FITformer® distribution transformers
Fluid-immersed distribution transformers up to 30 MVA

siemens.com/fitformer
FIT for the future of distribution grids

Distribution transformers are key assets at the first and the last step of power grids. In traditional networks, they were used to transform the transmitted high-voltage power into low voltage that could be used in industries, infrastructure, and households. With the rise of decentralized generated power they are now also responsible for the infeed of energy into power grids.

As manifold as their tasks, their variants are also: hermetically sealed and open system solutions or a unit with a conservator are available; amorphous cores lead to extremely low losses and alternative fluids enable safe and environmentally friendly operation – just to name a few special characteristics.

Sensformer®: Born connected
As distribution transformers are located at key nodes in the energy grid as well as industrial and infrastructure sites, they can do much more than just transform voltages. They can act as sensors and give indications about the status of the grid or production. Digitally connected Sensformers® enable transformer operators to remotely check on the status of their assets, across their entire fleet and in real time. As a consequence, they can maximize their operations and minimize operational risks.

Outstanding expertise and customer proximity
Siemens has been partnering with well-known power supply and industrial companies around the world. Our network of 15 factories scattered around the globe allows us to always be close by and support our customers to contribute to their success. Our factory network follows uniform internal guidelines for the design and manufacture of FITformers®, ensuring that the same expertise and quality are available to all customers globally. At the same time, the plants are well versed in the local standards and local conditions of the countries to which they deliver.

And with over a million Siemens transformers installed in the field, it is highly likely that one of our units is also close to your location.

Transformers are our passion
For our customers, distribution transformers are a core component of their power system. For us, they are a passion.

FIT for the future of distribution grids

Oil-immersed distribution transformers:
Budapest, HU
Weiz, A
Trois-Rivières, CA
Jackson, MS, USA
Tenjo, CO

Cast-resin GEAFOL transformers:
Kirchheim, D
Budapest, HU
Guanajuato, MX
Jundiaí, BRA
Guangzhou, CN

Large distribution transformers:
Tenjo, CO
Wuhan, CN
Weiz, A

Traction transformers:
Nuremberg, D
Jinan, CN
Voronezh, RUS
Kalwa, IND

Voltage regulators:
Jackson, MS, USA
Applications

There is a wide range of applications that rely on fluid-immersed distribution transformers.

**Utilities** need FITformers® to supply homes and businesses with power – 24/7. In modern power grids, they not only act as the last transformation step in the power transmission and distribution chain. They also serve as the first step when their task is the infeed of renewable power, for example from solar or wind power generation.

**Renewable power generation** happens at low-voltage levels and relies on FITformer® REN units that transform the voltage from the generator to the medium-voltage level needed for transmission. These units even withstand the harsh conditions in the nacelle of a wind turbine or can be designed to perfectly fit the needs of a solar park. They are often insulated with naturally friendly ester instead of conventional mineral oil.

**Infrastructures, buildings, and data centers** depend on stable power supply to keep businesses and daily life running. Minimized downtime and maximized efficiency are the main concerns for these FITformer® operators.

**In industrial applications**, high efficiency and long service life are the focus points for FITformers®. They have to withstand high dynamic and thermal stress due to rapid load changes. That’s why the winding design of Siemens FITformers® IND ensures reliable absorption of radial, axial, and contraction forces. They are suitable for heavy-duty drives, for example in steel mills, oil rigs, or offshore installations.

66 kV FITformer® REN use case

Data center use case

Converter use case
The right FITformer® for your task

The FITformer® portfolio is split into three product groups, one for each application branch.

**Standard FITFormers for distribution grids**

Standard FITFormers® are crucial elements of suburban areas, forming the link between the electrical grid and consumers. Ratings for medium-sized FITformers® stand between 315 kVA and 1,600 kVA. They offer a maximum voltage capacity of 36 kV. The voltage of a large distribution transformer can go up to 72.5 kV and its power rating from 6.3 up to 30 MVA.

Especially in Northern America single-phase pole-mounted and three-phase pad-mounted transformers are very common. Their voltage level is similar to those of standard medium-sized FITformers® and goes up to 36 kV. Single-phase types usually have a rated power between 10 and 167 kVA, three-phase units can have up to 2,500 kVA.

**FITformer® IND for industrial applications**

Transformers for industrial applications must deliver reliable and superior performance despite harsh conditions. Siemens FITformer® INDs are designed to supply energy for heavy-duty drives for steel mills, oil rigs, offshore installations, and conveyance facilities, and for the complete range of uses for drives in industry.

