PFISTERER

# Connex Turns Power Transformers Into Compact Allrounders

**The trend toward ever more compact substations and the dynamic change of network infrastructures place a new set of requirements on power transformers, which need to offer maximum flexibility with the highest level of safety, reliability and efficiency for a service life of at least 40 years. Such demands can be catered to by the dry-insulated and modular Connex connection system, which includes all of the components required – from cable fittings, to plug-in bushings, through to solid-insulated surge arresters.**

Originally conceived as a cable connection, Pfisterer eventually developed and refined the space-saving Connex system into a universally connectable element and transformer connection device. Today, it represents the largest product line for voltage ranges up to 550 kV by offering a wide variety of cable terminations and connections, solid-insulated surge arresters, plug-in bushings, sliding joints and voltage testing systems. The connection system makes it possible to replace or exchange all Connex components quickly and at any time to ensure that transformers can be conveniently retasked.

## Open to Network Changes

The Connex bushing allows power transformers to cater to future operative applications as various components such as plug-in bushings or solid-insulated surge arresters can be easily connected without requiring the sensitive equipment inside the transformer's casing to be accessed. The latter is also not required to establish a connection to the power supply or to carry out an on-site check, which in turn reduces the time spent on configuring the initial installation by a whopping 75 percent. In addition, the extensive time and money spent carrying out oil or gas-related work for conventional systems is ruled out altogether. Connex therefore facilitates the fast and easy changeover of transformers – at any time. Even if the infrastructure networks change in the mid-term or further down the road, the investment made in a transformer holds its value throughout the entire service life of the unit when a connectable Connex system is used.

## Compact Installation

Transformers equipped with Connex cable connections and solid-insulated surge arresters can be operated economically in the tightest of spaces as unlike air-insulated arresters and plug-in bushings, solid-insulated Connex components have a very compact design that does not require minimum gap clearances between phase connections or elaborate busbar configurations for the power supply. This, then, makes it possible to install and connect substations using a small amount of space – a key advantage, especially when it comes to settings involving densely populated areas.

The new HV Connex plug-in bushing rated to 245 kV is dry-installed directly on the transformer.

The pluggable, solid-insulated surge arrester operated on the high-voltage side of a transformer.

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**Safe to Maintain and Service**

More and more substations are being installed in buildings and in city centers, such as the new Oerlikon substation in Zurich. Along with favoring space-saving constructions in downtown environments come safety requirements, however. "Every distribution station is subjected to external and somewhat incalculable influences that can compromise its operation, and the stations themselves can pose a threat to the environment. Solid-insulated connection types can either eliminate both risks or at least minimize them", explains Ruben Grund, Head of Technology Cable Accessory at Pfisterer. Take maintenance and servicing, for example. The more compact a unit is, the greater the chance that service personnel will inadvertently come into direct contact with live, exposed parts. This risk is completely avoided with fully encapsulated Connex connections, which are touch-proof and can therefore be erected safely, without the need to put up protective barriers.

**Connex Fights Electrosmog**

Switzerland has Europe's most stringent regulations on non-ionizing radiation protection (NIRP), whereby locations that are frequented for extended periods of time may not be exposed to more than 1 µT (microtesla) of radiation output. This upper limit is met economically by Connex, since the full encapsulation of the connection system greatly minimizes the electromagnetic fields surrounding connected cables and components.

**Pluggable Solid-Insulated Surge Arrester**

Connex not only reduces the risks for individuals, but also protects high-value capital investments. A lightning strike or a switchgear assembly that suddenly operates at maximum capacity can cause catastrophic damage to a transformer. None of this poses a problem to the pluggable Connex solid-insulated surge arrester, however. Installed directly on the unit itself, the metal-oxide capsule of the arrester provides very reliable protection by dissipating any incoming overvoltage locally, before it has a chance to damage the transformer. Compared to the more commonplace air or gas-insulated arresters, solid-insulated surge arresters from Connex offer several benefits, one of which is that they can be installed in tight spaces because their insulation and field control are made from solid silicone. Environmentally-damaging fluids and $SF_6$ gas are also not used. Consequently, there is zero internal gas pressure, which means that pressure vessel regulations do not apply and a gas-monitoring system does not need to be used. Finally, the integrated plug-type connection design allows Connex solid-insulated surge arresters to be easily replaced without the need to open the transformer.

***About Connex***

The dry-installed Connex connection system, which was originally developed in 1975 for low and medium-voltage applications, currently covers the entire range of voltage supplies from 12 kV to 550 kV. Connex also represents the largest single product line on the market for voltage ranges up to 220 kV thanks to its wide array of cable fittings, solid-insulated surge arresters, plug-in bushings, sliding sleeves and voltage testing systems. Connex is compatible with all types of cable and can

be used with indoor and outdoor transformers as well as with gas-insulated switchgear (GIS). Due to the plug-in design of Connex components, this power equipment is quickly installed, maintained and replaced as no gas or oil operations are required, and the standardized connection interface makes it possible to conveniently reassign transformers and GIS equipment to different applications to remain in operation for the long term, even when network infrastructures change. Last but not least, the Connex connection system is the only one of its kind to have been certified for offshore applications by the DNV GL classification society and can therefore also be incorporated on deep-sea platforms and in wind power stations.

***About PFISTERER***

PFISTERER Holding AG, headquartered in Winterbach near Stuttgart, with around 1,400 employees and an annual turnover of around 250 million euros, is one the world's leading technology companies for system solutions and components in energy transmission. Established in 1921, this family-owned German-Swiss company is one of very few in the world to offer solutions for the complete transmission chain of low, medium, and high-voltage for outputs of between 110 V and 850 kV. The Group operates technology, distribution, and training centers at a number of locations in Germany and Switzerland; it has several manufacturing facilities in Europe, Argentina, and China, and is represented with sales offices in 18 countries throughout Europe, Asia, South America, and the USA. As an innovating force and supplier of key technologies with a complete range of products, as well as consulting, installation, and training services, PFISTERER AG is in demand globally as a partner for energy supply utilities, network operators, technology companies, rail transport operators, and other infrastructure companies.