OneFit
Operation manual

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For your safety!

- Make sure that the installation room (space and environment) is suitable for the electrical apparatus.
- Check that all the installation, putting into service and maintenance operations are carried out by qualified personnel with suitable knowledge of the apparatus.
- Make sure that the standard and legal prescriptions are complied with during installation, putting into service and maintenance, so that installations are performed according to the rules of good working practice and safety in the work place.
- Strictly follow the information in this instruction manual.
- Check that the rated performance of the apparatus is not exceeded during service.
- Check that the personnel operating the apparatus have this instruction manual at hand as well as the necessary information for correct use.
- Pay special attention to the danger notes indicated in the manual by the following safety notifications:

![WARNING]
**WARNING**
WARNING indicates a hazardous situation that has some probability of severe injury and substantial property damage.

![DANGER]
**DANGER**
DANGER indicates a hazardous situation that has a high probability of death, severe injury, and substantial property damage.

![CAUTION]
**CAUTION**
CAUTION indicates a hazardous situation that may result in minor or moderate injury and/or property damage.

![NOTICE]
**NOTICE**
NOTICE indicates a statement of company policy as it relates to the safety of personnel or protection of property.

Responsible behaviour safeguards your own and others’ safety!
For any requests, please contact the ABB Medium Voltage Service.
Foreword

I Introduction

OneFit is the latest ABB hard-bus retrofill design concept featuring an integrally safe plug-in technology for easy connection of new standard apparatus to a wide range of existing panels. Retrofill is a modernization process involving replacement of the circuit breaker and the main functional components of the original switchgear. OneFit is designed to replace apparatus while maintaining the existing switchgear in a serviceable condition.

OneFit comprises a frame housing the circuit breaker, connected to the existing switchgear bushings by an additional power circuit that acts as an internal interface with the new breaker. The adaptation system (the OneFit kit) allows you to fit completely standard ABB withdrawable apparatus into the old panel.

OneFit units can be equipped with the following apparatus:

- VD4, Vmax, VM1 series vacuum circuit breakers;
- HD4 series SF6 gas circuit breakers;
- V-Contact VSC series vacuum contactors;
- Operational trucks.

The instructions in this manual refer to the OneFit kit. For correct use of the apparatus, please refer to the relevant “Installation and maintenance instructions”. OneFit kits are designed for a large number of installation configurations. However, they do allow further technical and constructional modifications to be made, so as to adapt to special installation requirements. Consequently, the information given below may sometimes not contain certain instructions concerning special configurations requested by the customer. Apart from the manual, it is therefore always necessary to consult the latest technical documentation (circuit and wiring diagrams, foundation plans, any protection coordination studies, etc.), especially regarding any modifications requested in relation to the standard configurations.

For maintenance, only use original spare parts.

All information in this booklet was current at the time of printing.

II Environmental protection program

The OneFit kits are manufactured in accordance with the ISO 14000 Standard (Guidelines for environmental management). The production processes are carried out in compliance with the Standards for environmental protection in terms of reduction in energy consumption as well as in raw materials and production of waste materials. All this is guaranteed thanks to application of the medium voltage apparatus manufacturing facility’s environmental management system.

DANGER

All the installation, putting into service, running and maintenance operations must be carried out by skilled personnel with in-depth knowledge of the apparatus.
Introduction

The purpose of this manual is to provide instructions for put into service, operation, and maintenance for OneFit retrofill. This manual should be carefully read and used as a guide during put into service, initial operation, and maintenance. The specific ratings of each model are listed on the individual nameplate. In no event should they be applied outside of their nameplate ratings.

Introduction and safe practices

OneFit design includes several interlocks and safety features which help ensure safe and proper operating sequences. To ensure safety of personnel associated with installation, operation, and maintenance, the following recommendations must be followed: only qualified persons, as defined in the National Electric Safety Code or according to ISO/IEC 17024 standards for the general requirements for bodies operating certification of persons, who are familiar with the installation and maintenance of medium voltage circuits and equipment should be permitted to operate on these equipment.

Read these instructions carefully before attempting to put into service, operation, or maintenance of the OneFit equipment.

- Do not work on an energized switchgear.
- Do not work on a circuit unless all components are disconnected by means of a visible break and securely grounded.
- Do not work on a circuit with power supplied to the secondary control circuit.
- Do not defeat safety interlocks. This may result in bodily injury, death and/or equipment damage.
- Do not use a circuit breaker by itself as the sole means of isolating a high voltage circuit.
- Do not leave a circuit breaker in an intermediate position in a cell. Always place the circuit breaker in the test or connect position.

ANSI note:

The equipment described in this book are designed and tested to operate within their nameplate rating. Operation outside of these ratings may cause equipment to fail, resulting in property damage, bodily injury and/or death. All safety codes, safety standards and/or regulations as they may be applied to this type of equipment must be adhered to strictly.

Failure to observe the requirements of osha standard 1910.269 can cause death or severe burns and disfigurement. That standard specifically prohibits the wearing of polyester, acetate, nylon, or rayon clothing by employees working with exposure to electric arcs or flames.
1. Description

1.1. Unit construction features

The OneFit units are pre-assembled and tested in the factory.

All normal service operations are carried out from the front of the unit with the doors closed (OneFit safety) or open (OneFit) according to the customer’s requests.

The circuit breaker compartment can be fitted with withdrawable circuit breakers or contactors.

Switchgear built with OneFit units can be installed against walls and are fully accessible from the front for operation, maintenance and installation tasks.

The OneFit is available in four distinct packages, targetted on improvement of personnel safety and switchgear upgrading.

1. OneFit

The new apparatus racking system, integrated metallic isolating shutters and the state of the art interlocking system provide a true retrofill solution.

2. OneFit Safety

Added features overcome the existing equipment design limitations, providing a closed-door (dead front panel) operational mode to prevent accidents due to contact with live parts.

3. OneFit Safety Plus

Embedded remote racking provides a safer operating environment for personnel through the proven method of adding distance between the operator and arc flash incident energy at the switchgear site, thereby bringing operating power equipment to a new level of safety.

4. OneFit eSafety Plus

Embedded sensors give new life to switchgear by combining all the benefits of the previous packages with integral equipment revamping.

The Table below shows the protection degree of every OneFit package:

<table>
<thead>
<tr>
<th>OneFit package</th>
<th>Without covering metal sheet</th>
<th>Without door</th>
<th>With door (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door closed</td>
<td>IP original panel</td>
<td>IP original panel</td>
<td>IP original panel</td>
</tr>
<tr>
<td>Door open or without door</td>
<td>IP0X</td>
<td>IP1X</td>
<td>IP2X</td>
</tr>
</tbody>
</table>

(1) Door available in OneFit safety and enhanced packages

Each kit figure 1, figure 2, figure 3, figure 4, figure 5, figure 6 comprises the following main components:

1. Base
2. Fixing plate
3. Frame
4. Shutter
5. Copper Adaption System
6. Insulating shell
7. Insulating plate
8. Standard apparatus
9. Door (Safety Package or enhanced version)
10. Micro switch (Safety Plus Package or enhanced version)
11. Covering metal sheet
12. Current sensors
13. Automatic shutter system (ANSI option)
1. Description

