89/90	78/78	1230	860	1020
LE 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 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 **essential instruments** where oil contamination could cause breakdowns. Oil-free compressors are also used on board in situations where the oil presence in ballast water needs to be avoided, such as **Ballast Water Treatment**, emptying ballast tanks or air inside ballast tank for winterization. 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.**

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](http://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

Compressor type 50/60 Hz	Max. working pressure	Capacity FAD*	Installed motor power	Sound level**	Dimensions L x W x H	Weight
	bar(e)	m <sup>3</sup> /h	kW	dB(A)	mm	kg
<b>Skid versions</b>						
SF 1	8	9.6	1.5	65	800 x 600 x 540 (Receiver mounted) 1267 x 600 x 1154	105
	10	7.1	1.5	65		105
SF 2	8	14.4	2.2	67		110
	10	12.0	2.2	67		110
SF 4	8	24.0	3.7	68		120
	10	18.0	3.7	68		120
<b>Skid versions – duplex tank mounted</b>						
SF 6T	8	38.4	5.9	72	2043 x 600 x 1154	365
	10	32.4	5.9	72		365
SF 8T	8	48.0	7.4	73		375
	10	40.2	7.4	73		375
<b>Fully silenced – WorkPlace Air System™</b>						
SF 1	8	9.6	1.5	53	590 x 600 x 850	97
	10	7.8	1.5	53		97
SF 2	8	14.4	2.2	55		97
	10	12.0	2.2	55		97
SF 4	8	24.0	3.7	57		102
	10	20.4	3.7	57		102
SF 6	8	37.2	5.9	63	1450 x 750 x 1040	340
	10	31.8	5.9	63		340
SF 8	8	48.0	7.4	63		345
	10	40.8	7.4	63		345
SF 11	8	72.6	11	63	1450 x 750 x 1844	480
	10	60	11	63		480
SF 15	8	94.8	15	63		560
	10	82.2	15	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 30-45



### 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.

### Technical specifications

Compressor type	Max. working pressure	Capacity FAD*	Installed motor power	Weight without dryer
	bar(e)			
<b>Air-cooled only</b>				
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		
<b>Air- (ZT) and water-cooled (ZR)</b>				
ZR/ZT 30	7.5	282	30	1065/1125
	8.6	264		
	7.5	348		
ZR/ZT 37	8.6	330	37	1115/1175
	7.5	414		
	8.6	390		
ZR/ZT 45	7.5	414	45	1140/1200
	8.6	390		
	7.5	414		

\* According to ISO 1217, latest edition.

# Screw Blowers

## ZS 37+ -160+ VSD / ZS 18-132



### 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+ VSD blowers 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
Outlet air temperature	127°C max.
Cooling	Air-cooled
Ambient temperature	40°C
Max. pressure	1.2 bar

Compressor 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 50 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 edition 3, 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® (MKIV) regulation, ensuring reliable and safe operation.
- Control panel (MKIV) 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

Compressor type	Principle	Max. working pressure	Capacity FAD*		Motor power	Cooling
		bar(e)	l/s	m³/h	kW	
<b>60 Hz</b>						
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.

# 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 **3600 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 IC<sup>3</sup>, 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
- Plant air applications
- Air separation nitrogen compressors
- Refinery service
- Process air
- Emergency back up air applications
- API applications
- Nitrogen generation
- Gas purification



# Atlas Copco Rental

## 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, through our own rental companies and rental business lines in our customer centres.

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](http://www.atlascopcorental.com) for more details.

### Your benefits

- ▶ **Most reliable diesel engine.**
- ▶ **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.**

### Technical specifications

Outlet air temperature	10°C
Cooling	Air-cooled
Max. ambient temperature	45°C
Size (L x W x H)	5240 x 2350 x 2210 mm



## 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

## Hurricane Boosters B13-62

Over 40 years of experience has taught us to maximize every component. Like all of our boosters, this unit provides you with a better penetration rate, cooler bit temperatures and longer bit life. Our hurricane boosters are second to none. They are smaller, lighter and still pack as much power as the larger and heavier comparable units available in the marketplace today. Our quality control and turnkey manufacturing processes guarantee excellence, while superior engineering and design help drive custom solutions for our customers. Every feature that is built into our boosters shows you the experience, the power, the quality... *the Hurricane difference*. Typical applications include: mineral exploration and blasthole drilling, coal bed methane drilling, oil and gas air/foam drilling, nitrogen generation, and pipeline services.



