

Motor Drive™

for a silent HV Circuit Breaker



What is Motor Drive™?

A revolutionary concept for the operation of high voltage circuit breakers!

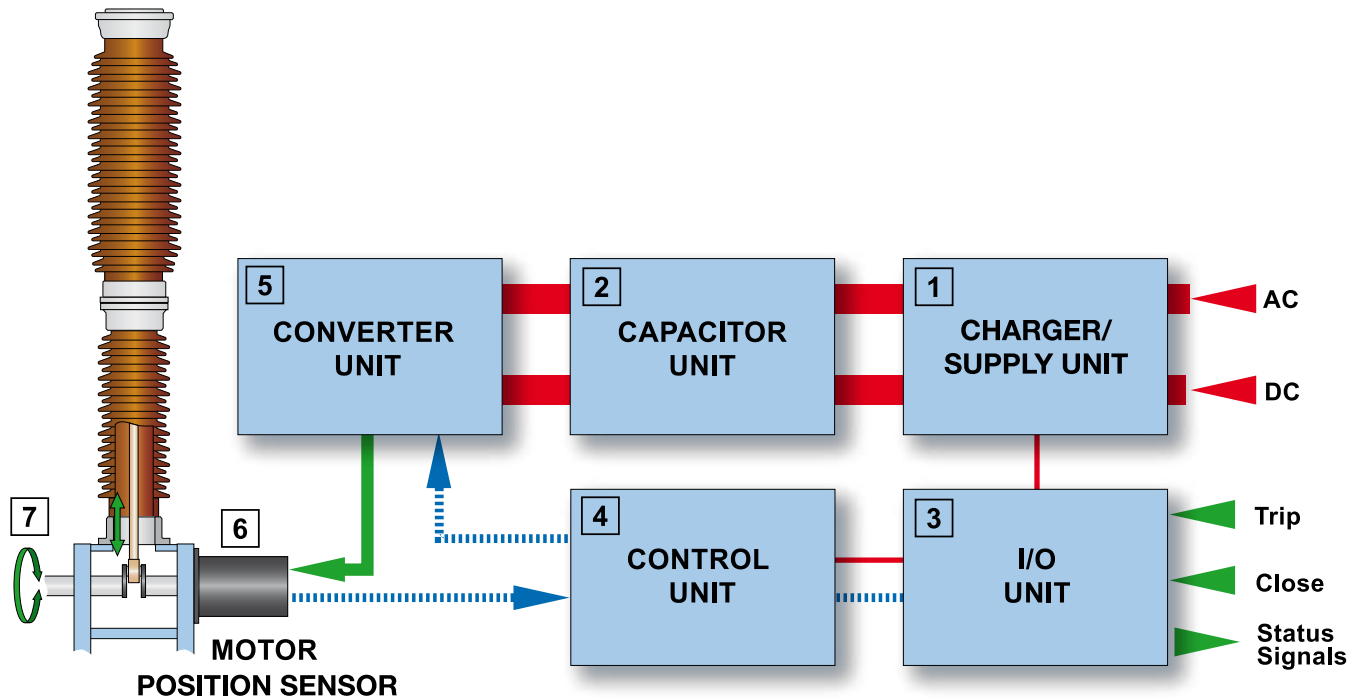


ABB has developed a digital directly controlled servomotor system capable of directly driving circuit breaker contacts with high precision and reliability. The number of moving parts in the operating mechanism is reduced to just one – the rotating motor shaft.

Energy Charging

(1) - Charger/Supply unit accepts redundant AC and DC supply inputs and provides internal power supply to Capacitor, I/O, and Control Units. Supply load demands are very low.

Energy Buffering

(2) - Operating energy for the drive is buffered in a Capacitor Unit. The unit is continuously monitored to ensure that operations are only permitted when sufficient energy is available. The unit is dimensioned to accommodate standard IEC and ANSI circuit breaker auto-re-closing demands.
(O-0,3 s-CO-3 min-CO or CO-15 s-CO)

Control & Signaling

(3) - The I/O unit receives all operating commands to the circuit breaker and provides signaling indication back to the substation control system. The I/O unit contains bistable relays, which replace the traditional mechanical auxiliary contacts.

Energy Release & Transmission

Once an operation command (Trip or Close) is validated through the I/O Unit (3) it passes on to the Control Unit (4). Permissive logic control of the operating commands is regulated in the Control Unit. The Control Unit contains and executes the programmed travel curve for the circuit breaker. The Control Unit will access the relevant curve program (Trip or Close) and sends internal commands to the Converter Unit (5). Taking DC supply from the Capacitor Unit (2), the Converter Unit will then send digitally controlled AC voltage and current to the Motor Stator (6) to drive the Motor Rotor with the required motion (7).

The rotor of the Motor is directly connected to the operating drive shaft of the circuit breaker. The integrated Position Sensor in the Motor continuously monitors the Rotor's position. This information is directly fed back to the Control Unit. The Control Unit verifies the measured position, compares it to the position required at that instant by the pre-programmed travel curve. It sends further control signals to the Converter Unit to continue the motion of the circuit breaker. Thus the circuit breaker motion is precisely controlled by the feedback according to the preprogrammed travel curve stored in the Control Unit memory.

