Small power transformers
Smart energy efficient solutions
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ABB is a global leader in power and automation technologies that enable utility and industrial customers to improve performance while reducing environmental impact. We offer a complete range of power and distribution transformers, components and services. Being a flexible expert partner worldwide is our commitment. Working alongside the customer, we identify individual needs to ensure we provide optimal solutions, whether the customer’s main focus is on advanced solutions, guaranteed delivery, service, ownership total cost reduction or global supply.

Key factors, including return on investment, lower operating and maintenance costs, and management of aging assets, are addressed and resolved.

That’s ABB’s idea of true partnership.

Our global manufacturing capabilities and our factory back-up strategy allow us to offer the best solutions in terms of production capability, on time delivery and product quality. Thanks to our focused factory concept, we can source our product from highly specialized factories, thereby increasing operating efficiency and achieving worldwide excellence.

We are an experienced partner across the globe, offering local customer interface, talking the customer’s language and providing local service.

In response to changing market needs, ABB has redefined its transformer product families and implemented a new business model around small power transformers, with up to 63 MVA and up to 170 kV ratings.

The sole player in the industry to have changed its organization to comply with market demands, ABB has set up a facilities completely focused on small power transformers, with its own management team, a dedicated technical staff and production experts who share their know-how on a global scale.

Our small power transformer factories are strategically located and have fully dedicated production lines that form a virtual global plant with twice the capacity of our nearest competitor.

The ABB focused factory in Monselice is the world’s leading center for product and process development. Its research and development (R&D) Center provides all ABB Small Power Transformer factories with continuous innovation as well as product and process improvement able to meet the challenges set by changing cost constraints. This enables public utilities and industry customers to improve their performance, cut costs and reduce environmental impact over the long term. That’s why ABB Monselice in stands for total quality, worldwide.
A world class transformer factory

The ABB focused factory in Monselice is the leading center for product and process development. Over the years, it has acquired international recognition, especially for its product and process excellence. During the past 60 years, ABB’s plant in Monselice plant has achieved the highest-level expertise in the production of Small Power Transformers thanks to a team of experts from different occupational and cultural backgrounds.

A new 17,000 square meter factory featuring a production facility equipped with the most state-of-the-art machinery, systems and offices was built in an area covering more than 40,000 square meters.

R&D and long-term and daily production activities are based on two key concepts: product excellence and process excellence. Making full use of the best ABB practices, we started by modularizing tried-and-tested transformer designs. This crucial first step led to standardization and simplification of the production process. Combined with the production capacity we have around the world, all this has allowed us to make substantial investments in automation. The Global Product Platform is the result of these developments and we are now manufacturing higher quality products in a much shorter time.

ABB small power transformers (SPT) are designed and manufactured according product excellence attributes, ie:
- Reliability
- Designs based on tried-and-tested technology
- Proven short-circuit strength.

ABB’s small power transformer production complies with so-called Process Excellence through:
- Modularization and scalability of designs
- Standardization of design tools
- Manufacturing on high throughput lines
- Use of the most advanced technology

This is how we achieve process excellence.

Factory background
The factory’s history goes back a long way:
1988: ABB took over INDELVE.
2002: The factory became a “Focused Factory” for Standard Small Power Transformers for Europe, the Middle East and North Africa.
2004: The new global product platform was ready to go into production.
2006: Capacity expansion to 5500 MVA and implementation of semi-automatic technologies in core and winding production.
2009: The new production facility was ready.
The range
Small power transformers from ABB in Monselice, with around 10 to 63 MVA and up to 170 kV ratings, offers ideal solutions for all standard applications including typical substations.

The group possesses skills and resources able to deal with customer needs, however complex these may be in terms of engineering or assembly requirements, special accessories and special materials or components.

Close cooperation with Global R&D Technology Center based in Monselice allows the technology to be steadily improved, all to the advantage of customer satisfaction and achievement of quality excellence.

