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	HV DISCONNECTORS AND EARTHING SWITCHES WITH RATED VOLTAGE FROM 72,5 kV TO 245 kV	GSH003 Rev. 02 16/06/2014

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Revision	Data	List of modifications
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01	17/01/2014	<ul style="list-style-type: none"> New Type Codes in Component List of Chilectra and Ampla Renumbered the Type Code for all items in Component List Editorial corrections Raised a.c. max absorbed power (VA)
02	16/06/2014	<ul style="list-style-type: none"> Added new columns in table in chapter 5 Introduction of alternative materials in nameplates (6.10) Added a new requirement in 7.1.1 for centre-break DSs Corrected 7.3.2.2, Closing block, b) Added information about low voltage components in 7.3.4 Updated paragraph 7.4.1 Deleted sentence about measuring of resistance of earthing switch in 8.2.6 Modified requirement in 9.3 Updated fig. A.2.6 Annex A3: added electric schemes for Ampla and Edesur Added a note in the 2nd figure of Annex B.2 Added a sentence at the beginning of Annex B.4 Added 2 notes in Annex D and the codes GSH3/506..509 (EDELNOR) Added in 3.1.2. a new law for Spain Added 9.3.1 Specific requirement for Endesa

Enel Distribuzione			Endesa Distribución Eléctrica		
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A. Dori	I. Gentilini	R. Lama	C. Llovich	T. González	F. Giammanco
Latam			Enel Distributie		
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1 SCOPE

The scope of this document is to provide technical requirements for the supply of HV disconnectors (hereinafter DS) and earthing switches (hereinafter ES) with rated voltage from 72.5 kV to 245 kV in the Enel Group Distribution companies, listed below:

- Ampla (Brazil)
- Chilectra (Chile)
- Codensa (Colombia)
- Coelce (Brazil)
- Edelnor (Perù)
- Edesur (Argentina)
- Endesa Distribución Eléctrica (Spain)
- Enel Distributie Banat (Romania)
- Enel Distributie Dobrogea (Romania)
- Enel Distributie Muntenia (Romania)
- Enel Distribuzione (Italy)

Note: the indication "Latam" refers to the Enel Group Distribution companies in South America.

Some requirements are applicable only to one or more companies, therefore, depending on the destination of the HV DS/ESs, the supplied equipment shall comply these specific requirements.

2 COMPONENTS LIST

The HV DS and, in required, ES are composed by two or three columns per each pole.

Two main typologies are provided:

- Three columns per each pole (double-break)
- Two columns per each pole (centre-break)

The complete list of the equipment with their main characteristics is in Annex D (Common List of HV DS/ESs).

Other types occasionally could be required in special situations. The requirements will be indicated properly and opportunely.

3 REFERENCE LAWS AND STANDARDS

3.1 Laws

3.1.1 Latam

3.1.1.1 *Brasil*

NR-10 - SEGURANÇA EM INSTALAÇÕES E SERVIÇOS EM ELETRICIDADE

3.1.2 Spain

Real Decreto Riesgo Eléctrico 614/2001

Reglamento sobre condiciones técnicas y garantías de seguridad en instalaciones eléctricas de alta tensión, Real Decreto 337/2014.

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3.2 Standards

The below listed reference documents shall be intended in the in-force edition at the contract date (amendment included).

3.2.1 Common standards

For Latin America destinations the reference standard are the IEC/ISO, whilst for Europe destinations the reference standard are the correspondent European standards (EN).

IEC 62271-1	High voltage switchgear and controlgear. Part 1: Common specifications.
IEC 62271-102	Alternating current disconnectors and earthing switches
IEC 60273	Characteristic of indoor and outdoor post insulators for systems with nominal voltages greater than 1000 V
IEC 62231	Composite station post insulators for substations with a.c. voltages greater than 1 000 V up to 245 kV - Definitions, test methods and acceptance criteria
IEC 60168	Tests on indoor and outdoor post insulators of ceramic material or glass for systems with nominal voltages greater than 1 000 V
IEC 60507	Artificial pollution tests on high-voltage insulators to be used on a.c. systems
IEC/TR 62271-300	High-voltage switchgear and controlgear – Part 300: Seismic qualification of alternating current circuit breakers
IEC/TR 62271-301	High-voltage switchgear and controlgear – Part 301: Dimensional standardization of high-voltage terminals
IEC 60073	Basic and safety principles for man-machine interface, marking and identification – Coding principles for indicators and actuators
IEC 60447	Basic and safety principles for man-machine interface, marking and identification - Actuating principles
IEC/TS 60815-1	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles
IEC/TS 60815-2	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 2: Ceramic and glass insulators for a.c. systems
IEC/TS 60815-3	Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 3: Polymer insulators for a.c. systems
IEC 60332-3-24	Tests on electric and optical fibre cables under fire conditions – Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables - Category C
ISO 1461	Hot dip galvanized coatings on fabricated iron and steel articles-Specifications and test methods

3.2.2 Specific standards

3.2.2.1 Latam

3.2.2.1.a) Chilectra

ETGI-1020 - Especificaciones técnicas generales - Requisitos de diseño sísmico para equipo eléctrico

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3.2.2.1.b) *Edelnor*

E-SE-10 – Especificación Técnica - Acción sísmica en Equipos Eléctricos y Mecánicos

3.2.2.2 *Endesa Distribución Eléctrica*

UNE-EN 60332 Métodos de ensayo para cables eléctricos y cables de fibra óptica sometidos a condiciones de fuego. Parte 1-1: Ensayo de resistencia a la propagación vertical de la llama para un conductor individual aislado o cable.

UNE 50267 Métodos de ensayo comunes para cables sometidos al fuego. Ensayo de los gases desprendidos durante la combustión de materiales procedentes de los cables

3.2.2.3 *Enel Distribuzione*

CEI 20-22/2 – Prove di incendio su cavi elettrici – Parte 2: Prova di non propagazione dell'incendio

LS6016 Specifica Tecnica Enel – Sostegni per sezionatori tripolari 132 – 150 kV

4 SERVICE CONDITIONS

4.1 General service conditions

The reference service conditions are the outdoor normal service conditions of IEC 62271-1 (par. 2.1.2), with the further indications in Annex D.

4.2 Specific service conditions

4.2.1 Colombia

The reference altitude is 2.600 m¹.

4.2.2 Seismic qualification level

Chilectra	ETGI-1020
Codensa	AF3 (IEC/TR 62271-300)
Edelnor	E-SE-010
Enel Distributie	AF5 (IEC/TR 62271-300)
Enel Distribuzione	AF5 (IEC/TR 62271-300)

¹ For Colombia the rated insulation levels in chapter 5 already consider the altitude effect on the external insulation, therefore the correction in clause 2.1.1 of IEC 62271-1 is not required. On the contrary are confirmed the precautions to be taken for low-voltage auxiliary and control equipments.

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5 TECHNICAL CHARACTERISTICS

DISCONNECTOR/EARTHING SWITCH												
Rated voltage U_r (kV)		72,5		123	145				170	245		
Rated short-time withstand current I_k (kA)		25/31,5	31,5/40	31,5/40	31,5	31,5/40	31,5/40/50	31,5/40/50	31,5	40	40	40
Rated short-duration power-frequency withstand voltage U_d	Common value	140		230	275				275	460		
	Across the isolating distance	160		265	315				315	530		
Rated lightning impulse withstand voltage U_p (kVp)	Common value	325		550	650				650	1050		
	Across the isolating distance	375		630	750				750	1200		
Rated frequency f_r (Hz)	Chilectra, Edesur, Endesa Distribución, Enel Distributie and Enel Distribuzione	50										
	Ampla, Codensa, Coelce and Edelnor	60										
Opening (closing) time if motor-operated (s)		≤ 15										
Degrees of protection provided by enclosures		IP 54										
Rated supply voltage U_a (Vdc)	Enel Distributie and Enel Distribuzione	110										
	Endesa Distribución Eléctrica, Ampla, Coelce, Chilectra, Codensa, Edelnor	125										
	Edesur	220										
		1000										
d.c. maximum absorbed power (W)		1000										
Rated supply voltage for anti-condensation circuits (Vac)	Endesa Distribución, Enel Distributie and Enel Distribuzione	230										
	Ampla, Coelce, Chilectra, Edelnor, Edesur	220										
	Codensa	120										
a.c. max absorbed power (VA)	Manual operated DS/ES	50 (only for anti-condensation circuit)										
	Motor operated DS/ES, dc motor (Enel Distribuzione and Latam)	250 (only for anti-condensation circuit)										
	Motor operated DS/ES, ac motor (Endesa Distribución Eléctrica and Enel Distributie)	1750 (400 Vac 3-phase)										
Auxiliary contact classes (table 6 IEC 62271-1)		1										
DISCONNECTOR:												
Rated normal current I_r (A)		1250	2000	1250	800	1250	2000	3150	1250	800	2000	3150
Rated static mechanical terminal load:	Straight load F_{a1} and F_{a2} (N)	400	400	500	600	600	800	1000	600	800	1000	1500
	Cross load F_{b1} and F_{b2} (N)*	130	130	170	200*	200*	250*	330*	200	270*	330*	500*
	Vertical force F_c (N)	500	500	1000	1000	1000	1000	1250	1000	1000	1250	1500
Mechanical endurance class M_r		M1										
Bus-transfer current switching by disconnectors (only if requested)	Rated bus-transfer current for disconnectors (A)	Clause B.4.106.1 of IEC 62271-102										
	Rated bus-transfer voltages for disconnectors (V)	Clause B.4.106.2 of IEC 62271-102										
EARTHING SWITCH:												
Earthing switches class		E0 – M0 – A										

*Edesur 500N

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6 CONSTRUCTION CHARACTERISTICS

6.1 General characteristics

The DS/ESs shall be manufactured in accordance with IEC 62271-102.

The manufacturer will provide all tubes, extensions, bearings and the rest of the necessary materials in order to assemble it properly and adapt it to the support standardized by each company.

The driving mechanism of the DS and of the ES will be manual-operated or motor-operated.

The upgrading from manual-operated type to motor-operated type shall be possible by retrofit on site, without need of intervention on power contacts, main regulations or on the movement transmission shafts.

The manual-operation of DS and ES (both for motor-operated and for manual-operated DS/ES) shall be compliant with IEC 60447.

All DSs and ESs shall be equipped with mechanical stops for position limits.

6.2 DS/ES Mechanical interlocking

DS combined with ES as a single unit will have a mechanical interlocking device that prevent the closure of the ES while DS is closed and prevent closure DS while closed ES. Electrical interlockings are described in chapter 7.

The mechanical interlocks shall be designed to withstand, preventing damages and without need of maintenance:

- in case of motor-operation, to the strains produced by the other DS/ES motor starting torque;
- on case of manual-operation, to 3 times the maximum force required for manual operation (5.105 of 62271-102), or, if a strain limiting device is present, to 1,5 times its intervention rated value.

6.3 Insulators

The insulators could be requested by Enel Group Distribution companies in ceramic or composite materials.

In case of ceramic insulators, they shall be in brown color and compliant with IEC 60273.

In case of composite insulators, they shall be in light grey color and compliant with IEC 62231. The envelope shall be made of silicone rubber, HTV type (High Temperature Vulcanized) or LSR type (Liquid Silicone Rubber) and completely free of EPDM or other organic rubbers.

6.3.1 Specific requirements for Chile

Chile requires insulator with mechanical classification of type C8 for 145kV and type C10 for 245 kV.

6.3.2 Specific requirements for Endesa

The creepage distance must comply with IEC 60815-2 and IEC 60815-3 part 9.7 with no deviations.

6.4 HV terminals

6.4.1 Latam

The HV terminals shall be manufactured with corrosion resistant copper or aluminum alloy, in order to be interfaced with aluminum alloy connectors or clamps.

The terminals shall be rectangular shape with the following dimensions, according to fig. 3 (2x2 hole pattern) or fig. 4 (2x4 hole pattern) of IEC/TR 62271-301:

- Hole diameters Ø 14.3mm
- Distance between holes 44.5mm

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6.4.2 Endesa Distribución

The HV terminals shall be compliant with fig. 1 (Ø 40x125 mm) of IEC/TR 62271-301.

6.4.3 Enel Distributie and Enel Distribuzione

The HV terminals shall be realized with corrosion resistant copper or aluminum alloy, in order to be interfaced with aluminum alloy clamps.

The HV terminals shall have Ø 40 ±0,25 X 80 min (mm) (fig. 1 of IEC/TR 62271-301) dimensions.

6.5 Grounding

The manufacturer shall ensure the equi-potentiality between all parts forming the equipment.

Inside the Control Box an internal collector (in tin-plated or nickel-plated copper, section ≥ 60 mm² and with M5 regular interval threaded hole) shall be present for the grounding connection of all cable shields; the manufacturer shall guarantee its effective connection to the DS+ES grounding system.

6.5.1 Specific requirements for Latam

For Brazil is required a clamp grounding connector for range 70-120 mm² on each base plate and operating mechanism. The connector material shall be copper Alloy (maximum 5% Zinc).

6.6 Control and Operating device Box(es)

The control box and the drive mechanisms with its control devices shall be included in one or two cabinets.

In addition to the IP requirement of table at chapter 5, the box protection degree with open doors shall be minimum IP2X.

The entrance of all cables shall be from the Control Box bottom side, where a removable loophole (in aluminum, with useful dimension of 150x100 mm) shall be provided.

A proper anti-condensation system shall be provided in order to prevent humidity damages and to ensure a proper air replacement.

The anti-condensation circuit, controlled by a thermostat with fixed regulation at 25 °C (box internal temperature), shall be unique for the overall equipment, supplied in a.c. (see table in chapter 5 for the supply rated voltage) and protected with a magneto-thermic automatic circuit breaker.

The heating elements shall be preferably connected in series in order to have the circuit opening in case of failure of an element; a minimum current sensor shall detect and signal the anomaly.

In parallel connection case, the manufacturer shall assure a correct fault detection and distance anomaly signaling in case of failure of an element, properly evaluating the tolerances of the supply voltage and of the components resistance.

The box interior shall be accessible from the front by mean of a door provided of handle and lock, hinged and equipped with an anti-wind system. It shall be possible to open the door over 90°.

In case of motor-operated DS/ES all accessories (hand-crank, document pocket etc.) shall be accommodated in the internal part of the box door. In case of manual-operated DS/ES is admitted to locate the hand-crank/swing lever outside the box.

All electric equipments components shall be:

- compliant with the respective IEC standards;
- equipped with an identification label indicating the codification used in the functional electric schemes;
- easily accessible for maintenance or substitution operations.

In particular, the extractable ones, plug-in connector included, shall be provided with proper anti-mistake coding.

The box internal wiring shall be performed with conductors with adequate section (always ≥ 1mm²), flexible type, compliant with IEC 60332-3-24 and insulated at Uo/U = 450/750 V.

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The cable ends shall be provided of pre-insulated compression type terminals, suitable for the clamps where they have to be connected.

In case of motor-operated DS/ES, the Control Box(es) shall include:

- remote/local selector switch (and/or relay);
- control buttons, with the following colors:

Operation	Chilectra, Codensa, Edelnor, Edesur, Endesa Distribución Eléctrica, Enel Distributie and Enel Distribuzione (according with IEC 60073)	Ampla, Coelce (according with NR10)
Closing	White	White "L" on Red white background
Opening	Black	White "D" on Green white background

- magneto-thermic automatic circuit breakers for the supplies protection (motors, lighting lamp, anti-condensation circuits – fuses are not admitted);
- interface terminal board for substation control system;
- internal lighting lamp (incandescent type are not admitted), with automatic switching in case of open door.

The grounding of a dc supply polarity is not admitted.

If diodes are used for the circuit separations or for the voltage return protection, they shall have inverse voltage ≥ 3 kV.

The cable trucking systems for the internal wiring shall have sufficient residual space ($\geq 10\%$ of used volume); the cables shall be anchored in some points in order to avoid their falling.

The cable trunks close to the interface terminal boards shall be used for the control system wiring and cannot be used for the internal wiring.

In addition to the dimensions shown in Annex B, the box base height respect to the ground shall be ≥ 400 mm and all HMI (Human Machine Interface) elements (controls and signalizations) shall be at ≤ 1800 mm. The hand-crank/swing lever connection point shall be at ≤ 1000 mm respect to the ground.

The main contacts position auxiliary contacts can be located in the control box or, in alternative, in a separated external box, providing a proper anti-condensation resistance.