Technical data on request

## 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

Compressor type	FAD	FAD	Speed	Drive	Dimensions	Weight
	scfm	m <sup>3</sup> /h	rpm	kW	L x W x H (mm)	tons
<b>Maximum pressure 2200 psig / 150 bar(a)</b>						
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	410	697	1030	132	4075 x 2500 x 2300	5.3
GA90-7				90	2950 x 925 x 1650	2.15
C3T212	508	863	920	160	4075 x 2500 x 2300	5.4
GA90-7				90	2950 x 925 x 1650	2.15
C3T210	603	1025	970	160	4075 x 2500 x 2300	5.4
GA160-13				160	2950 x 925 x 1650	2.57
C3T212	709	1205	680	160	4075 x 2500 x 2300	5.4
GA160-13				200	3300 x 1310 x 1976	4.4
C3T212	880	1496	850	200	4075 x 2500 x 2300	5.6
GA200-13				200	3300 x 1310 x 1976	4.4
<b>Maximum pressure 3000 psig / 207 bar(a)</b>						
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	308	524	680	110	4075 x 2500 x 2300	5.1
GA90-7				90	2950 x 925 x 1650	2.15
C4T116	406	690	900	132	4075 x 2500 x 2300	5.3
GA90-7				90	2950 x 925 x 1650	2.15
C3T212	500	850	940	200	4075 x 2500 x 2300	5.6
GA90-7				90	2950 x 925 x 1650	2.15
C3T210	607	1032	880	160	4075 x 2500 x 2300	5.4
GA160-13				160	3300 x 1310 x 1976	4.4
C3T210	716	1217	1045	200	4075 x 2500 x 2300	5.6
GA200-13				200	3300 x 1310 x 1976	4.4

For enquiries, please see: [www.greenfield-comp.com](http://www.greenfield-comp.com)

# Flexible Gas and Process Solutions

## Customized solutions for the growing LNG market

In more than three 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 the tanker “Venator” took to the sea in 1973, it carried an LNG compressor built by Atlas Copco.

In 2000, then, when the world’s first on-board reliquefaction system was introduced on the “Jamal” vessel, Atlas Copco compressors and expanders were once again the “heart of the plant.” And in 2003, 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 Componder.

The keys to it all are simple: When Atlas Copco develops its LNG solutions, it draws from broad and thorough know-how in engineering customized machines for the petrochemical and chemical industries, as well as air separation and cryogenic applications. Around the globe, more than 400 boil-off and vapor-return compressors are running aboard of LNG vessels. In fact, more than 50% of the world’s LNG fleet is equipped with customized compressors from Atlas Copco.

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 generator packages. Multi-staging, with up to four stages (two per pinion), is a uniquely effective configuration in energy recovery and process control applications. Take an inside look at the Atlas Copco solutions that help you meet your LNG needs – and future challenges.



## Ship's Propulsion System

		Steam Turbine	Duel Fuel Diesel Electric	Slow Speed Diesel with reliquefaction plant
Compressors	L/D Compressor Single-stage	✓	-	-
	L/D Compressor Two-stage	-	✓	-
	BOG Compressor Multi-Stage	-	-	✓
	H/D Compressor Single-Stage	✓	✓	✓
Reliquefaction plant	Nitrogen Compander	-	○	✓
	L/D Gas Heaters	✓	✓	-
Heaters & vaporizers	L/D Forcing Vaporizer	✓	✓	-
	Mist Separator	✓	✓	-
	H/D Gas Heaters	✓	✓	✓
	LNG Vaporizer	✓	✓	✓

- : Not available

✓: Standard

○: Optional

### L/D Compressor, Single-Stage/ Two-Stage (Multi-Stage)

- ▶ Single-stage: used to transfer Natural Boil-Off Gas (NBOG) and Forced Boil-Off Gas (FBOG) to the main boiler.
- ▶ Multi-stage: used to supply NBOG from cargo tanks to Duel-Fuel engines, while maintaining constant absolute cargo tank pressure with respect to the compressor output pressure.

