Enclosures for Transformer substations
Up to 40.5 kV

Reliable innovation.
Personal solutions.
Contents

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I. Introduction

Preface

Transformer substations in Ormazabal enclosures

Transformer substations in enclosures are composed of different components which comply with their own current particular standards. They are individually tested (the assembly may or may not be tested).

- Factory or on-site assembled switchgear.
- Flexibility to install multiple MV distribution configurations.
- Availability to include remote control, telemetering, integrated control, telemanagement, etc.
- Application: DNS (Distribution Network Solutions for secondary distribution)

Your business and DNS applications

Segments

- Utility: Smart Grid, Transmission & Distribution, Generation
- END USERS: Infrastructures, Industrial, Tertiary
- RES: Wind, Solar, Dispatchable RES
II. Main features

Safety
- People and equipment protection
- Dielectric liquid collector

Reliability
- Switchgear can be factory installed
- Easy and quick installation

Efficiency
- Industrialized uniform quality
- Protection against external impacts

Sustainability
- Minimal environmental, visual and acoustic impact
- Reduced size and versatility

Continuous innovation
- Aesthetic integration into the environment
- Available prefabricated solutions according to EN 62271-202
III. Product range

Enclosures for transformer substations

Concrete

- Underground: pfs
- Walk-in (monoblock): pfu
- Walk-in (modular): pf

Metal

- Walk-in / kiosk: ts.china

preforma.pf

pf.p
III. Product range

Underground: pfs

Concrete

Monoblock industrialized enclosure for underground walk-in type
Ormazabal transformer substations up to 40,5 kV.

- Ventilation: natural (class 10).
- Horizontal (h) or vertical (v) type
- Integration with the surroundings
- Assisted opening/closing, with opening of perimeter fence
- Dielectric liquid collection pits
- Experience: More than 5,000 pfs installed

- Optional: vertical concrete access with outdoor

Range

pfs.48

pfs.6-2t

pfs.75-1t / pfs.75-2t

pfs.93-1t / pfs.93-2t

Transformer Substations

1. Concrete enclosure pfs
1.1 Staff access
1.2 Equipment access
1.3 Ventilation (h or v)

2. MV switchgear
cgm.cosmos (up to 24 kV)
cgm.3 (up to 40,5 kV)

3. Transformer(s) 2 x 1000 kVA

4. Low voltage board

5. Ormazabal protection, control and metering units
### III. Product range

**Underground: pfs**

**Technical details**

<table>
<thead>
<tr>
<th>pfs</th>
<th>48</th>
<th>62</th>
<th>75</th>
<th>93</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ventilation</strong></td>
<td>h</td>
<td>y</td>
<td>h</td>
<td>y</td>
</tr>
<tr>
<td>Height</td>
<td>Body [mm]</td>
<td>-2840</td>
<td>-2840</td>
<td>-3200</td>
</tr>
<tr>
<td>Ventilation</td>
<td>[mm]</td>
<td>0</td>
<td>+565</td>
<td>0</td>
</tr>
<tr>
<td>Length</td>
<td>[mm]</td>
<td>6230</td>
<td>5140</td>
<td>7650</td>
</tr>
<tr>
<td>Depth</td>
<td>[mm]</td>
<td>2460</td>
<td>2460</td>
<td>2460</td>
</tr>
<tr>
<td>Weight</td>
<td>[kg]</td>
<td>25220</td>
<td>23800</td>
<td>≤32300</td>
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</table>

**Typical configurations (Examples)**

<table>
<thead>
<tr>
<th>pfs</th>
<th>48</th>
<th>62</th>
<th>75</th>
<th>93</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformers</td>
<td>1</td>
<td>1 or 2 (1T or 2T models)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cubicles</td>
<td>3 L + 1 P / 1 L + 1 P + 1 M (1T): 2 L + 1 S + 1 P + 1 M (2T): 3 L + 2 P / 2L + 2V</td>
<td>Wide variety of Utility and private diagrams, with control and remote control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low voltage board</td>
<td>1 (up to 8 outputs)</td>
<td>1 or 2 (up to 8 outputs)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
III. Product range

Underground: **pfs**

References

- Utility
- End Users

Main countries with **pfs** installed:

- Spain
- France
- Portugal
- Turkey
- Switzerland
- China
- Argentina
- Dominican Rep.
III. Product range

Walk-in (monoblock): **pfu**

Concrete

Monoblock industrialized enclosure for ground level walk-in type Ormazabal transformer substations up to 40,5 kV.