6.6.1 Enel Distribuzione specific requirements

In alternative to IEC 60332-3-24, cables compliant with Italian standard CEI 20-22/2 and marked with "CEI 20-22 II" can be accepted.

In case of "S/P" relay presence, a white lamp to indicate its activation (Lamp on in case of "P" status) shall be located in the DS Control Box.

6.6.2 Endesa Distribución specific requirements

The insulation material may be thermostable (Z) corresponding to the cable harmonized H07Z-K, or thermoplastic (Z1) for the 07Z1-K Cable and comply with the following requirements:

- Test for resistance to flame propagation conductors individual, according to UNE-EN 60332-1-1:2005
- Testing of no fire propagation according to UNE-EN 60332-3-23:2009, category C
- Testing of the gases evolved during combustion: No emission of halogen gases (UNE EN 50267-1) and the weighted value of conductivity is not exceed $10 \mu\text{S}/\text{mm}$ (UNE EN 50267-2)
- Test for determining the cable smoke density, according to standard UNE 50267 Parts 1 and 2, the level of light transmittance will be higher than 60%. The color of insulation is light gray except for earthing protection circuits which will be green-yellow color.

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6.6.3 Latam specific requirements

The internal wiring must be of flexible copper with an operating temperature of 90°C.

All conductors must arrive at terminal blocks and must have indelible marks indicating the place of Origin / Destination. Only one conductor will be accepted per terminal.

The terminals shall be stackable, suitable for placing its corresponding identification numbers.

The manufacturer must provide a minimum of 20% of reserve terminal blocks for the Client's use.

The piping inside the cabinets must be run using plastic cable trays. The conductors shall be grouped and attached by means of non-metallic fasteners, suitable for protecting its insulation and support the weight of the cables.

On the lower face of the control box , the connection of 2" diameter ducts must be allowed for low-voltage circuits cables

All the wiring external to the control box must be protected against mechanical damage with rigid or flexible metal conduits.

6.7 Protective treatments

All external surfaces shall have an effective and enduring anti-corrosion protection.

All iron parts (e.g. support, Control Box, bolts etc.) shall be in non-corrosive material or hot dip galvanized in compliance with ISO 1461. All processing shall be completed before the protective treatments.

Protective treatments alternative to the hot dip galvanization could be accepted if the manufacturer prove its fitness.

The metallic elements in contact between them shall be designed in order to avoid corrosion due to humidity galvanic effect.

6.8 Dimensional characteristics

Specific dimensional requirements are shown in Annex B.

6.9 Support

The support is an optional supply.

6.9.1 Enel Distribuzione specific requirements

If requested, the DS/ES support shall be compliant with LS6016.

The Control Box and Operating device Box(es) support, on the contrary, is a mandatory supply always included in the DS/ES supply.

6.10 Nameplates

The nameplates shall be in stainless steel. Alternative materials can be considered if the manufacturer proves the marking endurance respect to the ageing (this solution shall be approved by Enel Distribution companies).

Par. 5.10 of IEC 62271-102 apply, specifying that both DS/ES nameplate and control box nameplates shall include:

- the optional values;
- the Enel Group type code (see Common List) and the local components codification.

For traceability purpose, in the internal part of the driving mechanism (if any) door shall be located a self-adhesive nameplate with the following information:

- box manufacturer;
- serial number of the Control Box;
- year of construction.

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6.10.1 Latam specific requirements

The self-adhesive nameplate to be located in the internal part of the Control Box door shall also contain the contract number.

7 FUNCTIONAL CHARACTERISTICS

7.1 Common requirements

7.1.1 General characteristics

The drive mechanism of the disconnectors and the earthing switches (if any), must guarantee the simultaneous operation of the poles.

The drive mechanism shall operate on a highly reliable transmission system, in order to avoid any interruptions.

The turns number for a complete manual operation shall not exceed 50.

Centre-break DSs shall have the 2 movable contacts moving in the same direction.

7.1.2 Motor-operated disconnectors and earthing switches

The DSs and ESs operation shall be performed by tripolar motor-drive mechanisms with the possibility of emergency manual operation in case of necessity. It will consist of a gear motor (see table in chapter 5 for the supply rated voltage) which will transmit its movement to the drive shaft of the disconnector. The same for the earthing switch.

The motor circuit will be protected by a motor protector for short-circuits and overloads.

DS and ES shall be each one provided of the following circuits:

- a) n° 1 drive circuit of shunt closing release;
- b) n° 1 drive circuit of shunt opening release.

The ongoing operations shall be completed even in case of opposite operation request.

The operation requests persistence after the operation conclusion shall not produce effects.

In case of a DS/ES operation is not completed, any previously received operation requests shall not remain stored. In case of motor supply outage during a DS/ES operation, the drive mechanism shall ensure:

- the keeping of the reached position, both during supply absence and at its restore;
- the execution after the supply restore of any requested closing or opening operation, independently from the operation type ongoing at supply outage instant;
- that in case of not completed operation the operation sequence shall be stopped and an anomaly remote signalization (SNM – “Switch Not Maneuverable”) shall be sent, by mean of a timed contact.

The operations shall not be carried out if the request signal duration is shorter than 3 ms.

The hand-crank for manual operation shall be withdrawable type; its insertion shall disable the electric operations, both local and remote.

Further characteristics are specified in local specific requirements.

7.1.3 Manual-operated disconnectors and earthing switches

The characteristics are specified in local specific requirements.

7.1.4 Electric schemes, controls and signalizations

The electric schemes shall:

- a) be represented in the reference conventional conditions:
 - a.1) DS/ES (if any) in open position;
 - a.2) DBST not inserted (only for Enel Distribuzione);

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- a.3) DEC not energized (only for Enel Distribuzione);
- a.4) absence of a.c. and d.c. auxiliary supplies;
- a.5) remote/local selector switch in remote position (or relay, only for Enel Distribuzione);
- a.6) in case of micro-switches with the state dependent on the opening/closing of the boxes/carters of operating devices, they shall be represented disable (that is with boxes/carters open).
- b) contain the functional scheme, all information useful to identify the single wires and cables, the equipments wiring schemes (auxiliary contacts, relays etc.), the topographic schemes for interconnections between boxes, the topographic schemes about all the electric components in Control box/Operating device box(es), the anti-mistake coding.

The principle electric schemes of the different DS/ES typologies are represented in Annex A, including the interface terminal board for substation control system and the auxiliary signalling contacts characteristics.

7.2 Endesa and Enel Distributie functional characteristics

7.2.1 Disconnectors

The manual drive mechanism will have a signalling box with 6 closing contacts and 6 opening contacts, potential free.

7.2.2 Earthing switch

The drive mechanism of the earthing switches (if any) will be manual-operated or motor-operated.

Characteristics of the motor-operated drive mechanism are defined in section 7.1.2.

The manual-operated drive mechanism will have a signalling box with 4 closing contacts and 4 opening contacts, potential free, whose characteristics are defined in section 6.6 of this Standard.

7.2.3 Motor-operated disconnectors and earthing switches

All electric equipments components shall be compliant with the respective IEC standards.

All disconnectors and earthing switches shall be equipped with mechanical stops for position limits. Moreover it shall be possible to lock them at operation limits by mean of padlocks with Ø = 10 mm pin.

The set of auxiliary contacts designed for the control of the switchings typical of the DS/ES and the sets of additional auxiliary contacts will be actuated by the actuation mechanism.

The electric diagram appears in Annex A.

7.3 Enel Distribuzione functional characteristics

7.3.1 DS/ESs applications

Application descriptions of the different DS/ES typologies and the relative reference electric schemes are listed in the following table:

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Type Code (see Annex D)	Enel Distribuzione codification (see Annex D)	Application description	Reference electric schemes (see Annex A.2)
GSH003/001	156110	Line DS+ES motor-operated	Fig. A.2.1 + Fig. A.2.6
GSH003/002	156111	Line DS+ES manual-operated	Fig. A.2.2 + Fig. A.2.6
GSH003/003	156112	Busbar DS (line bay) manual-operated	Fig. A.2.3
GSH003/004	156113	Busbar DS (transformer bay) manual-operated	Fig. A.2.4
GSH003/005	156114	Conjoint busbar DS manual-operated	Fig. A.2.5

7.3.2 Motor-operated DS and ES

7.3.2.1 Control circuits of motor-operated DS and ES

DS local controls (motor or manual) shall be enabled by consensus (“Prova”) coming from line bay Circuit Breakers, working on the “S/P” relay (servizio/prova), located in its control box.

Usually the remote controls are enabled and the local controls are inhibited; with the “Prova” consensus it’s the opposite.

Earthing switch local controls (motor or manual) shall be subject to the remote/local switch (“Servizio/Prova”) located in its control box.

7.3.2.2 Blocking devices/circuits of motor-operated DS and ES

During normal operation, temporary block signalizations shall not be sent to the control system.

Closing block

The closing operation block (motor and manual) shall work when occurring at least one of the following conditions:

- a) DS
 - Circuit Breaker closed
 - ES closed
- b) ES
 - DS closed
 - line voltage presence

Opening block

The opening operation block (motor and manual) shall work when occurring at least one of the following conditions:

- a) DS
 - Circuit Breaker closed
- c) ES
 - line voltage presence
 - DBST inserted

7.3.2.3 Manual operation of motor-operated DS and ES

The manual emergency operation shall be enabled by a Consensus Electromagnetic Device (DEC – “Dispositivo Elettromagnetico di Consenso”) (three if ES is present, one for DS, one for ES and

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one for DBST); with this device the hand-crank insertion is enabled pressing a button² and in presence of external consensus "Prova" and of all requested conditions (see electric schemes).

The DEC shall be immune to possible malfunctions due to the residual magnetism.

The DEC status (energized/de-energized) shall be clearly visible.

With the hand-crank insertion an anomaly remote signalization (SNM) shall be sent.

7.3.2.4 *ES blocking device (DBST)*

The motor-operated ES shall be provided of a device for the earthing switch locking (DBST - "Dispositivo Elettromeccanico di Blocco Sezionatore di Terra"), subject to the ES remote/local switch ("Servizio/Prova") located in its control box.

All requirements of clauses 7.1.2 and 7.3.2.3 are entirely applicable to the DBST ("SNM" signalization becomes "DBST NM").

The DBST operation (motor or manual) shall be subjected to the ES in closed position; its insertion shall operate mechanically (operating directly on the mechanical transmission system) and electrically on the ES, avoiding its opening (motor or manual) and interrupting the motor supply.

The DBST operating device shall be preferably located in the ES operating device box.

The DBST insertion/exclusion circuits shall be electrically interlocked between them.

The access to internal part of DBST shall inhibit operations and shall generate a remote signal ("Blocco Violato").

The inserted/not inserted DBST signalizations ("DBST INSERITO", "DBST DISINSERITO") shall be provided by mechanically independent auxiliary contacts, directly actuated by extreme position limits of the lock unit.

7.3.3 **Manual-operated DS and ES**

7.3.3.1 *Control circuits of manual-operated DS and ES*

DS manual operation shall be enabled by consensus ("Prova") coming from the correspondent bay Circuit Breakers (line bay or transformer bay), working on the "S/P" relay (servizio/prova), located in its control box. This consensus is not present for Conjoint busbar DS.

7.3.3.2 *Blocking devices/circuits of manual-operated DS and ES*

The manual-operation block (opening/closing) shall work when occurring the following conditions:

- a) Line DS+ES manual-operated:
 - a1) DS
 - Circuit Breaker closed
 - ES closed
 - a2) ES
 - DS closed
 - Line voltage presence
- b) Busbar DS (line bay) "189SB(L)":
 - Circuit Breaker closed
- c) Busbar DS (transformer bay) "189TR":
 - It shall be realized a key interlock between the DS "189 TR" and the earthing switch on the MV side of the HV/MV transformers "89 T TR", in order to make impossible the DS "189 TR" closing with the MV side earthing switch "89 T TR" closed, and viceversa.

² Different designs with the same functional results can be evaluated by Enel.

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This function shall be realized with an electromagnetic device enabling rotation and extraction of a key, to which is combined another key enabling closing of the MV side earthing switch “89 T TR”.

The device, with its button activated, is energized with DS “189 TR” open in presence of “Prova” external consensus coming from transformer bay Circuit Breaker.

d) Conjoint busbar DS “189SB”:

- the operation shall be enabled only if all Circuit Breakers of one of the 2 semi-busbars are open (absence of energy flowing between the two HV semi-busbars).

7.3.3.3 *Manual operation of manual-operated DS and ES*

The manual operation shall be enabled by a Consensus Electromagnetic Device (DEC) (two if ES is present, one for DS and one for ES); with this device the hand-crank insertion (or the swing lever operation) is enabled pressing a button³ and in presence of all requested conditions (see electric schemes). In case of swing lever operation the DEC blocking system shall be designed to withstand 3 times the maximum force required for manual operation (5.105 of 62271-102).

The DEC shall be immune to possible malfunctions due to the residual magnetism.

The DEC status (energized/de-energized) shall be clearly visible.

If closing or opening operation is not fully completed an anomaly remote signalization (MNC – “Manovra Non Completata”) shall be sent.

Moreover, with the hand-crank insertion an anomaly remote signalization shall be sent using MNC signalization (not represented in the electric scheme, because not necessary in case of swing lever with an operation enabling).

7.3.4 **Controls and signalizations**


The contacts referred to the following controls and signalizations shall be reported in the terminal board, when they are necessary:

- a) drive circuit of shunt closing release control (CH, for DS and ES)
- b) drive circuit of shunt opening release control (AP, for DS and ES)
- c) drive circuit of DBST insertion control (INS)
- d) drive circuit of DBST de-insertion control (DIS)
- e) consensus “P” (Prova) to local operations
- f) remote/local selector switch in local (P) position (43SP-Prova)
- g) intervention of motor protection device and/or auxiliary supply missing (42RT)
- h) motor maximum operation time (BX)
- i) not-maneuverable DS (SNM, only in case of motor-operated, for DS and ES)
- j) not completed manual operation (MNC) (only in case of manual-operated, for DS and ES)
- k) close position (ccX189, for DS and ES)
- l) open position (caX189, for DS and ES)
- m) anti-condensation circuit anomaly (AnR189)
- n) consensus from on-site switchgears CBs (152), DS and ES (189).

Further specific control circuits, using signals from secondary terminals of on-site Inductive or Capacitive Voltage Transformers (see electric diagrams), elaborate absence of voltage on HV line (and status ON/OFF of relative low voltage protection CBs) to enable the ES closing:

- a) voltage presence (27ON)

³ Different designs with the same functional results can be evaluated by Enel.

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- b) voltage absence (27OFF)
- c) voltage presence anomaly (An PRES TENS)

For this purpose the low voltage components shall have the following characteristics:

- a) 3P+N circuit-breaker for protection of secondary VT circuits:
Ue = 400 V ac; In = 3A; Electromagnetic over current release - short circuit current setting: 12 A ("B-type"); Icu ≥ 25 kA;
- b) K27A/L, K27B/L and K27ATL relays:
Rated voltage = 100 V AC.

7.4 Latam functional characteristics

7.4.1 Operating mechanisms. General characteristics

For 3-column disconnectors, the rotation blades opening will be clockwise direction (seen from above).

7.4.2 Motor-operated and manual-operated disconnectors and earthing switches

It shall be possible to lock them at operation limits by mean of padlocks with Ø = 10 mm pin, operating from ground level, even in presence of high voltage.

In case the motor-operated, the manual emergency operation shall be enabled by a Consensus Electromagnetic Device (DEC) (two if ES is present, one for DS and one for ES); with this device the handcrank insertion is enabled pressing a button⁴ and in presence of all requested conditions. With the handcrank insertion an anomaly remote signalization (SNM) shall be sent.

A switch shall be to permit the selection of operation mode to 3 positions: "local, locked, remote" with auxiliary contacts that indicate the position. In the position, "local," the electric remote control shall be inoperable. In the position, "remote," the local electric control shall be inoperable. In the position, "locked," local and remote electric operations must be blocked.

In the case of motor-operated, must include an operations meter for the disconnector.

The set of control contacts designed for the control of the switchings typical of the disconnector and the sets of additional auxiliary contacts will be actuated by the actuation mechanism.

The DS and ES, both manual and motorized, shall have auxiliary contacts for remote indication of their position. Microcontact auxiliary schemes inserted in the electronic cards will not be accepted.

The DS and ES shall have a running switch limit to indicate the open or closed position of the blades. These must allow an adjustment of ± 10°.

For manual-operated, the contacts shall be included in a metal box appropriate for outdoor. In all cases, the auxiliary contacts shall be operated directly by the disconnector's drive shaft.