### BOG Compressor

- ▶ Used to supply NBOG from cargo tanks to the reliquefaction plant maintaining constant absolute cargo tank pressure & gas pressure for the cold box of the reliquefaction plant.

### 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.

### Nitrogen Compander

- ▶ Used for the cold production inside the NBOG reliquefaction plant.

### 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.

# Nitrogen for Marine Applications



## Atlas Copco can deliver nitrogen 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 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.

## Your benefits

- ▶ **Optimized installation and therefore optimized energy efficiency.**
- ▶ **The most efficient way to produce nitrogen due to balanced CMS 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 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 12 bar	Saving 7% energy per bar in pressure reduction for each compressor
Air to nitrogen factor at 5% Oxygen: 2 - 2.1	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 m <sup>3</sup> /h compressed air PSA produce 450 Nm <sup>3</sup> /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
Build-in availability for dry air (dew point -20°C) for venting and drying cargo tanks and void spaces	N/A	Dry air capacity at 2 x Nitrogen capacity at 95%
Moving parts: Yes, 6 valves per Generator module	Moving parts: Yes, also membrane systems have valves	All valves mounted 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

## Standard Complete Nitrogen Skids for Dual Fuel Systems

Atlas Copco has developed standard and complete N<sub>2</sub> skids with all the necessary equipment to ensure the safety of your vessels propelled on dual fuel or only on gas.



Complying with the Rule Requirements of the classification societies, our CustomDesign Department has designed for you the N<sub>2</sub> capacity you need, built on a single skid. It comes complete with compressor, after-coolers, filters, air receivers, dryers and N<sub>2</sub> units to match your available footprint. An N<sub>2</sub> receiver can be provided as an option.

As all hardware is connected on the skid, the yard or installation company has simply to connect to one flange and to one electrical box. This innovative Atlas Copco product is developed with your safety and efficiency in mind, as well as your running and installation costs.

### Your benefits

- ▶ High efficiency through up-to-date design.
- ▶ Simple installation thanks to all-in-one skid.
- ▶ Peace of mind, as all equipment comes from one manufacturer.
- ▶ Turnkey solution.

## Ideal for multiple applications

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- Inerting and purging of double-wall gas piping in engine room.
- Inerting and purging of bunker systems prior to bunkering, including storage tanks.
- Inerting and purging of insulation of gas tanks if applicable.
- Controlling O<sub>2</sub> and pressure of inert gas system.

## Flexible installation

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Installation is easy, quick and flexible thanks to the following features:

- Flanged or treaded connections.
- Small footprint.
- Mounted on oil-containing frame and fully interconnected.
- No extra pipework and no coaming needed.
- Voltage-free contacts to main engine installation.
- Protocol in accordance with major machinery alarm and monitoring systems.
- Fully automatic operation.
- Suitable for 50 and 60 Hz versions and for an ambient temperature of 55°C.

## Wide range of models: 10-60 m<sup>3</sup>/h

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Type	N <sub>2</sub> capacity	Required power	Dew point
	m <sup>3</sup> /h	kW	°C
DF10	10	15	-70
DF20	20	15	-70
DF30	30	30	-70
DF40	40	30	-70
DF50	50	55	-70
DF60	60	55	-70

## 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

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*"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 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 desiccant dryers and refrigerant dryers with advanced energy saving control algorithms as well as dryers for high pressure (30 bar).

