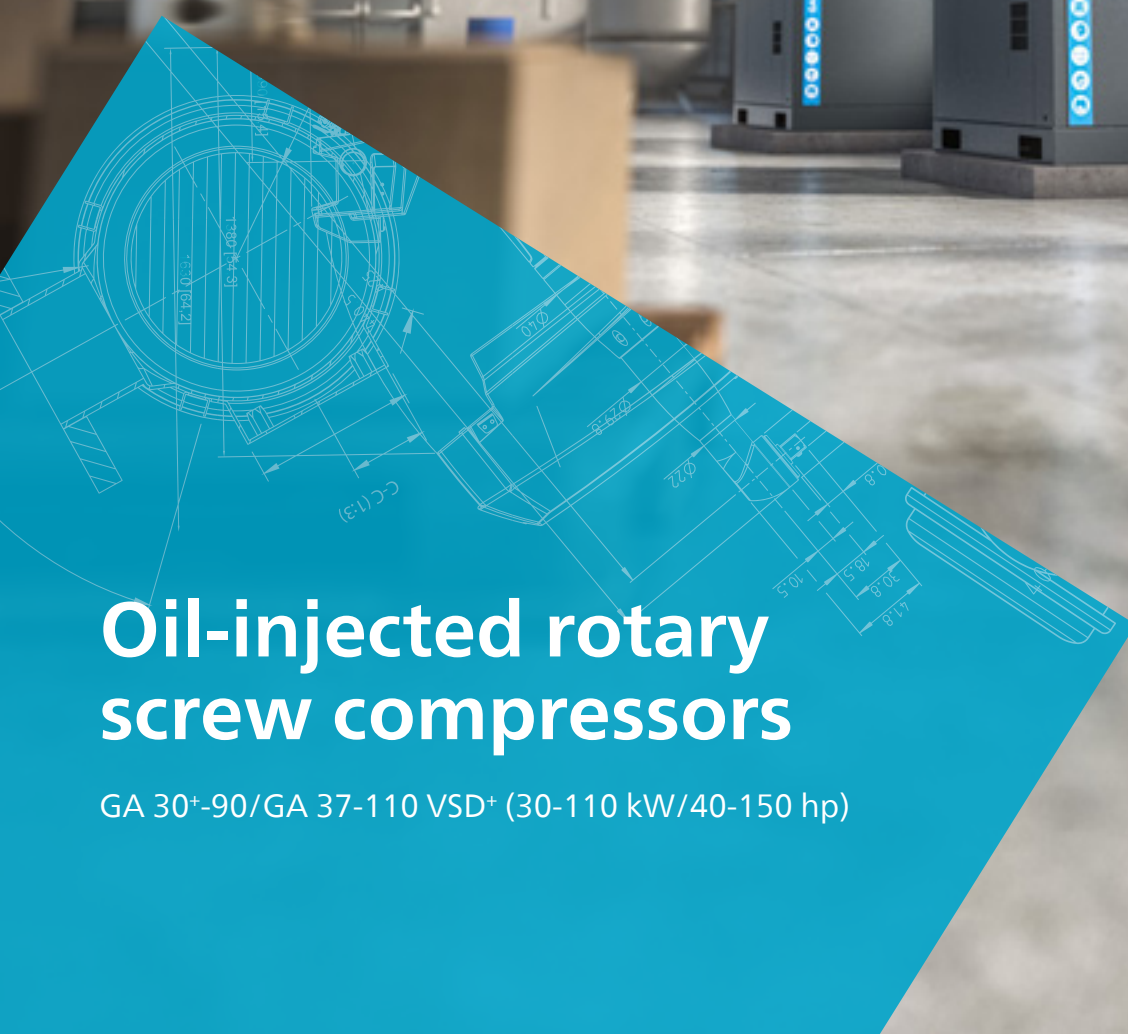




Atlas Copco



Oil-injected rotary screw compressors

GA 30⁺-90/GA 37-110 VSD⁺ (30-110 kW/40-150 hp)

The ultimate smart solution, driven by efficiency

Atlas Copco's GA compressors bring you outstanding sustainability, reliability and performance, while minimizing the total cost of ownership. A choice of three premium compressor types (GA VSD+, GA+ and GA) provides you with the compressed air solution that perfectly matches your requirements with clear value propositions. Built to perform even in the harshest environments, these compressors keep your production running efficiently.

GA90VSD+



GA

Premium compressor

- High performance Free Air Delivery.
- Premium quality at the lowest initial investment.
- Integrated refrigerant dryer.
- Elektronikon® Touch or Swipe controller.

GA+

Industry-leading performance

- Best-in-class Free Air Delivery.
- Lowest energy consumption for applications with a stable air demand.
- Low noise emission suitable for workplace installation.
- Integrated refrigerant dryer.
- Elektronikon® Touch controller.

- New GA 30+ -45+ models come with IE4 motor and all-new element for +2.7% Free Air Delivery and on average +3.2% energy efficiency.

GA VSD+

Ultimate energy saver

- 50% energy savings on average compared to fixed speed models.
- iPM motor equals IE5 standards.
- In-house designed NEOS inverter and iPM motor exceed IES2 (EN 50598) requirements for power drive efficiency.
- Industry-leading operating turndown range.
- Wide pressure selection: 4-13 bar.
- Start under system pressure, no blow-off.
- Integrated refrigerant dryer.
- Elektronikon® Touch controller.