- Monoblock enclosure with removable roof
- Industrialized uniform quality
- Ventilation: natural (class 10)
- Capacity for aesthetic integration and long service life
- Quick installation
- Dielectric liquid collection pits
- LV auxiliary feeder on the front wall
- Experience: More than 22,000 pfu installed in more than 15 countries

Range

- **pfu.3**
- **pfu.4**
- **pfu.5**
- **pfu.7**

Design

1. Concrete enclosure pfu
2. **cgmcosmos** (up to 24 kV)
   - **cgm.3** (up to 40,5 kV)
3. Transformer (s)
   - Up to 2 x 1000 kVA
4. Low voltage board
5. Ormazabal protection, control and metering units
III. Product range
Walk-in (monoblock): pfu

Technical details

<table>
<thead>
<tr>
<th></th>
<th>pfu.3</th>
<th>pfu.4</th>
<th>pfu.5</th>
<th>pfu.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width [mm]</td>
<td>3280</td>
<td>4460</td>
<td>6080</td>
<td>8080</td>
</tr>
<tr>
<td>Depth [mm]</td>
<td>2380</td>
<td>2380</td>
<td>2380</td>
<td>2380</td>
</tr>
<tr>
<td>Height [mm]</td>
<td>3045</td>
<td>3045</td>
<td>3045</td>
<td>3250</td>
</tr>
<tr>
<td>Visible height [mm]</td>
<td>2595</td>
<td>2585</td>
<td>2585</td>
<td>2790</td>
</tr>
<tr>
<td>Weight (empty) [kg]</td>
<td>10545</td>
<td>13465</td>
<td>17460</td>
<td>29090</td>
</tr>
</tbody>
</table>

Dimensions of staff access door: 900 (24 kV) / 1100 (36-40.5 kV) x 2100 mm
Dimensions of transformer door: 1260 x 2100 mm

Typical configurations (Examples)

<table>
<thead>
<tr>
<th></th>
<th>pfu.3</th>
<th>pfu.4</th>
<th>pfu.5</th>
<th>pfu.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformers</td>
<td>1</td>
<td>1</td>
<td>1 or 2 (1T ó 2T)</td>
<td>1 or 2 (1T ó 2T)</td>
</tr>
<tr>
<td>Cubicles</td>
<td>2L+1P</td>
<td>3L+1V</td>
<td>2L+1S+1P+1M (+1T)</td>
<td>6L+2P (+2T)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2L+2P (+2T)</td>
<td>3L+1R+1V+1M+2P (+1T)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3L+2P (+2T)</td>
<td>3L+1R+1V+1M+2P (+1T)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3L+1R+1P+1M (+1T)</td>
<td>3L+1R+1V+1M+2P (+1T)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1L+1V+1M+2P (+2T)</td>
<td>3L+1R+1V+1M+2P (+1T)</td>
</tr>
<tr>
<td>Low voltage board</td>
<td>1 (up to 8 outputs)</td>
<td>1 (up to 8 outputs)</td>
<td>1 or 2 (up to 8 outputs)</td>
<td>1 or 2 (up to 8 outputs)</td>
</tr>
</tbody>
</table>
III. Product range
Walk-in (monoblock): pfu

References

Main countries with pfu installed:
- Spain
- Portugal
- France
- Italy
- Argentina
- Brazil
- UK
III. Product range

Walk-in (monoblock) PAC type: preforma.pf

Concrete

Monoblock industrialized enclosure for ground level walk-in type
Ormazabal transformer substations up to 24 kV.
Generally for the French market.