Figure 1a

Figure 1b
# 1. Description

## 1.2. Main dimensions of OneFit frame

### According to IEC standards:

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>OneFit W600</td>
<td>7.2 - 17.5 kV</td>
<td>630 - 2000 A</td>
<td>16 - 40 kA</td>
<td>1VCS004646</td>
<td>535</td>
<td>859</td>
<td>792</td>
<td>60</td>
</tr>
<tr>
<td>OneFit W700</td>
<td>7.2 - 17.5 kV</td>
<td>630 - 2000 A</td>
<td>16 - 50 kA</td>
<td>1VCS006242</td>
<td>685</td>
<td>859</td>
<td>792</td>
<td>70</td>
</tr>
<tr>
<td>OneFit W700</td>
<td>24 kV</td>
<td>630 - 2500 A</td>
<td>16 - 31.5 kA</td>
<td>1VCS008024</td>
<td>685</td>
<td>941</td>
<td>977</td>
<td>80</td>
</tr>
<tr>
<td>OneFit W800</td>
<td>7.2 - 17.5 kV</td>
<td>630 - 3150 A</td>
<td>16 - 50 kA</td>
<td>1VCS010160</td>
<td>754</td>
<td>886</td>
<td>792</td>
<td>80</td>
</tr>
</tbody>
</table>

For higher ratings please contact ABB for feasibility

### According to ANSI standards:

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>OneFit W600</td>
<td>5 - 15 kV</td>
<td>1200 - 2000 A</td>
<td>25 - 40 kA</td>
<td>1VCS004646</td>
<td>21.7 / 551</td>
<td>33.8 / 859</td>
<td>35 / 888</td>
<td>143.3 / 65</td>
</tr>
<tr>
<td>OneFit W700</td>
<td>5 - 15 kV</td>
<td>1200 - 2000 A</td>
<td>25 - 50 kA</td>
<td>1VCS006242</td>
<td>27.6 / 701</td>
<td>33.8 / 859</td>
<td>35 / 888</td>
<td>165.3 / 75</td>
</tr>
</tbody>
</table>

For higher ratings please contact ABB for feasibility
### Generator application, according to Dual logo IEC / IEEE 62271-37-013:

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>OneFit W800</td>
<td>7.2 - 17.5 kV</td>
<td>up to - 3150 A</td>
<td>up to - 50 kA</td>
<td>1VC5010160</td>
<td>754</td>
<td>886</td>
<td>792</td>
<td>80</td>
</tr>
</tbody>
</table>

For higher ratings please contact ABB for feasibility.

Figure 7.3

---

1.3. Main components

#### 1.3.1. OneFit Frame

OneFit units can be equipped with the following apparatus:

- HD4 series SF6 gas circuit breakers;
- VD4, Vmax and VM1 series vacuum circuit breakers;
- V-Contact VSC series vacuum contactors;
- operational trucks.

The apparatus is always the withdrawable version, mounted on a truck that allows the following positions to be obtained in relation to the frame:

- **CONNECTED:**
  - main and auxiliary circuits connected;

- **ISOLATED:**
  - partially isolated with main circuits connected and auxiliary circuits connected (plug connector connected);
  - totally isolated with main and auxiliary circuits disconnected, (plug connector disconnected);

- **WITHDRAWN:**
  - main and auxiliary circuits disconnected and apparatus racked out of the switchgear.

In the connected and isolated positions the apparatus remains in the frame with the door closed and is visible through the switchgear inspection window. The apparatus is equipped with special locks, located on the front crosspiece, which fit into the corresponding slots in the frame. The front crosspiece also facilitates the connecting/isolating operation, with the door closed (on request), thanks to the special operating lever.

A lock prevents the truck from being racked into the switchgear (for example, when the earthing switch is closed).

If the truck is in an indefinite position (between connected and isolated), the lock prevents both mechanical and electrical closing of the apparatus. The truck can be equipped with a locking magnet accessory which, if de-energized, prevents it from operating.

The connector (plug) for connecting the accessories of the operating mechanism, is on the front of the apparatus.

The hole for activating the segregation shutters of the medium voltage contacts is located on the front of the frame under the hole used for operating the apparatus.

Please refer to the relative instruction booklet for further details.
1. **Description**

1.3.2. **OneFit earthing switch interlock (mechanical)**
This mechanical interlock is installed to prevent the earthing switch from closing while the apparatus is in the connected position. The mechanical interlock of the earthing switch works by using the key lock on the OneFit frame. Figure 14 and figure 15 (1) show an installation example. The interlock is supplied as a kit (figure 16). The enclosed photos are only given as installation examples. They illustrate a typical installation (see also drawing 1VCS006507).

1.4. **Interlocks/locks**

---

**DANGER**
Modification to interlocks can result in hazardous conditions to personnel and equipment. Do not override, by pass or adjust interlocks.

---

<table>
<thead>
<tr>
<th>Lock description</th>
<th>Apparatus</th>
<th>OneFit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical lock to prevent the apparatus from closing when the truck is not in the connected/isolated position.</td>
<td>●</td>
<td>Figure 8</td>
</tr>
<tr>
<td>Mechanical interlock to prevent the apparatus from racking in/out in the closed position.</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Mechanical lock to prevent the apparatus from closing when the truck is not in the racked-in or isolated position.</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Lock to prevent the apparatus from racking into an enclosure designed for another type or size of apparatus. The lock is located in the connector.</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>Locking electromagnet on the truck to prevent the apparatus from racking-in/out without power.</td>
<td>●</td>
<td>Figure 8</td>
</tr>
</tbody>
</table>

Mechanical lock to prevent the apparatus from racking-in with the door open.

The locks used in the OneFit units are mechanical and electrical with micro switches for circuit continuity or interruption. The mechanical locks can be:
- force locks;
- prevention locks;
- electromechanical locks;
- safety locks (padlocks/keys).
OneFit units can be equipped with the locks shown in the following table.

---

**CAUTION**
The operations must be performed by exercising a normal force (not more than 200 N), and only using the purpose-built levers. Do not force the mechanical interlocks if operation is inhibited. Check that the operations are correct.
### Lock description

<table>
<thead>
<tr>
<th>Apparatus</th>
<th>OneFit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 10</td>
<td>Figure 10</td>
</tr>
<tr>
<td>Figure 14</td>
<td>Figure 14</td>
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<tr>
<td>Figure 15</td>
<td>Figure 15</td>
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<td>Figure 16</td>
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<td>Figure 17</td>
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<td>Figure 8</td>
<td>Figure 8</td>
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<td>Figure 11</td>
<td>Figure 11</td>
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<td>Figure 9</td>
<td>Figure 9</td>
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<td>Figure 20</td>
<td>Figure 20</td>
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<td>Figure 10</td>
<td>Figure 10</td>
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<td>Figure 14</td>
<td>Figure 14</td>
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<td>Figure 15</td>
<td>Figure 15</td>
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<td>Figure 16</td>
<td>Figure 16</td>
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<tr>
<td>Figure 23</td>
<td>Figure 23</td>
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<tr>
<td>Figure 24</td>
<td>Figure 24</td>
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<tr>
<td>Figure 25</td>
<td>Figure 25</td>
</tr>
<tr>
<td>Figure 26</td>
<td>Figure 26</td>
</tr>
</tbody>
</table>

- **Mechanical interlock with the earthing switch (by means of the key lock):**
  - the apparatus cannot be inserted when the earthing switch is closed;
  - the earthing switch cannot be closed when the apparatus is inserted or in the intermediate positions between connected and isolated.

- **Mechanical lock to prevent manual opening of the shutters when the apparatus is withdrawn.** (Fail-Safe).