VSD+: a game changer

With the GA VSD+ range, Atlas Copco has revolutionized compressor build and performance. Instead of the normal space-taking horizontal design, the GA VSD+ has an upright, compact layout. This saves valuable floor and work space, eases maintenance access, and reduces total cost of ownership.

Inside the robust GA 37L-110 VSD+



IE5

Meeting and exceeding efficiency benchmarks:

- The iPM motor of the GA 37L-110 VSD+ equals IE5 standards.
- Neos inverter and iPM motor exceed IES2 (EN 50598) requirements for power drive efficiency.

1

Interior Permanent Magnet (iPM) motor

- Oil-cooled motor.
- Optimal cooling for all speeds and ambient conditions.
- Designed in-house in Belgium.
- Oil-lubricated motor bearing: no (re)grease(ing), increased uptime.
- IP66: pressure tight.

2

New compressor element

- New improved rotor profile.
- Reduced pressure losses.
- Optimized in and outlet portals.

3

Direct drive

- Vertical design, less parts.
- Oil-cooled, pressure-tight.
- No gears or belts, no shaft seal.

4

Inlet filter

- Heavy duty.
- Maintenance every 4,000 hours.
- Pressure drop indicator.

5

Electronic no-loss water drain

- Ensures constant removal of condensate.
- Manual integrated bypass for effective condensate removal in case of power failure.
- Integrated with compressor's Elektronikon® with warning/alarm features.

12

VSD+ Neos cubicle

- Electrical components remain cool, enhancing their lifetime.
- Dedicated drive for iPM technology motors.
- Heat dissipation of inverter in separate compartment.



6

High-tech fan

- Compact.
- Low noise level.
- High capacity for optimized cooling.
- Compliant with ERP2020 efficiency standards.

7

Classic cooler design

- Integrated water separation.
- Separate oil/air cooler.
- Easy access for maintenance.

8

Innovative Neos inverter

- Atlas Copco's in-house designed inverter now also controls iPM motors.
- IP5x protection.
- Robust aluminum enclosure for trouble-free operation in the harshest conditions.
- Fewer components: compact, simple and user-friendly.



9

Integrated dryer

- Extra compact footprint.
- Refrigerant R410A.

10

Elektronikon® Touch controller

- High-tech controller with warning indications, compressor shut-down and maintenance scheduling.
- Easy to use and designed to perform in the toughest conditions.
- Standard SMARTLINK remote monitoring to maximize air system performance and energy savings.
- Optional multiple compressor control (2, 4 or 6 compressors).



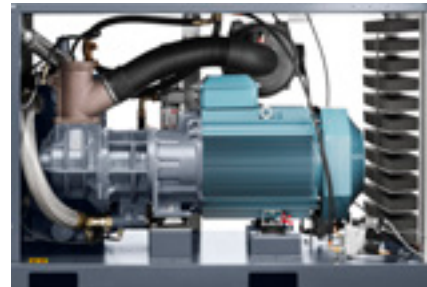
11

Sentinel no-loss inlet valve

- Optimizes the inlet flow of the air end.
- No blow-off losses.
- Full aluminum design: maintenance-free (GA 37L-75 VSD+).



Inside the reliable GA 30⁺-90



1 Maintenance-free drive system

- 100% maintenance-free; totally enclosed and protected against dirt and dust.
- Suitable for harsh environments.
- High-efficiency drive arrangement; no coupling or slippage losses.
- Standard up to 46°C/115°F and for high ambient version 55°C/131°F.

2 IE3/NEMA Premium Efficiency electrical motors

- IP55, insulation Class F, B rise.
- Non-drive side bearing greased for life.
- Oil-lubricated drive side bearings.
- Designed for continuous operation in harsh environments.

3 Robust spin-on oil filter

- High-efficiency; removes 300% smaller particles than a conventional filter.
- Integrated bypass valve with the oil filter.

4 Separate oversized oil cooler and aftercooler

- Low element outlet temperatures, ensuring long oil lifetime.
- Removal of nearly 100% of condensate by integrated mechanical separator.
- No consumables.
- Eliminates possibility of thermal shocks in coolers.



5 Electronic no-loss water drain (for + versions)

- Ensures constant removal of condensate.
- Manual integrated bypass for effective condensate removal in case of power failure.
- Integrated with compressor's Elektronikon® with warning/alarm features.



6 Elektronikon® Touch for remote monitoring

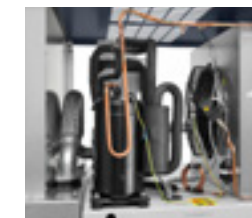
- High-tech controller with warning indications, compressor shut-down and maintenance scheduling.
- Easy to use and designed to perform in the toughest conditions.
- Standard SMARTLINK remote monitoring to maximize air system performance and energy savings.
- Optional multiple compressor control (2, 4 or 6 compressors).
- Optional for GA 37, GA 45, GA 55, and GA 75, which come standard with the Elektronikon® Swipe controller.

7 Heavy-duty air intake filter

- Protects the compressor components by removing 99.9% of dirt particles down to 3 microns.
- Differential inlet pressure for proactive maintenance while minimizing pressure drop.

8 Cubicle cooling booster

- Cubicle in overpressure minimizes ingress of conductive dust.
- Electrical components remain cool, enhancing their lifetime.



