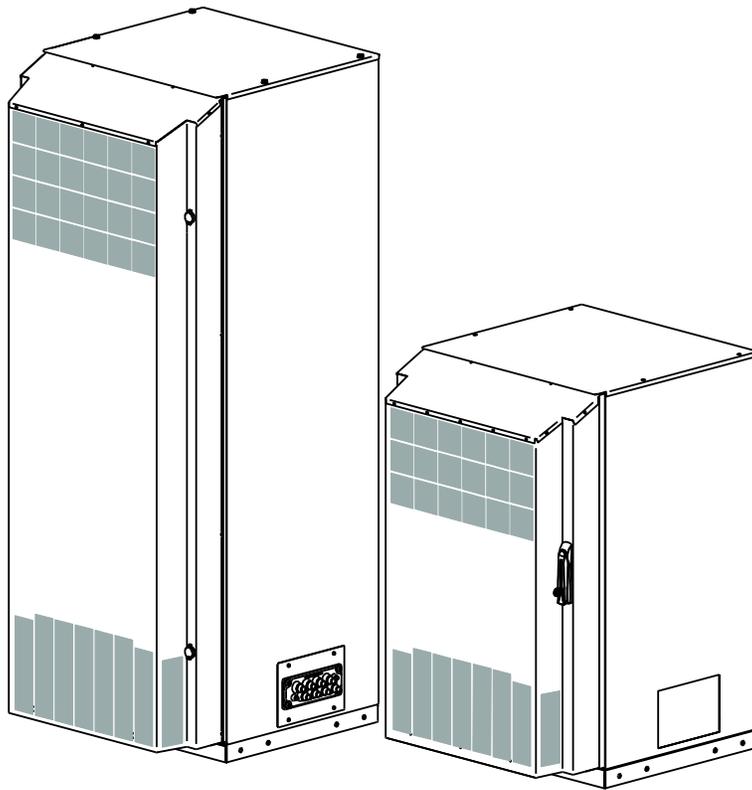


SITESTAR CABINET

MAINTENANCE INSTRUCTIONS



Product No: D000100/3

Revision: R2A

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1 INTRODUCTION

This document describes maintenance routines to follow when operating the SiteStar Cabinet, an outdoor battery backup system.

1.1 TARGET GROUP

The target group for this document is the personnel involved in the maintenance of the site.

1.2 DOCUMENTS

The following documents are available to provide detailed information on the SiteStar Cabinet and its handling:

- D000100/1, SiteStar Cabinet Description
- D000100/2, SiteStar Cabinet Installation
- D000100/4, SiteStar Spare Parts

1.3 ILLUSTRATIONS

Illustrations in this document can show alternative designs.

1.4 PREREQUISITES

All performance statement in this document relies on the following:

- Only approved hardware are used
- Proper hardware handling
- Maintenance instructions as well as documentation for external equipment are followed

1.5 ABBREVIATIONS

Abbreviations used in this document.

AC	Alternating Current
CB	Circuit Breaker
CCU	Climate Control Unit
CLU	Climate Unit
DC	Direct Current

DCCU	Direct Current Connection Unit
EN	European Norm
ESD	Electro Static Discharge
EQ	Earthquake
GWP	Global Warming Potential
LED	Light Emitting Diode
PE	Protective Earth
PSU	Power Supply Unit
RoHS	Restriction of Hazardous Substances
SPD	Surge Protection Device
WEEE	Waste Electrical and Electronic Equipment

2 HEALTH AND SAFETY INFORMATION

2.1 BATTERIES



Warning!

High energy levels are present in this unit. Improper handling of the unit can lead to short circuiting that can result in serious injury. Exercise care when working with this unit.



Warning!

To avoid battery thermal runaway, the batteries must be connected to an external PSU with thermal compensated charging. Furthermore, the external PSU must shut off the battery system if the temperature reaches 50°C inside the cabinet.



Warning!

It is important that every battery is connected with the ventilation tube, and that the first battery in the chain is plugged. The tube must be routed out of the cabinet.

There is a risk that explosive gases are accumulated in the cabinet.



Caution!

Improper handling of batteries can result in the batteries short-circuiting, which can result in serious injury due to high energy levels. Exercise the necessary care when working with batteries.



Caution!

Batteries can leak electrolyte if improperly handled. Electrolyte in contact with skin or eyes can cause injury. In the event of electrolyte injuries, rinse the affected area with water and seek medical attention immediately. Use protective equipment when replacing batteries.



Caution!

Excessive heat can cause battery casing to soften and warp, potentially allowing acid to escape. In contact with the skin, acid can cause injury, and if breathed in, can affect the airways. Use protective equipment when replacing batteries.



Caution!

Heavy batteries can cause injuries when lifting incorrectly. Risk of personal injury.



Caution!

Handling of the batteries in an incorrect way may cause pinching. Risk of personal injury.



Caution!

Heavy batteries can cause damages to the property when installed incorrectly.



Warning!

If the SiteStar cabinet is configured without the DCCU it is of vital importance that the Battery cables are provided with adequate protection at the site to ensure compliance to national wiring regulations. Risk of personal injury and property damage.

2.2 ELECTRICAL EQUIPMENT

Installation personnel should exercise care when working on or around electrical equipment. In addition to this safety information, the specific safety instructions for all products involved in the installation procedure should be adhered to.

When work is being done in a power cabinet, the power supply system must be de-energized. The mains supply and, if applicable, all batteries must be disconnected.

Installation personnel must have competence for electrical installation according to local regulations.



Warning!

High energy levels are present in this unit. Improper handling of the unit can lead to short circuiting that can result in serious injury. Exercise care when working with this unit.

2.3 REFRIGERANT

The refrigerant consists of R134a (1,1,1,2 – Tetrafluoroethane), which has a GWP of 1300. The required service intervals must be followed and proper care to avoid leakage at service and end of life must be taken.

Hazards

- Inhalation of high concentrations may irritate the respiratory tract and cause drowsiness and dizziness. At very high levels there is a risk of breathing difficulties.
- Skin contact or splashing in the eyes of the liquefied gas may cause frostbite.

All handling must take place so that inhalation and skin and eye contact is avoided. Avoid the steam coming into contact with the welding arcs. Avoid the steam coming into contact with hot surfaces (decomposition). If there is a suspicion of leakage from the cooling system, ventilate and leave the place. Call for a competent cooling technician.

In case of fire, the refrigerant, R134a, develops toxic and corrosive gases.

The cabinet must be standing upright for at least 1 hour before starting.



Caution!

The cabinet must be standing upright for at least 1 hour before starting.



Caution!

Inhalation of high concentrations may irritate the respiratory tract and cause drowsiness and dizziness. At very high levels there is a risk of breathing difficulties.

Skin contact or splashing in the eyes of the liquefied gas may cause frostbite.

2.4 ROHS/WEEE

For information, see document “*DOC-081 – End of Life Treatment Plan*”

This document is available on request.

2.5 IN CASE OF FIRE

Take care of any injured persons – Call for help – Try to extinguish the fire.

Only use approved fire extinguisher for extinguishing electrical equipment.

After a fire the cabinet insulation might have been damaged. In this case the cabinet strength will be considerably reduced and can cause the cabinet to collapse when opening the door.



Warning!

In case of fire, toxic and corrosive gases will be formed.



Caution!

Excessive heat can cause battery casing to soften and warp, potentially allowing acid to escape. In contact with the skin, acid can cause injury, and if breathed in, can affect the airways. Use protective equipment when replacing batteries.

2.6 DAMAGES

If the cabinet gets a dented area in size of a hand, with a depth of 10 mm, the cabinet strength is reduced and has to be replaced.

If the door has been warped so much so that it can't close securely, it has to be replaced.

3 TOOLS AND EQUIPMENT

The following tools are required for the cabinet installation:

- 8 mm wrench
- 13 mm wrench
- 18 mm wrench
- Allen wrench 5 mm
- Torque set 1 – 80 Nm
- Spirit level
- Screwdriver 0.4x2.5xL
- Screwdriver PZ #2
- Torx T20 screwdriver (only when changing from left hanged door to right hanged door)
- Torx T25 screwdriver
- Torx T30 screwdriver
- Torx T45 screwdriver
- Insulated tools for battery and busbar connections
- Insulation tape

4 GENERAL TORQUES DURING MAINTENANCE

Dimension	Torque	Note
M12	80 Nm	
M8	15 Nm	
M8	8 Nm	For battery poles
M6	9 Nm	Generally
St 4.8	4 Nm	Self drilling and self tapping screws. End torque, start torque is higher.
St 4.2	1 Nm	
St 3.5	1 Nm	Self drilling and self tapping screws. End torque, start torque is higher.

