

MOTOR CONTROL

VACUUM STARTERS  
AND CONTACTORS



Cutler-Hammer

EATON



CUTLER-HAMMER

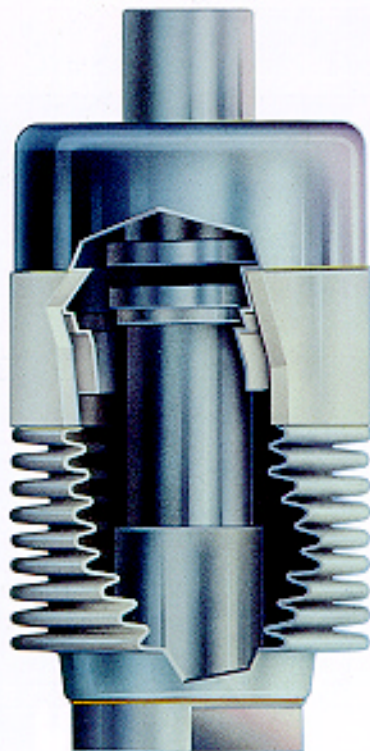
# The Vacuum Technology Leader.

To say that nothing happens in a vacuum could be considered misleading when talking about Cutler-Hammer vacuum technology for starters and contactors. What does not happen in the vacuum is the greatest asset.

The key feature of vacuum starters and contactors is the vacuum bottle inside which the contacts are sealed. In this air-free chamber, arc extinction and current interruption are completed within a fraction of a cycle, minimizing contact erosion. Vacuum starters and contactors are frequently used when motors are in continuous, heavy-duty cycling applications where contact life is critical. In short, Cutler-Hammer provides the confidence of reliable motor starting, in the most demanding applications.

No matter what the application, trust Cutler-Hammer's full line of reversing and nonreversing vacuum starters and contactors. With the benefits of small size, contained arc interruption, long life and reduced maintenance, Cutler-Hammer vacuum contactors and starters are ideally suited for the harshest, heavy-duty applications.

ARCING THAT OCCURS WITHIN THE VACUUM BOTTLE IS DISSIPATED OVER THE ENTIRE CONTACT SURFACE. CONTACT EROSION IS MINIMIZED MAKING VACUUM TECHNOLOGY THE PERFECT SOLUTION FOR HEAVY-DUTY CYCLING APPLICATIONS.





CONTACT EROSION AND CONTACT WELDING CAUSED BY ARCING IS MINIMIZED. THE HARD  
CONTACT MATERIALS ARE IDEAL FOR HIGH CURRENT, HEAVY CYCLING APPLICATIONS.





In the mining, petrochemical, pulp and paper, food processing and many other industries, the need for reliable motor starting is critical.

## VACUUM TECHNOLOGY

# Reliability Where It's Needed Most.

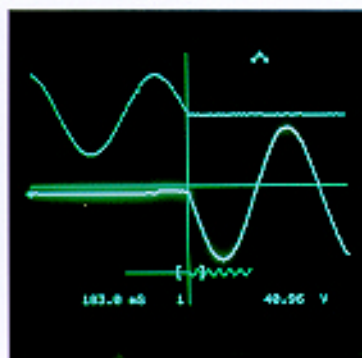
The very nature of vacuum technology keeps contacts sealed from air, moisture, and contaminants that could affect starter performance. With the main contacts sealed in a vacuum, arc interaction with the environment is minimized, making vacuum technology the clear choice in demanding environmental conditions.

Within the vacuum bottle, one contact is fixed and the other is movable. Durable metal bellows allow the moving contact to operate while maintaining the vacuum within the bottle. Size 5 and 6 contactors utilize internal bellows, while size 4 contactors use an external bellows.

Cutler-Hammer technology ensures current chop is reduced to the point where transient voltage spikes are virtually eliminated. Our silver tungsten carbide contacts provide maximum performance, with average chop currents less than 0.5 Amps.

Regardless of the application, you get years of troublefree operations with long-lasting Cutler-Hammer vacuum technology.