9 Integrated highly efficient R410A dryer

- Excellence in air quality.
- 50% reduction in energy consumption compared to traditional dryers.
- Zero ozone depletion.
- Incorporates optional UD+ filter according to Class 1.4.2.

10 High-tech fan

- Compact.
- Low noise level.
- High capacity for optimized cooling.



A new GA 30⁺-45⁺

The GA 30⁺-45⁺ has always delivered industry-leading efficiency. It just got even better. Thanks to its IE4 motor and all-new element, you enjoy 2.7% more Free Air Delivery and on average 3.2% better energy efficiency. And a compact footprint! The pack unit of the GA 30⁺-45⁺ is now 32% smaller.



A step ahead in monitoring and controls

The next-generation Elektronikon® operating system offers a great variety of control and monitoring features that allow you to increase your compressor's efficiency and reliability. To maximize energy efficiency, the Elektronikon® controls the main drive motor and regulates system pressure within a predefined and narrow pressure band.



GA 37, GA 45, GA 55 & GA 75: Elektronikon® Swipe

- Improved ease of use: intuitive navigation with clear pictograms and extra 4th LED indicator for service.
- Visualization through web browser using a simple Ethernet connection.
- Easy to upgrade.

Key features:

- Automatic restart after voltage failure.
- Delayed Second Stop function.
- Dual pressure set point.
- Built-in SMARTLINK online monitoring.
- Option to upgrade to the advanced Elektronikon® Touch controller.

GA 90, GA 30+-75+ & GA 37L-110 VSD+: Advanced Elektronikon® Touch

- Improved user-friendliness: 4.3-inch high-definition color display with clear pictograms and service indicator.
- Internet-based compressor visualization using a simple Ethernet connection.
- Increased reliability: new, user-friendly, multilingual user interface and durable touch screen.

Key features:

- Automatic restart after voltage failure.
- Built-in SMARTLINK online monitoring.
- Dual pressure set point.
- More flexibility: four different week schedules that can be programmed for a period of 10 consecutive weeks.
- On-screen Delayed Second Stop function and VSD savings indication.
- Graphical service plan indication.
- Remote control and connectivity functions.
- Software upgrade available to control up to 6 compressors by installing the optional integrated compressor controller.



VSD+ for 50% average energy savings*

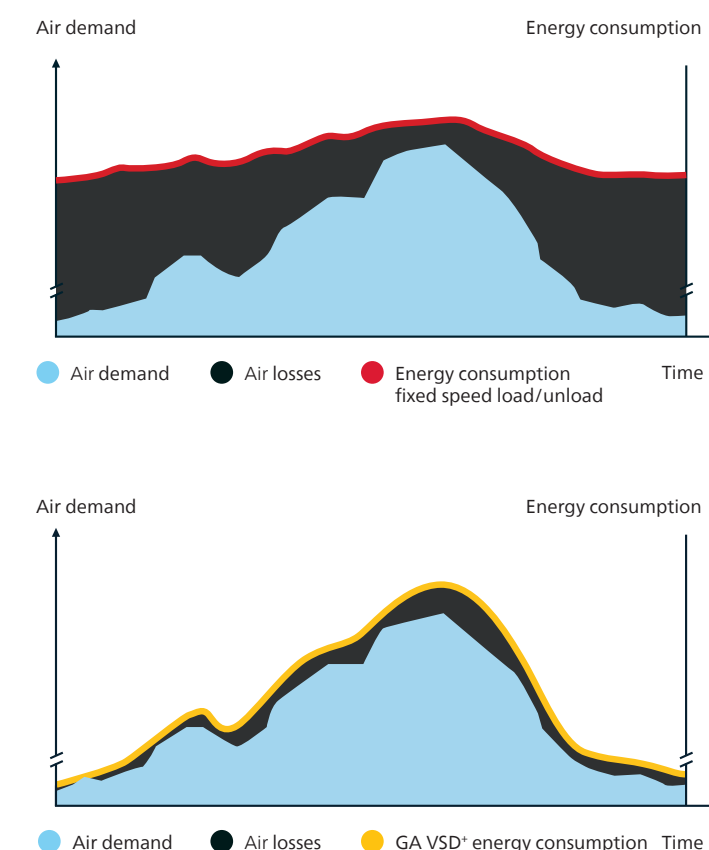
Over 80% of a compressor's lifecycle cost is taken up by the energy it consumes. Moreover, the generation of compressed air can account for more than 40% of a plant's total electricity bill. To cut your energy costs, Atlas Copco pioneered Variable Speed Drive+ (VSD+) technology in the compressed air industry. VSD+ leads to major energy savings, while protecting the environment for future generations. Thanks to continual investments in this technology, Atlas Copco offers the widest range of integrated VSD+ compressors on the market.

Why Atlas Copco Variable Speed Drive+ technology?

- On average 50% energy savings with an extensive flow range (20-100%).
- Integrated Elektronikon® Touch controls the motor speed and high-efficiency frequency inverter.
- No wasted idling times or blow-off losses during operation.
- Compressor can start/stop under full system pressure without the need to unload.
- Eliminates peak current penalty during start-up.
- Minimizes system leakage due to a lower system pressure.
- EMC compliance to directives (2004/108/EG).

* Compared to fixed speed compressors, based on measurement performed by an independent energy audit agency.

