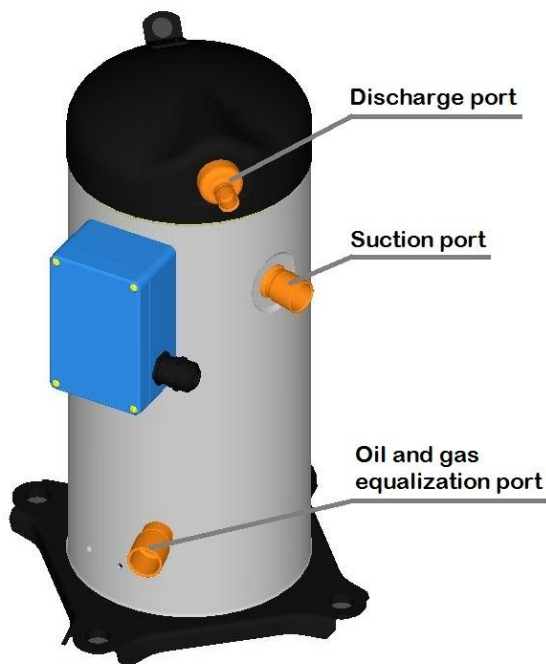


## PARALLELING OF ZB\*KCU AND ZH\*KCU COPELAND SCROLL™ COMPRESSORS FOR REFRIGERATION AND HEAT PUMP APPLICATIONS

### 1 Introduction

This Technical Information represents an appendix for Application Engineering Bulletin C32.17.2 “Tandem/Trio Oil Return and Balancing Verification / Floodback Tests” and provides important and distinctive information about ZB\*KCU and ZH\*KCU Scroll compressors designed for parallel operation and about sample compressors dedicated for customer qualification process, covering passive oil management. Since these compressors are intended for use with R290 as refrigerant pressure testing and safety considerations will be mentioned as well.

The compressor design features for parallel application differ from those of Copeland Scroll™ compressor models designed for single use, as shown in **Figure 1**.



**Figure 1: ZB\*KCU and ZH\*KCU scroll compressor for parallel applications**

Compressors for parallel operation have an additional brazing port used for oil and gas equalization positioned at the height where the normal oil level should be, 7/8" pipe diameter to be used.

For individual compressor information, please refer to the Copeland™ brand products Selection Software or to the application guidelines available from the Emerson Climate Technologies website at [www.emersonclimate.eu](http://www.emersonclimate.eu).

**Emerson Climate Technologies does not qualify and/or manufacture parallel arrangements with these compressors but can provide sample compressors equipped for this particular application testing, with feature required for the qualification process.**

**Sample compressors equipped with oil level glass - for laboratory test purpose only and with liability letter - can be ordered from Emerson Climate Technologies.**