5 OPEN AND CLOSE THE CABINET DOOR



Warning!

When opening the door before the cabinet is secured to the foundation, the empty cabinet can tip. Arrange some support for the door.

Risk of personal injury.

Do as follows to unlock and open the cabinet door:

1. Raise the cabinet to a standing position
2. Unlock the swing handle
3. Lift and turn the swing handle
4. Open the door

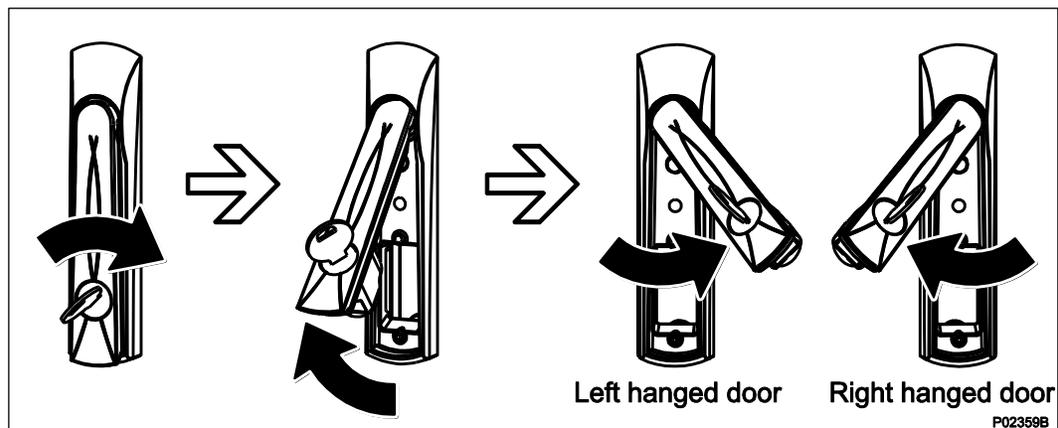


Figure 1 Unlocking and Opening Swing Handle

Do as follows to close and lock the cabinet door:

1. Release the door latch
2. Close the door
3. Turn and push the swing handle to locked position. The swing handle will lock automatically

6 PREVENTIVE MAINTENANCE

Preventive maintenance shall be performed in a 24 month interval in normal conditions.

Units located in areas with harsh climatic conditions or aggressive environments may require more frequent servicing. Certain environmental parameters, such as high temperature together with high humidity or long time-of-wetness, airborne pollutants and chlorides, are known to create a higher risk of corrosion.

This section describes:

- Re-tightening the EQ Zone 4 cabinet to the foundation
- Re-tightening the earth ground connection
- Cleaning of the climate unit
- Checking batteries
- Re-tightening the battery cable connectors

6.1 RE-TIGHTENING THE EQ ZONE 4 CABINET TO THE FOUNDATION

This section is only valid for EQ Zone 4 Cabinets.

Do the following to re-tighten the cabinet to the foundation:

1. Disconnect all power to prevent short circuits
2. Re-tighten the M12 bolts to a torque of 80 Nm

6.2 RE-TIGHTENING THE EARTH GROUND CONNECTION

Re-tighten the fastener connecting the earth grounding cable to a torque of 15 Nm.

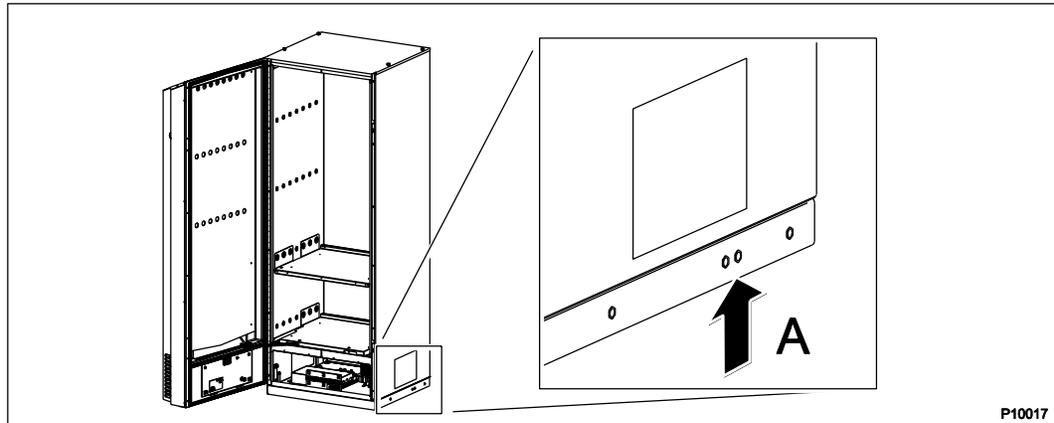


Figure 2 Earth Ground Connection at Cabinet without EQ Zone 4 Reinforcement

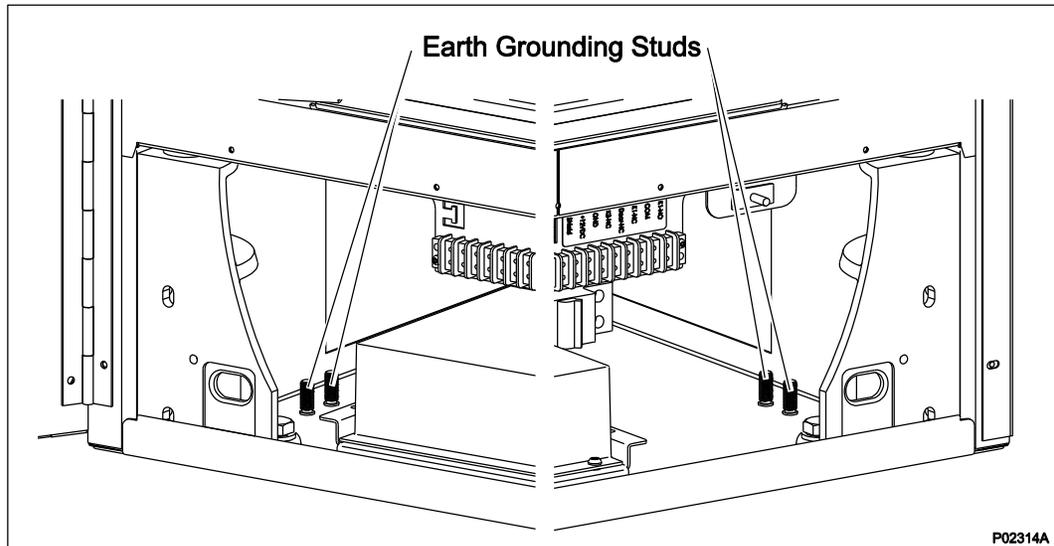


Figure 3 Earth Ground Studs in EQ Zone 4 Cabinet

6.3 CLEANING OF THE CLIMATE UNIT

If the condenser is fully clogged with dirt at the first 24 months service, the service intervals must be narrowed down, to remain a long term reliable system.

Do the following to clean the climate unit:

1. Remove the swing handle by removing the Torx screw as in the figure below. Use a T30 screwdriver with a minimum blade length of 75 mm.

