SAFETY INSTRUCTIONS

XMC20

Precautions and Safety

Equipment handling advices
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1 Preface

1.1 Scope

This document contains safety instructions and advices you need to adhere to when handling any type of XMC20 equipment, or any cabling used in conjunction with XMC20 equipment.

The XMC20 equipment is used in mission critical applications. It provides no functional safety.

Adherence to the safety instructions ensures compliance with the safety requirements as defined in EN 60950 (Safety of Information Technology Equipment).

1.2 Target Audience

This Safety Instructions document is targeted at persons who are entrusted with the installation, provisioning, operation, and administration of XMC20 equipment.

The persons targeted are

- the installation personnel, and/or
- the provisioning personnel, and/or
- the operation and administration personnel.

Only trained and skilled personnel as per EN 60950 may install and maintain XMC20 equipment.

1.3 Definition of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC</td>
<td>Alternating Current</td>
</tr>
<tr>
<td>DC</td>
<td>Direct Current</td>
</tr>
<tr>
<td>Earth</td>
<td>Synonym to Ground</td>
</tr>
<tr>
<td>ED Cover</td>
<td>Extended Depth Cover for the subrack</td>
</tr>
<tr>
<td>EN</td>
<td>European Norm</td>
</tr>
<tr>
<td>ESD</td>
<td>Electrostatic Discharges</td>
</tr>
<tr>
<td>Ground</td>
<td>Synonym to Earth</td>
</tr>
<tr>
<td>SD Cover</td>
<td>Standard Depth Cover for the XMC20 subrack</td>
</tr>
</tbody>
</table>
2 Symbols and Notations

2.1 Symbols and Notations used in the XMC20 Customer Documentation

2.1.1 Hazard Labeling

![DANGER] Non-observance can lead to death or injury.
Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
→ Possible actions are given.

![WARNING] Non-observance can lead to death or injury.
Indicates a hazard with a medium level of risk which, if not avoided, could result in death or injury to the user.
→ Possible actions are given.

![CAUTION] Non-observance could result in minor or moderate injury.
Failing to comply with this may result in the injury of the user or in physical damage.
→ Possible actions are given.

![NOTICE] Non-observance could result in equipment damage.
Failing to comply with this may result in physical damage of equipment.
→ Possible actions are given.

2.1.2 Operational Information Labeling

![STOP] Risk of operating trouble!
Indicates that an action may lead to operating trouble or loss of data.
→ Possible actions are given.

![Please note:] Shows significant information.
→ Possible actions are given.
2.2 Symbols and Notations applied on the Equipment

2.2.1 EC Declaration of Conformity

The XMC20 products, if used for the intended purpose, correctly installed and operated according to the applicable user manuals, comply with the European Directives as follows:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014/30/EU</td>
<td>Electromagnetic Compatibility Directive</td>
</tr>
<tr>
<td>2014/35/EU</td>
<td>Low Voltage Directive</td>
</tr>
<tr>
<td>2011/65/EU</td>
<td>Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment</td>
</tr>
</tbody>
</table>

Conformity to the previously mentioned EC directive is proven for complete compliance to the following harmonized standards:

<table>
<thead>
<tr>
<th>Standard</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETSI EN 300 386 V1.6.1</td>
<td>Electromagnetic compatibility and Radio spectrum Matters (ERM); Telecommunication network equipment; ElectroMagnetic Compatibility (EMC) requirements</td>
</tr>
</tbody>
</table>

2.2.2 Recycling

After usage the equipment must be disposed of properly as electronic waste according to WEEE (waste of electronic and electric equipment), in accordance with the local applicable disposal regulations.
The equipment must not be disposed of with domestic waste.

2.2.3 China RoHS

This symbol denotes a product containing a toxic or hazardous substance(s) with a number defining the “Environmentally Friendly Use Period” (EFUP), for example 50 years.
2.2.4 **Lead Free**

![Pb]

This symbol denotes a product containing no lead according to the RoHS Directive 2011/65/EU.

