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UP - Box for outdoor installations

This document describes the box for outdoor installations of the UP, the Remote Terminal Unit for telecontrol and supervision of Medium Voltage distribution network; it provides functional and construction requirements for the supply.


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Revision	Data	List of modifications
00	02.11.2015	First version
01	08.08.2017	Chapter 10 review, including in the supply conditions: TCA documents, manuals delivery and safety information on plate; Chapter 11 added, on safety requirements; Other minor fixes; Editorial amendments.
02	30.09.2019	Second edition. Implementation of the outcomes of the DtV Design to Value methodology. Clarification on holes dimensions on the lower shelf. Material requirement: STEEL AISI 316. Enhanced Mechanical Tests Required: shock and free fall, in addition to sinusoidal and random vibrations.

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55

56 **1 ACRONYMS**

57 **CPE** Customer Premises Equipment

58 **FPI** Fault Passage Indicator

59 **IC** Customer Interface device

60 **LVCB** Low Voltage Circuit Breaker

61 **LVI** Line Voltage Indicator

62 **PSBC** Power Supply Battery Charger

63 **RGDAT** directional fault passage and voltage loss indicator

64 **RGDM** directional fault passage indicator with measuring acquisition

65 **Recloser** Pole-mounted switch breaker with integrated control module

66 **RTU** Remote Terminal Unit for the remote control of the secondary substations

67 **SD** Switch Disconnecter

68 **SG** Switchgear

69 **TB** Terminal Board

70 **UE** Processing Unit of the RTU

71

72 **2 INTRODUCTION**

73 Enel standardized MV remote control solution for outdoor applications includes a Remote Terminal Unit (RTU) and, optionally, a fault detector installed in correspondence of the Line Out switch.

74 The Global Standards GSTR001 and GSTR002 describe the standardized Remote Terminal Unit (RTU), also called UP, which can be used to remote control MV pole mounted switches, reclosers and circuit breakers.

75 This document describes the outdoor box for the Remote Terminal Unit designed for pole-mounting applications.

76 This specification aims at maintaining the compatibility between the existing equipment normally used for indoor installations (batteries, power supply, and UE) and provide solutions suitable for pole installations (interface with the UE via terminals, layouts of the terminals in order to interface them to new equipment, etc...).

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85 **3 LIST OF COMPONENTS, PRODUCT FAMILY OR SOLUTIONS TO WHICH THE GS APPLIES**

86 Two versions of the outdoor container have been defined:

- 87 • Standard version - OS-UP
- 88 • Extended version- OXL-UP.

89 Each one corresponds to a different product family code.

90

91 **3.1 Enel Product family codes of the Outdoor Cabinets**

Global Product Family Code	Description	Reference Global Standard	Included in the Global Product family code
OS- UP2020 Lite Complete Kit	Complete UP kit for Outdoor application, mounted in the Wall-mounted indoor cabinet container equipped with UE 2020 L8	GSTR002 GSTR001/3	PSBC UE8 OS-UP
OS-UP	Outdoor cabinet container for pole-mounted Remote Terminal Unit - standard version	GSTR001/3	
OXL-UP	Outdoor cabinet container for pole-mounted Remote Terminal Unit - Extra-large version	GSTR001/3	

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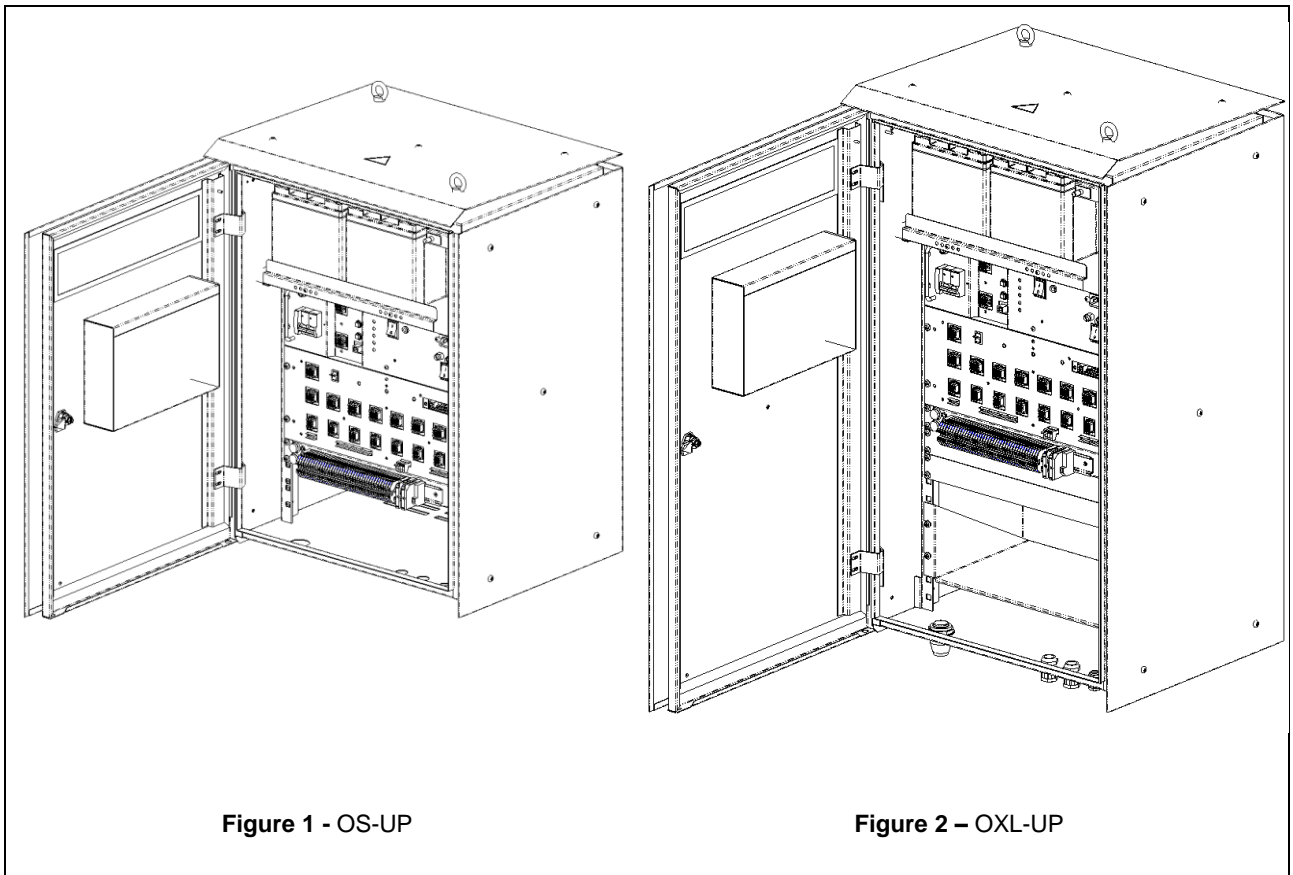



Figure 1 - OS-UP

Figure 2 – OXL-UP

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Accessories	Solution	Description		Supplied
PSBC	OS-UP/ OXL-UP	Power supply/ battery charger of the RTU, switchgears and auxiliary devices (modem, router, etc.) with accessories	GSTR002	Yes
UE8	OS-UP/ OXL-UP	Processing Unit Device capable to telecontrol for 8 switchgears with accessories	GSTR002	Yes
Batteries	OS-UP/ OXL-UP	Couple of 12V batteries for remote control secondary substations	GSCB001	No
GSM/GPRS Modem	OS-UP/ OXL-UP	DCE for the remote connection		No
Terminal Board (TB)	OS-UP/ OXL-UP	Terminal board, either for the power supply of other devices, or for the local commands of the SG.		Yes
Thermoregulation system	OS-UP/ OXL-UP	Anti-condensing/heating system		Yes
Additional shelf	OXL-UP	Additional shelf for placement of auxiliary devices		Yes
Batteries	OS-UP/ OXL-UP	Batteries in compliance with the global specifications on batteries for secondary stations		No
SG-TB cable	OS-UP/ OXL-UP	Cable for the connection between the SGs and the TBs		Yes
FPI-TB cable	OS-UP/ OXL-UP	Cable for the connection between the FPI connector and the TB		Yes
PSBC-TB cable	OS-UP/ OXL-UP	Cable for the connection between the PSBC and the TB		Yes

96

97 **4 APPLICABLE LAWS, REFERENCE STANDARDS AND GLOBAL STANDARDS**


98 **4.1 Applicable Laws and Standards**

99 Refer to GSTR002.

100 **4.2 Enel Global Standards quoted in the document**

101 Refer to GSTR002.

102

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103 **5 CONSTRUCTION CHARACTERISTICS**

104 Chapter 5.1 describes the design characteristics common to both the OS-UP and OXL-UP. Solutions.
105 Chapters 0 and 5.3 describe the design characteristics specific for each of the two solutions, standard
106 and XL, respectively.

107 **5.1 Common features**

108 **5.1.1 Cable passage**

109 Both the cabinet containers (standard and extended versions) described in these specifications, are a
110 variation of the box for indoor installation, as described in the GSTR001/2 specification. The container
111 base must be provided with holes to pass the cables.

112 The cable glands used for the entrance on the bottom side of the container (included in the supply) must
113 allow the passage of the cables listed below:

- 114 • Power supply cable, which must have a diameter equal to 16 mm;
- 115 • Cable for the connection to the switch disconnect/circuit breaker, which must have a diameter
116 equal to 20 mm;
- 117 • Antenna cable: jack must have a diameter equal to 9 mm;
- 118 • Ground earth should pass through bolt

119 The base of the container (Figure 3) must also be provided with a hole with a diameter of 35 mm, sealed
120 with a cable glands for the RGDAT sensors. The external diameter of the spiral sheath is equal to 21.5mm
121 and the internal diameter is equal to 16.5mm.