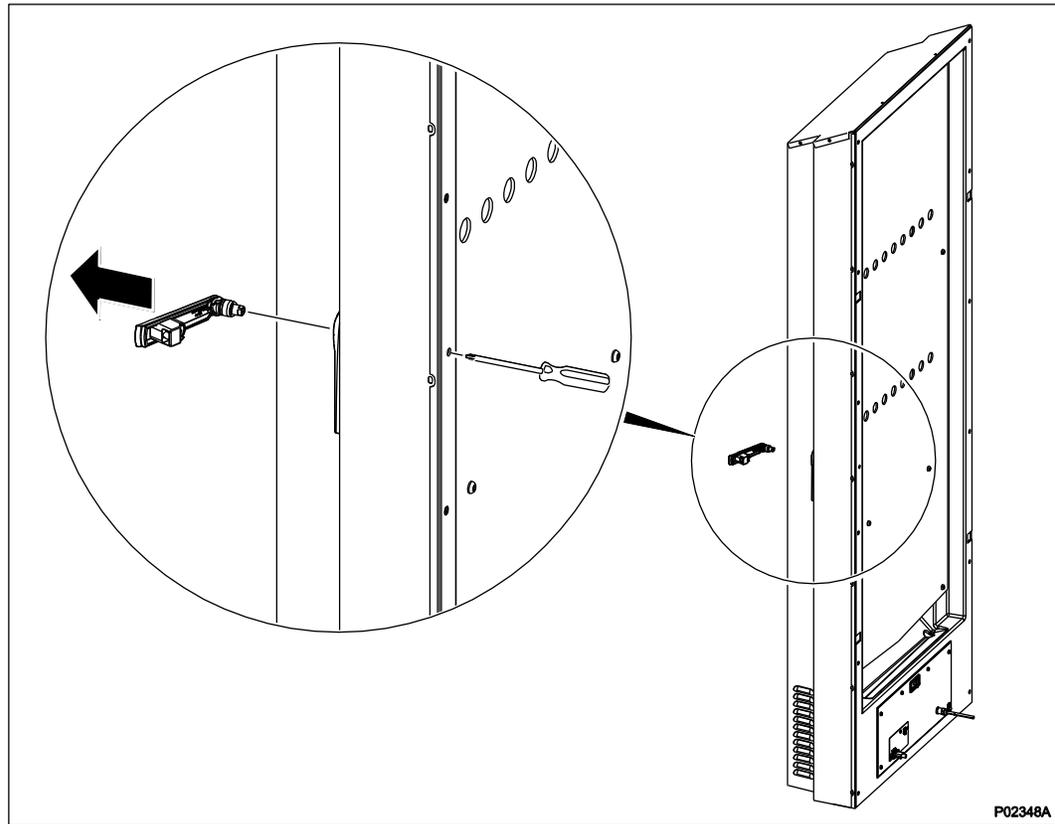


Figure 4 Remove the Swing Handle

2. Dismantle the door cover as in the figure below. Start with the screws (A) at the sides.

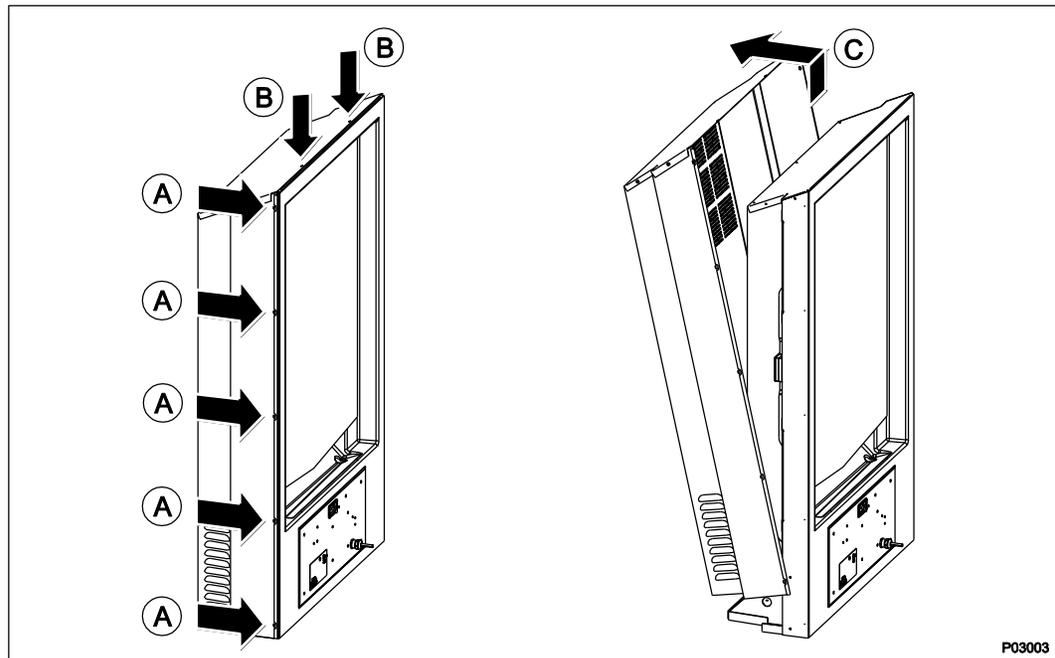


Figure 5 Dismantle the Door Cover

3. Inspect the climate unit external heat sink for trapped debris and other matter inside the fin channels.

Note: Do not use a brush with metal bristles as it may damage the heat sink coating.

4. If the heat sink looks clogged or heavily soiled, cleaning may need to take place.

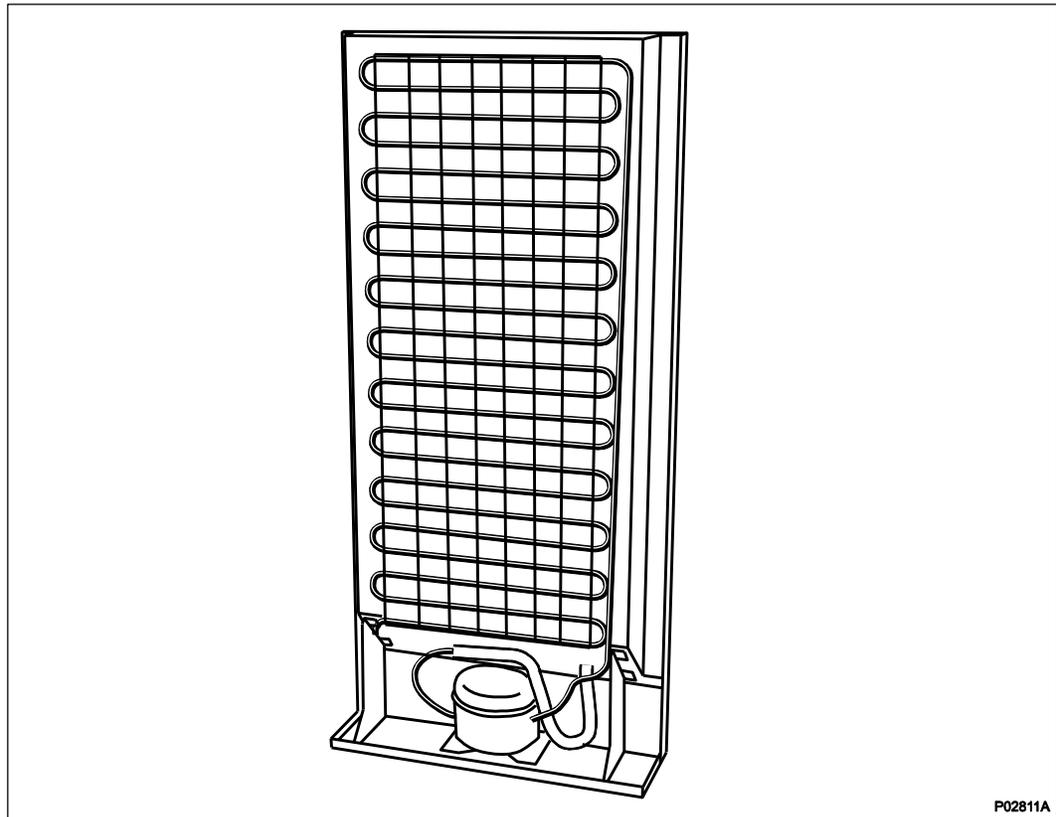


Figure 6 Heat Sink

5. Brush off any loose debris from the louvers at the door cover.

Note: Strong detergents must be avoided as they can be aggressive to aluminum and potentially cause unwanted corrosion in wiring.

6.4 CHECKING BATTERIES

See the document *SES-544-01 "NorthStar Battery Telecom Application Manual"* for procedure. This document is available on request.

6.5 RE-TIGHTENING THE BATTERY CABLE CONNECTORS

The battery cable connectors needs to be re-tightened after every battery replacement, and when installing new batteries. Refer to the battery supplier for recommended torque.

7 TROUBLESHOOTING

This section describes troubleshooting faults in the SiteStar Cabinet.