2.2.5 **Ground**

![ Ground Terminal Point ]

This symbol identifies the main protective earth/ground terminal point where the equipment must be connected to the building protective earth/ground.

2.2.6 **Hazard Labeling**

2.2.6.1 **Caution ESD**

Electrostatic discharges (ESD) may pose a risk for injuries when not properly discharged before touching any equipment or components. To protect yourself you must discharge any static charge from your person before touching any unit or any components. Wear a grounded, anti-ESD wrist-band when working with the Equipment.

2.2.6.2 **Hot Surface**

The hot surface symbol indicates the risk of injuries when touching the hot surface. Do not touch the hot surface.

2.2.6.3 **Heavy Weight**

Be aware of the heavy weight of the equipment. Think about an auxiliary construction to hold the equipment in its place until it is fixed in a properly manner.
3 Equipment Specification

3.1 Ambient Conditions

The equipment must be stored, transported and operated according to the ambient conditions specified below.

3.1.1 Storage

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental class</td>
<td>ETSI EN 300 019-1-1, class 1.2</td>
</tr>
<tr>
<td>- All equipment (exclusive batteries)</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>-25°C … +60°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>class 1.2</td>
</tr>
<tr>
<td>Biological and chemical active substances</td>
<td>not specified</td>
</tr>
</tbody>
</table>

3.1.2 Transport

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental class</td>
<td>ETSI EN 300 019-1-2, class 2.2</td>
</tr>
<tr>
<td>- All equipment (exclusive batteries)</td>
<td></td>
</tr>
<tr>
<td>Temperature ranges</td>
<td></td>
</tr>
<tr>
<td>- ambient air for unventilated enclosures</td>
<td>-25°C … +70°C</td>
</tr>
<tr>
<td>- ambient air for ventilated enclosures or outdoor</td>
<td>-25°C … +40°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>class 2.2</td>
</tr>
<tr>
<td>Vibration random Acceleration Spectral Density</td>
<td></td>
</tr>
<tr>
<td>- ASD @ 10-200 Hz</td>
<td>1.0 m²s⁻³</td>
</tr>
<tr>
<td>- ASD @ 200-2000 Hz</td>
<td>0.3 m²s⁻³</td>
</tr>
<tr>
<td>Biological and chemical active substances</td>
<td>not specified</td>
</tr>
</tbody>
</table>

3.1.3 Operation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental class</td>
<td>ETSI EN 300 019-1-3, class 3.3</td>
</tr>
<tr>
<td>- All equipment (exclusive batteries)</td>
<td></td>
</tr>
<tr>
<td>Temperature range (extended), with active cooling</td>
<td></td>
</tr>
<tr>
<td>- Operation of XMC20, altitude up to 2000 m</td>
<td>-25°C … +60°C</td>
</tr>
<tr>
<td>- Operation of XMC20, altitude up to 5000 m</td>
<td>-25°C … +50°C</td>
</tr>
<tr>
<td>Temperature range, with passive cooling¹</td>
<td></td>
</tr>
<tr>
<td>- Operation of XMC20, altitude up to 2000 m</td>
<td>-25°C … +55°C</td>
</tr>
<tr>
<td>- Operation of XMC20, altitude up to 5000 m</td>
<td>-25°C … +45°C</td>
</tr>
<tr>
<td>- Start up temperature</td>
<td>-25°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>0% … 95%, non-condensing</td>
</tr>
<tr>
<td>Mechanical conditions</td>
<td></td>
</tr>
<tr>
<td>- Subrack, core unit, service units</td>
<td>ETSI EN 300 019-1-8, class Special (3M5)</td>
</tr>
<tr>
<td>Biological and chemical active substances</td>
<td>not specified</td>
</tr>
</tbody>
</table>
3.2 EMC/ESD and Safety

3.2.1 EMC

3.2.1.1 Product Family Standard

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IP code</td>
<td>IEC 60529, IP20</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>IEC 60950-1, 2</td>
</tr>
<tr>
<td>Class of equipment</td>
<td>IEC 60950-1, class I</td>
</tr>
<tr>
<td>Explosive atmosphere</td>
<td>not allowed</td>
</tr>
</tbody>
</table>

