all-in-One Alcatel Service (SM) for Mobile Operators

Alcatel

GSM 900 / 1800

OEM Product Engineering

SPP-54

Specification for

EVOLIUM™ A9100

Compact BTS Outdoor

Site Preparation

Contents

Preface

Purpose

- The document defines the conditions regarding site preparation, for installing **EVOLIUM™ Compact BTS Outdoor cabinet (CBO)**, and activities to be handled by Customers and Alcatel Services .

General description of product

- **EVOLIUM™ CBO** range is designed to ensure an outstanding quality of service through very high radio performances and minimum service interruption, and to facilitate all kinds of evolutions: Site extension or sectorization, implementation of future features. In addition, special attention was focused on ease of deployment and maintenance. The use of highly integrated modules and state-of-the-art components results in very high compactness and reliability.
- **EVOLIUM™ CBO** supports GSM system.
- Ease of deployment and site interventions: Outdoor cabinets principle allows an easy site installation.
- In addition to its main features, CBO can transmit alarms to the OMC-R:
  - 3 alarm inputs for external functions outside the cabinet.
  - Other alarm inputs are dedicated to alarms collected inside the cabinet.

Handover of site

- For documents relating to handover of MRD site before installation of Alcatel equipment see SPG-07.

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This document is used by **Survey Premier** module

History

Date	Edition	Comments
03/05/22	01	Released.
05/06/24	02	Released. Introduction of CBODC.

Audience

- Alcatel Staff (Intermediate level).
- Installers.
- Customer and Alcatel services.

Assumed knowledge

You must have a basic understanding of the following

- BSS Alcatel operations
- Site Engineering methods

Related documents

Sigle	Title of document	Alcatel number
SPG-07	Specification of documents relating to handover of MRD site before installation of Alcatel equipment.	8BL 00703 0006 DRAGA
SPG-10	All-in-One Alcatel Service for Site Engineering	8BL 00703 0010 DRZZA

Document Structure

This section provides a summary of the contents of every chapter.

Chapter 1 : Customer or Operator Services

Chapter 2 : Alcatel Services

Chapter 3 : General specifications of product

Chapter 4 : Site preparation and supply requirements for Customer or Operator.

Chapter 5 : Installation and supply requirements for Alcatel.

Appendix A : Installation help, cabling site configuration with 1 Compact BTS Outdoor cabinet, 2 sectors, steel construction on roof, 2 antennas / sector.

Appendix B : Installation help, cabling site configuration with CBO cabinet, External battery cabinet, 2 sectors, concrete foundation on field, 2 antennas / sector, 1 tower.

Appendix C : Installation help, cabling site configuration with 1 Compact BTS Outdoor cabinet, back close to a wall.

Appendix D : Installation help, drilling.

Appendix E : Installation help, cable entry.

Abbreviations : Acronyms encountered within the document.

1. Customer or Operator Services

This chapter describes the services to be supplied by Customers or Operators.

1.1 - Services to be performed

1.2 - Services not treated

1.1 - Services to be performed

The customer or operator is responsible for choosing the site and for all preparation work. The main services are as follows:

Site (all-in-One Service: **Environment**)	• Preparation of site (refer to SPG-10).
Qualification and checking (all-in-One Service: **Environment**)	• Power supply. • Earth.
Qualification and checking (all-in-One Service: **Cable**)	• PCM links. • Feeders. • Antennas.
Main supplies (all-in-One Service: **Environment**)	• Lighting. • Circuit breaker . • Coarse lightning protectors in case of exposed site and/or overhead power lines. • Power distribution box : 48VDC or 230 V on single phase / Neutral. • Ground bar/plate. • Concrete foundation or steel construction.
Main supplies (all-in-One Service: **Cable**)	• AC or DC power, ground, PCM and alarm cables. • Cable way runs from the infrastructure to each CBO. • Cable way runs between CBO cabinet and battery cabinet. • PCM network termination (NTL) upline if necessary. • PCM and alarm distributor (DDF). • Feeders and antennas.
Installation (all-in-One Service: **Environment**)	• Of main supplies, (all-in-One Service: **Environment**)
Installation (all-in-One Service: **Cable**)	• Of main supplies, (all-in-One Service: **Cable**)
	ALCATEL should be informed about co-located RF emitting equipment in order to prevent its employees against radiation which they cannot influence.

1.2 - Services not treated

All services not provided by Customer or Operator shall be treated as additional Alcatel services.

2. Alcatel Services

This chapter describes the services to be supplied by Alcatel.

2.1 - Services to be performed

2.1 - Services to be performed

Alcatel installs the unit . The main services are listed hereafter:

Supplying installation kits (all-in-One Service**: Assemble)**

- Basic installation kit with RF jumpers.
- All lightning protections are integrated inside the CBO cabinet (optional coarse protectors for AC lines are installed externally).
- Synchronisation cable, (optional)
- PCM cable from Alcatel equipment to DDF, (optional)
- Power and ground cables, (optional)
- Alarm cables, (optional)

Installation (all-in-One Service**: Assemble)**

- Installation of CBO cabinet.
- Installation of External Battery Cabinet.
- Installation of synchronisation cable, (optional)
- Installation of ground and power cables, (optional)
- Installation of PCM cable, (optional)
- Installation of alarm cable, (optional)

Commissioning (all-in-One Service**: Commissioning)**

- Commissioning of EVOLIUM™ CBO.
- Commissioning of Microwave A9400 (Optional).
- Acceptance of EVOLIUM™ CBO.

3. General specifications of product

This chapter describes the general specifications of product about site preparation to install the product .

3.1 - Short description of product.

3.2 - Environmental conditions.

3.3 – Power system specifications.

3.4 – Grounding system.

3.5 - Consumption indications.

3.6 - Optional products.

3.7 - Battery backup time examples.

3.8 - Dimensions and weight indications.

3.9 – Installation indications.

3.10 - Clearance recommendations.

3.11 - Lightning and over voltage protection indications.

3.12 - External connections indications.

3.13 - External alarm indications.

3.14 – E1 connection indications.

3.15 - Alarm connection indications.

3.16 - CBO synchronisation indications.

3.17 – External Battery Cabinet Outdoor.

3.1 - Short description of product

- **EVOLIUM™ A9100 Compact BTS Outdoor (CBO)** is intended for rural applications which present a very low traffic or on large areas where the need to have service available despite this low traffic density.
- **EVOLIUM™ A9100 CBO** cabinet is available in AC (CBOAC) and DC (CBODC) versions.
- **EVOLIUM™ A9100 CBO** is designed to house GSM 900 or 1800 equipments and supports one or two sectors for CBOAC and up to three sectors for CBODC cabinet.
- **EVOLIUM™ A9100 CBO** is a single cabinet composed of:
  - Two subracks for TRX (MP or HP), SUMA, ANC, BATS battery and AC/DC converters modules.
  - Space (3U/19") in the top of the rack allowing the integration of optional equipments such as NTL or 19"/1U IDU microwave.
  - An area dedicated to DC distribution and connections cable inlet.
- Each module location within the CBO is driven by engineering rules, easy front cabling, optimisation of thermal dissipation, easy assembly and extensions on site. Each module supports hot insertion and extraction. No service interruption is thus necessary during the most of maintenance interventions.
- To increase back-up time, an External Battery Cabinet Outdoor can be optionally used to house up to three battery 90Ah (BU101) strings.

3.2 - Environmental conditions

The environmental conditions define the climatic requirements (air temperature, humidity, etc.) that apply to the unit in normal operation and storage. They also specify requirements concerning contaminating products and electromagnetic considerations.

ElectroMagnetic Compatibility (EMC)

- All **EVOLIUM™ CBO** fulfil the requirements of the **European Directive 89/336/EEC** and the standard:
  - **GSM:** EN 301 489-1 and EN 301 489-8 (ETSI)

Acoustic noise

- The acoustic noise caused by the **EVOLIUM™ CBO** complies with ETS 300 753.
  Maximum average noise pressure, 1m.
  Daytime operation: 55 dB(A)
  Night-time operation: 45 dB(A)

Climatic requirements

- The environmental conditions define the limits (temperature, humidity, etc.) for CBO cabinets in storage, operation and transportation conditions as specified in the following classes:

  - **For storage** ETS 300 019-1-1 class 1.2
  - **For transportation** ETS 300 019-1-2 class 2.2
  - **For operation** ETS 300 019-1-4 class 4.1

- **Protection level:** IP55; IEC 529: " Degrees of protection provided by enclosures"

Safety

- The **EVOLIUM™ CBO** is compliant with following safety standard:

  - IEC 950 (EN 60 950) Safety of information technology equipment.

Storage of batteries

- Interpolation is allowed
- Battery must be charged before storage.

Temperature	Duration of storage w/o re-charging	
	BU101 (90Ah battery)	BATS (small battery)
10 °C	1 year	1 year
20 °C	6 months	6 months
30 °C	3 months	3 months

❏ Environmental conditions for EVOLIUM™ CBO (ETS 300 019)

Environmental parameter	Unit	Operation -1-4 class 4.1		Storage -1-1 class 1.2	
Low air temperature	°C	-33		-25	
High air temperature	°C	+45		+55	
Low relative humidity	%	15		10	
High relative humidity	%	100		100	
Low absolute humidity	g/m³	0,26		0,5	
High absolute humidity	g/m³	25		29	
Rain intensity	mm/min	6		no	
Rate of change temperature	°C/min	0,5		0,5	
Low air pressure	KPa	70		70	
High air pressure	KPa	106		106	
Solar radiation (Note1)	W/m²	1120		1120	
Heat radiation	W/m²	Negligible		(Note 2)	
Movement of surrounding air	m/s	50		30	
Conditions of condensation	None	Yes		yes	
Conditions of precipitation (rain, snow, hail, ...)	None	Yes		yes	
Low rain temperature	°C	5		none	
Condition of water from sources other than rain	None	Splashing water		Dripping water	
Conditions of icing and frosting	None	Yes		yes	
Sand	mg/m³	300		300	
Dust (suspension)	mg/m³	5		5	
Dust (sedimentation)	mg/(m²h)	20		20	
Stationary vibration, sinusoidal: frequency range	Hz	2 to 9	9 to 200	2 to 9	9 to 200
- Peak-displacement amplitude	mm	3	NA	1.5	NA
- Peak-acceleration amplitude	m/s^2	NA	10	NA	5
Non-stationary vibration including shock:					
- Shock-response spectrum type L, peak acceleration	m/s²	NA		40	
- Shock-response spectrum type II, peak acceleration	m/s²	250		---	

- **Note 1:** Solar radiation does not impact thermal capability of CBO.
- **Note 2:** Conditions of heat radiation (e.g. in the vicinity of a room-heating system).