## Drains

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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 therefore 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

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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

Dryer 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)
<b>WATER-COOLED VERSIONS</b>								
FD 310 <sup>(1)</sup>	50°C/60°C	310	2.0	2.5	14	986	850	1190
FD 410 <sup>(1)</sup>	50°C/60°C	410	2.4	3.2	14	1250	850	1375
FD 510 <sup>(1)</sup>	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

Dryer type	Maximum inlet conditions (ambient/inlet)	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)
<b>AIR-COOLED VERSIONS</b>								
FD 5 <sup>(1)</sup>	50°C/60°C	6	0.20	0.2	16 <sup>(2)</sup>	558	515	582
FD 10 <sup>(1)</sup>	50°C/60°C	10	0.20	0.2	16 <sup>(2)</sup>	558	515	582
FD 15 <sup>(1)</sup>	50°C/60°C	15	0.33	0.3	16 <sup>(2)</sup>	558	515	582
FD 20 <sup>(1)</sup>	50°C/60°C	20	0.41	0.5	16 <sup>(2)</sup>	558	515	582
FD 25 <sup>(1)</sup>	50°C/60°C	25	0.41	0.5	16 <sup>(2)</sup>	558	515	582
FD 30 <sup>(1)</sup>	50°C/60°C	30	0.41	0.5	16 <sup>(2)</sup>	558	515	582
FD 40 <sup>(1)</sup>	50°C/60°C	40	0.57	0.7	16 <sup>(2)</sup>	716	389	679
FD 50 <sup>(1)</sup>	50°C/60°C	50	0.54	0.8	16 <sup>(2)</sup>	716	389	679
FD 60 <sup>(1)</sup>	50°C/60°C	60	0.63	1.0	13	795	482	804
FD 70 <sup>(1)</sup>	50°C/60°C	70	0.87	1.0	13	795	482	804
FD 95 <sup>(1)</sup>	50°C/60°C	95	1.18	1.5	13	795	482	804
FD 120 <sup>(1)</sup>	50°C/60°C	120	1.10	1.2	13	1170	855	1540
FD 150 <sup>(1)</sup>	50°C/60°C	150	1.30	1.6	13	1170	855	1540
FD 185 <sup>(1)</sup>	50°C/60°C	185	1.60	2.0	13	1170	855	1540
FD 220 <sup>(1)</sup>	50°C/60°C	220	1.80	2.2	13	1170	855	1540
FD 245 <sup>(1)</sup>	50°C/60°C	245	2.1	2.3	13	1170	855	1540
FD 285 <sup>(1)</sup>	50°C/60°C	285	2.4	2.4	13	1170	855	1540
FD 310 <sup>(1)</sup>	40°C-60°C (ambient)	310	2.8-2.9	4.3-4.6	14	986	850	1190
FD 410 <sup>(1)</sup>	40°C-60°C (ambient)	410	3.0-4.8	4.5-7.3	14	986-1525	850	1375
FD 510 <sup>(1)</sup>	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 1-21



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).
  - 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).
- ▶ **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

Dryer type	Maximum inlet conditions (ambient/inlet)	Air flow at outlet with a PDP of 5°C 50 Hz/60 Hz	Power consumption air-cooled, 50 Hz	Power consumption, 60 Hz	Maximum working pressure	Dimensions		
	°C	m³/h	kW	kW	bar(g)	L (mm)	W (mm)	H (mm)
<b>AIR-COOLED VERSIONS</b>								
FX 1	45°C/55°C	7	0.17	0.21	16 <sup>(1)</sup>	500	350	484
FX 2	45°C/55°C	12	0.24	0.24	16 <sup>(1)</sup>	500	350	484
FX 3	45°C/55°C	16	0.26	0.32	16 <sup>(1)</sup>	500	350	484
FX 4	45°C/55°C	23	0.48	0.47	16 <sup>(1)</sup>	500	350	484
FX 5	45°C/55°C	35	0.4	0.58	16 <sup>(1)</sup>	500	350	484
FX 6	45°C/55°C	45	0.84	0.84	13	500	370	804
FX 7	45°C/55°C	58	0.95	0.95	13	500	370	804
FX 8	45°C/55°C	69	1.08	1.08	13	500	460	829
FX 9	45°C/55°C	79	1.26	1.26	13	560	460	829
FX 10	45°C/55°C	100	1.58	1.58	13	560	460	829
FX 11	45°C/55°C	125	1.64	1.64	13	560	580	939
FX 12	45°C/55°C	148	2	2.03	13	560	580	939
FX 13	45°C/55°C	192	2.3	3.4	13	898	735	1002
FX 14	45°C/55°C	230	2.9	4.15	13	898	735	1002
FX 15	45°C/55°C	288	3.8	5.1	13	898	735	1002
FX 16	45°C/55°C	345	4.1	6.1	13	898	735	1002
FX 17	45°C/55°C	424	6.3	8.1	13	1082	1020	1560
FX 18	45°C/55°C	530	7	8.7	13	1082	1020	1560
FX 19	45°C/55°C	618	8.5	10.5	13	1082	1020	1560
FX 19.5	45°C/55°C	795	10	12.1	10	1123	1020	1560
FX 20	45°C/55°C	883	11.3	13.9	13	2099	1020	1560
FX 21	45°C/55°C	1236	15.9	17	13	2099	1020	1560