VACUUM TECHNOLOGY ENSURES ARC EXTINCTION AND CURRENT INTERRUPTION WITHIN A FRACTION OF A CYCLE. ARCS EXTINGUISH WHEN THE CURRENT GOES THROUGH ZERO AS IT ALTERNATES AT LINE FREQUENCY; THE ARC USUALLY DOES NOT SURVIVE BEYOND THE FIRST HALF CYCLE AFTER THE CONTACTS BEGIN TO SEPARATE.



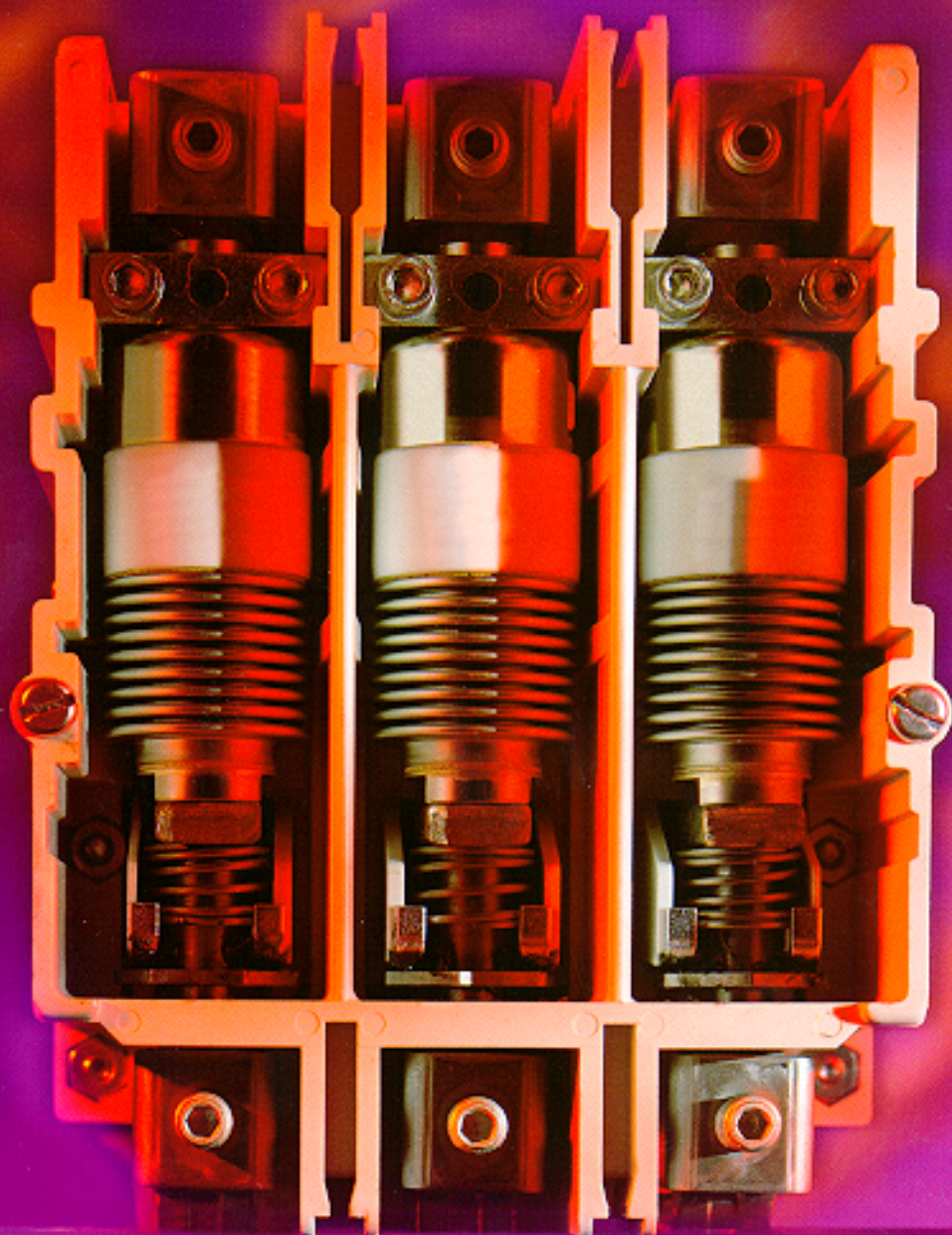
IN THE ILLUSTRATION ABOVE, THE UPPER OSCILLOSCOPE TRACE SHOWS CURRENT vs. TIME. THE LOWER OSCILLOSCOPE TRACE SHOWS VOLTAGE vs. TIME.