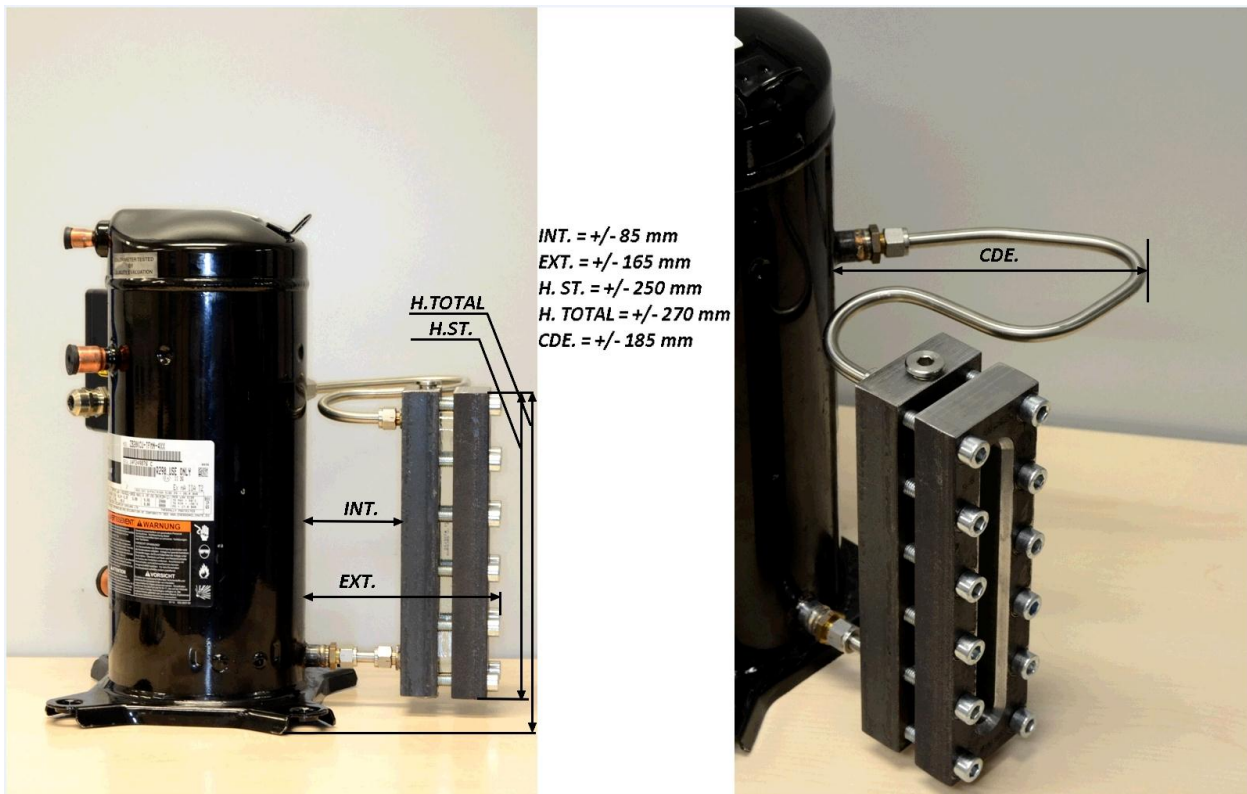


Figure 2: Sample compressors with relevant dimensions related to the oil level glass

The OEM's have to conduct the qualification process for parallel configuration before putting on the market systems where parallel arrangements are incorporated in order to be sure that the design will provide adequate oil balancing between the compressors under all relevant operating conditions.

Detailed information about testing procedure can be found in Application Engineering Bulletin C32.17.2 "Tandem/Trio Oil Return and Balancing Verification / Floodback Tests".

The oil reference level in the oil level glass is the one corresponding to the mid-level of the oil and gas equalization port. The acceptable oil level should be as shown in **Figure 3** in between  $\frac{1}{4}$  and  $\frac{3}{4}$  of the port height.

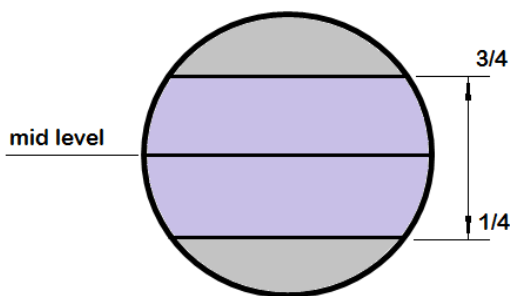


Figure 3: Acceptable oil level related to oil and gas equalization port

**NOTE:** Under no circumstance should sample compressors with oil level glass be used on site for trial. These are laboratory purpose samples only!

## 2 Safety considerations

Copeland Scroll compressors are manufactured according to the latest relevant European safety standards. Particular emphasis has been placed on the user's safety.

