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 symbol:
For your safety!

Safety notations alert personnel to possible death, injury or property damage situations. The safety notations appear before the step in which the condition applies. The one safety notice and three hazard levels notations are:

<table>
<thead>
<tr>
<th>DANGER</th>
<th>Indicates a hazardous situation that has a high probability of death, severe injury, and substantial property damage.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTION</td>
<td>Indicates a hazardous situation that may result in minor or moderate injury and/or property damage.</td>
</tr>
<tr>
<td>NOTICE</td>
<td>Indicates a statement of company policy as it relates to the safety of personnel or protection of property.</td>
</tr>
</tbody>
</table>
1. Foreword

1.1. Introduction

TruckMaster is the portable remote racking unit implementing the remote racking operations of the circuit breakers, offering a new level of safety to substation personnel.

An electric arc can occur for several reasons, such as human error or bad connections. Accidents are quite unusual but when they happen their consequences may be very severe. Operators are always exposed to these risks when working in the switchgear room. Flames, ejected parts, smoke and overpressure are the main effects of an arc fault in a non-arc classified switchgear. When the fault happens in an arc-classified switchgear not equipped with a proper exhaust gas duct, smoke is released in the room.

Maintaining a safe distance between personnel and equipment during operations provides the most effective means of avoiding injury by keeping people out of harm’s way.

Remote racking provides a safe operating environment for personnel through the proven method of adding distance between the operator and arc flash incident energy at the switchgear site.

Enhanced switchgear operability preventing human errors can be achieved: integrating a motor operated racking system on each new or retrofit breaker, when frequent operations from control system is required.

Installing a TruckMaster rack in-out device per each switchgear line-up for maintenance related operations by station personnel.

TruckMaster is composed of three elements:
• Docking unit
• Portable driver
• Remote console

The docking unit is applied to the circuit breaker compartment door to accept the link with the portable driver. A single portable driver and the relevant remote console are needed in the switchroom to implement the remote racking operations.

01 Floor-rolling apparatus with linear ratchet racking system;
02 Apparatus with rotary racking mechanism;
03 Floor-rolling circuit breaker with ratchet linear racking system
1. Foreword

Different TruckMaster variants are available in order to satisfy a huge range of application needs:
• TruckMaster CS for rotative racking mechanisms
• TruckMaster FR for ratchet linear racking mechanisms

This publication contains the information required to install closed door remote racking TruckMaster CS and put it into service. For correct use of the product, please read it carefully.

TruckMaster CS is designed for different installation configurations. However, they do allow further technical and construction modifications to be performed (at the customer’s request) so as to adapt to special installation requirements. For this reason, the information given below may sometimes not contain instructions concerning special configurations. Apart from this manual, it is therefore always necessary to consult the latest technical documentation (circuit and wiring diagrams, assembly and installation drawings, protection coordination studies, etc.), especially regarding any variants requested in relation to the standardized configurations. Always refer to the specific circuit breaker operation and maintenance manual before installing, commissioning and operating TruckMaster rack in-out device. The circuit breaker retrofit is designed for connection to the portable external driver in the racking phases. The driver can be moved from one cubicle position to the next, thus only one portable driver is required per switchgear. Operators will be able to safely control circuit breaker racking in and out operations from a remote console connected to TruckMaster FR by 15 meter / 50 feet cable. This solution allows operating personnel to carry out the racking procedures from a safe distance with the panel door closed.

During retrofit commissioning a driver docking will be mounted on the doors of each circuit breaker cubicle in order to connect TruckMaster.

1.2. Environmental protection program

TruckMaster 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 reducing energy consumption as well as use of raw materials and production of waste. All this is guaranteed thanks to application of the medium voltage apparatus manufacturing facility’s environmental management system.

1.3. Information about this booklet

This booklet provides information for the TruckMaster racking in-out solution as described below. Not all sections of the publication apply to all types of TruckMaster. All information in this booklet was current at the time of printing. Unless different indications are given, all references in this booklet refer to the circuit breaker viewed from the front.

WARNING

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

2.1. Introduction
The purpose of this manual is to provide instructions for unpacking, storage, installation, operation, and maintenance for TruckMaster CS rack in-out devices. Read and use carefully this manual as guidance during installation, initial operation, and maintenance.

2.2. Safe practices
TruckMaster CS rack in-out device is equipped with high energy mechanisms. The 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 of these rack in-out device, the following recommendations must be followed.

