ReliaGear™ SB switchboard
The road to reliability
Agenda

1. Product overview
2. Circuit breakers
3. Configurations
Product overview
## Distribution equipment stratification

**Switchboards**

### ABB’s ReliaGear family of low voltage electrical distribution products

<table>
<thead>
<tr>
<th>Product</th>
<th>Lighting panelboard</th>
<th>Power panelboard</th>
<th>Switchboard</th>
<th>Low voltage switchgear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trademark Name(s)</td>
<td>ReliaGear™</td>
<td>ReliaGear™ neXT</td>
<td>ReliaGear™ SB</td>
<td>ReliaGear® LV SG</td>
</tr>
<tr>
<td>UL certification</td>
<td>UL 67</td>
<td>UL 67</td>
<td>UL 891</td>
<td>UL 1558</td>
</tr>
<tr>
<td>Typical application</td>
<td>Light commercial</td>
<td>Heavy commercial</td>
<td>Heavy commercial/light industrial</td>
<td>Heavy industrial</td>
</tr>
<tr>
<td>Maximum amperage</td>
<td>800</td>
<td>1200</td>
<td>6000</td>
<td>5000</td>
</tr>
</tbody>
</table>
ReliaGear SB switchboard

Specifications

- 3P3W and 3P4W – 600/347 Vac, 480/277 Vac, 208/120 Vac
- Fully rated 100 KAIC at 480/277 Vac, 65 KAIC at 600/347 Vac
- Main circuit breakers: up to 6000 A
- Main lugs: up to 6000 A
- Plug-in branch circuit breakers: 15–1200 A
- Enclosures: NEMA Type 1 and 3R
ReliaGear SB advantages

**Safe**
Enhanced protection
- Finger-safe bus stack that meets IP20 standards
- Insert and remove components while reducing the risk of contact with live parts due to accidental contact
- Integrated Bluetooth® technology allows for viewing circuit breaker parameters from outside an arc-flash zone

**Smart**
Easy to install
- Circuit breakers install anywhere on the bus stack
- Same Ekip trip unit family for both power and molded case circuit breakers increase familiarity and setup speed
- Hinged gutter doors for quick, convenient cable access

**Reliable**
Outstanding reliability
- Spring-loaded circuit breaker plug-in connectors
- Magnetic forces generated by a short circuit make an even tighter connection
- No more bolted joints that can become loose or require torque checks
Circuit breakers
Devices

Main circuit breakers and switches
- Emax 2 (power circuit breaker): 6000 A max
- PowerBreak II (insulated case circuit breaker): 4000 A max
- HPC II (high pressure contact fused switch): 4000 A max
- BPS (bolted pressure switch): 4000 A max
- Tmax XT (molded case circuit breaker): XT5 (600 A max) & XT7 (1200 A max), individually or group mounted
Devices

**Feeder circuit breakers**

- **Individually mounted:**
  - Emax 2: 6000 A max
  - PowerBreak II: 4000 A max
  - Tmax XT7: 1200 A max
  - Tmax XT5: 600 A max

- **Group mounted:**
  - Tmax XT: 15 - 1200 A (XT1, XT4, XT5, XT6, XT7)
  - Record Plus FB: 15 – 100 A (1P and 2P)
Individually mounted circuit breakers
Emax 2 characteristics

- UL1066 certified, 3 or 4 poles
- Ekip Touch/Hi-Touch field upgradeable trip units
- Seven communication protocols available
- 1% energy accuracy with Ekip Hi-Touch trip unit
- Large color touch-screen display
- Direct communications with energy management cloud-computing platform, ABB Ability™
Emax 2 power circuit breaker

Family

E6.2  E4.2  E2.2  E1.2

Same height and depth from E6.2 to E2.2
Emax 2 power circuit breaker

E6.2

4000-6000 A, 3 and 4 poles\(^1\), stationary and withdrawable\(^1\)

Note 1 – 6000 A available with 3 pole, withdrawable construction only
Emax 2 power circuit breaker

E4.2

2500 – 3000 A, 3 and 4 poles, stationary and withdrawable
Emax 2 power circuit breaker

E2.2

1600 – 2000 A, 3 and 4 poles, stationary and withdrawable
Emax 2 power circuit breaker

E1.2

800-1200 A, 3 and 4 poles, stationary and withdrawable
Emax 2 power circuit breaker

Electrical accessories animation
Emax 2 power circuit breaker

Connectivity: communications

**Functionality**
- Supervision and control

**Communication protocols available**
- Ekip Com Modbus RS-485
- Ekip Com Modbus TCP/IP
- Ekip Com Profibus
- Ekip Com Profinet
- Ekip Com EtherNet/IP
- Ekip Com DeviceNet
- IEC 61850
- Redundant communications