- **NA: Not Applicable**

3.3 - Power system specifications

- **EVOLIUM™ CBO** cabinet is available in AC (CBOAC) and DC (CBODC) versions.

➢ ***CBOAC:***

- **EVOLIUM™ CBO** cabinet is powered with a nominal voltage of 230 V AC under single phase and connected to AC power supply with 2 wires (L,N) or with 3 wires (L, N, PE). All wires are connected to AC power terminal located in the box open at the bottom right side of the cabinet, max. cross section 6 mm² for ferrule.
- Characteristics of the power supply:
  - Nominal voltage: 230 V AC
  - Voltage range: 150 - 280 V AC
  - Frequency: 47 to 63 Hz
  - Impedance of the mains: R < 0,7 Ohm
- Following breakers are located in AC distribution unit inside the CBO cabinet:
  - Automatic circuit breaker C16A in L line, medium-slow acting, protecting BTS.
  - Automatic circuit breaker C16A in L line, medium-slow acting, protecting Heater.
  - Residual current breaker C10A/30mA, medium-slow acting, protecting service socket.
- Possible AC networks are: TNS, TNC or TT. For TT system external selective differential current breakers are mandatory.

➢ ***CBODC:***

- **EVOLIUM™ CBO** cabinet can be powered by DC power supply with a nominal voltage of 48VDC ± 20 %.
- **EVOLIUM™ CBO** cabinet is connected to DC power supply with 3 wires (-48V, 0V and PE).
  - –48V blue wire is connected to filter terminal M6 bolt.
  - 0V black wire is connected to M6 bolt close to –48V connection.
  - PE yellow/green wire is connected to the main earthing bolt M8 (GND).
- All wires are connected to DC power terminal located in the box open at the bottom right side of the cabinet.
- Following breakers are located in DC distribution unit inside the CBO cabinet:
  - Automatic circuit breaker 70A in –48V line and 0V line for DC input.
  - Two automatic circuit breaker 25A in –48V line for subracks.
  - Three automatic circuit breaker 15A in –48V line (optional equipment MW, heat exchanger and DC heater).

3.4 – Grounding system

- Site GND must be connected to M8 thread located in the box open at the bottom right side of the cabinet (main earthing point).
- All metallic parts of cabinet are connected to the main earthing point M8.
- Inside the CBO Outdoor, the resistivity between any conductive structure and main earthing bolt is R< 0.1 Ohm.

3.5 - Consumption indications

CBOAC – 2x1 TRX				
	Maximum power*			
	TRX 900 MP	**TRX 900 HP**	**TRX 1800 MP**	**TRX 1800 HP**
Fully equipped TRX-Edge+ including heat exchanger (VA)	497	538	576	656
For battery on charge (BATS).	Add 100 VA			
Total power (VA) *(Consumption: 1 phase / 230V)*	**= 597** *(2.6A)*	**= 638** *(2.8A)*	**= 676** *(2.9A)*	**= 756** *(3.3A)*

CBOAC – 1x2 TRX								
	TRX 900 MP		**TRX 900 HP**		**TRX 1800 MP**		**TRX 1800 HP**	
	Max.*	**Oper.****	**Max.***	**Oper.****	**Max.***	**Oper.****	**Max.***	**Oper.****
Fully equipped TRX-Edge+ including heat exchanger (VA)	486	403	526	432	564	467	645	524
For battery on charge (BATS).	Add 100 VA							
Total power (VA) *(Consumption: 1 phase / 230V)*	**= 586** *(2.5A)*	**= 503** *(2.2A)*	**= 626** *(2.7A)*	**= 532** *(2.3A)*	**= 664** *(2.9A)*	**= 567** *(2.5A)*	**= 745** *(3.2A)*	**= 624** *(2.7A)*

- CBO offers one service socket (US type) for AC version only: *Consumption 5A max under 230V / single phase.*

CBODC – 2x2 TRX				
	TRX 900 MP		TRX 1800 MP	
	Max.*	Oper.**	Max.*	Oper.**
Fully equipped TRX-Edge+ including heat exchanger (W)	778	630	918	744
Consumption (A) under –48VDC.	16.2	13	19	15.5

CBODC – 3x1 TRX				
	Maximum power*			
	TRX 900 MP	TRX 900 HP	TRX 1800 MP	TRX 1800 HP
Fully equipped TRX-Edge+ including heat exchanger (W)	621	675	726	834
Consumption (A) under –48VDC.	13	14	15	17.4

- Service socket for DC version cabinet: *Not provided.*

(*) Maximum power consumption means: Full traffic load and full Tx power.

(**) Operational power consumption means:
- Consumption of BCCH, 100%.
- Consumption of other TRX, 60%.
- Consumption of heating, 0%.
- Consumption for heat exchanger, 100%.
- Consumption of service socket, 0%.

Power consumption for optional equipments (Add to previous values)

Products	Power consumption
Battery Back-up for CBOAC	The above AC power consumption is given with internal battery back-up module (BATS). On request of higher battery capacity, an External Battery Cabinet Outdoor can be used. In this case, the internal battery is removed and the following battery charging have to be considered: • If EBCO contains one BU90: add 400 VA for battery charging. • If EBCO contains more than one BU90: add 800VA for battery charging.
Microwave A9400UX (IDU 19"/1U)	• Add 60VA per terminal for CBOAC cabinet. • Add 50W per terminal for CBODC cabinet.
Heater for CBOAC or CBODC	• Heating consumption in warm-up phase: 500 W. • This may also occur at very low ambient temperature or with reduced traffic at low temperature. Therefore, heater will be foreseen only for cold countries. • Needed for temperature below –5°C only. • **Nota:** Heat exchanger never operates in time with heater.

3.6 - Optional products

- 3U/19" space are foreseen in the top of CBO cabinet to receive optional equipments. It allows the integration of equipments such as NTL, or 19"/1U IDU microwave.
- Digital Distribution Frame (DDF) can also be mounted on the top right side of the cabinet.
- Optional equipments are DC powered via wire terminal located at DC distribution unit.

3.7 - Battery backup time examples

There is one integrated small battery (BATS) in CBO cabinet with backup time of about 30 minutes at 500W DC load.

The other possibility to extend backup time is to use External Battery Cabinet with up to 3 Battery Backup Unit 90Ah (BU101). See description in chapter 3.17.

On first approach, the interpolation is allowed to define back-up of each configuration.

The following table gives Backup time for one BU101:

	Power backup (W) / Backup time BU101 (minutes)			
	GSM 900 MP	**GSM 900 HP**	**GSM 1800 MP**	**GSM 1800 HP**
CBO AC 1x2 TRX	360W / 847mn	386W / 787mn	417W / 716mn	468W / 603mn
CBO AC 2x1 TRX	444W / 656mn	480W / 576mn	514W / 518mn	586W / 446mn

- The back-up time calculation has been made with the following rule:
  - Consumption of BCCH, 100%
  - Consumption of other TRX, 60%
  - Heating consumption, 0 %
  - Heat exchanger consumption, 100 %
  - Socket service consumption, 0%
  - Optional products consumption, 0W

3.8 - Dimensions and weight indications

	CBO cabinet
Total width (mm)	720
Total depth (mm)	700
Total height (mm)	902
Weight of empty rack (kg) *)	55
Total weight fully equipped (kg)	**140**

***)** *Empty means w/o subracks, BTS units, battery, heat exchanger.*

The total width and depth dimensions are accross top hood, back fittings and side lifting attachments overlapping the cabinet body.

3.9 – installation indications

- CBO cabinet is intended for installation on a floor structure (e.g. concrete plinth or steel frame).
- The cabinet has no side doors and its access is only possible from the front side (all internal cabling and equipment accessible only from front side).
- Cabinets may be installed back to back or back to a wall (clearance conditions must be followed).
- The cabinet must be fixed to the floor. Four fixing points for fixation to fundament. Two front fixing points are inside the cabinet and accessible when door open. Two back fixing points are outside of cabinet.
- The drilling diameter of holes is 15 mm for metallic structure and 18 mm for concrete foundation.
- For CBO cabinet, fixing dimensions between axis are:
  - **Front fixing:** 535 mm ±1 on width. Holes diameter = 15 mm
  - **Back fixing:** 634 mm ±1 on width. Shape of holes = Oblong 20 x 15 mm.
  - **Front and back fixing**: 590 mm ±1 on depth

- External cables (PCM, clock, external alarms, antenna cables, AC power cables ...) enter the cabinet from bottom side. In right hand side of the cabinet, there is a cable entry box open in bottom and covered by a removable plate for better manual access.

- CBO cabinet can be lifted and carried:
  - Manually at bottom handle-angles and top hood along its reinforced side edges.
  - By means of transport belts fitted in bottom handle-angles.
  - By means of hoisting lines attached to eye-bolts with M12 threads in edge profiles under the top hood (the eye-bolts are not supplied with cabinet).
- CBO cabinet can be transported in upright position or horizontally layed back.

3.10 - Clearance recommendations

Sufficient clearance must be allowed for handling, maintenance and inspection procedures, and for equipment cooling purposes.

- In particular, in the front of the CBO, a clearance of approximately 1 m is recommended to allow handling and 1,2 m if there is a high wall limiting air circulation.
- 600 mm on cable entry right side.
- At left and rear side: 100 mm
- At the top: 300 mm.

