

HACR Ratings and UL® Listed Molded Case Circuit Breakers

Introduction

Heating, Air Conditioning, and Refrigeration (HACR) applications are a common example of group motor installations. Most modern heating applications include fans for combustion air, exhaust control, and heated air handling. Air conditioning and refrigeration equipment use compressors for the refrigerant and fans for cooled air handling.

The National Electric Code® (NEC®) provides information on installation of branch circuits and overcurrent protection equipment for use with group motor installations. Article 430.53(c)(3) of the NEC states that for group motor installations, "Each circuit breaker is listed and is of the inverse time type."

NEC Article 440.21 and 440.51 lists the requirements for applications and selection of the branch circuit overcurrent protection devices for air conditioning and refrigeration equipment.

History of HACR Ratings

For many years Underwriters Laboratories® (UL)® required special testing of circuit breakers used in group motor applications in air conditioning and refrigeration equipment. UL had Listed these circuit breakers as HACR Type and they were used to meet the requirements of Article 430.53(c)(3). At first, UL restricted the HACR listing to circuit breakers rated 240 Vac or less and 60 A maximum. In the early 1990s UL redefined the test parameters for UL Listed HACR Type circuit breakers, resulting in HACR ratings for circuit breakers rated 600 Vac and less and 250 A maximum as a second step.

By these test parameters HACR Type circuit breakers were the same as other types of inverse-time circuit breakers except they were additionally investigated by UL and determined to be suitable for motor branch circuit protection on group installations. Initially, these circuit breakers were tested and Listed to UL 489, the standard for safety for molded-case circuit breakers. Then additional investigation was done including tests to determine that the circuit breaker provided appropriate protection for the circuit components of typical heating, air conditioning, and refrigeration equipment. These included compressor motors and fan motors connected in group motor applications.

HACR Ratings Today

A great number of circuit breakers were investigated by UL using the special HACR testing. It was found that all circuit breakers that passed the normal UL 489 tests also passed the special HACR testing without a special design. As a result, UL 489 has been revised to recognize that all circuit breakers that satisfy the construction and test requirements for UL 489 Listing are also suitable for HACR applications.

Section 7.8 of the 11th edition of UL 489 grants HACR listing to all UL 489 Listed circuit breakers. There is no longer a requirement for special testing. These circuit breakers are suitable for group motor applications requiring HACR designation.

HACR Labeling

Most customers and electrical inspectors are familiar with this section of the UL 489 standard and will accept UL 489 Listed circuit breakers in group motor applications requiring HACR type devices.

The Square D brand offer provides HACR Type circuit breakers from 15 to 2500 A up to 600 V.

Table 1: Table 2:UL Listed and Labeled HACR Type Circuit Breakers

Circuit Breaker	Voltage (Vac)	Continuous Current Rating (A)	Number of Poles
HOM	120	15–50	1
	120/240	15–100	2
		15–70	1, 2
HOMA	120/240	110–115	2
HOMT	120/240	15–50	1, 2
QO	120/240	10–70	1, 2
		15–70	1
	240	10–70	3
		40–100	3
		40–100	2
QOA	120/240	40–100	2
QOB	120/240	15–20	1
		15–100	2
		10–70	1, 2
	240	10–70	3
		40–100	3
QOC	120/240	110–125	2
QOCB	120/240	110–125	2
QOU	120/240	10–70	1, 2
		80–100	1, 2
	240	10–70	3
		15–100	3
QOUA	120/240	125	1, 2
FA, FH	240, 480, 600	15–100	2, 3
HD, HG, HJ, HL, HR	240, 480, 600	15–150	2, 3
JD, JG, JJ, JL, JR	240, 480, 600	70–250	2, 3
DG, DJ, DL	240, 480, 600	150–600	3, 4
LA, LH	240, 480, 600	125–400	2, 3
LD, LG, LJ, LL	240, 480, 600	70–600	3, 4
MA, MH	240, 480, 600	300–1200	2, 3
MG, MJ	240, 480, 600	300–800	2, 3
PG, PJ, PL ¹	240, 480, 600	250–1200	2, 3
RG, RJ, RL	240, 480, 600	600–2500	2, 3, 4
ED, EG, EJ	120, 240, 277, 347	15–70	1
	240, 480Y/277	15–125	2, 3

¹ PL circuit breakers rated up to 480 Vac only.