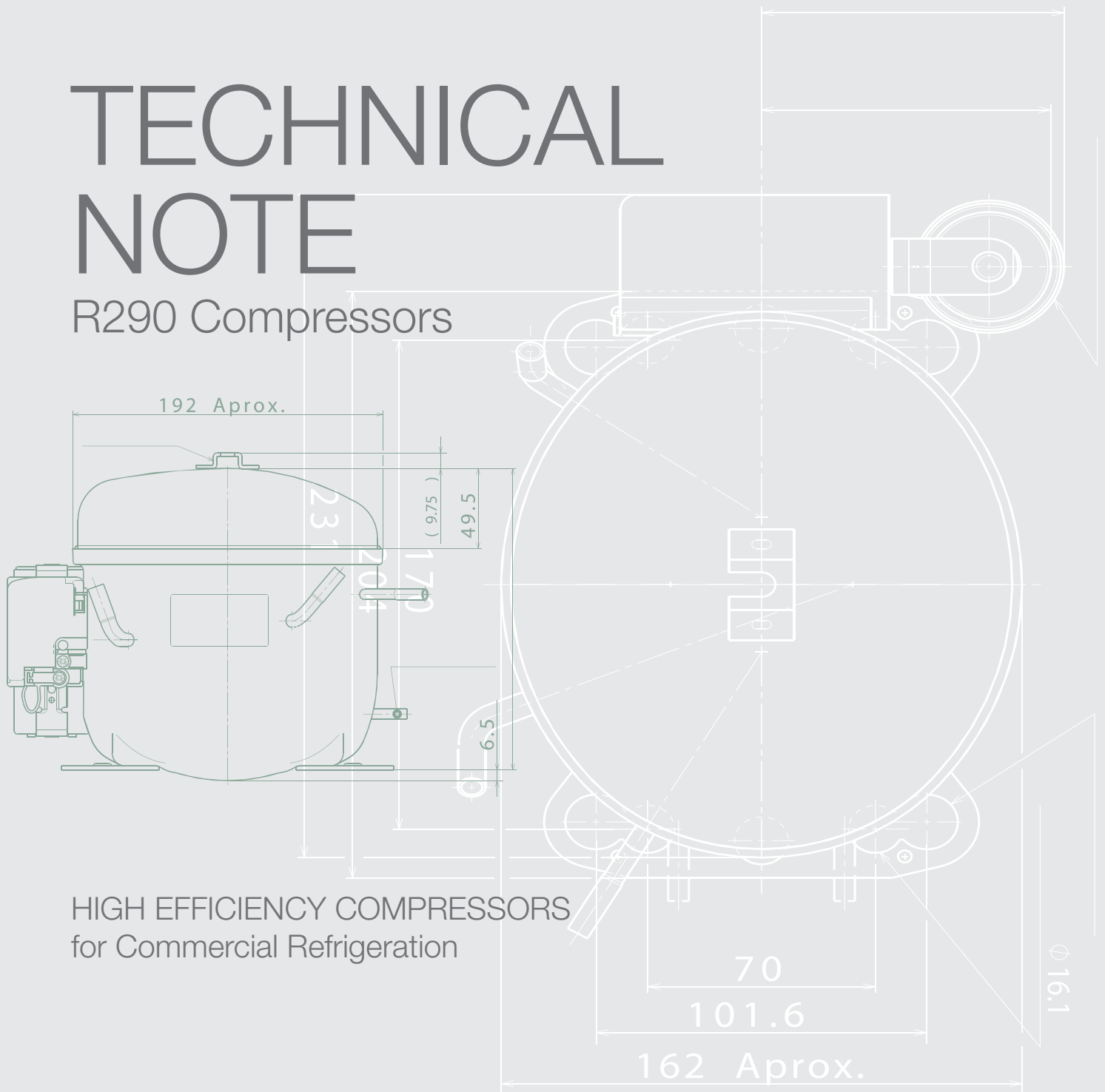


TECHNICAL NOTE

R290 Compressors



HIGH EFFICIENCY COMPRESSORS
for Commercial Refrigeration



cubigel[®]
compressors



by
HUAYI
COMPRESSOR
BARCELONA

R290 Cubigel Compressors® models

Efficiency, competitiveness and compactness



Huayi Compressor Barcelona following the market trends has developed a complete high efficiency compressor ranges working with natural refrigerants.