(1) 20 bar(g) / 290 psig) 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 21 available in 400/50 Hz and 460/60 Hz.

## Heatless Adsorption Air Dryers CD 7-1600 / BD



Atlas Copco CD adsorption dryers eliminate the moisture before it can cause any damage. Even the possibility of freezing is non-existent. The CD/BD 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	Pressure drop (excl. filters)	Connections	Recommended filter sizes			Dimensions (mm)			Weight
	7bar(e)/100 psig			bar	50 Hz: G/PN 16 60 Hz: NPT/DN	0.1 ppm prefilter	0.01 ppm after filter	L	W	
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 dimensional sizes 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.

## Compressed Air Filters



### Your benefits

- Maximum contaminant removal
- Significant energy savings
- Limited system operating costs
- Increased reliability
- Easy maintenance

### Compressed air purity

Grade	Particles (micron)	Oil (ppm)
DD	1	1
PD	0.01	0.01
QD	-	0.003
DDp	1	-
PDp	0.01	-



sizes 9-32

## Technical specifications

Filter size	Nominal capacity <sup>(1)</sup>		Maximum capacity <sup>(1)</sup>		Connections G or NPT	Dimensions			Free space for cartridge replacement <sup>(2)</sup>	Weight
	l/s	cfm	l/s	cfm		A	B	C		
DD, DDp, PD, PDp, QD						mm	mm	mm	mm	kg
9	9	19	11	23	3/8	90	61	268	75	1
17	17	36	21	45	1/2	90	61	268	75	1.1
32	32	68	40	85	1/2	90	61	323	75	1.3
44	44	93	55	117	3/4 & 1	110	98.5	374	75	1.9
60	60	127	75	159	1	110	98.5	414	75	2.1
120	120	254	150	318	1-1/2	140	105	520	100	4.2
150	150	318	188	399	1-1/2	140	105	603	100	4.5
175	175	371	219	464	1-1/2	140	105	603	100	4.6
280	280	594	350	742	2 & 2-1/2	179	121	689	150	6.9
390	390	827	488	1035	3	210	128	791	200	11
520	520	1102	650	1378	3	210	128	961	200	12.6
520F	520	1102	650	1378	DN80	330	189	1292	728	71
780F	780	1654	975	2067	DN100	460	228	1320	686	127
1050F	1050	2226	1313	2784	DN100	460	228	1320	686	128
1400F	1400	2968	1750	3710	DN150	550	287	1464	672	189
1800F	1800	3816	2250	4770	DN150	570	282	1467	681	210
2100F	2100	4452	2625	5565	DN150	620	291	1499	676	251
2700F	2700	5724	3375	7155	DN200	740	352	1634	692	328
3150F	3150	6678	3938	8349	DN200	740	352	1634	692	329
4800F	4800	10176	6000	12720	DN250	740	410	1662	800	507
7200F	7200	15256	9000	19080	DN300	1000	485	1755	850	675

(1) Nominal pressure: 7 bar(e)/102 psig; temperature: 20°C

(2) Distance from the center of the flange down to the lowest point of the vessel.



sizes 44-520



sizes 520F-7200F

## Compressed Air Tools and Pumps

### Atlas Copco air hoists

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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		∅ 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		∅ 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		∅ 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		∅ 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 scalars



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 Ø	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	
qjc 10	nip 10
qjc 15	nip 15
ergo qjc 08	ergo nip 08
ergo qjc 10	ergo nip 10
claw	

#### Air prep. units

Midi F/R D	ball / ergoqjc
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 l/m	Length m	Power kW	Weight kg	Outlet
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

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### 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

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Pneumatic pumps	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.