122

HOLE USE	Hole diameter in the metallic base ¹	Dimension of the cable to be installed after cable gland installation ²
POWER SUPPLY	23 mm	16 mm
switch disconnect/circuit breaker	23 mm	20 mm
ANTENNA	14-16 mm	9 - 10 mm
RGDAT	35-37 mm	21.5 mm

123

¹ Suggested dimension. It afflicts the choice of the cable gland to be used in order to guarantee the mandatory requirement regarding the external diameter of the cable. Other solution may be proposed to ENEL for approval.

² Mandatory requirement.

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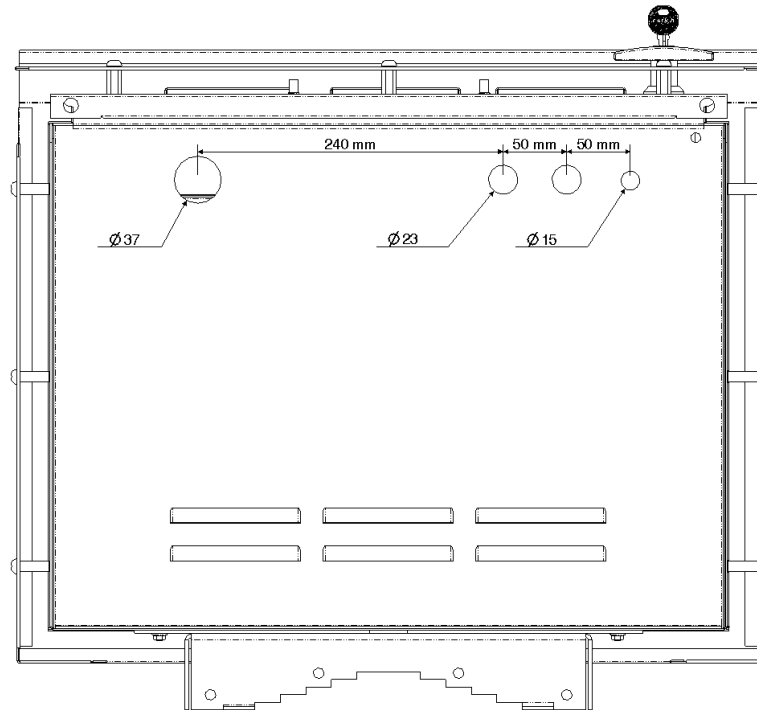


Figure 3 – Layout of the container base

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128 **5.1.2 Environmental Conditions**

129 All of the external surfaces of the cabinet container must ensure an effective and prolonged anti-corrosion
130 effect.

131 The metal components of the box shall be made of AISI 316 STEEL. The minimum width of the steel
132 sheets shall be 0,8mm.

133 The cabinet container must have IP54 or higher degree of protection, and must be suitable to use in
134 environmental conditions classified as climatic category type C5-M "Very High" (coastal areas with high
135 salinity), in compliance with standards ISO 9223 and EN ISO 12944-2. No painting is needed due to the
136 intrinsic anti-corrosion propriety of the AISI 316 steel. Anyway, an external treatment shall be done in
137 order to reduce solar reflections of the surfaces of the box.


138

139 **5.1.3 Content of the cabinet**

140 The content of the cabinet (UE panel, PSBC, and any other devices) shall be mounted on a 19"
141 standardized rack frame. The box must be accessible from the front, and the rack frame must be of the
142 unified multi-hole type.

143 **The rack frame should allow the insertion of devices with a depth up to 280mm.**

144 The batteries will be inserted on the shelf (Figure 4) positioned on the upper side of the container (space
145 of 5U).

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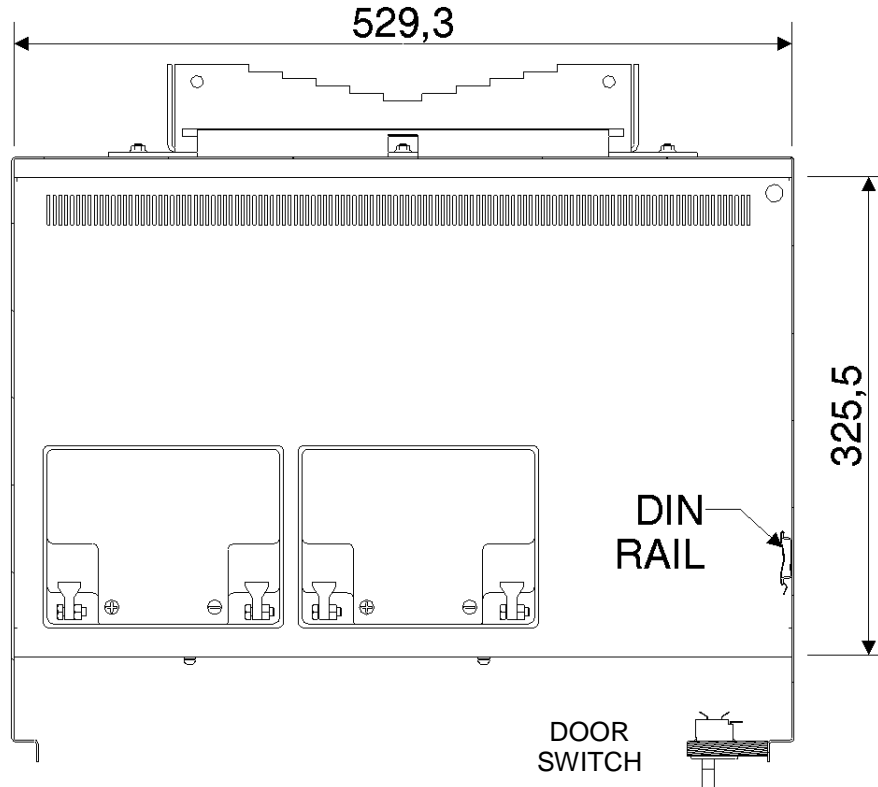


Figure 4– Horizontal section – batteries shelf

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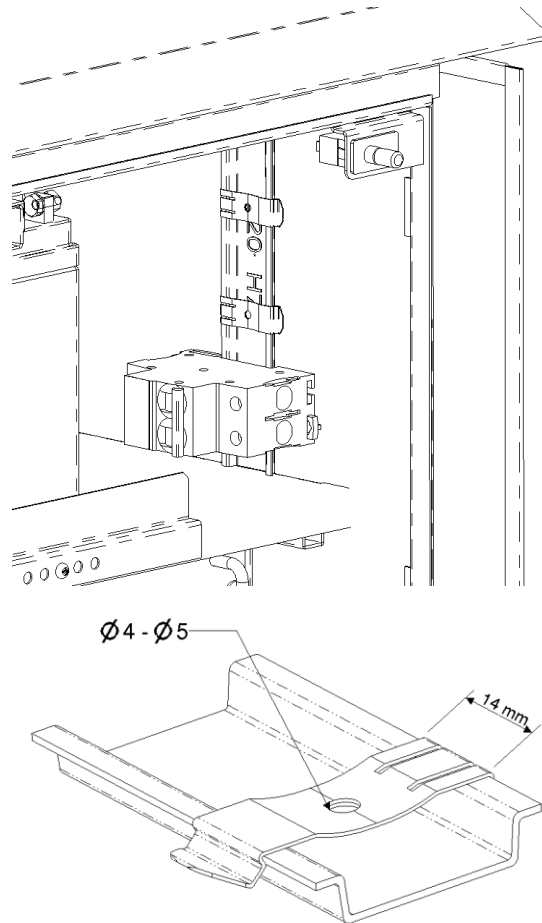
149 On one side of the container (Figure 4), corresponding to the battery cover, a (type omega) a DIN rail
150 must be installed (Figure 5), which must be equipped with 2 clips and a circuit breaker which connect the
151 secondary VT in order to simplify commissioning and maintenance.

152 The DIN rail with the circuit breaker can be installed also in the lower part of the box, to guarantee easiness
153 of installation.

154 The other side of the circuit breaker will be pre-wired to the expected loads (PSBC, heater, etc ...).

155 **The default position of the breaker must be OFF position.**

156 Alternative solutions to the breaker, aimed to guarantee the safety during the connection of the VT, must
157 be proposed to Enel for acceptance (e.g. a sectionable terminal board).



158

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162

All the grounding braids are included in the supply.

163

The grounding braids must have a section at least equal to 16 mm² and include the connection of the grounding bolts (Figure 6) of the individual panels with the grounding bolt placed on the container.

164


165

The metal container must be provided with a grounding bolt for the connection of either the +24V_{DC} power supply or the eventual exposed-conductive-parts.

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Figure 5 – DIN rail with circuit breaker and applied clip (detail).

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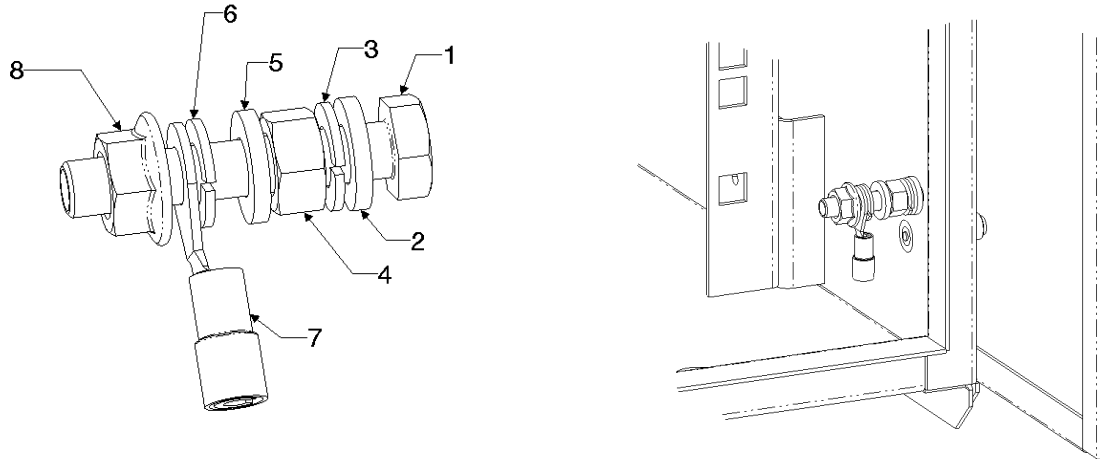


Figure 6 - Grounding bolt

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The container must be equipped with lifting eyebolts to help the transport and installation of the RTU.

