

The Secop Compressor Range

The Secop range of hermetic reciprocating AC and DC compressors packs a mighty punch in a small package. Compact design, efficient motors and low energy consumption are the main features in hermetic compressors that build on over 60 years of reliability and quality.

AC Compressors Fixed-Speed

Our hermetic refrigeration compressors program for fixed AC voltages ranging from 115 V to 240 V (mains) consist of the types P / T / D / K / KL / N / F / S and G-Series compressors. Secop hermetically reciprocating compressors are designed for refrigeration systems using refrigerants R600a (isobutane), R290 (propane), R134a, R404A, and R407C. Selected models are approved for alternative refrigerants R452A and R513A

AC Compressors Variable-Speed

Full load operation is extremely rare in most cooling applications, restricted to a few days per year. That is why Secop builds variable-speed control into the DLV, NLV and SLV/E-Series. This unique technology makes capacity automatically adapt to your actual requirement. Secop variable-speed compressors are designed for refrigeration systems using the refrigerants R600a (isobutane) and R290 (propane)

Secop AC refrigeration compressors are designed for the main voltage 220 V 50 Hz and 115 V 60 Hz. The compressors can also be used at other voltages and frequencies. Thus 220 V compressors can also be used on 240 V 50 Hz mains as the higher voltage tends to amplify the motor capacity. Some compressors can be used on 60 Hz mains, for instance 220 V 60 Hz and 230 V 60 Hz, however dependent on the application, the compressor, and the type. The rated voltages 100 V 50 Hz, 120 V 60 Hz, 127 V 60 Hz, 110 V 50 Hz and 127 V 50 Hz will strengthen the motors. The rated voltages 110 V 60 Hz and 100 V 60 Hz will weaken the motors. If used at 50 Hz the motors will be strengthened but the compressor capacity will be reduced by approx. 17%.

DC Variable-Speed Compressors

The Secop variable-speed DC-powered BD compressors program is intended for use in mobile, and medical applications, for example, automotive passenger cars, portable cooling boxes, boats, caravans, trucks, parking cooling in trucks, vans, buses, and battery and shelter cooling in telecom stations. The compressors are also suitable for dedicated stationary applications powered by photovoltaic solar panels or fuel cell

Secop variable speed compressors type BD (battery driven) are designed for connection to 12–24V DC and 48V DC power supply for refrigeration systems using isobutane, refrigerant R600a and propane, refrigerant R290, and for refrigerant types R134a and/or R1234yf.

Advantages of Direct Current Compressors

Secop direct current compressors can be used in applications using either capillary tube or TEV as the throttling device. The BD compressor must be mounted in a dry and clean place. The compressors will withstand storage temperatures down to -25°C and up to +70°C.

Condensing temperatures:

Max. 60°C at stable conditions and max. 70°C at peak load.

Ambient temperatures: Min. -10°C, max. 43°C

The BD compressor concept includes an electronic unit which features overload protection, battery protection, wrong polarity protection, evaporator and condenser fan control, LED diagnosis signal, light bulb connection, load dump protection, mechanical or electronic thermostat, ECO function, AEO (Adaptive Energy Optimizing) function and bus communication interface. These features are model dependant. The electronic module has internal voltage recording and calibration to the applied voltage. The electronic module may also be powered directly from certain types of electronic power supply units and thus no battery is required.

In addition to being especially quiet in operation – ranging from 33 dB(A) to 38 dB(A)– depending on model and speed of compressor, all BD compressors have high COP values.

Tilt Angle of BD Direct Current Compressors

The BD compressors are designed to be mounted in a horizontal position. However they are also designed to operate temporarily in conditions with heeling up to 30° such as can occur in boats, car and trucks driving in mountains. Under such heeling conditions the compressor can be noisy when internal compressor parts knock against the compressor shell.

Refrigerants

Refrigerants with certain molecular structures have been identified as substances that can be harmful to the environment. Two properties are critical: the ozone depleting potential (ODP) and the global warming potential (GWP). The first negative property is covered by the Montreal Protocol ('Montreal Protocol on Substances that Deplete the Ozone Layer') from 1987 which is an international agreement designed to protect the earth's ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. The result was the replacement of HCFC (halogenated chlorofluorocarbon, R22) refrigerants with HFC (hydrofluorocarbon, e.g. R134a) refrigerants which have an ODP of zero (or close to zero). The significant downside of HFC refrigerants is their high global warming potential since they belong to the category of greenhouse gases. This fact was discovered after the Montreal Protocol was adopted and was recently covered by an amendment adopted in Kigali in October 2016. Before this amendment, the United States and the EU had introduced regulations to define the phase down and replacement of these HFCs on a federal level.

Secop has been a pioneer and early adopter of hydrocarbons as refrigerants and believes the most efficient and economical friendly substances for use in cooling appliances are isobutane (R600a) and propane (R290). Secop recommends the first one as a replacement for household appliances and small capacities in the light commercial segment and the latter one for medium to large light commercial applications. Secop is also aware that the transition towards hydrocarbons is challenging for manufacturers as well as for service providers and not always feasible in the short term.

