

Minera

Oil-immersed Distribution and Medium Power Transformers



We offer you a complete range of oil-immersed distribution and medium power transformers adapted to the structure of your distribution network and suited to standard and special applications.

Our Large industrial worldwide platform provides a full range of products at our customer's doorstep ensuring a shorter delivery time

Quality based on years of experience

With more than 40 years of technical expertise and over two million oil-immersed transformers installed worldwide, we constantly design and improve the Minera transformer range to ensure optimum reliability and safety of your installations while offering the most cost-effective solution. You are sure to invest in a proven technology constantly enhanced in our competence centers.

Our standard range of Minera transformers is available as:

- Three phase units (single phase available on request)
- With ratings up to 20 MVA, 72.5kV, 50/60 Hz (Higher ratings available on request)
- Naturally cooled (ONAN) or air-forced (ONAF) upon request

We also offer transformers for special applications (rectifier, Oil & Gas Zone II, earthing, welding, transformers with OLTC, reactors, etc.)

Minera oil-immersed transformers meet the requirements of international standards such as ANSI, IEC, SPLN and individual country standards.

Customer benefits

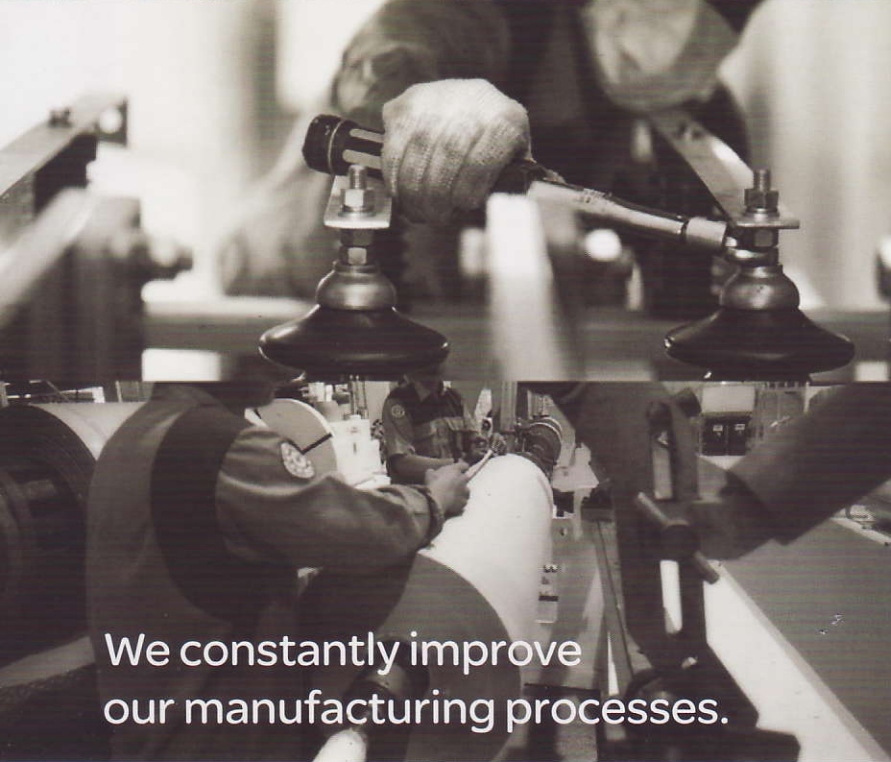
- High quality and reliability
- Economically optimized
- Capitalization of losses
- Reduced dimensions
- Solid construction
- Long life-cycle
- Low maintenance
- Eco-friendly solution



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We constantly improve our manufacturing processes.

High quality level for more reliability

As a customer satisfaction is our main concern, we constantly improve our manufacturing processes. We have reduced our delivery times while ensuring a high quality level. All of our **Minera** oil-immersed transformer production sites are ISO 9001 or ISO 14001 and OHSAS 18001 certified.

To ensure this high level of quality, our **Minera** transformers undergo routine tests in accordance with IEC standards. We can also proceed to type test or special tests on request.