1. Passive cooling operation of the XMC23 and XMC22 subrack requires vertical mounting of the sub-rack.

3.2.1.2 Emission

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interference voltage 0.15 MHz … 30 MHz - DC power supply IF</td>
<td>EN 55022, class A</td>
</tr>
<tr>
<td>- traffic signal interfaces</td>
<td>EN 55022, class B</td>
</tr>
<tr>
<td>Radiated field 30 MHz … 1000 MHz</td>
<td>EN 55022, class B</td>
</tr>
</tbody>
</table>

3.2.1.3 Immunity

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunity standard</td>
<td>ETSI ES 201 468 V1.3.1, test level 2</td>
</tr>
<tr>
<td>Electromagnetic field 80 MHz … 1000 MHz, 20 V/m 1 GHz … 2.7 GHz, 10 V/m</td>
<td>IEC/EN 61000-4-3</td>
</tr>
<tr>
<td>Conducted common mode HF disturbance 150 kHz … 80 MHz, modulated 1 kHz 80% AM, 10 V</td>
<td>IEC/EN 61000-4-6</td>
</tr>
<tr>
<td>Fast transients/bursts</td>
<td>IEC/EN 61000-4-4</td>
</tr>
<tr>
<td>- on power supply IF (CDN)</td>
<td>2 kV</td>
</tr>
<tr>
<td>- on traffic signal interfaces (capacitive clamp)</td>
<td>1 kV</td>
</tr>
<tr>
<td>Surge immunity - Traffic and control interfaces</td>
<td>ETSI EN 300 386 V1.6.1, ITU-T K.20 and ITU-T K.45</td>
</tr>
<tr>
<td>- Power supply interface</td>
<td>IEC/EN 61000-4-5</td>
</tr>
<tr>
<td>- Common mode</td>
<td>1 kV 1.2/50 μs (8/20 μs)</td>
</tr>
<tr>
<td>- Differential mode</td>
<td>0.5 kV 1.2/50 μs (8/20 μs)</td>
</tr>
</tbody>
</table>
### 3.2.2 ESD

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrostatic Discharge</td>
<td>IEC/EN 61000-4-2</td>
</tr>
<tr>
<td>- contact discharge</td>
<td>8 kV</td>
</tr>
<tr>
<td>- air discharge</td>
<td>15 kV</td>
</tr>
</tbody>
</table>

### 3.2.3 Safety

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety according to IEC/EN 60950-1 (2006)</td>
<td>+A1 +A11 +A12 +A2</td>
</tr>
<tr>
<td>Railway applications - Insulation coordination</td>
<td>EN 50124-1 (2001) +A1 +A2</td>
</tr>
<tr>
<td>Part 1: Basic requirements - Clearances and</td>
<td></td>
</tr>
<tr>
<td>creepage distances for all electrical and</td>
<td></td>
</tr>
<tr>
<td>electronic equipment</td>
<td></td>
</tr>
</tbody>
</table>

### 3.2.4 Earthing

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthing and bonding of the equipment</td>
<td>ETSI EN 300 253 V2.2.1 (2015-06), designed for</td>
</tr>
<tr>
<td></td>
<td>integration according to the configuration shown in</td>
</tr>
<tr>
<td></td>
<td>figure 2 of this EN.</td>
</tr>
</tbody>
</table>

### 3.3 Hazardous Substances

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>XMC20 equipment</td>
<td>Directive 2011/65/EU of the European Parliament and of the Council of</td>
</tr>
<tr>
<td>Cables (approved by ABB)</td>
<td>8 June 2011 on the Restriction of the use of certain hazardous substances in</td>
</tr>
<tr>
<td></td>
<td>electrical and electronic equipment</td>
</tr>
</tbody>
</table>

### 3.4 Powering

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC powering of the equipment</td>
<td>ETSI EN 300 132-2 V2.3.6 (2011-02), Equipment Engineering (EE); Power</td>
</tr>
<tr>
<td></td>
<td>Supply Interface at the Input to Telecommunications Equipment; Operated by</td>
</tr>
<tr>
<td></td>
<td>Direct Current (DC)</td>
</tr>
</tbody>
</table>
### Interfaces