In almost every production environment, air demand fluctuates depending on different factors such as the time of the day, week or even month. Extensive measurements and studies of compressed air demand profiles show that many compressors have substantial variations in air demand.



Why dry your compressed air?

Untreated compressed air contains moisture, aerosols and dirt particles that can damage your air system and contaminate your end product, creating the risk of corrosion and compressed air system leaks. Maintenance costs can far exceed air treatment costs. An air dryer is therefore essential to protect your systems and processes. The GA, GA+ and GA VSD+ compressors have an integrated dryer option to ensure your peace of mind.

Integrated dry air

- Optimized sizing for the compressor, avoiding excessive energy consumption.
- Fit for your application.
- Controlled and monitored by the Elektronikon*.
- Space-saving all-in-one solution with low installation costs.

Lowest lifecycle costs and peace of mind

- No extra installation costs.
- Saving floor space.
- Use of energy-efficient, environmentally friendly refrigerant R410A reduces operating costs and stands for zero ozone depletion.
- Heat exchanger cross-flow technology with low pressure drop, saving energy and costs.
- Zero waste of compressed air thanks to no-loss condensate drain.
- Advanced control functions ensure dry air under all circumstances and prevent freezing at low load.
- Pressure dew point of 3°C/37°F (100% relative humidity at 20°C/68°F).



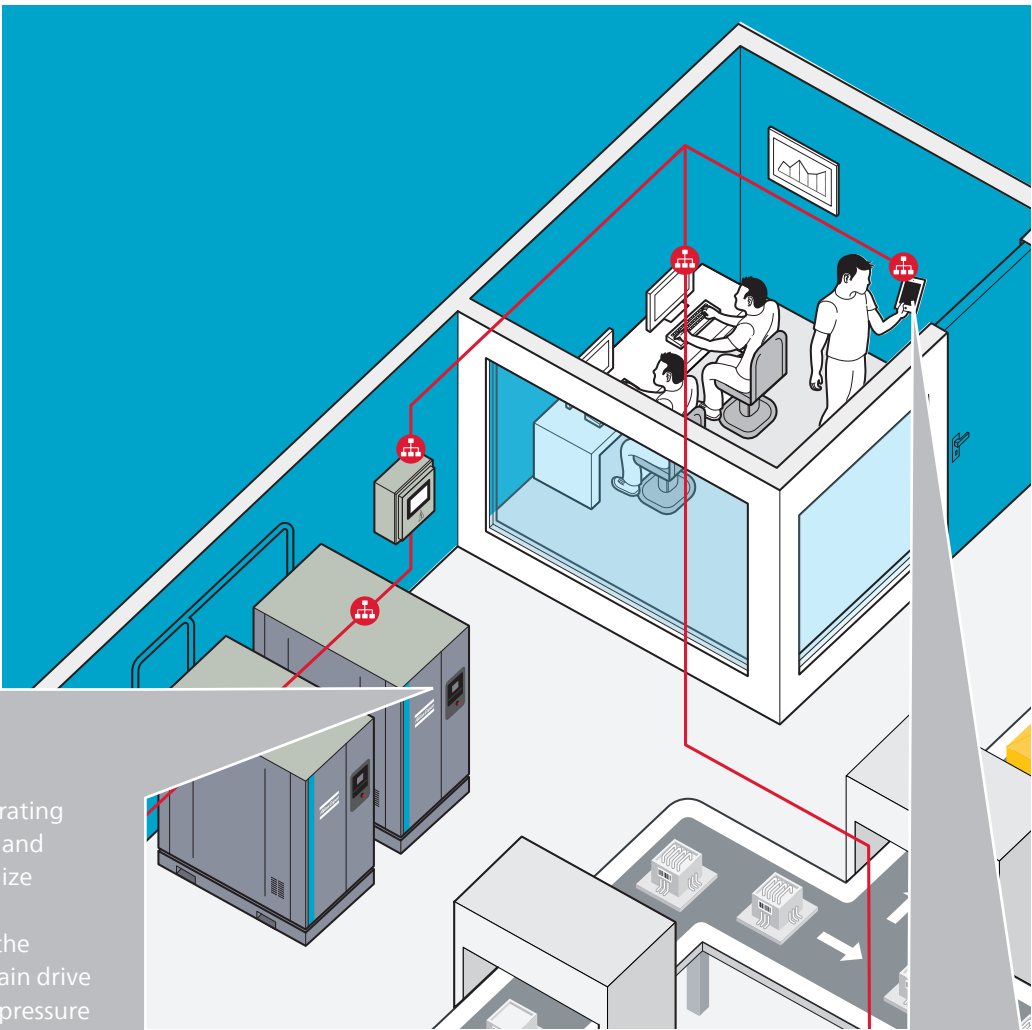
Integrated purity

	ISO QUALITY CLASS*	DIRT PARTICLE SIZE	WATER PRESSURE DEW POINT**	OIL CONCENTRATION
Pack compressor	3.-4	5 microns	-	3 ppm
Integrated refrigerant dryer	3.4.4	5 microns	+3°C/37°F	3 ppm
DD+	2.4.2	1 micron	+3°C/37°F	0.1 ppm
UD+	1.4.2	0.5 micron	+3°C/37°F	0.1 ppm

* The table values reflect the maximum limits according to the ISO quality air standard (ISO 8573-1:2010).
** Water pressure dew point based on 100% RH at 20°C/68°F.