Only qualified persons, as defined in the National Electric Safety Code, who are familiar with the installation and maintenance of medium voltage circuits and equipment should be permitted to work on these rack in-out device. Read these instructions carefully before attempting any installation, operation, or maintenance of these rack in-out device.

Do not defeat safety interlocks. This may result in bodily injury, death and/or equipment damage.
Do not work on a closed circuit breaker.
Do not leave a circuit breaker in an intermediate position in a cell. Always place the circuit breaker in the disconnect or connect position.

2.3. Standards and regulations

2.3.1. Fabrication
The TruckMaster CS rack in-out device is conform to the following Standards:
- DIN VDE 0670, part 104, and IEC 62271-1
- DIN VDE 0847, part 4, and IEC 61000-4

2.3.2. Installation and operation
For assembly and operation, please refer to the relative regulations, and in particular to:
- ANSI / NFPA70
- NEC

2.3.3. Service conditions
Normal service conditions
Follow the recommendations in the IEC 62271-1 Standards. In more details:

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>+ 40 °C</td>
</tr>
<tr>
<td>Average maximum over 24 hours</td>
<td>+ 35 °C</td>
</tr>
<tr>
<td>Minimum (according to class – 5), apparatus for indoor installation</td>
<td>- 30 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>The average relative humidity value measured for over 24 hours must not exceed 95%</td>
</tr>
<tr>
<td>The average water steam pressure value without condensation measured for over 24 hours must not exceed 2.2 kPa.</td>
</tr>
<tr>
<td>The average relative humidity value measured for over 1 month must not exceed 90%.</td>
</tr>
<tr>
<td>The average water steam pressure value measured for over 1 month must not exceed 1.8 kPa.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Climate</th>
</tr>
</thead>
<tbody>
<tr>
<td>To avoid the risk of corrosion or other damage in areas:</td>
</tr>
<tr>
<td>- with a high level of humidity, and/or</td>
</tr>
<tr>
<td>- with rapid and large temperature variations, take appropriate steps to prevent condensation phenomena.</td>
</tr>
</tbody>
</table>

For special installation requirements or other operating conditions, please contact ABB.
3. Receiving, handling and storage

TruckMaster CS rack in-out device is subject to complete factory production tests and inspection prior to packaging and shipment. The shipping package is designed to provide reasonable protection during shipment and to provide convenient handling.

3.1. Receiving

On receipt, check the state of the device, integrity of the packing and correspondence with the nameplate data (see fig. 1) with what is specified in the order confirmation and in the accompanying shipping notes. Also make sure that all the materials described in the shipping notes are included in the shipment. Should any damage or irregularity be noted in the material on unpacking, notify ABB (directly or through the agent or supplier) as soon as possible and in any case within five days of receipt. Check the contents of each carton against the packing list before discarding any packing material. If any discrepancy is discovered, promptly notify the nearest district office. Information specifying the purchase order number, carton number, and part numbers of damaged or missing parts should accompany the claim. The device is only supplied with the accessories specified at the time of ordering and validated in the order confirmation sent by ABB. The accompanying documents inserted in the shipping packing are:

• Instruction manual (this document)
• Identification label
• Copy of the shipping documents
• Electric wiring diagram (included in instruction manual)

Other documents which are sent prior to shipment of the apparatus are:

• Order confirmation
• Original shipping advice notes any drawings or documents referring to special configurations/conditions.
3.2. Handling

TruckMaster CS rack in-out device is designed to be manually handled and transported by its built-in handles trolley. Care must be taken not to damage the secondary plugs when transporting or handling the TruckMaster CS rack in-out device.

Fig. 2a

3.3. Storage

The shipping containers provided are not designed for stacking.

When the TruckMaster CS is not placed in service for some time, it is advisable to provide adequate means of environmental protection. This may be done by keeping the rack in-out device in its original shipping container and storing it in a warm, dry, and uncontaminated atmosphere. The rack in-out device should be stored to minimize condensation. Moisture can cause deterioration of metal parts and insulation. Prior to storage of the rack in-out device, verification should be made that it is in satisfactory operating condition.

Fig. 2b

<table>
<thead>
<tr>
<th>TruckMaster loads</th>
<th>SI (Kg)</th>
<th>Imperial (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TruckMaster CS portable drive</td>
<td>10.5</td>
<td>23.1</td>
</tr>
<tr>
<td>TruckMaster CS docking unit</td>
<td>2</td>
<td>4.4</td>
</tr>
<tr>
<td>TruckMaster CS remote console</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>TruckMaster CS kit complete with trolley (D x L x W: 580 x 440 x 330 mm)</td>
<td>23</td>
<td>61.7</td>
</tr>
</tbody>
</table>
4. Description and operations

4.1. General

**CAUTION**
Correct installation is of prime importance. The instructions given by the manufacturer must be carefully studied and followed. It is good practice to use gloves to handle the pieces during installation.