- **Key lock to prevent the apparatus from being inserted. Only when the apparatus is in the isolated position can the lock be operated and the key released, thus preventing the apparatus from being inserted.**

- **Padlock on shutter movement.**

- **Mechanical interlock to prevent the auxiliary circuit connector from being disconnected when the apparatus is connected and when it is being racked in/out.** (requires the door)

- **Mechanical lock to prevent the apparatus from being racked out with the shutter open.**

- **Mechanical lock to prevent the apparatus from being racked in with the shutter closed.**

- **Mechanical lock to prevent shutter closing with the apparatus connected.**

- **Mechanical lock to prevent shutter closing while the apparatus is racked in/out.**

- **Mechanical lock to prevent the apparatus from operating while the shutter is moving.**

- **Mechanical lock to prevent the apparatus from being withdrawn while the shutter is moving.**

- **Mechanical lock to prevent the door from opening if the shutter is open.** (requires the door)

- **Potential-free contacts of the shutter in the OPEN position for electrical interlock:** may be used to prevent the earthing switch from closing or to prevent the original switchgear frame door from opening by means of a locking magnet (optional) (*) when the shutter is open.

- **Mechanical lock to prevent shutter movement without the door.** (requires the door)

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**Legend:**

- Standard
- On request
- (*) Requires the interlock installed on the apparatus
- (**) Function may be achieved by using the provided free potential contacts
1. Description
1. Description
1.5. Reference standard

IEC 62271-1 for general application
IEC 62271-102 for the earthing switch
IEC 62271-100 for the circuit breakers
IEC 62271-200 for the switchgear
IEC 62271-106 for the contactor
IEC 60529 for the protection classes of the enclosures
GB 3906-2006 for the switchgear
GB/T 1985-2014 for the earthing switch
GB/T 1984-2014 for vacuum circuit breaker
IEC 60044-7/8 for electronic instrument transformers (sensors)
C37.59 IEEE Standard Requirements for Conversion of Power Switchgear Equipment
C37.20.2 IEEE Standard for Metal Clad Switchgear
C37.04 IEEE Standard Rating structure of high voltage circuit breakers

General operating characteristics, -BGU micro switches

<table>
<thead>
<tr>
<th>Technical characteristics</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage</td>
<td>400 V</td>
</tr>
<tr>
<td>Rated current</td>
<td>22 A</td>
</tr>
<tr>
<td>Contact resistance</td>
<td>&lt;30 mW</td>
</tr>
<tr>
<td>Power frequency withstand voltage</td>
<td>1890 V ± 3%</td>
</tr>
<tr>
<td>Mechanical life, number of cycles</td>
<td>1,000,000</td>
</tr>
<tr>
<td>Electrical life</td>
<td>AC-12&gt;50,000</td>
</tr>
<tr>
<td></td>
<td>DC-12&gt;50,000</td>
</tr>
<tr>
<td></td>
<td>AC-15&gt;30,000</td>
</tr>
<tr>
<td></td>
<td>DC-13&gt;30,000</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>-25 °C ... +85 °C</td>
</tr>
</tbody>
</table>
2. OneFit operations

DANGER
Do not remove the circuit breaker cover; if necessary, keep at a safe distance during apparatus opening and closing operations to avoid any contact with moving parts. The operations must be carried out with normal activating force (not more than 200 Nm), and only using the special tools. Should this not work, make sure that the operating sequence is correct.

2.1. Accessories and operating devices

Key
1. Crank handle for racking apparatus in/out and shutter opening/closing handle (figure 27a (1)). If OneFit Kit is low in height this handle is supplied with a pivot pin (figure 27b (2)).
2. Emergency operating levers for VSC contactors (figure 28a (3)) and for VM1 circuit breakers (figure 28b (4)) - supplied with the apparatus.
3. Earthing switch operating lever (Fig. 28c (5)).
4. Circuit breaker carrier truck (figure 29 (6)).

CAUTION
Do not attempt to remove the circuit breaker from OneFit frame without the required ramp, dolly or circuit breaker carrier truck (figure 29 (5)).

Do not attempt to insert the circuit breaker into any OneFit frame prior to inspection. Compare the circuit breaker name plate rating with the onefit rating. Verify secondary voltages on the circuit breaker and in the compartment.
Do not attempt to insert a closed circuit breaker. Always inspect the OneFit frame to insure that it is free of obstructions, tools, or other equipment.
Take all precaution when moving the CB onto and from the carrier truck to avoid any injure to the hands as this is a heavy object.
Take all precaution when moving the CB fixed on the carrier truck on station floor. Danger of overturning due to high center of gravity!
2.2. Labels explanation

The labels affixed to OneFit are illustrated in figures 30 and 31.

Key
1. Nameplate with commercial code and serial number.
2. Rating plate with technical characteristics of product.
3. Plate with closed door operating instructions.
4. Plate with shutter interlock and operating instructions.

Figure 30

2.3. Apparatus racking in/out

The apparatus must only be inserted into the unit in the open position. Racking in/out must be gradual, so as to protect the mechanical interlocks against deforming impact.

If the operations are prevented, do not force the mechanical interlocks and check that the operating sequence is correct.

For safety reasons, the circuit breaker must be treated as though it were “connected” if the switching position cannot be clearly determined. In this case, all high voltage connections to the circuit breaker on the busbar and on the cable side must be de-energized. In addition, the earthing switch must be temporarily earthed (so as to ensure that the switchgear is in a safe condition) and zero potential on the primary side of the circuit breaker has to be confirmed prior to commissioning, operation, maintenance or repair work.

WARNING
Should any operation be carried out while the apparatus is withdrawn from the switchgear, pay the utmost attention to the moving parts.

CAUTION
Before inserting a breaker into a OneFit frame, remove foreign objects, tools and debris, or obstructions from inside the module.

2.3.1. Apparatus (circuit breakers and contactors)
The following instructions apply to all apparatus (VD4, Vmax, VM1 HD4 and V-Contact VSC).

a) Apparatus positioning and shutter opening
- Make sure that the key lock is in the horizontal position (figure 10 (3)) by releasing the key from the interlock with the earthing switch (if present);
- Make sure that the shutter is closed;
- Lift the door (dead front panel) to open. Make sure that the pins, shutter/door interlock and hooks have been released before removing the door;
- Before fitting the apparatus into the OneFit frame, make sure that it is in the open position;
- Release the apparatus from the truck by its handles and push it towards the OneFit frame;

Key
5. Shutter movement – turn handle counter-clockwise to allow the shutter operating lever to be inserted.
6. Shutter locked in closed position – in this position the key (the same used for the earthing switch interlock) can be removed.
7. Shutter movement unlocked – in this position the key (the same used for the earthing switch interlock) must be inserted and cannot be removed.
10. Number of turns to fully rack-in/out the CB.
11. Shutter fully open indicator.
12. Shutter moving or closed indicator.
13. Padlock – Shutter movement unlocked.
15. Lever for opening the hole of the apparatus operating lever in the door.