Advanced monitoring, control & connectivity

Whether you call it Industry 4.0 or the Internet of Things (IoT), interconnectivity is the future. Your GA comes fully prepared. Its advanced monitoring, control and connectivity features allow you to optimize compressor performance, resources, efficiency and productivity.



CONTROL

The Elektronikon* Touch operating system gives you the control and monitoring options to optimize compressor performance. To maximize energy efficiency, the Elektronikon* controls the main drive motor and regulates system pressure within a predefined and narrow pressure band.

Dual Pressure Set Point

Create two different system pressure settings to reduce energy use and costs during fluctuating demand.

Integrated Saver Cycles

Fan Saver Cycle reduces energy consumption by switching off the fan in light load applications.

Timer

A built-in clock supports any working schedule – per day, per week or customized to your specific situation and needs.

CONNECT SMARTLINK*: Data Monitoring Program

- Remote monitoring that helps you optimize your compressed air system and save energy and costs.
- Provides a complete insight in your compressed air network.
- Anticipates potential problems by warning you upfront.

* Please contact your local sales representative for more information.

Optimize your system

Some applications may need or may benefit from additional options and more refined control/air treatment systems. To meet these needs, Atlas Copco has developed options and easily integrated compatible equipment.

		GA 30*/37/45	GA 37*/45*	GA 55*-75* GA 55-90	GA 37L-110 VSD*
Air treatment	Integrated filter kit class 1*	•	•	•	•
	Integrated filter kit class 2*	-	-	•	-
	Dryer bypass*	-	-	•	-
Condensate	OSCi	-	-	•	-
Protection	Oil retaining frame	•	•	•	-
	Motor space heater + thermistors	-	•	•	-
	Water shut-off valve**	-	•	•	•
	Phase sequence relay (GA 55-90)	-	-	•	-
	Tropical thermostat	•	•	•	•
	Freeze protection	•	•	•	-
	NEMA 4 cubicle	-	•	•	-
	NEMA 4X cubicle	-	•	•	-
	Pre-filter	•	•	•	•
	Advanced monitoring	-	•	•	-
	ANSI flange outlet	•	•	•	-
	DIN flange outlet	•	•	•	-
Public works	Rain protection	•	•	•	-
	Main power isolator switch	-	•	•	-
	Lifting device	•	-	•	-
	Oversized motor (except GA 45* & GA 90)	-	-	•	-
Communication	ES 100 relays***	•	•	•	-
	Elektronik® Touch upgrade (only for GA 37 to GA 75)	•	-	•	-
	EQ2i/EQ4i/EQ6i	•	•	•	•
	Digital I/O expansion module	•	•	•	•
Oils	Food grade oil	•	•	•	•
	Roto Synthetic Xtend oil (8,000 hours)	•	•	•	•
General options	Witness performance test	•	•	•	•
	Energy recovery	•	•	•	•
	Power duct fan	•	•	•	•
	Modulating control	-	•	•	-
	High-ambient temperature version (HAV 55°C, 131°F)****	•	•	•	•
	IT/TT ancillaries	-	-	-	•

* FF units only.

** Water-cooled units.

*** Includes potential-free contacts: motor running, compressor load/unload.

**** FF units max 50°C/122°F.

Transformer included for 200-230-575V units.

• : Optional - : Not available

Recover and save energy

As much as 90% of the electrical energy used by a compressed air system is converted into heat. Using Atlas Copco's integrated energy recovery systems, you can recover up to ~ 75% of that power input as hot air or hot water without any adverse influence