7.1 ALARM

Problem	What to do
Internal temperature outside regulation window, too high	<ol style="list-style-type: none"> 1. Check if the compressor works 2. Check if the fan works 3. Check if the CCU works correctly
Internal temperature outside regulation window, too low	Install optional heater. If heater is installed, check heater and relay if equipped.
Compressor fails	Replace door
Heater fails (if equipped)	Replace heater
Fan fails	Replace fan
Controller internal error	Replace controller
External temperature outside system specification	See section 7.4
Door switch open	Close door
Power failure	Check mains fuse (external)

7.2 MECHANICS

Problem	What to do
The door does not close correctly	Check if there is anything stuck between the door and the cabinet
	Check if the door has been damaged. If necessary replace the door.
	Check if the cabinet has been damaged. If necessary replace the cabinet.

7.3 DC OUTPUT

Problem	What to do
No voltage	Check battery connection
	If equipped, check DCCU fuse
	For further guidance check PSU and battery manuals
Voltage too high or too low	Check if the battery configuration is right
	Check battery connection
	Check batteries

7.4 COOLING – HEATING

Problem	What to do
Temperature in the cabinet is too high	The condenser might be clogged with dirt. If necessary clean the condenser. See Maintenance, section 6.3.
	Check if the door sealing is damaged. If necessary replace the sealing.
	If the door is damaged, it has to be replaced
Temperature in the cabinet is too low	Check temperature sensor If the temperature sensor is ok, replace control board
The fan does not work	Check connections. If the fan still does not work, replace it to a new one.

7.5 LEAKAGE

Problem	What to do
Water in the cabinet	Check possible water from condensation. Check If the drain tube is clogged.
	Check possible water leakage from outside the cabinet. If necessary replace damaged sealing's.
	Check if the door has been damaged. If necessary replace the door.
Acid from the batteries	Remove leaking batteries. Clean the cabinet and shelves surfaces where acid leaked. Replace with new batteries.

8 RECONFIGURING THE EXTERNAL ALARM

The controller is by factory default configured for individual alarms on alarm outputs K1, K2, and K3. The controller also supports sending summary alarm, NO or NC on alarm output K1.

Do as follows to reconfigure from individual to summary alarm:

1. Disconnect power.
2. Remove the CCU Front Plate.
 - a) Loosen the five screws holding the CCU Front Plate, No 1 in the figure below.
 - b) Lean the CCU Front Plate forward, No 2 in the figure below.

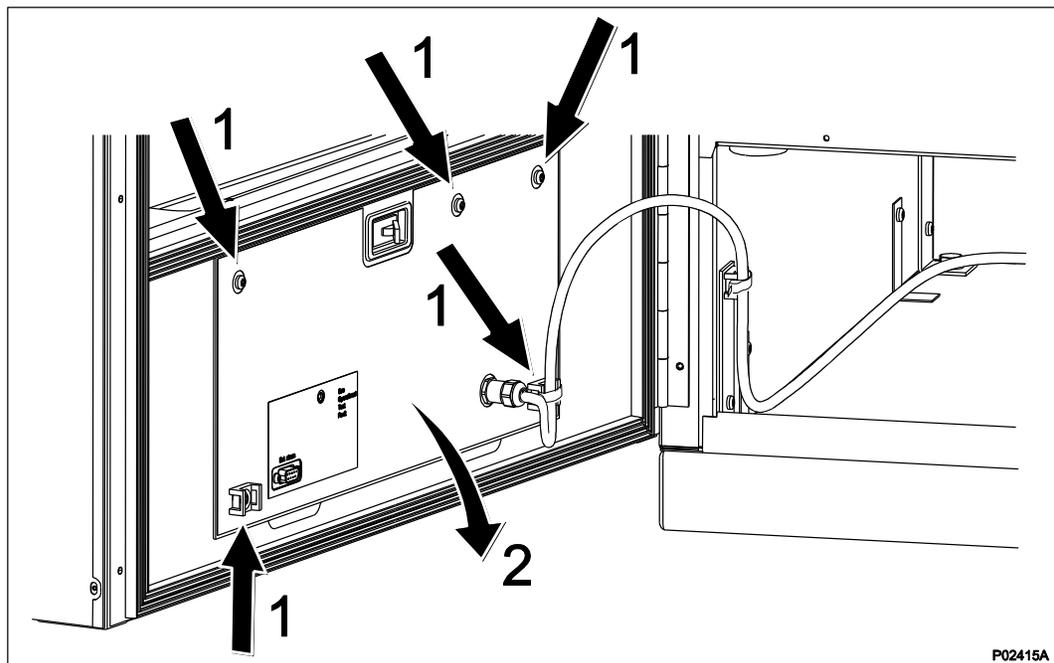


Figure 7 Removing CCU Front Plate

3. Locate configuration connector P16.
4. Remove the configuration jumper as shown in Figure 8.

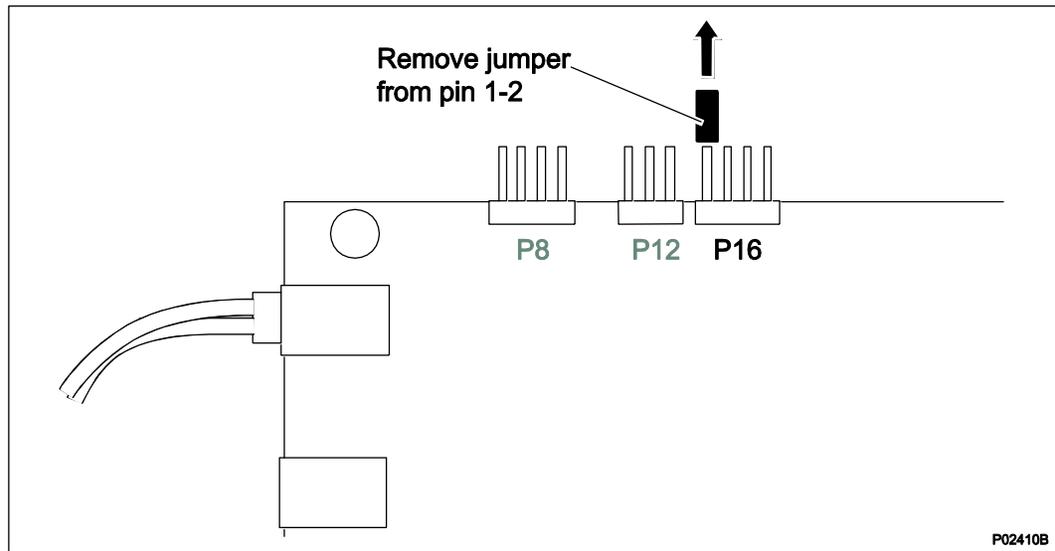


Figure 8 Reconfiguring for Summary Alarm

5. Reinstall the CCU Front Panel.
6. Reconnect power.

9 REPLACING BATTERIES

This section describes how to:

- Remove batteries
- Install batteries

9.1 REMOVE BATTERIES

Make sure that all power is disconnected before any works starts.

If the cabinet is an EQ Zone 4 cabinet the EQ Zone 4 reinforcement in front of the batteries has to be removed before the batteries can be removed. Do as follows to remove the reinforcements:

1. Remove the cross braces as in Figure 9.

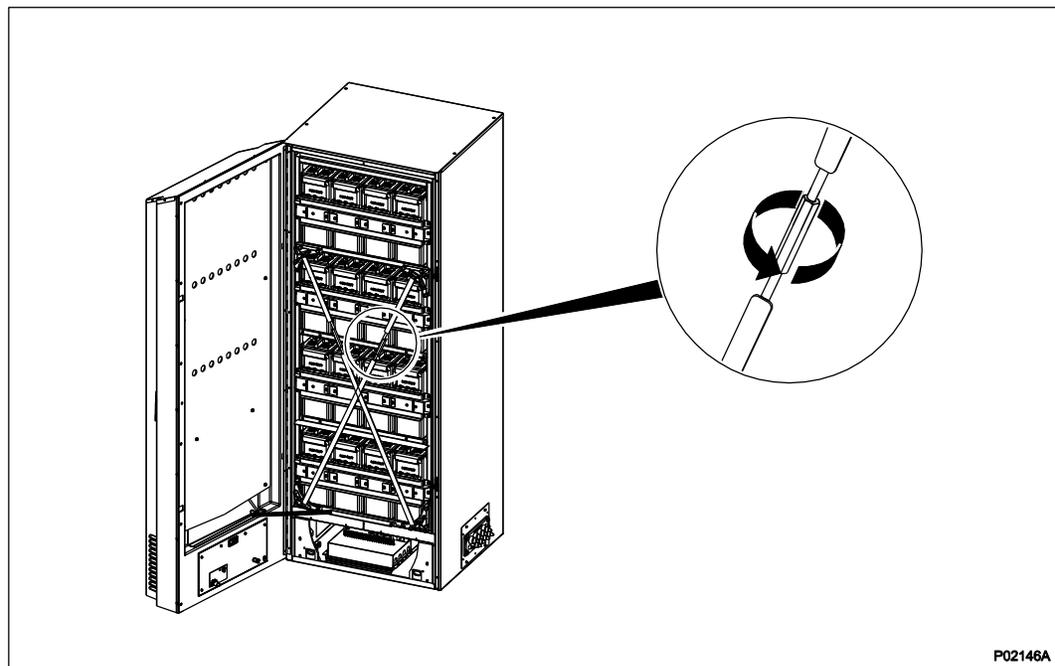


Figure 9 Remove Cross Braces

2. Remove the front bars as in Figure 10.

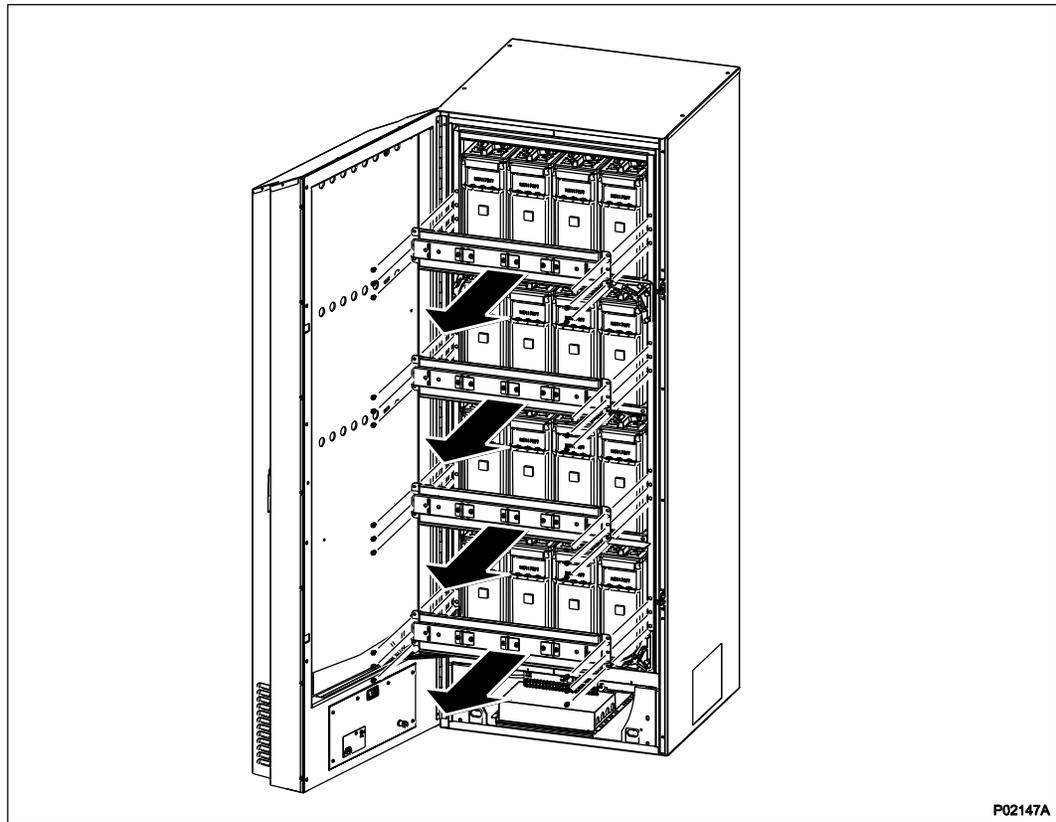


Figure 10 Remove Front Bars

3. Remove the corner pieces as in Figure 11.

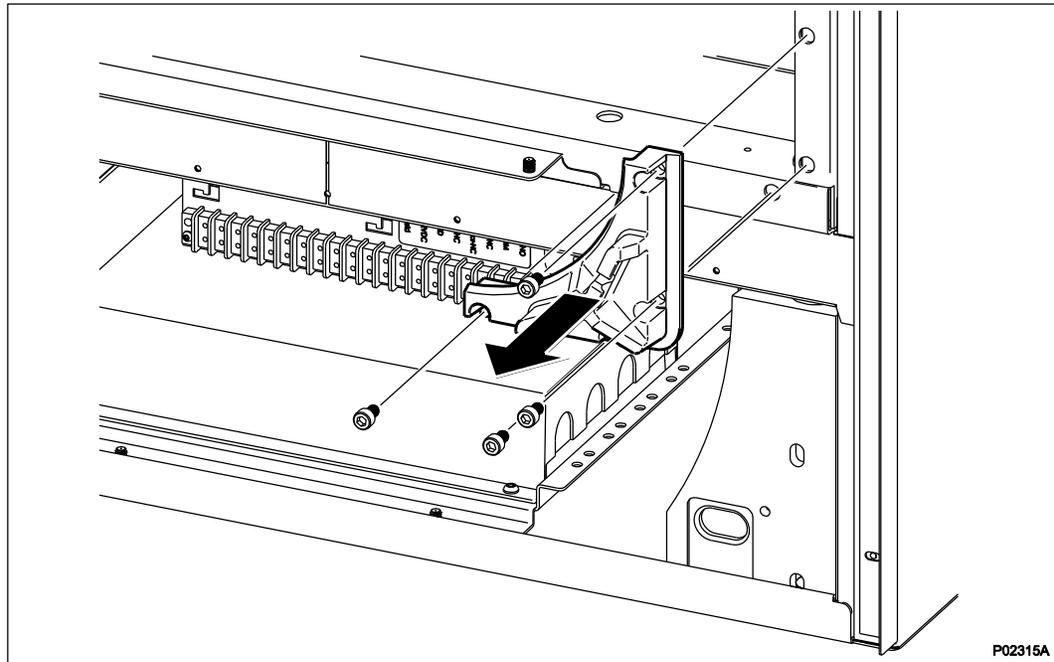


Figure 11 Remove Corner Pieces

Disconnect the Batteries

Make sure that all power at the external power supply are switched off before any work starts.

Do as follows to disconnect the batteries:

1. Remove the pole protections.

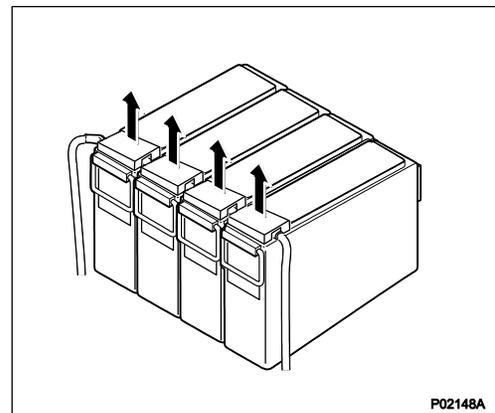


Figure 12 Removing Pole Protections.

2. Remove the battery cables from the battery strings.

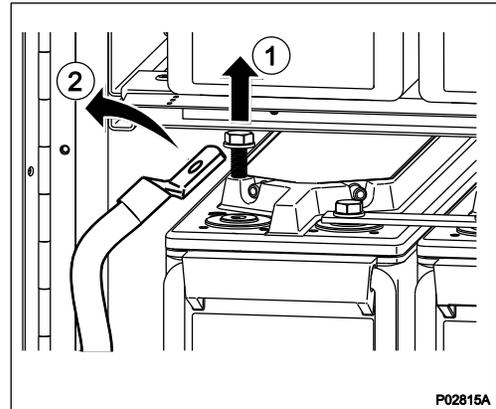


Figure 13 Removing Battery Cable

3. Insulate the cable lugs.

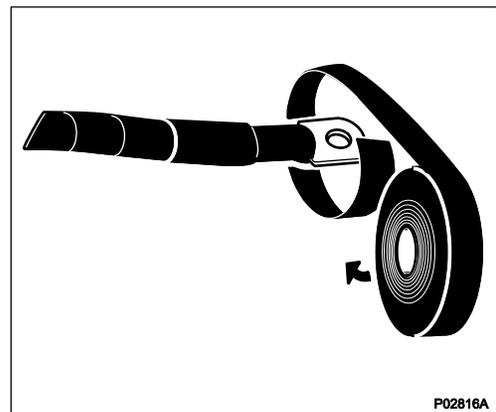


Figure 14 Insulating Cable Lug

4. Remove the fuses in the DCCU, if equipped.
5. Remove the three inter-block connectors connecting the batteries to each other.