**Additional communications**
- Ekip Com Hub (ABB Ability EDCS)
- Ekip Link (local bus communication)

<table>
<thead>
<tr>
<th>Photo</th>
<th>Required products</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ekip Touch or greater</td>
</tr>
<tr>
<td></td>
<td>Ekip Com module</td>
</tr>
<tr>
<td></td>
<td>Ekip Supply</td>
</tr>
<tr>
<td></td>
<td>Ekip T&amp;P Programming Unit</td>
</tr>
<tr>
<td></td>
<td>Ekip Connect software</td>
</tr>
</tbody>
</table>
Emax 2 power circuit breaker

Connectivity: Bluetooth Low Energy (BLE)

Functionality
- ABB EPiC app used to commission circuit breakers
- Available for iOS and Android
- Simple dashboard for status updates
- Monitoring and events
- Adjustments of protection settings
- Upgrade trip unit functionality via ABB MarketPlace
- Import/Export settings
- Password protection provides access for authorized personnel only
- Provided as standard for Ekip Touch or greater with the option to remove via configurator
Remaining individually mounted devices

- PowerBreak II
- High pressure contact switch
- Bolted pressure switch
- Tmax XT5 and XT7
Remaining individually mounted devices

PowerBreak II

400-4000 A, 3 poles, stationary and withdrawable

Note 1 – 4000 A stationary mounting is 80% rated
Remaining individually mounted devices

High pressure contact switch

400-4000 A, 3 poles, stationary and withdrawable
Remaining individually mounted devices

Bolted pressure switch

1000-4000 A, 3 poles, stationary and withdrawable
Remaining individually mounted devices

Tmax XT5 and XT7

400-1200 A, 3 poles, stationary
Group mounted circuit breakers
Group mounted circuit breakers
Molded case circuit breakers

- Record Plus FB
- Tmax XT1
- Tmax XT4
- Tmax XT5
- Tmax XT6
- Tmax XT7
Group mounted circuit breakers

Tmax XT7

800-1200 A, 3 poles, Ekip Dip and Touch/Hi-Touch trip units

Note 1 – 1000 A and 1200 A requires conductors that are sized based on 75°C with an insulation rating of 90°C
Group mounted circuit breakers

Tmax XT6

800 A, 3 poles, thermal-magnetic adjustable (TMA) and Ekip Dip trip units
Group mounted circuit breakers

Tmax XT5

400-600 A, 3 poles, thermal-magnetic adjustable (TMA), Ekip Dip and Touch/Hi-Touch trip units
Group mounted circuit breakers

Tmax XT4

250 A, 3 poles, thermal-magnetic adjustable (TMA), Ekip Dip and Touch/Hi-Touch trip units
Group mounted circuit breakers

Tmax XT1

125 A, 3 poles, thermal-magnetic fixed (TMF) trip units
Group mounted circuit breakers

Record Plus FB

100 A, 1 and 2 poles, thermal-magnetic fixed (TMF) trip units
**Tmax XT trip units**

**Thermal magnetic**
- TMF: Thermal Magnetic Fixed: No adjustments possible
- TMA: Thermal Magnetic Adjustable: Adjustable Thermal (L) and Magnetic (I)
- LT adjustable on TMA from 0.7-1.0

**Ekip Dip**
- LSI: Adjustable L, S, and I
- LIG: Adjustable L, I, and G
- LSIG: Adjustable L, S, I, and G
- LT adjustable from 0.4-1.0 in .02 increments

**Ekip Touch/Hi-Touch**
- LSI: Adjustable L, S and I
- LSIG: Adjustable L, S, I, and G
- LT adjustable from 0.4-1.0 in .001 increments

**Ekip trip units are electronic**
Which trip unit should I choose?

Molded case circuit breakers

<table>
<thead>
<tr>
<th>Thermal magnetic (TMF/TMA)</th>
<th>Ekip Dip</th>
<th>Ekip Touch/Hi-Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>– Basic protection against overloads and short-circuits are needed</td>
<td>– First level electronic trip unit for greater protection selection</td>
<td>– Advanced electronic trip unit with high accuracy measurements and digital display</td>
</tr>
<tr>
<td>– When you just need “a circuit breaker”</td>
<td>– Ground fault protection is required</td>
<td>– Communications, including Bluetooth®</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Metering (1% power and energy accuracy)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Field upgradeable</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Monitoring via the Cloud</td>
</tr>
</tbody>
</table>
Ekip Touch/Hi-Touch
Measurement functions and precision

Ekip Touch trip units are available three different versions

Ekip Touch allows for current metering while the Ekip Touch Measuring adds voltage and power metering. Ekip Hi-Touch continues but also adds 1% power accuracy.