TruckMaster CS is available in different variants in relation to switchgear rack in-out positions:
- TruckMaster CS 2 positions for switchgear with circuit breaker connected and disconnected positions (see fig. 2a);
- TruckMaster CS 3 positions for switchgear with circuit breaker connected, test and disconnected positions (see fig. 2b).

Refer to ABB for any detailed information. It can be used for the specific application it has been designed for and specifically mentioned on the nameplate data (fig. 1), and it cannot be applied to other equipment.

The apparatus is always the withdrawable version, mounted on a truck that allows the following positions to be obtained in relation to the panel frame:
- **Connected:**
  - main and auxiliary circuits connected;
- **Test (if present):**
  - isolated for test position with main circuits disconnected and auxiliary circuits (if provided) connected;
- **Disconnected:**
  - totally isolated with main and auxiliary circuits disconnected;
- **Withdrawn:**
  - main and auxiliary circuits (if provided) disconnected and apparatus racked out of the switchgear.

In the connected, test (if present) and disconnected positions the apparatus remains in the frame with the door closed and is visible through the switchgear inspection window if available.

If the truck is in an indefinite position (between connected and disconnected), the lock prevents both mechanical and electrical closing of the apparatus. Please refer to the relative circuit breaker instruction booklet for further details. The TruckMaster CS rack in-out device are pre-assembled and tested in the factory. All normal service operations are carried out far from the front of the unit with the TruckMaster CS portable drive mechanically connected (and optionally electrically connected) to the original panel. For special installation requirements, please contact ABB.

**NOTICE**
Test position of the circuit breaker has to be considered only when this is physically available on the switchgear panel or circuit breaker cubicle.

Key
1. Remote console unit
2. Umbilical cord
3. Electrical plug
4. Light for TruckMaster CS ready to start (green)
5. Light for fault condition (red)
6. Light for circuit breaker disconnected position (yellow)
7. Light for circuit breaker in connected position (white)
8. Push buttons for TruckMaster CS: push button for confirm operations (green) and for reset command (emergency pushing button - red)
9. Push buttons for TruckMaster CS rack-in (white) and rack-out (black)
10. Contact key
11. Handles
12. Light for circuit breaker in test position for TruckMaster CS 3 positions only
4.2. TruckMaster CS remote console

The unit is used to operate the portable drive and manage the movement of the circuit breaker from disconnected to test position (if present) or to connected position and vice versa. The electrical connection to the portable drive is through a 15 m long cord.

4.2.1. Operating and signaling parts

Lamp area:
1. The green light indicates the TruckMaster CS is ready to use.
2. The red light indicates the TruckMaster CS has detected a problem.
3. The yellow light indicates the circuit breaker is disconnected.
4. The white light indicates the circuit breaker is connected.

Push button area:
5. The “confirm” push button serves as a safety measure to prevent accidental rack in or rack out operation.
6. The “reset” push button stops any TruckMaster CS operation. This action is required when the operator notices an anomaly during insertion or extraction. The “reset” push button is also used to restore the kit, after fault.
7. The “rack in” push button pressed concurrently with the “confirm” push button, initiates racking in the circuit breaker.
8. The “rack out” push button pressed concurrently with the “confirm” push button, initiates racking out the circuit breaker.
9. The central contact key has the purpose to switch off the remote console in order to avoid any accidental racking in-out operation.
10. The white light indicates the circuit breaker is in test position (when available on switchgear).

Push buttons 5, 6, 7 and 8 need only be momentarily depressed to initiate the intended action.

**WARNING**

Signals lamps shown position of limit switches inside the TruckMaster CS device. Circuit breaker real test / DISCONNECTED and connected position verification is the operator responsibility.

**NOTICE**

Test position of the circuit breaker has to be considered only when this is physically available on the switchgear panel or circuit breaker cubicle.
4. Description and operations

Push button area
The “rack-in” push button when depressed concurrently with the “confirm” push button initiates the rack in operation. The push button is enabled in one case only, see the following coordination table.