The quantities of auxiliary contacts: normally open (NO) and normally close (NC) are indicated in the following table for DS and ES:

⁴ Different designs with the same functional results can be evaluated.

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Company	72,5 [kV]		145 [kV]		245 [kV]	
	DS	ES	DS	ES	DS	ES
Ampla	6NO/6NC	4NO/4NC	6NO/6NC	4NO/4NC	-	
Chilectra	-		6NO/6NC	4NO/4NC	6NO/6NC	4NO/4NC
Codensa	-		6NO/6NC	4NO/4NC	6NO/6NC	4NO/4NC
Coelce	6NO/6NC	4NO/4NC	-		-	
Edelnor	8NO/8NC	4NO/4NC	-		8NO/8NC	4NO/4NC
Edesur	-		10NO/10NC	6NO/6NC	10NA/10NC	6NA/6NC

Further requirements are specified in next paragraphs and in the electric scheme in Annex A.

8 TESTING

8.1 General information

The tests will be performed according to Standards IEC 62271-1 and IEC 62271-102.

The tests to be performed on DS/ESs are divided in:

- Type tests;
- Routine tests;
- Commissioning tests.

8.2 Type tests

8.2.1 Visual inspection

The DS/ES, complete of all accessories and fully assembled in operation layout, shall be subject to a visual inspection in order to verify its functional, dimensional and constructive compliance with this Global Standard.

8.2.2 Dielectric tests

(IEC 62271-102 par. 6.2)

8.2.3 Radio interference voltage (r.i.v.) tests

(IEC 62271-102 par. 6.3)

Not applicable for 72,5 kV DS/ES.

8.2.4 Measurement of the resistance of the main circuit

(IEC 62271-102 par. 6.4)

8.2.5 Temperature-rise tests

(IEC 62271-102 par. 6.5)

8.2.6 Short-time withstand current and peak withstand current tests

(IEC 62271-102 par. 6.6)

8.2.7 Verification of the degree of protection

(IEC 62271-102 par. 6.7)

8.2.8 Electromagnetic compatibility (EMC) tests

(IEC 62271-102 par. 6.9)

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8.2.9 Additional tests on auxiliary and control circuits

(IEC 62271-1 par. 6.10)

For this verification the manufacturer shall provide a paper copy of the DS/ES electric schemes.

The correct operation of all controls, interlocking and signalizations shall be also verified.

The absorption curves of the motors, taking note of the maximum values (inrush excluded), shall be registered in the following situations:

- at rated voltage;
- at 110% of the rated voltage;
- at 85% of the rated voltage.

8.2.10 Operating and mechanical endurance tests

(IEC 62271-102 par. 6.102)

Note: par. 6.102.3.2 applies also to measuring of resistance of earthing switch.

8.2.11 Operation under severe ice conditions

(IEC 62271-102 par. 6.103)

This test is mandatory in case of ice coating higher than 1 mm.

Note: par. 6.103.4.2 applies also to measuring of resistance of earthing switch.

8.2.12 Operation at the temperature limits.

(IEC 62271-102 par. 6.104)

This test is mandatory.

8.2.13 Bus-transfer current switching tests

(IEC 62271-102 par. 6.106)

Tests is mandatory only for Disconnectors for which this characteristic is requested (see Annex D).

8.2.14 Induced current switching tests

(IEC 62271-102 par. 6.107)

This test is mandatory.

8.2.15 Seismic qualification

If requested, DS/ES (including the support) shall be compliant with seismic qualification, according with standards listed in 4.2.2.

8.2.16 Protective treatments

Hot dip galvanized coatings on iron and steel components shall be verified in accordance with ISO 1461 by mean of magnetic flux equipments, performing at least 5 measures on each component, in uniform manner on the various surfaces, avoiding edges and angular parts.

The verification of other protective coatings shall be performed considering their characteristics: the manufacturer will indicate the minimum thickness allowed and the others characteristics.

8.2.17 Tests on insulators

The ceramic insulators shall be tested in accordance with IEC 60168 and IEC 60507.

The composite insulators shall be tested in accordance with IEC 62231.

8.3 Routine Tests

The Routine tests (also called acceptance tests) shall be made in the manufacturer's factory on each apparatus supplied, to ensure the product compliance with the sample approved during the conformity

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assessment (homologation, certification etc.) process and on which the type tests have been performed.

In principle it's acceptable to limit the mounting for testing to subassemblies consisting in the single poles fully mounted. Only for the first routine tests of each new contract, the first motor-operated DS/ES and the first manual-operated DS/ES shall be fully assembled in factory in order to perform all routine tests, mechanical operating tests included.

If for a DS/ES the erection and commissioning tests assistance are requested to be performed by the manufacturer, the fully assembling in factory is not required even if it's the first sample; in this case the fully assembling in factory is postponed to the first sample for which the manufacturer's erection and commissioning tests assistance is not requested.

Test values/results shall be in compliance with rated values (and relative tolerances).

The manufacturer shall provide, for each DS/ES supplied, the report of all measures and tests carried out.

8.3.1 Dielectric test on the main circuit

(IEC 62271-102 par. 7.1)

Accordingly with 7.1 of 62271-1 the test is fulfilled with the test in 8.3.4.

8.3.2 Tests on auxiliary and control circuits

(IEC 62271-102 par. 7.2)

To be performed if auxiliary and control circuits are present.

The possibility to perform this test without connecting the Control Box(es) to the power kinematic chain shall be approved during conformity assessment process, considering the specific manufacturer design (fully functional tests will be performed on the completely assembled DS/ES on site).

Functional tests (par. 7.2.2 of IEC 62271-1) shall be done only at rated voltage.

Dielectric tests (par. 7.2.4 of IEC 62271-1) shall be done applying 1 kV for 1 s.

Electronic devices, motors etc. can be excluded by dielectric test only if agreed during the conformity assessment (homologation, certification etc.) process.

8.3.3 Measurement of the resistance of the main circuit

(IEC 62271-102 par. 7.3)

The ambient temperature influence can be neglected.

8.3.4 Design and visual checks

(IEC 62271-102 par. 7.5)

The checks shall be performed referring to conformity assessment (homologation, certification etc.) documents and verifying damage absence.

8.3.5 Mechanical operating tests

(IEC 62271-102 par. 7.101)

8.3.6 Protective treatments

The thickness of the protective coatings shall be verified according with 8.2.16.

8.4 Commissioning tests

The manufacturer shall indicate in the manual the checks and tests to be done after the erection (see 10.2.5 of 62271-1), consisting at least in:

- Visual check;
- Tests on auxiliary and control circuits (if any);
- Measurement of the resistance of the main circuit (after mechanical operating tests);

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d) Mechanical operating tests.

In case of erection and commissioning tests performed by Enel group personnel, if any problem occurs or any commissioning test has negative result, the manufacturer shall intervene in field to verify and solve the problem.

9 SUPPLY REQUIREMENTS

9.1 Tender's technical documentation

For each DS/ES typology offered in the tender the supplier shall provide the Annex C properly filled.

9.2 Conformity assessment

9.2.1 Conformity assessment process

The conformity assessment processes (homologation, certification etc.) are specified in the proper contractual documents.

9.2.2 Conformity assessment documentation

The project documentation that the supplier uses to manufacture each DS/ES typology can be divided in Type A documents (public, not confidential) and Type B document (confidential).

For each Enel Group Distribution company requesting a specific DS/ES typology, the manufacturer shall provide a specific documentation set according with the specific requirements stated in this document.

The Type A documentation shall consist at least in:

- 1) Type A documents list;
- 2) Type B documents list;
- 3) Annex C properly filled;
- 4) Overall dimensions drawing;
- 5) Insulators drawings and characteristics;
- 6) Electric diagram (see 7.1.4-b), low voltage components list included;
- 7) Control Box (if any) layout drawings;
- 8) Overall DS/ES and Control Box (with open/closed doors) pictures;
- 9) Nameplate and labels drawings;
- 10) DS/ES installation, use and maintenance handbook/manual;
- 11) Routine and commissioning tests:
 - a) Test report form (two documents, one for factory tests and one for on-site tests);
 - b) Reference values table (with tolerances);
 - c) Protective coatings (typology, minimum thickness, reference standards);
- 12) List of documentation, materials and accessories supplied;
- 13) Main sub-components suppliers list;
- 14) Only for Enel Distribuzione, Manufacturing and Control Plan (PFC).

9.3 Packaging, transport, storage and installation/testing

Par. 10.1 and 10.2 of IEC 62271-102 applies.

In order to limit the on-site mounting operations the DS/ES shall be transported in subassemblies consisting in the single poles fully mounted (this requirement is not mandatory for 245 kV DSs).

DS/ESs' package shall be suitable to guarantee:

- the protection during transport (including by ship, if necessary);

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- an elevation from the ground at least of 100 mm;
- the external storage for at least three months.

On external side of packaging, the following information shall be present:

- 1) manufacturer name;
- 2) manufacturing year/month;
- 3) manufacturer designation type;
- 4) manufacturer serial number;
- 5) Enel component codification (i.e.: GSH003/1 - XXXXX);
- 6) contract number;
- 7) destination substation;
- 8) total weight;
- 9) lifting information (showing the points and the correct method of lifting);
- 10) only for Enel Distribuzione, the bar code, in accordance with PVR006.

With each DS/ES the following items shall be supplied in the local language of destination (items from 4 to 8 on paper):

- 1) the support structure (only if requested) with its anchor bolts to the civil works (stainless or hot dip galvanized steel, chemical or expansion type);
- 2) bolts to assembly the DS/ES poles to support structure;
- 3) hand-crank or swing lever and Control Box(es) support with its anchor bolts to the civil works;
- 4) list of documentation, materials and accessories supplied;
- 5) overall dimensions drawing;
- 6) electric diagram;
- 7) DS/ES installation, use and maintenance handbook/manual;
- 8) routine and commissioning tests:
 - a) routine (factory) test reports;
 - b) reference values table (with tolerances);
- 9) one CD-Rom containing the whole type A documentation (pdf file format).

If on-site assembly is performed by the manufacturer, waste (including packaging) shall be disposed by him.

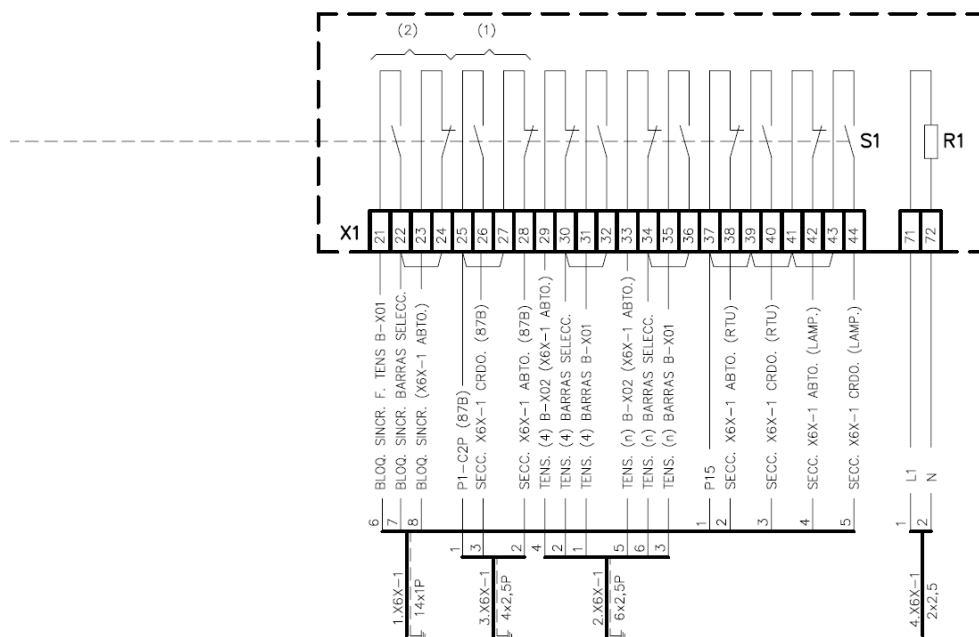
9.3.1 Specific requirement for Endesa

The manufacturer must present the declaration of conformity in compliance with ITC-RAT 03 of the “Reglamento sobre condiciones técnicas y garantías de seguridad en instalaciones eléctricas de alta tensión, Real Decreto 337/2014.”

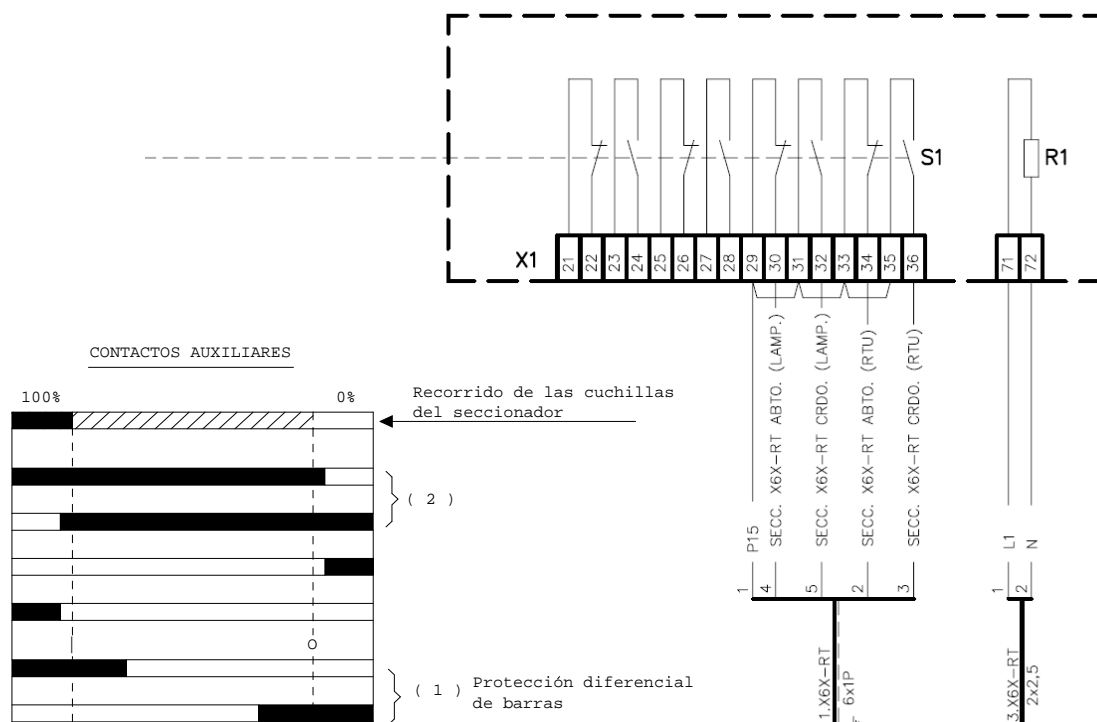
ANNEX A – ELECTRICAL SCHEMES

A.1 – ENDESA AND ENEL DISTRIBUTIE ELECTRICAL SCHEMES

FINAL TERMINAL STRIP MANUAL DRIVING DEVICE (Applicable to ENDESA)
CAJA CONTACTOS AUXILIARES SECCIONADOR (CUCHILLAS PRINCIPALES)