TO START AND PROTECT AC MOTORS, A FULL LINE OF VACUUM STARTERS AND CONTACTORS IS AVAILABLE IN REVERSING, NON-REVERSING, ENCLOSED, AND MOTOR CONTROL CENTER CONFIGURATIONS. A CUTLER-HAMMER SIZE 4 STARTER IS SHOWN BELOW IN A NEMA 1 ENCLOSURE.





NEMA SIZE 4 SHOWN AT ACTUAL SIZE.





CONTACTORS AND STARTERS CAN BE  
APPLIED TO A WIDE RANGE OF VOLTAGES  
AND ARE AVAILABLE IN BOTH NEMA  
AND IEC RATINGS. OPEN THE GATEFOLD ON  
THE NEXT PAGE FOR DETAILS.

The compact size and superior performance of Cutler-Hammer vacuum starters and contactors make them well suited for retrofitting existing air-break devices (NEMA size 4, 5 and 6). Complete motor control center unit assemblies are available for a variety of Cutler-Hammer Motor Control Centers, which ensure simple installation and minimal downtime.

SURGE SUPPRESSORS ARE NOT REQUIRED  
SINCE AVERAGE CHOP CURRENT ON  
CUTLER-HAMMER VACUUM STARTERS AND  
CONTACTORS IS ONLY 0.5 AMPERES.

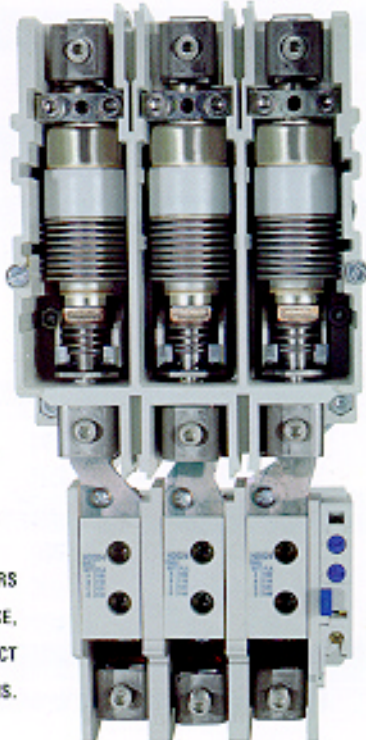
#### **GUARANTEED PERFORMANCE**

# **Built For New or Retrofit Installations.**

Cutler-Hammer engineers and manufactures all components for further quality assurance, including a complete line of enclosed vacuum starters and contactors. Each of these products has been designed to be easy to mount, wire, and service—a significant benefit during field replacement or installation.

In short, material choice, product design and engineering advantages ensure that Cutler-Hammer vacuum starters and contactors are the best products for the toughest applications. Every time.

VACUUM STARTERS AND CONTACTORS  
ARE DESIGNED TO USE MINIMAL SPACE,  
WHICH MAKES THEM A PERFECT  
SOLUTION IN RETROFIT APPLICATIONS.