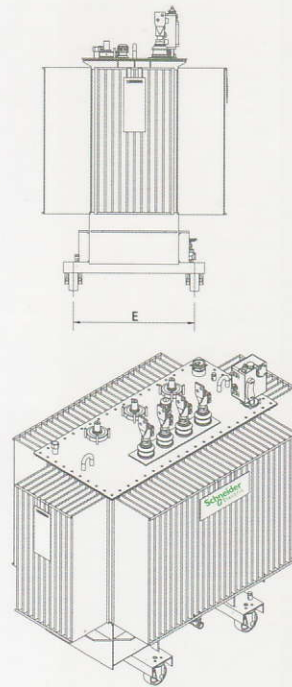
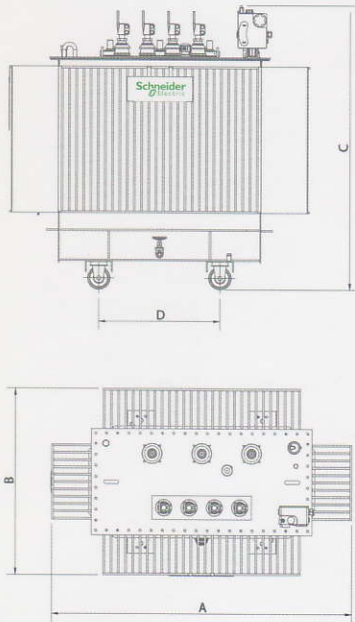
Our company follows a policy of continuous improvement taking into account the latest worldwide developments. This ensures that transformers are state-of-the-art and comply fully with the most strict requirements: fast delivery time, improved quality and recycling capabilities, reduced size and, on request, very low noise and very low losses.

Minera, the right tune for your network

Depending on the application and environmental influences, you might require a different type of oil-immersed transformer. Minera can deliver the flexibility you require:

- Breathing type with conservator, hermetically sealed or nitrogen gas cushion sealed type
- For indoor applications: in buildings or industrial plants, or in compact distribution substations
- For Outdoor applications: ground mounted but also pad or pole mounted
- Low noise levels for urban or residential areas
- Normal, low or very low level of losses to enhance the distribution network efficiency
- Vegetable Oil available on request





Private Transformers - IEC 60076

| Highest system voltage (HV) KV | Rated power KVA | Dimension (mm) | | | | | Weight (kg) | |
|-----------------------------------|--------------------|----------------|------|------|------|------|---------------|------|
| | | A | B | C | D | E | Total inc oil | Oil |
| <= 24 kV | 400 | 1460 | 860 | 1457 | 670 | 670 | 1280 | 335 |
| | 500 | 1660 | 970 | 1512 | 670 | 670 | 1530 | 380 |
| | 630 | 1660 | 1020 | 1557 | 670 | 670 | 1760 | 475 |
| | 800 | 1700 | 1020 | 1657 | 670 | 670 | 2100 | 540 |
| | 1000 | 1800 | 1090 | 1737 | 820 | 820 | 2350 | 600 |
| | 1250 | 1880 | 1130 | 1787 | 1070 | 1070 | 3020 | 750 |
| | 1600 | 2000 | 1170 | 1845 | 1070 | 1070 | 3520 | 925 |
| | 2000 | 2300 | 1370 | 1845 | 1070 | 1070 | 4395 | 1155 |
| | 2500 | 2340 | 1370 | 2045 | 1070 | 1070 | 5390 | 1330 |
| | 3000 | 2580 | 1530 | 2188 | 1070 | 1070 | 6300 | 1670 |
| 3150 | 2580 | 1530 | 2188 | 1070 | 1070 | 6310 | 1670 | |

