

Type VHKX Vacuum Replacement Breakers for Type HK and HKV Breakers

Descriptive Bulletin



VHKX: A modern, reliable, economical direct replacement of existing type HK and HKV breakers

Background

In 1958, the ITE Circuit Breaker Company introduced the type HK medium voltage air magnetic circuit breaker. Switchgear for the HK breaker product line was also designated as type HK. Since 1958, thousands of HK circuit breakers and switchgear frames have been manufactured and supplied under the names of: ITE Circuit Breaker Company, ITE Imperial Corporation, Gould Inc., Gould-Brown Boveri, Brown Boveri Electric, BBC Brown Boveri, Asea Brown Boveri, and now ABB Inc. Breakers manufactured over this 30 year interval have been in the 2 kV through 15 kV voltage classes, with interrupting capabilities through 1,000 MVA.

Circuit breakers that have the same model number are similar and directly interchangeable. Model number changes indicate a major design modification. Breakers of the same rating, but with different model numbers, are not interchangeable. Model numbers for most HK breakers have progressed to model "03", the current version. The only exception is on certain 1,000 MVA breakers that are designated as model "10" or "11".

Design modifications that do not affect breaker interchangeability are indicated by a letter following the model number, such as "03-A" or "03-B". Subsequent HK circuit breaker designs have evolved from air magnetic technology, to vacuum interruption technology. There have been two HK vacuum (HKV) circuit breaker designs (model "03-B" and "03-C"). HKV breakers have been superseded by the current series of medium voltage vacuum circuit breakers, designated as type VHKX.



Original HK Breaker

Description

VHKX circuit breakers are interchangeable with most of the HK and HKV circuit breakers previously supplied. This provides the opportunity for existing HK switchgear installations to be modernized with completely tested, certified and fully warranted, state-of-the-art vacuum circuit breakers, designated as type VHKX.

The VHKX circuit breakers supplied are both mechanically and electrically interchangeable with existing air magnetic type HK and early model vacuum type HKV circuit breakers. This includes matching HK model number interchange requirements. Type HK breaker cells do not have to be modified to accept VHKX vacuum replacement breakers.

Capabilities and Applications of VHKX Breakers*

- Instant upgrade to modern vacuum technology for nuclear or commercial grade
- Interchangeable with existing HK breakers for switchgear life extension, as well as match-and-line applications
- Ability to increase select system MVA ratings
- Faster VHKX closing times can minimize dead-bus transfer times (see table 2 on next page)

Features and Benefits

- Benefits of vacuum interrupter technology: clean, reliable interruption, less maintenance and longer contact life
- Time-proven stored energy operating mechanism
- Duplicate racking mechanism for direct replacement
- Faster closing and opening times
- Many common accessories
- Shorter delivery time for new breaker (7-9 weeks verses 12-14 weeks)
- Able to keep the existing equipment up and running at lower cost
- Rolls right into frames without any changes to equipment or breakers
- Able to upgrade kA rating of equipment by just changing out the breakers
- Breaker maintenance is quicker due to less parts to work on
- Breaker is lighter and easier for personnel to handle safely
- Parts for VHKX are readily available

**if the breaker is upgraded to another MVA, then the switchgear needs to be reviewed by an engineer to approve the upgrade*

Table 1: Ratings and Operating Characteristics

Breaker Type	Nom. Voltage Class kV	Nom. MVA Class	Rated Cont. Curr. A RMS 60 Hz	Min. V kV RMS	Rated Max. V kV RMS	Wtstd. V Low Freq. kV RMS	Wtstd. Impls. Level BIL kV	Min. kV Rated Short Cir. Curr. kA Sym.	Max. kV Rated Short Cir. Curr. kA Sym.	Short Time Cap. kA RMB 3 Sec.	Close & Latch Cap. kA RMS	Rated Int. Time Cycle (0 - 100 %)	Asym. Rating Cap. Ratio	Rated V Range Factor
5VHKX250	4.16	250	1200 2000	3.8	4.76	19	60	36	29	36	60	3	1.2	1.24
5VHKX350	4.16	350	1200 2000 3000	4.0	4.76	19	60	49	41	49	80	3	1.2	1.19
7.5VHKX500	7.20	500	1200 2000 3000	5.5	8.25	36	95	41	33	41	55	3	1.2	1.25
15VHKX500	13.80	500	1200 2000 3000	11.5	15.00	36	95	23	18	23	40	3	1.2	1.30
15VHKX750	13.80	750	1200 2000 3000	11.5	15.00	36	95	36	28	36	60	3	1.2	1.30
15VHKX1000	13.80	1000	1200 2000 3000	11.5	15.00	36	95	48	37	48	80	3	1.2	1.30

Selection and Application**

Table 1 above shows available ratings for VHKX breakers. Catalog numbers are not provided for VHKX breakers, since each breaker is manufactured as a direct replacement for a specific HK or HKV breaker in existing switchgear. The serial number of the existing breaker is required for accurate model number selection, quotation and order entry. Please refer to Price List 6.2.5.5 for order entry information.

Racking

Insertion and removal of the VHKX is identical to existing HK or HKV circuit breakers. VHKX uses the same racking mechanism as the HK circuit breakers, including racking stop positions and safety mechanical interlocking features. Conversion from HK to VHKX is accomplished simply by withdrawing the existing HK breaker and inserting the replacement VHKX breaker.

Operating Mechanism

The operating mechanisms employed for closing and opening VHKX breakers are similar to the time proven basic operating mechanisms from HK and K-Line breakers, except modified for proper operation and stroke required for vacuum interrupters. VHKX breaker operating times, compared to HK breakers are as follows on table 2.

Table 2:

Breaker Type	Closing Time (MS)	Opening Time (MS)
VHKX	40 - 60	25 - 40
HK	105 - 140	25 - 45



*VHKX Breaker Rear View
Primary, Secondary and Ground contacts
are identical to existing equipment*

***contact your local representative for applications of Model "10" for 15VHKX1000*



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