MV/LV Transformer Substations for Distribution Network Solutions

**ctr**
Compact prefabricated rural transformer substation
Up to 24 kV, 250 kVA
Standard IEC 62271-202

Reliable innovation. Personal solutions.
www.ormazabal.com
Foreword

After decades producing different types of industrialised enclosures and prefabricated transformer substations, in 2006 Ormazabal developed the ctr as a solution for rural distribution networks up to 24 kV.

ctr is a kiosk-type prefabricated transformer substation installed at ground level and operated externally, small in size, standard-built, tested and supplied from the factory as a single unit. One of its characteristics is that it includes a compact medium voltage associated Ormazabal unit in accordance with Standard IEC 62271-212.

ctr prefabricated transformer substations are used in a multitude of Distribution Network Solutions (DNS) for utilities (public distribution) and end-users of electrical energy (infrastructure, industry and tertiary). Its application is mainly aimed at rural environments, natural spaces, water catchment areas, high fire-risk forest areas and areas with restricted or reduced space.

It is the alternative to supporting and under-pole transformer installations. It can also be used in applications as an end-of-line substation. Up to now close to 5000 rural transformer substations have been installed all over the world.

Benefits

Safety
» Heightened safety for persons against accidental direct contact, step voltage and contact voltage
» Possibility of installation away from the overground-underground pole
» Reduction of medium voltage trips due to atmospheric type overvoltages
» Fire barrier protection components: layer of pebbles on the pit

Reliability
» Fully factory-assembled (transformer, and internal earthing circuit in the enclosure)
» Elimination of problems associated with birds nests
» Decreased alteration of characteristics due to solar radiation, pollution or atmospheric agents, compared to on-pole solutions
» Selectivity between MV and LV guards, and coordination with HV guards

Efficiency
» Ventilation by natural circulation of air
» Quick and simple replacement
» Input/output of MV and LV cables through pre-punched orifices at the base of the building

Sustainability
» MV switching and breaking with ground-level accessibility
» Protection of birds
» Reduced dimensions
» Low risk for discharges of the insulators to the public highway: dielectric liquid collection pit that is watertight and has resistant coating

Continuous innovation
» Low-voltage auxiliary supply from cables from a generator set, located on the side of the enclosure
» Great ability for aesthetic integration into its environment
» Prefabricated solutions available in accordance with EN 62271-202

Technical details

Construction characteristics
» Concrete monoblock enclosure (base and walls) with a removable cover

Compact electrical assembly:
» Fully gas-insulated medium-voltage switchgear up to 24 kV: Electrical diagram of a feeder functional unit, containing three MV limiter fuse cartridges inside the tank. Includes voltage presence detector, ekor.vpis, and an earthing prevention alarm, ekor.sas
» MV/LV distribution transformer, fully filled in dielectric liquid up to 24 kV in 100, 160 or 250 kVA
» LV Switchgear: Low-voltage board, either two bases of 400 A or four bases of 160 A
» Rural remote control cabinet, including wiring up to the low voltage board
» MV direct interconnections through the ormalink connecting set and by LV cable
» Earthing circuit connection
» Lighting and auxiliary services

Technical characteristics

<table>
<thead>
<tr>
<th>ctr 2</th>
<th>Rated voltage [kV]</th>
<th>24</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Frequency [Hz]</td>
<td>50</td>
</tr>
<tr>
<td>Transformer</td>
<td>Power [kVA]</td>
<td>100 / 160 / 250</td>
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<tr>
<td>MV Switchgear</td>
<td>Rated current [A]</td>
<td>200</td>
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<tr>
<td></td>
<td>Short-time current [kA]</td>
<td>16</td>
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<tr>
<td></td>
<td>Insulation level Power Frequency [kV]</td>
<td>50 / 60</td>
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<tr>
<td></td>
<td>Lightning impulse [kV]</td>
<td>125 / 145</td>
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<tr>
<td>Low-Voltage Board</td>
<td>Rated voltage [V]</td>
<td>420</td>
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<tr>
<td></td>
<td>Rated current [A]</td>
<td>630</td>
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<tr>
<td></td>
<td>Rated current / N outputs</td>
<td>400 / 2</td>
</tr>
<tr>
<td></td>
<td>Rated current / N outputs</td>
<td>160 / 4</td>
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</table>
Design

**ctr.2**

**Concrete enclosure**

**Compact electrical assembly:**

2.1 MV Switchgear

2.2 Transformer

2.3 LV Board

**External dimensions and weight**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
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<tbody>
<tr>
<td>Length</td>
<td>[mm]</td>
<td>150</td>
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<tr>
<td>Width</td>
<td>[mm]</td>
<td>1400</td>
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<tr>
<td>Height</td>
<td>[mm]</td>
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<tr>
<td>Visible height</td>
<td>[mm]</td>
<td>1560</td>
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<tr>
<td>Total weight*</td>
<td>[kg]</td>
<td>660</td>
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</table>

* With 250 kVA transformer

For other powers, please check with Ormazbal.