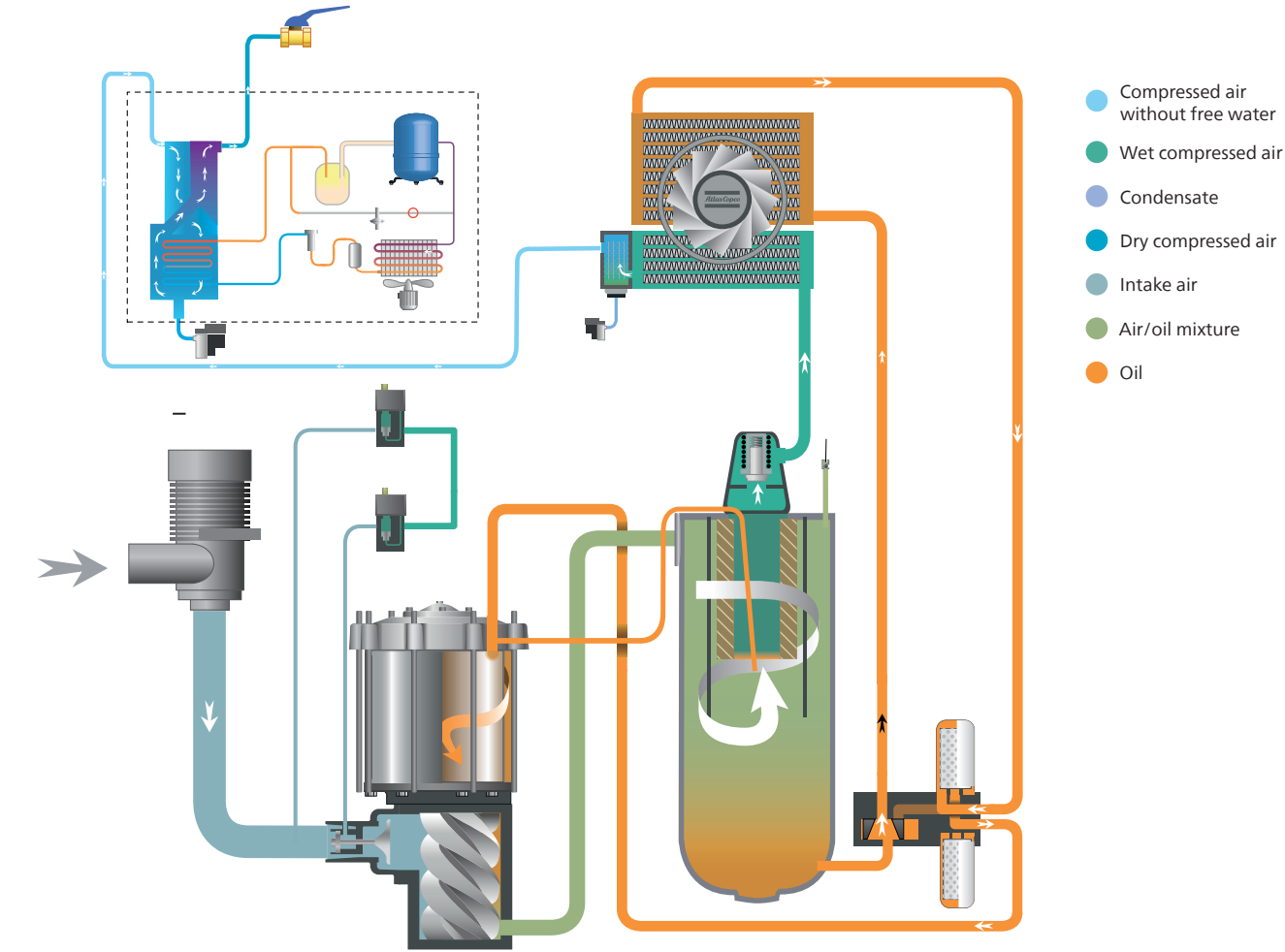
on the compressor's performance. Through efficient usage of the recovered energy, you generate important energy cost savings and a high return on investment.



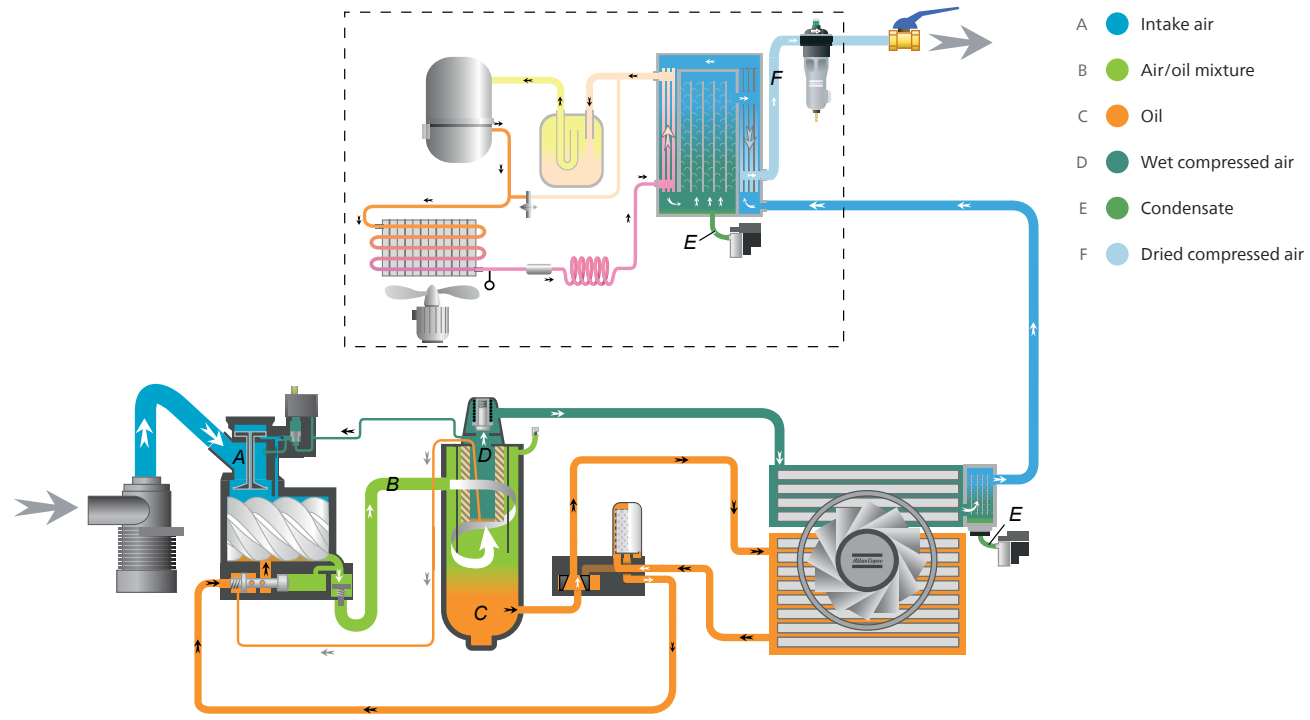
Applications

- Auxiliary or main heating of warehouses, workshops...
 - Industrial process heating.
 - Water heating for laundries, industrial cleaning and sanitary facilities.
- Canteens and large kitchens.
 - Food industry.
 - Chemical and pharmaceutical industries.
 - Drying processes.