3.11 - Lightning and over voltage protection indications

RF lightning protection

- RF interfaces are protected.
  1 kV/µs, 40 kA (i_{sn}, 8/20 µs) ; quarter wave stub

AC lightning protection

- AC mains protectors are supplied only on AC supplied CBO variant.
  Medium stage protectors IEC 61643, class 2:
  20 kA phase
  20 kA neutral (i_{sn}, 8/20 µs).

Note: In locations exposed to lightning strokes or in case of overhead lines external coarse lightning protectors IEC 61643 class 1 with sufficient decoupling must be used.

PCM lightning protection

- PCM transmission interfaces G703 are protected:
  Common mode, protection level 800V, 5 kA (i_{sn}, 8/20 µs). 8 twisted pairs or 8 coaxial cables.

Alarm lightning protection

- The 3 alarm inputs for external functions outside the cabinet are **lightning** protected (protection level 48V)
  - Nominal impulse discharge current (wave 8/20µs): 2.5 kA.
- All other alarm inputs are **not lightning** protected and are dedicated to alarms collected inside the cabinet.
  - The alarm inputs 1-16 are pre-wired and cannot be used for optional equipments.
  - The alarm inputs 17-24 can be used for optional equipments. These inputs can withstand a wave 1.2/50µs 1500V.

3.12 - External connections indications

The external connections (glands, connectors and feed-through) are located in box open in bottom right hand side and covered by a removable plate:

- 6x7/16 female antenna connectors equipped with lightning protectors (spacing 55 mm).
- 3 glands M20 (EMC and humidity protected) for cables diameter 7-13mm.
- 2 glands M16 (EMC and humidity protected) for cables diameter 4.5-10mm.
- ***CBOAC cabinet***: 3 terminals 10mm² with removable cover for AC cable.
- ***CBOAC & CBODC cabinets :***
  - 1 filter with cover for external DC (-48V).
  - 1 x M6 bolt for external DC (0V).
  - 1 x M8 thread for central Protective Earth.

3.13 - External alarm indications

CBO cabinet provides 3 alarm inputs for external functions outside the cabinet and 8 alarm inputs for optional products and specific functions inside the cabinet which can be adapted to the individual requirements of each customer by the customer himself.

- External alarms are connected within CBO connection area. Alarms connection is made easy for customer owing to self fastening contacts which require neither a pre-equipped cable (only stripping) nor an intermediate connection point.

- The alarm levels are defined as follows:

  - alarm inactive: 0...< 4.8V alarm active: > 6.4 ...12V
  - A current of approximately 1 mA flows from the alarm input to ground if the alarm input is pulled to ground.
  - Open alarm inputs are regarded as active.
  - The inputs are defined according to TNV of EN 60950.
  - An alarm line must stay longer than 1 ms in the active status in order to be detected as active.

- It is possible to pull the alarm inputs with software on active or inactive level in order to check them.

- A special pre-equipped alarm interface cable is not necessary. A cable with shielding braid connected to GND by means of earthing clamps will be sufficient..

  - Alarms for optional products inside CBO: 8 twisted pairs with cross section from 0,2 to 1 mm².
  - Alarms for external functions outside CBO: 3 twisted pairs with cross section from 0,2 to 1,5 mm².

3.14 E1 connection indications

- The **EVOLIUM™ CBO** provides 4 x E1 physical interfaces.
- PCM lines are:
  - 120 Ohms: multi pairs from copper line type L907.
  - 75 Ohms: multi coax from coaxial cable type FLEX3.
- These cables are without connector at the CBO end and prepared to be screw-fastened at the connection unit end.
- On DDF side, these cables can be inserted on terminal blocks (120 or 75 Ohms).
- 120 Ohms: The distance from CBO cabinet to NTL is depending on NTL type, in general with G.703, E1 interface with 40 dB sensitivity the maximal distance is 100 m for L907 using general shield for 4 copper pairs (2TX + 2RX). Diameter of wire: 0,5 mm.
- Recommended distance between DDF and CBO cabinet: ≤ 20m.

Network impedance	Type of cable	Connection DDF side recommended
120 Ohms	L907 type: 4 x 4 x 0,5 mm (diameter)	Inserting
75 Ohms	8 coaxs 0,4 / 2,0 / 3,55 FLEX3 type	Inserting

3.15 - Alarm connection indications

Alarm cable is a multi pair from copper line type L907 without connector on CBO cabinet side. On DDF side, these cables can be inserted on terminal block.

- Recommended distance between DDF and CBO cabinet : ≤ 20m

Type of cable	Connection DDF side recommended
L907 type: 4 x 4 x 0,5 mm (diameter)	Inserting

3.16 – CBO synchronisation indications

Recommended distance between 2 **EVOLIUM™ CBO**: ≤ 10m

3.17 – External Battery Cabinet Outdoor

Short description

- The External Battery Cabinet is outdoor cabinet designed to house large battery back-up (up to 3 x 90Ah batteries BU101).
- Internal equipments:
  - 3 battery shelves 19".
  - Air Conditioning Unit (ACU) to secure the low operational temperature.
  - Breakers for AC lines.
  - Breakers for DC lines.
  - Smoke detector.
  - Door switch supervised by alarm.
  - Service light and socket.
  - Document wallet
  - Remote inventory board (for battery charging)
- The cabinet has no side doors and its access is only possible from the front (all internal cabling accessible only from front side).
- The cabinet has anchor bolt holes at the bottom and must be fixed on the floor.
- Cabling access is in the cabinet plinth from bottom, back or either side.
- The cabinet is delivered with eye bolts for lifting and in upright position.

Dimensions and weight indications

Width (mm)	700 mm
Depth (mm)	800 mm
Height (mm)	1500 mm
Cabinet pre-equipped with ACU (w/o batteries)	< 180 kg
Maximum weight with 3 battery strings	< 600 kg

Clearance

- Sufficient clearance must be allowed for handling, maintenance, inspection procedures and for equipment cooling. In particular, in the front of the battery cabinet, a clearance of approximately 1 m is recommended (1,2 m if there is a high wall limiting air circulation).
- At the top: 600 mm
- Left / right side: 100 mm. Back side: 200 mm
- Or in all cases 600 mm when cables arrive left/right or back.

Distance indications

- Maximum cables length between CBO cabinet and battery cabinet: 10 m.
- Maximum distance between CBO cabinet and battery cabinet: 5 m.
- Cables between CBO and EBCO must be routed inside of grounded metallic tube or tray.

Environmental conditions

- **Climatic requirements**:
  - For operation: ETS 300 019-1-4 class 4.1E. Exceptional max operational temperature for short period (8 hours) up to 50°C.
  - For storage: ETS 300 019-1-1 class 1.2.
  - For transportation: ETS 300 019-1-2 class 2.2, with batteries fitted. Class 2.3, without batteries fitted.
- **Acoustic noise:** The acoustic noise caused by the Battery Cabinet Outdoor, measured according to ISO 7779 and ETS 300 019-1-4 complies with ETS 300 753 table B2 Class 4.1E
- **Electromagnetic compatibility**:
  - Conducted emission on AC (ACU) and DC (HEX) lines: EN 55022 class B
  - Surge immunity AC lines: EN 61000-4-5 level 4
  - Harmonic current emissions on AC lines: EN 61000-3-2
- **Safety standard:** EN 60950.
- **Ingress protection level:** IP55

Power system indications

- External Battery Cabinet is powered with 230VAC +/-15% (single phase-3 wires) directly from the site AC distribution box to supply airconditioner (ACU) and service light and socket incorporated inside the cabinet.
- There is no AC connection between CBO cabinet and battery cabinet.
- The External Battery Cabinet is connected to CBO through DC power cables and signalling / alarms cable (remote inventory of battery, ACU/HEX fail, door open, smoke detection).
- AC breakers are fitted in left side wall of cabinet:
  - 1 x C16A MCB in L line (incoming mains line)
  - 1 x C10A MCB in L line (ACU)
  - 1 x 2-pole 6A/30 mA RCD in L an N lines (light/service socket)
- DC breakers are fitted in 3U distribution pannel at top of cabinet:
  - 1 x 2 pole 80A MCB fast acting in 0V and –48V main DC lines.
  - 3 x 1 pole 80A MCB fast acting in minus line of each battery string.
  - 1 x 2A fuse in 12V line of smoke detector.

Note: 0V lead (+ pole of battery) will be connected to PE inside CBO.

Grounding system

- The main earthing bolt of the cabinet must be connected to the ground plate available on site.
- CBO and battery cabinets must be connected to the same ground plate.

Consumptions indications

	230 VAC
Air Conditioning Unit (ACU)	500 W
Heater	1000 W
Service light and socket	1000 W

Lightning protection

- Only AC lines are protected. Medium stage protectors for L and N leads.

4. Site preparation and supply requirements for Customer or Operator

This chapter describes the requirements of product about site preparation and supplies provided by Customer or Operator.

4.1 – Site safety requirements

4.2 – RF power emission requirements

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4.1 - Site safety requirements

- The site must be compliant with IEC 364 (NFC 15100) for equipment located only in restricted access locations.
- On the site, the current safety instructions must be strictly followed and hazardous points must be marked. The inspectors must make sure that signs are posted with the telephone number of emergency medical assistance in the event of electric shock.
- Appropriate protection shall be provided to ensure the protection of personnel against all risks of falls and exposure to hazardous voltage sources. An appropriate system of protection shall be provided to protect personnel against the risks associated with high voltage areas: equipotential earth bonding of all handrails and metal obstacles, handrail protection for passageways near the edges of flat roofs.
- Displacement of equipment (transport, handling, or hoisting) must not endanger either personnel or equipment near-by.