<table>
<thead>
<tr>
<th>Remote console status lamps</th>
<th>Rack in push button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready</td>
<td>Fault</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>off</td>
<td>on</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
</tr>
</tbody>
</table>

(1) : with “confirm” push button depressed
(2) : when present; used only with TruckMaster CS 3 position version

The “rack-out” push button when depressed concurrently with the “confirm” push button initiates the rack out operation. The push button is enabled in one case only, see the following coordination table.

<table>
<thead>
<tr>
<th>Remote console status lamps</th>
<th>Rack in push button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ready</td>
<td>Fault</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>off</td>
<td>on</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
</tr>
<tr>
<td>on</td>
<td>off</td>
</tr>
</tbody>
</table>

(1) : with “confirm” push button depressed
(2) : when present; used only with TruckMaster CS 3 position version

Never disconnect the portable motor drive unit from the panel with the circuit breaker in intermediate position between isolated and connected position. Refer to emergency operation chapter 4.6.4 for further actions.

Never disconnect the portable motor drive unit from the panel with the circuit breaker in intermediate position between isolated and connected position. Refer to emergency operation chapter 4.6.4 for further actions.

Check that circuit breaker position is the same indicated by remote console lamp (depend whether the pre-settings have been done or not)

4.3. TruckMaster CS portable drive
The portable motor drive contains the electric drive motor used to rack the circuit breaker in and out and is directly connected to the circuit breaker racking shaft via an operating shaft designed specifically for the subject circuit breaker. The motor drive is design to be fixed onto the circuit breaker compartment panel door by the docking unit.

Fig. 7
1 Remote console electrical socket
2 Power supply electrical socket
3 Lifting handles
4 Power switch
5 Hook for fixing to the docking unit
6 Racking in-out lever with locking pin
7 Operating shaft for rack-in-out operations
8 Adapter
4.4. TruckMaster CS power cord

A 5 meter (16.4 ft) umbilical cord used to electrically connect the TruckMaster portable motor drive and the power supply. The cord has an Amphenol 4 pins socket on one side, and a industrial plug 16A - 50/250Vdc - 2P+E Grey according to IEC60309 standard on the other. Power supply, has to be as written in the rating plate of portable motor drive (110Vdc or 220Vdc; voltage range 80%-110%; min. 150W).

Fig. 8
1 Power supply cord
2 Power supply plug

4.5. Preliminary operations

4.5.1. Connection of the auxiliary circuits (if present)

Note: the minimum cross-section of the wires used for the auxiliary circuits must not be less than the one used for the internal cabling AWG16. In case of auxiliary circuits testing at 2kV please disconnect TruckMaster auxiliary connections, if present.

4.5.2. Connection of the auxiliary plug to the TruckMaster CS portable motor drive

TruckMaster portable motor drive is equipped with two sockets (see fig. 7); these are located on the portable drive (see fig. 9). Connect the remote console cord to the 16 pins socket (see fig. 4) and connect TruckMaster CS 4 pin plug to power supply with the power cord (see fig. 8).

**WARNING**

Supplying TruckMaster CS with AC voltage or DC voltage different from as prescribed on unit rating label may result in damage of the unit itself.

**WARNING**

Preliminary operations has to be done on the supplied TruckMaster Kit, but NOT connected to the apparatus to be later racking operated.
4. Description and operations

4.5.3. Connection of the power cord to the power supply

Using the power cord, connect the TruckMaster CS portable drive to the wall outlet or to the low voltage compartment, through the industrial plug 16A - 50/250Vdc - 2P+E according to IEC60309 standard (see fig. 11a, fig. 11b and fig. 11c). This wall socket has to be installed on the panel in the auxiliary cell by instructed persons (IEC 60050-195:1998, Amendment 1:2001, 195-04-02) or skilled persons (IEC 60050-195:1998, Amendment 1:2001, 195-04-01) only. TruckMaster CS has to be energized with DC voltage supply only (110Vdc or 220Vdc according to the rating plate; voltage range 80%-110%; min. 150W) in order to operate the forward and reverse directions for racking in and out.

The power cord can be connected into a switchgear socket if available or to a suitable external supply.

4.5.4. Setting position of the portable driver (SET)

Before connect the TruckMaster CS portable drive to the panel and circuit breaker, the circuit breaker status must be verified related to the portable motor drive positions. Based on the circuit breaker positions action has to be done: use the following table T1 for checking the circuit breaker positions and then using the TruckMaster CS remote control and make the relevant action required before putting the portable unit into service.