- Monoblock enclosure with removable roof
- Industrialized uniform quality
- Capacity for aesthetic integration
- Quick installation
- Dielectric liquid collection pits
- Experience: More than 6,000 preforma.pf installed

Range

preforma.pf-3  preforma.pf-4  preforma.pf-5

Design

1. Concrete enclosure
   preforma.pf

2. MV switchgear
   cgmcosmos (up to 24 kV)

3. Transformer
   - preforma.pf-3 Up to 1 x 400 kVA
   - preforma.pf-4/5 Up to 1 x 1000 kVA

4. Low voltage board (TIPI type)

5. Auxiliary equipment
III. Product range
Walk-in (monoblock) PAC type: `preforma.pf`

Technical details

<table>
<thead>
<tr>
<th></th>
<th>preforma.pf-3</th>
<th>preforma.pf-4</th>
<th>preforma.pf-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width [mm]</td>
<td>3667</td>
<td>3667</td>
<td>4490</td>
</tr>
<tr>
<td>Depth [mm]</td>
<td>2170</td>
<td>2170</td>
<td>2370</td>
</tr>
<tr>
<td>Height [mm]</td>
<td>3325</td>
<td>3325</td>
<td>3325</td>
</tr>
<tr>
<td>Visible height [mm]</td>
<td>2570</td>
<td>2570</td>
<td>2570</td>
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<tr>
<td>Weight [kg]</td>
<td>12000</td>
<td>12000</td>
<td>14000</td>
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</table>

Typical configurations (Example)

<table>
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<tr>
<th>Standards</th>
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<tbody>
<tr>
<td>HN 64-S-33</td>
</tr>
<tr>
<td>HN 52-S-20 / HN 52-S-27</td>
</tr>
<tr>
<td>HN 64-S-52</td>
</tr>
<tr>
<td>HN 63-S-61</td>
</tr>
</tbody>
</table>
III. Product range

Walk-in (monoblock) PAC type: **preforma.pf**

References

Utility

End Users

Main countries with **preforma.pf** installed:

- France
- Germany
- Switzerland

Transformer Substations
III. Product range

Walk-in (modular) : pf
Concrete

Modular industrialized enclosure for ground level walk-in type
Ormazabal transformer substations up to 40,5 kV.

- **Industrialized** uniform quality
- **Configuration flexibility** and adaptability
- **Suitability** for any MV diagram
- **Transportability** to difficult access areas
- **Dielectric** liquid collection pits
- **Variety** of modular panel widths
- **Experience**: More than 5,000 pf installed in more than 10 countries

**Range**

pf.202/302

pf.2015/3015

pf.2030/3030

1. Modular concrete enclosure
2. MV switchgear
   2.1. cgmcosmos (up to 24 kV)
   2.2. cgm.3 (up to 40,5 kV)
3. Transformer(s) up to 1000 kVA
4. LV board/s
5. Ormazabal protection, control and metering units
## III. Product range