Standard small power transformers
Rating | 10-63 MVA
Maximum system voltage | 170 kV
Maximum insulation level | BIL 650
Cooling | ONAN/ONAF/OFAF/ODAF/KNAN/KNAF

Characteristics of complex small power transformers include:
- More than three windings
- Single phase transformers
- Auto-transformers
- Special layouts (truck or railway mobiles)
- Special cooling
- Low noise level
Technology Center

The Technology Center in Monselice is a cutting edge technological research center for the development of small power transformers. It excels in technology and possesses a multidisciplinary character within the ABB Group. The Technology Center has a team of experts from different backgrounds and with different professional origins in the electrical and mechanical engineering, information technology, process and product development industries.

It is the reference point for all ABB plants around the world when it comes to developments regarding small power transformers.

Not only does the Technology Center provide production backup but also advisory services as to the specifications required when standard and special products are developed.

Moreover, it coordinates research and engineering activities and provides support for the production units when projects are budgeted and costed.

The Technology Center utilizes some of the most up-to-date information support technologies - 3D system CAD and simulation and optimization techniques - and collaborates with the prestigious University of Padua (Italy), which not only allows it to access high level human and technological potential, but also today’s leading laboratories and research centers worldwide.

The presence of experts in the Technology Center from all over the ABB world is of vital importance, since projects can be assessed, developed and implemented thanks to the first-hand experience acquired by the individual team experts.

The Technology Center has developed a Global Product Platform for all SPT factories.
This is supported by a common IT design tool that includes:
- Test-proven electrical design rules
- Mechanical rules
- Built-in design optimization application
- Built-in verification tool allowing test values to be checked against calculated parameters (with feedback to optimize the calculation rules to a further extent)

This tool speeds up the design cycle, allows errors to be detected in time, and produces complete engineering documentation (standard drawings and automatic bills of materials). Engineering excellence is one of the pillars on which ABB’s world leadership in power and automation technologies is founded.

High Temperature Class Transformers

Product development
Requirements are continuously changing all over the world and the global product platform, the core of ABB’s present and future transformer technology, is designed to integrate each upcoming development, such as:
- High Temperature Class Transformers
- Low noise solutions
- Online monitoring system - TEC
- Efficient transformers with reduced losses
Standard features of power transformers

ABB transformers are generally of the conventional type with free breathing tank and filled oil conservator. Sealed units are also available.

They are manufactured and tested in accordance with the major international standards. Cooling methods are ONAN, ONAF, OFAF,ODWF and ODAF.

The transformers can be provided with off-load or on-load tap changers.

Core
Core design is a three-limb type of circular cross-section without bolts through the core. The joints are mitered or step-lap mitered for low losses, low on-load current and minimum noise.

Windings
The conductor material can be either copper or aluminium. Conductor types can be foil, strip or continuously transposed cables. The available winding technologies are foil, layers, helical and disk.

Insulating oil
The mineral oil used in ABB transformers complies with the principal international standards. When required, the transformers can be filled with silicon oil or other fluid.

A new dielectric insulating fluid has been used in power transformers to achieve high-level reliability, reduce the risk of power outage, obtain a compact size and ensure low environmental impact.

BIOTEMP® was developed in the ’90s in order to provide the market with a biodegradable high fire point dielectric fluid made from renewable sources. Compared to conventional mineral oil, use of this dielectric insulating fluid provides significant benefits. Superior transformers as to safety, longer life, compact substations and environment-friendly equipment are goals that can be achieved with the combined use of BIOTEMP and Nomex.

Tanks
The tank, cover and conservator are made of steel plates. Double welding is used where oil tightness is required. Rubber or cork rubber compound is used for the gasket on flanged connections. The transformer tank usually has removable radiators connected by shut-off valves. All tanks are subjected to leak tests.
Painting and surface treatment

ABB has a range of tried-and-tested surface treatments depending on the application environment and transformer installation site.

Typically, external tank surfaces are painted as required or in accordance with ISO1294 standards.