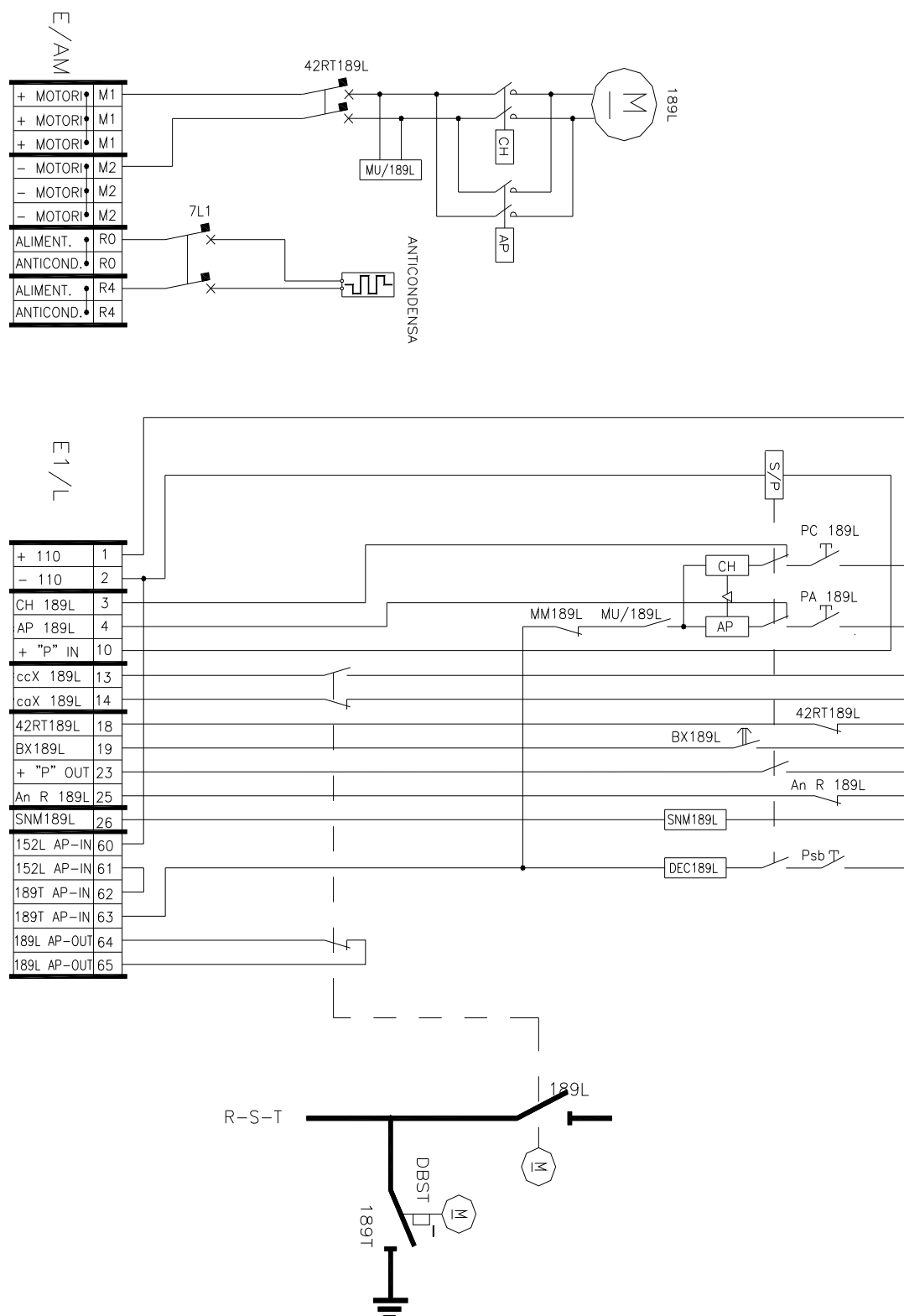
CAJA CONTACTOS AUXILIARES SECCIONADOR (CUCHILLAS DE PUESTA A TIERRA)



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A.2 – ENEL DISTRIBUZIONE ELECTRICAL SCHEMES

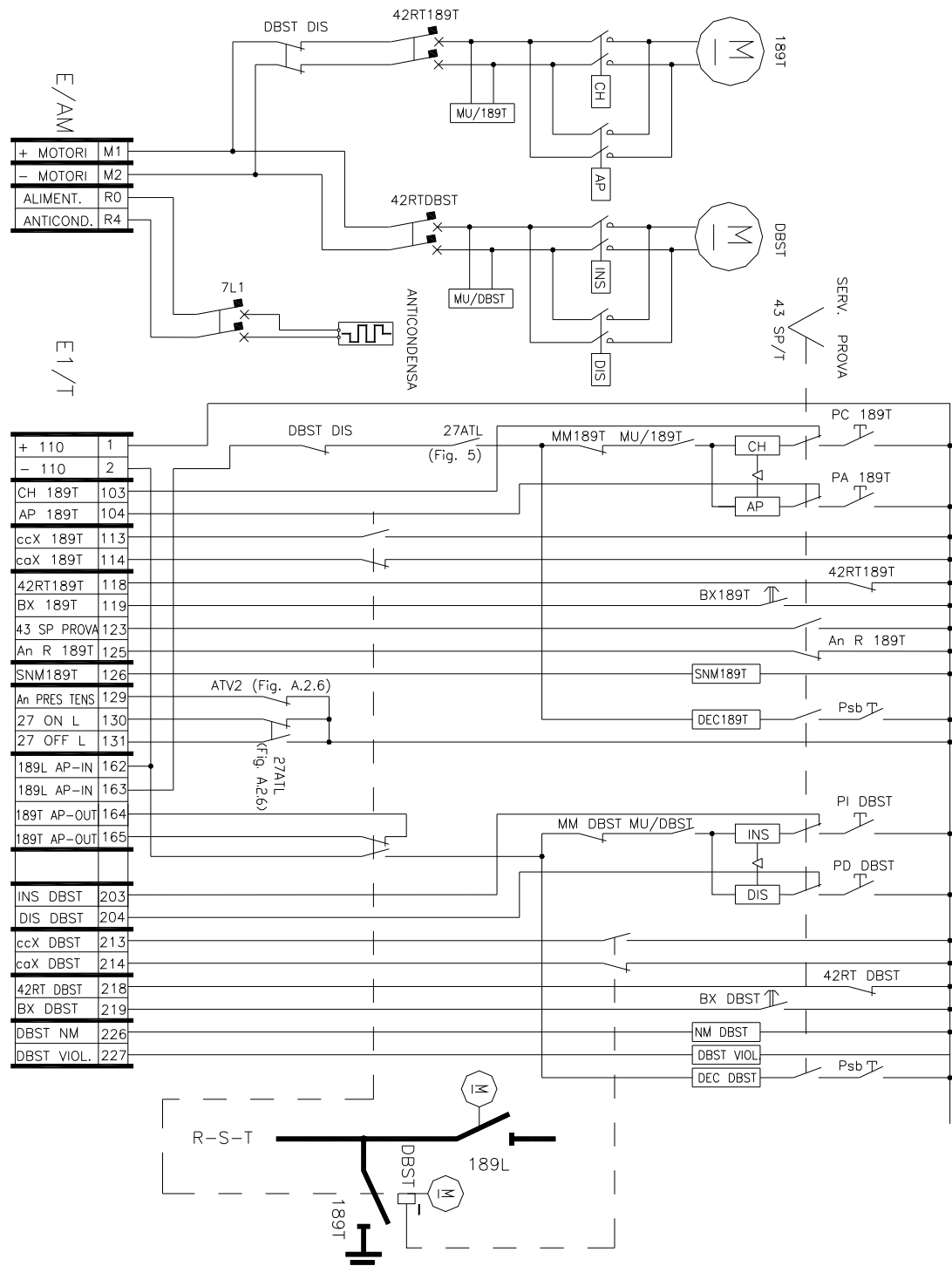
Fig. A.2.1 (motor-operated line DS+ES electrical scheme pag. 1/2)



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kV TO 245 kV**

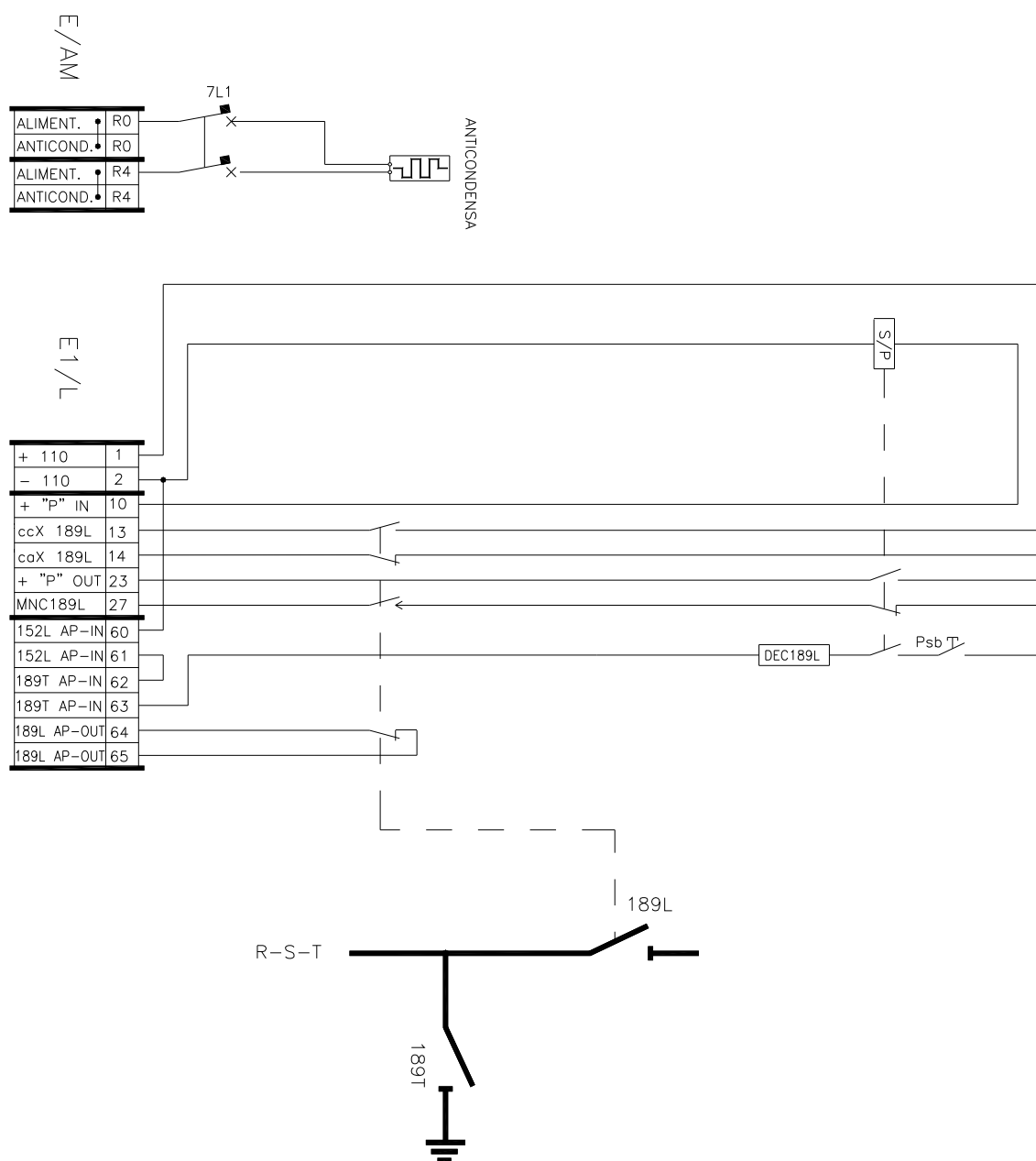
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Fig. A.2.1 (motor-operated line DS+ES electrical scheme pag. 2/2)



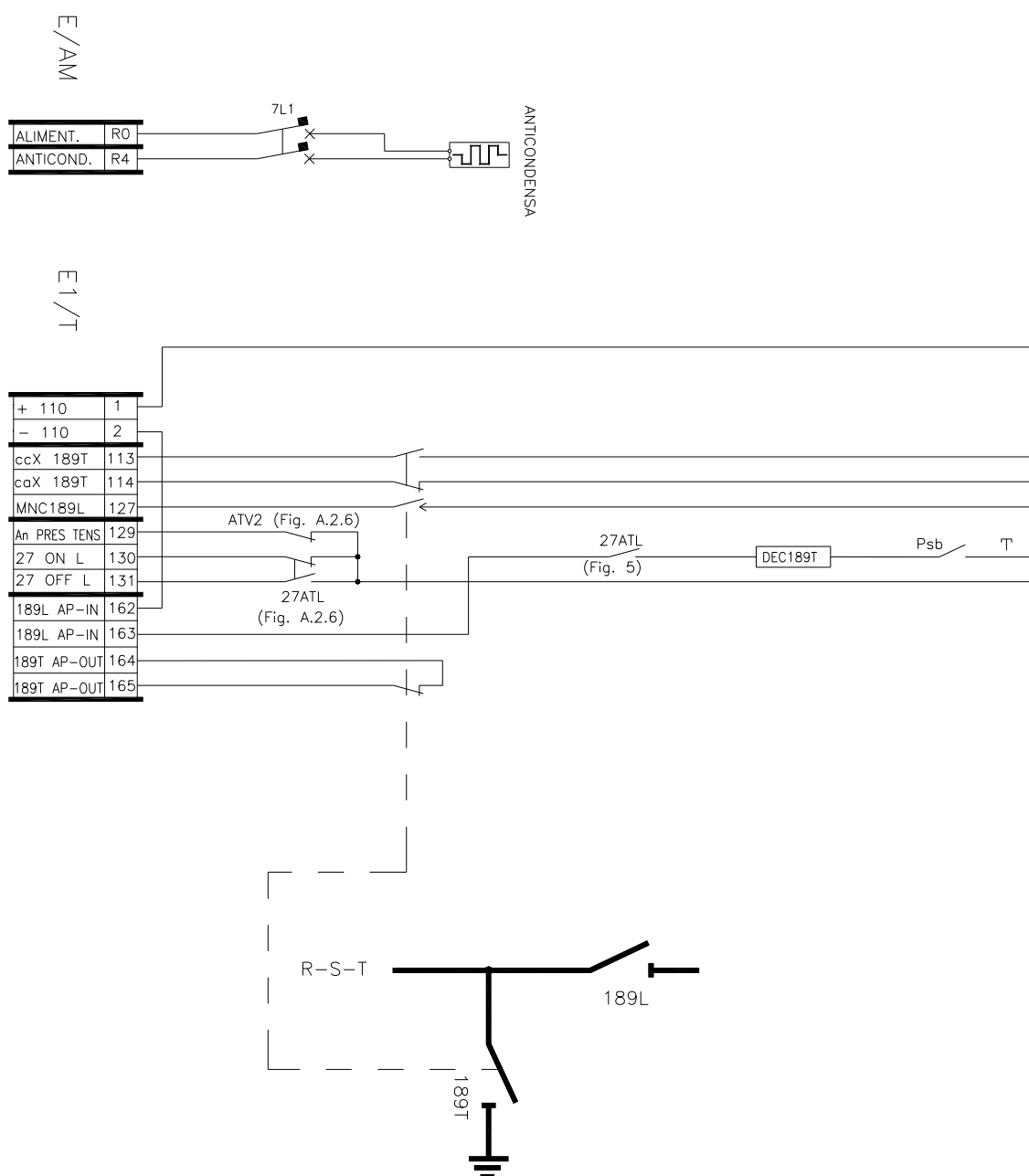
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Fig. A.2.2 (manual-operated line DS+ES electrical scheme pag. 1/2)



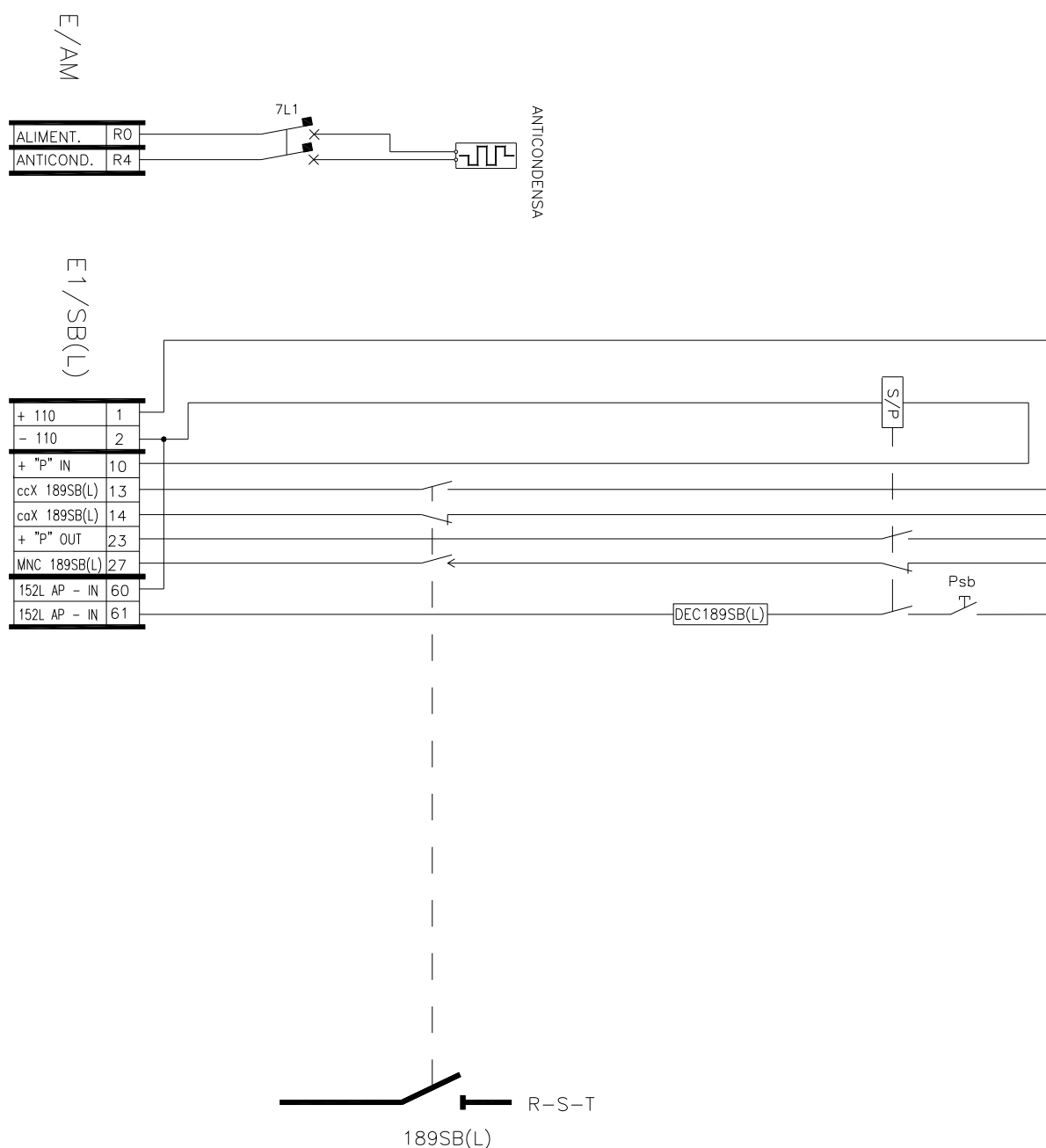
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Fig. A.2.2 (manual-operated line DS+ES electrical scheme pag. 2/2)