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Instructions on how to optimize the use of the eyebolts are required.

173

The container must be provided with proper solutions to limit the risk of overheating, due to the direct solar radiation (such as air inlets/outlets, reflector panels or ventilated wall chambers).

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The panel must project beyond the front door. The access door must allow for the insertion/removal of all of the equipment housed in the container. Once the door is closed, it must be locked with a security lock with a key (see Figure 7).

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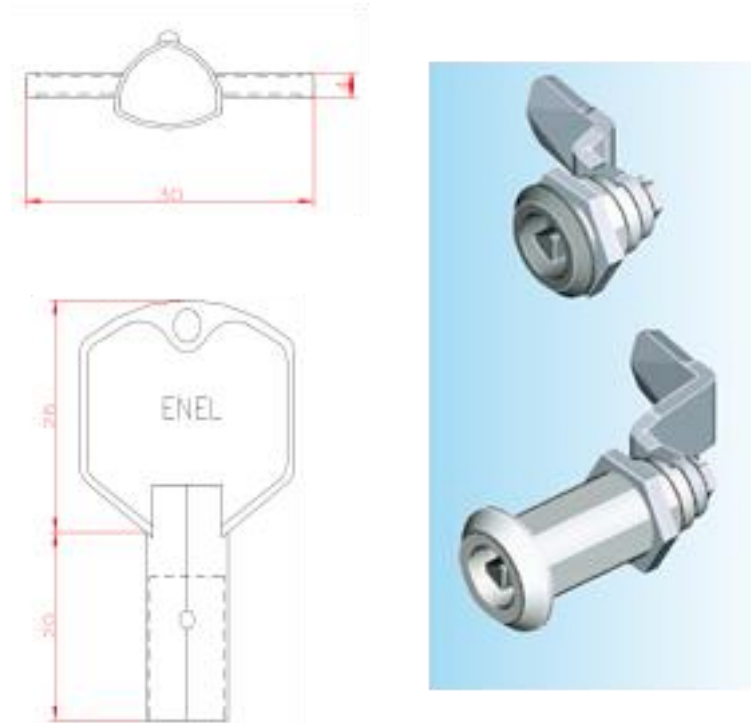
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The cabinet container must be provided with a system allowing the rainwater to runoff (such as an inclined panel, as shown on the top of Figure 11).

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Figure 7 – Standard Enel Key with a triangle of 6,5mm and examples of metallic door locks to be used.

183

184

On the inside of the front door it must be possible to house a fault detector (RGDAT/RGDM).

185

For this reason the door must have an adequate profile (as to the depth) in order to allow placing the devices without producing any contact or interference upon door closing and cables wiring.

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The maximum size to be considered for the RGDAT/RGDM is: LxHxW: 300x200x70 [mm].

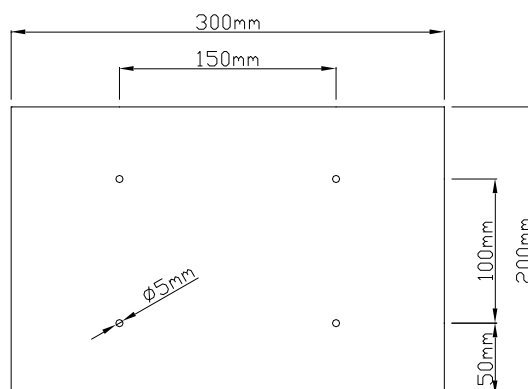
188

For the RGDAT/RGDM mounting pattern, refer to the diagram which is provided in Figure 8.

189

4 fixed bolts must be present in the internal side of the front door: each one must be equipped with a washer and a nut, see Figure 9 and Figure 10.

190



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Figure 8 – Mounting pattern of the RGDAT/RGDM

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Figure 9 – 4 Fixed bolts (washers and nuts must be on every bolt)

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Figure 10 – Detail of washer and nut on the bolt

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A contact must be provided, capable to communicate the door opening to the RTU, by means of a connection to the “Door Opening” Remote Signal.

The air inlets must be equipped with an anti-insect net.

All of the cables leading from either the switch disconnecter or the circuit breaker, which is mounted on the top of the pole, or the antenna, run along the pole, toward the base of the RTU container, and are mechanically protected by a fiberglass channel (Figure 11).

In order to avoid water infiltrations inside the container, a coiled sheath, properly curved, protects the last section of the cables, from the end of the fiberglass channel, toward the RTU container.

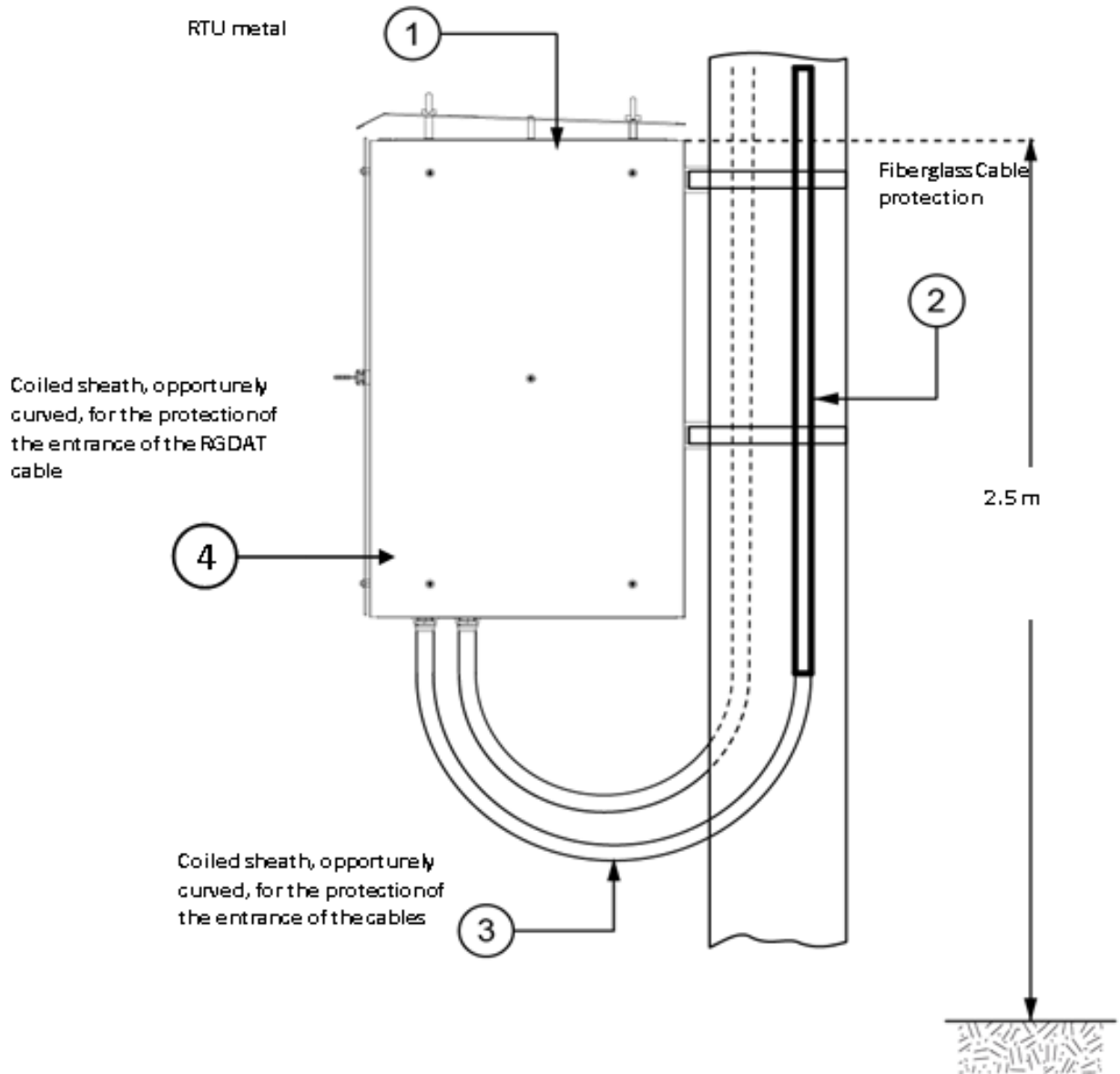
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An entrance must be available for the cables of the switch disconnecter, the 100V_{CA} power supply derived from the transformer, the antenna, and all of the spare RMs and RSs if any.