4.2 – RF power emission requirements

They are several national and international standards and recommendations dealing about human exposure to ElectroMagnetic Fields. Their main characteristics are very similar for they take account the international recommendations issued by ICNIRP (International Commision on Non Ionizing Radiation Protection).
The site must be compliant with ICNIRP guidelines or local regulation if more restrictive.
The following rules should be strictly applied by Customer:

- Compliance RF perimeters related to ElectroMagnetic Field exposure must be marked.
- Produce clear signalling and marking labels.
- Minimize RF emission from the antenna.
- Workers should be allowed to switch-off the power if they have to operate into compliance RF perimeter for workers.
- Assure good cable connection.
- Install the antenna as high as possible from floor or area with public access
- Install the antenna as far as possible from other existing equipment emitting RF power.
- People with electronic medical devices (for example pace-makers and hearing aids) and pregnant women must identify themselves to site officer.

4.3 - Main supplies provided by Customer or operator

See chapter 1: Customer or Operator Services:
- Main supplies (all-in-One Service: **Environment**)
- Main supplies (all-in-One Service: **Cable**)

4.4 - Site infrastructure requirements

The site shall be handed over with the leased lines in operation.

Accessibility

- The people in charge to prepare the site (in which the equipment is to be installed) shall provide the site with hoisting and handling devices for delivery of the equipment. If not, the costs incurred by the installer will be added to the installation costs and charged to the client.
- The equipment can be transported by crane or by people. In the last case, the entrances to the buildings must be large enough to transport the rack in an upright position.
- Access to the sites must be facilitated:
  - either by the presence of a local correspondent during delivery, assembly / wiring, and initial start-up of the equipment
  - or by obtaining a set of duplicate keys to the sites prior to those operations.

Service facilities

- One or two phone lines are needed for the periods of installation and initial start-up of the equipments.

Floor

- The floor must be able to bear a load of 150kg per CBO cabinet (+ 600 kg for External battery cabinet).
- It must be able to withstand a momentary overload of 250 kg/100 cm² and be puncture-resistant to 30 kg/cm^2.
- The floor must be leveled and smooth.
- Floor evenness must be less:
  - 3 mm surface evenness under a 1.5 m ruler.
  - 6 mm slope per meter at any cabinet side.
- The racks are fixed on the ground and levelling possible by means of shims.

Distance constraints

- Various clearance spaces must be provided for maintenance and inspection operations and to allow equipment ventilation.

High voltage protector

- The external ports of the equipment (AC mains, PCM links, Ext. Alarms, RF cables) are protected. External coarse lightning protectors are recommended in case of exposed site and/or overhead power lines.

Lighting and wall sockets

- The external lamps on site should be of the electronic ballast type. The electronic ballast type is a system without pulses and do not disturb the PCM links.
- 230 V sockets will be provided inside AC distribution box mainly for emergency and installation purpose (two sockets, 2 poles and ground, 16 A).
- Inside the AC version cabinet, 230V socket service (US type) is provided in AC distribution unit. This socket is protected by 10A circuit breaker (total load = 1150VA).
- Inside the CBO DC version, 230VAC service socket is not provided.

Environment of the equipment

- Cable connections of CBO cabinet are only located at the bottom right side.
- Cabling access of External battery cabinet is only from the bottom.
- Cables from AC or DC distribution box to CBO cabinet should not exceed 20 meters.
- Cables from DDF to CBO cabinet should not exceed 20m.

Feeders

- The antenna feeders shall have labelled 7/16 feeder connectors.
- Feeder cables linking CBO cabinet to antennas (1 to 2 for each sector) shall be grounded .
- Distance from feeder termination to CBO connector should be ≤ 3 m.
- **CBO feeder type** : LCF Cu2Y: 1/2 “, 7/8”, 1 ¼” or 1 5/8”
  Compliant with IEC 754-1/-2.
- The standard for feeder connector is: IEC 169-4.
- Feeder losses from CBO antenna connector to antenna input connector, should not exceed 3 dB.
- For correct CBO operation, the VSWR should be < 1,5 (or > 14 dB) on feeder termination.
- Lightning protections are incorporated in the RF connector of the CBO.
- **Microwave A9400 feeder type** :ET 390 998 (up to 300m). Diam=10.3mm.
  Compliant with IEC 332-1.

Antennas

- Minimum of decoupling for antennas is 30 dB.

4.5 – Cable way requirements

- The cable way shall be separated or several cable trays shall be installed in order to separate the various electrical supply systems or a space of 30 cm should be foreseen between two signal types (e.g.: the 230 V should be not adjacent to transmission lines more than 2m).
- Cables between CBO cabinet and external battery cabinet or outdoor power plant must be trunked inside cable tray connected to GND. DC power cables and signal cable may be routed in same track of cable tray. AC mains cable must be routed in separate track of cable tray.

4.6 - Computer requirements

Laptop LMT/IMT provided in option, but necessary during the commissioning. The length of connecting cables between laptop equipment and rack on the site shall not exceed 15 meters.

Clearance	
Length of cables from MBS Outdoor to LMT/IMT terminal	15 m
Side clearance (only one side is necessary)	0.7 m
Front clearance	1 m
Rear clearance	0.2 m
Dimension and weight	
Width x depth x height (mm)	300x265x45
Maximum weight (kg)	3
100-240V, 50-60 Hz consumption	
Maximum power consumption (W)	200
Fuse gauges, earth leakage protection 30 mA	
Gauge (A)	6

4.7 - Power system requirements

The customer shall install all cables at the position of rack.
Cables shall be installed according to cable manufacturer recommendations.

Ground network TN-S system

- TN-S system without any restrictions (according to ETS 300 253)
  - origin of PE at the main earthing terminal of the power source.
  - PE is intentionally earthed intermediately in the distribution and at each main earthing terminal.
  - N and PE are separated throughout the distribution, the installation and within each equipment.

Ground network TN-C system

- TN-C system without any restrictions (according ETS 300 253).
  - the PEN conductor shall be connected to the main earthing terminal only.
  - from the main earthing terminal to and within the consumer locations inside the building the Neutral conductor (N) shall be treated as a live conductor.
  - a dedicated PE shall be provided.

Ground network TT system

- TT system: An additional external Residual Current operated circuit Disrupter (RCD) has to be specified (according ETS 300 253).
  (fault current of the RCD: ≥ 100 mA and selective type)
  - Origin of PE at the local main earthing terminal of the installation.
  - N and PE are separated throughout the installation and within each equipment.

Power supply system

- The CBODC power plant should include standard backup batteries for emergency power.
- CBO is powered with a nominal voltage:
  - 230 VAC under single phase L, N, PE. (CBOAC)
  - Or 48VDC power (CBODC).
- Characteristics of the AC power supply:
  - Nominal voltage: 230VAC.
  - Voltage range: 150 – 280 VAC.
  - Frequency: 47 to 63 Hz.
  - Impedance of the mains: R< 0,7 Ohm.
- Characteristics of the DC power supply:
  - Nominal range: 48VDC ± 20%
- A power distributing box must be provided as part of the site preparations. It must include marked breakers for each output, and a grounding bus bar for the power cables. The box or power station must be marked.

Power cable recommended

- Power cables, for CBO and battery cabinet, are with lug connector at the unit end. (AC lug pin 1.5 to 6 mm² , DC lug pin 25mm², ground cable diam.= 8mm).
- Multi strand flexible copper core. Strand composition 0,41 mm max. class 5 (IEC 228) . Standard to be compliant with country legislation.

➢ **AC power cables:**

- Maximum cable length, condition: Min. AC input voltage : 195 V.

1 cable per cabinet (CBOAC or battery cabinet)		
Signal	**Cross section**	**Length max.**
230 V	3 x 2.5 mm²	80 m
Ground	50 mm² / YG	100 m(see note 1)

➢ **DC power cables:**

- Maximum cable length, condition: Min. DC input voltage : -38.4 V.

Signal	**Cross section / color**	**Length max**	
		EBCO ↔ CBOAC	CBODC
-48VDC	25 mm² / Blue	10 m	10 m
0VDC	25 mm² / Black	10 m	10 m
Ground	50 mm² / YG	100 m (see note 1)	

Note 1: Cabinets on site must be connected to main PE strip on shortest way.

distribution box recommendations

- The DC distribution should be defined for using lugs pin crimp of system 8 mm for 0V and –48V wires.
- The AC or DC distribution should be defined for using lugs of system 8 mm for electrical earth.
- The AC distribution should be defined for using tips of system 2.5 mm² for L and N.

Breakers recommendations

- The customer provides the following gauges (with lightning protection if necessary):
  - The gauges should be calculated to operate with ETS 300132-2 standard (-38.4VDC or 195VAC).
  - On first approach, the gauge is calculated like: Imax.+ 1/3 Imax. (I at –38.4VDC or 195VAC).
- AC breaker recommended is category C with breaking capacity 6000 A. Selective differential circuit breaker at high leakage current recommended is >100 mA in accordance with the country legislation.
- It is recommended to dimension the gauge according to the final configuration to avoid an interruption of service during an extension. The gauges must be in line with product safety standards.

RECOMMENDED EXTERNAL BREAKERS		
Version / Cabinet	***AC voltage 230 V (1 phase / neutral)***	***DC voltage –48V***
CBOAC	C25A One breaker / curve C	*Not applicable*
CBODC	*Not applicable*	80A One breaker / curve C
EBCO	C25A One breaker / curve C	*Not applicable*

Lightning protection for AC lines

- Coarse lightning protection, class I according to IEC 61643 [discharge capability minimum 50kA (10/350) in L and N leads] is recommended and manufacturers recommendations should be followed (e.g. distance from adjacent parts, decoupling etc.).

Grounding distribution

- A ground plate directly connected to the ground box of the building must be available on site.
- The grounding system is composed of a metallic grounding network, formed of iron flooring .The grounds are respectively connected to grounding plate, and to the metallic ground of the power distributing box.
- The ground wire circuit resistance must be less than 10 ohms.