### 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 170 countries, we can act fast for service and parts.

We are the only company to have our own highly trained service engineers available around the clock in all time zones.

All our offices have 24/7 call numbers and an additional number especially for Marine services.

We have well-equipped part centers in several areas around the world. Even if your part is not available at your local Atlas Copco Center, we will be able to find it for you. Wherever the part comes from, you can order it at your local Atlas Copco Center, and we will make sure it is delivered to the address you choose.

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.

► **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

To deliver parts, we have a World Class Distribution Center

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- Fully automated order handling
- Shipping: 80 trucks – 500 tons per day
- 75000 parts references
- 1300000 orders line per year
- 4000 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 Nm<sup>3</sup>/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<sup>3</sup>/min, must be recalculated in l/s:

$$12 \text{ Nm}^3/\text{min} = 12 \times 1000/60 = 200 \text{ NI/s.}$$

Inserting the current input data in the formula gives:

$$Q_{\text{FAD}} = \frac{Q_N \times (273 + T_i) \times 1.013}{273 \times P_i} = \frac{200 \times (273 + 35) \times 1.013}{273 \times 0.74} = 309 \text{ l/s(FAD)}$$

- $Q_{FAD}$  = Free Air Delivery (l/s)
- $Q_N$  = Normal volume rate of flow (NI/s)
- $T_{FAD}$  = Maximum inlet temperature (30°C)
- $T_N$  = Normal reference temperature (0°C)
- $P_{FAD}$  = Standard inlet pressure (1.00 bar(a))
- $P_N$  = 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  $387 \times 1.15 \approx 450$  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

$Q_c$  = Compressor capacity = 450 l/s

$P_1$  = Compressor inlet pressure = 1 bar(a)

$T_1$  = Maximum inlet temperature =  $30^\circ\text{C} = 273 + 30 = 303\text{ K}$

$F_{\text{max}}$  = Maximum cycle frequency = 1 cycle/30 seconds

$(P_u - P_L)$  = Pressure difference between Loaded and Unloaded compressor = 0.5 bar

$T_0$  = Compressed air temperature out of the selected compressor is  $10^\circ\text{C}$  higher than the ambient temperature; therefore the maximum temperature in the air receiver will be =  $273 + 40 = 313\text{ K}$

Compressor with loading/unloading regulation gives the following formula for the air receiver volume:

$$V = \frac{0.25 \times Q_c \times T_0}{F_{\text{max}} (P_u - P_L) \times T_1} = \frac{0.25 \times 450 \times 313}{1/30 \times 0.5 \times 303} = 6972\text{ l}$$

This is the minimum recommended air receiver volume.

The next larger standard size is usually selected.

### 3.4 Dimensioning the dryer

The required dew point in this example is  $+5^\circ\text{C}$ . 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  $10^\circ\text{C}$  higher than the ambient temperature, the refrigerant dryer inlet temperature will be maximum  $30 + 10 = 40^\circ\text{C}$ . In addition, the desired pressure dew point is  $+5^\circ\text{C}$ .

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  $30^\circ\text{C}$  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.