These compressors are intended for installation in systems according to the EC Machinery Directive 2006/42/EC, to the Pressure Equipment Directive PED 97/23/EC and to the ATEX 94/9/EC Directive for Zone 2. They can only be installed in the EU if they have been installed in systems according to instructions and conform to the corresponding provisions of legislation. Conformity to local national rules and regulations that apply to explosive atmosphere must also be observed.

**The OEM's should consider safety instructions during testing and qualification process of the end products built.**

**In case of explosive atmosphere, the laboratory technicians shall immediately stop and/or de-energize the power supply of the test facility (EN 378).**

**Emerson Climate Technologies strongly advises to follow the detailed safety instructions from the Application Guidelines of the compressors.**

The Material Safety Datasheet (MSDS) for R290 shall be considered when working with this type of refrigerant – please check this document provided by the gas supplier.

## 3 Recommended tandem configurations

The only parallel configuration of ZB\*KCU and ZH\*KCU compressors which this Technical Information refers to consists of two compressors which are equal in size and model (even tandem).

The bill of material number (last three digits of the compressor model) for tandem-ready compressors is different from single application compressors, so when placing an order please order the right BOM which is -424 for a tandem-ready compressor.

When a sample compressor for laboratory test purpose is required, please mention "with oil level glass" on your order.

## 4 Design information

Emerson Climate Technologies recommendations for tandem designs are based on years of experience and include the latest technological tools such as computational fluid dynamics analysis.

The passive oil management applied for these compressors is to be done by use of an oil and gas equalization line which is also called Two-Phase Tube Line (TPTL), connected to the dedicated port existing on parallel purpose compressors. The pipe outside diameter required is 7/8" and it must not be reduced.

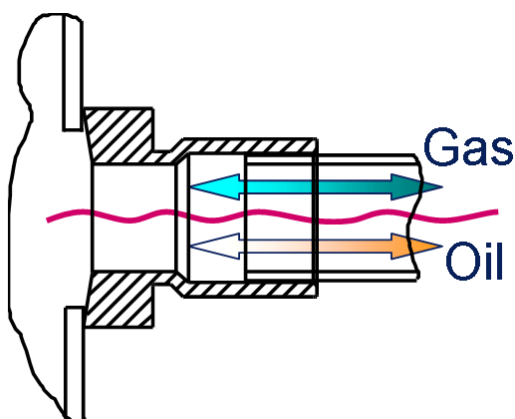


Figure 4: Oil and gas equalization (TPTL)

**NOTE: Emerson Climate Technologies recommends that on the final piping design no sight glass is to be fitted on the oil and gas equalization line!**

A non-return valve is fitted on the discharge port of each compressor so it will not be required to install additional external ones.

Emerson Climate Technologies concept for pipe design and arrangement for tandems with ZB\*KCU and ZH\*KCU is shown in **Figure 5**.



**Figure 5: Piping design examples ZBT\*\*KCU / ZHT\*\*KCU**

## 5 Pressure testing

The compressor has been strength-tested in the Emerson Climate Technologies factory. As the compressor complies with EN 14276-1, it is not necessary for the OEM to strength-test the compressor. Since it is not possible to isolate the compressors from the rest of the system, system strength pressure testing according to EN 378-2 should be carried out.

The compressor has been leak-tested in the Emerson Climate Technologies factory. It is not necessary for the OEM to leak-test the compressor.

**All systems built, including the test tandem, shall be tested thoroughly for tightness of the whole or in parts according to EN 378-2.**

**We strongly advise to follow the detailed safety instructions from the Application Guidelines of the compressors when changing a compressor in a tandem arrangement.**

## 6 Additional technical information

Please visit <http://www.emersonclimate.com/europe/en-eu/resources> for free download of the documents listed below:

- C32.17.2 Application Engineering Bulletin “Tandem/Trio Oil Return and Balancing Verification / Floodback Tests”
- C6.2.28 Application Guidelines “Scroll™ Compressors for R290 applications”
- Safety Instructions for Copeland™ brand compressors

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