The prohibition label located on the back of the TruckMaster CS portable drive (see fig. 12 item 1) recommends not to rotate the operating shaft for

<table>
<thead>
<tr>
<th>Lamps status on TruckMaster CS remote console</th>
<th>Real circuit breaker positions by visual inspection</th>
<th>TruckMaster CS remote settings action*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disconnected</td>
<td>Test (')</td>
<td>Connected</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
</tr>
<tr>
<td>On</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>Off</td>
<td>On</td>
<td>Off</td>
</tr>
<tr>
<td>Off</td>
<td>Off</td>
<td>On</td>
</tr>
</tbody>
</table>

* (1) : when present; used only with TruckMaster CS 3 position version
4.5.5 Responsibility key
The central contact key has the purpose to switch off the remote console in order to avoid any accidental racking in/out operation. This key should be used as a responsibility key by removing it from the TruckMaster CS remote console, and keep it in a place accessible only to authorized personnel when not used.

CAUTION
All the operations regarding putting into service must be carried out by suitably qualified customer personnel with in depth knowledge of the apparatus and of the installation. Should the operations be prevented, do not force the mechanical interlocks and check that the operating sequence is correct.

CAUTION
Ensure that the operating shaft mounted on TruckMaster CS (see fig. 7) is used on the proper switchgear type.

CAUTION
Circuit breaker status (open or close) control and proper racking direction is delegated to operator
- Remote console shows position of the portable driver DISCONNECTED, TEST OR CONNECTED POSITION
- Wrong racking operations with a closed breaker or in the wrong direction are blocked by switchgear mechanical locks, causing TruckMaster self-stopping
- Plug for power source to be connected to 110VDC or 220VDC external supply circuit

NOTICE
Test position of the circuit breaker has to be considered only when this is physically available on the switchgear panel or circuit breaker cubicle.

SAFETY INSTRUCTIONS
Ensure that the external surfaces of the door of the circuit breaker cubicle are cleaned and degreased.

4.6. TruckMaster operation

4.6.1. General procedures
General procedures before using TruckMaster CS:
- supply the auxiliary circuits with power DC only;
- compare the circuit breaker name plate rating with the switchgear rating;
- do not attempt to rack a closed circuit breaker;
- always inspect the circuit breaker compartment to insure that it is free of obstructions, tools, or other equipment;
- do not force the mechanical interlocks;
- supply the electrical connection of the portable motor driver.
- compare rating plate of TruckMaster CS, with ratings plate of circuit breaker of switchgear.

4.6.2. Putting into service preliminary operations
TruckMaster CS portable drive and remote console setting:
1. Connect the portable drive socket to the power supply.
2. Connect the portable drive socket to the remote console.
3. Check the remote console lamp signal matches the circuit breaker status. If not, follow 4.2.1 instructions.
4. Description and operations

Install the portable drive:
1. If necessary due to the shape of the door, adjust depth of the 4 magnetic legs of docking unit properly. Before proceeding, clean the docking unit magnets and the circuit breaker door.
2. Insert centering pin in a TruckMaster CS docking unit and fix it to the circuit breaker panel door by centering the pin to the hole door (fig. 13-14); when present open the shutter of actuating point before.
3. Remove the centering pin and put it back into the trolley; then level horizontally the main plate by spirit level and fix it using the four knurled knobs (fig. 15a; 15b).
4. Hold the TruckMaster CS portable drive by lifting handle.
5. Align the operating shaft of TruckMaster CS portable drive and the latches with the docking unit (fig. 16).
6. Anchor the portable drive to the docking unit by two locking clips and verify the device is firmly fastened (fig. 17).
7. If necessary, further regulate depth of the operating shaft of the portable drive using the upper lever. When finished, fasten with the upper wingnut (fig. 18a; 18b).
4.6.3. Racking operation

1. Turn on the key on remote console.
2. Before any action, be sure the circuit breaker is open and correctly engaged in its cubicle.
3. Check the remote console lamp signal about circuit breaker position matches with the real circuit breaker position, otherwise go to 4.2.1.
4. Take the remote console by the handles and move away from the front, positioning in a safe area.
5. Initiate rack in or rack out operation as required.

6. During the racking operation, check the external condition of the panel and kit and in case of visible mechanical deformation press emergency push button.
7. Once the racking operation is completed the racking operation, the TruckMaster CS kit can be left electrically and mechanically connected or disconnected. If the circuit breaker is in open and in disconnect position, it is possible to turn the central contact key on the remote console clockwise, and extract it in order to safely lock the circuit breaker racking.