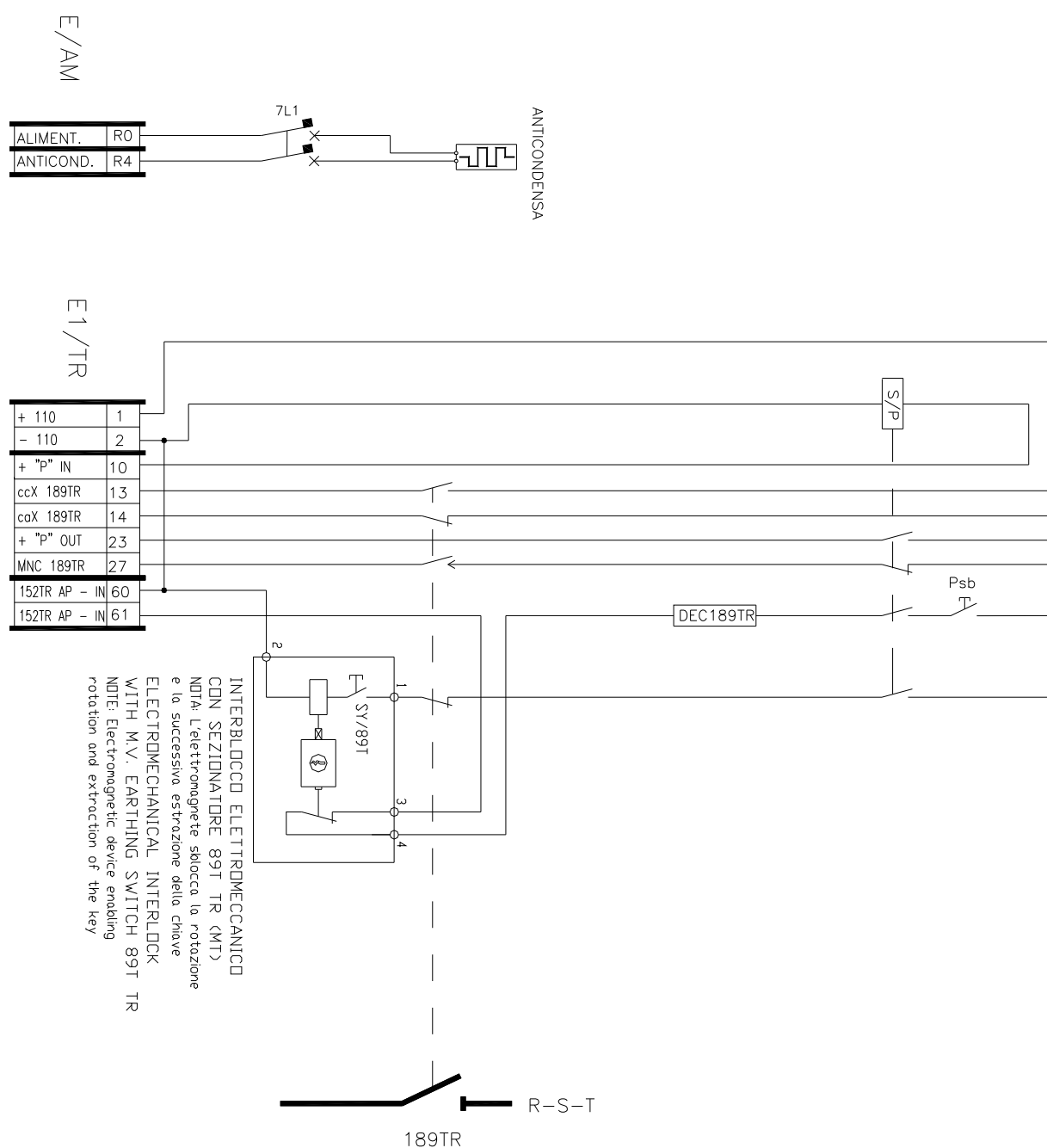
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Fig. A.2.3 (manual-operated Busbar DS (line bay) electrical scheme)



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Fig. A.2.4 (manual-operated Busbar DS (transformer bay) electrical scheme)



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Fig. A.2.5 (manual-operated Conjont busbar DS electrical scheme)

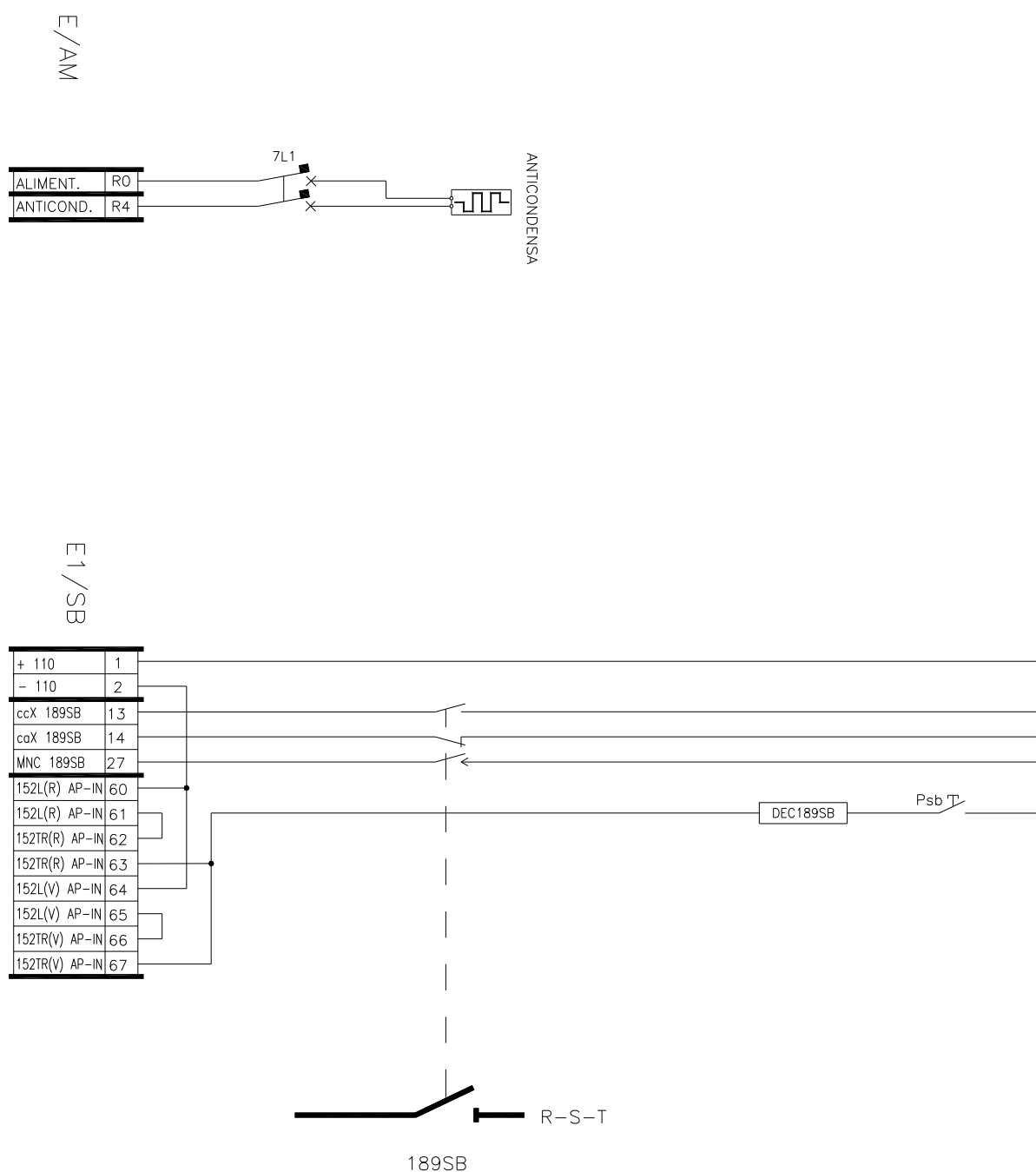
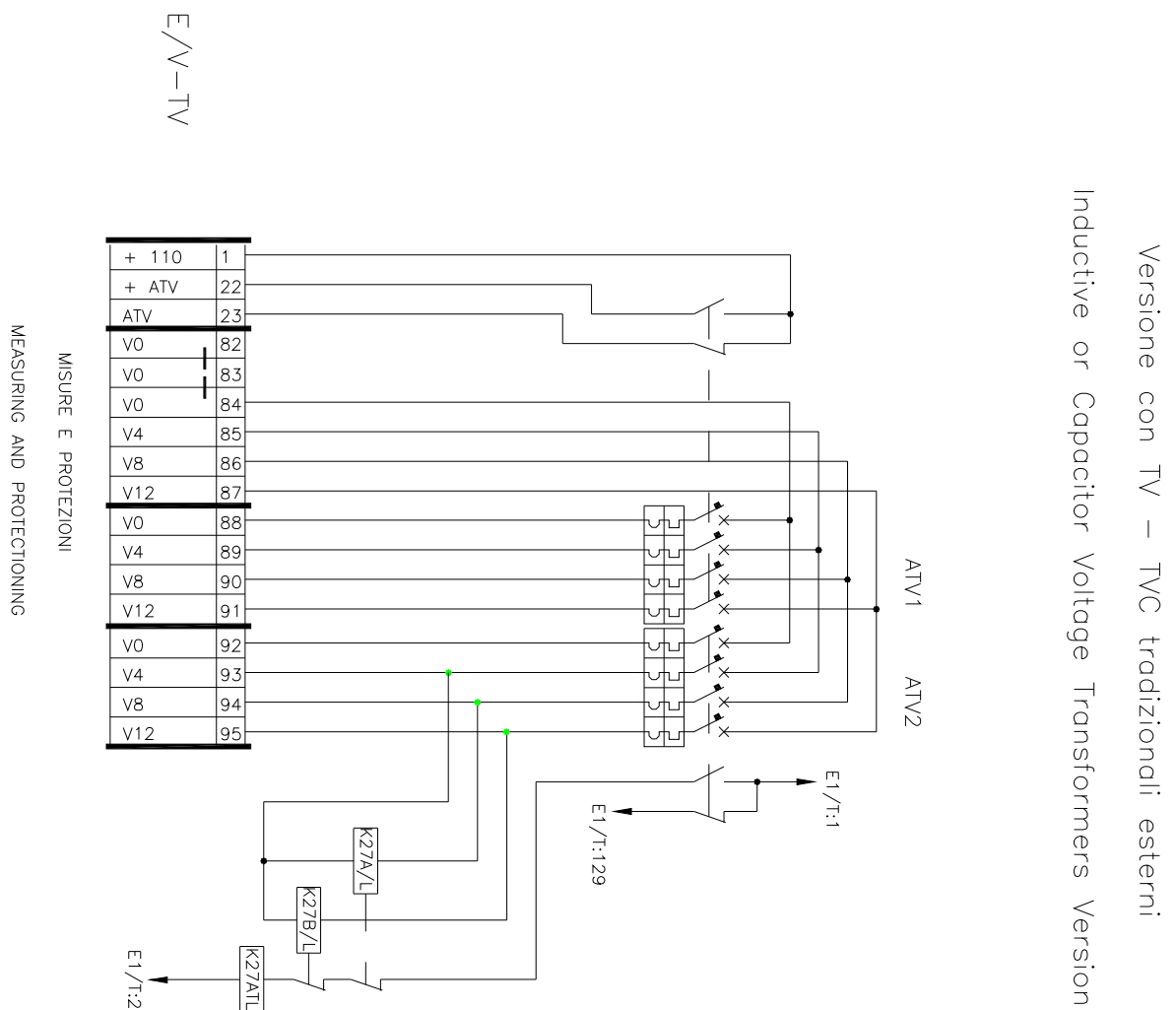


Fig. A.2.6 (VTs connection)