Figure 31
2. OneFit operations

- The apparatus must lock in the isolated position (figure 36). The handles (figure 33 (1)) must spring out sideways and locking the apparatus truck into the dedicated cavities (figure 34 (3)) and (figure 35 (3));
- Connect the auxiliary circuit using the connector of the apparatus (figure 37);
- Close the door (dead front panel) by holding it by its handle. Make sure that the eight hinges, three pins and shutter/door interlock are centered;
- Push the door (dead front panel) downwards (figure 44);
- Turn the lever (figure 31 (15)) counter-clockwise;
- Insert the handle (figure 27 (1) and figure 39 (2A)) and turn it clockwise to open the shutter until its indicator points to the “shutter open” symbol (figure 31 (11)), and the lever (figure 38 (1)) is able to move to the initial position (figure 35 (4)) freeing the access for CB truck operation.

b) Apparatus racking in (without door)
- Open the door shutter, insert the handle (figure 27 (1) and figure 40 (2B)) into its seat in the apparatus truck and turn it clockwise;
- Check the position of the apparatus as it is racked-in.
- Figure 41 and figure 42 show the apparatus in the “connected” and “open” position.

c) Apparatus racking out (without door)
- Open the door shutter, insert the handle (figure 27 (1) and figure 38 (2B)) into its seat in the apparatus truck and turn it counter-clockwise;
- Check the position of the apparatus through the window as it is racked-out.

For further details about operating the apparatus please refer to the specific manual.

d) Shutter closing
- Make sure that the apparatus is in the “withdrawn” position;
- Turn the lever (figure 38 (1)) counter-clockwise;
- Insert the handle (figure 27 (1) and figure 39 (2A)) and turn it counter-clockwise to close the shutter until its indicator points to the “shutter moving/ closed” symbol (figure 31 (12)) and the lever (figure 38 (1)) is able to move to the initial position (figure 35 (4)).
- When the key lock is in the vertical position, its key can be released so as to activate an interlock with the earthing switch (if present);

e) Door closing/opening
- Proceed as described below to close the door:
  - Make sure that the shutter is closed.
  - Hold the door by the handle (figure 43 (1)) taking care to center the eight hooks (1) (figure 45), the three pins (2) (figure 46) and the shutter/door interlock (3) (figure 46).
  - Push the door downwards (figure 44).
- Proceed as follows to open the door:
  - Make sure that the shutter is closed.
  - Lift the door and make sure that the pins, shutter/door interlock and hooks are unhooked before removing it.

f) Apparatus racking in (with door)
- Insert the rotary handle (figure 27 (1) and figure 40 (2B)) into the seat in the door (figure 31 (15)) and turn it clockwise;
- Check the position of the apparatus through the window (figure 12 (11)) during the racking in phase.

g) Apparatus racking out (with door)
- Insert the handle (figure 27 (1) and figure 40 (2B)) into the seat in the door (figure 31 (15)) and turn it counter-clockwise;
- Check the position of the apparatus through the window (figure 12 (11)) during the racking out phase.

h) Motor-operated racking in and out
- motor-operated racking (in, out) is available with the use of certain accessories (electrical contacts for shutter position) in OneFit SafetyPlus packages and enhanced versions. Motor-operated racking in/out shall be performed at a safe distance from the panel by enabling the electrical racking in and racking out command after having prepared the apparatus as described in point a).

(1) Door is available in OneFit Safety and higher packages
always operate motor racking in/out keeping a safe distance from the panel, considering an arc flash event effects.

DANGER

WARNING

Provide an external circuit switch to isolate racking motor whenever using manual lever to operate the CB truck. Please always remove the manual lever before returning to motor operated mode for safety purpose – the lever can be operated when the motor truck is energized (figure 40).

Always verify the lever (1) (figure 38) is returned in horizontal position before operating the motor truck.
2. OneFit operations

The photos have been shot without bypassing the interlocks.
All commissioning operations must be carried out by ABB personnel or customer personnel who are suitably qualified and have an in-depth knowledge of the apparatus and installation. If the operations are prevented, do not force the mechanical interlocks, but check that the operation sequence is correct.
2. OneFit operations

2.4. Current Sensors

2.4.1. Operating conditions
The sensor shall be mounted in dry, indoor conditions without excess ingress of dust and corrosive gases. The sensor shall be protected against unusually heavy deposits of dust or similar pollution, as well as against direct sunshine. The sensor is designed for standard ambient temperature between -5 °C and +40 °C (storage and transportation temperature between -40 °C and +80 °C). The altitude for mounting should be lower than 1000 m above sea level. The sensor may also be used at higher altitudes when agreed upon with the manufacturer.

2.4.2. Technical details
Rated values for each individual sensor are mentioned on the rating plate on the sensor (figure 49).

<table>
<thead>
<tr>
<th>KECA 80 C165</th>
<th>S/NVLT5408001587</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ipr: 80 A</td>
<td>Usr: 0.150/0.180 V</td>
</tr>
<tr>
<td>Kpcr: 50.0</td>
<td>Cfs al: 1.0078</td>
</tr>
<tr>
<td>fr: 50/60 Hz</td>
<td>Ith/Idyn: 50(3s)/125 kA</td>
</tr>
<tr>
<td>IEC 60044-8</td>
<td>0.65 kg</td>
</tr>
<tr>
<td></td>
<td>E</td>
</tr>
<tr>
<td></td>
<td>17 Oct 2013</td>
</tr>
</tbody>
</table>

Figure 49. Example of rating plate (label)
2.4.3. Instruction for installation

2.4.3.1 Factory installation
OneFit eSafety Plus package includes the embedded current sensors, which give new life to switchgear by combining all the benefits of the available accessories with integral equipment revamping. ABB KECA 80 C104 and KECA 80 C165 current sensors (electronic instrument transformers) are mounted on the backside of the OneFit Frame and tested in the factory. A label identifies each current sensor (e.g. IED L1 to monitor phase L1), as shown on the figure 52.

The current sensors are intended for use in current measurement in medium voltage switchgear. The case of sensor is made from plastic, the internal parts are shielded and this shielding is earthed. The primary conductor must be insulated for the application voltage. The insulation of primary conductor determines the highest permissible system voltage. The sensor assembly is type tested in OneFit application, relevant highest permissible voltage is stated on OneFit rating label.

2.4.4. Secondary connections

2.4.4.1 Cable
The secondary cable is a special shielded cable designed to give maximum EMI shielding. The cable is separable part of each sensor and cannot be changed or withdrawn due to the guarantee of accuracy and performance of the sensor. The cable shall be connected directly (or via a connector adapter if needed) to Intelligent Electronic Device (e.g. protection relay). The electrical shielding of cable is connected to connector shielding and shall be earthed on IED side. The cable shall be fixed close to metal wall or inserted inside of metal cable tray far from power cables. The maximal bending radius for the cable is 7.5x cable diameter. The cable cannot be moved if the temperature is below 0 °C. If cable, connector or connector grommet is damaged please contact the manufacturer for instructions.

The secondary cables are housed inside the low voltage compartment of the OneFit frame, as shown on the figure 53 (1).
2. OneFit operations

2.4.4.2 Connection to the IED

The sensor cable is terminated by shielded RJ-45 plug connector that shall be connected to the inputs of the IED. A label identifies each phase connector.

![RJ-45 connector](image1)

Note:

It is recommended to use a cable tie to fasten long sensor cables approximately 10 cm from the RJ-45 socket. A cable not connected to the IED can be left open or short-circuited without any harm for the sensor. Even during a primary short-circuit the voltage in the secondary circuit of the current sensor will be below 100 V. Nevertheless it is a good safety practice to earth cables not connected to the IED.

RJ-45 plug connector has 8 contacts and locking latch coupling. The sensor connector plug shall be inserted properly with the IED mating receptacle before completing the coupling with the bayonet lock. Take care and do not use excessive force to plug-in and plug-out these connectors.