4.6.4. Emergency operation

Emergency operation shall be performed in full safety conditions with de-energized panel. In case of emergency during racking operation (in or out) push the reset push button on remote console; TruckMaster CS portable drive stops immediately in an intermediate position. Turn the key of the remote console and the selector on portable drive in OFF position.

---

**T2 Table**

<table>
<thead>
<tr>
<th>Circuit breaker status by visual inspection</th>
<th>Press push button</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected</td>
<td>Test (1)</td>
</tr>
<tr>
<td>Disconnected</td>
<td>Open</td>
</tr>
<tr>
<td>Rack OUT</td>
<td></td>
</tr>
<tr>
<td>Rack IN or OUT (2)</td>
<td></td>
</tr>
<tr>
<td>Rack IN</td>
<td></td>
</tr>
</tbody>
</table>

Note
(1): In TEST position, perform rack IN if the desired final state is “Connected” or perform rack OUT if the desired final state is “Disconnected” (2): when present; used only with TruckMaster CS 3 position version

---

**CAUTION**

The racking in-out operations must always be carried out with the circuit breaker open. The racking in-out operations must always be carried out after checking the circuit breaker status.

---

**CAUTION**

Emergency operation shall be performed in full safety conditions with de-energized panel.
4. Description and operations

To manage the emergency condition, follow the next steps:
1. Disconnect power cord.
2. De-energize panel.
3. Remove portable drive from the docking unit.
4. Test small rack-out movement with manual handle (see fig. 19 on the Operation manual) to check mechanical problems; if no issues are found complete rackout operation manually.
5. Open the door, inspect the circuit breaker main parts and ensure any possible obstacle or mechanical interference.
6. Check the switchgear; it shall be in expected conditions for normal operations.
7. Connect the power cord to the portable drive
8. Turn the key of remote console and selector on portable drive in ON position.
9. Press “Reset” button on the remote console to fix error signal.
10. Complete same operation that cause the emergency condition:
- Rack-in if emergency condition was caused during rack-in operation
- Rack-out if emergency condition was caused during rack-out operation
11. Set TruckMaster CS portable drive in rack-out position (if necessary).
12. Mount TruckMaster CS portable drive on its docking unit.
13. Proceed with the normal operations.
14. If during the steps above the problem persist, please contact ABB.

4.6.5. Power cord removing operation
1. The portable motor drive unit must be in an end position - either fully racked in or fully racked out or in test position.
2. Release the portable motor drive plugs.
3. Store the power cord and the remote console using the original material supplied.
4. For reconnecting power cord and remote console following the preliminary operations chapter 4.5.

4.6.6. Portable motor drive removing operation
1. Release the portable drive locking clips.
2. Remove the portable drive from docking unit.
3. Remove also the docking unit.
4. Store the portable drive and docking unit using the original trolley supplied.
5. For reconnecting portable drive, follow the preliminary operations chapter 4.5.

4.7. Interlocks

Note
Interlocks work properly only when circuit breaker is in open position and its position is consistent with the portable motor drive status (see 4.6.3).

Interlock to avoid wrong racking operation is part of the TruckMaster CS rack in-out device; never make any modification to TruckMaster CS rack in-out device. If the operations are prevented, do not override the interlock and check that the operating sequence is correct. This interlock is provided to prevent incorrect operations and/or malfunctions. The interlock on the portable drive is intended to prevent circuit breaker damages due to accidental extra torque applied on the circuit breaker racking shaft.

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4. Description and operations

To manage the emergency condition, follow the next steps:
1. Disconnect power cord.
2. De-energize panel.
3. Remove portable drive from the docking unit.
4. Test small rack-out movement with manual handle (see fig. 19 on the Operation manual) to check mechanical problems; if no issues are found complete rackout operation manually.
5. Open the door, inspect the circuit breaker main parts and ensure any possible obstacle or mechanical interference.
6. Check the switchgear; it shall be in expected conditions for normal operations.
7. Connect the power cord to the portable drive
8. Turn the key of remote console and selector on portable drive in ON position.
9. Press “Reset” button on the remote console to fix error signal.
10. Complete same operation that cause the emergency condition:
- Rack-in if emergency condition was caused during rack-in operation
- Rack-out if emergency condition was caused during rack-out operation
11. Set TruckMaster CS portable drive in rack-out position (if necessary).
12. Mount TruckMaster CS portable drive on its docking unit.
13. Proceed with the normal operations.
14. If during the steps above the problem persist, please contact ABB.