#### 3.5.1 Power Interfaces

The equipment uses electrical signal interfaces according to the following circuit categories:

<table>
<thead>
<tr>
<th>Interface type</th>
<th>Circuit category according to EN 60950-1</th>
<th>Max. rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Current</td>
</tr>
<tr>
<td>Local power supply DC</td>
<td>TNV2</td>
<td>72 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Local power supply AC</td>
<td>Primary circuit</td>
<td>264 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Backup battery</td>
<td>TNV2</td>
<td>72 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
</tbody>
</table>

#### 3.5.2 Electrical Signal Interfaces

The equipment uses electrical signal interfaces according to the following circuit categories:

<table>
<thead>
<tr>
<th>Interface type</th>
<th>Circuit category according to EN 60950-1</th>
<th>Max. rating</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Voltage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Current</td>
</tr>
<tr>
<td>Ethernet</td>
<td>SELV</td>
<td>3.3 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Ethernet with PoE (power over Ethernet)</td>
<td>TNV1</td>
<td>56 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>RS-485</td>
<td>TNV1</td>
<td>6 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>V.24/V.28</td>
<td>SELV</td>
<td>25 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>X.24/V.11</td>
<td>TNV1</td>
<td>6 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>V.35/V.28</td>
<td>SELV</td>
<td>25 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>V.35/Appendix II</td>
<td>SELV</td>
<td>1 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>ITU-T G.703 E1</td>
<td>SELV</td>
<td>3.3 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>ITU-T G.703 E0</td>
<td>TNV1</td>
<td>2 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>POTS a/b</td>
<td>TNV3</td>
<td>75 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>ISDN-BA</td>
<td>TNV3</td>
<td>100 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Magneto voice</td>
<td>TNV3</td>
<td>80 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>E&amp;M voice</td>
<td>TNV1</td>
<td>1.1 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>E&amp;M signaling</td>
<td>TNV3</td>
<td>75 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>SHDSL with remote power feeding</td>
<td>TNV3</td>
<td>115 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>SHDSL with wetting current</td>
<td>TNV2</td>
<td>72 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>SHDSL without wetting current/ remote power feeding</td>
<td>TNV1</td>
<td>5 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>STM-1</td>
<td>SELV</td>
<td>1 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Synchronization interface</td>
<td>SELV</td>
<td>3 V&lt;sub&gt;AC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Alarm inputs (fan and alarm units)</td>
<td>TNV2</td>
<td>72 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Alarm outputs (fan and alarm units)</td>
<td>SELV</td>
<td>6 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
<tr>
<td>Alarm output backup battery</td>
<td>TNV2</td>
<td>72 V&lt;sub&gt;DC&lt;/sub&gt;</td>
</tr>
</tbody>
</table>
3.5.3 Optical Signal Interfaces

3.5.3.1 SFP and SFP+ based Optical Interfaces

The equipment uses pluggable laser modules of type SFP and SFP+. All such laser modules are supplied by third-party manufacturers.

<table>
<thead>
<tr>
<th>Laser Class</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser class 1</td>
<td>As the laser protection class 1 is complied, dangerous radiation cannot be emitted. Thus, special precautions for failures or laser warnings are not necessary.</td>
</tr>
</tbody>
</table>
4 General Safety Advices

4.1 General Advices

**DANGER** Non-observance can lead to death or injury.
Only authorized and properly trained personnel is admitted to carry out the following equipment tasks:
→ Installation, commissioning, maintenance, repair, decommissioning and disposal.

**DANGER** Non-observance can lead to death or injury.
The Precautions and Safety document should be read and clearly understood before working with the equipment.

**DANGER** Non-observance can lead to death or injury.
The warning labels regarding precautions and indications of hazardous voltages and hazardous energy levels must be strictly observed.

**DANGER** Non-observance can lead to death or injury.
Mechanical safety facilities such as cover plates must not be removed or bypassed during operation.