Variable Speed Drive: GA VSD+



Fixed speed: GA+ & GA



Technical specifications GA 30+-90 (50 Hz versions)

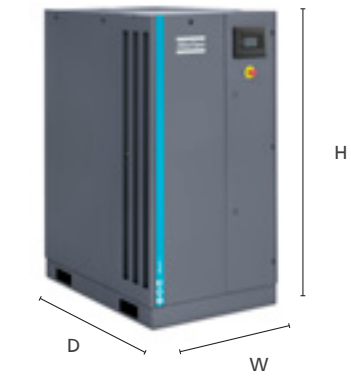
Compressor type	Pressure variant	Max. working pressure WorkPlace		Capacity FAD*			Installed motor power		Noise level**	Weight WorkPlace	
		bar(e)	psig	l/s	m³/hr	cfm	kW	hp		kg	lbs
GA 30+	7.5	7.5	109	99	357	210	30	40	66	626	1380
	8.5	8.5	123	90	325	191	30	40	66	626	1380
	10	10	145	83	298	175	30	40	66	626	1380
	13	13	189	71	256	151	30	40	66	626	1380
GA 37	7.5	7.5	109	116	418	246	37	60	67	683	1506
	8.5	8.5	123	108	389	229	37	60	67	683	1506
	10	10	145	100	360	212	37	60	67	683	1506
	13	13	189	88	317	186	37	60	67	683	1506
GA 37+	7.5	7.5	109	124	446	263	37	50	67	777	1713
	8.5	8.5	123	117	421	248	37	50	67	777	1713
	10	10	145	105	378	222	37	50	67	777	1713
	13	13	189	88	317	187	37	50	67	777	1713
GA 45	7.5	7.5	109	138	497	292	45	75	68	692	1526
	8.5	8.5	123	128	461	271	45	75	68	692	1526
	10	10	145	120	432	254	45	75	68	692	1526
	13	13	189	105	378	222	45	75	68	692	1526
GA 45+	7.5	7.5	109	150	539	317	45	60	68	808	1781
	8.5	8.5	123	144	519	305	45	60	68	808	1781
	10	10	145	131	473	278	45	60	68	808	1781
	13	13	189	106	380	224	45	60	68	808	1781
GA 55	7.5	7.5	109	173	623	367	55	75	69	1229	2709
	8.5	8.5	123	162	583	343	55	75	69	1229	2709
	10	10	145	149	536	316	55	75	69	1229	2709
	13	13	189	129	464	273	55	75	69	1229	2709
GA 55+	7.5	7.5	109	184	662	390	55	75	66	1358	2994
	8.5	8.5	123	174	626	369	55	75	66	1358	2994
	10	10	145	156	562	331	55	75	66	1358	2994
	7.5	7.5	109	224	806	475	75	100	73	1259	2776
GA 75	8.5	8.5	123	212	763	449	75	100	73	1259	2776
	10	10	145	191	688	405	75	100	73	1259	2776
	13	13	189	170	612	360	75	100	73	1259	2776
	7.5	7.5	109	249	896	528	75	100	68	1413	3115
GA 75+	8.5	8.5	123	236	850	500	75	100	68	1413	3115
	10	10	145	210	756	445	75	100	68	1413	3115
	13	13	189	179	644	379	75	100	68	1413	3115
GA 90	7.5	7.5	109	281	1012	595	90	125	73	1425	3142
	8.5	8.5	123	275	990	583	90	125	73	1425	3142
	10	10	145	249	896	528	90	125	73	1425	3142
	13	13	189	217	781	460	90	125	73	1425	3142

* Unit performance measured according to ISO 1217, Annex C, Edition 4:2009.
** A-weighted emission sound pressure level at the work station, Lp WSA (re 20 µPa) dB (with uncertainty 3 dB).
Values determined according to noise level test code ISO 2151 and noise measurement standard ISO 9614.

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

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

Pressure dew point of integrated refrigerant dryer at reference conditions:
2°C to 3°C, 36°F to 37°F



Dimensions	Standard						Full Feature					
	D (mm)	W (mm)	H (mm)	D (in)	W (in)	H (in)	D (mm)	W (mm)	H (mm)	D (in)	W (in)	H (in)
GA 30-45/30+-45+	1310	890	1790	51.57	35.04	70.47	1810	890	1790	71.26	35.04	70.47
GA 55+/75+/55/75/90	1080	2248	1955	42.52	88.50	76.97	1080	2248	1955	42.50	88.50	76.97
GA 37L-75 VSD+	1100	1153	1968	43.31	45.39	77.48	1100	1656	1968	43.31	65.20	77.48
GA 75L-110 VSD+	1400	1300	1968	55.12	51.18	77.48	2178	1300	1968	85.75	51.18	77.48

Technical specifications GA 30+-90 (60 Hz versions)