4.8 - Leased line requirements

The following shall also be handed over:

- a diagram of the distribution frame, identifying the lines, a wiring diagram.
- the technical and commercial references of each line.
- the lines connected to the line terminal blocks.
- the looped Tx/Rx lines on DDF.
- the quality tested lines of the local distribution frame to the remote distribution frame.
- For G703 installation, the following cables are recommended:
  - 120 Ohms, L907 (up to 100m), CBO-NTL link.
  - 75 Ohms, Flex 3 (up to 300m), CBO-NTL link.
  These cables are without connector at CBO end and prepared to be screw-fastened at the connection unit end.
- There is no protection for rodent on these cables. On hazardous field, it is necessary to put these cables inside a closed cable way.
- for each cable type 3 m additional length is necessary to perform the different connections.

Network Impedance	Type of cable	Connection DDF recommended	Length max.	Nber
120 Ohms	L907 type: 4 x 4 x 0,5 mm (diameter)	Inserting	100m	1 cable
75 Ohms	8 coaxs 0,4 / 2,0 / 3,55 FLEX3 type	Inserting	300m	1 cable

4.9 - DDF requirements

- The Digital Distribution Frame should have terminal blocks for inserting PCM cables:
  - L907 for 120 Ohms — copper, D : 0,5 mm
  - Flex 3 for 75 Ohms — copper, D : 0,4 mm
- The equipment terminal block must be apart of customer terminal block (DDF) at maximum 1m.
- The customer must indicate to Alcatel the connector type on equipment side (only for E1 cables 75 Ohms) and the supplier.
- The pins of terminal block to wrap (120 Ohms) supplied by the customer must have a diameter between 1 and 1,5 mm.

4.10 - External alarm connection requirements

Optionally, the alarms can be connected directly on connection area of CBO. The following cables can be used in the case where the customer wants to connect the alarms on the DDF without connector.

Alarms	Cable L907	Connection on DDF side	Nber
Inputs	4x2x0,5 mm² for 4 alarms	inserting	1

4.11 - Orientations and exposure requirements

- The front of the rack will face North in northern hemisphere or South in southern hemisphere to avoid constant exposure to the sun (heat exchanger).
- In countries with strong solar radiation and high ambient temperature, a sun shade is recommended only if the cabinet is installed at surfaces absorbing solar heat (asphalt and similar). The sun shade must be installed in such a way, to ensure at least 1 meter shadow in front of doors (heat exchangers).
- To allow servicing when it is raining, the front to rear axis of the rack should be at right angles of the prevailing wind direction.
- If these two requirements cannot be satisfied, priority shall be decided according to the characteristics of the site.
- The CBO cabinet is designed to withstand a 180 km/h wind speed.

4.12 - Site information requirements

The customer shall produce an overall drawing for each CBO site.

General site information requirements

- The drawing shall be submitted to Alcatel, after the initial site inspection, or in preliminary project documentation concerning the site supplied by the customer.
- The drawing shall indicate the position of the CBO cabinet with its connections, relative to a reference point.
- The drawing shall indicate co-located RF emitting equipment.
- The site data sheet must be completed based on data provided by the client or during site inspection.
- The site information procedure document (see document SPG-07) should be completed by the customer or during a site inspection visit with Alcatel.

PCM site information requirements

- The operator shall hand over to the supplier, with the preliminary study document or on the occasion of the site inspection.
- A drawing of the distribution frame identifying technical and commercial links with numbers for each link.
- The links with transmit/receive loops set up on the cable at the unit side. Links qualified as far as the CBO.

Layout

- The client shall draw up a layout map for each site. That map will indicate the location of:
  - Racks,
  - Power supplies,
  - Air-conditioning system,
  - Cable ways,
  - Collector rod system,
  - Grounding plate,
  - Distribution frames (positioning of the terminal blocks),
  - Furniture for the operating and maintenance tools.
  - Compliance RF perimeters.
- That plan is submitted to the manufacturer, either after an initial inspection of the site or in a preliminary project file for the site provided by the client.

5. Installation and supply requirements for Alcatel

This chapter describes the requirements about installation and supplies provided by Alcatel.

5.1 - Installation

5.2 - Supplies

5.1 - Installation

The main services are as follows:

Fitting of CBO system

- The services provided are:
  - Preliminary preparation.
  - Rack installation.
  - Power supply and earth cables installation.
  - PCM cables installation.
  - Antenna jumpers installation.
  - Alarm cables installation (optional).
  - Synchronization cables installation (optional).
  - Finishing installation.

and are detailed in **EVOLIUM™ A9100 CBO** Installation manual.

Commissioning of CBO system

- CBO cabinet powering up and running in accordance with **EVOLIUM™ A9100 CBO** Commissioning manual.

Acceptance of CBO system

- Customer agrees that CBO has been installed, commissioned and is running in accordance with **EVOLIUM™ A9100 CBO** Acceptance test manual.

5.2 - Supplies

Alcatel provides:

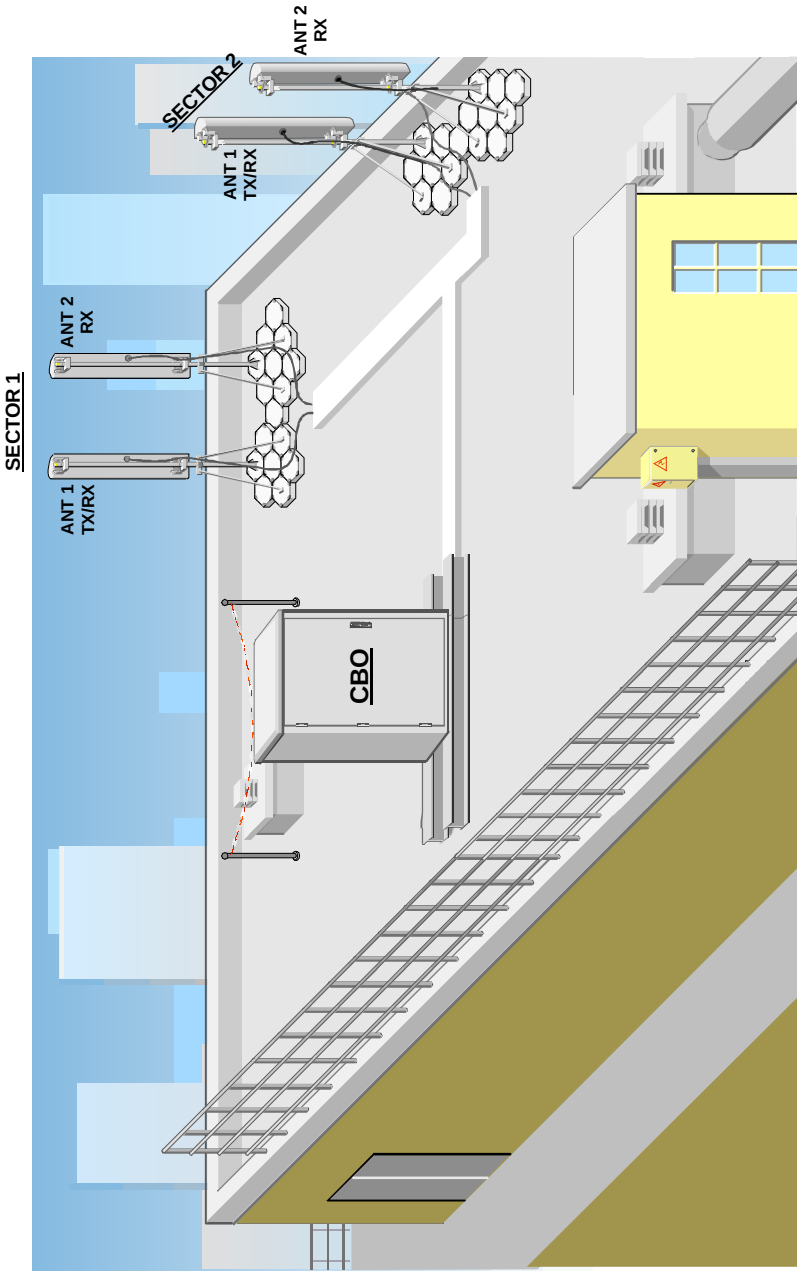
Mandatory

- Installation kit to install CBO system.
- RF jumpers (recommended 1m, 7/16 male connectors).
- Installation kit to install External Battery Cabinet Outdoor.