The used RJ-45-type connectors (EIA/TIA 568A Standard) are screened and designed to guarantee low resistance shielding; they are particularly adapted to applications where electromagnetic compatibility (EMC) is important. The connectors are robust but it is necessary to be careful during their assembly – do not use force.

2.4.5. Instructions for use

The current sensors are used:

- To convert large currents in the primary circuit of the network to the appropriate signal for the secondary equipment (e.g. IEDs)
- To insulate primary and secondary circuits from each other
- To protect secondary equipments from harmful effects or large currents during abnormal situations in the network

The use of a sensor for other purposes than those described above is forbidden.

![DANGER](image2)

The use correction factor for amplitude error is required condition in order to achieve the declared accuracy class, as below described:

**KECA 80 C104**

- Value of amplitude (al) correction factor to be set in the relay= al marked on the label shall be multiplied for 0,988.
- Value of phase (pl) correction factor to be set in the relay= pl marked on the label shall be increased or decreased (depending on the sign) with +0,166°.

| e.g. value of amplitude (al) correction factor, according to the label on figure 55. |
| 1.0078 x 0,988 = 0.9957 |
| e.g. value of phase (pl) correction factor, according to the label on figure 55. |
| (+0.21°) + (+0.166°) = +0.376° |

**KECA 80 C104**

S/N1VT5408001587

| Ipr: 80 A | Usr: 0.150/0.180 V | cl: 0.5/SP630 |
| Kp: 50.0 | Cfs al: 1.0078 | pl: +0.2100° |
| fr: 50/60 Hz | Ith/Idyn: 50(3s)/125 kA | 0.40 kg |
| EIC 60044-8 | Made by ABB | 17 Oct 2013 |

For more details (technical characteristics, sensor accessories, type of IED, etc.) see the OneFit web page.
2.5. Automatic shutter system

Automatically operated insulating shutter during circuit breaker rack-in and rack-out, as shown on the figure 56 (1). This system is an accessory, which complies with ANSI requirements. Motor operation of the automatic shutter system is possible by using OneFit SafetyPlus package with Vacuum CB motorized truck.

2.6. Heater application

Anti-condensation heater application is mounted inside left side of the OneFit frame, as shown on the figure 57 (1), it is designed for high-humidity areas, to keep the interior dry. Alternate mounting below the OneFit basement is possible. Accessory on demand.
2. OneFit operations

2.7. Earthing application

Earthing application is mounted on OneFit frame, as shown on the figures 58 (1), and on the its base, it is designed for the earthing truck with or without making capability, up to 32kA 1 sec., as shown on the figures 59 and 60. Accessory on demand.

DANGER

There are hazards of electrical shocks and/or burns whenever working in or around electrical equipment. Turn off power ahead of the switchgear before performing any inspection or maintenance operations. Check incoming line terminals to verify that the equipment is de-energized and grounded. Check out-going terminals to ensure that no back-feed condition exists.
3. OneFit with optional Earthing Switch and Current Transformers

3.1. Construction features

OneFit can be combined with optional earthing switch (ES) installed upon the basement and current transformers (CTs) to replace the original panel ones for a more comprehensive modernization solution and direct connection to original panel busbars. The solution is based on OneFit frame and available both for retrofitting panels with access from rear or access limited from front side only.

Direct connection to the existing switchgear busbar risers by an additional power circuit interfacing to the new spouts assembly makes it a hard-bus retrofill.

**Features:**
- Integration of the ES Earthing Switch in the retrofill provides safety of operation by enabling earthing of the load side in the panels where an ES was not present or it is not more reliable
- The new ES earthing switch is fully interlocked with standard OneFit, providing renewal and highest reliability of all safety features
- Optional CTs enable renewal of measurement and protection in one packaged and type tested solution
The solution is available in four distinct packages, targeted on improvement of personnel safety and switchgear upgrading.

1. **Standard**
The OneFit frame combined with spout assembly for new apparatus racking system, integrated metallic isolating shutters and the state of the art interlocking system to provide a true retrofill solution. Ready for design to order connection to original panel busbar risers.

2. **CTs – Current transformers**
Optional CTs enable renewal of measurement in one packaged and type tested solution. CTs ratings available upon selection can support existing protection relay, combining all the benefits of the previous packages with integral equipment revamping. Renewal of protection relay with Relion family further provides protection modernization.

3. **ES – Earthing Switch**
Integration of the Earthing Switch in the retrofill provides safety of operation by enabling load side earthing in the panels where an ES is not present or it is not more reliable. The new earthing switch is fully interlocked with standard OneFit, providing renewal and highest reliability of all safety features.

4. **ES + CT - Earthing Switch and Current Transformers**
Full option solution for the complete switchgear modernization.

Figure 62

---

**3. OneFit with optional Earthing Switch and Current Transformers**

The solution is available in four distinct packages, targeted on improvement of personnel safety and switchgear upgrading.

1. **Standard**
The OneFit frame combined with spout assembly for new apparatus racking system, integrated metallic isolating shutters and the state of the art interlocking system to provide a true retrofill solution. Ready for design to order connection to original panel busbar risers.

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Optional CTs enable renewal of measurement in one packaged and type tested solution. CTs ratings available upon selection can support existing protection relay, combining all the benefits of the previous packages with integral equipment revamping. Renewal of protection relay with Relion family further provides protection modernization.

3. **ES – Earthing Switch**
Integration of the Earthing Switch in the retrofill provides safety of operation by enabling load side earthing in the panels where an ES is not present or it is not more reliable. The new earthing switch is fully interlocked with standard OneFit, providing renewal and highest reliability of all safety features.

4. **ES + CT - Earthing Switch and Current Transformers**
Full option solution for the complete switchgear modernization.
3.2. Main components

3.2.1 OneFit frame
This solution is based on standard W600 OneFit frame with relevant accessories and packages. It can be equipped with the apparatus and operational trucks in phase distance 150mm and up to 12kV, 1250A, 31.5kA in the withdrawable execution version.

3.2.2 Earthing Switch
The retrofit solution can be equipped with earthing switch type ST1-UG that is a crank opening (fig. 63) and closing (fig.61a item 3, 7) earthing device with rectilinear movement also used in UniGear550. The ES is fitted with a snap action operating mechanism for positive high speed closing and it is dimensioned to conduct the rated short circuit making current when closed under load.

The switch is equipped with an earthing blade which connects the three phases via the earthing pins mounted on the copper bars on the OneFit bottom side and electrically connected to earth by a stranded copper conductor.

The switching speed and torque achieved are independent of the action of the operating mechanism.

A manual operating lever is provided for operation of the switch.

The earthing switch has short-circuit making capacity and has been qualified according to IEC 62271-102 for two closing operations at 100% of the rated short-circuit making current.

The device is provided with auxiliary switches for signalling the open and closed positions, operated by the rod mechanism.

The following are available on request:
- Locking magnet
- Key locks interlock

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>Rated withstand</th>
<th>Rated short-time withstand current</th>
<th>Rated duration of short circuit</th>
<th>Making current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ur (kV)</td>
<td>Up (kV)</td>
<td>Is (kA)</td>
<td>ts(s)</td>
<td>I_{sym} (kA)</td>
</tr>
<tr>
<td>12</td>
<td>75</td>
<td>31.5</td>
<td>4</td>
<td>80</td>
</tr>
</tbody>
</table>
3. OneFit with optional Earthing Switch and Current Transformers

The standard mechanical interlock, key based (mandatory) and electrical (optional) interlocks are provided to prevent the closing operation of the earthing switch while the apparatus is in the connected position and the possibility to open the shutter and rack-in the apparatus when the earthing switch is closed to earth.