**Walk-in (modular) : pf**

Technical details

<table>
<thead>
<tr>
<th>pf up to 24 kV</th>
<th>pf.201</th>
<th>pf.202</th>
<th>pf.203</th>
<th>pf.204</th>
<th>pf.2015</th>
<th>pf.2030</th>
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</thead>
<tbody>
<tr>
<td>Width [mm]</td>
<td>2620</td>
<td>4880</td>
<td>7240</td>
<td>9600</td>
<td>3700</td>
<td>7240</td>
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<tr>
<td>Depth [mm]</td>
<td>2520</td>
<td>2620</td>
<td>2620</td>
<td>2620</td>
<td>2620</td>
<td>2620</td>
</tr>
<tr>
<td>Height [mm]</td>
<td>3200</td>
<td>3200</td>
<td>3200</td>
<td>3200</td>
<td>3200</td>
<td>3200</td>
</tr>
<tr>
<td>Visible height</td>
<td>2650</td>
<td>2650</td>
<td>2650</td>
<td>2650</td>
<td>2650</td>
<td>2650</td>
</tr>
<tr>
<td>Weight (empty) [kg]</td>
<td>9000</td>
<td>16100</td>
<td>22500</td>
<td>29200</td>
<td>13500</td>
<td>23550</td>
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<table>
<thead>
<tr>
<th>pf up to 36 kV</th>
<th>pf.301</th>
<th>pf.302</th>
<th>pf.303</th>
<th>pf.304</th>
<th>pf.3015</th>
<th>pf.3030</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width [mm]</td>
<td>2620</td>
<td>4880</td>
<td>7240</td>
<td>9600</td>
<td>3700</td>
<td>7240</td>
</tr>
<tr>
<td>Depth [mm]</td>
<td>2520</td>
<td>2620</td>
<td>2620</td>
<td>2620</td>
<td>2620</td>
<td>2620</td>
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<tr>
<td>Height [mm]</td>
<td>3600</td>
<td>3600</td>
<td>3600</td>
<td>3600</td>
<td>3600</td>
<td>3600</td>
</tr>
<tr>
<td>Visible height</td>
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<td>3050</td>
<td>3050</td>
<td>3050</td>
<td>3050</td>
<td>3050</td>
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<td>Weight (empty) [kg]</td>
<td>10000</td>
<td>17400</td>
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<td>31200</td>
<td>15000</td>
<td>25650</td>
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</table>
III. Product range
Walk-in (modular) : pf

References

Utility
End Users
RES

Main countries with pf installed:
• Spain
• Portugal
• Poland

Transformer Substations
III. Product range

Walk-in (modular): pf.p

Concrete

Modular industrialized enclosure for ground level walk-in type
Ormazabal transformer substations up to 40,5 kV.

- Industrialized uniform quality
- Configuration flexibility and adaptability
- Suitability for any MV diagram
- Variety of dimensions
- Capacity for aesthetic integration and long service life
- Dielectric liquid collection pits
- Experience: More than 500 pf.p installed

Range

pf.p-250: 2500 mm width series
pf.p-300: 3000 mm width series

Design

1. Modular concrete enclosure:
   - Cable cellar/ panelable body/ cover
2. MV switchgear
   - cgmcosmos / ga-gae (up to 24 kV)
   - cgm.3 (up to 40,5 kV)
3. Transformer(s) up to 1000 kVA
4. LV board/s
5. Ormazabal protection, control and metering units
III. Product range

Walk-in (modular) : pf.p

Technical details

<table>
<thead>
<tr>
<th>pf.p-250</th>
<th>pf.p-300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>Width</td>
</tr>
<tr>
<td>2500 mm</td>
<td>3000 mm</td>
</tr>
<tr>
<td>Length</td>
<td>Length</td>
</tr>
<tr>
<td>2700 to 7500 mm</td>
<td>2700 to 7500 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Weight</td>
</tr>
<tr>
<td>19-37 T</td>
<td>22-40 T</td>
</tr>
</tbody>
</table>

Complexes

Combinations of enclosures into complex housings up to 1600 kVA

Transformer Substations
III. Product range

Walk-in (modular): pf.p

References

Utility

End Users

RES

Main countries with pf.p installed:

- Poland
- France

Transformer Substations
III. Product range

Walk-in / kiosk: ts.china

Metallic

- Industrialized metallic enclosure for ground level type
- Ormazabal transformer substations up to 12kV. Generally for the Chinese market.
  - Ground level installation
  - Walk-in / non walk-in type
  - Capacity for aesthetic integration and long service life
  - Quick installation

References

Utility

End Users

RES

Transformer Substations

Design

1. Metal enclosure
2. MV switchgear
   - cgmosmos (up to 12kV)
   - ga / gae (up to 12kV)
3. 1 transformer up to 1000 kVA
Thank you!
more information:
www.ormazabal.com
and
social networks

We are launching a new website
Designed for you, letting you know everything about OrmaZabAl

Transformer Substation downloads:

- Brochures: CA-443 / 444 / 442 / 448 / 328 / 336 / 431 / 432
- Manuals: IG-135 / 131 / 130 / 181 & others