**DANGER** Non-observance can lead to death or injury.
Alteration of the equipment is not allowed.

**DANGER** Non-observance can lead to death or injury.
The equipment must only be transported, stored and operated in environments according to the environmental specification, see section 3.1 Ambient Conditions (on page 8). This applies also for any attached cables.

**NOTICE** Attention to access control. Risk of equipment damage!
Unrestricted access to the equipment premises holds a risk of damaged equipment and disrupted services.
→ Install and operate the equipment in a room that is normally closed and not generally accessible.

**NOTICE** Non-observance could result in equipment damage.
The XMC20 user manuals should be read and clearly understood before working with the equipment.
4.2 Electrical Hazards

DANGER Hazardous voltages. Risk of electric shock!
Equipment might be connected to high voltages and can cause an electric shock when incorrectly installed.
→ Do not touch any live wires or related wire contacts.

DANGER Hazardous voltages. Risk of electric shock!
Safe circuits can be elevated to hazardous voltage due to wrong interconnection.
→ Take care to interconnect only circuits of the same circuit category. Refer to section 3.5.2 Electrical Signal Interfaces (on page 11).
→ Always assume a hazardous voltage to be present.

WARNING Hazardous electric currents. Risk of flashover and electric shock!
Equipment might be connected to high voltages and can cause an electric shock during periods of lightning.
→ Do not work on the equipment during periods of lightning.
→ Do not connect or disconnect cables during periods of lightning.

CAUTION Non-observance could result in minor or moderate injury.
The maximum output voltage at the ISDN-BA ports with activated power feeding is 100 V_{DC}.
→ Never touch bare wires of the ISDN-BA port. Never touch the contacts on the unit.
→ Do not switch on the power feeding on an ISDN-BA port before the installation has been completed and made secure.

CAUTION Non-observance could result in minor or moderate injury.
The maximum output voltage at the SHDSL ports with activated power feeding is 115 V_{DC}.
→ Never touch bare wires of the SHDSL span. Never touch the contacts on the unit.
→ Do not switch on the power feeding on an SHDSL span before the installation has been completed and made secure.

CAUTION Non-observance could result in minor or moderate injury.
The maximum output voltage at the POTS ports with activated ringing is 75 V_{RMS}.
→ Never touch bare wires of the POTS wires. Never touch the contacts on the unit.
→ Do not enable the POTS port before the installation has been completed and made secure.
4.3 Heat Related Hazards

**CAUTION** Non-observance could result in minor or moderate injury.
The front of the fanless variant units can become hot.
→ Do not touch the front cover.

4.4 Mechanical Hazards

**DANGER** Hazardous voltages. Risk of electric shock!
Any liquid or conductive object entering the equipment enclosure will potentially create electric shock and fire hazards.
→ Under no circumstances place metallic objects or receptacles containing any liquids on the equipment.
→ Never insert pointed objects (e.g. screwdrivers or wires) into the equipment or into the connection terminals for electrical conductors.

4.5 Radiation Hazards

**CAUTION** Laser radiation harmful for eyes!
There is a risk that higher-powered optical transmitters are located in adjacent equipment.
→ Do not look into the end of any optical fiber which might carry optical signals.
→ Do not look into an unterminated or broken optical fiber unless the optical source has been turned off or the optical power is removed. Confirm the removal of the power with an optical power meter over a period of at least 2 minutes. The 2 minute interval is required because most systems have ALS (Automatic Laser Shutdown and auto re-start facility).
→ Fit all unconnected optical plugs and couplers with caps.

4.6 Chemical Hazards

**WARNING** Non-observance can lead to death or injury.
Enclosures containing rechargeable batteries or having direct connection to the main cable ducts can be subject to a build-up of an explosive concentration of gas or vapors in extreme conditions.
→ All compartments and equipment containing rechargeable batteries must have appropriate ventilation provided to prevent the build-up of an explosive concentration of any gas released by the batteries. Ventilation must be to the external atmosphere and not into other parts of the enclosure.
→ Cable entry and exit points from enclosed ducts must be sealed to prevent entry of explosive gas and vapors into the enclosure.
→ All potential sources of ignition must be extinguished and procedures relating to gas detection observed before undertaking any work.
5 Specific Safety Advices

5.1 Installation

DANGER Hazardous voltages. Risk of electric shock!
Equipment might be connected to high voltages and can cause an electric shock when incorrectly installed.
→ If a stationary battery is used as local power supply, the charging unit must have a safety insulation according to EN 60950-1.
→ If an AC/DC power supply is used instead of a stationary battery, this must also provide a safety insulation according to EN 60950-1.