The mechanical interlock of the earthing switch is supplied factory mounted on the solution basement and connects the OneFit frame to earthing switch operation point providing or blocking access to the ES operating lever, fig. 61c (13).

**CAUTION**

The operations must be performed by exercising a normal force (not more than 200 N), and only using the purpose-built levers. Do not force the mechanical interlocks if operation is inhibited. Check that the operations are correct.

**DANGER**

Modification to interlocks can result in hazardous conditions to personnel and equipment. Do not override, by pass or adjust interlocks.

Key
1. Mechanical interlock to earthing switch (standard)
2. Earthing switch shaft
3. Earthing switch operating shaft and interlock mechanism
4. Key based mechanical interlock (mandatory accessory)
5. Electrical interlock (on request)

Figure 64
The earthing switch standard mechanical interlock (fig. 64 item 1, 65b item 8) may rotate solidly with OneFit frame responsibility key depending on shutter position. Referring to figs. 65, when shutter is locked in closed position, fig. 65a (6) the mechanical interlock enables to operate the earthing switch and close it to earth to secure cable side.

In this position the key (fig 65a and b) can be removed. It is possible to use it for interlocking logics, as example to link it with the ES key based mechanical interlock, fig. 64 (4).

When the shutter movement is unlocked, fig. 65a (7) the OneFit frame key must be inserted and cannot be removed. The earthing switch standard mechanical interlock in this key position prevents access to the earthing switch operating shaft and only operations on OneFit shutter and circuit breaker racking are permitted.

For installation and verification of earthing switch standard mechanical interlock (fig 65b item 8) please refer to installation manual 1YHT700015D0003 and 1YHT700015D0004.

The locks used in the OneFit solution are mechanical and electrical with micro switches for circuit continuity or interruption. The solution can be equipped with the locks shown in the following table, available on request in the OneFit with optional Earthing Switch with or without CTs configurations only.

<table>
<thead>
<tr>
<th>Lock description</th>
<th>Basement + Earthing switch</th>
<th>OneFit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical interlock with the earthing switch</td>
<td>● Figure 64 1, 65b 8</td>
<td>● Figure 64 3</td>
</tr>
<tr>
<td>- the apparatus cannot be inserted when the earthing switch is closed;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- the earthing switch cannot be closed when the apparatus is inserted or in the intermediate positions between connected and isolated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Key lock to prevent the Earthing Switch to be operated. Only when the apparatus is in the isolated position and closed shutter the lock be operated and the key released, thus enabling the ES operation</td>
<td>● Figure 64 4</td>
<td></td>
</tr>
<tr>
<td>Electrical lock –RLE3 to prevent the the Earthing Switch to be operated. Only when supplied the lock can be operated enabling the ES operation</td>
<td>○ Figure 64 5</td>
<td></td>
</tr>
<tr>
<td>Potential-free contacts –BGE1/BGE2 of the Earthing Switch in the Open/Closed position for electrical interlock:</td>
<td>● Figure 63b</td>
<td></td>
</tr>
</tbody>
</table>

● Standard
○ On request

All locks described require the earthing switch version.
3. OneFit with optional Earthing Switch and Current Transformers

3.2.2.1 Earthing Switch auxiliary contacts – BGE1/ BGE2
Electrical signalling of Earthing Switch open/closed are available with two groups of potential free auxiliary contacts with a total of 4NC and 2NO when in open position.
Mounted in ES and ES + CT OneFit versions only.

3.2.2.2 Earthing Switch locking magnet (-RLE3)
Electrical lock – RLE3 is mounted on request to prevent the Earthing Switch to be operated.
The locking magnet striker does not allow operation of the ES shaft access cover if de-energised. Only when supplied the lock can be released enabling the ES lever insertion and ES operation.

<table>
<thead>
<tr>
<th>General operating characteristics - BGE micro switches</th>
<th>General operating characteristics - RLE3 locking coil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated current</td>
<td>Un 24-30-48-60-110-125...127-220-230...240 V ~ 50/60 Hz</td>
</tr>
<tr>
<td>Contact resistance</td>
<td>Operating limits 80 … 110% Un</td>
</tr>
<tr>
<td>Power frequency withstand voltage</td>
<td>Power on inrush (Ps) DC = 250 W; AC=250 VA</td>
</tr>
<tr>
<td>Mechanical life, number of cycles</td>
<td>Continuous power (Pc) DC = 5 W; AC=5 VA</td>
</tr>
<tr>
<td>Power frequency withstand voltage</td>
<td>Inrush duration 150 ms</td>
</tr>
<tr>
<td>Electrical life</td>
<td></td>
</tr>
<tr>
<td>Operating temperature</td>
<td></td>
</tr>
<tr>
<td>Wiring</td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td></td>
</tr>
</tbody>
</table>

<20 mΩ

2.500 VAC

1.000.000

AC-12×100.000; DC-12×50.000

-25 °C ... +70 °C

1.5~0.75 mm²

IP20

-RLE3 Magnet coil for ES
Interlock Option for customer.
3.2.3 CTs – Current transformers
Optional CTs type LZZX-10Q by ABB enable renewal of measurement in one packaged and type tested solution. Renewal of protection relay with Relion family further provides protection modernization. This retrofit solution must equipped with three current transformers or three insulators (Fig. 62, configuration ES) to support the lower side copper busbar system.

<table>
<thead>
<tr>
<th>Rated primary current</th>
<th>Rated secondary current</th>
<th>Accuracy class</th>
<th>Capacity</th>
<th>Rated short-time thermal current/duration</th>
<th>Rated dynamic current</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>1, 5</td>
<td>0.2S or 5P10</td>
<td>10</td>
<td>31.5/4</td>
<td>80</td>
</tr>
<tr>
<td>300</td>
<td>1, 5</td>
<td>0.2S or 5P10</td>
<td>10 or 15</td>
<td>31.5/4</td>
<td>80</td>
</tr>
<tr>
<td>400</td>
<td>1, 5</td>
<td>0.2S or 5P10</td>
<td>10 or 20</td>
<td>31.5/4</td>
<td>80</td>
</tr>
<tr>
<td>500, 600, 800</td>
<td>1, 5</td>
<td>0.2S or 5P10</td>
<td>15 or 20</td>
<td>31.5/4</td>
<td>80</td>
</tr>
<tr>
<td>1000, 1250</td>
<td>1, 5</td>
<td>0.2S or 5P10</td>
<td>15 or 20</td>
<td>31.5/4</td>
<td>80</td>
</tr>
</tbody>
</table>

CTs ratings available upon selection can support existing protection relay, please select secondary current available (1A, 5A) to match existing protection relay analog input ratings.
3. OneFit with optional Earthing Switch and Current Transformers

