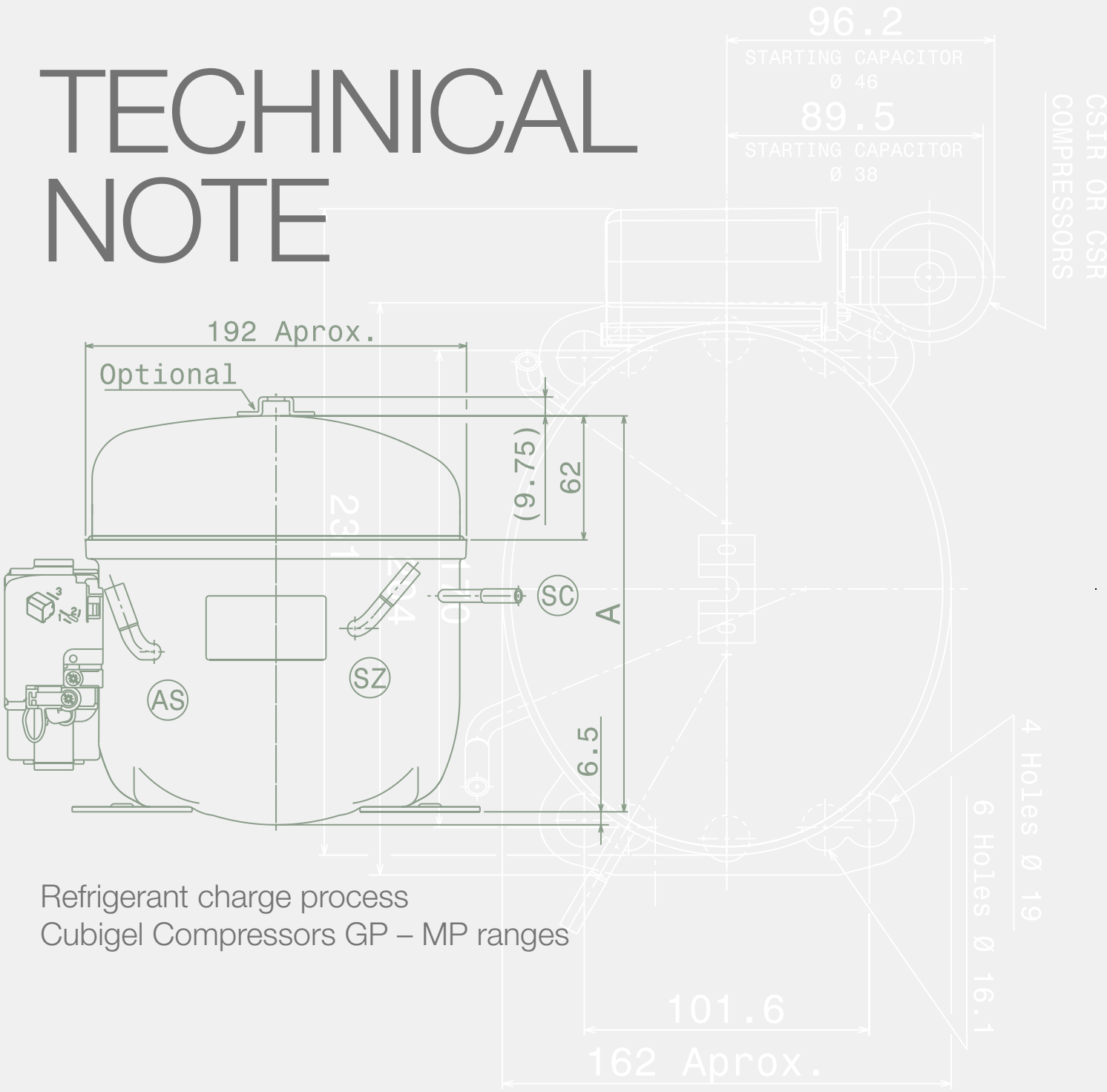
TECHNICAL NOTE



Refrigerant charge process
Cubigel Compressors GP – MP ranges

cubigel® compressors by HUAYI COMPRESSOR BARCELONA

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Technical Note

Refrigerant charge process Cubigel Compressors GP – MP ranges

Refrigerant blends like R404A are made of three different refrigerants. As a consequence, it suffers from fractionation that is the change of composition of the blend when changing from liquid to vapor or vice versa. Therefore, composition in the liquid phase is different from that in the vapor phase in equilibrium with it. It is a general recommendation that refrigerant blends are to be charged into systems from the refrigerant cylinder in liquid phase.