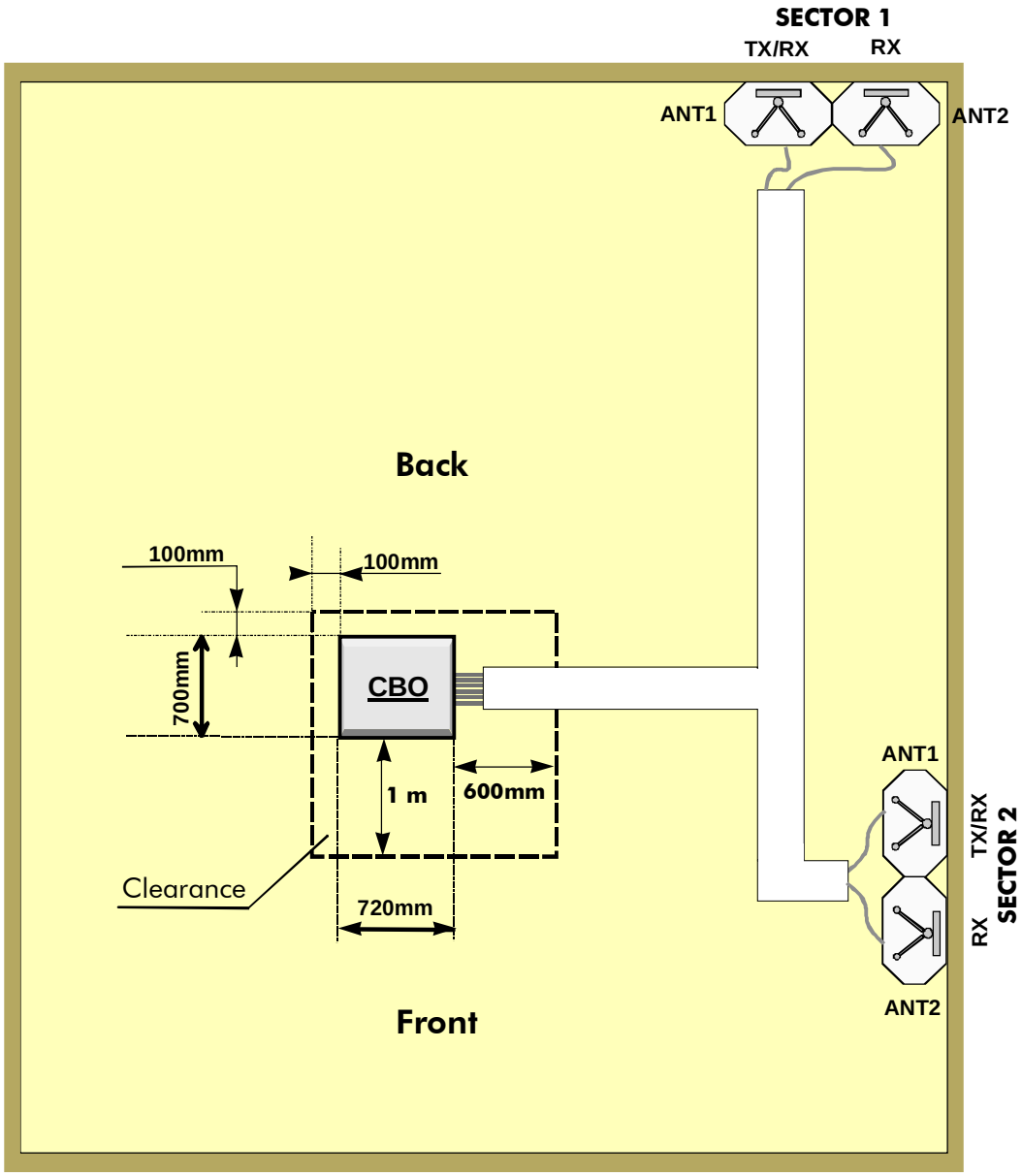
Optional

- Synchronisation cables.
- Alarm cable.
- PCM cables.
- AC or DC and ground cables.
- DDF.

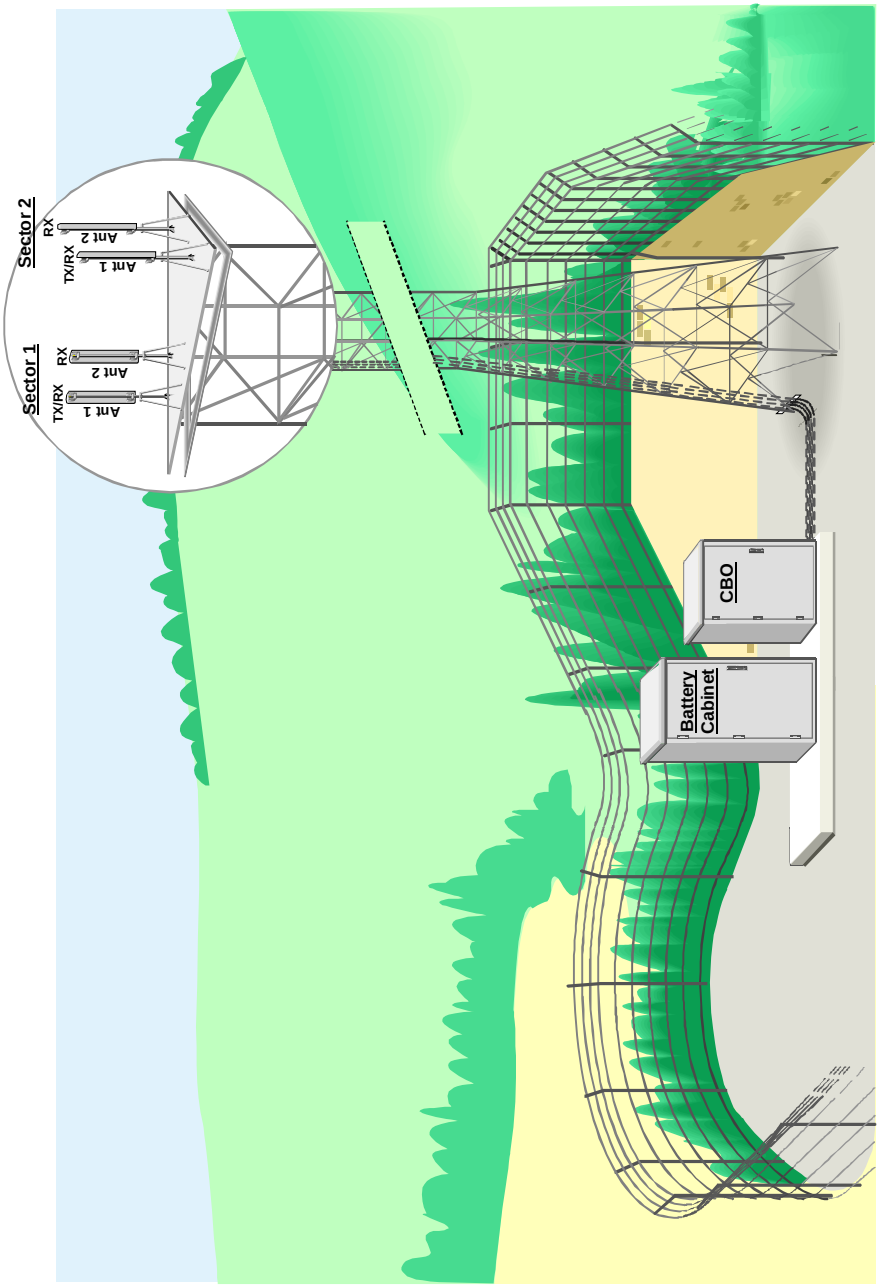
Appendix A: Installation help, cabling site configuration with 1 Compact BTS Outdoor cabinet, 2 sectors, steel construction on roof, 2 antennas / sector.