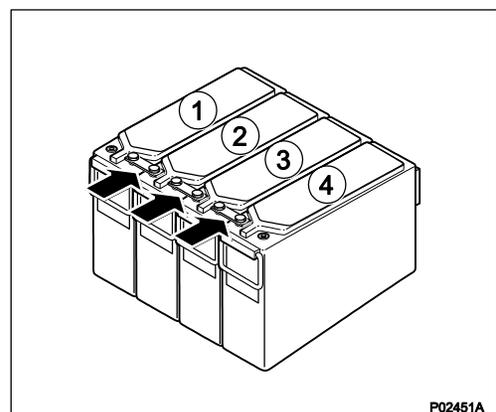


Figure 15 Removing Inter-block Connectors

6. Remove the gas ventilation tubes.

7. Pull the batteries out. Start with battery No. 3.
8. When pulling out battery No. 2, remove the battery temperature sensor if installed.

9.2 INSTALLING BATTERIES

Install the battery blocks on the shelves. Start with battery block no. 1 at the position most to the left on the shelf.

Fit the temperature sensor into the temperature sensor holder and install battery block no. 2.

Install battery block no. 4 most to the right on the shelf.

Install battery block no. 3.

The distances between the battery blocks are normally given by the inter connections and the spacers.

To ensure necessary air circulation around the battery blocks it is important to keep a minimum distance of 7 mm between the battery blocks.

The distance between the wall and the outer battery block will be approx. 35 mm in Cabinets without EQ Zone 4 reinforcement and approx. 30 mm in EQ Zone 4 Cabinets.

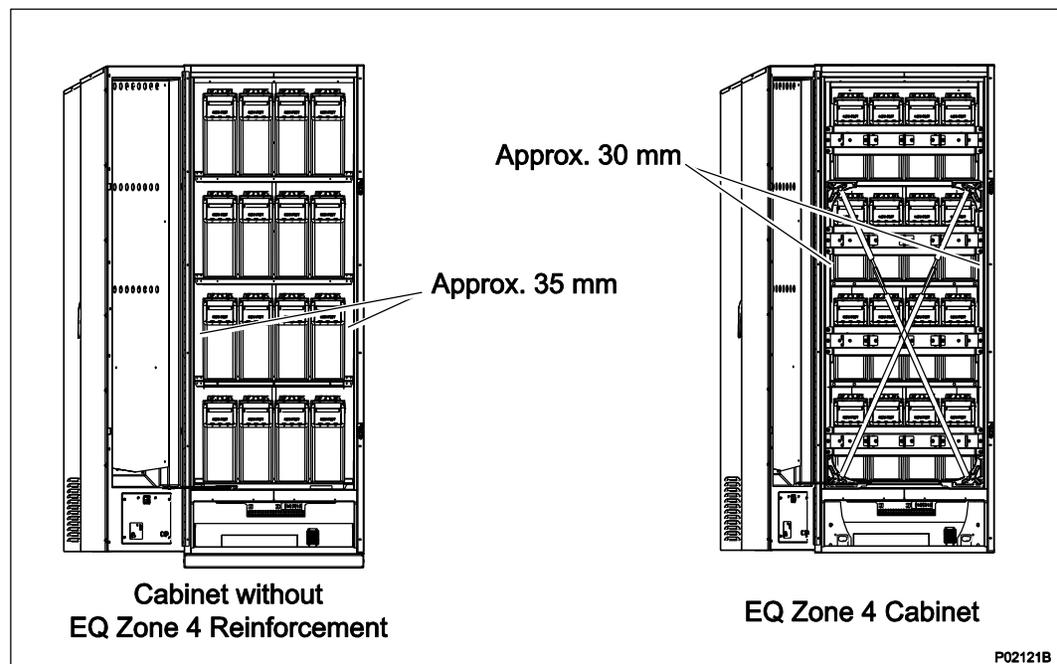


Figure 16 Placement of Batteries

Connecting Gas Ventilation Tubes



Warning!

It is important that every battery is connected with the ventilation tube, and that the first battery in the chain is plugged. The tube must be routed out of the cabinet.

There is a risk that explosive gases are accumulated in the cabinet.

Note: When installing ventilation tubes, always use tubes with flammability class UL94V-2, or better.

It is recommended that when installing new batteries also install new ventilation tubes.

Do the following to connect the gas ventilation tubes:

1. Cut the venting tube in four pieces for each battery string, three pieces with length = 110 mm, the fourth tube is the remaining length. Use the short pieces for connecting the batteries in the battery string as in Figure 17.
2. Use the long tube and connect the gas ventilation tube between the shelves as in Figure 18 and Figure 19.
3. At the top shelf, fit the end stop to the battery at the end of the battery string as in Figure 17.