DANGER Hazardous voltages. Risk of electric shock!
Insufficient overvoltage protection of the transmission interfaces will lead to destruction of the transmission equipment. Since the overvoltage tries to discharge to ground via the lowest resistance path, the surge can create extremely high currents anywhere in the installation and may burn cables and equipment. Onboard overvoltage protection is only adequate for inhouse connections.
→ For electrical connections leaving the building external primary protection with gas discharge tubes is mandatory.
→ For a description of these measures refer to [505] Installation Instruction “Lightning Protection”.

DANGER Hazardous voltages. Risk of electric shock!
Cables connected from the local equipment to remote equipment can carry large current flowing in the cable screens if there are different local earth potentials at opposite ends that do not share the same earth connections. Earth currents in cable screens can cause damage to cables and equipment but also fire and injury to personnel.

DANGER Hazardous voltages. Risk of electric shock!
Power up the equipment only when the installation procedure is finished and verified.
→ The subrack is mounted correctly.
→ The units are plugged and secured.
→ The cables are plugged and secured.
**WARNING** Hazardous electric currents. Risk of flashover and electric shock!
Omitting the fuses or circuit breakers in the power supply circuits might lead to seriously damaged equipment or create a fire in the case of overload or short circuits.
→ Connect the equipment only to a switchable power supply and switch off the power supply before installation or de-installation of any equipment.
→ Install fuses or circuit breakers in the power supply circuits outside of the equipment. Recommended fuses: XMC25: 30 A, slow-blow; XMC23: 16 A, slow-blow; XMC22: 8 A, slow-blow.
→ Make sure that the fuses or circuit breakers are correctly installed and intact for each of the power supply circuits.

**WARNING** Non-observance can lead to death or injury.
The equipment must be stable in its installed location. To achieve this secure the equipment by fixing it into a rack that is itself made stable in use by fixing it to the floor, wall or ceiling of a building interior, or by being part of a purpose-built enclosure.
→ Make the rack stable before mounting the equipment into it.
→ Do not place heavy objects on or in the equipment. This can cause injury by the heavy object becoming unstable.
→ Do not use the equipment on an unstable surface. The equipment may fall, causing serious bodily injury and serious damage to the equipment.
→ Use one of the mounting methods defined in the Installation Instruction when mounting the equipment.

**WARNING** Attention to proper earthing. Risk of electric shock!
Equipment that is not properly connected to earth poses a high risk that could result in serious injury, and that could damage your equipment.
→ It is mandatory to connect the equipment to a suitable protective ground e.g. the Common Bonding Network. Make sure the selected site provides efficient earthing terminals, and that the equipment is properly connected to earth. Only proper earthing of the equipment will protect you and your equipment from lightning.
→ Connect the protective earth contact of the housing with the protective earth of the power supply.
→ The positive (+) pole of the local power supply must be connected to earth. The negative (-) pole of the local power supply must be protected with a thermal-magnetic circuit breaker.
→ Instructions on correct earthing of the subrack are provided in the installation instruction of the equipment.

**WARNING** Hazardous electric currents. Risk of flashover and electric shock!
With live power supplies short circuits with flash over might result. Make sure that
→ The external powering is switched off before you connect the power leads to the equipment.
→ The power cables provide sufficient insulation.
CAUTION Non-observance could result in minor or moderate injury.
Be aware of the heavy weight of the equipment.
→ Think about an auxiliary construction to hold the equipment in its place until it is fixed in a properly manner.