PLN Transformers - SPLN D3

| Highest system voltage (HV) KV | Rated power KVA | Dimension (mm) | | | | | Weight (kg) | |
|-----------------------------------|--------------------|----------------|------|------|-----|-----|---------------|-----|
| | | A | B | C | D | E | Total inc oil | Oil |
| <= 24 kV | 25 | 800 | 470 | 1195 | 450 | 450 | 485 | 160 |
| | 50 | 1040 | 628 | 1234 | 450 | 450 | 490 | 180 |
| | 100 | 1150 | 667 | 1341 | 520 | 520 | 715 | 190 |
| | 160 | 1340 | 640 | 1356 | 520 | 520 | 1025 | 265 |
| | 200 | 1290 | 670 | 1446 | 520 | 520 | 1050 | 220 |
| | 250 | 1325 | 680 | 1461 | 520 | 520 | 1150 | 230 |
| | 315 | 1250 | 860 | 1679 | 520 | 520 | 1470 | 300 |
| | 400 | 1250 | 860 | 1679 | 670 | 670 | 1520 | 290 |
| | 630 | 1830 | 1040 | 1780 | 670 | 670 | 2215 | 530 |
| | 1000 | 1980 | 1140 | 1899 | 820 | 820 | 3155 | 726 |



IKPP, Serang - Indonesia



Thamrin City, Shopping Centre and Apartement, Jakarta - Indonesia

Minera

Oil Immersed Distribution and
Medium Power Transformers

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|---|---|
| Oil Immersed Distribution and Medium Power Transformer | Hermetically sealed, conservator type or N ₂ Gas Cushion Type |
| Rated power | 25 - 20.000 kVA (higher rating available on request) |
| Insulation levels | According to IEC U _M = 1.1, 3.6, 7.2, 12, 17.5, 24, 36, 72 kV According to ANSI up to 69 kV (higher ratings available on request) |
| Phases | 3-phase (single phase is available on request) |
| Tappings | ± 2.5% or ± 2x2.5% (or different ranges on request) |
| Short circuit impedance | U _k =4% for P < 630 kVA and U _M < 24 kV U _k =4 or 4.5% for P < 630 kVA and U _M = 36 kV U _k =6% or above for P > 630 kVA Difference value also available on request |
| Rated frequency | 50 Hz (60 Hz on request) |
| Vector groups | Yzn recommended up to 50 kVA with U _M < 24 kV Yzn recommended up to 100 kVA with U _M = 36 kV Dyn for all other rated power (any vector group according to IEC, ANSI, and other international Standards) Dyn for all other rate power (any other vector group according to IEC, ANSI, and other international Standards) |
| Material thermal class insulation | According to IEC 60085 class A |
| Temperature rise | Mean winding temperature rise : 65 K Top oil temperature rise : 60 K With ambient temperature in accordance with IEC 60076-1 The temperature of the cooling air should not exceed: <ul style="list-style-type: none">• 20°C yearly average• 30°C monthly average of the hottest month• 40°C at any time For other ambient temperatures, winding and oil temperature rise should be adapted |
| Type of cooling | ONAN (Oil Natural Air Natural) or ONAF on request |
| Dielectric liquid | Mineral oil according to IEC or ANSI standard On request : silicon, midel, vegetable oil |
| Ability to withstand Short-circuit | The transformers are designed to withstand the thermal and the dynamic effects resulting from a secondary shortcircuit in accordance with IEC 60076-5 |
| Sound level | The measurement (A-weighted sound pressure LpA) and the calculation of sound level(A-weighted sound level LwA) are done in accordance with IEC 60076-10. The sound level requirements are in accordance with national standards, |
| Installations | Indoor or outdoor |
| HV & LV terminals | HV terminals : plug-in or porcelain bushings LV terminals : busbars or porcelain bushings On request : cable boxes according to client/manufacturer standard or norm (i.e BS requirements) On request : protective boots for HV/LV bushings |
| Accessories | <ul style="list-style-type: none">• Standard : lifting lugs, earthing terminal, name and rating plate, oil filling plug, off circuit tap changer, bidirectional rollers if applicable (out of scope hanging pole transformer)• On request : pad lock/locking device for HV plug-in bushings and /or tap changer, protective relay (DGPT2, RIS, DMCR,...), oil level indicator, thermometer, with or without contacts, pressure relief device, pressure relay with contact, oil drain plug with/without sampling device, filling valve, drain valve, explosion vent, winding temperature indicator (OTi + WTI) Accessories for conservator : dehydrating breathing Buncholz relay, drain plug, oil level indicator. |

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