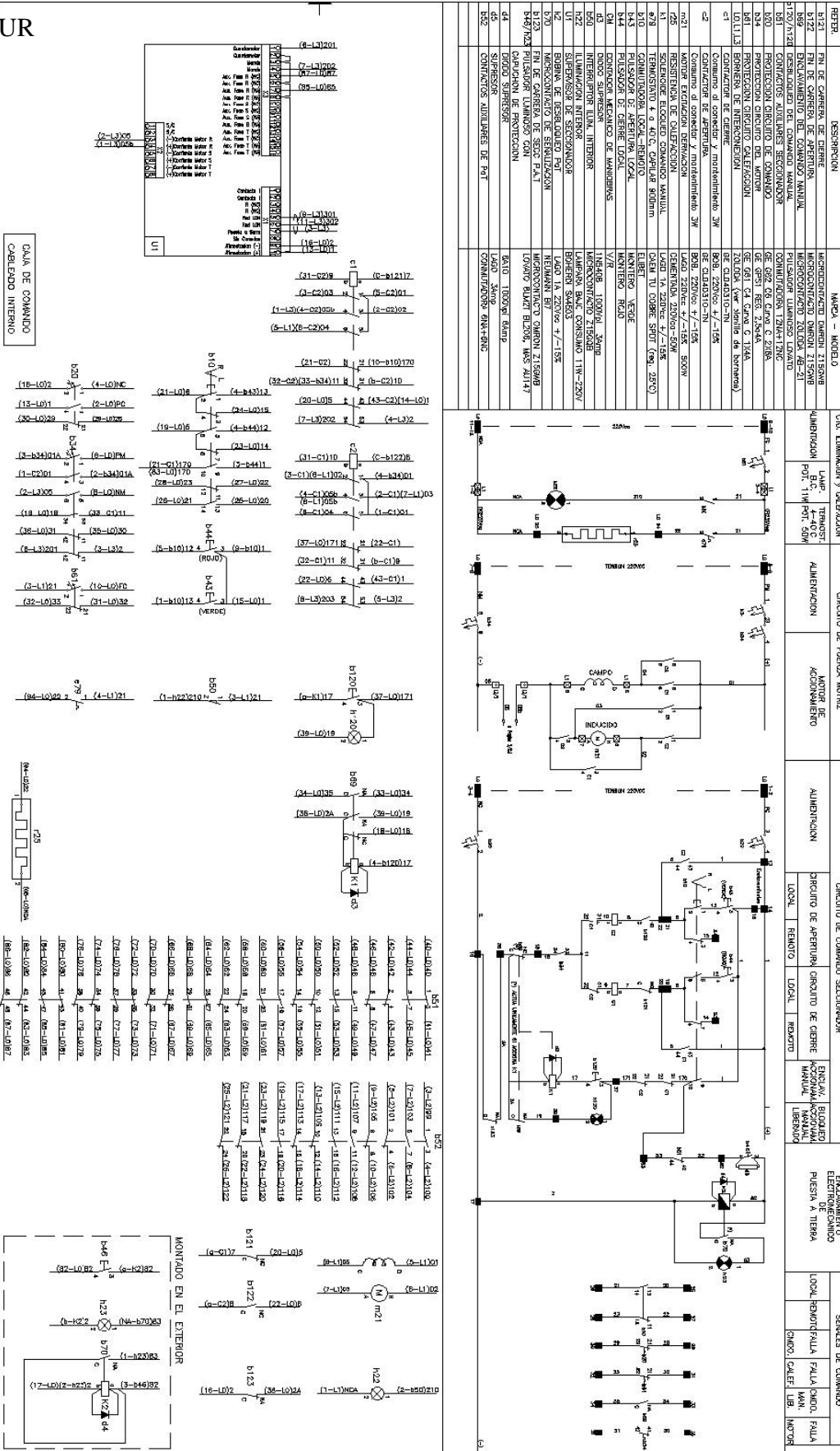
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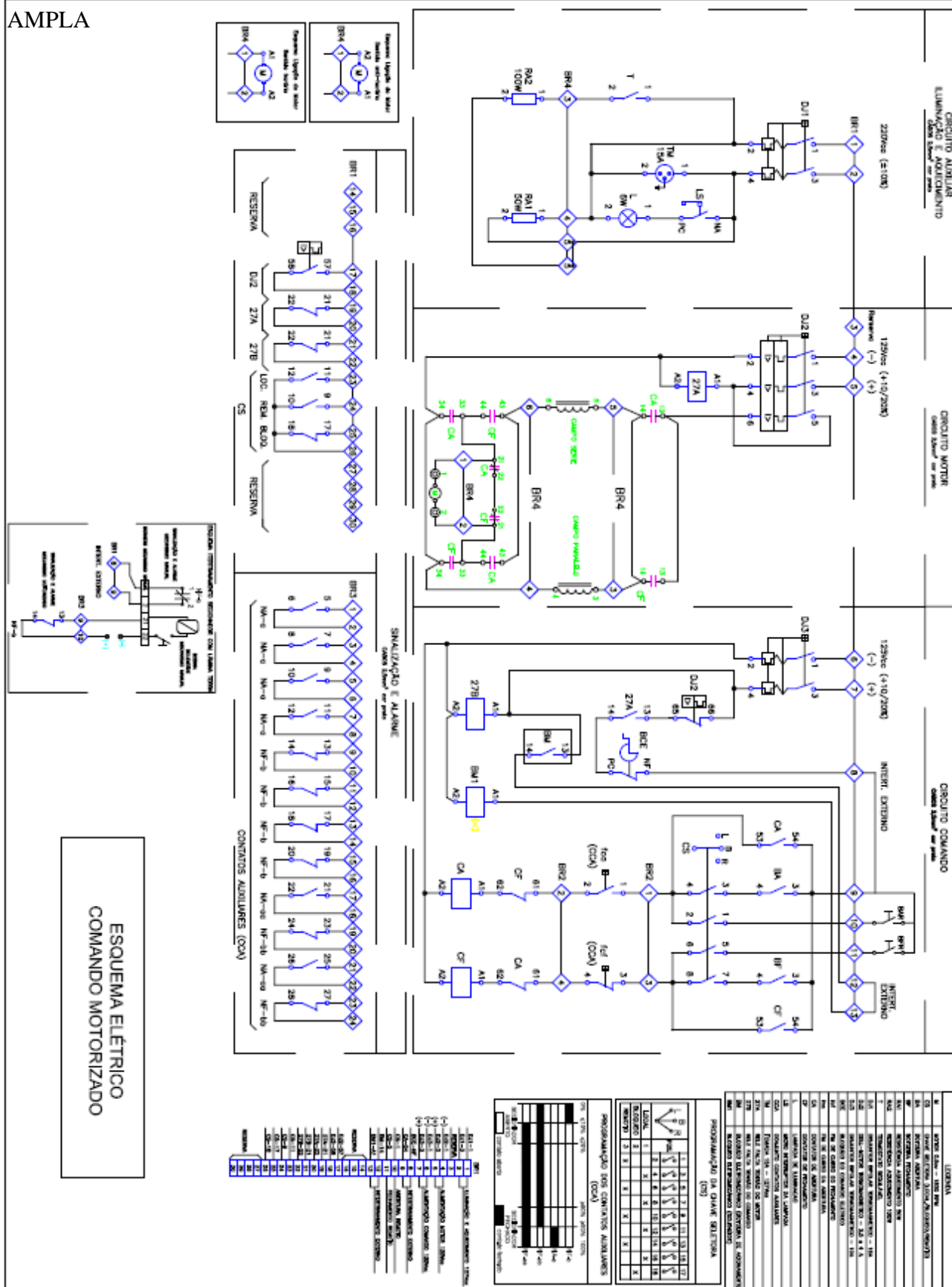
EDESUR



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AMPLA

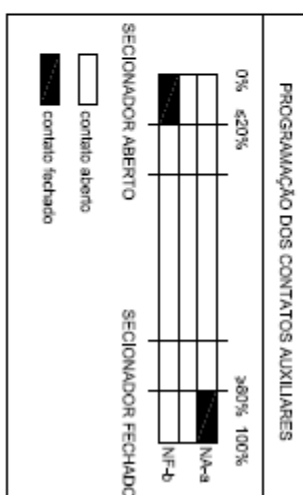
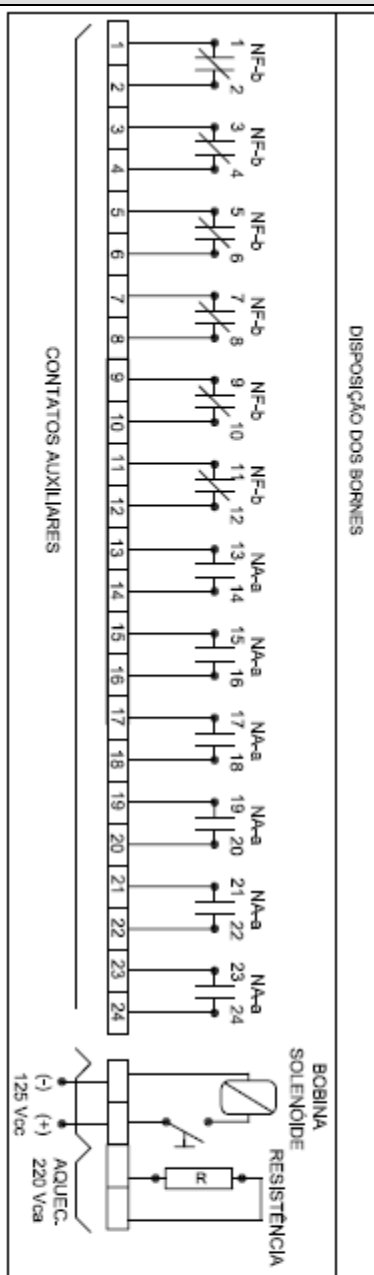




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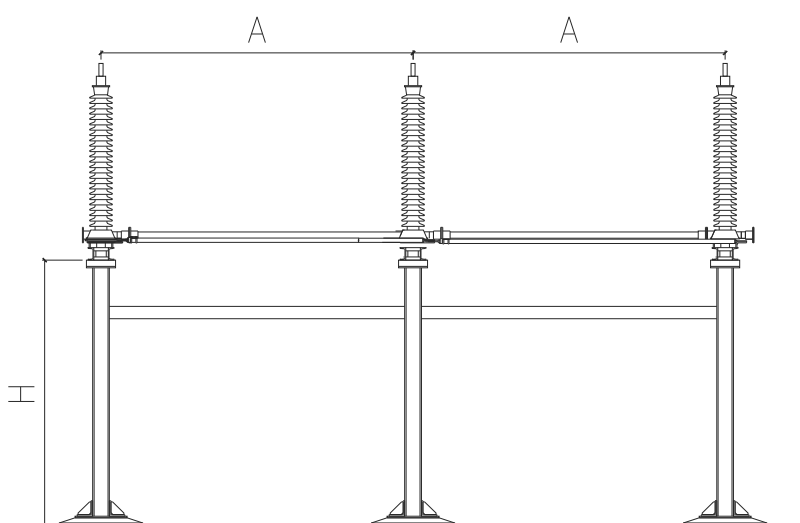
CONTATOS AUXILIARES-COMANDO MANUAL



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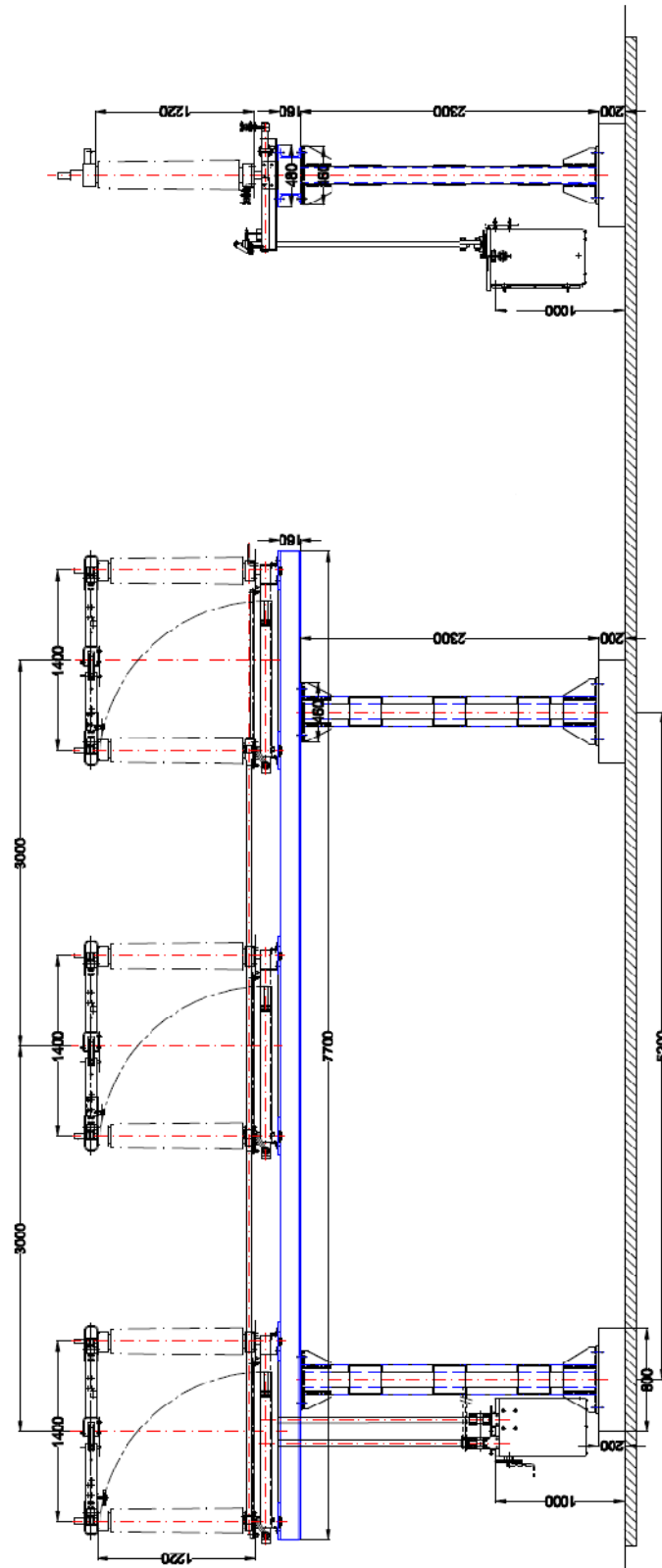
ANNEX B – DIMENSIONAL DRAWINGS

B.1 – ENDESA DIMENSIONAL DRAWING

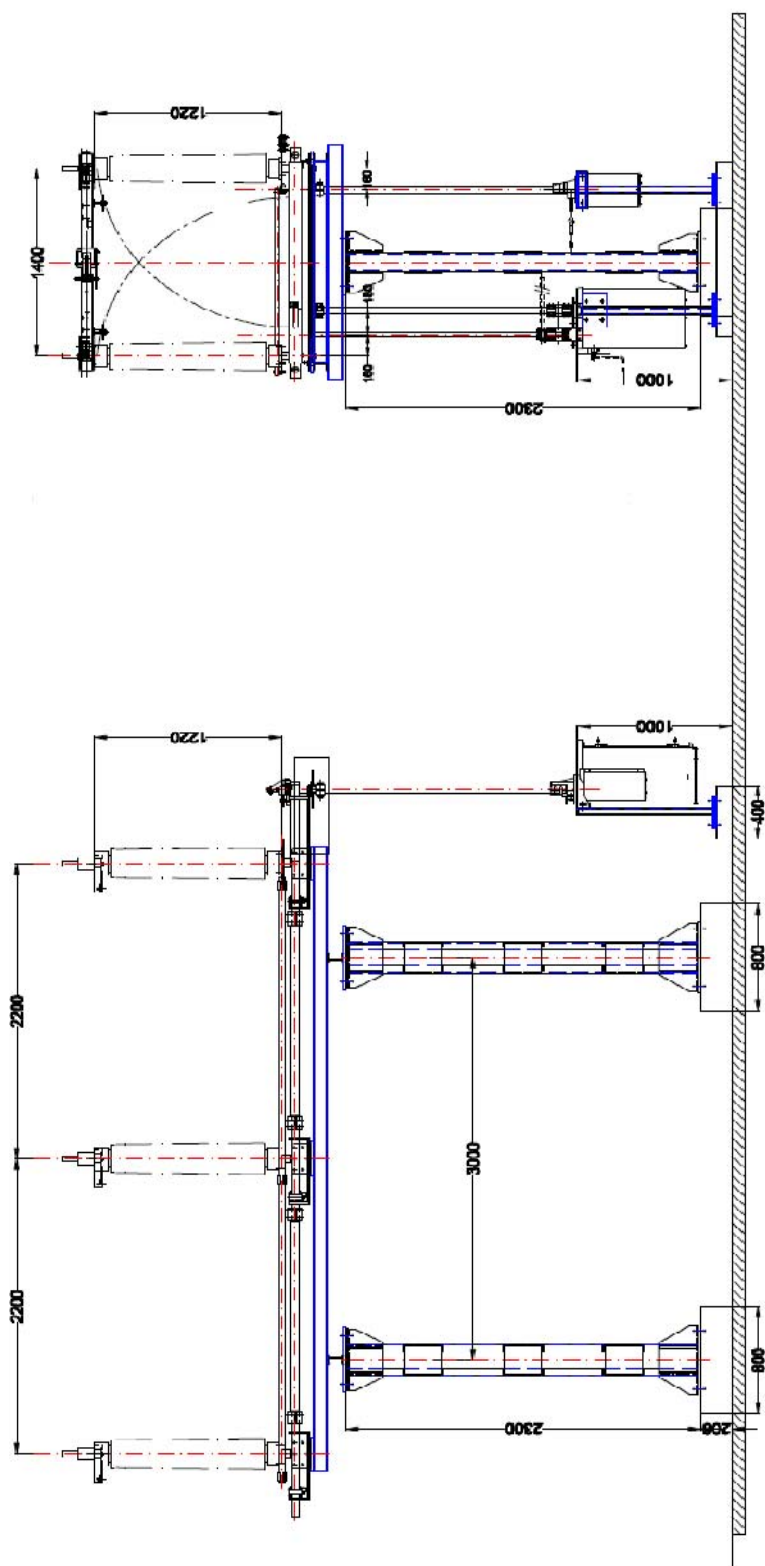


Dimensions (mm)	72 kV	145 kV
H	2600	2600
A	1500	3000

B.2 – ENEL DISTRIBUTIE DIMENSIONAL DRAWINGS
HORIZONTAL IN LINE TYPE (support in the second page)