4.6.5. Power cord removing operation
1. The portable motor drive unit must be in an end position - either fully racked in or fully racked out or in test position.
2. Release the portable motor drive plugs.
3. Store the power cord and the remote console using the original material supplied.
4. For reconnecting power cord and remote console following the preliminary operations chapter 4.5.

4.6.6. Portable motor drive removing operation
1. Release the portable drive locking clips.
2. Remove the portable drive from docking unit.
3. Remove also the docking unit.
4. Store the portable drive and docking unit using the original trolley supplied.
5. For reconnecting portable drive, follow the preliminary operations chapter 4.5.
5. Maintenance

TruckMaster CS rack in-out device is designed for a minimum amount of maintenance. TruckMaster CS rack in-out device used in a clean, non-corrosive environment requires only annual inspection. Dusty or corrosive environments require inspection more often at the discretion of the user.

5.1. General

TruckMaster CS rack in-out device is featured by simple, sturdy construction and long life. Service requirements may vary depending on operational activity and environmental conditions.

Note

For maintenance work, respect the following standards:

• the relative specifications indicated in the “standards and specifications” chapter;
• regulations for safety in the workplace indicated in the “putting into service and operations” chapter;
• regulations and specifications of the country where the apparatus is installed.

The maintenance operations can only be carried out by trained personnel who respect all the safety regulations. Furthermore, it is recommended that ABB service personnel should be called in, at least to check the service performances, and for any repair work. During maintenance work, turn the power supply off and put the apparatus under safe conditions.

5.1.1. Portable drive

The mechanism requires visual inspection of hardware, check no mechanical deformation or lubrication leakage are present, in case of above conditions contact ABB and do not use in service. Every year only lubricate the rotating surfaces of operating shaft (see fig. 7 item 8) by protrude it at the maximum extension using lever as indicated in fig. 18. Use only grease ISOFLLEX Topas NB52. If the grease becomes caked and dirty, remove with a clean cloth and reapply lubrication.

5.1.2. Remote console and umbilical cord

The remote console and its umbilical cord requires visual inspection of hardware, check no damages of the lamps, case or push button, burns, cracks or other mechanical damage of cords and connectors are present, in case of above condition the replacement of the damaged part is mandatory.

5.1.3. Repairs

Replacement of spare parts and accessories must only be carried out by ABB personnel or suitably qualified and specially skilled personnel. Always work with the TruckMaster CS portable drive electrically and mechanically disconnected from the panel.

• DO NOT use on TruckMaster CS with energized circuit breaker.
• DO NOT use TruckMaster CS with closed circuit breaker.
• DO NOT work on a TruckMaster CS unless all the kit and components are electrically and mechanically disconnected.
• DO NOT work on a TruckMaster CS with its power supply connected.
• DO NOT defeat safety interlock. This may result in bodily injury, death and/or equipment damage.
• DO NOT leave a circuit breaker in an intermediate position in a cell. Always have the circuit breaker in the disconnected or connected position.
6. Spare parts and accessories

To order TruckMaster CS spare parts, refer to the ordering sales codes and always state the following:
- serial number of the TruckMaster CS
- rated voltage of any electrical spare parts
- type and ratings of switchgear

For ordering and availability of spare parts, please contact our Service office.

6.1. Spare parts

The list of spare parts is available on TruckMaster CS order instruction code 1VCP000687.

Please ask ABB last version available.

![WARNING]

All assembly operations of spare parts/accessories must be carried out following the instructions enclosed with the spare parts by ABB personnel or by suitably qualified customer personnel with in-depth knowledge of the apparatus (ANSI/IEEE C37.04 - C37.54 - C37.09 - C37.55 Standards, NETA Standards, NEC NPFA70 and IEC 62271-1 Standards) and all the standards aimed at carrying out these interventions in safe conditions. Should the maintenance be carried out by the customer’s personnel, responsibility for the interventions remains with the customer. Before carrying out any operation, always make sure that the TruckMaster CS have to be completely disconnected from the panel.
7. TruckMaster CS overall dimensions

7.1. TruckMaster CS 2 positions

Dimensions are shown in mm and inches (between brackets)
7. TruckMaster CS overall dimensions

7.2. TruckMaster CS 3 positions

Dimensions are shown in mm and inches (between brackets)
8. Electric circuit diagram