Our static converter transformers provide a reliable link between supply network and different kinds of drive systems in many applications, from transportation systems to heavy industry. They must allow for frequent start-up loads and endure heavier dynamic and thermal stress due to rapid changes in the load. Siemens’ special winding design achieves a high short-circuit withstand capability making the transformer unsusceptible to the stress caused by frequent drive peak loads. Another positive factor is the high overload capability of this type of transformer.

**Applications**

- The making of a transformer
- Ten reasons to partner with Siemens
- The open secret of our success: proven quality
- The right FITformer® for your task
- Converter brochure
FITformer® REN for renewable applications

Wind turbine operators need reliable and safe transformers so that the turbine never fails – no matter whether onshore or offshore. With expertise in transformers since 1892, and about 5,000 units built for wind farms in the last ten years, Siemens has been at the frontline of wind application transformer technology.

Transformers for wind applications convert low voltage to medium voltage with identical frequency. Typical ratings are ≤10 MVA and ≤ 72.5 kV.

FITformer® REN for solar applications

Installed next to the inverters in a transformer substation, these transformers have a rating of up to 5 MVA and a rated voltage of up to 36 kV.

Thanks to Siemens touch-proof design, FITformer® REN can be installed both outside and inside without extra housings.

Solar farms face harsh weather conditions and still need to operate reliably at all times. Its design options make FITformer® REN a highly reliable solution – resistant to high corrosion, extreme weather conditions, and temperature variations.
The making of a transformer

Our definition of quality is the combination of expertise, high-grade materials, and qualified employees working together in every operational step.

Core
High-grade, cold-rolled metal sheets are precision-cut and assembled into cores using step-lap technique or wound-core technology. The result: optimized flux distribution at the joints, low losses, and minimal no-load noise.
Amorphous material is formed to wound cores for extremely low losses.

Windings
Made of copper or aluminum, low-voltage windings are made from strip or flat wire and high-voltage windings from rectangular wire. Diamond-dotted paper bonds the winding into a compact block during the drying process for increased short-circuit capacity.

Insulating fluids
Insulation and cooling is done with either mineral oil or eco-friendly ester with high fire points. All fluids must be resistant to ageing and not contain corrosive components.
**Tank and cooling**

Tanks are sealed absolutely tight under mechanical stress and regardless of wind or weather. Corrosion protection is done by sandblasting, multi-coating and (on request) galvanization. Tanks can be hermetically sealed, open system, or equipped with an oil conservator. Design can be with corrugated walls or smooth-walled tanks and built-in radiators.

**Final assembly**

Core, windings, and connecting cables are assembled; high-quality drying and quick filling with insulation liquid play a decisive role in extending the lifetime of a transformer.

**Testing**

Each unit is finally inspected and tested before being dispatched to the customer. All units undergo standard routine tests according to IEC or ANSI/IEEE. Type tests like temperature-rise test, dielectric test, and determination of sound level prove that the transformer is designed and manufactured according to the customer’s unique specification. And even special tests, for example short-circuit withstand test, partial discharge measurement, or determination of transient voltage transfer characteristics are performed regularly.
The open secret of our success: proven quality

Quality for us is a universal philosophy that governs all our manufacturing sites worldwide and is reflected in all our processes. All our FITformer® products are manufactured in accordance with our quality management system, certified to EN ISO 9001, ISO 14001, and BS OHSAS 18001. Compliance with all relevant IEC and VDE as well as ANSI and IEEE standards is a matter of course for us.

We pride ourselves of being the industry leaders in terms of quality and expertise. Using our combination of expertise, high-grade materials, and qualified employees working together in every operational step, quality truly takes on a meaning of its own at Siemens. Our standards are compiled in quality assurance manuals that are also available to our customers. Each manufacturing step is accompanied by checks – partly as self-checks with the associated evidence, partly conducted by trained quality experts. Final testing and acceptance tests are performed exclusively in the testing laboratory. We also perform type and special tests on request. Our clients can always rest assured of the quality of our product.

When it comes to reliable assurance, we like to take our service to our customers even further. Prior to the sale, we advise our customers on the parameters which will yield preferred, required, and, possibly, added benefits. At all our locations, project management and order processing are handled by service-oriented employees, who our customers can rely on. And, of course, our after-sales service is also available to you after the transformer has been delivered.
Ten reasons to partner with Siemens

1. Customized designs to fulfill specific customer requirements
2. Prompt preparation of bids
3. Proven quality according to certified standards
4. Optimized end-to-end project management and order processing
5. Noticeably shorter production and delivery times
6. Very high delivery reliability
7. Flexibility and reliability thanks to backup factories
8. Accelerated, standardized documentation
9. Just-in-time delivery
10. Transformers that act as an eye on the grid with Sensformer® connectivity feature
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