Nowadays the importance of the energy saving regarding the impact on the environment is clear.

Hydrocarbon refrigerants are environmentally friendly, nontoxic, non-ozone-depleting replacement for chlorofluorocarbons (CFCs), hydro chlorofluorocarbons (HCFCs) and hydro fluorocarbons (HFCs). From a chemical point of view, a hydrocarbon is the simplest organic compound, consisting entirely of hydrogen and carbon. Hydrocarbons are safe, with proper handling. Since hydrocarbons are flammable, some basic safety rules need to be respected by manufacturers, installers and users, which may differ slightly depending on the application.

Cooling Systems charged with natural refrigerants are more efficient than the ones charged with other refrigerants. Furthermore, Cubigel Compressors®' complete high efficiency ranges shows an extra COP increase between 15% and 35% (depending on the application) that, in turn, means an important reduction of fossil fuels consumption. It should not be forgotten that 1kWh energy consumption represents about 0,45kg of CO2 emitted to the atmosphere.

The **major environmental benefits** are obtained combining the use of the **natural refrigerants** with the design criteria of **high efficiency range**, more than with any of the other refrigerants.

R290 Main Advantages and Benefits

- R290 has no direct contribution to global warming (GWP=3) and null Ozone Depletion Potential (ODP=0).
- Advanced motor windings and patented electrical diagram design which allows the “optional running capacitor” concept.
- Excellent thermodynamic properties leading to high energy efficiency.
- Good compatibility with system components.
- Low refrigerant charges allowing smaller heat exchangers and piping dimensions. This is a key point due to the limitation of 150gr refrigerant.
- Wide working range: from -25°C to +10°C (HMBP) and from -40°C to -10°C (LBP) evaporating temperature range.
- Wide operating voltage range: from 187V to 264V at 50Hz.
- Compressor able to work up to 43°C ambient temperature.



R290 vs R600a

For a same cooling capacity: R290 → better COP than R600a in HMBP.

For a same cooling capacity: R290 → lower dimensions than R600a.

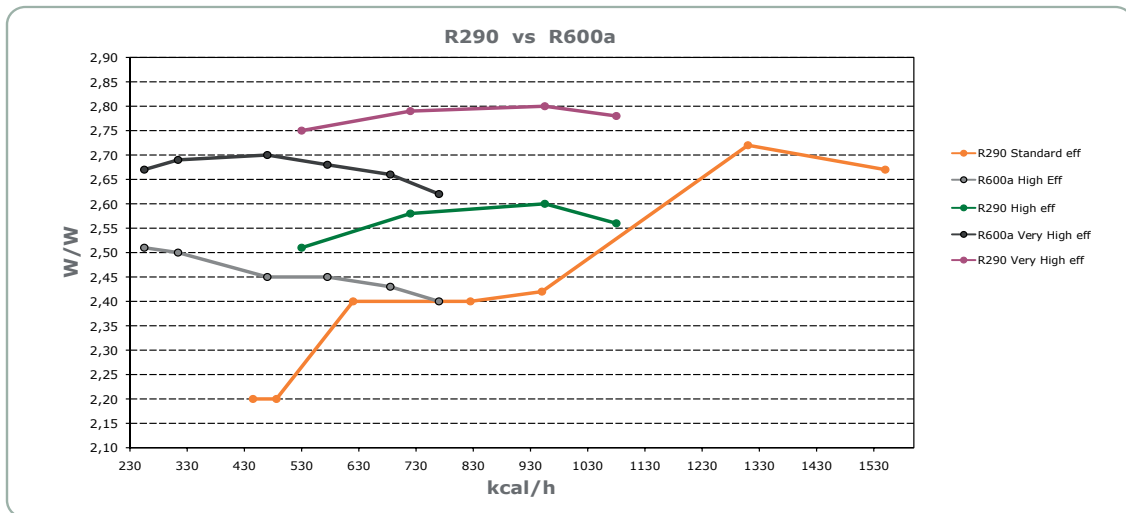
For a same cooling capacity: R290 → more competitive in terms of cost than R600a.