3.2.3.1. Technical details
Rated values for each individual Current Transformer are mentioned on the rating plate.

<table>
<thead>
<tr>
<th>ABB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial No.: 148741706</td>
</tr>
<tr>
<td>Prod. year: 08-2017</td>
</tr>
<tr>
<td>LZZX-100Q: Current transformer/电流互感器</td>
</tr>
<tr>
<td>Insulation level/绝缘水平: 12/42/75kV</td>
</tr>
<tr>
<td>Rated continuous thermal current/额定连续热电流: 120%</td>
</tr>
<tr>
<td>Terminal symbol/铭牌标志: S1-S2</td>
</tr>
<tr>
<td>Kn/额定电流比 (A): 1250/1</td>
</tr>
<tr>
<td>Rated output/额定输出 (VA): 20</td>
</tr>
<tr>
<td>Accuracy class/准确级: 0.5S</td>
</tr>
<tr>
<td>Indoor/户内: 50Hz</td>
</tr>
<tr>
<td>Ih: 31.5kA/4s</td>
</tr>
<tr>
<td>Idyn: 80kA</td>
</tr>
<tr>
<td>cl: E</td>
</tr>
<tr>
<td>Material No./料号: Cosp=0.8</td>
</tr>
<tr>
<td>广东消电ABB互感器有限公司</td>
</tr>
<tr>
<td>Made in ABB</td>
</tr>
</tbody>
</table>

Fig. 69. Example of rating plate (label)

<table>
<thead>
<tr>
<th>Labels abbreviation definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZZX-100Q: Current Transformer type code</td>
</tr>
<tr>
<td>IEC 61869-2: IEC – standards referred to</td>
</tr>
<tr>
<td>Ih/Idyn: Rated short-time (3s) thermal current in kA and rated dynamic current in kA (peak)</td>
</tr>
<tr>
<td>fr: Rated frequency in Hz</td>
</tr>
<tr>
<td>Kn: Rated primary/secondary current ratio in A</td>
</tr>
<tr>
<td>cl: Rated accuracy class</td>
</tr>
</tbody>
</table>

CT secondary terminals are pre-wired in a standard length of 0.15 m and short-circuited. The cable shall be connected directly (or via a connector adapter if needed) to the protection relay. The CT secondary terminals wiring shall be fixed close to metal wall/parts or inserted inside of metal cable tray far from power cables.

---

**DANGER**
Opening a CT secondary circuit while energized can result in hazardous overvoltage conditions to personnel and equipment.

**CAUTION**
Verify CTs secondary circuits are properly terminated or short-circuited before energizing.
3.2.4 Basement
The basement supports OneFit frame and new spouts. All of the other main components (earthing switch, CTs or isolators as well as interlocks) are factory assembled on it.

During site assembly process the basement is fixed to the original panel by the fixing plates which can be found in the accessory package and extension feet on sides.

Basement is delivered with the Design to Order height according to each specific project engineering, see figure 71 for general dimensions in the different configuration and min-max height available.

<table>
<thead>
<tr>
<th>Production type</th>
<th>H1 (mm/inch)</th>
<th>H2 (mm/inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OneFit+ES+CT</td>
<td>1200 ~ 1560</td>
<td>340 ~ 700</td>
</tr>
<tr>
<td></td>
<td>47.2 ~ 61.4</td>
<td>13.4 ~ 27.6</td>
</tr>
<tr>
<td>OneFit+ES</td>
<td>1200 ~ 1560</td>
<td>340 ~ 700</td>
</tr>
<tr>
<td></td>
<td>47.2 ~ 61.4</td>
<td>13.4 ~ 27.6</td>
</tr>
<tr>
<td>OneFit+CT</td>
<td>970 ~ 1560</td>
<td>110 ~ 700</td>
</tr>
<tr>
<td></td>
<td>38.2 ~ 61.4</td>
<td>4.3 ~ 27.6</td>
</tr>
<tr>
<td>OneFit</td>
<td>900 ~ 1560</td>
<td>40 ~ 700</td>
</tr>
<tr>
<td></td>
<td>35.4 ~ 61.4</td>
<td>1.6 ~ 27.6</td>
</tr>
</tbody>
</table>

** Dimensions with ** will be changed accordingly.
The height of the basement depends on the original panel retrofitting design.
The vertical dimensions relative to the basement should be recalculated according to final height of the basement changed to specific project requirements.
3. OneFit with optional Earthing Switch and Current Transformers

3.3 OneFit with Earthing Switch operation

OneFit with optional earthing switch requires additional operation instruction for the ES installed upon the basement.

Due to safety interlocking ES operation is permitted only when the apparatus in racked-out, test - disconnected position or removed from the frame and the OneFit shutter is closed.

Earthing switch should be turned on – closed to earth only when the door is closed and on a dead circuit.

Electromechanical key based interlock and, if installed, on request electrical locking magnet (-RLE3) shall be released as well to enable ES operation.

When all locking condition are disabled first check ES status, the position of the earthing switch can be seen from the front by means of a mechanical coupled indicator:

- Open condition - visual indicator showing BLACK label with “O” letter, fig. 72 item 4;
- or Closed to earth condition – visual indicator showing RED label with “I” letter

Control of the earthing switch is actuated from the front of the switchgear with manual operation. With ES operation enabled the shaft access plate below ES position indicator can slide down to open access to operating shaft. Operating handle can be inserted and rotated

If the operation is prevented, do not force the interlock and check that the operation sequence is correct.

Put the operating lever in a pointed upwards or downwards position so that there is sufficient room for it to move.

Key
1. Rating plate with with commercial code, serial number and technical characteristics of product
2. Plate with ES key lock operating instructions, locked in left position, unlocked in right position
3. Warning plate for ES operations
4. Plate with ES operating instructions
5. -RLE3 ES locking magnet

Figure 72 ES visual indication
Fit the operating lever (Figure 73) onto the hexagonal shaft, which is now released for operation.

To close the earthing switch, turn the lever clockwise through approx. 180° until the stop position is reached. Turning the lever in an anticlockwise until the stop position is reached opens the earthing switch.

- Observe the mechanical / electrical switch position indicator.
- Remove the operating lever. The slide remains open if the earthing switch is in the closed position, locking the OneFit frame shutter operation.

Make sure the operating lever fully reaches the stop position in the operating process to ensure that the earthing switch is in its defined limit position.

DANGER

All the operations regarding putting into service must be carried out by ABB. Check the status of the shutter before operating the ES! Miss operation may damage the interlock device!
4. Commissioning

Before opening the door, check the position of the apparatus through the inspection windows. Before being put into service, all the apparatus installed must be checked and tested.

5. Periodic checks

For the circuit breaker installation operations, maintenance, periodic checks and spare parts also refer to the technical documentation of the circuit breaker. The racking-in/out operations must always be carried out with the circuit breaker open.

There are hazards of electrical shocks and/or burns whenever working in or around electrical equipment. Turn off power ahead of the switchgear before performing any inspection or maintenance operations. Check incoming line terminals to verify that the equipment is de-energized and grounded. Check out-going terminals to ensure that no back-feed condition exists.

Before proceeding with any operation, make sure that the apparatus is open with springs unloaded. Check the positions of the apparatus and earthing switch through the inspection windows before opening the door.
5. Periodic checks

5.1. General information

During normal service the unit may require interventions that depend on specific installation aspects such as operation frequency, interrupted current value, power factor and ambient conditions. As a precaution, the paragraph below gives the inspection program table with the relevant periodic checks. It is advisable to comply with the instructions in the table, at least for the first check. The best frequency for performing successive inspections can be established according to the results obtained.

It is advisable to keep a maintenance card and a service book containing all the operations performed along with date, description of any faults and reference data allowing the apparatus to be traced.

For further information, refer to IEC 62271-1 Standards.

In any case, should there be any problems, do not hesitate to contact us.

We recommend performing an inspection within one year from putting the apparatus into service.

5.2. Inspection program

### DANGER

For routine checks and maintenance of the apparatus and protection devices, please refer to the relative instruction manuals.