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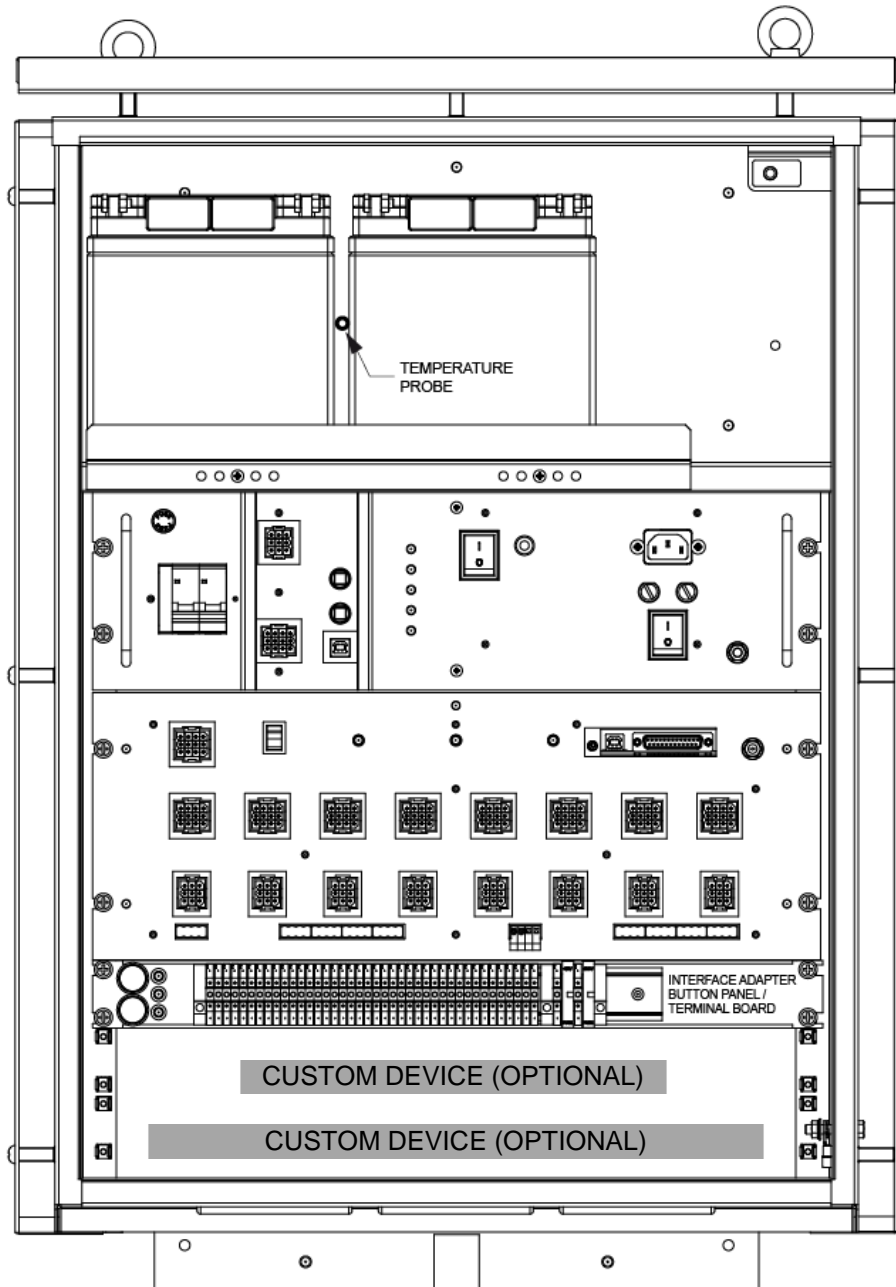
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Figure 11 – Installation example

218 **5.2 Outdoor box – Standard version**

219 The standard version of the outdoor cabinet must be suitable to house devices with total height of 15U.
 220 The size of the standard version of the outdoor cabinet container is shown in Figure 12, Figure 13, Figure
 221 14.



222 **Figure 12 – Front view of the Standard version of the outdoor cabinet container.**

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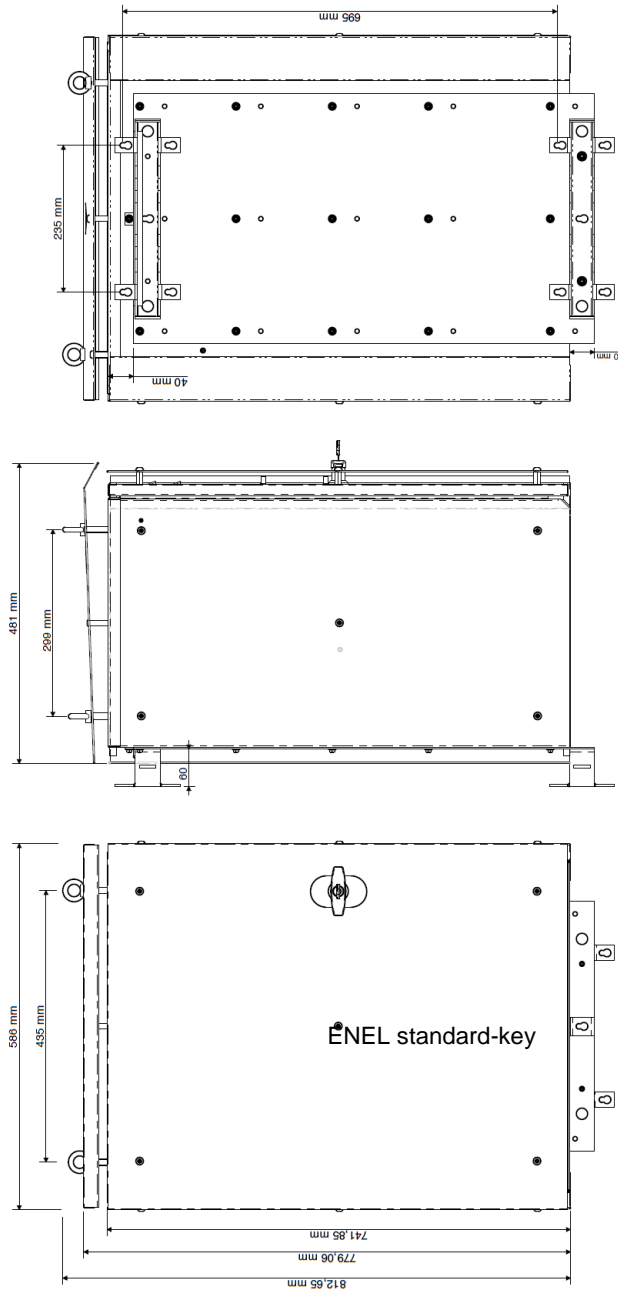



Figure 13 – Standard version of the Outdoor Cabinet container- Front/Left Side

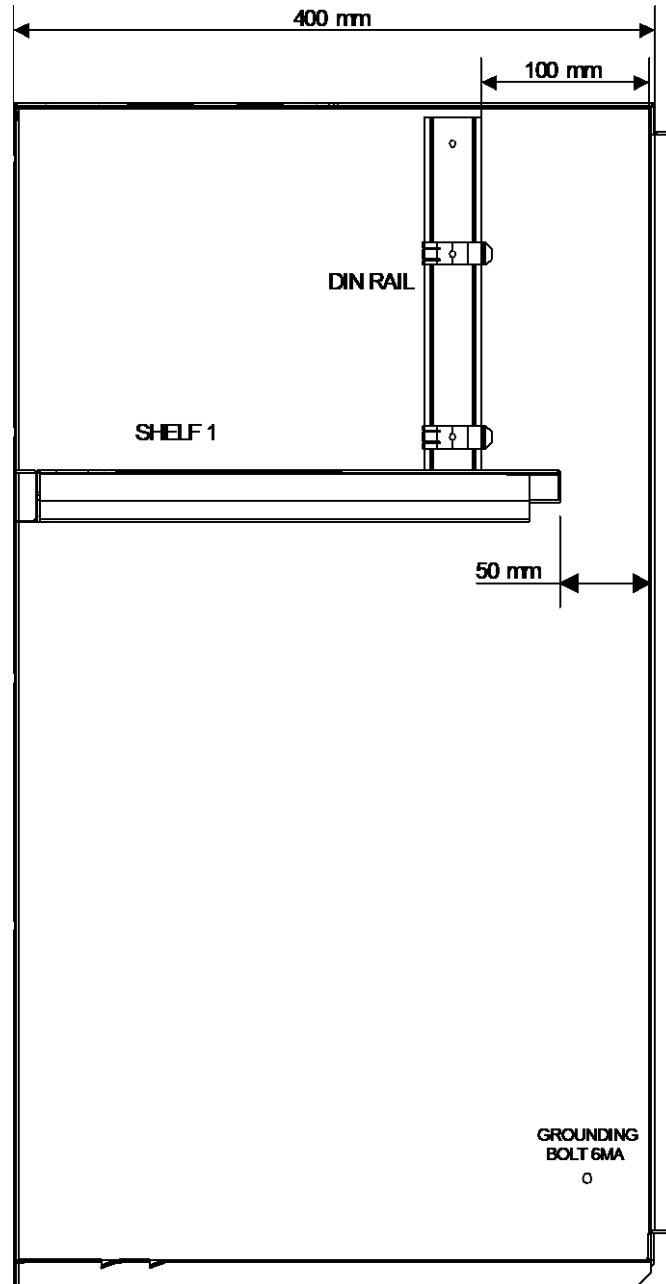
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235 The front door must be hinged on a side, and equipped with a door-lock compliant with the ENEL standard
236 key as shown in Figure 7.

237 With reference to the battery compartment, the horizontal plane must be provided with a small edge to
238 avoid the batteries slipping out from the front (Figure 14 and Figure 15).