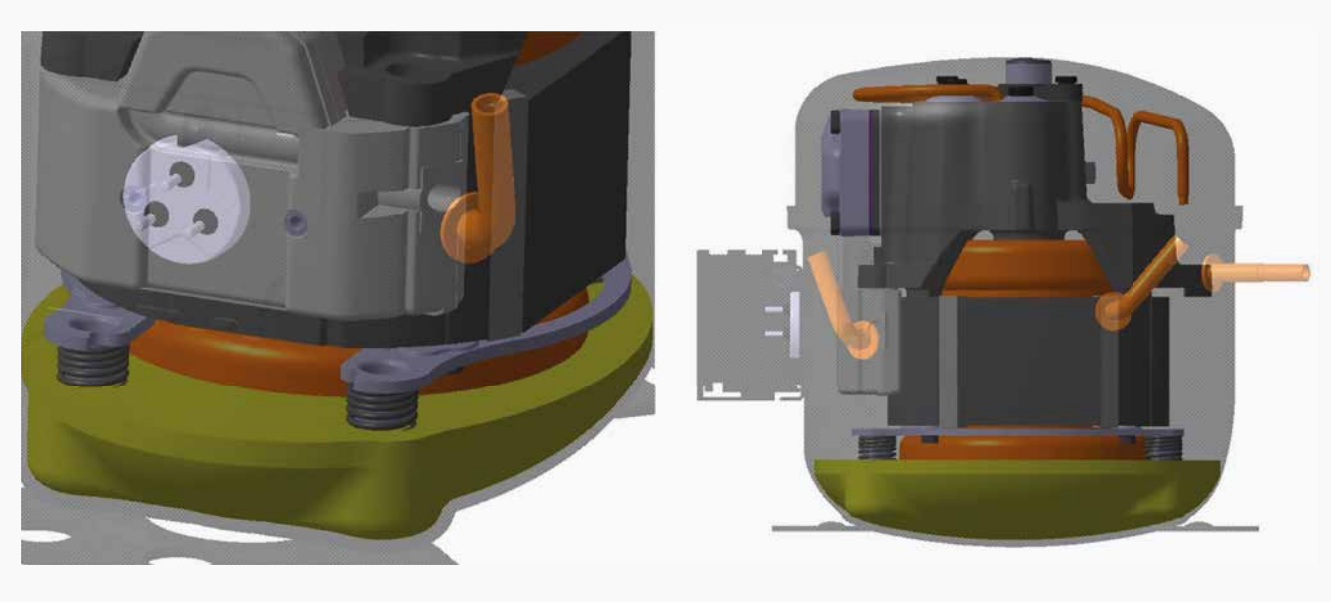
It is consequently quite common to **charge refrigerant in liquid phase**, not only for refrigerant blends (ex.: R404A) but also for pure refrigerants (ex.: R134a).

However, this general procedure may lead to some troubles when the quantity of refrigerant is important. Main problems can be the following:

1. Liquid / oil arrives into the internal compressor suction inlet and can damage the valves / gaskets.
2. Compressor mechanics are lubricated with liquid refrigerant and can produce seizure on mechanical parts.

1. Liquid / Oil arrives into the internal compressor suction inlet

The compressors from GP – MP Series are built with a plastic suction muffler to increase efficiency. This muffler inlet is in front of the compressor suction tube inlet and not far from the oil level:



The allowed maximum quantity to be charged in liquid phase will be different according to:

– the system and application of the compressor

– the size and relative refrigerant charge

In average, the maximum quantity to be charged in one shot should not be more than **350 grams** directly in the compressor through the service tube.

Refrigerant charging process in case of exceeding the recommended limit

– Charge the liquid refrigerant into the condenser, by means of a “T” piece *(fig. 1)*, or through the filter *(fig. 2)*.