Lubricants for IEC standards:
- Halogen-free cleansers (optional)
- ETHANOL F 25 M (for general cleaning);

### CAUTION

Do not use alcohol or freon. Limit the use of solvents to removing grease and conductors, insulation and unpainted metallic surfaces. Use an OSHA approved, non flammable solvent with a threshold limit of 300 PPM or higher in accordance with local regulations. Use solvents in well-ventilated areas.

Note: Take care not to remove or tarnish plating.

<table>
<thead>
<tr>
<th>Subject of Inspection</th>
<th>Time intervals</th>
<th>Procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Visual inspection of Insulating parts.</td>
<td>3 years and in any case in relation to any environmental pollution.</td>
<td>Insulating parts must be free from dust, dirt, cracks, traces of flashover and damage. Remove any dust and dirt with a vacuum cleaner and dry, clean cloths.</td>
</tr>
<tr>
<td>2. Auxiliary contacts.</td>
<td>3 years. In any case, refer to the specific apparatus manual.</td>
<td>Check functionality and signals.</td>
</tr>
<tr>
<td>3. Auxiliary circuit conductors.</td>
<td>5 years.</td>
<td>Check whether any cabling strap is loose or broken and make sure that the connections are tight.</td>
</tr>
<tr>
<td>4. Interlocks.</td>
<td>3 years.</td>
<td>Check functionality of devices.</td>
</tr>
<tr>
<td>5. Power connections Copper Adaptation System and Earthing Switch included.</td>
<td>5 years.</td>
<td>The connections must be tight and have no traces of overheating or oxidization. Check the voltage drop (if possible).</td>
</tr>
<tr>
<td>6. Insulation resistance measurement.</td>
<td>3 years.</td>
<td>Ask ABB.</td>
</tr>
<tr>
<td>7. Heater</td>
<td>1 years.</td>
<td>Verify operation of heaters and thermostats, if used.</td>
</tr>
</tbody>
</table>
6. Maintenance operations

**DANGER**

Maintenance must be carried out either by ABB Service personnel or by qualified skilled personnel. For the circuit breaker installation operations, maintenance, periodic checks and spare parts also refer to the technical documentation of the circuit breaker. The racking-in/out operations must always be carried out with the circuit breaker open.

**DANGER**

There are hazards of electrical shocks and/or burns whenever working in or around electrical equipment. Turn off power ahead of the switchgear before performing any inspection or maintenance operations. Check incoming line terminals to verify that the equipment is de-energized and grounded. Check out-going terminals to ensure that no back-feed condition exists.

**DANGER**

Always work with the circuit breaker open and locked so that it cannot be closed again, with the work area insulated and made safe. All power supply sources must be disconnected and made safe against any reclosing during removal and installation work.

Should the customer’s personnel be in charge of maintenance, the customer is responsible for any operation performed on the apparatus. When performing routine checks and maintenance operations, de-energize all the components. Always work with the circuit breaker open and locked so that it cannot be closed again, with the work area insulated and made safe. All power supply sources must be disconnected and made safe against any reclosing during removal and installation work.

The spare parts shown in the “List of spare parts/accessories of the relevant apparatus manual” table can only be replaced by ABB Service personnel. For the apparatus, consult the relevant manual. Use original spare parts only.
6.1. General information

Thanks to their simple design, OneFit kits do not require any particular maintenance except for the “Periodic checks” in chapter 4. In order to avoid any hazardous deterioration of the insulating level, it is advisable to perform the first inspection within one year from putting the apparatus into service in order to establish the routine check intervals and to create a maintenance card.

Moreover, it is advisable to comply with the instructions for the individual components given in the respective instruction manuals supplied with the apparatus. It is advisable to keep a maintenance card and a service book containing all the operations performed along with date, description of any faults, reference data allowing the apparatus to be traced, etc.

The electrical apparatus is easily affected by ambient conditions and can be damaged by abnormal service conditions. Dust, heat, humidity, a corrosive atmosphere, chemical residues, exhaust fumes, vibrations and other elements can affect the performance of the apparatus and the life of the electrical components. Especially when combined, these conditions can cause premature faults.

The most important rules to follow are:
- keep the apparatus clean;
- keep the apparatus dry;
- tighten bolts and connections;
- protect the mechanical parts from excessive friction.

Comply with the instructions concerning the work to be performed on the various parts of the unit, with the exception of equipment for which the relative instruction manuals must be consulted.

**Galvanized components**

All the metal sheets of the OneFit frame are made by galvanized components. The galvanized and passivated components can be cleaned with a dry cloth. Oil and grease can be removed using a cloth soaked in a suitable solvent. To polish the surface, repeat the previous operation.

6.2. Mechanical actuators

The mechanical actuators comprise all the mechanical parts of the kit used to carry out the operations, locks and safety devices. The force, prevention and safety locks are all considered mechanical actuators. The moving components are lubricated and tested while the switchgear is assembled. Contact ABB service personnel if accessories must be installed in already installed switchgear.

The mechanical interlocks must not be ignored, but used properly to avoid any hazardous situations.

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**DANGER**

![DANGER]

The mechanical interlocks must reach the final locked/unlocked positions without any intermediate stops.

They must be tested several times to check that they operate perfectly. The operating force required must also be checked. For safety reasons, always make sure that the mechanical interlock is in position between the circuit breaker and the fixed part of the apparatus. If excessive force is required to activate the device, it means that the mechanism is prevented from moving. In this case, please contact us.
7. Accessories and spare parts

7.1. Accessories and tools for operations

Standard accessories:
The kit is usually supplied complete with:
• Emergency operating lever for the VM1 circuit
• Emergency operating lever for the VM1 circuit breaker and V-Contact VSC contactor (supplied with the relevant apparatus)
• Handle for shutter opening/closing and apparatus racking in/out (supplied with OneFit kit);
• Circuit diagrams and drawings
• Instructions for installation, service and maintenance
• Handle for earthing switch operation when OneFit with earthing switch is configured

Package accessories
On request, the kit can be configured on the basis of the following packages: OneFit with optional Earthing Switch and Current Transformers:
• Earthing Switch locking magnet -RLE3
• Current Transformers only for OneFit with Earthing Switch variant
• Potential-free ES position contacts for electrical interlock -BGE

7.2. Spare parts

Refer to the relative installation, service and maintenance instructions for the apparatus. The spare parts normally supplied for the kit are listed in the table below.

<table>
<thead>
<tr>
<th>Description of spare part</th>
<th>Assembly by the customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Interlock to prevent the earthing switch from closing when the shutter is open -BGU</td>
<td>YES</td>
</tr>
<tr>
<td>Potential-free shutter position contacts for electrical interlock</td>
<td>YES</td>
</tr>
<tr>
<td>Frame - shutter Key lock kit</td>
<td>YES</td>
</tr>
<tr>
<td>Current sensors</td>
<td>NO</td>
</tr>
<tr>
<td>Heater</td>
<td>NO</td>
</tr>
<tr>
<td>Only for OneFit with Earthing Switch variant Potential-free ES position contacts for electrical interlock -BGE</td>
<td>YES</td>
</tr>
<tr>
<td>ES key lock kit</td>
<td>YES</td>
</tr>
<tr>
<td>Earthing Switch locking magnet -RLE3</td>
<td>YES</td>
</tr>
<tr>
<td>Current Transformers</td>
<td>NO</td>
</tr>
</tbody>
</table>
8. Electrical diagram

OneFit standard electrical diagram is 1VCS005961. Please ask ABB last version available.