CAUTION Attention to temperature range. Risk of injury!
Equipment has a high power dissipation. Insufficient ventilation causes hot spots and overheating on the equipment. Overheating holds a high risk for injuries when touching hot parts.
→ Do not touch components of units that have been plugged out of the sub-rack while in operation.

NOTICE Attention to temperature range. Risk of equipment damage!
Equipment has a high power dissipation. Insufficient ventilation causes hot spots and overheating on the equipment. Overheating holds a high risk for damage of the equipment.
→ A sufficient ventilation or cooling and ventilation must be provided by the operator for the racks or subracks that guarantees for a maximum ambient temperature of 60° C using active cooling of the equipment.
→ Units requiring active cooling must not be operated in a subrack without an operational fan unit.
→ A sufficient ventilation or cooling and ventilation must be provided by the operator that guarantees for a maximum ambient temperature of 55° C using passive cooling of the equipment.

NOTICE Attention to temperature range. Risk of equipment damage!
Obstructed airflow may lead to overheating and damage of your equipment.
→ Make sure that the selected installation allows the equipment to dissipate the heat created within the equipment.
→ Cables should be positioned so as not to block the airflow into the sub-rack.

NOTICE Attention to temperature range. Risk of equipment damage!
High ambient temperature caused by other equipment may lead to overheating of the equipment.
→ Do not install the equipment near or on top of equipment that dissipates heat.

NOTICE Attention to EMC properties!
Electronic equipment is sensitive to strong electromagnetic fields and may show unexpected behavior when exposed to fields above the specified level.
→ Select an installation place with sufficient distance to equipment that produces strong electromagnetic fields (e.g. large transformers, power rectifiers, generators, electrical machines, railways etc.).
NOTICE  Non-observance could result in equipment damage.
The equipment has to be installed according to the instructions given in the
Installation Instruction provided in the user documentation.
→ Refer to [301] Installation Instruction “XMC25 Installation”.
→ Refer to [310] Installation Instruction “XMC23 Installation”.
→ Refer to [322] Installation Instruction “XMC22 Installation”.

5.2  Commissioning

NOTICE  Disruption of data transmission!
The equipment has to be commissioned according to the instructions given in the user documentation.

5.3  Operation

Please note:
The equipment is operated with remote supervision only. No physical presence and user action are required.

5.4  Maintenance and Repair

The following maintenance and repair operations are considered:
• A new unit is installed into an existing subrack.
• An existing unit is replaced due to defect or changes in the requirements.

DANGER  Hazardous voltages. Risk of electric shock!
Equipment might be connected to high voltages and can cause an electric shock when incorrectly installed.
→ If possible respecting the operational requirements, switch off the power supply before manipulating anything at the equipment. Use the manual switch on the circuit breaker, and/or fully disconnect/unplug the power cables from the equipment.
→ If it is not possible to switch off the power supply always assume a hazardous voltage to be present.

NOTICE  Disruption of data transmission!
When switching off the power supply data transmission will be interrupted.
→ If possible postpone maintenance and repair to periods with very little traffic.
NOTICE  Attention to EMC properties!
When during a maintenance or repair action the subrack front cover is removed the electromagnetic disturbance generated by the operating equipment does exceed the specified level.
→ There is a risk that other equipment cannot operate as intended.
→ After the completion of the maintenance or repair action the front cover of the subrack has to be mounted again immediately.

NOTICE  Attention to EMC properties!
When during a maintenance or repair action the subrack front cover is removed from the operating equipment the immunity to electromagnetic disturbances is below the specified level.
→ There is a risk that the equipment cannot operate as intended.
→ After the completion of the maintenance or repair action the front cover of the subrack has to be mounted again immediately.

NOTICE  Non-observance could result in equipment damage.
When the equipment is brought from a cold to a warm environment, this may lead to condensation. Operation of the equipment during condensation is not permitted.
→ Equipment with condensation must be dried before taking it into operation.

NOTICE  Non-observance could result in equipment damage.
In case of a repair only original spare parts may be used. Other spare parts are only permitted if this does not affect the safety of the equipment.