Fig. 1

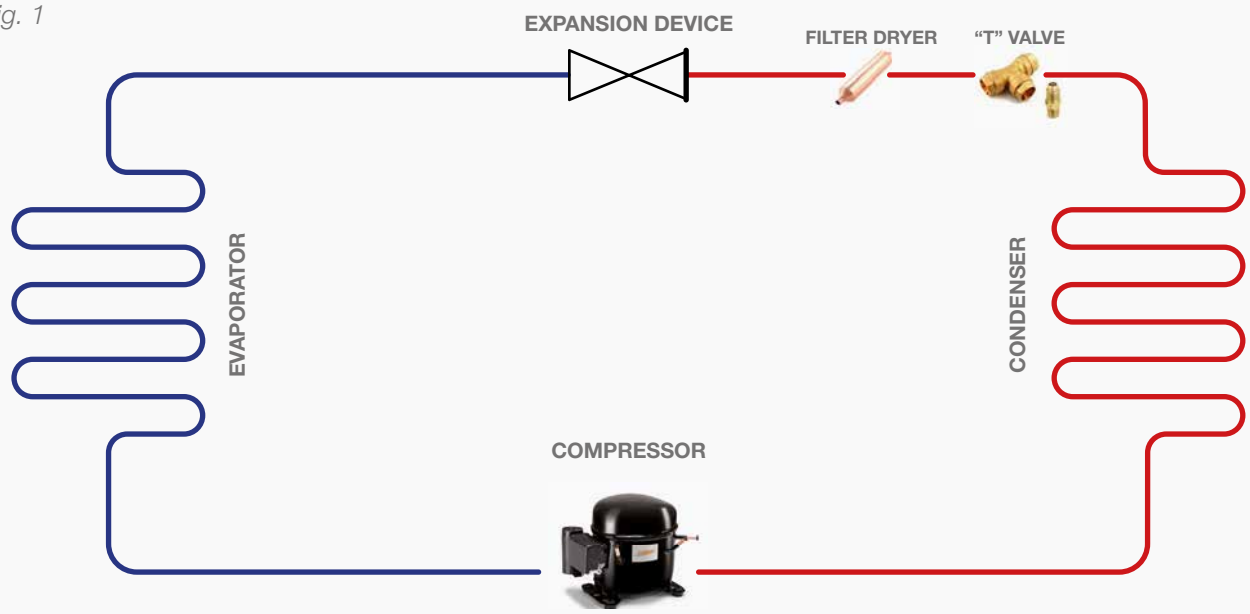
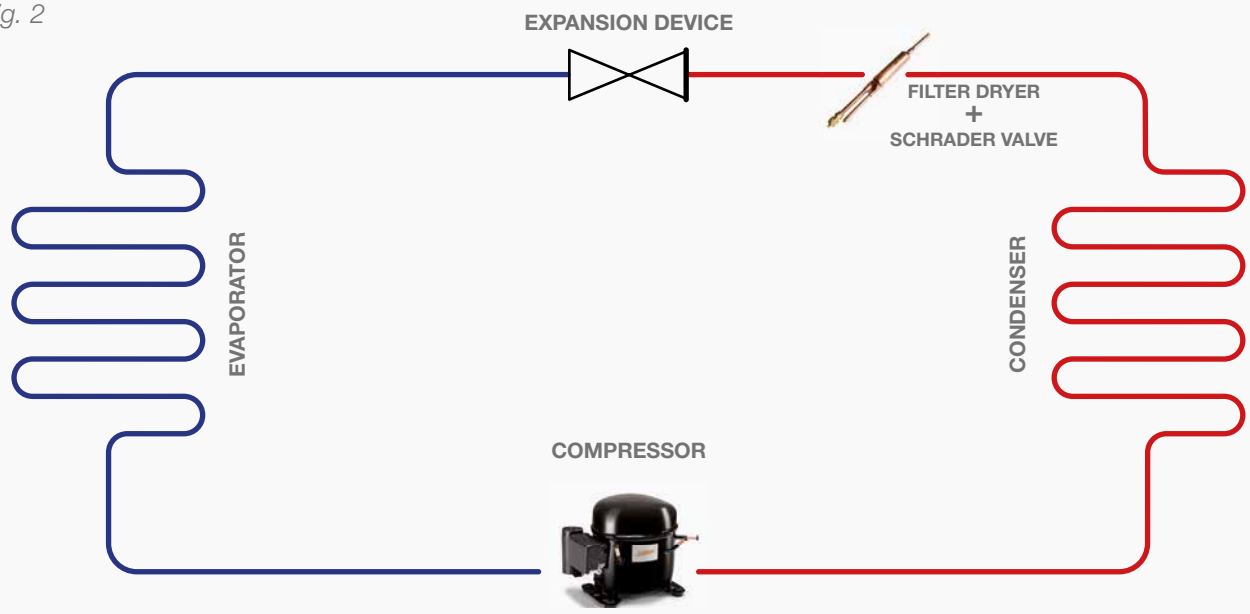


Fig. 2



– Charge in different steps through the compressor service tube, each step no more than 350 grams. The compressor must be switched on between each step in order to move the liquid to the condenser.

– Use an intermediate charging cylinder. The refrigerant is weighted in liquid phase from the charging station and injected into this intermediate cylinder. Part of it is charged into the compressor in liquid phase and the compressor is switched on (never start the compressor while the system is under vacuum). The compressor will suction the rest of the charge remaining in the intermediate cylinder in vapor phase.

2. Compressor mechanics are lubricated with liquid refrigerant

When injecting the entire refrigerant charge at once and high-speed, part of it vaporizes, but the majority remains in liquid phase and places itself in the bottom part of the compressor. The oil stays above the refrigerant, in contact with the moving parts of the compressor mechanics.

When starting up the compressor shortly after finishing the charging process, the crankshaft oil pump is pumping only refrigerant from the compressor bottom part, and not oil, so that bearings are not lubricated.

Moreover, while pressure decreases, refrigerant evaporates taking oil with it and foaming. This mixture reaches the suction inlet and gets into the refrigeration circuit. The quantity of oil in the crankcase during the first minutes after starting up may not be enough and, in any case, its lubrication effect will be poor since it is solved into the refrigerant.

This may result in sizing up or creating important damages on the bearing surfaces.

This problem happens at the beginning of operation and seizure may already be formed during the final checking of the appliance.

For that reason, apart from the above refrigerant charge guidelines, we suggest to:

– Let some time pass before starting up the compressor, once the charging is finished, in order to allow the refrigerant to vaporize completely.

NOTE:

This recommendation does not apply if refrigerant charge is made in vapor state.
Also, since there is a limitation for charging natural refrigerants (R600a, R290), the recommendations given in this note does not apply in this specific case.