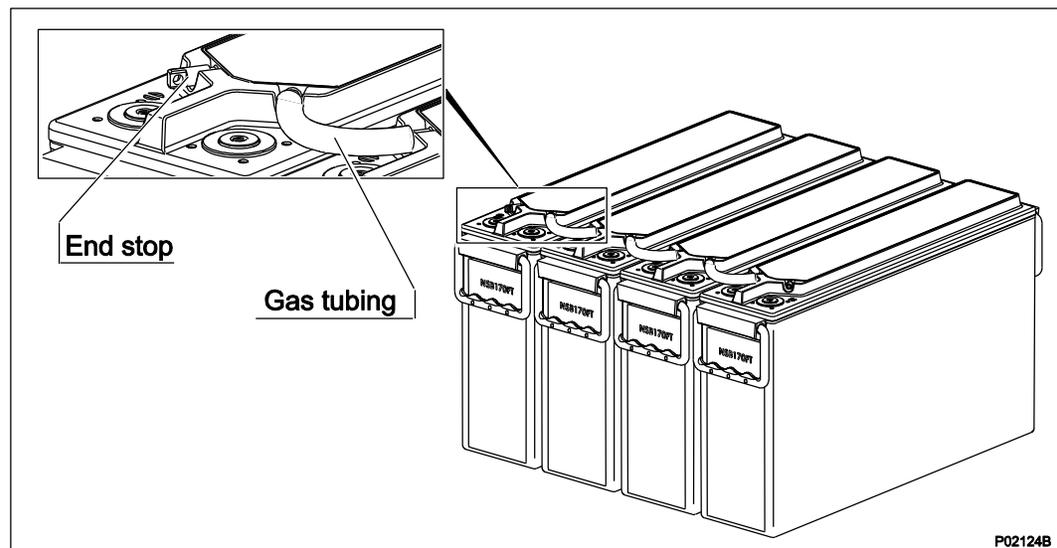


Figure 17 Connecting Gas Ventilation Tubes

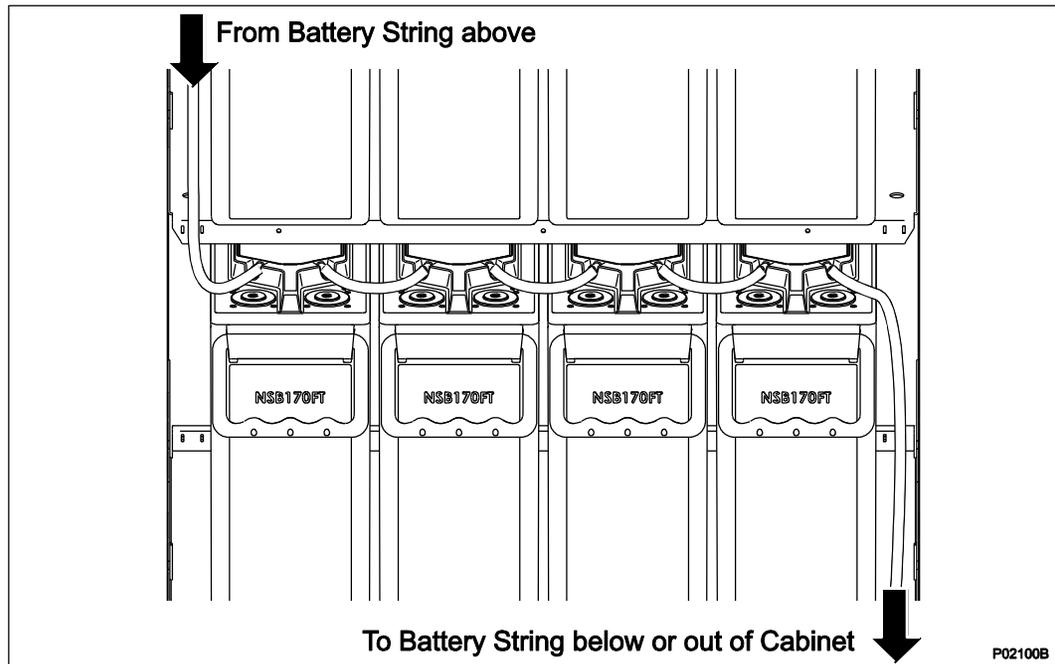


Figure 18 Connecting Gas Ventilation Tube

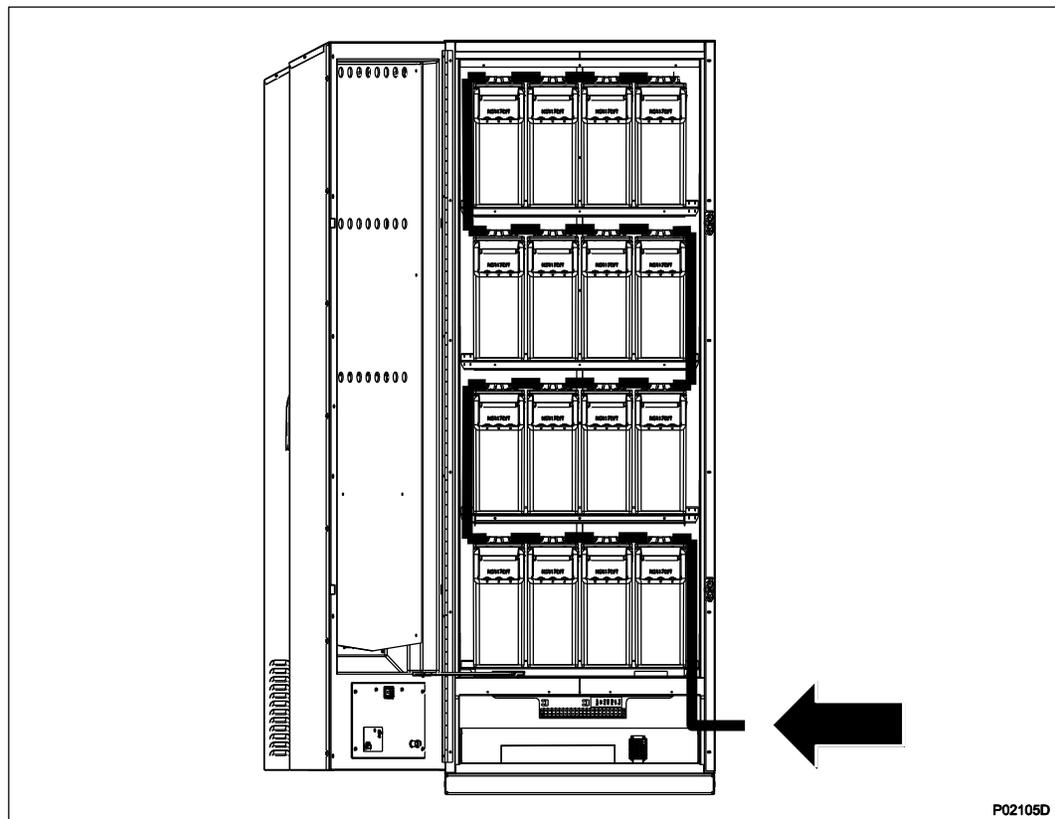


Figure 19 Routing Gas Ventilation Tube

For more information, see the installation instruction for the battery kit.

Connecting Battery Cables



Warning!

To avoid battery thermal runaway, the batteries must be connected to an external PSU with thermal compensated charging. Furthermore, the external PSU must shut off the battery system if the temperature reaches 50°C inside the cabinet.

Note: Improper handling when connecting batteries can result in short-circuiting, which can result in serious injury due to high energy levels. Exercise the necessary care when working with batteries.

Secure that not connected cable lugs are insulated.

Connect the battery blocks into a battery string according to the following:

- 1 Attach the three inter-block connectors between battery block no 1 and no 2, between battery block no 2 and no 3 and between battery block no 3 and no 4, using M8 bolts and washers. Tighten to a torque of 8Nm.

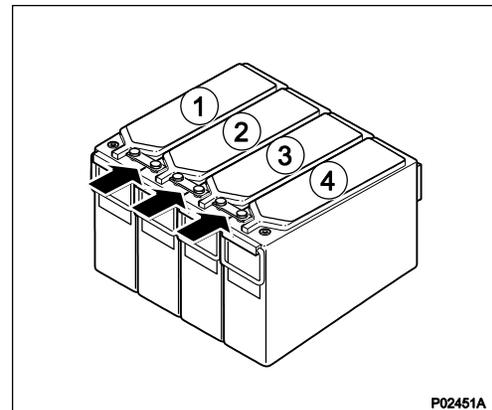


Figure 20 Attach Inter-block Connectors

- 2 Connect the negative (-) cable to battery block no 1, using M8 bolt and washer. Tighten to a torque of 8Nm.

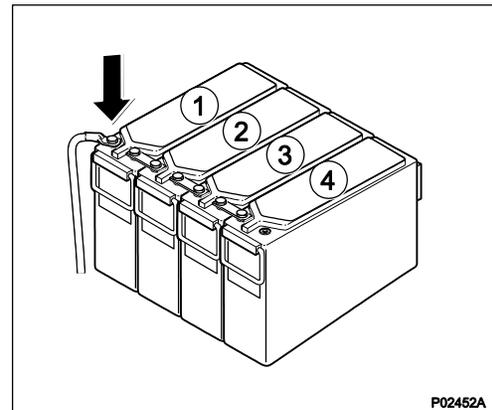


Figure 21 Connecting Negative Cable

- 3 Connect the positive (+) cable to battery block no 4 using M8 bolt and washer. Tighten to a torque of 8 Nm.

The battery string positive cable is not to be connected until all connections to the CF have been made.

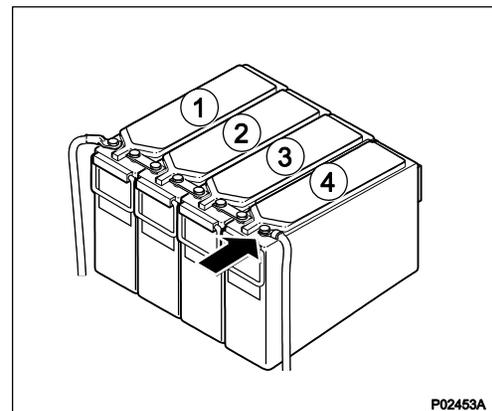


Figure 22 Connecting Positive Cable

- 4 Fit the pole protections.

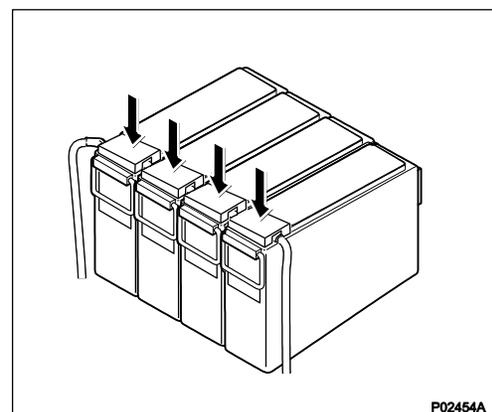


Figure 23 Fitting Pole Protections

Reinstalling EQ Zone 4 Components

This section is only valid for EQ Zone 4 Cabinets.