Minimum of Maintenance

Design features

The Motor Drive is essentially a digital system. The required operating motions (trip & close) are digitally programmed into a Control unit.

On command, the required operations are executed according to the stored contact travel program and the motor is driven to move the circuit breaker primary contacts accordingly. Energy charging, buffering, release and transmission are essentially electrical and as such the mechanical system is reduced to one single moving part - the rotor of the Motor.

Active operational supervision

The operating mechanism controls the function of its units by continuously performed supervision. One part of the self-supervision is the unique Micro-motion function, that increases the circuit breaker's availability by activating the whole system and a minimal contact travel is performed. At Micro-motion a series of diagnostic functions are performed in order to check all units, cables, mechanisms and also the motor with its integrated position indicator. If any errors a signal will immediately be sent to the station control so that service can be performed.

As the circuit breaker in this way is continuously supervised, you are sure that it will function when needed!

Diagnostic

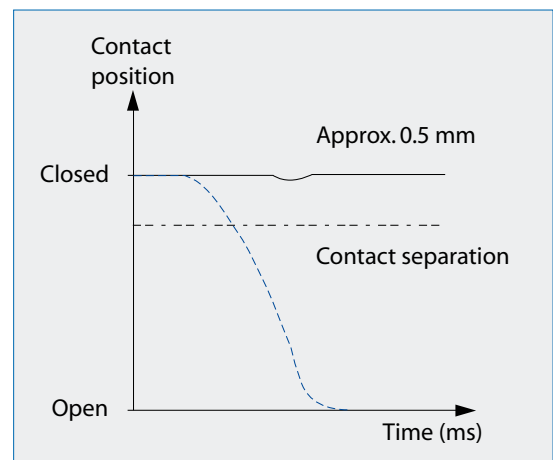
Motor Drive collects and stores a wide array of data that can be downloaded and analyzed. Stored events of the circuit breaker's activities and detailed information about the latest operations are available. With the software MD Service several service parameters can be checked and viewed on a local laptop or from a computer in the stations control room. With this program you can also update some of the circuit breakers settings according to your wish.



For best availability the whole circuit breaker system is continuously supervised



Three-pole operated LTB Circuit Breaker with Motor Drive.



The system is tested with Micro-motion at predetermined time intervals

Minimum of Maintenance

The inherent mechanical simplicity of Motor Drive™ provides major advantages:

Controlled Motion



Low Mechanical Stress



Low sound level



Low Wearing



Minimum of Maintenance

- Elimination of wearing components
- Reduction in operating forces
- Maximum reliability due to simplified mechanical system

Extensive Type Tests

The Motor Drive is type tested with the ABB LTB D circuit breaker in accordance with IEC and ANSI.

Of particular interest EMC tests in accordance with IEC and EN have been performed.

Extensive development tests have been performed to verify correct behavior for various applications.

Mechanical life tests have been performed with 10,000 operations. Endurance tests have been performed with more than 20,000 operation without damage.

Simple Erection

Installation and commissioning is easy.

Each Motor Drive is pre-tested and shipped to installation site in the form of a few pre-assembled units.

Service Experience

Motor Drive has been used in circuit breaker installations all over the world since 2002.

Further information

Further information about Motor Drive™ can be found in Live Tank Circuit Breakers, Buyer's Guide, Catalogue publication 1HSM 9543 22-00

Technical Data

For Circuit Breakers Type

Will be implemented in most ABB HV circuit breaker applications. Available for LTB D 72-170 kV. Single- or three-pole operated. DCB (Disconnecting Circuit Breakers) WCB (Withdrawable Circuit Breakers)

Installation

Outdoor / Indoor (-50 to +40 °C)

Power Supply

Input 1 and 2: 110-250 VDC or 220-240 VAC (70% - 110%)

Maximum power required at rated supply voltage

During start up: <100 ms 550 W, <60 s 350 W
On-line without operation: <100 W
During and immediately following a single operation <10 s: <400 W

Control Circuits

- Close Input, 110 V DC (220 V DC on request)
- Trip Input, 110 V DC (220 V DC on request)
- Others, 110 V DC (220 V DC on request)

160 mA during the first 3 ms, then 3 mA
160 mA during the first 3 ms, then 3 mA
160 mA during the first 3 ms, then 3 mA

Heaters, 110-230 V AC/DC

Thermostat-controlled: 2 x 100 W

External Connections

Terminal block (Entelec, Phoenix)
Optical Serial Communication Port



ABB AB

High Voltage Products

SE-771 80 LUDVIKA, SWEDEN

Tel: +46 (0)240 78 20 00

Fax: +46 (0)240 78 36 50

E-mail: circuit.breakers@se.abb.com

Internet: <http://www.abb.com>

NOTE! ABB AB is working continuously to improve the products. We therefore reserve the right to change designs, dimensions and data without prior notice.