239

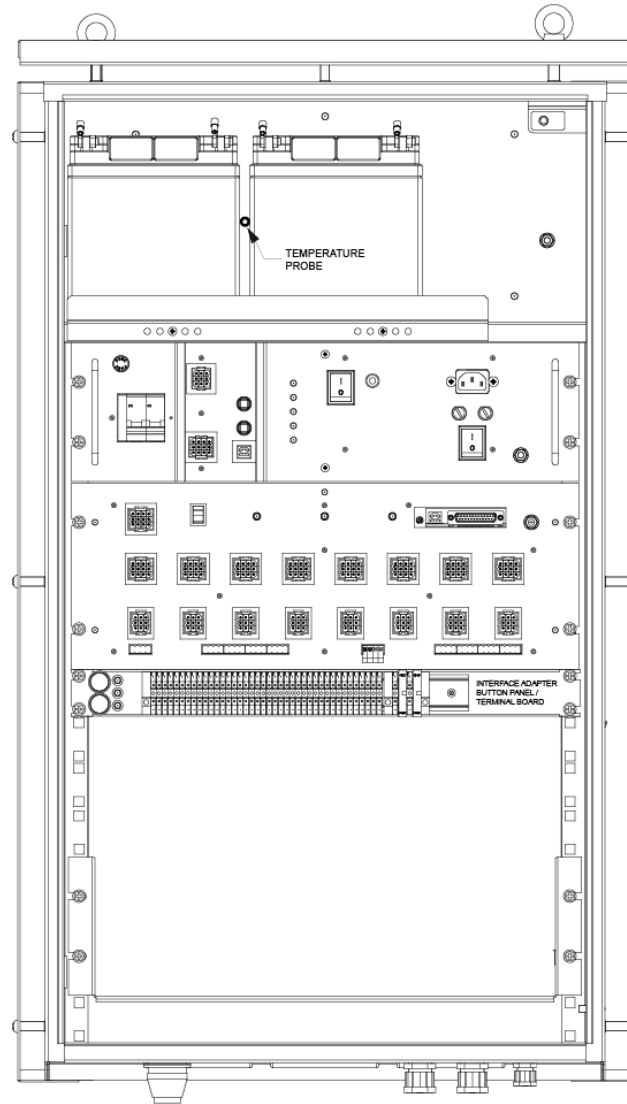


240
241 **Figure 14 – Standard version of the Outdoor Cabinet container-Side view**
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243 **5.3 Extended (XL) version of the Outdoor Cabinet container.**

244 The extended version of the outdoor cabinet differs from the standard version in the vertical size (Figure
 245 15). The cabinet shall have an overall height equal to 20U.



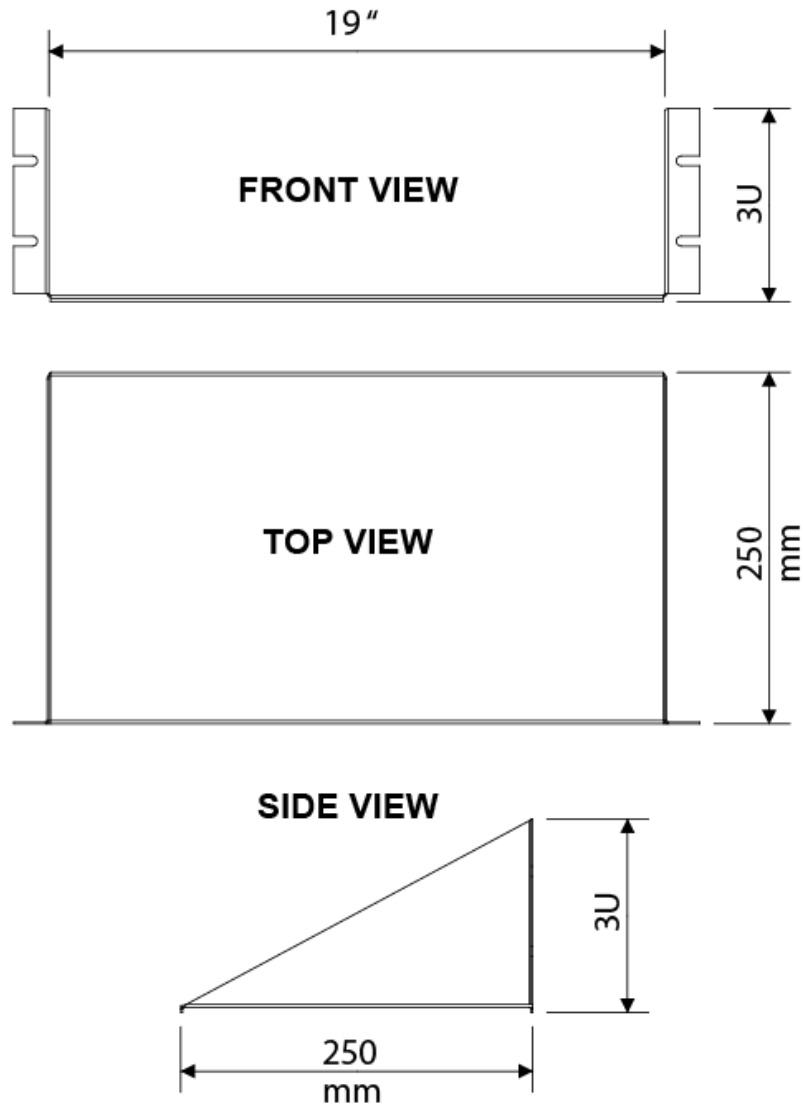
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Figure 15 – XL version of the Outdoor Cabinet container– front view

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Moreover, in this configuration, the box must be equipped with an additional shelf (Figure 16), which is useful to house other supplementary equipment. The fixing support must have a height of 3U.



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Figure 16 – Shelf for the XL version

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254 **6 EQUIPMENT TO BE PLACED INTO THE CABINET**

255 The cabinet is designed to host the equipment described in the Global Standard GSTR001/1.

256 The UE which is referred to throughout this specification represents the 8-channel "basic" version, namely
257 UE8.

258 According to different specific applications, the Outdoor UP can be assembled in different configurations,
259 containing all of or a subset of the following components:

- 260 • Power supply/battery charger (PSBC) with accessories;
- 261 • UE (UE8 version) with accessories;
- 262 • Batteries
- 263 • Terminal boards for the interface with the switchgears and the RGDAT/RGDM, and the power
264 supply terminal boards
- 265 • Custom devices
- 266 • Communication module
- 267 • Other items to be installed on the additional shelf included in the OXL-UP version only

268 **6.1 PSBC**

269 The UP Battery Charger/Power supply, called PSBC, is described into the Global Standards GSTR001
270 and GSTR002.

271 The PSBC has to be assembled on a 19" rack, with screws and cage bolts included in the supply. The
272 overall height is equal to 3U.

273 **6.2 UE8**

274 The UP Processing Unit Device, available in two different versions is described into the specification
275 GSTR001/1 and GSTR002. Only the UE8, capable to manage up to 8 switchgears, is applicable to the
276 Outdoor UP solution.

277 The UE8 has to be assembled on a 19" rack, with screws and cage bolts included in the supply. The
278 overall height is equal to 4U.

279 **6.3 Batteries**

280 The batteries must be compliant with the Global Standard GSCB001 and they shall be housed inside a
281 proper compartment, as shown in the Figures of the previous chapters of this specification.

282 **6.4 Terminal board**

283 Only part of the 8 channels on the UE8 will be normally used in outdoor applications. The interface among
284 the UE and switchgear (SG), and Fault Detector (FPI, i.e. RGDAT/RGDM) and power supply terminal
285 boards must be designed as follows:

- 286 • Channel 1: SG and FPI connectors, leading from the RTU, will be made available on the pre-wired
287 terminal board.
- 288 • Channels 2, 3,...,8: SG and FPI connectors of the UE are available for a direct connection.

289 The connectors for SG and DFPI must be easily identifiable by a separator, a distance or a differentiated
290 color.

291 The terminal board must be assembled on a 19" rack (with an overall height equal to 1U) with the screws
292 and cage bolts included in the supply.

293 The technical solution, as well as the layout of the terminals provided with a fuse holder, must be compliant
294 with the one shown in Figure 17, in order to contain the overall height within 1U. Figure 17 also shows the
295 trimmers (which are housed on the same bracket) for the adjustment of the thresholds of the temperature,
296 and the humidity for the thermoregulation system.

297

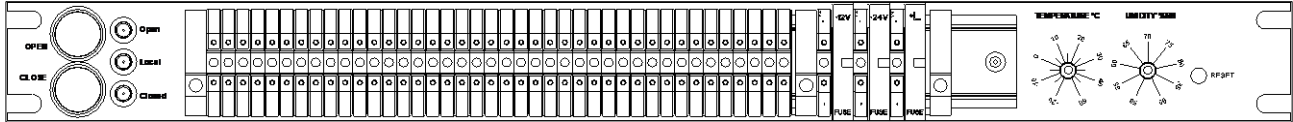


Figure 17 – Terminal board, example of solution.

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The serigraphies must clearly indicate the pin number, and if possible, the function, with the synthetic name reported in Table 1 and Table 2. On the internal part of the door, a label will always be present for decodification of the terminal board components.

304

The connection from SG and DFPI cables to the terminal, can be performed by a connector, with Molex format, as in the example of Figure 18.

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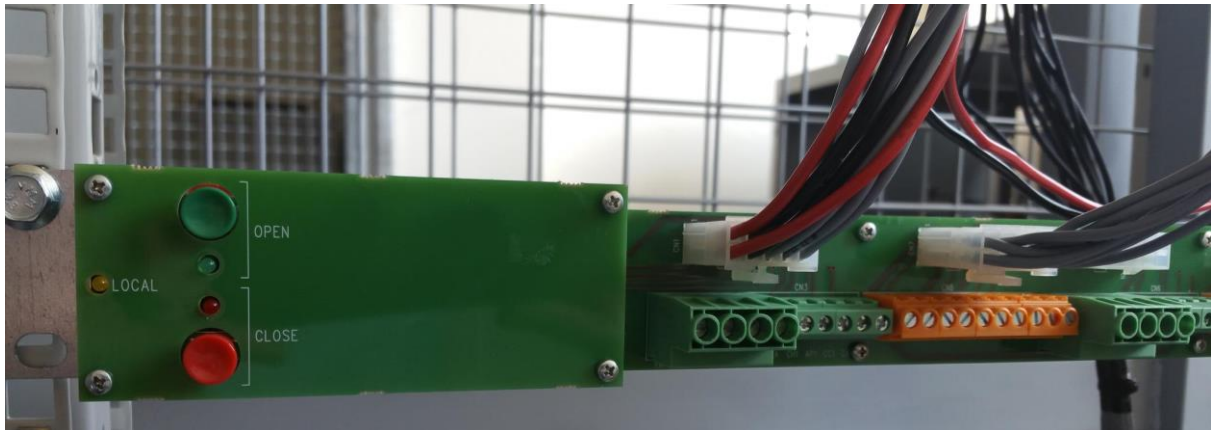


Figure 18 – Cables from SG and DFPI connection to the terminal board by means of Molex connector

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The 3 LEDs at the left side of Figure 17, which indicate the open or closed position of the SG, and the local control configuration, respectively, must be available on the terminal board.