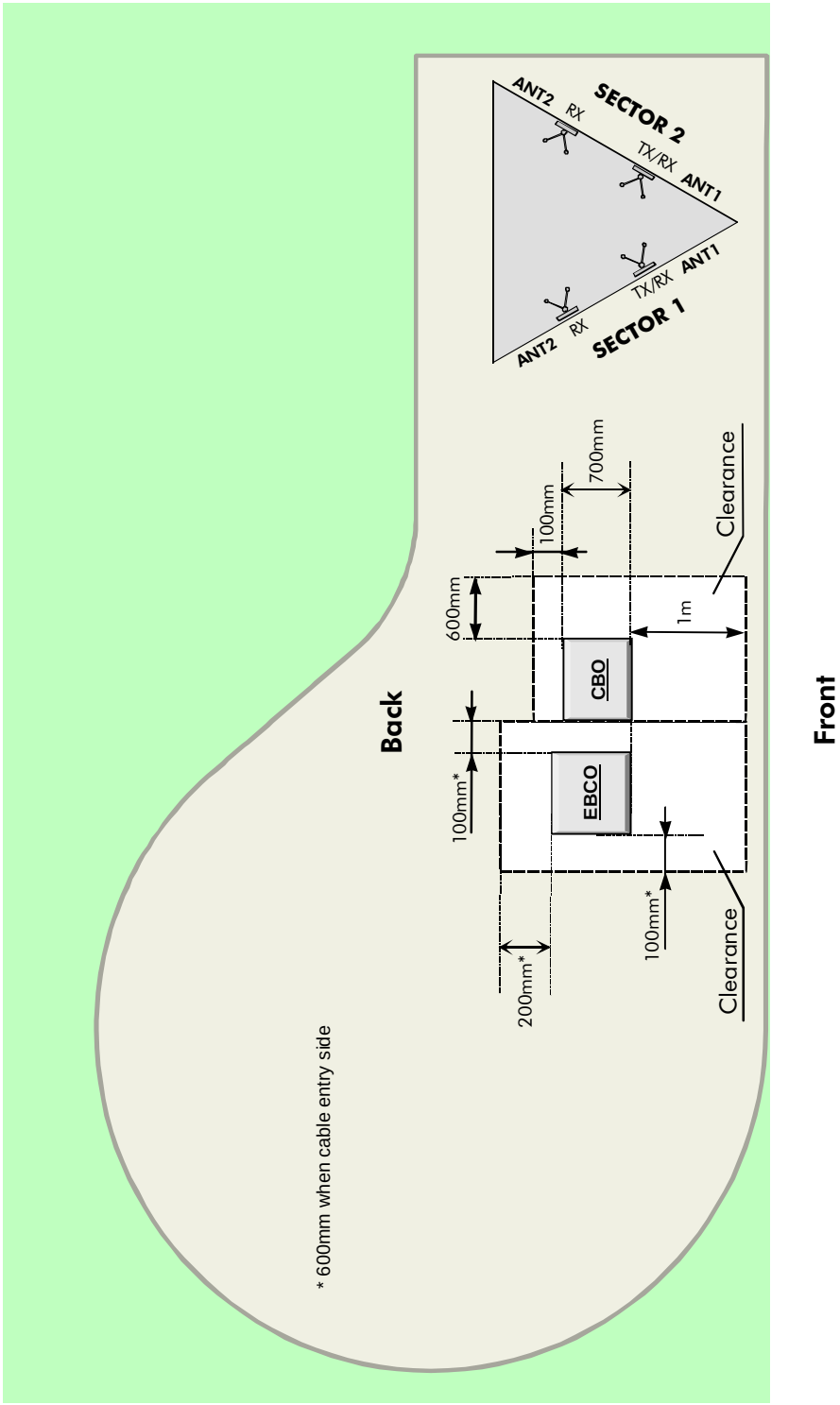
Clearance



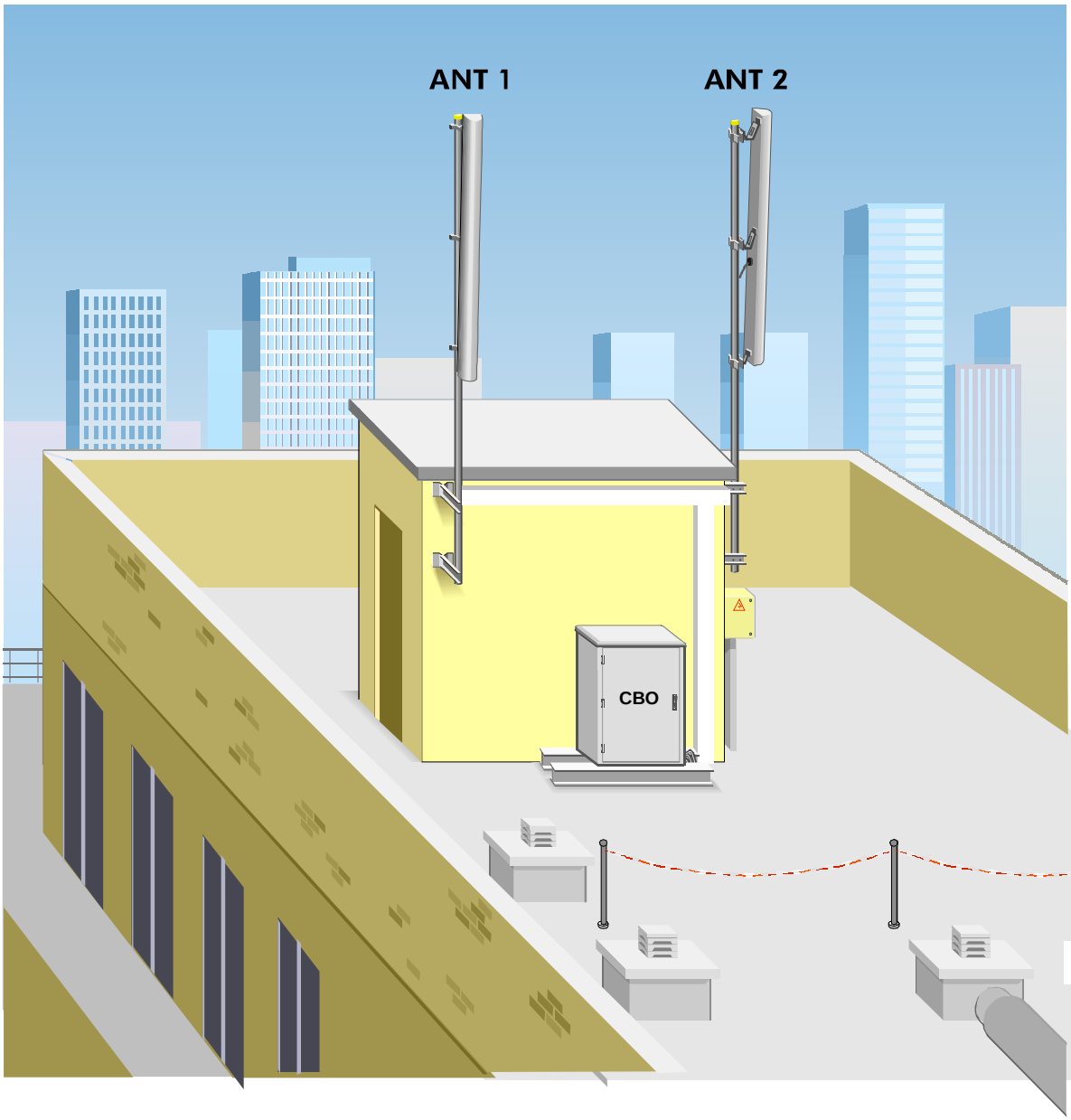
Appendix B: Installation help, cabling site configuration with CBO cabinet, External Battery cabinet, 2 sectors, concrete foundation on field, 2 antennas / sector, 1 tower.



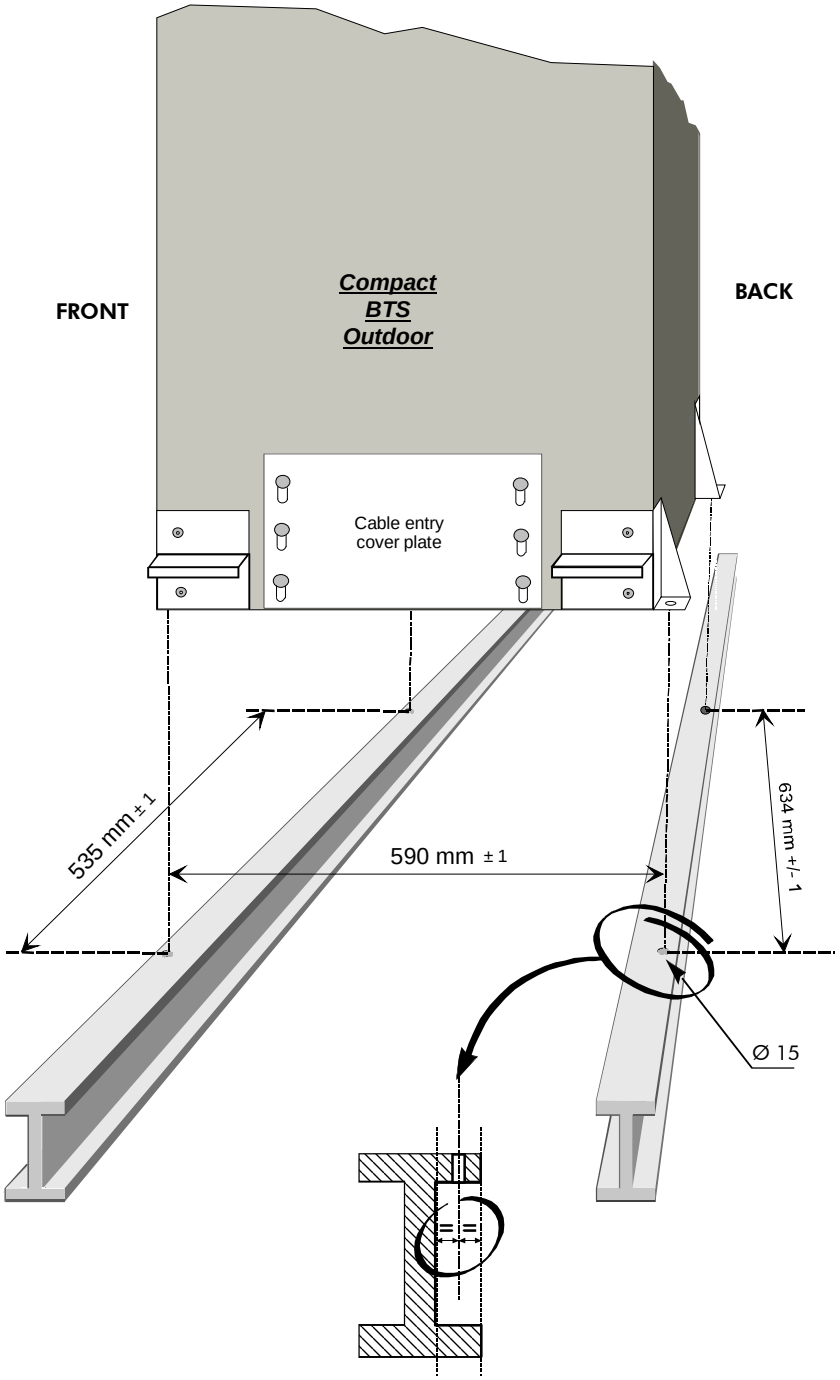
Clearance



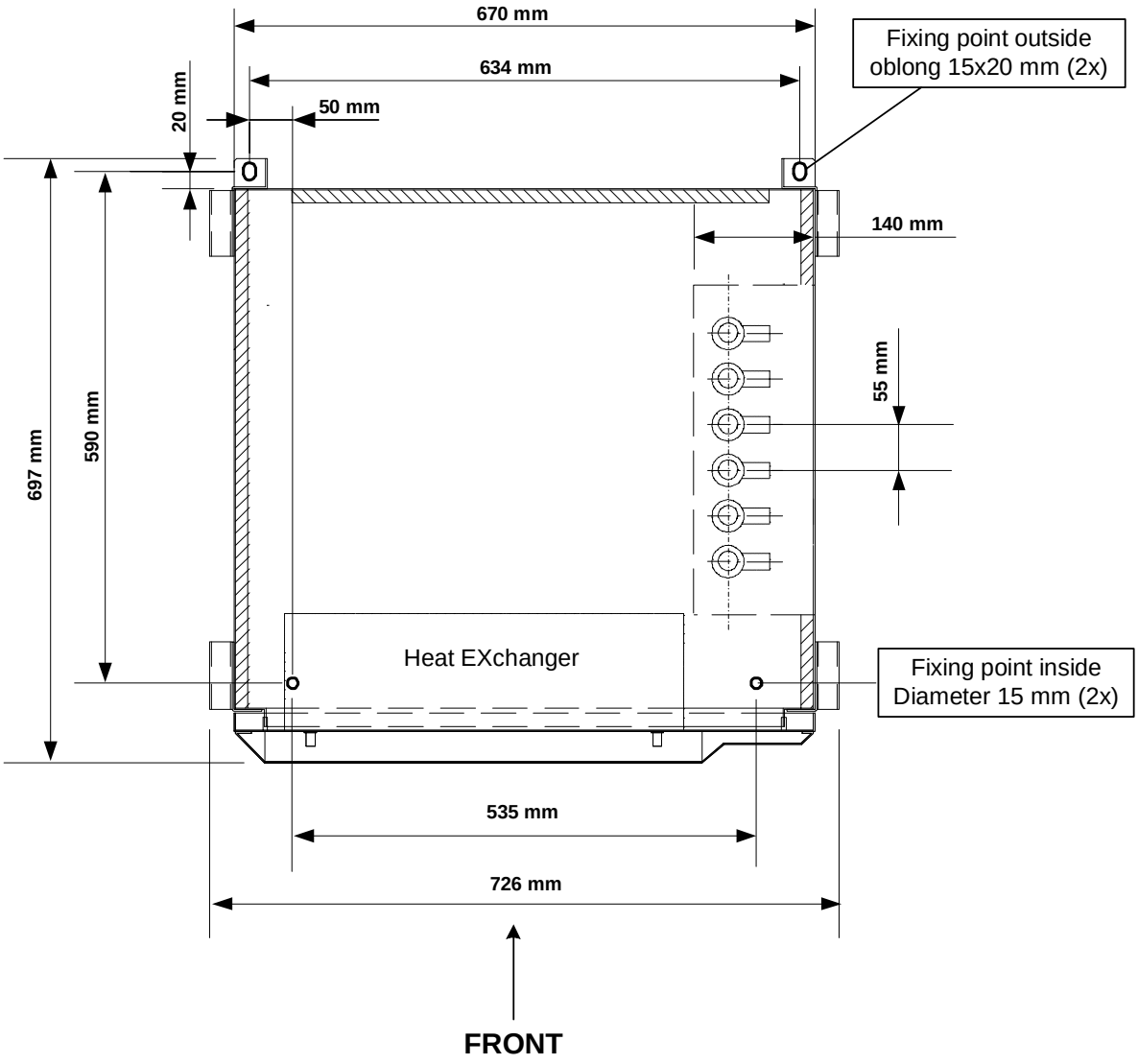
Appendix C: Installation help, cabling site configuration with 1 Compact BTS Outdoor cabinet, back close to a wall.