Compressor type	Pressure variant	Max. working pressure WorkPlace		Capacity FAD*			Installed motor power		Noise level**	Weight WorkPlace	
		bar(e)	psig	l/s	m³/hr	cfm	kW	hp		kg	lbs
GA 30+	100	7.4	107	101	364	214	30	40	66	626	1380
	125	9.1	132	92	329	194	30	40	66	626	1380
	150	10.8	157	83	298	176	30	40	66	626	1380
	175	12.5	181	75	269	158	30	40	66	626	1380
GA 37	100	7.4	107	117	421	248	37	50	67	698	1539
	125	9.1	132	107	385	227	37	50	67	698	1539
	150	10.8	157	98	353	208	37	50	67	698	1539
	175	12.5	181	93	335	197	37	50	67	698	1539
GA 37+	100	7.4	107	124	446	262	37	50	67	777	1713
	125	9.1	132	112	401	236	37	50	67	777	1713
	150	10.8	157	102	368	217	37	50	67	777	1713
	175	12.5	181	88	317	187	37	50	67	777	1713
GA 45	100	7.4	107	139	500	295	45	60	68	745	1642
	125	9.1	132	130	468	275	45	60	68	745	1642
	150	10.8	157	118	425	250	45	60	68	745	1642
	175	12.5	181	108	389	229	45	60	68	745	1642
GA 45+	100	7.4	107	152	548	322	45	60	68	808	1781
	125	9.1	132	139	500	294	45	60	68	808	1781
	150	10.8	157	131	472	278	45	60	68	808	1781
	175	12.5	181	114	411	242	45	60	68	808	1781
GA 55	100	7.4	107	175	630	371	55	75	69	1229	2709
	125	9.1	132	157	565	333	55	75	69	1229	2709
	150	10.8	157	143	515	303	55	75	69	1229	2709
	175	12.5	181	131	472	278	55	75	69	1229	2709
GA 55+	100	7.4	107	185	666	392	55	75	67	1358	2994
	125	9.1	132	167	601	354	55	75	67	1358	2994
	150	10.8	157	141	508	299	55	75	67	1358	2994
	100	7.4	107	227	817	481	75	100	73	1259	2776
GA 75	125	9.1	132	202	727	428	75	100	73	1259	2776
	150	10.8	157	194	698	411	75	100	73	1259	2776
	175	12.5	181	175	630	371	75	100	73	1259	2776
	100	7.4	107	250	900	530	75	100	69	1413	3115
GA 75+	125	9.1	132	227	817	481	75	100	69	1413	3115
	150	10.8	157	205	738	434	75	100	69	1413	3115
	175	12.5	181	182	655	386	75	100	69	1413	3115
GA 90	100	7.4	107	291	1048	617	90	125	74	1425	3142
	125	9.1	132	267	961	566	90	125	74	1425	3142
	150	10.8	157	250	900	530	90	125	74	1425	3142
	175	12.5	181	228	821	483	90	125	74	1425	3142

Footnotes, reference conditions and FAD details of the 50 Hz versions.

Technical specifications GA 37L-110 VSD+

Compressor type	Max. working pressure		Capacity FAD* (min-max)			Installed motor power		Noise level**	Weight WorkPlace	Weight WorkPlace Full Feature
	bar(e)	psig	l/s	m³/h	cfm	kW	hp	dB(A)	kg	kg
GA 37L VSD+	4	58	26-133	94-479	55-282	37	50	67	860	1060
	7	102	26-132	93-475	55-279	37	50	67	860	1060
	9.5	138	25-116	89-418	53-246	37	50	67	860	1060
	12.5	181	38-99	138-355	81-209	37	50	67	860	1060
GA 45 VSD+	4	58	26-159	94-573	55-337	45	60	67	860	1060
	7	102	26-157	93-565	55-332	45	60	67	860	1060
	9.5	138	25-137	89-494	53-291	45	60	67	860	1060
	12.5	181	38-115	138-359	81-211	45	60	67	860	1060
GA 55 VSD+	4	58	26-189	93-680	55-400	55	75	67	900	1100
	7	102	26-188	94-677	55-399	55	75	67	900	1100
	9.5	138	26-166	93-598	55-352	55	75	67	900	1100
	12.5	181	40-140	145-504	85-297	55	75	67	900	1100
GA 75 VSD+	4	58	26-226	93-815	55-480	75	100	70	920	1120
	7	102	27-225	97-809	57-476	75	100	70	920	1120
	9.5	138	27-198	96-712	57-419	75	100	70	920	1120
	12.5	181	42-167	150-600	88-353	75	100	70	920	1120
GA 75L VSD+	4	58	47-269	169-967	100-569	75	100	73	1207	1496
	7	102	48-266	172-957	101-563	75	100	73	1207	1496
	9.5	138	58-235	210-847	124-498	75	100	73	1207	1496
	12.5	181	70-194	252-699	149-411	75	100	73	1207	1496
GA 90 VSD+	4	58	48-311	174-1121	102-660	90	125	74	1213	1503
	7	102	49-306	176-1101	104-648	90	125	74	1213	1503
	9.5	138	60-269	215-969	127-570	90	125	74	1213	1503
	12.5	181	71-218	255-784	150-461	90	125	74	1213	1503
GA 110 VSD+	4	58	47-348	170-1251	100-736	110	150	76	1222	1573
	7	102	49-345	175-1241	103-731	110	150	76	1222	1573
	9.5	138	59-309	211-1111	124-654	110	150	76	1222	1573
	12.5	181	71-268	254-965	150-568	110	150	76	1222	1573