Tests have so far shown good results with refrigerant R452A as a drop-in replacement for R404A and R507. Based on this information, Secop allows the use of R452A on all its R404A and R507 released compressors. It is the customer's responsibility to validate the application, and they should carefully consider the requirements and drawbacks when changing from R404A/R507 to R452A in their application. The HFO (hydrofluoroolefin) R1234yf can be used as drop-in for replacing R134a in the short-term for most of the applications. R1234yf is classified as flammable according to relevant safety standards. It is more expensive than R134a, however, it holds remarkably less greenhouse potential than R134a. Our R134a compressors can be used for testing with this refrigerant, and we will be more than happy to assist you in discovering that right solution for you and when it comes to the approval procedure. Investigations into material compatibility have so far shown good results with refrigerant R1234yf in Secop R134a compressors. These results must be confirmed in ongoing long-term tests. Currently, testing system performance can be conducted using compressors originally designed for R134a. The same application limits as described on the R134a data sheet may be used, however, partly with changed electrical equipment. Since R1234yf is classified as a flammable refrigerant, the compressors must be used with starting equipment approved for flammable refrigerants. The compressors designed for R134a do not have a safety approval for flammable refrigerants like R1234yf.

Handling of Refrigerants

To ensure reasonable refrigeration system life, the refrigerant must have a maximum moisture content of 20 ppm (20 mg/kg). Do not fill the refrigerant from a large container into a filling bottle through several container sizes, as with every drawing-off the water content in the refrigerant is increased considerably.

Charging with Refrigerant

Normally, charging with refrigerant is no problem with a suitable charge, provided that the charging amount of the refrigeration system equipment is known.

Always charge the refrigerant amount and type stated by the refrigerator manufacturer. In most cases this information is stated on the refrigerator type label. The different compressor brands contain different amounts of oil, so when converting to another brand it may be advisable to correct the amount of refrigerant. Charge of refrigerant can be made by weight or volume.

Flammable refrigerants like R600a and R290 must always be charged by weight. Charging by volume must be made with a refrigerant charging cylinder. The refrigerant R404A and all other refrigerants in the 400 series must always be charged as liquid.

If the charging amount is unknown, charging must be done gradually until the temperature distribution above the evaporator is correct. However, mostly it will be more appropriate to overcharge the system and then gradually draw off refrigerant until the correct charge has been obtained. The refrigerant charge must be made with the compressor running, the refrigerator without load and with the door closed.

The correct charge is characterized by the temperature being the same from the inlet to the outlet of the evaporator. At the compressor suction connector the temperature must be approx. ambient temperature. Thus transfer of moisture to the refrigerator insulation is avoided.

Systems with an expansion valve must be charged with refrigerant until there are no bubbles in the sight glass, which should be placed as close to the expansion valve as possible.

HFC Refrigerants (R134a)

The HFC refrigerant R134a and HFC mixtures require Polyester type oil. Contamination of components and systems with mineral oil and alkylbenzols must be avoided. Greasy substances and other long-chained, high molecular substances not dissolved must not be present. Manufacturing processes which require a lubricant can be done with Polyester oil approved for the compressors. Procedures for mounting, evacuation and charging must be carried out in such a way that contamination with chlorine refrigerants is avoided. HFC refrigeration systems must always have a drier with 3 Angstrom Molecular Sieves.

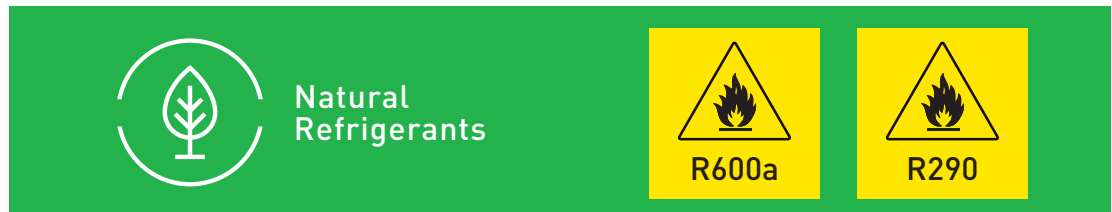
Flammable Refrigerants R290 and R600a

R600a (isobutane) and R290 (propane) are hydrocarbons. Hydrocarbon refrigerants are flammable and are only allowed for use in appliances that meet the requirements set out in the latest revision of EN/IEC 60335-2-34. Consequently, R600a and R290 are only allowed to be used in appliances designed for this refrigerant and fulfil the above-mentioned standard. R600a and R290 are heavier than air and the concentration will always be highest at the floor. R600a must only be stored and transported in approved containers and must be handled according to existing guidelines.

Do not use the refrigerants R600a or R290 near an open fire. The refrigeration systems must be opened with a tube cutter.

The flammability limits are approx. as follows,

Refrigerant	R600a	R290
Lower limit	1.5 % by vol. (38 g/m ³)	2.1 % by vol. (39 g/m ³)
Upper limit	8.5 % by vol. (203 g/m ³)	9.5 % by vol. (177 g/m ³)
Ignition temperature	460 °C	470 °C



To properly perform maintenance and repair work on R600a or R290 systems, service staff must be properly trained in handling flammable refrigerants. This includes knowledge of tools, transportation of the compressor and refrigerant, and the relevant regulations and safety precautions when carrying out service and repair work.

Do not use open fire when working with refrigerants R600a and R290!

Conversions from refrigerants R12 or R134a to R600a is not permitted, as the refrigerators are not approved for operation with flammable refrigerants, and the electrical safety has not been tested according to existing standards either. The same applies to conversions from refrigerants R22, R502 or R134a to R290. Secop compressors that use flammable refrigerants R600a and R290 are equipped with a yellow warning label as shown.