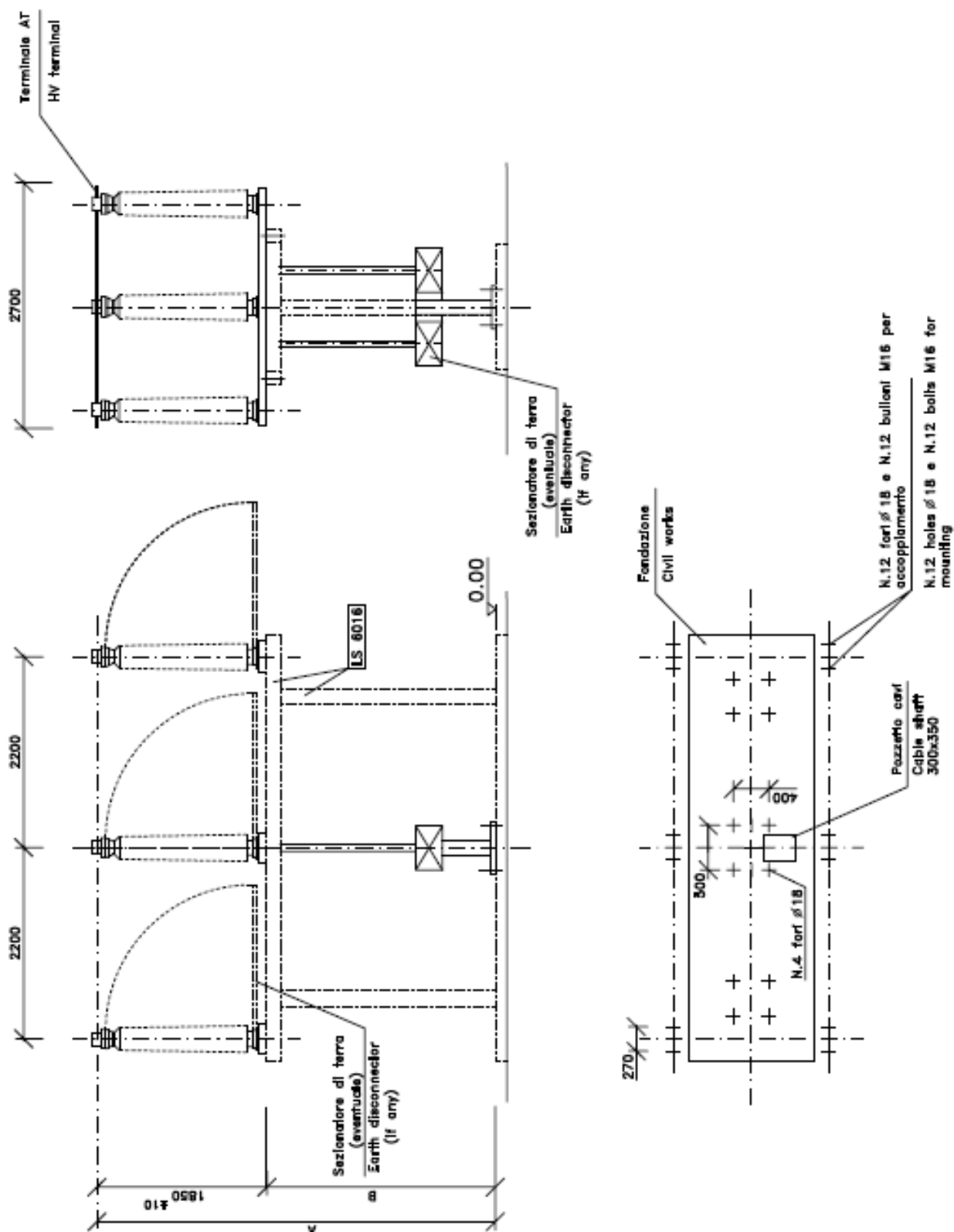


HORIZONTAL PARALLEL TYPE (support in the second page)



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	<p>HV DISCONNECTORS AND EARTHING SWITCHES WITH RATED VOLTAGE FROM 72,5 kV TO 245 kV</p>	<p>GSH003 Rev. 02 16/06/2014</p>

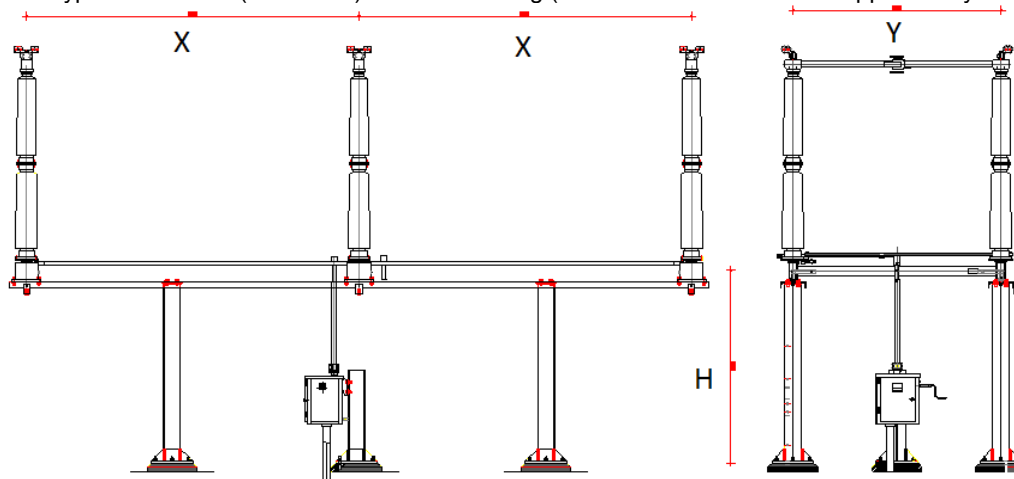
B.3 – ENEL DISTRIBUZIONE DIMENSIONAL DRAWING



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B.4 – LATAM DIMENSIONAL DRAWINGS

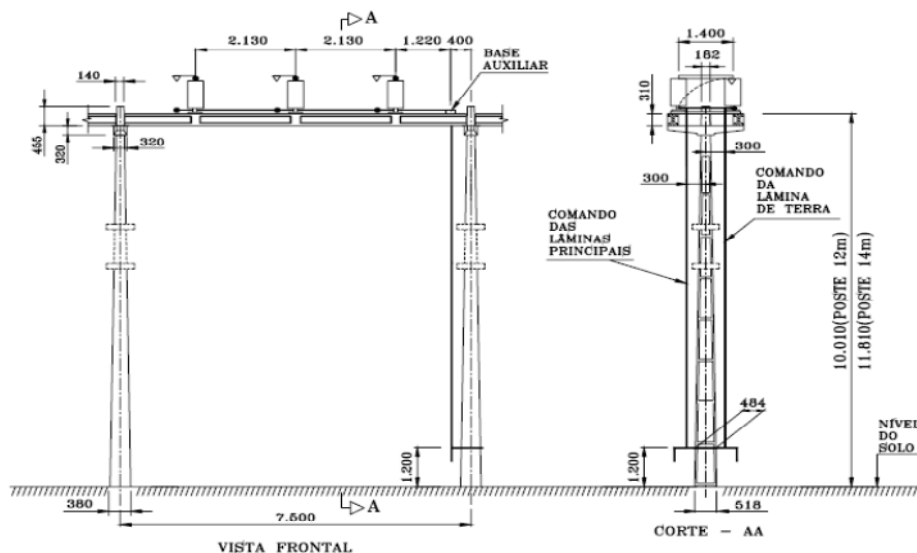
The typical distances (referential) are the following (different solutions shall be approved by Enel Distribution companies):



Empresa	Tensión	X[mm]	Y[mm]	H [mm]
Ampla	72,5	2100		See Common List
	145	2600		See Common List
Coelce	72,5	1900	1400	See Common List
Edelnor	245	4000		See Common list
	72,5	1500		See common list
Chilectra	145	3000		See common list
	245	4000		See Common list
Codensa	145	2480		See Common List
Edesur	145			See Common List
	245			See Common List

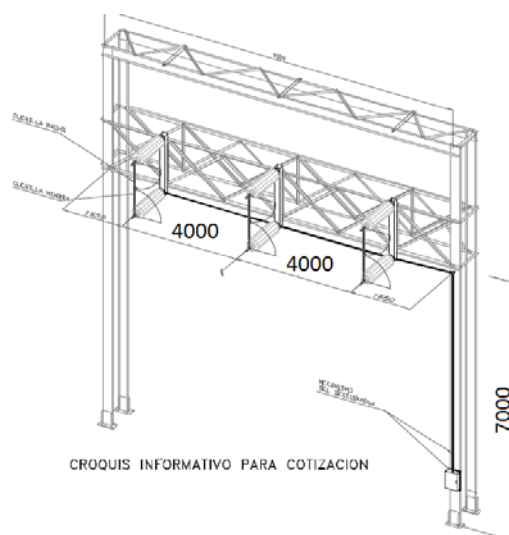
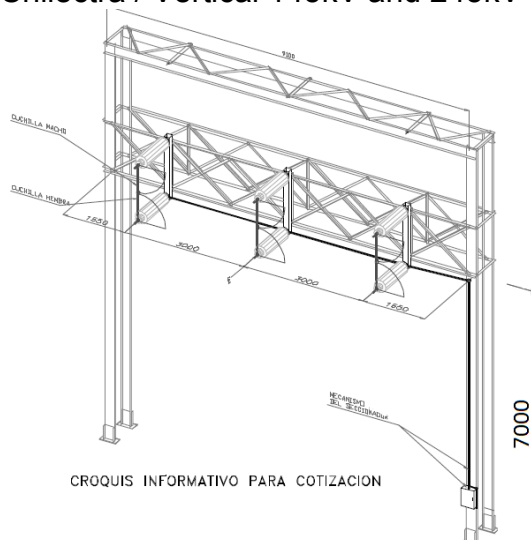
Assembly examples:

Coelce

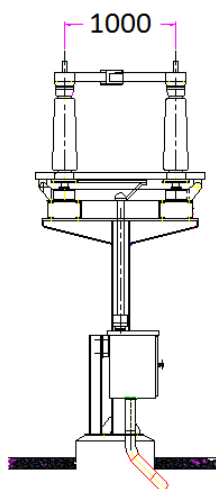
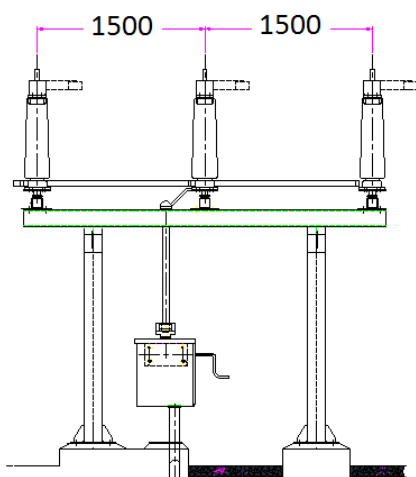



	<p style="text-align: center;">GLOBAL STANDARD</p> <p style="text-align: center;">HV DISCONNECTORS AND EARTHING SWITCHES WITH RATED VOLTAGE FROM 72,5 kV TO 245 kV</p>	<p>Page 45 of 48</p> <p>GSH003 Rev. 02 16/06/2014</p>
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Chilectra / Vertical 145kV and 245kV



Edelnor



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ANNEX C – TENDER’S TECHNICAL DOCUMENTATION

GLOBAL STANDARD: GSH003 – HV DS/ESs		TENDER:	
SUPPLIER:		FACTORY:	
ENEL GROUP TYPE CODE: GSH003/___		SUPPLIER MODEL:	
TECHNICAL CHARACTERISTIC		STANDARD REQUIREMENT	SUPPLIER OFFER
Service conditions		outdoor normal service conditions of IEC 62271-1	
Reference altitude (m)		< 1.000 (2.600 for Colombia)	
Minimum ambient air temperature (°C)		See Annex D	
SPS Class (IEC/TS 60815 series)		See Annex D	
Ice coating (mm)		See Annex D	
Seismic qualification level		See table in 4.2.2	
Rated short-time withstand current I_k (kA)		See Annex D	
Rated short-duration powerfrequency withstand voltage U_d (kV rms)	Common value	See table in 5	
	Across the isolating distance	See table in 5	
Rated lightning impulse withstand voltage U_p (kVp)	Common value	See table in 5	
	Across the isolating distance	See table in 5	
Rated frequency f_r (Hz)		50 or 60	
Opening (closing) time if motor-operated (s)	DS	≤ 15	
	ES	≤ 15	
Degrees of protection provided by enclosures		IP 54	
Rated supply voltage U_a (Vdc)		See table in 5	
d.c. max absorbed power (W)		1.000	
Rated supply voltage for heating and anti-condensation circuits (Vac)		See table in 5	
a.c. max absorbed power (VA)		50 (250 if motor-operated)	
Auxiliary contact classes		1	
DS Rated normal current I_r (A)		See Annex D	
DS Mechanical endurance class M_r		M1	
Bus-transfer current switching by disconnectors	Rated bus-transfer current for disconnectors (A)	See Annex D and table in 5	
	Rated bus-transfer voltages for disconnectors (V)	See Annex D and table in 5	
Earthing switches class E_r		E0 – M0 – A	
Insulators materials		Composite or ceramic	
Dimensions			To enclose an overall equipment drawing for each Enel Group Distribution Company