310
311

The board must allow the opening and closing of the switchgear, through a pair of buttons (green for the opening, red for the closure) which will be active only if the RTU is under local control.

312
313

Under local control, the L+ signal provided on the terminal board has the high level, + 24V.

314

Figure 19 shows the detail of the terminals for the connection of the power supplies and the distribution to other devices. The negative terminals of the power supplies (nr.1 at 12V and nr. 3 at 24V) will be equipped with fuse holders and 2.5 A fuses, on the load side.

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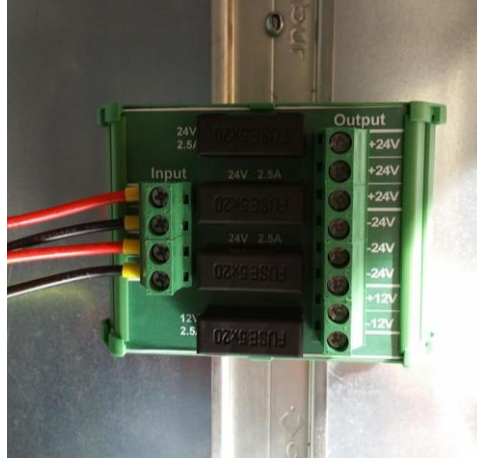


Figure 19 – Terminal board for the distribution of the auxiliary power supplies

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All of the terminals of this board must be provided with a screw tightening, for all of the cables with a section equal to 1,5mm². The connections to the battery poles, red for the positive and black for the negative, must have: a section $\geq 3\text{mm}^2$ ($2 \times 1,5 \text{mm}^2$), a length $\geq 80\text{cm}$ and, on the battery side, a collar label indicating the respective polarity and ring terminal connector for screw size M8 assembled in factory.

322
323
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327

The wiring between the connectors of channel 1 on the UE and the terminal board will be via two cables included in the supply.

Each terminal must allow easy identification of the corresponding associated signal, according to the naming defined for them as in the GSTR001/1 and GSTR002 specifications, as shown in the following Table 1, Table 2 and Figure 20. Their name may be also quoted on the board itself.

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IMS	Function		Peripheral Unit
	Signal	Description	
1	+M	Motor power supply (+24 V _{DC})	1
1	+M	Motor power supply (+24 V _{DC})	1
2	-M	Motor power supply (-24 V _{DC})	2
2	-M	Motor power supply (-24 V _{DC})	2
3	+A	Commands power supply (+24 V _{DC})	3
4	-A	Commands power supply (-24 V _{DC})	4
5	89CX	Closing command	5
6	89AX	Opening command	6
7	89ccx	Signal closing position switch-disconnector	7
8	89cax	Signal opening position switch-disconnector	8

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Table 1– Pin out of the SG terminals

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Terminal of the Interface board	Function		Pin of the FPI connector on the UE
1	COM RS	(+24 V _{DC}) Power supply and Common	1
2	51S	Overcurrent tripping	2
3	RS	RS Spare	3
4	TM	Measurement input (pole 1)	4
5	67S	Zero sequence directional tripping	5
6	TM	Measurement input (pole 2)	6
7	COM DO	Common Digital Output	7
8	DO	Digital Output	8
9	-	Power supply (-24 V _{DC})	9

Table 2 – Pin out of the FPI terminals

Nevertheless, NOT pre-wired terminals must be provided in order to connect an additional SG/FPI channel.

The following items must be provided in the supply:

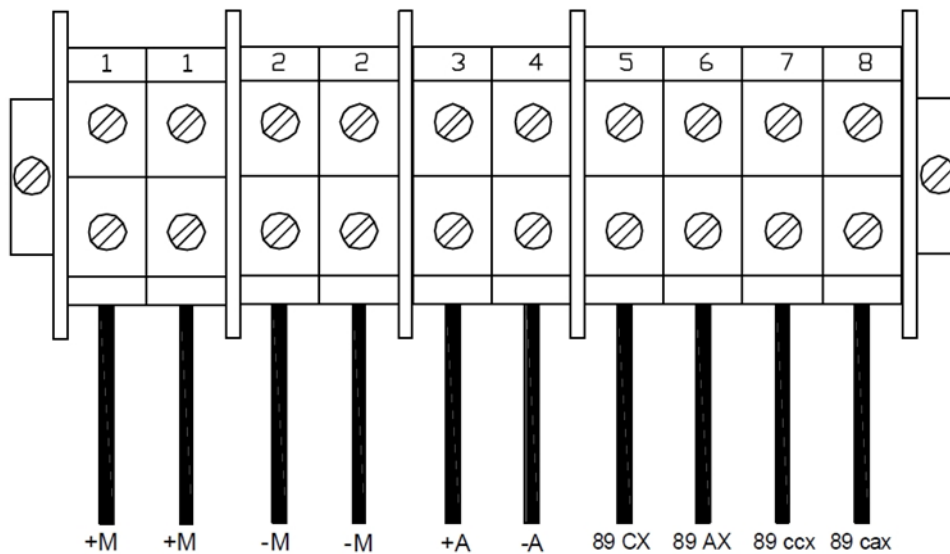
- Nr. 1 11-wire cable, called the "SG-TB cable", provided with:
 - the "SG" male 12-socket connector, on one end, compliant with the GSTR001/1 specification;
 - pre-wired cables on the terminal board (Molex), on the other end, with same pin numbering of the 12-socket pin connector
- Nr. 1 9-wire cable, called the "FPI-TB", provided with:
 - the FPI 9-socket male connector, on one end, compliant with the GSTR001/1 specification;
 - pre-wired cables on the terminal board (Molex), on the other end, with same pin numbering of the 9-socket pin connector.

Any other cables of the above mentioned types can be requested and supplied as spare accessories.

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377 **6.5 Custom devices**

378 It has to be possible to place one or more custom devices on the 19" rack with the screws and cage bolts
379 included in the supply. The overall height that must be made available is equal to 2U.

380 **6.6 Communication module**

381 This module is an integrated device, which can be constituted by either a GSM/GPRS modem or a CPE
382 device, connected to either the UE8 or other Router interfaces, via the standard serial interface. The
383 device allows the connection of the RTU to the Central System, through various possible communication
384 networks.

385 The module is powered via the 12V_{DC} output, provided for on purpose and derived from the TB-AUX
386 terminal board.

387

388

Figure 20 - Pre-wiring of the terminal board, in detail.

389 **7 THERMOREGULATION SYSTEM**

390 A system must be provided for the thermoregulation of the RTU, in order to guarantee an outdoor
391 operating temperature in the range $-20^{\circ}\text{C} \div 55^{\circ}\text{C}$.

392 Alternative proposals, which differ from the two solutions described below, can be accepted, but they must
393 be agreed in advance and approved by ENEL.

394 **7.1 Solution with anti-condensation heater and temperature controller**

395 A (100V_{AC}) 50W sized anti-condensation heater is provided, housed as low as possible within the
396 container, and it has to be protected by a fuse, to avoid accidental contact with the conductors.

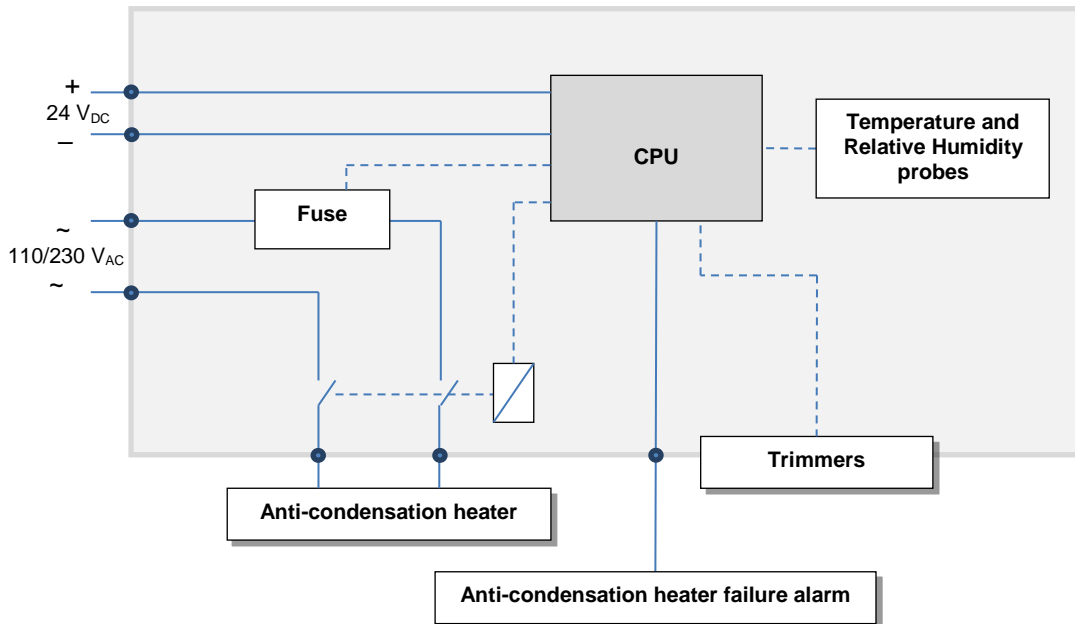
397 Moreover, a temperature controller (shown in the diagram of Figure 21) must be housed in the cabinet
398 container, which includes both humidity and temperature probes, which controls the anti-condensation
399 heater, in order to guarantee standard climatic conditions within the container.