$$450 \times 0.95 \times 1.0 \times 0.95 = 406\text{ l/s.}$$

### 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

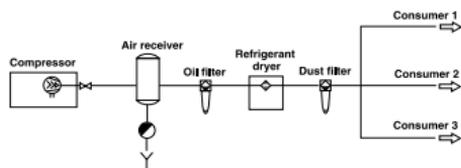
Total power consumption = 5.1 kW

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

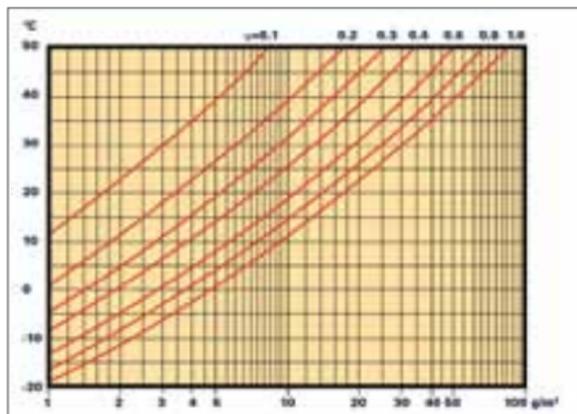
The maximum unloaded pressure of 7.5 bar(e) and load pressure of 7.0 bar(e) for the selected compressor gives a lowest pressure at the consumers of  $7.0 - 0.4 = 6.6$  bar(e). Add to this the additional pressure drop increase across the filter that occurs over time. This pressure drop increase is unique 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 <sup>3</sup>
Dynamic viscosity	$17.89 \times 10^{-6}$	Pa x s
Freezing point	57-61	K
Gas constant	287.1	J / (kg x K)
Kinematic viscosity	$14.61 \times 10^{-6}$	m <sup>2</sup> /s <sup>2</sup>
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 ( $\phi$ )



## 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	$kg \times m \times s^{-2}$
Pressure/mechanical stress	Pascal	Pa	$N/m^2$
Energy/work	Joule	J	$N \times m$
Electric quantity/charge	Coulomb	C	$A \times s$
Electric voltage	Volt	V	$W/A$
Capacitance	Farad	F	$C/V$
Resistance	Ohm	$\Omega$	$V/A$
Conductivity	Siemens	S	$A/V$
Magnetic flux	Weber	Wb	$V \times s$
Magnetic flux density	Tesla	T	$Wb/m^2$
Inductance	Henry	H	$Wb/A$
Luminous flux	Lumen	lm	$Cd \times sr$
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	$^\circ$	$1^\circ = \pi/180 rad$
Plane angle	Minute	'	$1' = 1^\circ/60$
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
Sub-divisions	Name	deci-	centi-	milli-	micro-	nano-	pico-	femto-	atto-	zepto-	yocto-
	Symbol	d	c	m	$\mu$	n	p	f	a	z	y
	Factor	$10^1$	$10^2$	$10^3$	$10^6$	$10^9$	$10^{12}$	$10^{15}$	$10^{18}$	$10^{21}$	$10^{24}$
	Factor	$10^0$	$10^{-1}$	$10^{-2}$	$10^{-3}$	$10^{-6}$	$10^{-9}$	$10^{-12}$	$10^{-15}$	$10^{-18}$	$10^{-21}$

Conversions required for:

<b>Length:</b>	1 meter = 39.37 inches	<b>Flow (derived):</b>	1 m <sup>3</sup> /h = 0.588 cfm
<b>Volume:</b>	1 m <sup>3</sup> = 219 (UK) / 264 (US) gallon	<b>Pressure:</b>	1 bar = 14.5 psi
<b>Mass:</b>	1 kg = 2.2 lbs (UK)		1 bar = 1000 mbar
<b>Power:</b>	1 kW = 1.34 hp		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)
<b>Drilling machines, <math>\phi</math> = bit diameter (mm)</b>	
Small: $\phi < 6.5$	6.0
Medium: $6.5 < \phi \leq 10$	7.5
Large: $10 < \phi < 16$	16.5
<b>Thread cutters</b>	<b>6</b>
<b>Screwdriver, d = screw size</b>	
Small: $d < M6$	5.5
Medium: $M6 < d < M8$	7.5
<b>Impact wrench, d = bolt size</b>	
Small: $d < M10$	5.0
Medium: $M10 < d < M20$	7.5
Large: $d \geq M20$	22.0
<b>Filing machine</b>	<b>7.5</b>
<b>Polishers/Die grinders, e = power (kW)</b>	
Small: $e < 0.5$	8.0
Large: $e > 0.5$	16.5
<b>Grinders, e = power (kW)</b>	
Small: $0.4 < e < 1.0$	20.0
Medium: $1.0 < e < 2.0$	40.0
Large: $e > 2.0$	60.0
<b>Chipping hammers</b>	
Light	6.0
Heavy	13.5
<b>Air hoists, t = lifting tonnage</b>	
$t < 1$ ton	35
$t > 1$ ton	45
<b>Scaler</b>	<b>5.0</b>
<b>Cleaning nozzle</b>	<b>6.0</b>
<b>Nut runner, d = bolt size</b>	
$d \leq M8$	9
$d \geq M10$	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 m <sup>3</sup>			Mass concentration mg/m <sup>3</sup>	Vapor pressure dewpoint	Liquid g/m <sup>3</sup>	Total oil (aerosol liquid and vapor) mg/m <sup>3</sup>
	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:

