Tech Note # 112

SCCR Discussion and Circuit Breaker Application

Keywords: SCCR, kA, MSP, CB, UL 1995

Recent updates to UL standard 1995 include a requirement to mark equipment containing motor control and/or power devices with a short circuit current rating or SCCR. While marking equipment containing motor control and/or power devices with an SCCR is a straight forward process, the value of the SCCR, combined with the MCA and MOPD values, may cause issues for the authority having jurisdiction. This is particularly true if the SCCR is in the 5 to 10 kA (kilo-Ampere) range and the MCA (minimum circuit ampacity) and/or MOPD (maximum over-current protection device) are over 30 Amps.

Desert Aire has decided to revise the motor starting devices to replace the overload relay and include a motor starter protector (MSP). This protector includes short circuit and overload protection as well as a manually operated disconnect. Using this device allows the SCCR to be marked at 65kA (kilo-amperes). An exception to this is if the unit is powered at 575VAC. In these cases, the motor starting equipment will have a 25kA or 30kA rating instead of 65kA, depending on the motor size.

Prior to 2012, some Desert Aire equipment would have had an SCCR of 5kA due to a number of issues, but most notably, the motor starting devices. The contactor in use by Desert Aire has an SCCR of 5kA (kilo-amperes). Since the SCCR at a particular facility is not typically known to Desert Aire, and selecting a short circuit protective device to increase the contactor SCCR requires a specific value, some target value is required for Desert Aire to meet which will allow our equipment to be installed without issues.

Adding fusing for every motor branch circuit could allow an SCCR rating of 100kA. However, space limitations on Desert Aire's QV, LC and LV dehumidifiers make this option unworkable without a major redesign.

Removing the overload relay protection and replacing this device with a motor starter protector (MSP) allows the rating of the motor starting equipment at 65kA. An exception is if the unit is powered at 575VAC. In these cases, the motor starting equipment will have a 25kA or 30kA rating instead of 65kA. The MSP has short

circuit and overload protection combined in a single device. Using the MSP also has the advantage of adding short circuit protection to motor branch circuits. This negates the requirement for additional branch circuit protection when a duct heater is required.

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If the power supply had an available fault current higher than this, our equipment would need to be modified to allow connection to this power supply. The first step is to determine the type of power supply system the equipment will be connected to and the available fault current the system could possible generate. Any equipment connected to the power supply will need to have an SCCR higher than this available fault current.

ypically available pply air volume due to the wide range of ambient loads the refrigeration system will encounter. A Variable Air Volume (VAV) system requires the outside air volume to change to meet the zone's internal load changes if the system is to achieve the highest level of energy savings. These two objectives are the designing engineer in order to meet the energy objective. A method to achieve this can be to use a constant volume DOAS unit with a mixing box to modulate the volume of outside air and a by-pass duct system to recalculate the excess supply air volume not being required by the VAV systems.

Basic Design Values & Sequence

1. AHU – 1 & 2 will provide a constant supply air cfm at the discharge of the unit at point "A"

2. The By-Pass duct CFM will vary from a value of zero to the maximum outside air requirement

3. The Outside Air Duct will vary from a minimum code ventilation value as dictated by ASHRAE 62.1 to the maximum outside air requirement.

4. The sensor located at point "D" will measure the static pressure in the supply duct approximately ¾'s of the way down stream of the unit. As this duct static increases the By-pass duct will modulate open to provide a lesser

value of air volume downstream of the By-pass branch duct.

5. The sensor at location “E” will measure the pressure drop across the Condenser Reheat Coil. This pressure drop will vary the position of the outside air damper to maintain the constant discharge air volume as the position of the by-pass damper changes.

6. The unit includes a Room Reset control Option. If the room sensor’s see an increase in space temperature the reheat valve will modulate to the cooling position and provide sensible cooling to the space. If the space sensor see’s a call for space heating and the compressor is running the reheat valve will move off the SAT set point and modulate to a maximum of a 87°F SAT. If the outside air dew point is below set point and heat is required the hot water valve will modulate to provide a maximum SAT of 87°F.

Initial Air Balance and Set-up

1. At initial start-up the By-pass damper must be in the closed position and the manual balancing damper must be closed. All VAV boxes and duct branches downstream of the By-pass duct must be in the Open Position. The Outside Air damper is to be in the Open Position.

2. A traverse of the supply duct should be taken and motor sheaves adjusted to provide the design maximum air volume. The static pressure drop across the Condenser Reheat Coil at location “E” should be recorded and compared to the Factory value.

3. Once the unit fan has been setup for the design maximum air volume the static pressure at location “D” should also be recorded. This value will need to be entered into the unit controller. This will be the starting point of the By-pass damper closed position. Any value increase at location “D” the by-pass damper will start to modulate to the open position.

4. All VAV boxes should be set to the minimum air flow value as specified.

5. A traverse of the By-pass duct should now be recorded and the Manual Balancing damper set for the maximum design of the difference between the design maximum air volume and the minimum code ventilation value.