400 Using trimmers placed on the terminal board, the temperature and humidity threshold levels may be
401 regulated within the given ranges which are listed below:

402 Temperature: $-20^{\circ}\text{C} \div 55^{\circ}\text{C}$;

403 Relative Humidity: $50 \div 90\%$.

404 In case of failure or short-circuit of the anti-condensation heater (blown fuse), a warning alarm must be
405 generated by the UE, which will in turn send it to the Center, using a spare RS.



406

407


Figure 21 – Anti-condensation heater and temperature controller

408

409 **7.2 Solution with heater**

410 If the controller is mounted in a watertight cell, the variations of the relative humidity of the external ambient
411 could not be compensated. In this case, the heater can only control the temperature, through a thermostat,
412 which is able to maintain the temperature of the watertight cell above the pre-set minimum operating
413 threshold of the RTU.

414 The power of the heater may exceed 50W, though the overall consumption must be less than 200VA.

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415 In this case, a temperature probe, positioned opportunely, shall detect the failure of the thermoregulation
416 system. The probe is configured so that an alarm is generated (acquired on the spare RS 8) whereas the
417 internal temperature is out of the normal operating range.

418 **8 TESTING AND INSPECTION**

419 The testing and certification process for the UP and its components must be executed according to Enel
420 Global Standard **GSCG002 - Technical Conformity Assessment**. That Global Standard describes the
421 procedures for “technical conformity assessment” (hereinafter “TCA”) of components to be supplied
422 (directly or indirectly) to all Enel Global Infrastructure and Networks Countries.

423 Before starting the supply, the UP and its components must receive the “Statement of Conformity”,
424 according to GSCG002 prescriptions.

425 In addition to the tests prescribed in the GSTR001/1 and GSTR002, the following tests must be executed:

- 426 • Type tests, with the aim to verify the perfect compliance of a production item with the technical
427 specifications detailed in the present document;
- 428 • Acceptance tests, with the aim to control the essential characteristics of each item of the supply.

429 **8.1 Type tests**


430 The supplier must maintain and provide ENEL with access to the documentation which attests to the
431 successful execution of the type tests.

432 **8.1.1 Visual inspection**

433 It is mandatory to verify the absence of visible manufacturing defects, the accuracy of construction, the
434 compliance of the dimensions of the cabinet container with those indicated in the present specification,
435 as well as the prescribed IP degree of protection and prescriptions related to the environmental conditions.

436 **8.1.2 Verification of all of the functionalities**

437 All of the functionalities of either the thermoregulation system or of the terminal board controls must be
438 verified.
439

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440 **8.1.3 Mechanical tests**

441 The tests to be executed on the cabinet container, as well as the methodology of the execution of these
442 tests, are described within the standards recalled in the following table.

443

TEST	DESCRIPTION	REMARKS
STATIONARY VIBRATION (SINUSOIDAL)	<ul style="list-style-type: none"> Displacement amplitude (mm) : 0,75 Acceleration amplitude (m/s²) : 10 Frequency range (Hz): 10-500 Duration: 5 cycles per axis Fixing points: those of the standard mounting structure, considering the UP full equipped without batteries. Acceptance criteria: Correct operation of the device during the test (e.g. execution of open/close commands on a switch) 	Reference standard: EN 60068-2-6 (method Fc)
STATIONARY VIBRATION (RANDOM)	<ul style="list-style-type: none"> Spectrum A.1 "Transportation" – Tab.A2 – Category 2 (EN 60068-2-64) Duration: 0.5 hours per axis (3 axis) Fixing points: as in standard shipping position without package. Acceptance criteria: No damage of the device 	Reference Standard: EN 60068-2-64 (method Fh) Category: 2 (transportation-water, trailers, lorries, in areas with well developed road systems)
SHOCK TEST	<ul style="list-style-type: none"> 3 positive impulses and 3 negative impulses for each axis, equal to 15g for 11 ms 	Reference Standard: IEC 60721-4-2 , table 6 class 2M2 of the standard.
FREE FALL TEST³	<ul style="list-style-type: none"> 2 falls on cement, height of the fall along the axis perpendicular to the pallet (Z axis) in function of the total mass under test: Total mass exceeding 30/40/50/100 kg falling from 50/40/30/20 cm 	Reference Standard: IEC 60721-4-2 , table 6 class 2M2 of the standard.

444

445 These tests must be executed with all panels supplied mounted inside the Box, reproducing:


- 446
- 447 • **The operation condition in case of sinusoidal vibrations**
448 Sinusoidal vibration tests (IEC 60068-2-6) must be performed on the assembled device, in normal
449 operation conditions and mechanical fixation, with the device in operation.
 - 450 • **The transport conditions in case of random vibrations**
451 Random vibration tests (IEC 60068-2-64) must be performed on the assembled device, in the
452 same condition as the device will be shipped, and using mechanical fixation methods allowed by
453 IEC 60068-2-64.

454 **8.1.4 Climatic tests**

455 In addition to other tests, salt tests verification must be made according to IEC 60068-2-11:1981.

456

³ An additional annex will be provided during the tender, describing the acceptance criteria for the shock and free fall tests.


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457 **8.2 Acceptance tests**

458 Within the overall set of type tests, a subset of tests will be selected (i.e. the functionality of the
459 thermoregulation system), mandatory for the acceptance of each specimen of supply.

460 For each item supplied, a certificate must be provided, which attests to the success in the execution of
461 the acceptance test.

462

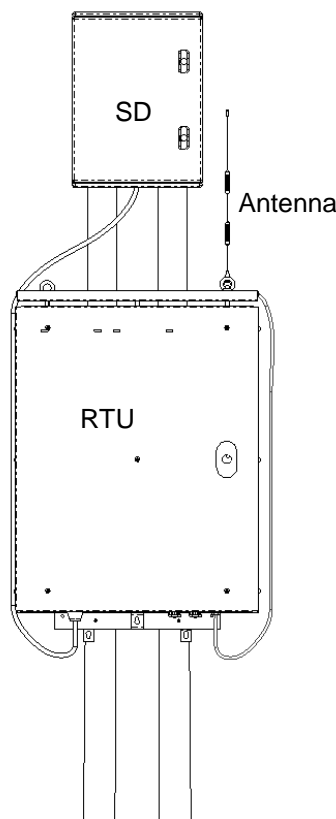
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463 **9 POLE FASTENING SYSTEM**

464 The pole fastening system, as well as the number of holes and their dimensions, must be defined by the
465 constructor. This in order to guarantee the stability of the entire structure due to an overload equal to twice
466 the equipment weight, for either the standard or the extended versions.

467 It must be possible to fix the container to the pole (Figure 22 – Pole installation) at approximately 2.5 m
468 above the ground, so that the front panel door must be accessible by using a ladder set up on the pole.

469 **Given that the pole diameter must have a range between 30 and 50 cm, it is recommended that a**
470 **fastening system be constituted of a stainless steel band with clip.**



471 **Figure 22 – Pole installation**

472
473 Components used for the proper assembly of the RTU are described in Figure 24; all the external
474 components or hanging accessories must ensure effective and prolonged anti-corrosion properties
475 according to the same requirements stated in **Chapter 5.1.2 - Environmental Conditions**.

476 The hanging systems must be engineered so as to withstand the weight of the RTU fully equipped and,
477 in any case, no less than 120kg

478 A plate (B) is mounted at the rear of the RTU, with the upper edge curved in order to allow the RTU to be
479 hooked the RTU on the support (A). This last must be fixed in advance to the pole with metal clamps.

480 **9.1 Mounting kit for poles with a squared section**

481 In case of poles having a squared section, an optional kit (C) must be engineered to be adopted as an
482 additional accessory in the countries where these kind of poles are frequently used (see **Figure 23** part
483 C). This Kit includes all the necessary bolts, screws and everything necessary to guarantee a proper
484 installation.