Accessories
- Silicone or porcelain bushings
- Oil conservator with level gauge
- Rubber-bag in the conservator to prevent oil from coming into direct contact with air (optional)
- Filling and drain valves
- Oil sampling device
- Earthing terminals
- Lifting lugs
- Jacking packs (radiator tanks)
- Maintenance-free dehydrating breather
- Online gas monitoring system
- Electronic Control of the transformer
- Remote Tap Changer Control Panel
- Silica-gel breather
- Buchholz relay
- Top oil thermometer.

Additional accessories can be fitted to suit the customers’ specifications.

Bushings

Bushings made of solid porcelain and conforming to international standards are generally located on the cover.

Condenser type bushings are used if the voltage rating exceeds 52 kV. An enclosure can be provided on the primary and/or on the secondary side and can be designed for cable or bus duct connection. Transformers can also be provided with plug-in bushings.

Components and materials

Natural esters like BIOTEMP, which is safer (less flammable) and environment-friendly, can be used by the transformer industry as well as new materials like Nomex, insulations and alternative insulation fluids like Midel. Insulation materials able to withstand higher temperatures have reduced the footprint and led to higher overload capability. New materials pave the way to new applications, such as transformers with increased safety for urban substations or for installation on off-shore platforms.
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Production

The factory is designed for high production volumes and is equipped with state-of-the-art manufacturing equipment. High-pace operation is based on product design standardization and modularization, both of which are present to a very high degree in the SPT product.

The machinery features high-level automation (E-Stacker - automated core cutting and stacking, SAWM - semi-automatic winding machines, etc.) so as to achieve high productivity and repeatability. This also makes the processes less vulnerable to human error.

The production processes are well standardized and documented in the form of so-called Production Standards. A set of 50 dedicated Production Standards is available for the SPT production processes, including outsourced key processes, eg, tank manufacture.

Shop-floor application of design and process requirements is controlled by a set of 25 Quality Inspection Cards. The OHS requirements are fulfilled by compliance with the Global ABB OHS Instructions.

Automatic core cutting and stacking (E-Stacker)

Laminations are automatically cut and stacked to form the complete core. Thanks to this technology, the process is faster while quality is constant and does not depend on human factors. This kind of machine achieves very good quality cores, with lower losses, lower noise levels and lower magnetizing current.

Semi-automatic winding

Disks and helical windings are manufactured on vertical winding machines with automatic conductor bending and braking. Layer windings are produced on horizontal winding machines. Both horizontal and vertical machines feature computer-assisted controls which receive the manufacturing specifications electronically from the design department and require limited manual operation. These machines also include:

– a tool for controlling axial and radial force during winding manufacture
– control of conductor tension.

Thanks to this new technology, the process is faster while the winding dimensions are more precise and able to withstand short-circuits.
Handling
The product is conveyed through the production process thanks to an air cushion system. This improves efficiency as well as increasing safety and flexibility. Overhead cranes (with a maximum lifting capacity of 200 tons) are equipped with inverter controls to ensure high precision during the most delicate stages (i.e. tanking/untanking).

Vapour phase drying
This process technology was mainly used for manufacturing large power transformers. It has now been introduced on a large scale for the production of small power transformers, so as to provide the same quality as that required for larger units.
Quality

Quality can never be achieved by inspections and controls alone. Built-in quality procedures are implemented in transformer production even before the design work begins so as to ensure that customer requirements are interpreted correctly. A globally accepted quality system – ISO 9001 and supplier qualification program – is integrated with specific factory quality programs including operational excellence, cost of poor quality and on time delivery, all supported by the ABB customer complaint resolution process.

Certifications acquired
- Quality System: ISO 9001
- Environmental Management System: ISO 14001
- Health and Safety Management System: OHSAS 18001 regarding its application in on-site activities.

Customer complaints resolution process

ABB aims to completely fulfill its customers’ needs and demands with a view to achieving the very highest level of customer satisfaction. Our company strives to establish a very strong relationship with its customers by promptly meeting all their needs.

For this reason ABB has planned an endorsed system called “Customer complaints resolution process,” to assess and resolve all possible complaints.

This allows the customers to be assisted step by step until their problems have been resolved. After a complaint has been received, we are ready to meet our customer’s requirements by promptly assisting him through a specific action plan that focuses attention on the customer’s deadline.