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ANNEX D – COMPONENT LIST

TYPE CODE	COMPANY	COMPANY CODE	N° Column s/pole	Type opening	Ur	Ir	Ik	ES	DS operation	ES operation	SPS class	Bus bar transfer	Minimum ambient air temperature (°C)	Ice coating (mm)	ASSEMBLY	Installation height (mm)
GSH003/900	AMPLA	4545883	2	Centre-break	72.5	1250	25	Y	MANUAL	MANUAL	d	N	-10	1	Vertical	< 10000
GSH003/901	AMPLA	4545884	2	Centre-break	72.5	1250	25	Y	MANUAL	MANUAL	d	N	-10	1	Horizontal paralel	< 6000
GSH003/902	AMPLA	4545894	2	Centre-break	72.5	1250	25	Y	MANUAL	MANUAL	d	N	-10	1	Horizontal paralel	> 10000
GSH003/903	AMPLA	4545875	2	Centre-break	72.5	1250	25	N	MANUAL	-	d	N	-10	1	Horizontal paralel	> 10000
GSH003/904	AMPLA	4545893	2	Centre-break	72.5	1250	25	N	MANUAL	-	d	N	-10	1	Vertical	< 10000
GSH003/905	AMPLA	4545888	2	Centre-break	72.5	1250	25	N	MANUAL	-	d	N	-10	1	Horizontal paralel	< 6000
GSH003/906	AMPLA	4545891	2	Centre-break	72.5	1250	25	Y	MOTOR	MANUAL	d	N	-10	1	Horizontal paralel	< 6000
GSH003/907	AMPLA	4545890	2	Centre-break	72.5	1250	25	N	MANUAL	MANUAL	d	N	-10	1	Horizontal paralel	< 10000
GSH003/908	AMPLA	4545882	2	Centre-break	72.5	1250	25	Y	MOTOR	MANUAL	d	N	-10	1	Horizontal paralel	> 10000
GSH003/909	AMPLA	4545889	2	Centre-break	72.5	1250	25	N	MOTOR	-	d	N	-10	1	Horizontal paralel	< 6000
GSH003/910	AMPLA	4545917	2	Centre-break	72.5	1250	25	N	MOTOR	-	d	N	-10	1	Horizontal paralel	< 10000
GSH003/911	AMPLA	4545886	2	Centre-break	72.5	1250	25	N	MOTOR	-	d	N	-10	1	Horizontal paralel	> 10000
GSH003/912	AMPLA	4545872	2	Centre-break	145	1250	40	Y	MANUAL	MANUAL	d	N	-10	1	Horizontal paralel	< 10000
GSH003/913	AMPLA	4545887	2	Centre-break	145	1250	40	Y	MANUAL	MANUAL	d	N	-10	1	Vertical	< 10000
GSH003/914	AMPLA	4545869	2	Centre-break	145	1250	40	Y	MANUAL	MANUAL	d	N	-10	1	Horizontal paralel	> 10000
GSH003/915	AMPLA	4545868	2	Centre-break	145	1250	40	N	MANUAL	-	d	N	-10	1	Horizontal paralel	< 6000
GSH003/916	AMPLA	4545916	2	Centre-break	145	1250	40	N	MANUAL	-	d	N	-10	1	Horizontal paralel	< 10000
GSH003/917	AMPLA	4545948	2	Centre-break	145	1250	40	N	MANUAL	-	d	N	-10	1	Vertical	< 10000
GSH003/918	AMPLA	4545960	2	Centre-break	145	1250	40	Y	MOTOR	MANUAL	d	N	-10	1	Horizontal paralel	< 6000
GSH003/919	AMPLA	4545961	2	Centre-break	145	1250	40	N	MOTOR	-	d	N	-10	1	Horizontal paralel	< 10000
GSH003/920	AMPLA	4545955	2	Centre-break	145	1250	40	Y	MOTOR	MANUAL	d	N	-10	1	Horizontal paralel	> 10000
GSH003/921	AMPLA	4584354	2	Centre-break	145	1250	40	N	MOTOR	-	d	N	-10	1	Horizontal paralel	< 6000
GSH003/922	AMPLA	4545855	2	Centre-break	145	1250	40	N	MOTOR	-	d	N	-10	1	Vertical	< 10000
GSH003/923	AMPLA	4545874	2	Centre-break	145	1250	40	N	MOTOR	-	d	N	-10	1	Horizontal paralel	> 10000
GSH003/924	AMPLA	6806423	2	Centre-break	72.5	1250	25	N	MOTOR	-	d	N	-10	1	Vertical	< 10000
GSH003/925	AMPLA	6806426	2	Centre-break	72.5	1250	25	N	MANUAL	-	d	N	-10	1	Vertical	> 10000
GSH003/926	AMPLA	6806427	2	Centre-break	145	1250	40	N	MANUAL	-	d	N	-10	1	Vertical	> 10000
GSH003/600	COELCE	4544141	2	Centre-break	72.5	1250	31,5	Y	MANUAL	MANUAL	e	N	-10	1	Horizontal paralel	10010mm
GSH003/601	COELCE	6771461	2	Centre-break	72.5	1250	31,5	N	MANUAL	-	e	N	-10	1	Horizontal paralel	10010mm
GSH003/602	COELCE	6771466	2	Centre-break	72.5	2000	31,5	Y	MANUAL	MANUAL	e	N	-10	1	Horizontal paralel	10010mm
GSH003/603	COELCE	6771467	2	Centre-break	72.5	2000	31,5	N	MANUAL	-	e	N	-10	1	Horizontal paralel	10010mm
GSH003/604	COELCE	6771465	2	Centre-break	72.5	1250	31,5	N	MANUAL	-	e	N	-10	1	Vertical	6000mm
GSH003/605	COELCE	6771469	2	Centre-break	72.5	2000	31,5	N	MANUAL	-	e	N	-10	1	Vertical	6000mm
GSH003/606	COELCE	6771462	2	Centre-break	72.5	1250	31,5	N	MANUAL	-	e	N	-10	1	Horizontal paralel	2470mm
GSH003/607	COELCE	6771468	2	Centre-break	72.5	2000	31,5	N	MANUAL	-	e	N	-10	1	Horizontal paralel	2470mm
GSH003/608	COELCE	6783064	2	Lateral-break	72.5	1250	31,5	N	MANUAL	-	e	N	-10	1	Vertical	10400mm
GSH003/500	EDELNOR	6792662	2	Centre-break	72.5	2000	40	N	MOTOR	-	e	Y	-10	1	Horizontal paralel	2300 mm
GSH003/501	EDELNOR	6792646	2	Centre-break	72.5	2000	40	Y	MOTOR	MANUAL	e	Y	-10	1	Horizontal paralel	2300 mm
GSH003/502	EDELNOR	6760960	2	Centre-break	72.5	1250	31,5	N	MOTOR	-	e	N	-10	1	Horizontal paralel	2300 mm
GSH003/503	EDELNOR	6757158	2	Centre-break	72.5	1250	31,5	Y	MOTOR	MANUAL	e	N	-10	1	Horizontal paralel	2300 mm
GSH003/504	EDELNOR	6798993	2	Centre-break	245	2000	40	N	MOTOR	-	e	Y	-10	1	Horizontal paralel	2300 mm
GSH003/505	EDELNOR	6798994	2	Centre-break	245	2000	40	Y	MOTOR	MOTOR	e	Y	-10	1	Horizontal paralel	2300 mm
GSH003/506	EDELNOR	6806310	2	Vertical-break	72.5	1250	31,5	N	MOTOR	-	e	Y	-10	1	Vertical	4200 mm
GSH003/507	EDELNOR	6806311	2	Vertical-break	72.5	1250	31,5	Y	MOTOR	MANUAL	e	N	-10	1	Vertical	4200 mm
GSH003/508	EDELNOR	6761914	2	Vertical-break	72.5	1250	31,5	Y	MOTOR	MANUAL	e	N	-10	1	Vertical	4200 mm
GSH003/509	EDELNOR	6761915	2	Vertical-break	72.5	1250	31,5	N	MOTOR	-	e	Y	-10	1	Vertical	4200 mm
GSH003/700	CODENSA	6788913	2	Centre-break	145	2000	40	N	MANUAL	MANUAL	c	N	-10	10	Horizontal paralel	2150 mm
GSH003/701	CODENSA	6787659	2	Centre-break	145	2000	40	Y	MANUAL	MANUAL	c	N	-10	10	Horizontal paralel	2150 mm
GSH003/702	CODENSA	6801955	2	Centre-break	145	2000	40	N	MOTOR	MANUAL	c	N	-10	10	Horizontal paralel	2150 mm
GSH003/703	CODENSA	6801956	2	Centre-break	145	2000	40	Y	MOTOR	MANUAL	c	N	-10	10	Horizontal paralel	2150 mm
GSH003/400	EDESUR	0104-0049	3	Centre-break	145	2000	31,5	N	MOTOR	-	c	N	-10	10	Horizontal paralel	2250 mm
GSH003/401	EDESUR	0104-0367	2	Centre-break	145	800	31,5	N	MOTOR	-	c	N	-10	10	Horizontal paralel	2250 mm
GSH003/402	EDESUR	0104-0361	2	Centre-break	145	800	31,5	N	MOTOR	-	c	N	-10	10	Horizontal in line	2250 mm
GSH003/403	EDESUR	0104-0048	2	Centre-break	145	800	31,5	Y	MOTOR	MANUAL	c	N	-10	10	Horizontal paralel	2250 mm
GSH003/404	EDESUR	0104-0424	2	Centre-break	145	800	31,5	Y	MOTOR	MANUAL	d	N	-10	10	Horizontal paralel	2250 mm
GSH003/405	EDESUR	0104-0366	2	Centre-break	145	2000	31,5	N	MOTOR	-	c	N	-10	10	Horizontal in line	2250 mm
GSH003/406	EDESUR	0104-0401	2	Centre-break	145	2000	31,5	Y	MOTOR	MANUAL	c	N	-10	10	Horizontal paralel	2250 mm
GSH003/407	EDESUR	0104-0382	2	Centre-break	145	3150	31,5	N	MOTOR	-	c	N	-10	10	Horizontal in line	2250 mm
GSH003/408	EDESUR	0104-0362	2	Centre-break	245	800	40	N	MOTOR	-	c	N	-10	10	Horizontal in line	2250 mm
GSH003/409	EDESUR	0104-0363	2	Centre-break	245	2000	40	N	MOTOR	-	c	N	-10	10	Horizontal in line	2250 mm
GSH003/410	EDESUR	0104-0364	2	Centre-break	245	2000	40	Y	MOTOR	MANUAL	c	N	-10	10	Horizontal paralel	2250 mm
GSH003/411	EDESUR	0104-0386	2	Centre-break	245	3150	40	Y	MOTOR	MANUAL	c	N	-10	10	Horizontal paralel	2250 mm
GSH003/412	EDESUR	0104-0394	2	Centre-break	245	3150	40	N	MOTOR	-	c	N	-10	10	Horizontal paralel	2250 mm
GSH003/413	EDESUR	0104-0385	2	Centre-break	245	3150	40	N	MOTOR	-	c	N	-10	10	Horizontal in line	2250 mm



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TYPE CODE	COMPANY	COMPANY CODE	N° Column s/pole	Type opening	Ur	Ir	Ik	ES	DS operation	ES operation	SPS class	Bus bar transfer	Minimum ambient air temperature (°C)	Ice coating (mm)	ASSEMBLY	Installation height
GSH003/800	CHILECTRA		2	Centre-break	245	2000	40	N	MOTOR	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/801	CHILECTRA		2	Centre-break	245	2000	40	Y	MOTOR	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/802	CHILECTRA		2	Centre-break	245	3150	40	N	MOTOR	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/803	CHILECTRA		2	Centre-break	245	3150	40	Y	MOTOR	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/804	CHILECTRA		2	Centre-break	145	2000	40	N	MOTOR	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/805	CHILECTRA		2	Centre-break	145	2000	40	Y	MOTOR	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/806	CHILECTRA		2	Centre-break	145	2000	40	N	MOTOR	-	c	-	-10	10	Vertical	7000 mm
GSH003/807	CHILECTRA		2	Centre-break	145	2000	40	Y	MOTOR	MOTOR	c	-	-10	10	Vertical	7000 mm
GSH003/808	CHILECTRA		2	Centre-break	145	3150	40	N	MOTOR	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/809	CHILECTRA		2	Centre-break	145	3150	40	Y	MOTOR	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/810	CHILECTRA		2	Centre-break	145	2000	50	N	MOTOR	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/811	CHILECTRA		2	Centre-break	145	2000	50	Y	MOTOR	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/812	CHILECTRA		2	Centre-break	145	2000	50	N	MOTOR	-	c	-	-10	10	Vertical	7000 mm
GSH003/813	CHILECTRA		2	Centre-break	145	2000	50	Y	MOTOR	MOTOR	c	-	-10	10	Vertical	7000 mm
GSH003/814	CHILECTRA		2	Centre-break	145	3150	50	N	MOTOR	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/815	CHILECTRA		2	Centre-break	145	3150	50	Y	MOTOR	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/816	CHILECTRA		2	Centre-break	145	2000	40	N	MANUAL	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/817	CHILECTRA		2	Centre-break	145	2000	40	Y	MANUAL	MANUAL	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/818	CHILECTRA		2	Centre-break	145	2000	40	N	MANUAL	-	c	-	-10	10	Vertical	7000 mm
GSH003/819	CHILECTRA		2	Centre-break	145	2000	40	Y	MANUAL	MANUAL	c	-	-10	10	Vertical	7000 mm
GSH003/820	CHILECTRA		2	Centre-break	145	2000	50	N	MANUAL	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/821	CHILECTRA		2	Centre-break	145	2000	50	Y	MANUAL	MANUAL	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/822	CHILECTRA		2	Centre-break	145	2000	50	N	MANUAL	-	c	-	-10	10	Vertical	7000 mm
GSH003/823	CHILECTRA		2	Centre-break	145	2000	50	Y	MANUAL	MANUAL	c	-	-10	10	Vertical	7000 mm
GSH003/824	CHILECTRA		2	Centre-break	245	2000	40	N	MOTOR (1 ø)	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/825	CHILECTRA		2	Centre-break	245	2000	40	Y	MOTOR (1 ø)	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/826	CHILECTRA		2	Centre-break	145	3150	40	N	MOTOR (1 ø)	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/827	CHILECTRA		2	Centre-break	145	3150	40	Y	MOTOR (1 ø)	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/828	CHILECTRA		2	Centre-break	145	3150	50	N	MOTOR (1 ø)	-	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/829	CHILECTRA		2	Centre-break	145	3150	50	Y	MOTOR (1 ø)	MOTOR	c	-	-10	10	Horizontal paralel	3000 mm
GSH003/200	EDE	6701206	2	Centre-break	72,5	2000	31,5	Y	MANUAL	MANUAL	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/201	EDE	6701207	2	Centre-break	72,5	2000	31,5	N	MANUAL	-	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/202	EDE	6701208	2	Centre-break	72,5	1250	31,5	Y	MANUAL	MANUAL	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/203	EDE	6701209	2	Centre-break	72,5	1250	31,5	N	MANUAL	-	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/204	EDE	6707698	2	Centre-break	72,5	2000	31,5	Y	MANUAL	MANUAL	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/205	EDE	6707699	2	Centre-break	72,5	2000	31,5	N	MANUAL	-	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/206	EDE	6707700	2	Centre-break	72,5	1250	31,5	Y	MANUAL	MANUAL	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/207	EDE	6707701	2	Centre-break	72,5	1250	31,5	N	MANUAL	-	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/208	EDE	6701204	2	Centre-break	145	1250	31,5	N	MANUAL	-	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/209	EDE	6707696	2	Centre-break	145	1250	31,5	N	MANUAL	-	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/210	EDE	6701205	2	Centre-break	145	1250	31,5	Y	MANUAL	MANUAL	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/211	EDE	6707697	2	Centre-break	145	1250	31,5	Y	MANUAL	MANUAL	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/212	EDE	6710771	2	Centre-break	145	1250	31,5	N	MOTOR	-	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/213	EDE	6710772	2	Centre-break	145	1250	31,5	N	MOTOR	-	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/214	EDE	6710773	2	Centre-break	145	1250	31,5	Y	MOTOR	MANUAL	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/215	EDE	6710774	2	Centre-break	145	1250	31,5	Y	MOTOR	MANUAL	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/216	EDE	6701203	2	Centre-break	145	2000	31,5	N	MANUAL	-	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/217	EDE	6707695	2	Centre-break	145	2000	31,5	N	MANUAL	-	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/218	EDE	6701202	2	Centre-break	145	2000	31,5	Y	MANUAL	MANUAL	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/219	EDE	6707694	2	Centre-break	145	2000	31,5	Y	MANUAL	MANUAL	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/220	EDE	6710775	2	Centre-break	145	2000	31,5	N	MOTOR	-	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/221	EDE	6710776	2	Centre-break	145	2000	31,5	N	MOTOR	-	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/222	EDE	6710777	2	Centre-break	145	2000	31,5	Y	MOTOR	MANUAL	d	N	-25	10	Horizontal paralel	3000 mm
GSH003/223	EDE	6710778	2	Centre-break	145	2000	31,5	Y	MOTOR	MANUAL	e	N	-25	10	Horizontal paralel	3000 mm
GSH003/001	ENEL DISTR.	156110	3	Double-break	170	1250	31,5	Y	MOTOR	MOTOR	d	N	-25	10	Horizontal paralel	2650 mm
GSH003/002	ENEL DISTR.	156111	3	Double-break	170	1250	31,5	Y	MANUAL	MANUAL	d	N	-25	10	Horizontal paralel	2650 mm
GSH003/003	ENEL DISTR.	156112	3	Double-break	170	1250	31,5	N	MANUAL	-	d	N	-25	10	Horizontal paralel	2650 mm
GSH003/004	ENEL DISTR.	156113	3	Double-break	170	1250	31,5	N	MANUAL	-	d	N	-25	10	Horizontal paralel	2650 mm
GSH003/005	ENEL DISTR.	156114	3	Double-break	170	1250	31,5	N	MANUAL	-	d	N	-25	10	Horizontal paralel	5150 mm
GSH003/100	ENEL RO	615204	2	Centre-break	123	1250	40	N	MANUAL	-	d	N	-30	22	Horizontal paralel	2300 mm
GSH003/101	ENEL RO	615205	2	Centre-break	123	1250	40	N	ELECTRIC	-	d	N	-30	22	Horizontal paralel	2300 mm
GSH003/102	ENEL RO	615206	2	Centre-break	123	1250	40	Y	MANUAL	MANUAL	d	N	-30	22	Horizontal paralel	2300 mm
GSH003/103	ENEL RO	615207	2	Centre-break	123	1250	40	Y	ELECTRIC	ELECTRIC	d	N	-30	22	Horizontal paralel	2300 mm
GSH003/104	ENEL RO	615208	2	Centre-break	123	1250	40	YY (2ESs)	MANUAL	MANUAL	d	N	-30	22	Horizontal paralel	2300 mm
GSH003/105	ENEL RO	615209	2	Centre-break	123	1250	40	YY (2ESs)	ELECTRIC	ELECTRIC	d	N	-30	22	Horizontal paralel	2300 mm
GSH003/106	ENEL RO	615210	2	Centre-break	123	1250	40	N	MANUAL	-	d	N	-30	22	Horizontal in line	2300 mm
GSH003/107	ENEL RO	615211	2	Centre-break	123	1250	40	N	ELECTRIC	-	d	N	-30	22	Horizontal in line	2300 mm
GSH003/108	ENEL RO	615212	2	Centre-break	123	1250	40	Y	MANUAL	MANUAL	d	N	-30	22	Horizontal in line	2300 mm
GSH003/109	ENEL RO	615213	2	Centre-break	123	1250	40	Y	ELECTRIC	ELECTRIC	d	N	-30	22	Horizontal in line	2300 mm
GSH003/110	ENEL RO	615214	2	Centre-break	123	1250	40	YY (2ESs)	MANUAL	MANUAL	d	N	-30	22	Horizontal in line	2300 mm
GSH003/111	ENEL RO	615215	2	Centre-break	123	1250	40	YY (2ESs)	ELECTRIC	ELECTRIC	d	N	-30	22	Horizontal in line	2300 mm

- Note: “MOTOR (1 ø)” means 3 motors, 1 for each phase
- Note: “YY (2 EEs)” means 2 earthing switches, located on the opposite ends of the disconnecter