<table>
<thead>
<tr>
<th>Measurements</th>
<th>Touch</th>
<th>Touch Measuring</th>
<th>Hi-Touch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currents (RMS)</td>
<td>[A] L1, L2, L3, Ne</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Ground fault current (RMS)</td>
<td>[A] Ig</td>
<td>2%</td>
<td>2%</td>
</tr>
<tr>
<td>Phase-to-phase voltage (RMS)</td>
<td>[V] U12, U23, U31</td>
<td>-</td>
<td>0.50%</td>
</tr>
<tr>
<td>Phase-to-neutral voltage (RMS)</td>
<td>[V] U1, U2, U3</td>
<td>-</td>
<td>0.50%</td>
</tr>
<tr>
<td>Frequency</td>
<td>[Hz] f</td>
<td>0.20%</td>
<td>0.20%</td>
</tr>
<tr>
<td>Active power</td>
<td>[kW] P1, P2, P3, Ptot</td>
<td>-</td>
<td>2%</td>
</tr>
<tr>
<td>Reactive power</td>
<td>[kVAR] Q1, Q2, Q3, Qtot</td>
<td>-</td>
<td>2%</td>
</tr>
<tr>
<td>Apparent power</td>
<td>[KVA] S1, S2, S3, Stot</td>
<td>-</td>
<td>2%</td>
</tr>
<tr>
<td>Power factor</td>
<td>PF1, PF2, PF3, PF total</td>
<td>-</td>
<td>2%</td>
</tr>
<tr>
<td>Active energy</td>
<td>[kW] Ep total, Ep positive, Ep negative</td>
<td>-</td>
<td>2%</td>
</tr>
<tr>
<td>Reactive energy</td>
<td>[kVAR] Eq total, Ep positive, Ep negative</td>
<td>-</td>
<td>2%</td>
</tr>
<tr>
<td>Apparent energy</td>
<td>[KVA] Es total</td>
<td>-</td>
<td>2%</td>
</tr>
</tbody>
</table>
Group mounted accessories

Plug-in protection modules

**Surge protection devices (SPD)**
- Plug-in module
- Voltages (AC): 120 Wye, 277 Wye, 347 Wye, 480 Delta
- Impulse currents (kA): 65, 80, 125, 150, 200, 300
- Takes up 10X height
- Can be used in all widths, dependent upon the configuration

**Reduced Energy Let Through (RELT)**
- Plug-in module to mitigate arc flash hazard
- Touch trip unit required
- Voltages (AC): 240, 480, 600
- Compulsory by NEC for 1200 A breaker (XT7)
- Takes up 3X height
- Can be used in all widths, dependent upon the configuration
Configurations
Group mounted configurations

Center

Offset

One-sided

Click on bus stack to see animation
01. ReliaGear SB interior
02. ReliaGear SB vertical bus stack
03. Circuit breaker line side connector
Superior plug-in circuit breaker connections

- Increased plating thickness withstands repeated insertion and removal
- Uses the magnetic force generated by a short circuit to make the connection even tighter and more reliable
- No more bolted joints that can become loose or require torque checks
- Levering features further reduce installation and removal force
## Sizing

Circuit breaker spacing requirements

Group mounted circuit breakers are sized by X space requirements where $X = 1.385''$ in height

<table>
<thead>
<tr>
<th>Circuit breaker name</th>
<th>Number of poles</th>
<th>Maximum circuit breaker amperage</th>
<th>X spacing requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Record Plus FB</td>
<td>1</td>
<td>100</td>
<td>1X</td>
</tr>
<tr>
<td>Record Plus FB</td>
<td>2</td>
<td>100</td>
<td>2X</td>
</tr>
<tr>
<td>Tmax XT1</td>
<td>3</td>
<td>125</td>
<td>3X standard, also offered in a 2 pack at 5X or 5 pack at 11X</td>
</tr>
<tr>
<td>Tmax XT4</td>
<td>3</td>
<td>250</td>
<td>3X, 4X for Touch, Hi-Touch</td>
</tr>
<tr>
<td>Tmax XT5</td>
<td>3</td>
<td>600</td>
<td>4X standard, 5X if it contains a bell alarm, auxiliary contact, shunt trip, undervoltage release; Touch, or Hi-Touch trip units</td>
</tr>
<tr>
<td>Tmax XT6</td>
<td>3</td>
<td>800</td>
<td>6X</td>
</tr>
<tr>
<td>Tmax XT7</td>
<td>3</td>
<td>1200</td>
<td>6X</td>
</tr>
</tbody>
</table>
Tmax XT circuit breaker plugging into vertical bus stack