We answer the customer within 24 hours and illustrate how we intend to solve the issue, however complex it may be.

After the assistance process has terminated, we ask the customer to express his degree of satisfaction. This allows us to improve and to pay more attention to our customers’ needs and expectations.

This is our duty and first order of business.

Customer complaints resolution process stages

Our Goal is > 95%
Improvement Projects, 4Q, Quality School

The goal at ABB Monselice is continuous improvement of all processes, whether related to manufacturing activities or to company organization.

Quality assurance promotes and fosters the employment of ABB’s shared “4Q Methodology.” This is a simple but structured methodology for in-depth analysis of issues, the aim being to understand their current state, identify their root causes, investigate the chances for improvement and sustain their ultimate resolution. The driver that triggers off such analyses is the voice of the Customer. Consequently, continuous improvement at ABB Monselice is directed towards the customer satisfaction goal.

The approach to continuous improvement results in a series of projects and activities which are supported by Quality Assurance.

Operational Excellence (OpEx) projects are identified by the Management Team every year, and are followed up by regular meetings. These projects are also shared within the ABB organization, and related savings are constantly monitored. The OpEx Team, a special ABB global Team formed by experts in operational excellence, oversees the activities of such projects and provides us with best practices for the development of our projects.

Training is an essential part of improving the skills of our Human Resources. Sharing knowledge among colleagues in the same work place is also a key element for ensuring that all the staff members are informed and updated with the most recent information. ABB Monselice believes that these aspects are worth time and resources. The so-called “Quality School” has been institutionalized as a consequence and as a result, more than 1000 hours of training are dedicated to ABB personnel in Monselice every year. ABB internal speakers and experts participate as teachers in Quality School sessions, providing high-level training and responding to the staff members’ needs in their professional tasks.
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Service

Just offering the best product is not enough: to provide them with true value, the customers must be supported day by day throughout the world. In addition to the small power trouble-free concept, ABB can offer engineered solutions, monitoring and diagnostic contracts, fleet assessment, factory and on site repair.

Since it works with selected partners and local ABB service organizations, ABB Monselice can take care of transportation and installations around the world.

Conclusion

We deliver much more than a transformer to our customers – we deliver a product that is fully tested to your requirements, one that has been optimized for the lowest life cycle costs by the most advanced design tools and manufactured with the most efficient processes in the shortest time.

Along with our transformer you also have:
- Tried-and-tested design and cumulative experience
- State-of-the-art transformer technology, open to future developments
- Products and processes designed for quality
- Global knowledge and production, local sales and services
- Rapid and precise documentation.
Travelling to Monselice by car

**From Venice** take the highway A4 direction Milan, without leaving the highway follow the highway A13 direction Bologna. After 40 km take the exit of Monselice and follow the instructions of the map.

**Arriving from Bologna** take the highway A13 direction Padua and exit once you are close to Monselice toll gate. Then follow the instructions of the map.

*(GPS: 45°12'34.19"N, 11°44'38.13"E)*

**Note:** in order to reach our plant we advise you to insert the following address: Via Trentino. Once you arrive at the end of this road you will find ABB Monselice that is in Via Campestrin 6 A.

Travelling to Monselice by air

The closest airports are:

- **Venice Airport Marco Polo**, just 67 Km from Monselice
  For further information [www.veniceairport.it](http://www.veniceairport.it)
- **Verona Airport Catullo**, just 140 Km from Monselice
  For further information [www.aeroportoverona.it](http://www.aeroportoverona.it)
- **Bologna Airport Marconi**, just 110 Km from Monselice
  For further information [www.bologna-airport.it](http://www.bologna-airport.it)
- **Treviso Airport**, just 130 Km from Monselice.
  For further information [www.trevisoairport.it](http://www.trevisoairport.it)

Travelling to Monselice by rail

**From Venice, Padua, Rovigo, Ferrara, Bologna**
Bologna-Venice rail line, Monselice station

**from Mantua:** Mantua-Monselice