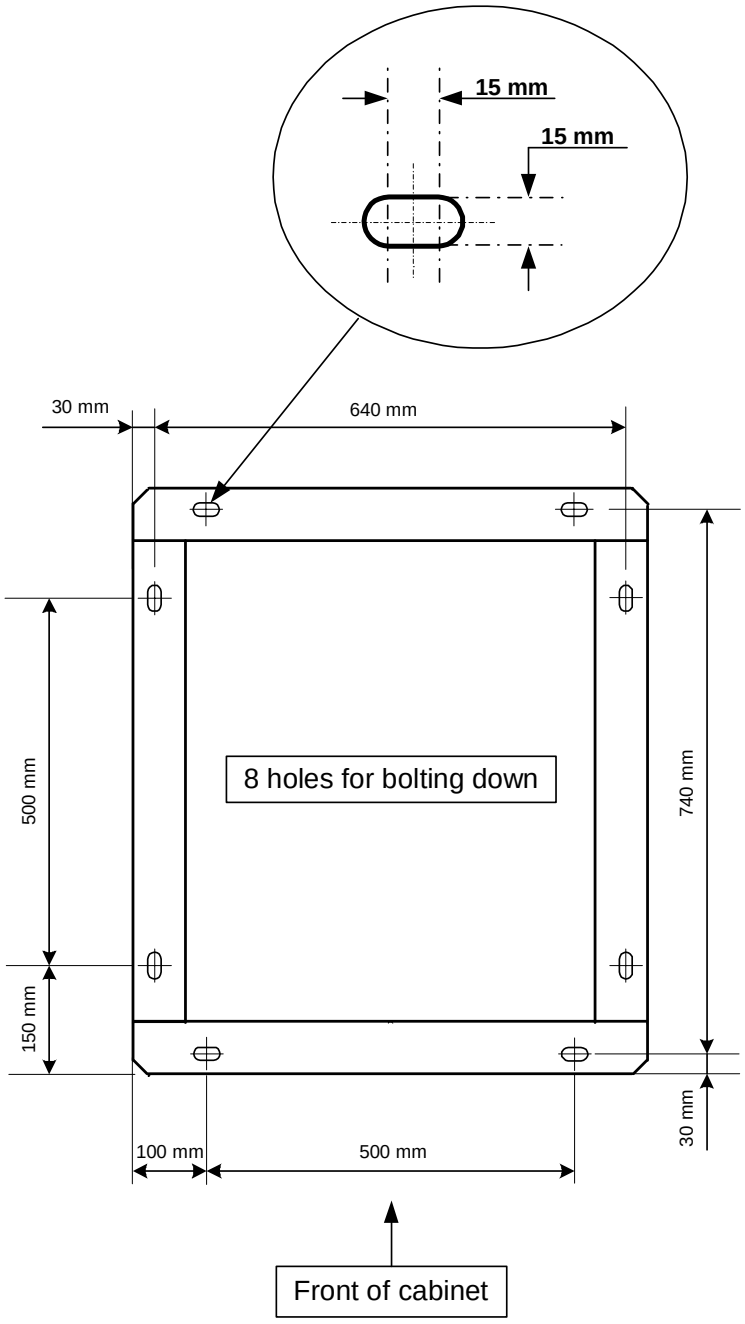
Appendix D: Installation help, drilling



Top of view of CBO cabinet
Fixing points

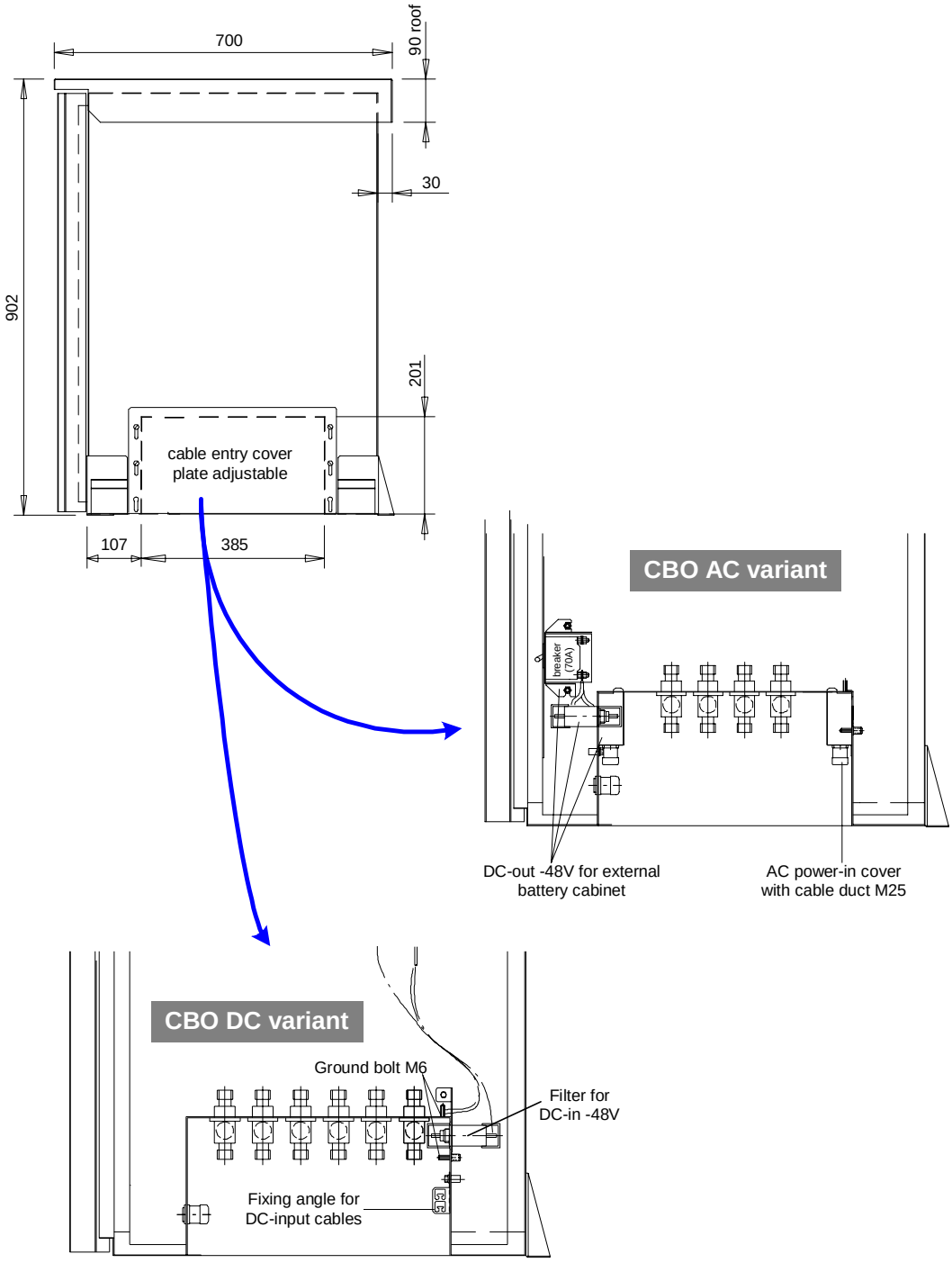


Top of view of External Battery Cabinet
Fixing points



Installation note: Fixing with four screws is sufficient.

Appendix E: Installation help, cable entry.



Abbreviations

Sigle	Description
AC	Alternative Current
BTS	Base Transceiver Station
CBO	Compact BTS Outdoor
DC	Direct Current
DDF	Digital Distribution Frame
EDGE	Enhanced Data rates for GSM Evolution
EMF	ElectroMagnetic Field.
GSM	Global System for Mobile communication
HP	High Power
IDU	InDoor Unit for transmission connection (Microwave)
IMT	Interface Maintenance Terminal.
IPN	Metallic part streamlined in I
LCF	Low Loss Cellflex cable
LMT	Local Maintenance Terminal
MND	Mobile Networks Division
MP	Medium Power
N	Neutral
NTL	Network Termination Line
ODU	OutDoor Unit
PCM	Pulse Code Modulation
PDU	Power Distribution Unit
PE	Protective Earth
PEN	Combined Protective Earth and Neutral
RCD	Residual Current operated circuit Disrupter
RF	Radio Frequency
SELV	Safety Extra Low Voltage
TNV	Telecom Network Voltage
TRX	Transmitter and Receiver unit
VSWR	Voltage Standing Wave Ratio (Return loss)

END OF DOCUMENT