**V201K4C & V201KRC**

NEMA  
SIZE 4  
135 AMP

SPECIAL  
PURPOSE  
160 AMP



**V201K5C & V201KTC**

NEMA  
SIZE 5  
270 AMP

SPECIAL  
PURPOSE  
320 AMP



**V201K6C & V201KVC**

NEMA  
SIZE 6  
540 AMP

SPECIAL  
PURPOSE  
610 AMP

MOTOR RATING	HP	HP	HP	HP	HP	HP
200V	40	50	75	100	150	150
230V	50	60	100	125	200	200
380V	75	100	150	200	300	300
460V	100	125	200	250	400	400
575V	100	150	200	300	400	500
800V	—	200	—	400	—	700
1000V	—	300	—	500	—	1000
1500V	—	400	—	800	—	1300
MOTOR RATING	kW		kW		kW	
230V	—	45	—	90	—	160
400V	—	75	—	160	—	300
525V	—	110	—	220	—	400
1000V	—	200	—	400	—	800
CAPACITOR RATING (KVAR)						
230V	40	47	80	94	160	176
460V	80	95	160	190	320	356
600V	100	100	200	200	400	400
1500V	—	205	—	500	—	1000
TRANSFORMER RATING (kVA)						
208V	—	20	—	41	—	81
240V	14	23	27	47	54	94
480V	27	47	54	94	108	188
600V	34	59	68	117	135	234
ELECTRICAL LIFE: TESTED AT 480 & 600VAC AT RATED CURRENT						
AC3	$1.1 \times 10^5$	$.9 \times 10^5$	$.7 \times 10^5$	$.7 \times 10^5$	$.3 \times 10^5$	$.3 \times 10^5$
AC4	$1.2 \times 10^5$	$1.0 \times 10^5$	$4.5 \times 10^4$	$3.8 \times 10^4$	$5.0 \times 10^4$	$4.4 \times 10^4$
MAXIMUM OPERATING FREQUENCY (ops./h)						
Mechanical	1200	1200	1200	1200	1200	1200
AC3	900	900	900	900	900	900
AC4	450	450	450	450	450	450
WIRE SIZE						
AWG	#12 - 4/0	#12 - 4/0	Ring Lugs	Ring Lugs	Ring Lugs	Ring Lugs



# VACUUM CONTACTORS AND STARTERS

## Product Specifications.

	NEMA SIZE 4 135 AMP	SPECIAL PURPOSE 160 AMP	NEMA SIZE 5 270 AMP	SPECIAL PURPOSE 320 AMP	NEMA SIZE 6 540 AMP	SPECIAL PURPOSE 610 AMP
<b>MAKING CAPABILITY</b>						
Max. Amp	1350	1600	2700	3200	5400	6500
<b>BREAKING CAPABILITY</b>						
Max. Amp	1080	1350	2160	2700	4320	6000
<b>SHORT TIME CURRENT WITHSTAND (A)</b>						
1s	2400	2400	4500	4500	9100	9100
2s	2000	2000	3750	3750	7580	7580
10s	1600	1600	3200	3200	6100	6100
30s	960	960	1920	1920	3600	3600
<b>3 CYCLE SHORT CIRCUIT WITHSTAND (kA)</b>						
50mSec	10	10	18	18	18	18
<b>POWER POLE CLOSING TIME</b>						
mSec	18-22	18-22	24-32	24-32	24-32	24-32
<b>POWER POLE OPENING TIME</b>						
mSec	95-115	95-115	95-115	95-115	95-115	95-115
<b>SHOCK RESISTANCE (g)</b>						
Contacts closed	5	5	5	5	5	5
Contact open	5	5	5	5	5	5
<b>VIBRATION (g)</b>						
10 to 500Hz	2	2	2	2	2	2
<b>ALTITUDE MAXIMUM AND MINIMUM (meter)</b>						
Above Sea Level	3600	3600	3600	3600	3600	3600
Below Sea Level	2500	2500	4500	4500	4500	4500
<b>AMBIENT TEMPERATURE (°C)</b>						
Storage	-40 to +80	-40 to +80	-40 to +80	-40 to +80	-40 to +80	-40 to +80
Operation	-10 to +75	-10 to +75	-10 to +75	-10 to +75	-10 to +75	-10 to +75
<b>MOUNTING DIMENSIONS IN INCHES (mm)</b>						
Height	6.63 (168)	6.63 (168)	8.94 (227)	8.94 (227)	17.1 (434)	17.1 (434)
Width	4.63 (118)	4.63 (118)	7.9 (201)	7.9 (201)	7.9 (201)	7.9 (201)
Depth	5.91 (150)	5.91 (150)	6.25 (159)	6.25 (159)	6.96 (177)	6.96 (177)
Mounting Width	1.88 (48)	1.88 (48)	6.75 (172)	6.75 (172)	6.75 (172)	6.75 (172)
Mounting Height	6.00 (152)	6.00 (152)	8.00 (203)	8.00 (203)	8.00 (203)	8.00 (203)

For a complete listing of Vacuum Control Products, consult the Cutler-Hammer 25-000 catalog, or your local sales office.