Do the following to reinstall the corner pieces, the front bars and the cross braces:

If removed, reinstall the corner pieces to the EQ Zone 4 structure as in Figure 24.

Tighten the four M6 screws at each corner to a torque of 9 Nm.

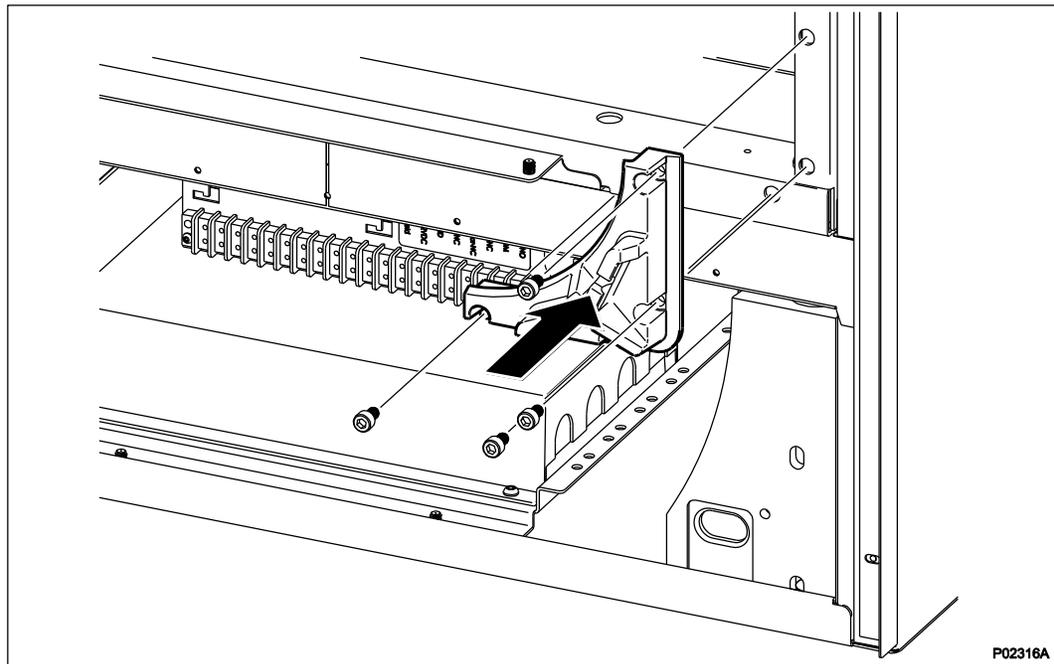


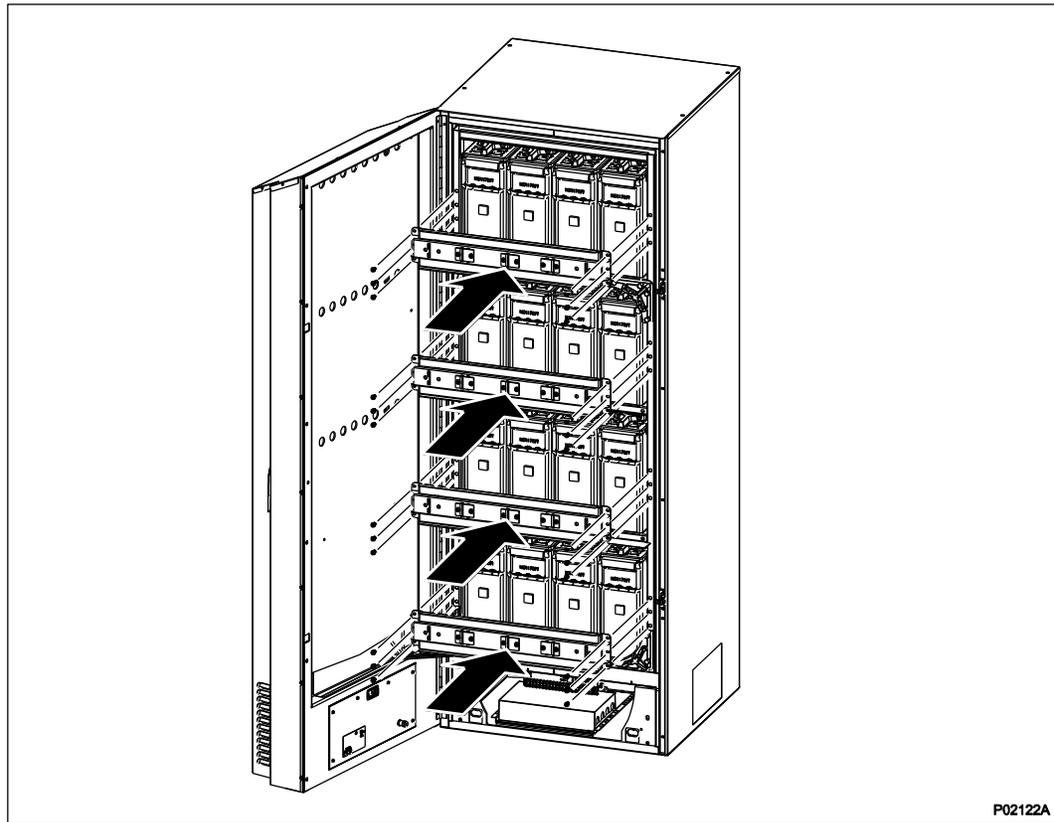
Figure 24 Reinstalling Corner Pieces

Fit the front bars to the EQ Zone 4 structure as in Figure 25.

Note: Use the inner front bar position for the 100 Ah batteries.

Use the outer front bar position for the 170/180 Ah batteries.

Tighten the six M6 screws at each front bar to a torque of 9 Nm.



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Figure 25 Reinstalling Front Bars

Fit the cross braces to the corner pieces as in Figure 26.

Tighten the turnbuckles (stretchers) by hand.

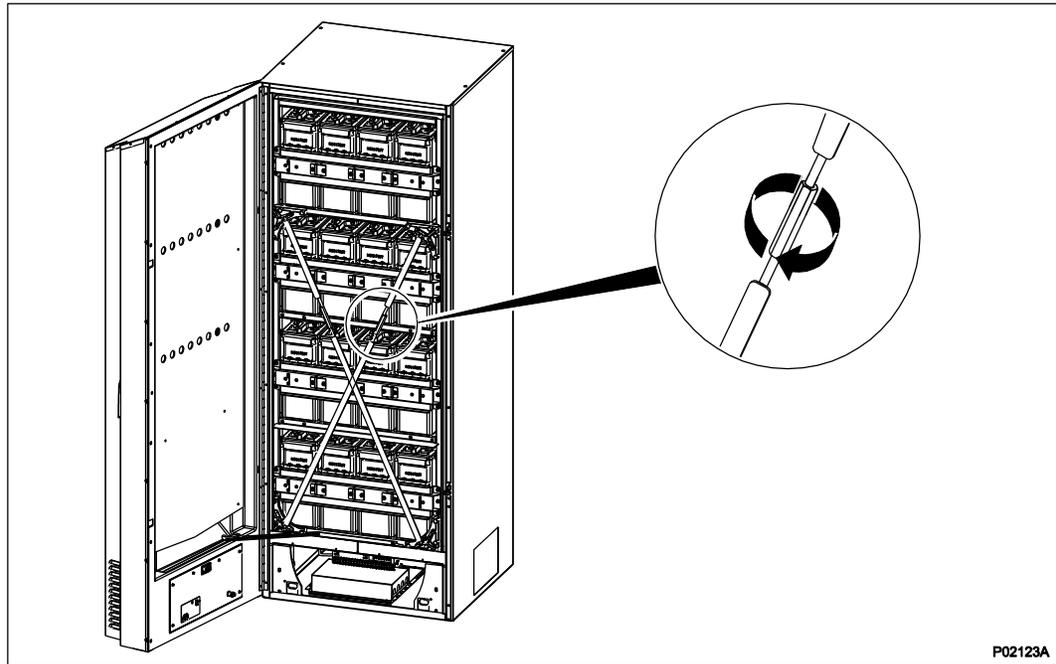


Figure 26 Reinstalling Cross Braces

10 SPARE PARTS

See *D000100/4, SiteStar Cabinet Spare Parts*, for spare parts suitable for the SiteStar Cabinet.