$$Q_v = 284.5 N / \Delta T$$

$Q_v$  is the required ventilation capacity (cfm)

$N$  is the installed motor power (hp)

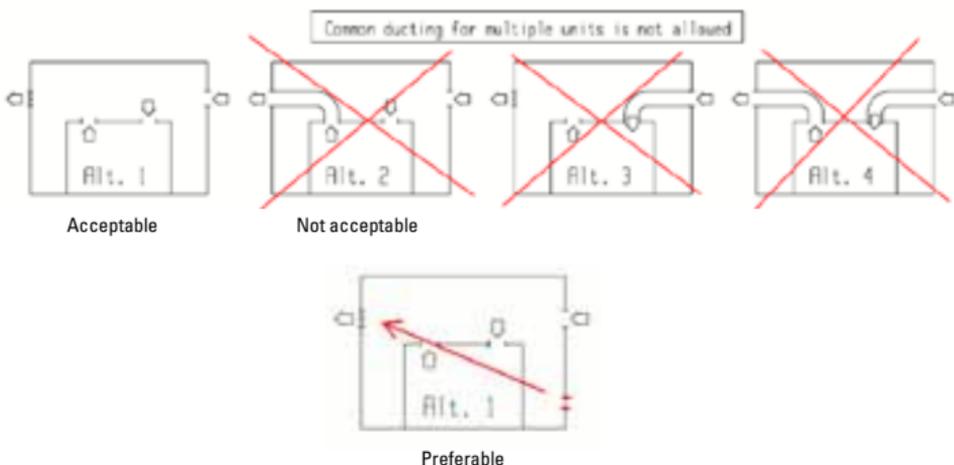
$\Delta T$  is the compressor room temperature over the outdoor temperature ( $^{\circ}\text{F}$ )

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

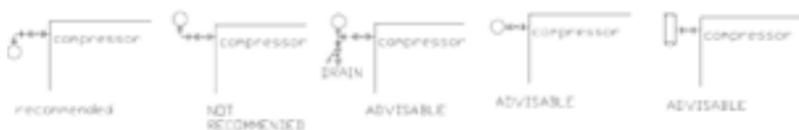


**Reason: to avoid water direct water ingress by crew deck washing or heavy seas.**

### 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, Polyethylene coated, CuNiFe or GRP (glass reinforced polyester).
- We advise 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 specification

#### Central fresh cooling water system

Normally steel piping; in case more machinery is installed on the same cw pipeline it is advised 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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#### **Driven by innovation**

With more than 135 years of innovation and experience, Atlas Copco will deliver the products and services to help maximize your company's efficiency and productivity. As an industry leader, we are dedicated to offering high air quality at the lowest possible cost of ownership. Through continuous innovation, we strive to safeguard your bottom line and bring you peace of mind.



#### **Building on interaction**

As part of our long-term relationship with our customers, we have accumulated extensive knowledge of a wide diversity of processes, needs and objectives. This gives us the flexibility to adapt and efficiently produce customized compressed air solutions that meet and exceed your expectations.



#### **A committed business partner**

With a presence in over 170 countries, we will deliver high-quality customer service anywhere, anytime. Our highly skilled technicians are available 24/7 and are supported by an efficient logistics organization, ensuring fast delivery of genuine spare parts when you need them. We are committed to providing the best possible know-how and technology to help your company produce, grow, and succeed. With Atlas Copco you can rest assured that your superior productivity is our first concern!