NOTICE  Attention to temperature range. Risk of equipment damage!
If a single fan of a fan unit has failed, the total air flow is roughly maintained, but the temperature below the failed fan will rise.
→ ABB recommends a replacement of the fan unit within 24 hours.

NOTICE  Attention to temperature range. Risk of equipment damage!
If more than one fan of a fan unit has failed, in the worst case no operating fans are left.
→ The temperature of high power units without ventilation rises within minutes to a level where damage may occur.
→ ABB recommends switching off the equipment immediately as an emergency measure.
→ Replace the defective fan unit before switching on the equipment again.
5.5 Decommissioning and Disposal

**CAUTION** Non-observance could result in minor or moderate injury.

After usage the equipment must be disposed of properly as electronic waste according to WEEE (waste of electronic and electric equipment), in accordance with the local applicable disposal regulations.

→ The equipment must not be disposed of with domestic waste.
→ Only a reputable and competent recycling company should deal with the equipment, which may contain items that could be hazardous during dismantling operations.
6 Equipment Handling Advices

**NOTICE** Degrading or breaking of optical fiber with loss of communication!
Excessive bending and ignoring the minimum bending radius damages optical fibers.
→ Do not bend or press optical fibers.
→ Always keep at least the minimum bending radius.
→ Special optical fibers allow a bending radius of 15 mm.

**NOTICE** Danger of damaging optical fibers with others than XMC20 ED covers!
The ordinary XMC20 SD cover is not deep enough to house optical fibers but excessively bends the optical fibers.
→ Install the XMC20 ED cover. Replace possibly installed SD covers.

**NOTICE** Attention to EMC properties!
In order to preserve the specified EMC characteristics of the equipment it is essential to adhere to the following rules:
→ Use (shielded) signal cables that are approved by ABB only.
→ Connect the shields of the signal cables to the subrack front.
→ Connect the shields of the signal cables at both sides, at the subrack and at the external equipment, e.g. the distribution frame.
→ Do not modify the ferrite filters provided with the cables.
→ Ensure that all 3rd party equipment which is installed near to the equipment is compatible with the EMC and Safety standards.
→ Cover the subrack with its front cover.

**NOTICE** Electrostatic discharges. Risk of equipment damage!
The original packaging provides the best protection for your equipment.
→ Leave the units in their packaging until you install them in the subrack.
→ Restore the units in their original packaging after removal from the subrack.

**NOTICE** Electrostatic discharges. Risk of equipment damage!
Electrostatic discharges may damage your equipment when you are touching or closely approaching the equipment, connectors, or components mounted on printed circuit boards. To protect your equipment you must discharge any static charge from your person before touching any unit or any components.
→ Before touching any devices make sure you wear a grounded ESD wristband. It can prevent the sensitive components from being damaged by electrostatic discharges.

**NOTICE** Attention to temperature range. Risk of equipment damage!
Units requiring active cooling may overheat and be damaged quickly if the fans are not running. Natural air convection is not sufficient to evacuate the locally dissipated heat.
→ Make sure that the fan unit is operational, whenever the subrack is equipped with units requiring active cooling and is powered up.
7 Cyber Security

The product / software/ firmware/ or the resulting overall solution are designed for data-processing and data-transmission and may therefore be connected to communication networks. It is your sole responsibility to provide and continuously ensure a secure connection between the product / software/firmware/ or the resulting overall solution and your network or any other networks (as the case may be). You shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product / software/ firmware/ or the resulting overall solution, the network, its system and all the interfaces against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB Switzerland Ltd and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Although ABB provides functionality testing on the products including related firmware and software that we release, you should institute your own testing program for any product updates or other major system updates (to include but not limited to firmware/software changes, configuration file changes, third party software updates or patches, hardware exchanges, etc.) to ensure that the security measures that you have implemented have not been compromised and system functionality in your environment is as expected.
8  Annex

8.1  Associated XMC20 Documents

[301] Installation Instruction "XMC25 Installation"

[310] Installation Instruction "XMC23 Installation"

[322] Installation Instruction "XMC22 Installation"

[505] Installation Instruction "Lightning Protection"