**Cutler-Hammer, a part of Eaton Corporation, is a leader in the development and manufacturing of power distribution equipment, electrical control products, and advanced industrial automation solutions.**

**For more information on Cutler-Hammer products and services,  
call 1-800-525-2000, or visit our web site at  
[www.cutlerhammer.eaton.com](http://www.cutlerhammer.eaton.com)**

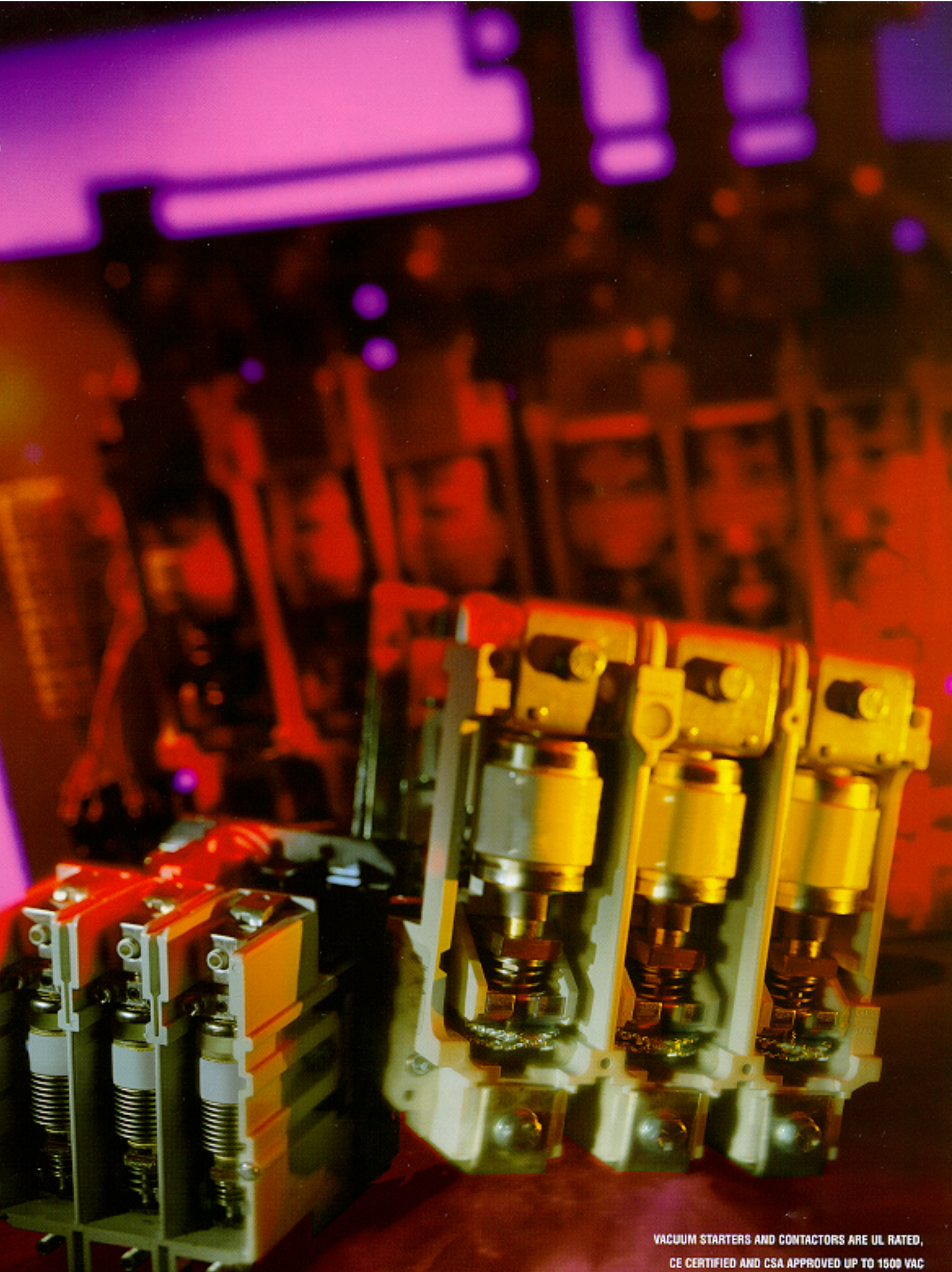
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**EATON**





VACUUM STARTERS AND CONTACTORS ARE UL RATED,  
CE CERTIFIED AND CSA APPROVED UP TO 1500 VAC