



Technical Bulletin (TB-0056) Electrical Ratings and Recommendation

Version 2, July 2016

This bulletin clarifies BITZER's electrical ratings and recommendations for UL recognized compressors.

MCC and RLA

All BITZER semi-hermetic compressors come standard with PTC temperature sensors (thermistors) embedded in the motor windings. The thermistors work with the motor protection module to provide an electrical overload and thermal protection system. As such, the motors comply with UL & NEC definitions of inherent thermal protection and have the wording "Thermally Protected" included on the compressor nameplate.

The thermal protection system will not allow the compressor to run higher than the amperage value that is referred to as Maximum Continuous Current (MCC)

$$RLA = \frac{MCC}{1.40} \text{ vs. } \frac{MCC}{1.56}$$

A Rated Load Amperage (RLA) is used for sizing electrical components and unit ratings. Please consult the applicable standard, code, or guideline in appropriately applying the RLA.

With motors that are thermally protected, UL and NEC require that a minimum of $\frac{MCC}{1.56}$ be used as the RLA. In the past, a more conservative $\frac{MCC}{1.40}$ has been used. Both values are given in the table.

It should be noted that operating amperage can exceed the RLA value.

MOA

Maximum Operating Amperage (MOA) is the maximum amperage that the compressor should ever draw based on the approved application envelope (normally at the maximum evaporating temp and max condensing temp for a given motor version). The values in the table correspond to the values found in the BITZER software. Please note that for 208V, the MOA may be a separate, higher value than 230V.

MOA should be taken in to consideration when sizing electrical components including inverters.

LRA

Locked Rotor Amperage (LRA) is stated on the compressor nameplate. This value indicates the maximum current the windings will draw on start up or if the running gear is unable to rotate. For part winding motors, there are two values: the lower value is for a part winding start and the higher value is for a direct start (across the line).

LRA should be used in verifying the correct sizing of contactors.

INVERTER SIZING

When sizing an inverter for a BITZER semi-hermetic compressor, it is important that the inverter has the available power to run the compressor at all pressures within the application envelope. For this reason, BITZER recommends that the inverter output amperage be greater than the compressor MOA \times 1.1.

If running the compressor at a frequency higher than the power supply frequency (trans-synchronously), then additional power / current must be available in the motor of the compressor. Please consult the application engineering team (techsupport@bitzerus.com).

Please note, when sizing electrical components and unit ratings, the **rated input current** of the inverter should be used rather than the compressor RLA or MOA. This is because the equipment power is connected directly to the inverter, not the compressor. For this reason, we only supply this value for our VARISPEED compressors. This value may also be used as the Maximum Rated Current (MRC) as mentioned in UL1995.

CONTACTOR AND CIRCUIT BREAKER SIZING

Applicable standards, codes and guidelines, should be used to establish minimum electrical component sizes. The minimum allowable electrical component size should be compared with the compressor MOA to avoid compressor reliability issues and nuisance tripping.

Undersized contactors can result in increased pitting and wear of the contact surfaces. In order to avoid possible compressor motor failure due to undersized contactors, BITZER recommends sizing the contactor using the more conservative factor, $\frac{MCC}{1.40}$, or by using the MOA (whichever is higher). The contactor's locked rotor rated current must also be sufficiently higher than the compressor LRA. It is recommended to consider a safety factor to account for higher voltages than the nominal rating voltage (e.g. 10%).

Nuisance tripping of the circuit breaker can occur if sizing strictly on RLA. For this reason, the MOA should be considered when sizing the circuit breakers. For example, the selection should be at least 110% of MOA or even up to 125% of MOA (when possible based on applicable standards or codes).

RUNNING LOAD AMPERAGE

RLA is often mistaken to represent "running load amperage," which is sometimes used incorrectly in place of the actual "Rated Load Amperage". The "running load amperage" should not be used for sizing of any electrical devices. The "running load amperage" indicates the current that the compressor is pulling at a specific condition. This value can be found in the BITZER Software by selecting the desired compressor, inputting the exact conditions (SST/SDT etc.), and noting the "Current" which is shown under the "Results" tab. It is important to adjust for actual voltage as this "Current" value is only applicable for the indicated nominal voltage.

Disclaimer

The information contained in this document is presented for informational purposes only. It is not intended to replace any national/local electrical standards or codes or specific equipment requirements. The responsibility for proper selection of electric equipment remains solely with the purchaser.