Comparison between Natural Refrigerants Ranges

The graph shows a COP comparison vs. cooling capacity between R290 and R600a compressors in HMBP conditions, taking into consideration the different efficiency levels that Cubigel Compressors® has currently available:

- Standard Efficiency.
- High Efficiency → Mechanical improvements in addition with a more efficient motor.
- Very High Efficiency → Mechanical improvements, more efficient motor together with the advantages of adding a running capacitor.

COP comparison between R290 and R600a



R290 compressors shows better COP than R600a ones. In addition to that, R290 is also able to perform more than double cooling capacity for a same displacement and its range is wider than in R600a.

Comparison between R290 and R600a HMBP Ranges

R290 HMBP Range					R600a HMBP Range			
Standard Efficiency	kcal/h 7,2°C	W/W 7,2°C	High Effic. CSIR/CSR	kcal/h 7,2°C	W/W 7,2°C	"High Effic. CSIR/CSR"	kcal/h 7,2°C	W/W 7,2°C
						HLY55MAa	255	2,51
						HLY55MAb	255	2,67
						HLY70MAa	314	2,50
						HLY70MAb	314	2,69
NL40TB	445	2,20						
NL45TB	486	2,20				HLY99RAa	472	2,45
						HLY99RAb	472	2,70
			NLY45RAa	530	2,51	HPY12RAa	580	2,50
			NLY45RAb	530	2,75	HPY12RAb	580	2,70
NL60TB	620	2,40						
			NLY60RAa	720	2,58	HPY14RAa	690	2,45
			NLY60RAb	720	2,79	HPY14RAb	690	2,70
NL80TB	825	2,40				HPY16RAa	780	2,45
						HPY16RAb	780	2,70
NL90TB	950	2,42	NLY80RAa	955	2,60			
			NLY80RAb	955	2,80			
			NLY90RAa	1080	2,56			
			NLY90RAb	1080	2,78			
NP12TB	1310	2,72						
NP14TB	1550	2,65						

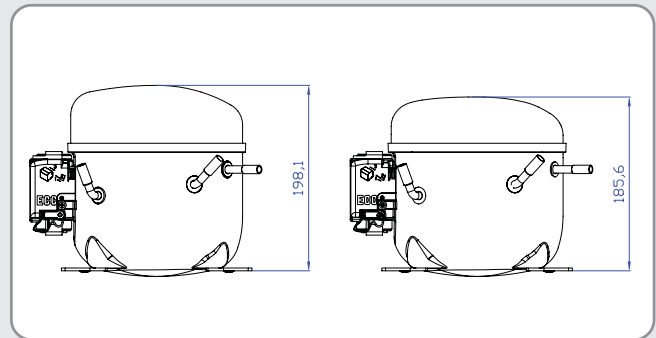
General Dimensions

Another important advantage of using R290 compressors rather than R600a's is the compactness. Due to the higher pressures in R290 versus R600a, a same size of mechanical kit is able to perform more refrigerant mass flow with R290 rather than with R600a. An approximate relation is that double displacement is needed in order to be able to perform as an equivalent R290 model.

As a consequence of that, equivalence between R600a and R290 models makes the R600a's compressor bigger than the R290 one.

The figure shows the dimensions of equivalent models from the cooling capacity point of view between R600a and R290.

It makes **R290** models more compact in dimension and not only easier to be installed in the cabinet but also **more competitive** in terms of cost.



R600a compressor dimension and its R290 equivalent.



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