State of operation represented
The diagram indicates the following conditions:
• De-energized circuits
• Circuit breaker open and connected
• Racking-in/out kit engaged with circuit breaker truck and front door

Graphical symbols for electrical diagrams (IEC 60617 Standards)
8. Electric circuit diagram

Electrical circuit diagram 2RDA030532 for TruckMaster CS
Reference designation of objects in electrical documents
(in compliance with Standard IEC 81346-2 and ABB technical Standard 2NBA000001)

Represented operational state
The diagram indicates the following conditions:
• de-energized circuits
• circuit breaker off and connected

Caption
* = See note indicated by the letter
–AR50 = Digital motor driven trolley control unit
–BGB1 = Circuit breaker auxiliary contact
–BGE3 = Position switch signalling earthing switch in open position and not in operation (Operative lever not inserted) (see note B)
–BGT1 = Contacts signalling circuit breaker in inserted position (on the circuit breaker/switchboard)
–BGT2 = Contacts signalling circuit breaker in isolated position (on the circuit breaker/switchboard)
–BGT21, 24 = Contacts signalling circuit breaker in inserted position (on the kit)
–BGT22, 25 = Contacts signalling circuit breaker in isolated position (on the kit)
–BGT23 = Limit switch contact. This is open during the truck isolating travel (on the circuit breaker/switchboard)
–BGT23.1, .2 = Limit switch contact. This is open during the truck isolating travel (on the kit)
–FCM = Miniature circuit breaker
–MAT = Motor drive for C.B. racking-in/out (direct current supply)
–KFT = Timer to disarm reset on - AR50 (MDC2)
–PFG = Green signalling lamp (Truckmaster Ready)
–PFR = Reed signalling lamp (Truckmaster Fault)
–PFY = Yellow signalling lamp (C.B. isolated)
–PFT = White signalling lamp (C.B. in position of test)
–PFW = White signalling lamp (C.B. inserted)
–SFC1 = Key selector to activate Remote Console
–SFC2 = Selector to activate Kit
–SFC3 = Pushbutton for confirmation circuit breaker racking-in/out operation
–SFC4 = Pushbutton for reset –AR50 (MDC2)
–SFC23 = Pushbutton for the racking-in operation
–SFC24 = Pushbutton for the racking-out operation
–XDB1 = Connector for the circuit breaker circuits
–XDB5 = Terminal block of support
–XDB9 = Connector for the Kit supply
–XDB10 = Connector for the control box circuits
–XDB13,...,22 = Connectors of the accessories
–XDX = Terminal block of support

Possible configurations

Diagram figures description
Fig. 1 = Kit
Fig. 2 = Remote Console
Fig. 3 = Addendum for 2 POSITIONS “STANDARD” version
Fig. 4 = Addendum for 2 POSITIONS “ENHANCED CONTROL” version
Fig. 5 = Addendum for 3 POSITIONS version
Fig. 6 = Addendum for 3 POSITIONS “STANDARD” version
Fig. 7 = Addendum for 3 POSITIONS “ENHANCED CONTROL” version

Note
The contacts - BGB1, - BGE3, - BGT1, - BGT2, - BGT23, have to be available in the switchboard.
A) If the contact -BGE3 is not available to realize a link among the blocks - XDB5:1 and -XDB5:2
9. Product quality and environmental protection

The apparatus are produced in compliance with the requirements of international standards for the quality management system and environmental management system. The excellent level is proved by quality certify according to ISO 9001 and by the EMS according to ISO 14 001.

End of life of product
The ABB company is committed to complying with the relevant legal and other requirements for environment protection according to the ISO 14 001 standard.

The duty of company is to facilitate subsequent recycling or disposal at the end of product life. During disposal of the product, it is always necessary to act in accordance with local legal requirements in force.

Methods of disposal
Disposal can either be carried out thermally in an incineration plant or by storing on a waste site.

<table>
<thead>
<tr>
<th>Raw material</th>
<th>Recommended disposal method according to local / waste site requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metal material (Fe, Cu, Al, Ag, Zn, W, others)</td>
<td>Separation and recycling or disposal</td>
</tr>
<tr>
<td>Thermoplastics</td>
<td>Separation of metal material and recycling or disposal of the rest</td>
</tr>
<tr>
<td>Epoxy resin</td>
<td>Removal from equipment and further recycling or disposal</td>
</tr>
<tr>
<td>Rubber</td>
<td>Removal from equipment and further recycling or disposal</td>
</tr>
</tbody>
</table>