485

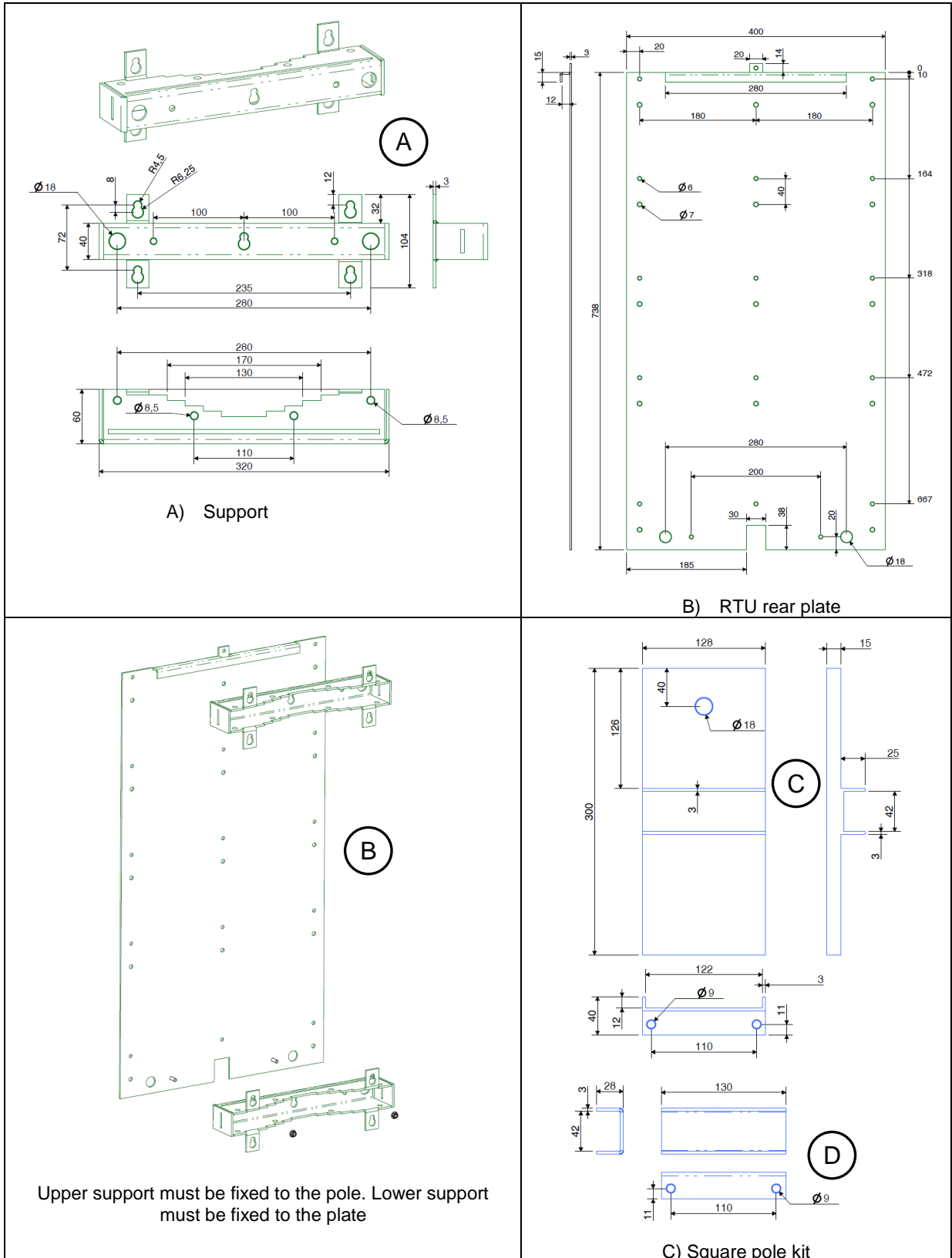
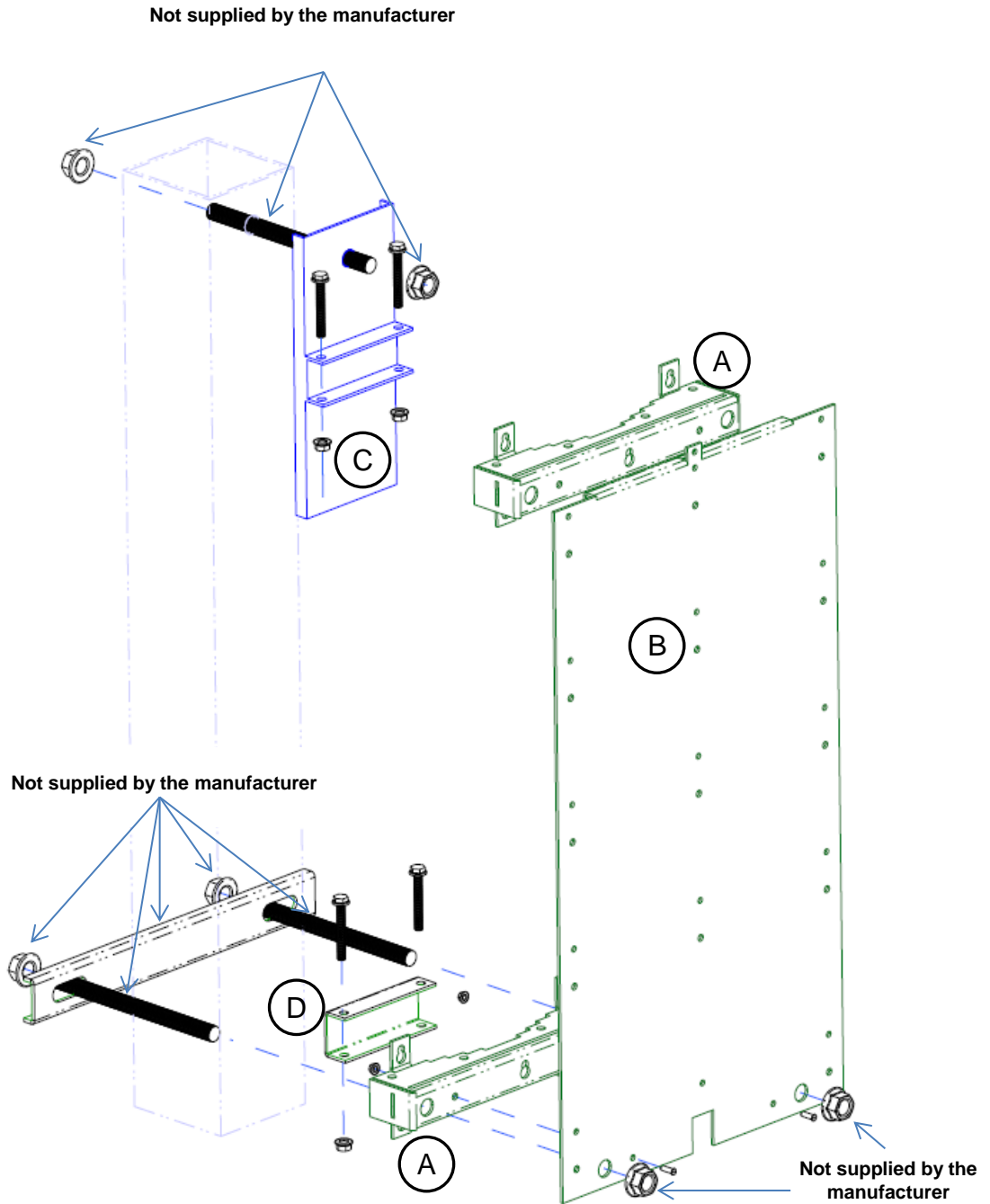


Figure 23 – RTU pole mounting kit

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Figure 24 – Square pole mounting example

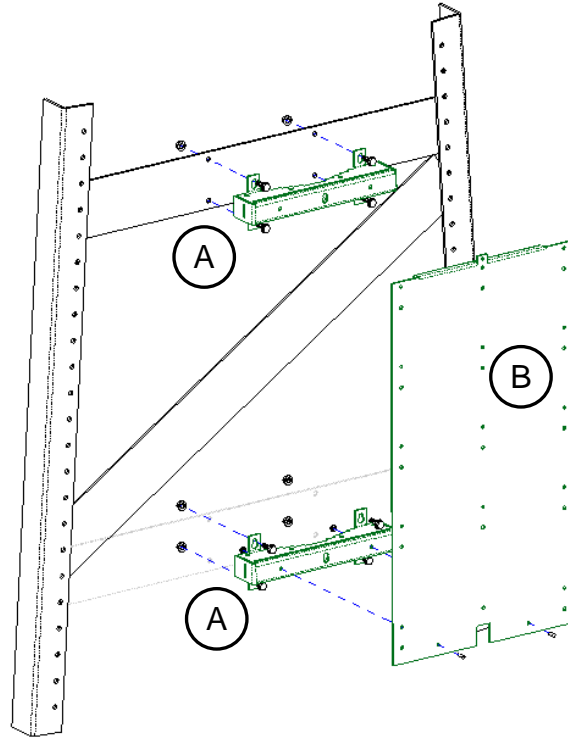


Figure 25- Pylon mounting example

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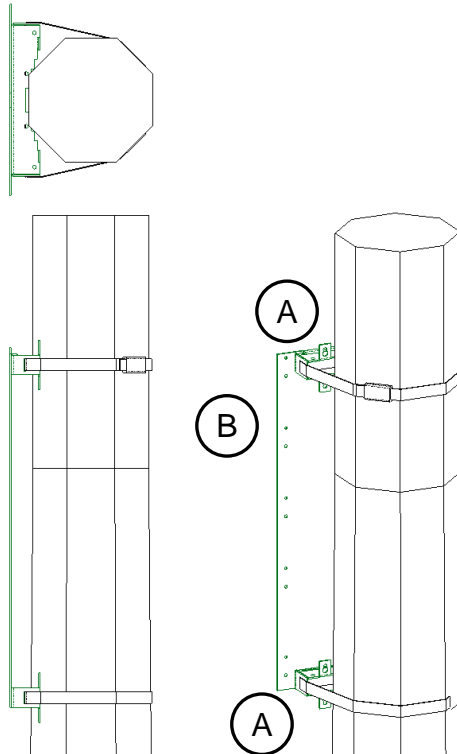



Figure 26 – Pole mounting example

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501 **10 AMBIENT OPERATING CONDITIONS**

502 The apparatus provided must be in compliance with the operating conditions listed below:

- 503
- Ambient temperature limit in the range of $-25 \div 85$ °C;
 - 504 • Atmospheric pressure in the range of $70 \div 106$ kPa;
 - 505 • Humidity limit of 93% at the max ambient temperature;
 - 506 • Storage temperature in the range of $-25 \div 85$ °C.

507 Besides, the cabinet container must have IP54 or higher degree of protection, and must be suitable to
508 use in environmental conditions classified as **climatic category type C5-M "Very High"** (coastal areas
509 with high salinity), as comprehensively described in in Chapter 5.1.2 - Environmental Conditions.

510 **11 SUPPLY REQUIREMENTS**

511 **11.1 TCA documents and manuals**

512 **11.1.1 TCA documents**

513 The Enel technical organization unit in charge of the Technical Conformity Assessment of the device will
514 supervise the technical documentation and the execution of the functional tests required to receive the
515 "Statement of Conformity", according to GSCG002 prescriptions.

516 **11.1.2 Manuals**

517 The supplier shall provide all the end-user documentation manuals of the UP and its components (e.g.
518 operation, maintenance and installation manual, overall dimensional drawings, plate drawing, product
519 colored pictures, etc). The information shall be provided on digital support.

520 All the manuals shall be in the local language of the device destination country.

521 **11.1.3 Safety warnings on Plate**

522 The safety warnings required in the plate of the UP Box and its components must be written in the local
523 language of the UP destination Country.

524 **12 SAFETY REQUIREMENTS**

525 Each component of the RTU, including the non-electrical ones, must be in compliance with all of the
526 current safety regulations (where applicable).

527